Development of the INSPIRE integrated care model for older adults in Canton Basel-Landschaft using an implementation science approach

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Olivia Yip

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Primary Supervisor: Prof. Dr. Sabina De Geest

Secondary Supervisor: Prof. Dr. med. Andreas Zeller

External expert: Prof. Dr. med. Reto Auer

Further advisor: Dr. Leah Zullig

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Dean
Prof. Dr. Primo Schär

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List of Abbreviations

ADL	Activities of Daily Living
APG	Altersbetreuungs- und Pflegegesetz
BL	Basel-Landschaft
BS6	Brief Social Support Scale
CICI	Context and Implementation of Complex Interventions
CGA	Comprehensive Geriatric Assessment
ED	Emergency Department
ERIC	Expert Recommendations for Implementing Change
GFI	Groningen Frailty Indicator
GP	General Practitioner
HCP	Health care providers
HR-QoL	Health-related Quality of Life
IAC	Information and Advice Center
ICOPE	Integrated care for older people
ICT	Information and communications technology
INSPIRE	ImplemeNtation of a community-baSed care Program for home dwelling senIoR citizEns
IQR	Interquartile range
MRC	Medical Research Council
PRISMA	Program of Research to Integrate Services for the Maintenance of Autonomy
SELFIE	Sustainable intEgrated chronic care modeLs for multi-morbidity: delivery, FInancing, and performance

SSP	Social service provider
WHO	World Health Organization

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Summary

The unique needs of the aging population call for health and social care systems to adapt their services and care models in response (1). Home-dwelling older adults may be subject to multiple challenges such as frailty and/or multimorbidity (2, 3), and therefore require health and social care from diverse providers as well as support from different caregivers to help them continue to live at home (4). However, as the provision of services and support is often uncoordinated, this creates a risk of fragmented care, which leads to further negative outcomes (3). Integrated care (i.e., a person-centered approach where individual care is facilitated by multidisciplinary collaboration and coordination of various care providers (5, 6)) models are therefore often promoted as a solution to address fragmented care (1, 7).

Many research studies have developed and evaluated integrated care models for home-dwelling older adults living with frailty and/or multimorbidity, aiming to improve outcomes such as quality of life, functional limitations, hospitalizations, or health care costs (8-11). However, these studies are yet to deliver the promising results which are expected of them, as systematic reviews demonstrate inconclusive results overall (8-13). Yet, these reviews have noted that the individual studies which were included have not been consistent with respect to the components and delivery of interventions, the target population, or the outcomes chosen. Furthermore, evaluations rarely focus on the implementation or include process evaluations, despite the complexity and challenges associated with implementing integrated care (8, 14). Implementation science, which can support interventions in real-world contexts and help differentiate between “intervention failure” and “implementation failure”, can therefore play a crucial role in the design and evaluation of integrated care studies (8). Implementation science focuses on closing the gap between research and practice, through elements such as involving stakeholders, analyzing context, as well as utilizing contextually-appropriate implementation strategies and hybrid designs (15, 16).

One Swiss canton introduced a care law that required creation of *Information and Advice centers* (IACs) to provide advice about ageing-related matters to the older population and assess their care needs. This created an ideal opportunity to set-up these IACs using an integrated care model supported by the INSPIRE project. INSPIRE is a multi-phase,

implementation science project which aims to develop, implement and evaluate an integrated care model for the IACs. This dissertation is embedded within the INSPIRE project.

The overall aim of this dissertation was to describe the research which was invested into the development phase of the integrated care model, using implementation science methods. Further, it describes the study protocol to evaluate both the effectiveness and implementation of the care model. The dissertation is divided into six chapters.

Chapter 1 provides a general overview about age-related health risks for home-dwelling older adults and research on integrated care. It also introduces the key elements of implementation science which are applied throughout this dissertation. Chapter 2 follows with the dissertation aims.

Chapter 3 describes our unique methodological approach to the development of the integrated care model, which included three main activities: 1) conducting a systematic review and meta-analysis, 2) conducting a contextual analysis (including a population-based survey) using an implementation science framework, and 3) involving stakeholders. Based on our contextual analysis, we reported on the contextual factors identified across the political and legal, epidemiological, socio-cultural, and socio-economic domains, as well as the setting. For example, we detected numerous organizations involved in caring for older adults; care gaps identified by stakeholders; a lack of integrated care regulations; changes in nursing education; and that approximately 25% of INSPIRE population survey respondents showed signs of frailty. Chapter 3 also describes how we involved various stakeholders, as they played an instrumental role throughout the contextual analysis and project overall. The findings from these three activities (i.e., systematic review and meta-analysis, contextual analysis, and stakeholder involvement) were synthesized to refine the program theory for the INSPIRE care model, which included four components: 1) screening; 2) conducting a comprehensive geriatric assessment with a multi-disciplinary team; 3) creating and coordinating an individualized care plan; and 4) follow-up. Contextual factors also informed the implementation strategies needed to support the intervention, as they suggested the importance of facilitating coordination with the other existing services, creating new tools and pathways, targeting competencies of the IAC staff, and the need for marketing of the IAC to reach frail older adults and their family members as well as stakeholders. Thus, specific implementation strategies were selected, such as *build a coalition, develop and deliver*

educational materials, and *use mass media* (17). As logic models are recommended for complex interventions and specifically during the design phase of integrated care models (12, 18), our logic model is presented to describe the program theory, connecting the inputs, activities, outputs, outcomes, and implementation strategies.

Chapter 4 describes the mixed methods study we conducted to quantify and understand the current picture and preferences of frail older adults' formal health and social care as well as informal care and social support. We found that 93.5% of participants indicated that their support matches their perceived needs, and that a variety of formal and informal caregivers appear to support home-based frail older adults in the Canton. Three-quarters of the respondents used at least one source of informal care, fulfilling a wide variety of roles as described by interviewees. In terms of community services used and preferred in future, *help with the housework* and *care and assistance at home* were popular. Many community services and support from organizations, such as meal services and non-profit aid (e.g., home care support) will have increased demand in future, should frail older adults become more in need of help. We also observed some areas requiring increased attention, such as those with unmet needs, informal caregivers, receiving a holistic assessment of needs, and having a named coordinator. The work of Chapter 4 led to further considerations for executing the care model.

Chapters 3 and 4 laid the foundation for the next phases of the project: testing the feasibility and effectiveness of the care model (Chapter 5). As outlined in the protocol, a feasibility study will be conducted first to assess recruitment feasibility; implementation outcomes; and perceptions of service users and care professionals about the care model. The findings from the feasibility study will determine if adaptations are needed to the care model or implementation strategies before the effectiveness study takes place. The effectiveness study will use a hybrid effectiveness-implementation design, aiming to: 1) determine the impact of the integrated care model on person-centred coordinated care (primary outcome) for home-dwelling frail older adults compared to usual care, as well as other secondary outcomes (e.g., health-related quality of life), and 2) assess implementation and process outcomes through a process evaluation.

Chapter 6 provides a summary of the findings from the three chapters and interprets them within the current literature. The methodological strengths and limitations of these studies

are also discussed in this chapter. Finally, the dissertation suggests some implications for practice, policy, and research of future integrated care initiatives.

In conclusion, this dissertation aims to contribute to gaps in previous integrated care research by using implementation science methods to contextually-adapt and evaluate integrated care for home-dwelling frail older adults. The chapters share our contextual findings including an in-depth perspective of our target population; make our program theory transparent; describe how we involved stakeholders and selected contextually-adapted implementation strategies; and explain how we will use a hybrid effectiveness-implementation design to evaluate the care model, including a process evaluation. As this study progresses, the hope is that this will build further understanding about the implementation of integrated care for home-dwelling frail older adults and contribute evidence on whether the anticipated benefits can be generated in practice.

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Chapter 1
Introduction

1.1 Introduction

Worldwide, there is growth in the aging population (1). In Europe, from 2008 to 2060, the proportion of adults aged 80 and above is projected to increase three-fold (2). Lower birth rates and increased life expectancy contribute to the aging population (3). There are both positive and negative aspects to an increased longevity (3). Some older adults may prefer and be able to age at home (4). However, many older adults may experience functional limitations, chronic illnesses, and syndromes which may threaten their ability to continue to live independently at home (5-7). Older adults may also be increasingly faced with social isolation and loneliness (8).

1.2 Age-related health problems

As age increases, challenges such as multi-morbidity (i.e., living with two or more chronic conditions) and frailty become more prevalent (9-11). It is estimated that over half of those aged over 65 years are expected to be living with multimorbidity (9). Frailty is considered a syndrome that indicates a "state of physiological vulnerability with diminished capacity to manage external stressors" (12 p.61, 13). Frailty is associated with multimorbidity (11), and anticipated to impact at least 10% of community-dwelling older adults (14). While frailty can be defined through a clinical and physiological lens, frailty has been recognized in other definitions as a "multidimensional construct" which includes physical, psychological, social, and cognitive domains (15, 16). Moreover, frailty is associated with several negative health outcomes (e.g., morbidity, mortality, hospitalization, and disability in basic and instrumental activities of daily living [ADL]s); and has public health relevance (17, 18). In fact, Kojima (2018) recently determined that frailty in community-dwelling older adults strongly predicted moving into a nursing home (19).

1.3 Care types and risk of fragmented care

Given the complex needs of older adults living with frailty and/or multimorbidity, health and social care and support in the community can be provided by a combination of informal caregivers (i.e., non-professionals, such as a spouse or children) and formal caregivers (i.e., paid professionals, such as home care nurses) (20-22). While previous research on these two approaches to caregiving often looked at them separately, the interplay between formal and informal care for home-dwelling frail older adults is becoming a more popular study topic

(23). How the dynamics of this relationship between formal and informal care work is still under exploration, as well as how integrated care influences this relationship (23).

Authors of the European SUSTAIN project (2019) described concerning "divisions" that prevail during the care of older adults, for example between informal and formal care and between health and social care (24). There are multiple formal caregivers involved in providing care and support for frail home-dwelling older adults in the community, yet care between these providers is often uncoordinated and not centralized (25, 26). Therefore, older adults often experience fragmented health care and social support services when accessing care in the community setting (25, 27, 28). Driven by many factors (e.g., funding streams, professional cultures), care fragmentation can result in gaps in information delivery, service duplication, patient confusion and distress, and higher care costs (25, 29). It has been acknowledged that a fragmented system can add burden to the patients and their informal caregivers when trying to work their way through the system (30).

Despite the many positive aspects of the Swiss health care system, it is also recognized as being fragmented and expensive (31, 32). The 2014 Commonwealth Fund International Health Policy Survey of Older Adults identified that 29% of older adults aged 65+ in Switzerland had experienced a coordination problem in the last two years (33). In the 2017 survey, they found that 'high-need' older adults (i.e., having 3+ chronic conditions and/or functional limitations due to health) experienced more care coordination problems (36% compared to 27% who were not 'high-need') (34). Such coordination issues in Switzerland are problematic and can lead to "overuse and misuse" (32, p.2).

1.4 Integrated care

One solution to improve fragmented care is integrated care, which is "a person-centered approach where individual pro-active care is facilitated by continuous, multidisciplinary collaboration and coordination of various care providers" (35-38, p.2). Integrated care initiatives target various settings within the health care sector or between sectors (i.e., health and social) (39). As described by the World Health Organization (WHO; 2016), there are four types of integration (i.e., organizational, functional, service and clinical) and integration can occur at a horizontal or vertical level (39). Integrated care models include individual-level focused models, group and disease specific models, and population-based models (39).

1.4.1 Components of integrated care models for home-based older adults

There is no consensus regarding a single, ideal model of integrated care for the aging population (40, 41). However, the *Integrated care for older people (ICOPE) implementation framework: guidance for systems and services* (2019) recommends that integrated care models in the community-setting include multiple components according to two important reviews (41-43). These include: "community-level and home-based assessments; person-centered assessments and integrated care plans; shared decision-making and goal-setting; support for self-management; multidisciplinary care team; unified information or data-sharing systems; community engagement and caregiver support; and formal links with social care and support services" (41-43). A recently published integrated care framework also considers most of these common components and is called the Sustainable intEgrated chronic care modeLs for multi-morbidity: delivery, FInancing, and performancE or SELFIE framework (27). SELFIE has been widely used in European research studies and aims to support the development, implementation and evaluation of integrated care programs for multi-morbid populations (27). The framework uniquely focused on aspects which are important for multimorbidity (e.g., challenges of care fragmentation and needing care from multiple professionals across different sectors), identifying multiple relevant concepts to provide integrated care to a multimorbid population (27). In our systematic review and meta-analysis of nurse-led integrated care models for home-dwelling older adults, we found many of the core components from the SELFIE framework were included in the integrated care models (e.g., a multidisciplinary team, high risk screening, formal holistic assessment and an individualized care plan) (36). However, we also found variation in how the components were operationalized, which was in congruence with other reviews of integrated care models for multimorbidity and/or frailty (36, 44, 45).

1.4.2 Integrated care - program theory

Integrated care initiatives are often considered 'complex interventions' as they are typically dynamic, targeting multiple levels, and requiring behavior change which is challenging (46, 47). Given the complexity of integrated care initiatives, a clear program theory can be beneficial to disentangle the inner workings of the program (41, 48). Without a strong theoretical underpinning, it may be difficult to clearly pinpoint the pathway in which individual components of these interventions lead to outcomes (41). To communicate the ultimate changes which a program is striving for and how a program will create change, tools

such as theory of change or logic models can be used (49). Logic models are "visual tools that demonstrate an overall program theory, describing and linking the program's input/resources, activities, expected outcomes and impact" (35 p.2, 50, 51). A logic model can be valuable during program planning, monitoring and evaluation, and is beneficial when communicating about the program together with stakeholders (50, 51).

1.4.3 Evaluating the effectiveness of integrated care models

Reviews have demonstrated that the evidence on integrated care for home-based older adults living with frailty and/or multimorbidity is mixed and inconclusive (36, 44, 45, 52-54). However, individual studies have demonstrated improvement in outcomes including reduced hospital admissions (55), emergency department visits (56), mortality rates (57), as well as increased well-being and patient satisfaction (58, 59). Furthermore, as highlighted by Arajou et al. (2017) there is a solid evidence base for individual components (e.g., comprehensive assessments and care plans), and integrated care is widely promoted (60-62). Meanwhile, there are multiple aspects which may be contributing to the mixed results found in systematic reviews, such as the: 1) design of the integrated care model (63); 2) different outcomes selected and whether they are the most appropriate (44, 45); 3) heterogenous nature of the interventions (59, 64); 4) implementation challenges and overlooking the context (63, 65); and 5) evaluation challenges (63). Despite the plethora of research conducted on integrated care, there remains a void in clear conclusions about two significant aspects. The first being the outcomes, and the second being *how* to implement integrated care (66). In a scoping review of integrated care for the older/frail population, Threapleton et al. (2017) identified many implementation issues across the macro, miso and micro level, such as organizational leadership, communication issues, and funding (41). Case studies have also demonstrated the mechanisms which can facilitate implementation of integrated care (67, 68). Consequently, the complexity involved with researching and delivering integrated care models requires a strong focus on the implementation process (65). Therefore, principles and methods from the field of implementation science, which prioritizes the *how*, can be incorporated to facilitate the uptake of integrated care in daily practice and increase the chance of its success (69, 70).

1.5 Applying implementation science to the study of integrated care

1.5.1 Implementation science (definition and key elements)

Implementation science is "the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice, and, hence, to improve the quality and effectiveness of health services" (71, p.1). The foundation of implementation science comes from diverse disciplines (72) and it maintains emphasis on aspects related to the organizations and individuals who adopt and deliver an intervention (71). Implementation science includes key elements to support the design, implementation, and sustainment of an intervention to the real-world contexts to impact societal change (73). The Basel Heptagon for Implementation Science outlines seven important elements which should be considered in implementation science: stakeholder involvement; contextual analysis; implementation science frameworks; effectiveness and implementation outcomes; implementation strategies; transdisciplinary teams; and hybrid implementation-effectiveness designs (73, 74). In fact, four of these elements, namely stakeholder engagement, implementation science frameworks, implementation strategies and implementation outcomes, were recently highlighted by Sadler et al. (2018) as being particularly valuable for integrated care designed for frail older adults (70). This dissertation will demonstrate how the elements of implementation science were applied during the INSPIRE project, and therefore most elements will be described in this subchapter.

1.5.2 Implementation science frameworks and taxonomies

The field of implementation science hosts many different theories, models and frameworks (75), as well as taxonomies, which can be used as guidance in implementation science studies. The purpose of each theory, model and framework can vary, hence leading Nilsen to publish a taxonomy to help researchers understand and appropriately use them depending on their goal (75). According to Nilsen's classifications (75), an example of a "determinant" framework is featured in this thesis, as the Context and Implementation of Complex Interventions (CICI) framework developed by Pfadenhauer et al. (2017) was used to guide an analysis of the context and identify which contextual factors are present that could exert an influence on the implementation outcomes or the intervention (76). Gathering such information about the context is crucial, as described in 1.5.3 below. Furthermore, this dissertation also features taxonomies to provide a clear conceptualization and consistency of terms, such as the Expert Recommendations for Implementing Change (ERIC) taxonomy. The ERIC taxonomy includes

terms and definitions for 73 discrete implementation strategies (77), which were later grouped into nine categories (77).

1.5.3 Contextual analysis

Given the influence of context, many implementation frameworks and reporting guidelines address context (75, 78). Before introducing a new intervention into a real-world situation e.g., a community, it is crucial for researchers to obtain an understanding of the existing context and setting where the intervention will be embedded (76, 79). Context is complex and dynamic (80), and it is important to collect and analyze information on contextual aspects which can act as potential barriers and facilitators of intervention implementation and uptake (79). Many general barriers and facilitators related to integrated care have been previously identified, such as leadership, funding, and service structure and culture (41, 81). The Context and Implementation of Complex Interventions (CICI) framework can be used to assess the multiple levels of context, and how it interacts with the intervention and setting (76). It is an especially applicable framework for analyzing the context as it adopts a broad perspective for considering the types of factors which could be at play (72, 76, 82). As described in the CICI framework, in addition to the setting, there are seven contextual domains which can be considered: geographical, epidemiological, socio-cultural, socio-economic, ethical, legal and political (76). Acquiring knowledge about relevant factors within these domains can help to refine the intervention components and select potential implementation strategies (e.g., activities or resources which may be needed to support the intervention) (74, 83). Context is a relevant consideration for integrated care interventions (47), and is suspected to contribute to the mixed evidence on integrated care (84).

1.5.4 Implementation strategies

Implementation strategies are the "methods or techniques used to enhance the adoption, implementation, and sustainability of a clinical program or practice" (85, p.2). Powell's group published the Expert Recommendations for Implementing Change (ERIC) taxonomy of implementation strategies, which lists 73 discrete implementation strategies such as 'audit and provide feedback', 'conduct educational meetings', and 'create new clinical teams' (77). In continuation, Waltz et al. (2015) worked further with experts to rate these strategies by importance and feasibility, and organized them into categories, such as 'engage consumers' and 'train and educate stakeholders' (86). As demonstrated by this dissertation, this can be

applied to integrated care by combining discrete strategies to help address some of the well-known or empirically observed implementation barriers, to increase uptake of the care model (70, 77). In this dissertation, preliminary implementation strategies were selected in accordance with the taxonomies from the ERIC study based on the literature, a contextual analysis, and stakeholder input. However, selecting implementation strategies according to their evidence base and in alignment with their contextual barriers is a process which is known to be challenging (87).

1.5.5 Summative and Implementation outcomes

Proctor et al. (2011) described three types of outcomes which warrant attention in implementation science: summative outcomes, such as increased quality of life or decreased blood pressure, service outcomes (e.g., health care efficiency), and implementation outcomes, which are "key intermediate outcomes in relation to service, system or clinical outcomes" (88). Proctor et al. (2011) also published a taxonomy of eight implementation outcomes, such as acceptability, adoption, appropriateness, and fidelity to the intervention (88). These implementation outcomes will be applied in this dissertation as they are important to measure early during the implementation pathway using mixed methods, before trying to interpret the summative outcomes further down the road (88). In other words, if the intervention in our study is not acceptable to the care professionals delivering it, or is implemented with low fidelity compared to the original plans, this provides valuable information about implementation aspects which need to be addressed before we can interpret the effectiveness outcomes.

1.5.6 Stakeholder involvement

Stakeholders play an essential role in implementation science projects (73). It is recommended to involve stakeholders (e.g., patients, professionals and community members) throughout the entire project duration (73, 74). It is necessary to capture their voice, ensuring their needs are considered and that those involved with implementation have sufficient resources available (73). Stakeholders have been continuously engaged in various ways throughout the duration of the INSPIRE project to date. For example, stakeholders' valuable input was incorporated into the INSPIRE population survey to ensure it was contextually and culturally appropriate and relevant, as well as the INSPIRE logic model when considering the program outcomes.

1.5.7 Hybrid designs

In comparison to a typical research design evaluating effectiveness of an intervention, Curran et al. (2012) proposed three types of "hybrid effectiveness-implementation designs", where implementation aspects are woven in with varying weights (89). In a hybrid type I, the main focus is to test the intervention, meanwhile gathering some implementation-related data, such as contextual information. A hybrid type II has a balanced focus on determining effectiveness of the intervention as well as studying an implementation strategy. Lastly, a hybrid type III primarily focuses on testing the implementation strategy, and also gathers information on the intervention, but the latter carries less weight (89). The design of a hybrid type I effectiveness-implementation study is exemplified in this thesis, based on the level of evidence available for integrated care which surfaced through conducting a systematic review and meta-analysis (36).

1.6 Care for older adults in the Canton Basel-Landschaft of Switzerland

The Canton Basel-Landschaft (BL) in Switzerland has a rapidly aging population, with those aged over 65 and over 80 estimated to increase from 2018 to 2040 by 41% and 77% respectively (90). A new care law, the 'Altersbetreuungs- und Pflegegesetz (SGS 941)', was introduced in 2018 to redesign care for home-dwelling older people in the canton (91). Within the changes required, one part includes reorganizing the municipalities into larger care regions and the creation of Information and Advice Centers (IACs) in each of these newly formed care regions (91). The law also mandates the IACs to be staffed with at least a nurse to provide advice about ageing-related matters to the older population and assess their care needs, especially if and when entry into a nursing home is planned (91). The Canton approached the Institute of Nursing Science at the University of Basel to support the new care regions with the planning of these novel IACs for their communities. As a result, the INSPIRE (ImplemeNtation of a community-baSed care Program for home dwelling senIoR citizEns) research project was born in 2017.

1.7 The INSPIRE project

In close collaboration with the Canton and the care regions, INSPIRE aims to develop, implement and evaluate an integrated care model for the IACs for home-based older adults in Canton BL. The INSPIRE project includes three phases (Figure 1) according to the Medical Research Council Framework for developing and evaluating complex interventions (46). The

first phase, development is described in Chapter 2 and 3 of this dissertation, which laid the foundation for Chapter 4, which describes the protocol for the second two phases: feasibility and effectiveness studies. As an implementation science project, INSPIRE incorporates many key elements described above, including: iterative stakeholder involvement; an intervention which is not only evidence-informed but also contextually-adapted; selecting and refining implementation strategies to support the intervention; and measuring both effectiveness and implementation outcomes. Prior to this dissertation, we conducted a literature review (including a systematic review and meta-analysis), which focused on nurse-led integrated care models for community-dwelling older adults (36).

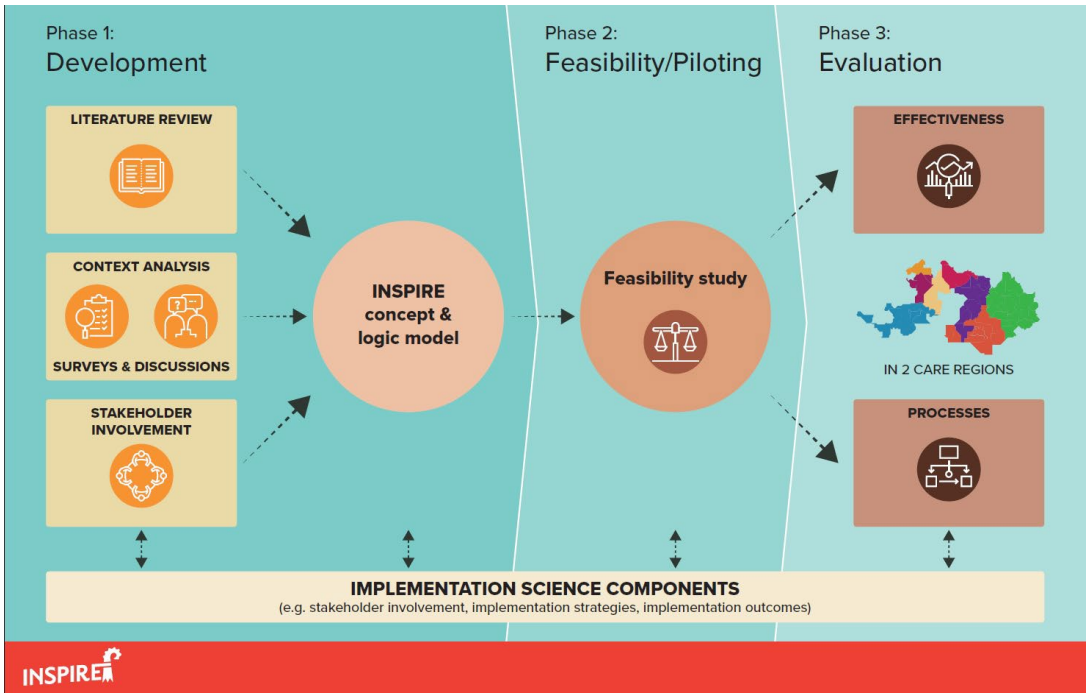

Figure 1. Overview of the INSPIRE project phases (35)

1.8 Research gap and rationale for this dissertation

Integrated care models are strongly promoted by the World Health Organization, among others (37, 62). As demonstrated in Table 1, despite the great deal of efforts which have been invested into integrated care initiatives, the field is still left wondering about two crucial components: are integrated care models for frail older adults effective at bringing the desired outcomes, and how do we best implement integrated care (69, 92)? The importance of closing this gap in integrated care research was recently well-articulated by Goodwin: "what or how to implement things... the very practicalities that managers and professionals need if they are to replicate or adopt new ways of working effectively" (69, p.1). There are few known

examples in the literature of studies that marry these two concepts by creating, implementing and evaluating an integrated care model for frail older adults while actively embracing implementation science principles and methods (36, 70). Leveraging the strengths of implementation research can increase the chances of achieving the promising outcomes which integrated care strives for.

Table 1. A brief summary of what we know so far about integrated care in context of this dissertation

What we know	What we can learn
• Integrated care is highly recommended, but implementation of integrated care is challenging and complex. • There are many barriers and facilitators to implementing integrated care for home-dwelling frail older adults. • Multidisciplinary teams, comprehensive assessments, and case management are common to many integrated care models for home-dwelling older adults (42). • Implementation science has rarely been used as an approach to support research and implementation of integrated care for home-dwelling older adults (36, 70).	• How effective is integrated care for home-dwelling frail older adults? • Which strategies best support implementation and sustainability of integrated care models for home-dwelling frail older adults? • Can we remove or overcome the many barriers to care integration?

Given the population projections for the Canton BL and the local care law which was brought into action, this created an ideal opportunity to establish and research an integrated care model for the Information and Advice Center (IAC). The IAC is where policy, practice and research come together, implying the potential of the INSPIRE research project to generate findings with widespread use. This dissertation begins the sequence of phases in the INSPIRE project, describing the investment which was put into the development phase. Bridging the gaps from previous integrated care research, this study contributes methodological and content knowledge to the field. The illustration of processes such as conducting a contextual analysis and developing logic models which include stakeholder involvement; findings about contextual factors, implementation strategies, as well as frail older adults' future preferences for care and support; and the description of how the INSPIRE care model will be tested, may influence the planning and evaluation of future integrated care initiatives both locally and abroad.

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Chapter 2
Study aims

Embedded within the overall INSPIRE project, this dissertation includes the following aims:

1) to conduct a contextual analysis and develop a logic model (including preliminary implementation strategies) for integrated care for frail older adults living at home in Canton BL (Chapter 3)

2) to explore frail older adults' current use of formal health and social care; informal care and social support; as well as experience and future care preferences (Chapter 4)

3) to present a protocol for the feasibility and effectiveness studies for the INSPIRE integrated care model in one information and advice center in Canton BL (Chapter 5)

Chapter 3

A contextual analysis and logic model for integrated care for frail older adults living at home: The INSPIRE project

Olivia Yip[1], Evelyn Huber[1,2], Samuel Stenz[1], Leah L. Zullig[3], Andreas Zeller[4], Sabina M. De Geest[1,5], Mieke Deschodt[1,6,7], and the INSPIRE consortium[8]

[1] Nursing Science (INS), Department of Public Health, University of Basel, Switzerland
[2] Institute of Nursing, School of Health Professions, ZHAW Zurich University of Applied Sciences
[3] Department of Population Health Sciences, Duke University Medical Center, USA
[4] Centre for Primary Health Care, University of Basel, Switzerland
[5] Academic Center for Nursing and Midwifery, Department of Public Health and Primary Care, KU Leuven, Belgium
[6] Gerontology and Geriatrics, Department of Public Health and Primary Care, KU Leuven, Belgium
[7] Healthcare and Ethics, Faculty of Medicine and Life Sciences, UHasselt, Belgium
[8] Matthias Briel, Matthias Schwenkglenks, Franziska Zuniga, Penelope Vounatsou, Carlos Quinto, Eva Blozik, Flaka Siqeca, Maria José Mendieta Jara

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3.1 Abstract

Introduction: Implementation science methods and a theory-driven approach can enhance the understanding of whether, how, and why integrated care for frail older adults is successful in practice. In this study, we aimed to perform a contextual analysis, develop a logic model, and select preliminary implementation strategies for an integrated care model in newly created information and advice centers for older adults in Canton Basel-Landschaft, Switzerland.

Methods: We conducted a contextual analysis to determine factors which may influence the integrated care model and implementation strategies needed. A logic model depicting the overall program theory, including inputs, core components, outputs and outcomes, was designed using a deductive approach, and included stakeholders' feedback and preliminary implementation strategies.

Results: Contextual factors were identified (e.g., lack of integrated care regulations, existing community services, and a care pathway needed). Core components of the care model include screening, referral, assessment, care plan creation and coordination, and follow-up. Outcomes included person-centred coordinated care experiences, hospitalization rate and symptom burden, among others. Implementation strategies (e.g., nurse training and co-developing educational materials) were proposed to facilitate care model adoption.

Conclusion: Contextual understanding and a clear logic model should enhance the potential for successful implementation of the integrated care model.

Keywords:

Integrated care; Implementation science; Frail elderly; Logic model; Program development; Program theory

3.2 Introduction

Frail older adults, often living with multimorbidity and functional and cognitive disabilities [1], are at higher risk of mortality, hospitalization and institutionalization [2, 3]. Care for this population tends to be uncoordinated and fragmented [4], as frail older adults may require support from several health and social care providers as well as informal care [5, 6]. Fragmented care can lead to negative health outcomes such as patient confusion and distress, gaps in information delivery, duplication of services, unnecessary hospitalizations and higher care costs [4]. These negative outcomes may be overcome by integrated care, a person-centered approach where individual pro-active care is facilitated by continuous, multidisciplinary collaboration and coordination of various care providers [7, 8].

In the many studies evaluating integrated care for frail or multimorbid older adults, comprehensive assessments, tailored care plans, multidisciplinary care teams, case management, and a proactive and patient-centered approach, are commonly reported as key components [9-15]. However, systematic reviews indicate major heterogeneity with respect to the target population, the study outcomes selected, the delivery of their intervention elements, and most importantly, the results found on a patient-, provider-, and system-level, impeding consistent conclusions [9-11]. The lack of impact resulting from integrated care initiatives may be related to the outcomes measured and the measures used [9, 10], but may also be a result of implementation issues with these complex interventions, potentially low fidelity to the intervention or the intervention lacking contextual fit [16-18]. This indicated the need for effectiveness studies which include process evaluations, contextual analysis, and measuring implementation outcomes to determine if, how and why community-based integrated care for frail, older adults is successful in practice [14, 19, 20].

Intervention development, implementation, and evaluation can be facilitated by using a theory-driven approach and implementation science methods, ensuring contextual relevance [21, 22]. Furthermore, feasibility studies to measure for example, acceptability and fidelity, are needed before evaluating ultimate effectiveness [22-25], especially in light of the major challenges recognized in implementing integrated care in practice [17]. While fidelity has been measured in a seldom number of studies of integrated care for frail, home-based older adults [26, 27], most studies rarely include implementation science methods such as

stakeholder involvement; use of theories, models and frameworks; contextual analysis; and studying implementation strategies (i.e., the methods used to increase the likelihood for intervention uptake and success [28]) and implementation outcomes (e.g., acceptability, adoption, and fidelity [23]) [11, 29]. Additionally, logic models, which are recommended when planning an intervention to illustrate how a program will create change [25, 30], were not often used [11, 18]. Logic models are visual tools that demonstrate an overall program theory, describing and linking the program's input/resources, activities, expected outcomes and impact [31, 32]. They are especially valuable in integrated care initiatives as deciphering the underlying pathway and which individual components of these complex interventions contribute to the outcomes can be especially challenging [11, 14]. Logic models have numerous benefits during program planning, monitoring and evaluation, such as communicating the evidence-informed strategies used in the program; detecting gaps in theory; facilitating a shared understanding of the program with stakeholders; identifying what to measure during evaluation; and helping to differentiate between intervention and implementation failure [31-33]. Applying implementation science methods and creating a logic model when developing an intervention may improve the chances of success, inform future care models and reduce research waste.

Context is a major focus in implementation science [21, 34, 35]. During intervention development, a strong grasp of the context helps to ensure that the intervention components will be well-suited for the context and the actions needed [18]. Although there are inconsistencies in how the term "context" is formulated in the literature, Pfadenhauer et al.'s (2017) work using a Pragmatic Utility concept analysis helped to refine the conceptualization of context as: "a set of characteristics and circumstances that consist of active and unique factors, within which the implementation is embedded. As such, context . . . interacts, influences, modifies and facilitates or constrains the intervention and its implementation" [36]. The Context and Implementation of Complex Interventions (CICI) framework proposed by Pfadenhauer provides a richer assessment of "context", differentiating it from the "setting" [36]. Specifically, the "context" dimension includes seven domains: geographical, epidemiological, socio-cultural, socio-economic, ethical, legal and political, while "setting" is defined by the physical place where an intervention takes place [36]. As a "determinant" framework, CICI provides a solid basis for understanding and analyzing the extensive set of

factors within the context which may affect the intervention and implementation outcomes [36-38]. Accounting for such contextual factors is an essential consideration when planning and evaluating integrated care initiatives [7, 11, 18] and can lead to the selection of appropriate implementation strategies [39, 40]. The selection of implementation strategies will be influenced by their proposed effectiveness [41] but also greatly depends on the context in which an intervention is implemented [42].

Given their major importance in the development and evaluation of complex care interventions, implementation science methods and a theory-driven approach will be applied in the INSPIRE project (ImplemeNtation of a community-baSed care Program for home dwelling senIoR citizEns) in Canton Basel-Landschaft (BL), Switzerland. A 2018 Cantonal law required the 86 BL municipalities, with an approximate population of 288'000, to re-organize themselves into eight care regions, and each develop a care concept including services for outpatient, intermediate, and inpatient care [43]. The INSPIRE project aims to develop, implement and evaluate an integrated care model for the information and advice centers (IAC), which are required in each of these newly formed care regions [43]. These community-based centers must include a nurse to provide needs assessments and advice for older adults who are living at home, especially if entry into a nursing home is being considered [43]. Building on gaps and recommendations in recent studies, the aim of this paper is to report the contextual analysis, logic model development, and preliminary implementation strategies for the INSPIRE integrated care model for home-dwelling older adults in Canton Basel-Landschaft.

3.3 Methods

Overall Project Design

The overall INSPIRE project is positioned within phases one to three of the Medical Research Council (MRC) framework for developing and evaluating complex interventions, yet also includes implementation science elements, such as a contextual analysis, stakeholder involvement, mapping of implementation strategies, and using a hybrid implementation-effectiveness evaluation [*See Chapter 1, Figure 1*]. This paper specifically addresses the development phase of INSPIRE and aims to:

- Determine the contextual factors which may influence the INSPIRE integrated care model for the IACs and implementation strategies by collecting information through various sources
- Develop a logic model to display the overall theory for the INSPIRE care model, including inputs, activities, outputs, anticipated outcomes and assumptions
- Propose preliminary implementation strategies for the INSPIRE care model

Performing the tasks related to these aims is a simultaneous and iterative process as shown in Figure 2.

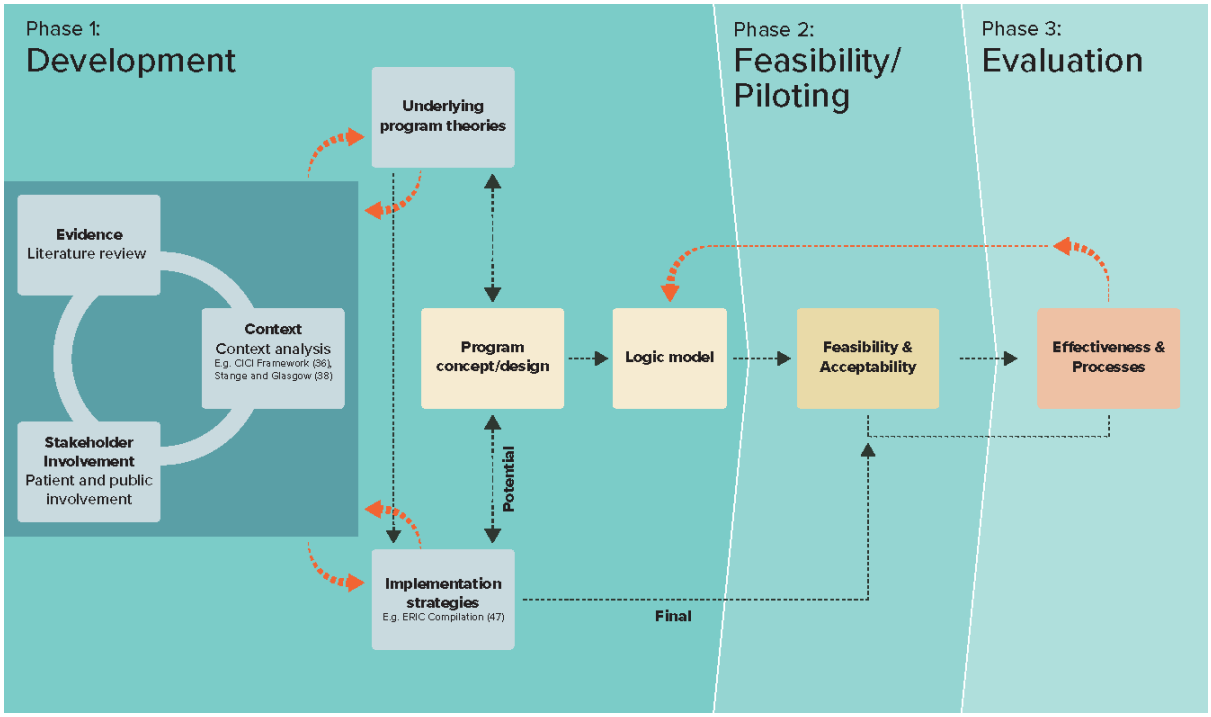


Figure 2. The INSPIRE project approach to care model development

Contextual analysis

We followed Stange and Glasgow's (2013) approach to assessing context to identify, analyze and report on contextual factors which may influence the INSPIRE care model [38]. Their approach involves gathering contextual input from various stakeholders and using theories or frameworks to determine relevant 'domains' from which quantitative and qualitative information related to contextual factors should be collected, assessed, and reported [38]. Pfadenhauer's CICI framework was used to identify which contextual domains to consider

(e.g., political, socio-economic, socio-cultural), and how these contextual factors and the setting may interact with the INSPIRE intervention and its implementation [36]. We used a worked example in Pfadenhauer's paper [36] as a template (Additional File 1) to synthesize our collected data related to the context, setting, and anticipated implementation. The data came from a combination of activities initiated by the research team, such as: conducting the INSPIRE cantonal stakeholder meetings, a cross-sectional survey and the context analysis meetings; participating in local stakeholder meetings; conducting the Basel-Landschaft Older Persons Survey [44] and reviewing local, national and international reports (e.g., a key document by Threapleton et al. on implementation facilitators and barriers [14]) (Table 1). We mapped the identified contextual factors according to the CICI framework, and subsequently refined the INSPIRE care model components, the implementation process, and the potential implementation strategies.

Table 1. Data sources used for the contextual analysis

Data source	Participants involved	N	Mode of data collection	Purpose of data collection
INSPIRE Project Cantonal stakeholder meetings	The project team invited various individuals to the first INSPIRE Project Cantonal stakeholder meeting from organizations who are relevant in supporting or caring for the older population. New members are continuously welcomed, and participation has now grown to up to 70 members	5 cantonal stakeholder meetings organized by the INSPIRE research team between January 2018 and December 2019, with the number of participants ranging between 20-40 per individual meeting. Correspondence was sent via email from the INSPIRE account.	In-person meetings	To help the INSPIRE team stay informed on current happenings; identify relevant barriers and facilitators; inform stakeholders and discuss their input and concerns related to various project components (e.g., the care law "Altersbetreuungs- und Pflegegesetz", the early prototype of the IAC care model, and the Basel-Landschaft Older Persons Survey).
Cross-sectional surveys and informal follow-up meetings to confirm interpretation of findings	A selection of representatives who participated in the first INSPIRE Project Cantonal stakeholder meeting	12 completed surveys	Electronic survey with 11 open-ended questions	To identify organizational interest in INSPIRE, current practices related to the intervention, perceived gaps in the health care supply, views on the role of the nurse in the IAC, as well as potential barriers and facilitators in implementing the IAC.
INSPIRE Project local stakeholder meetings	Health and social care providers and political representatives from specific care regions within Canton BL	Meetings are organized by the care regions approximately monthly (approximately 11 to date), and INSPIRE has been invited as a participant	In-person meetings	To discuss planning and implementation of the care model in local practice with the working groups from specific care regions.
Context analysis meetings	A local General Practitioner's office, Specialist Centers for Ageing Issues and home-care providers in selected care regions	5 meetings were arranged by the INSPIRE research team	In-person meetings and semi-structured interviews	To get an overview of the daily processes and activities related to the care of older adults in each setting, and learn how to work together with current providers to support the IAC implementation.

Local, national and international papers and reports related to integrated care or caring for multi-morbid/frail older adults	n/a	n/a	Report/article review and data extraction	To increase research team's awareness and understanding of the background, trends, and recent evidence, and inform the thinking about relevant factors to consider with respect to the integrated care model.
Basel-Landschaft Older Persons Survey	n = 8,786 valid questionnaires were completed by home-based adults aged 75 and older living in Canton BL	*More details reported elsewhere* [44]	Quantitative paper survey	To understand the living preferences of home-based older adults in Canton BL as well as the support and services they require and anticipating needing in future to make ageing in place possible.

BL = Basel-Landschaft; IAC = Information and Advice Center

Development and validation of the logic model

Development

A logic model describing the input/resources, activities, anticipated outcomes and impact was created to illustrate the overall INSPIRE program theory for how the IAC could function to achieve the desired results in the community. The template and definitions for each logic model component were based on the W.K. Kellogg Foundation [32], the Canadian Evaluation Society [45] and the Centers for Disease Control and Prevention [30]. The one-page logic model illustrates the outcomes chain (i.e., the successive relationship between the immediate, intermediate and long-term outcomes) in the program theory and some of the assumptions about "program factors" (e.g., effective advertising of the IAC), "nonprogram external factors" (e.g., participant factors that can potentially influence the outcomes) and the change process [31, 32]. The logic model was built based on a deductive approach to constructing program theory as the ideas were gathered from documentation such as the data sources for the contextual analysis, grey and peer-reviewed literature, and program documents developed by the research team [31]. As logic model development is not a static process, it continued to evolve as we gathered contextual information, detected gaps in our program theory, and identified additional types of implementation strategies needed (e.g., *train and educate stakeholders* and *engage consumers*) [46, 47].

Validation

The original core components of the INSPIRE integrated care model were presented during in-person cantonal stakeholder meetings to ensure that the overall model appeared to be appropriate from the perspective of local professionals. To gather stakeholders' opinions on the program logic model, we undertook a structured activity during a stakeholder meeting attended by 40 stakeholders (e.g., health and social care organizations/providers, cantonal and municipal representatives, patient organizations, umbrella organization for care homes, volunteer organizations, health insurers, etc. [48]). We showed the stakeholders a condensed German version of the logic model that included the resources, activities, and outputs, but excluded outcomes. We asked stakeholders to work in groups to create a list of outcomes, i.e., the differences they expect to see as a result of the INSPIRE care model. Groups contributed their input via online interactive presentation software. Stakeholders were asked

to choose from the long-list the three most relevant outcomes, resulting in a final list. Following the meeting, their input was incorporated into the INSPIRE logic model to create a new version, which was subsequently emailed to the stakeholder group for further input, and to identify any gaps or revisions needed.

Deriving preliminary implementation strategies

Determining implementation strategies which fit the context is a two-step process involving an analysis of the factors which may influence implementation, followed by a selection and tailoring of implementation strategies [42]. In the current study, we mapped contextual data to the CICI framework, and synthesized this information to derive actions needed in terms of the care model and preliminary implementation strategies. We also reflected on the implications for the intervention or implementation strategies based on the contextual factors.

The implementation strategies were specified according to the Expert Recommendations for Implementing Change (ERIC) compilation [28, 47, 49], and were added to the logic model to indicate the actors and outcomes they intend to influence. This is a preliminary selection of strategies which will be systematically mapped, assessed for their evidence level and reviewed by stakeholders.

Bringing it all together

As shown in Figure 2, the INSPIRE project team used a unique approach to perform the preparatory work when designing the care model that aligns with O'Cathain's recommendations [50]. As a first step, the project team performed a literature review, context analysis and involved stakeholders to develop the underlying program theory for how the intervention could work. As this is a circular process, specific details of the program theory and operationalization of the program progressed through stakeholder feedback or as more empirical data surfaced over time. Likewise, potential implementation strategies transpired as a result of the evidence, context and stakeholder input, as well as through the evolution of the program theory. The program theory was then formulated into a preliminary concept for the care model, accompanied by potential implementation strategies. To operationalize and communicate the program theory, a logic model was drafted and regularly adapted for one

year. The final implementation strategies will evolve based on their success or failure, and as new information becomes available.

Ethical considerations

This study was submitted to the Ethikkommission Nordwest- und Zentralschweiz (EKNZ) in Switzerland, EKNZ Project ID Req-2019-00900. The study was able to be conducted as the EKNZ deemed that it complied with the general ethical and scientific standards for research with humans (Art. 51 Abs. 2 HRA) and did not meet the definition as a research project requiring further review as per the Human Research Act ART.2.

3.4 Results

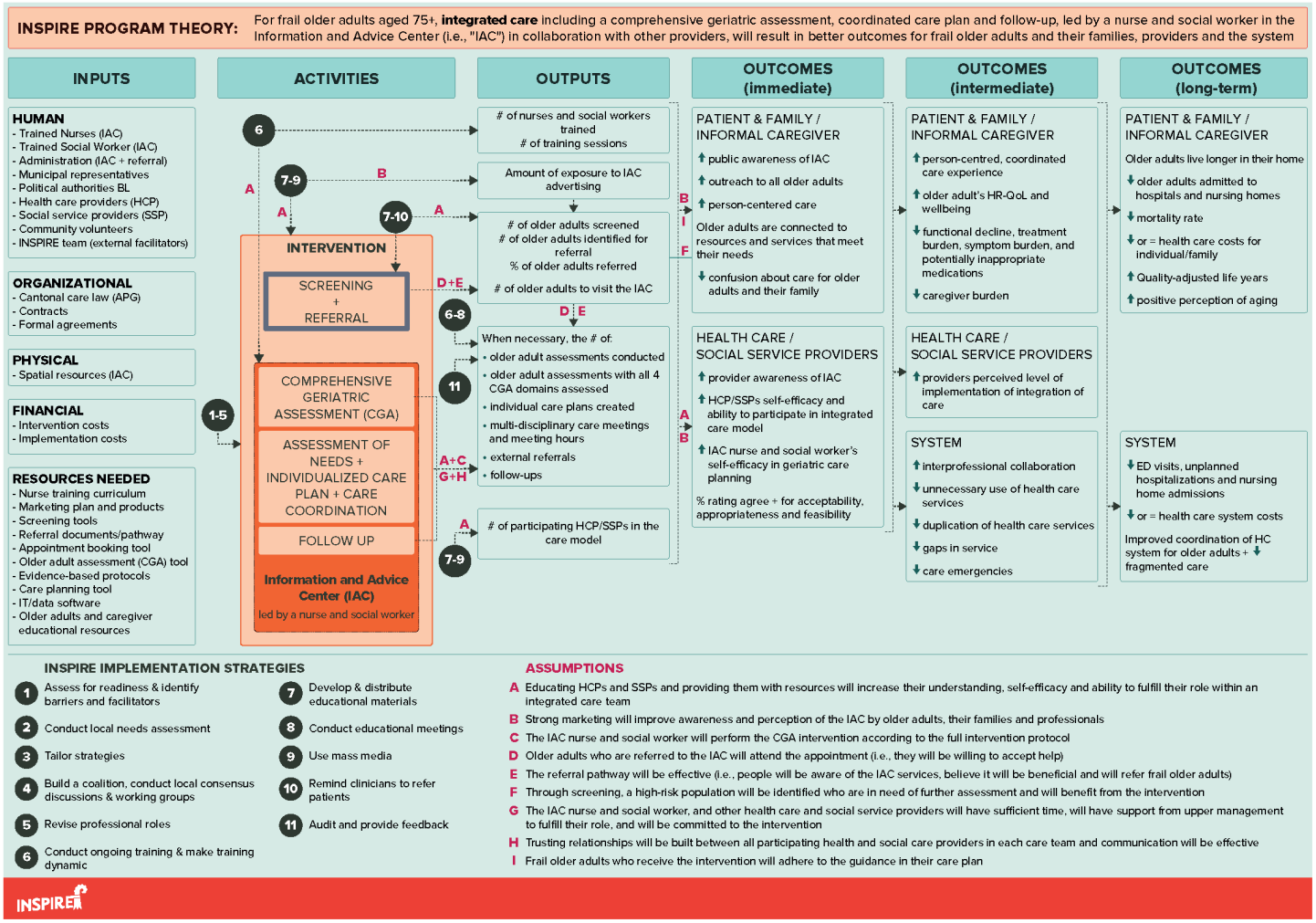
Context analysis

We selected specific contextual domains according to the CICI framework, including: socio-economic, socio-cultural, political, legal, epidemiological and the setting (Additional File 1). Key contextual factors on a macro level included: a lack of national integrated care regulations; the presence of integrated care guidance and indications of political support for integrated care; potentially challenging financing models; and inconsistent IT systems. Additionally, we noted the significant changes in nursing education across Switzerland over the past several decades, which is an important consideration when hiring an appropriate nurse for the IAC. On a meso level we noted: the rapidly growing population of older adults in BL; a cantonal law aiming to improve care for older adults yet not specifying the organization of integrated care; and the numerous organizations involved in the care of older adults. We also found that approximately one quarter of home-based older adults (aged 75+) in Canton BL showed signs of frailty, but that health care professionals likely do not systematically screen for frailty nor do general practitioners (GPs) typically perform a comprehensive geriatric assessment (CGA). On a micro level, we observed that the IAC and the nurse position would be new for the community and therefore new processes and tools, such as a referral pathway, an electronic patient file and communication tools, would be needed for the professionals to work together to deliver person-centered integrated care. In terms of the setting, the function of existing community-based centers that are mainly staffed

by social service professionals and provide advice (e.g., social/financial) to older adults, could potentially be morphed into the new IACs required in the care law.

Logic Model

The INSPIRE logic model illustrates the program theory for a care model that integrates health and social care service provision for home-based frail older adults (Figure 3).



BL = Basel-Landschaft; CGA = Comprehensive Geriatric Assessment; ED = Emergency Department; HC = Health care; HCP = Health care providers; HR-QoL = Health-related Quality of Life; IAC = Information and Advice Center; SSP = Social service providers

Figure 3. The logic model for the INSPIRE care model

The inputs column lists the resources that will contribute to the operation of the care model within any care region in BL. This covers human resources, such as the people referring older adults to the IAC, IAC employees, and stakeholders involved in decision making/funding, as well as organizational resources, such as the care law which mandates the IAC. It also includes the physical space where the IAC services will be delivered, the costs to run and support implementation of the IAC, and other resources (e.g., tools for screening and conducting a CGA, as well as marketing products).

The activities include the core components of the INSPIRE care model. First, individuals will be screened to identify those at risk of health deterioration who could benefit from in-depth geriatric assessment and coordination of additional services. Screening older adults aged 75+ for a certain geriatric risk profile indicating potential frailty can be performed by older adults, family members or health/social care professionals in the community such as GPs. At-risk older adults can be referred for an appointment at the IAC. The core components of the care model in the IAC, include conducting a CGA by a geriatric nurse expert and social worker; creating an individualized care plan including evidence-based interventions with a multidisciplinary team; and needs-based follow up. The geriatric nurse expert will act as the care coordinator in close collaboration with the social worker, and the care plan will be rolled out with the older adult and their caregivers, the GP, and health and social services in the community. The outputs column describes the main products anticipated as a result of both the intervention components and the implementation strategies. Certain aspects that will contribute to the measurement of implementation outcomes (e.g., acceptability, appropriateness, feasibility and fidelity) are reflected in the outputs and outcomes columns. For example, the percent of eligible older adults who receive an individualized care plan will contribute to the measurement of the intervention fidelity, and the IAC nurses' views on whether the intervention is appropriate for frail older adults will be explored to measure intervention appropriateness. The outcomes columns are grouped temporally based on when we anticipate the change will be seen.

Lastly, arrows indicate the links between the activities and outcomes. These links illustrate the sequential outcomes anticipated and are evidence-informed based on clinical expertise, expert opinion, recommendations or previous/current hypotheses. To provide three examples: first, we anticipate that performing a CGA including a care plan and follow-up,

which involves multi-disciplinary care professionals, will result in a care plan coordinated by one professional based on the older adults' needs, being connected to necessary resources and services, and improving person-centered coordinated care. If the health and social needs of the older adults are assessed, we anticipate this will result in appropriate referrals, which may help to reduce the pressure on caregivers. As a second example, the educational meetings held will be instrumental to increase awareness of the IAC, and to determine how care planning can best be coordinated between the IAC and the other health and social service professionals, such as GPs. Thirdly, reviewing the patients' medication list by the geriatric nurse expert as part of the CGA should help to flag any potentially inappropriate medications, which can be a concern with community-dwelling older adults.

During the validation phase, stakeholders elicited similar outcomes to those anticipated by the project team, and contributed new valuable outcomes. There were no concerns or discrepancies regarding the logic model when the revised version was sent to stakeholders.

Implementation strategies

Table 2 presents the implementation strategies which were selected from six different ERIC clusters, namely: *Use evaluative and iterative strategies*; *adapt and tailor to context*; *develop stakeholder interrelationships*; *train and educate stakeholders*; *support clinicians*; and *engage consumers* [49]. For example, the strategy "use advisory boards and workgroups" was operationalized in our project by collaborating with local workgroups, including social service professionals to co-develop the electronic patient file which will be used for the IAC consultations. Meanwhile, given the diversity in the nursing education system in Switzerland, ongoing training is planned for the IAC nurse to increase their self-efficacy in geriatric care planning and to fulfill their role, as marked by the training-related strategies. In terms of educating stakeholders, it will be crucial to provide GPs as well as other providers in the community with information about the IAC, a referral path, as well as communication tools to foster care coordination. We anticipate that additional strategies will be needed as implementation progresses, depending on the resources available.

Table 2: Potential implementation strategies for INSPIRE presented using the Expert Recommendations for Implementing Change (ERIC) compilation [49]

ERIC CLUSTER	ERIC IMPLEMENTATION STRATEGY	Description of the implementation strategy in the INSPIRE project
Use evaluative and iterative strategies	Assess for readiness and identify barriers and facilitators	To identify barrier and facilitators, a contextual analysis was conducted. Readiness has been assessed through communication with cantonal stakeholders and local care regions.
	Audit and provide feedback	A form of auditing and feedback will be provided to the IAC nurse and social worker based on data collected in the feasibility study.
	Conduct local needs assessment	Local needs, gaps and current care processes were assessed through the contextual analysis. To gather a deeper understanding of older adults' experiences of their health and social needs and care, a population survey was conducted with older adults in Canton BL and interviews are planned with frail older adults.
Adapt and tailor to context	Tailor strategies	Potential implementation strategies have been and will continue to be selected based on the contextual analysis, stakeholder input, and strength of evidence. New strategies will be selected during the feasibility phase based on any emerging barriers and discussed with stakeholders.
Develop stakeholder interrelationships	Build a coalition	The INSPIRE team established a Cantonal stakeholder group that aims to meet quarterly to discuss matters related to the IAC, the care model, the INSPIRE project activities and the new care law. The INSPIRE team also collaborates on a local level with workgroups. Local GPs will be engaged separately as an important stakeholder.
	Conduct local consensus discussions	
	Use advisory boards and workgroups	The INSPIRE team participates in any working groups (which include local politicians and frontline social service professionals) that focus on implementation of the IAC within a selection of care regions, where the care model components and study design are discussed. The social service professionals and the research team are co-developing the electronic patient file for the IAC, which is the tool that will be used for consultations with older adults.
Train and educate stakeholders	Conduct ongoing training	A training curriculum has been co-developed for the IAC nurse(s) which includes input from the contextual analysis. In-person and online training modules are planned for the IAC nurse(s). If needed, training or education sessions will be planned for the IAC social workers.
	Make training dynamic	

	Develop educational materials	Educational materials will be co-developed with care regions and distributed to inform health and social service providers about the new IAC services, how to screen and refer at-risk older adults to the IAC, and the goals and process of integrated care planning. Any changes to the IAC services would also be communicated to these local professionals.
	Distribute educational materials	
	Conduct educational meetings	An event with local GPs is being planned in collaboration with stakeholders which will include discussion of the IAC. Additionally, a marketing plan and educational session will be planned with stakeholders for community providers to learn about the IAC, including their roles as community professionals, and provide their feedback.
Support clinicians	Remind clinicians	A mechanism could be suggested to remind GPs and home care nurses to screen older adults with a certain geriatric risk profile, and refer them to the IAC if appropriate.
	Revise professional roles	Roles and responsibilities will need to be clear for the IAC staff, and emphasizing the goals of care continuity and coordination between professionals. The INSPIRE team co-developed a job description for an IAC nurse and emphasized the importance of the role of the social worker in continuously collaborating with the IAC nurse to effectively co-deliver integrated care services. An integrated care pathway will be created to clearly outline the different roles of the professionals. The electronic patient file for the IAC may also help to delineate the roles of each professional.
Engage consumers	Use mass media	Advertising materials should be co-developed with care regions to inform older adults, their family, care professionals and community members about the new IAC services. Consistency in advertising will be important.

BL = Basel-Landschaft; IAC = Information and Advice Center; GP = General Practitioner

3.5 Discussion

Given the international desire to establish effective models of integrated care for home-based, frail older adults, this paper described the essential investments made during the development phase before implementing a new integrated care model in Canton BL. The results of this study demonstrate how a rich understanding of the context can help further refine an intervention concept and consider preliminary implementation strategies. Additionally, a contextually-relevant logic model was created to effectively communicate the program theory to INSPIRE project members, stakeholders, and other researchers.

Overall, many of the activities, outputs and outcomes described in our logic model are comparable with those seen in the Social Care Institute for Excellence Logic Model for Integrated Care [51] and the Logic Model for Patient-Centered Medical Home Models [52], among others [53, 54]. Nevertheless, our logic model is specifically designed for our program and context, incorporates our assumptions, has an operational-level focus, and includes our implementation strategies. By providing a rich description of the contextual factors collected to date, this study addresses a common gap in the literature where the context of interventions is often not reported or only vaguely described. Without the findings emerging from the contextual analysis, necessary actions related to the intervention or implementation strategies would not have been detected. Examples of this include: the future role of IACs in performing a CGA and care coordination based on the current care system; identifying the local health and social service organizations to coordinate care with and to prevent duplication of services; the importance of a marketing plan for the IAC and unique strategies needed to reach family members; and the competencies needed by the IAC nurse and how defined pathways could help them work together with the social worker and GPs. Additionally, the importance of early involvement of professionals in the community, such as GPs, to facilitate frailty screening and referral to the IAC and collaborative care planning. However, some of the contextual barriers will remain outside of our control within the project, such as the financing models, incentives for integration or whether electronic records are shared across the whole system [14]. Awareness of these factors will also allow for a more accurate evaluation of the care model in future and interpretation of the results, and can also support other researchers or professionals who are looking for guidance on how to analyze context and use the findings within their intervention development. Stadnick et al. (2019)

recently conducted seven case studies of integrated care initiatives across multiple countries, where they reflected on the shared contextual factors which influenced the implementation of these projects [55]. Among the inner context factors, several of the important considerations identified such as knowledge, education, training and confidence of service providers; monitoring fidelity; and shaping providers' roles and responsibilities, will be relevant in the INSPIRE project and can guide where to enhance our efforts [55]. Establishing a "community-academic partnership" was the main bridging factor they identified [55], which will remain of great importance during all phases of the INSPIRE care model. By describing and linking the ultimate program goals with the activities that will be done to achieve these goals, the logic model revealed our thinking about what should work and how [31-33], mitigating the "black box" phenomenon which can otherwise occur when describing an intervention [46, 52].

With respect to the overall program theory, the integration of health and social care has been fundamentally endorsed for years [13, 56-58], especially for populations with complex needs [59, 60]. The program theory encompasses the World Health Organization's approach to *Integrated Care for Older People* (ICOPE) at the micro-level [60], and at the meso-level it incorporates actions deemed essential based on findings from the recent eDelphi study on implementing the ICOPE approach (e.g., conducting comprehensive assessments and training personnel to develop a care plan) [61]. As the first component in the care model, screening for potential frailty has been promoted as a part of a preventative approach and as an effective means to determine the subset of the older population that would benefit from further comprehensive assessment and subsequent interventions [62-65]. Given that only a subset of the older population is estimated to be in higher need of IAC services, screening for potential frailty is particularly appropriate to use healthcare resources efficiently, combined with the recognition that frailty is an emerging public health priority [66]; and that it is likely a major factor predicting admittance to a nursing home [3]. Although there are different schools of thought on whether and how to screen older people for frailty in different health care settings based on feasibility, evidence gaps and resources required [65-69], frailty detection is essential to determine actions which can help prevent further conditions associated with aging [66]. If supported by appropriate implementation strategies, we believe

screening can be an effective mechanism for identifying older adults most in need of further assessment.

Following screening, the remaining activities included in the program theory (i.e., conducting a CGA; assessing needs; creating and coordinating a care plan; and conducting follow-up) are highlighted as part of an integrated care approach for frailty or multi-morbidity [11, 13-15, 70-72], and are common to many studies of this nature [19, 65, 73-76]. The core intervention features a CGA at the center, which is considered either beneficial or a gold standard in caring for frail older adults in certain settings [66, 77-79]. In a recent scoping review of 27 integrated care programs for older people, the authors found that the 21 different CGA instruments used incorporated three of the dominant principles of integrated care, i.e., comprehensive, multidisciplinary and person-centred care [80]. However, they proposed that stronger involvement of both social care professionals and older adults could strengthen the CGA process, which will be key in the INSPIRE model [12]. The present study, together with results from the ongoing systematic review by Briggs et al. assessing the effectiveness of the CGA in community-dwelling, frail older adults [81], will help add to the body of research testing the CGA as part of an integrated care model to improve outcomes for this population.

The program outcomes presented in the logic model were derived from studies of related care models [9-11, 82-85]; outcomes that have been proposed for integrated care initiatives [8, 86]; the program team's realistic assumptions and/or stakeholder expectations (e.g., relief and support, coordination, costs and perception of aging). Achievement of these outcomes relies on important assumptions such as trusting relationships and strong communication between providers [87] as well as "provider commitment to and understanding of the model" [88]. However, previous authors have questioned whether some of the outcomes hypothesized for integrated care for this population are in fact appropriate or realistic, such as improvements in activities of daily living or quality adjusted life years [9, 10]. Focusing on care processes and outcomes that are most important to patients have been emphasized as a priority [9, 10, 85], particularly measuring patient's care experience as an outcome to reflect the quality of integrated care for multi-morbid individuals [89] or concentrating on intrinsic capacity and the patient's individual goals [59].

With respect to the process of intervention development, O'Cathain et al. (2019) conducted a consensus exercise with experts to offer guidance for intervention development [50]. We

endorse the principles they put forward, as we illustrated a "dynamic, iterative, creative, open to change and forward looking" approach in our process [50, p.2]. Our paper provides a practical example of how some of the actions within their framework (e.g., "involving stakeholders, reviewing published research evidence, drawing on existing theories, articulating programme theory, undertaking primary data collection, and understanding context") can be applied and combined to prepare for a new intervention. It also reflects on the relationship between these steps with emphasis on logic model development and adds the element of implementation strategies. While the process and results are specific to our project, the approach and methods we used for the development phase can be broadly generalizable for other researchers, which is a strength of this study.

Methodological Considerations

With regards to contextual analysis, new methods are under development to guide researchers in the field to use a consistent, systematic approach for analyzing context [90]. As context constantly evolves, the factors present at the time of data collection may change and therefore it will be important that the implementation strategies adapt along with it. Contextual factors will differ for every setting limiting the generalizability of the care model; therefore, we have made the contextual factors in our situation transparent for researchers. In essence, the overall methodological approach can guide researchers for assessing their own setting, designing a logic model, and to facilitate the design and evaluation of future care models.

Logic models can also be criticized for not describing "why" activities produce outcomes that would otherwise be clear through a theory of change [91]. Another downfall is that some more basic or linear versions may fail to capture context or communicate the true complexity involved for a complex intervention to become contextually-fit [92, 93]. However, our format supports program planning and was appropriate for our purposes, as described by Mills et al. [92]. Nevertheless, the combination of the logic model, extensive narrative describing the evidence-informed strategies, and contextual analysis we provided in compliment should support interpretation of the logic model and understanding of the development of this complex intervention [36]. As an alternative means, other authors have described innovative methods they used to account for context while developing logic models [46, 93], and have proposed a new format for presenting this [92]. Innovative work by Smith et al. (2020) may

support implementation science researchers moving forward as they have introduced new templates for logic models that link the different frameworks specific to implementation science and can support the various study designs [94]. For the future evaluation of the care model, a systems thinking approach may be more appropriate to accurately reflect the complexity of the system [95].

3.6 Conclusions

This study has set the foundation for the next steps in the INSPIRE research project: to conduct a feasibility study of the integrated care model and implementation strategies prior to full evaluation of the implementation and intervention outcomes. Based on the insights of previous integrated care studies on older adults, stronger understanding of context and program theory is needed, especially to develop, implement and evaluate these initiatives which are yet to yield strong evidence in the field. Investing sufficient efforts into program development and stakeholder involvement is essential to ensure a strong fit between the context and the integrated care model, identify the implementation strategies needed, and reduce research waste. Flexibility in the next phases of research and implementation will also be essential as changes in leadership, policies, and so on is typically inevitable. The approach followed during this study can be used as a basis and adapted when developing future integrated care programs.

3.7 References

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3.8 Supplementary files

3.8.1 Supplementary File 1: Applying the Context and Implementation of Complex Interventions (CICI) framework to the INSPIRE project

SETTING	**Description of the setting for a new integrated care model (a complex intervention)**	**Implications for the INSPIRE intervention**
Setting	**Macro** • Switzerland **Meso** • Canton Basel-Landschaft (BL) in the German-speaking part of Switzerland • Municipalities, organizations and professionals within Canton BL are affected by the Cantonal care law requirements (APG) to form new care regions and establish an information and advice center (IAC) for older adults [1] • Numerous organizations are involved in providing services or support for home-based older adults in Canton Basel-Landschaft, such as: 30+ different home care organizations, patient organization for older people, an umbrella organization for care homes, health insurance companies, meal delivery services, churches, transportation services, disease-related support services **Micro** • There are current Specialist Centers for Ageing Issues in some of the care regions which is a social service that older adults and/or their families can visit when they have social or financial concerns (however no medical advice is provided there) • The work environment of the IAC will influence the implementation of the care model	• The new information and advice center (IAC), which based on the INSPIRE model will be an integrated care site combining health and social services, could potentially be embedded in the existing Specialist Center for Ageing Issues in certain care regions • Co-location of the IAC nurse and social service provider may increase frequency and quality of communication and improve access to the appropriate professional knowledge • Coordination with the other existing community services will be important
CONTEXT		
Contextual domains and description	**Description of the context for a new integrated care model**	**Implications for the INSPIRE intervention or implementation strategies**
Socio-economic context	**Macro** • Funding for health care in Switzerland comes from multiple private and public sources, including high out-of-pocket expenses that are covered by patients/individuals [2] • Funding for the social security system and social support services come from public and private/semi-private sources • Basic health insurance in Switzerland is mandatory, with the option to purchase supplementary health insurance [2]	• The financing models in Switzerland may present challenges for coordinating care with providers who will be involved in the care plan of an older adult who visits the IAC • The IAC care model and services may be faced with uncertainty, lack of

	• The financing models, rate structures, and limited cost incentives for health care integration have been recognized by Swiss Cantonal representatives as very significant obstacles to providing integrated care in Switzerland, and requiring need for action [3] • The compensation systems in Switzerland are based on individual institutions or professional groups, which make networking and coordination a challenge [3] **Meso** • Local stakeholders shared concerns regarding the ability to coordinate/synchronize the different health and social services when organizations have different funding, requirements, and mandates, and the APG does not set explicit details regarding funding • Local stakeholders have recognized funding gaps for individual preventative services, programs for certain populations and for care and support at home **Micro** • An international survey of adults aged 65+ (n = 1,084 in Switzerland) found that 22% of adults aged 65 or over spent 2,000 dollars or more out-of-pocket in the past year on care [4] (however, this must be interpreted within the Swiss context)	clarity from professionals and implementation delays due to its position within a larger care law • There are important funding and service gaps for the IAC staff to be aware of
Socio-cultural context	**Macro** • A survey across Switzerland in 2015-2016 identified an upward trend in integrated care initiatives. As part of the innovative research in health care services, coordinated care is seen as one priority evidenced by funding for coordinated care initiatives [2, 5] • Swiss Cantonal representatives have recognized the conflicting interests of all actors involved as a very significant obstacle to providing integrated care in Switzerland and requiring need for action [3] • Often family members of older adults provide support instead of, or in addition to, using formal long-term care services, partially due to the costs [6, 7] • There have been many changes in nursing education across Switzerland over the past several decades, therefore there is a mix between nurses who were trained in for example higher education programs, colleges, or hospital-based nursing schools, as well as other vocational training [8] • Differences can be expected between the health and social sectors in terms of accountability, professional backgrounds, values, instruments used and so forth **Meso** • There are already multiple centers and services for older adults, many of which may be well-utilized	• It is important that the IAC services do not overlap with the existing services offered in some of the care regions to avoid duplication. IAC staff should be aware of these services to ensure optimization • The services delivered at the IAC should strive to: improve coordination between professionals in the canton, provide a comprehensive list of all the offers available for older adults and caring relatives (e.g., health, social and housing offers and services, including all of the different home care organizations and costs involved), provide case management when necessary, have strong awareness of the situation and gaps related to

	• Many local health and social care organizations report actively working with each other, however also perceive a lack of coordination and collaboration between some of the services, organizations and service providers in the Canton • Examples of gaps reported by local health and social care organizations include: limited relief services for caring relatives or affordable intermediary service, limited care or engagement with the subgroup of older adults that could be very old, lonely, less mobile or don't have support from family or financially, gaps in outpatient service for 24 hours of care, lack of coordinated services, lack of concrete case management and insufficient night coverage services • There is insufficient information on services available (including for caring relatives) and also contradictory information, therefore many older adults, their family members, and community professionals may not be aware of the full range of services available • There may be too many contact points available for people when needing support, instead of one central contact point • The transition to nursing homes could be improved • Primary and community health and social care providers are not often brought together to discuss the needs of individual older people [9] • Communication between professionals varies between formats depending on who the communication is with and GPs often do not meet with other providers • There may be many older adults who choose not to ask for help or are reluctant to using services available as they would prefer not to be a burden for others or highly value independence • Canton BL has urban and rural parts, where different values and interests may be noted • To avoid duplication (e.g., parallel structures offering the same consultations/clarification), the IAC needs to be perceived by the population as professionally competent and broadly based and ensure good coordination with the numerous existing centers • There may often not be time for primary care GPs to conduct a comprehensive geriatric assessment of their patients	current services in the care supply chain • Marketing of the IAC will need to be well planned • Communication/support is needed for family members of older adults who would benefit from IAC services • Unique strategies are required to reach out to and approach isolated older adults who would benefit from care but do not demand it • When developing the materials and resources for the IAC, there are local organizations who can provide resources and knowledge • Communication between GPs and the IAC staff regarding referral and care planning will need to be piloted • IAC staff need to have close exchange and involvement with other providers. A new process flow as well as tools will be needed for the IAC staff to communicate and coordinate care with the older adult's other health and social professionals • Many important topics will need to be included in the IAC nurse training depending on their level of knowledge and experience • Home visits may be necessary to reach more frail individuals • The INSPIRE project team should be aware of the different values when working with local professionals and older adults, as well as understanding the cultural change that is introduced

		by establishing the new care regions, for example
Political and legal context	**Macro:** • Switzerland's health system has a federalist structure, and the responsibilities are divided at three levels: federal, cantonal and local. The system is decentralized and the 26 Cantons in Switzerland have a major responsibility for healthcare, and the local municipalities have a major role in long-term care [2, 10] • Responsibilities within the social security system (e.g., old age pensions) are divided across the three government levels. Other social support services are often run privately/semi-privately • Switzerland has no federal regulatory framework for integrated care [2] • The Swiss Conference of Cantonal Health Directors (GDK) has published guidelines on integrated care for the cantons [3] • Based on a recent survey, there appears to be political support for state actors to become more involved in integrated health care [3] • Swiss Cantonal representatives demonstrated commitment in a recent survey to the integrated care goals related to improving cooperation between different professionals and organisations as well as coordination and continuity of care, however lower ratings to connecting the health and social systems [3] • High diversity of IT systems in the Swiss health system and in companies that provide electronic health records. The use of an electronic health record for patients is mandatory for certain sites (e.g., hospitals and nursing homes), however it is voluntary for other healthcare providers including GPs [11]. Therefore, there lacks a nation-wide electronic health record system. **Meso:** • The APG in Canton Basel-Landschaft was introduced in January 2018 to improve care for the aging population and requires implementation of a new information and advice center (IAC) in each care region where needs are assessed and information and advice is provided to older adults, especially before entering a nursing home. The law specifically states that a nurse must be involved, that health promotion and prevention could be included in the IAC tasks, and that the center should be run independently to prevent a conflict of interest. The care law provides a high-level framework but does not provide detailed operational advice on how to carry out the guidance. The care law also does not provide guidance or common governance on how to deliver integrated care for older people in BL [1] • Diverse IT systems for electronic health records **Micro:**	• Despite the absence of a federal or cantonal framework for integrated care, there are guidelines and appears to be political support for elements of integrated care, however there may be some challenges • The APG mandates will require the municipalities to comply and organizations and professionals may therefore be motivated to cooperate in making the IAC successful for their community. However, guidance on integrated care is not specifically included in the care law, and a care model and new tools will be required for operationalizing the service. • The political timelines will influence the intervention timelines • The IAC should include health promotion and a preventative focus • The IAC should aim to use an IT system that can cooperate with the various other IT systems used by the professionals in the Canton to improve care referral and coordination • Explore opportunities to promote safe data sharing and electronic platforms for the IAC

	• There are many political players and processes involved in forming the care regions and carrying out the guidance in the new care law • Safe data sharing agreements or consent procedures will be required between different professionals involved • The current Specialist Centers for Ageing Issues are not using a standardized electronic patient file that can incorporate documentation from multi-disciplinary professionals	

Epidemiological context	**Macro:**
	• In Switzerland (2018): proportion of people ≥65 was 18.5% and ≥80 years was approximately 5% [12]
	• Switzerland has one of the highest life expectancy rates at birth [6, 13]
	• In 2014, an international survey (n in Switzerland = 1084) found that 44% of adults aged 65 or older living in Switzerland were living with 2+ chronic conditions. 29% of adults aged 65 or older had experienced a coordination problem in the past two years. Of patients that had a chronic condition, only 47% had a treatment plan for their condition they could carry out in their daily life. Only 9% had a health care professional that between Doctor's visits contacts them to check in and only 58% said they can contact one to ask questions or get advice [4]
	• In the next 30 years, there is forecasted to be an increased demand in long-term care in Switzerland [6]
	• Based on international estimates, the majority of people prefer to live in their own home yet one-third of home-dwelling older people are at risk for not being able to age in place due to functional limitations [14, 15]
	
	Meso:
	• In Canton Basel-Landschaft (2018): proportion of people ≥65 years was 21.9% and ≥80 years was 6.4% [12]
	• In Canton Basel-Landschaft: compared to 2018, population projection for adults aged ≥80 will increase by 27% in 2025 and 77,3% in 2040 [16]
	• GPs in BL do not currently use a standardized tool to screen their elderly patients for frailty
	• The INSPIRE Basel-Landschaft Older Persons Survey (conducted in 2019) of home-based older adults aged 75+ results identified that [17]:
	  ○ respondents would prefer to live in their own home, even if they were to become more dependent
	  ○ 1 in 4 respondents showed signs of frailty
	  ○ respondents assumed in the future they may rely more on family members and organisations
	  ○ note: additional results are reported in Deschodt et al (2020)
		• The rapidly aging population and proportion of those living with multi-morbidities or frailty justifies development of innovative care models
		• A screening tool will be needed for GPs and professionals to screen the older population and identify those in need of further health and social assessment at the IAC. A referral pathway will also be needed for the IAC
		• The IAC should aim to support older adults to continue living at home and overcoming functional limitations
		• The IAC should aim to improve coordination between professionals
		• The IAC staff could create a treatment plan and potentially be a contact for older adults between their other appointments

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Chapter 4

Health and social care of home-dwelling frail older adults in Switzerland: A mixed methods study

Olivia Yip, MSc[1], Suzanne Dhaini, PhD, RN[1], Jan Esser, MSc[1, 2], Flaka Siqeca, MD, MPH[1], Maria Jose Mendieta, MD, MPH[1,3], Evelyn Huber, PhD, RN[4], Andreas Zeller, MD, PhD[5], Sabina De Geest, PhD, RN[1, 3], Mieke Deschodt, PhD, RN[6,7], Franziska Zúñiga, PhD, RN[1], Leah L. Zullig, PhD[8, 9, α], Heather A. King, PhD[8, 9, 10, α] and the INSPIRE consortium

[1] Nursing Science, Department of Public Health, University of Basel, Switzerland

[2] Department of Neurosurgery, Medical Center - University of Freiburg, Freiburg, Germany

[3] Academic Center for Nursing and Midwifery, Department of Public Health and Primary Care, KU Leuven, Belgium

[4] Institute of Nursing, School of Health Professions, ZHAW Zurich University of Applied Sciences, Winterthur, Switzerland

[5] Centre for Primary Health Care, University of Basel, Switzerland

[6] Gerontology and Geriatrics, Department of Public Health and Primary Care, KU Leuven, Belgium

[7] Competence Center of Nursing, University Hospitals Leuven, Leuven, Belgium

[8] Department of Population Health Sciences, Duke University School of Medicine, Durham, NC, USA

[9] Center of Innovation to Accelerate Discovery and Practice Transformation, Durham Veterans Affairs Health Care System, Durham, NC, USA

[10] Division of General Internal Medicine, Department of Medicine, Duke University School of Medicine, Durham, NC, USA

[α] joint senior authorship

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4.1 Abstract

OBJECTIVES

We investigated the types of formal health and social care as well as informal care and social support used by home-dwelling frail older adults; whether they perceive their support as sufficient; and their experience with and preferences for care and support.

METHODS

Using an explanatory sequential mixed methods design, we conducted a secondary analysis of a subset (n=2,314) of cross-sectional data from the INSPIRE population survey (using descriptive analysis) and data from 7 interviews (using applied thematic analysis). Results were integrated via a joint display table.

RESULTS

Support from health and social, formal and informal caregivers is diverse and anticipated to increase. Most participants perceived their overall support to meet their needs; however, findings suggest areas which merit attention regarding integrated care concepts and informal caregiver burden.

DISCUSSION

To optimize future care for home-dwelling frail older adults, we recommend efforts to integrate care and prevent risk of fragmentation between health and social as well as formal and informal care.

KEY WORDS
Delivery of healthcare, Integrated; Community-care; Frail elderly; Social support; Formal and informal care

4.2 Background

Aging in place is a common goal for home-dwelling older adults (1, 2), requiring health and social care systems that support the older person to continue to live at home (3, 4). However, living at home independently can become a major challenge for frail older adults (5), who are often faced with functional limitations, multimorbidity and complex care needs (6, 7). They depend on health and social care and support, which may involve multiple formal (e.g., professionals, care organizations) and informal caregivers (e.g., family members, neighbors) (8-10). In the community setting, care and support for frail older adults is often fragmented and uncoordinated (11-13), leaving them at risk for negative health outcomes (12). Care should ideally be based on a formal assessment and tailored to older adults' needs and preferences, as well as integrated (14), whereby interprofessional collaboration and coordination between all relevant caregivers is leveraged to support frail older adults to age in place (15-17).

To help the aging population remain living at home despite their high care needs, and to avoid costly institutional care, there will be an increasing need for both health and social care from formal and informal caregivers (8, 9). *Health care* services include "acute, chronic, preventive, restorative and rehabilitative care", delivered by various providers (18, p.22). *Social care* includes a wide variety of services which provide "physical, emotional and social support to help people live their lives" (19). *Formal care* at home includes health or social services provided by (mostly) paid and trained professionals, such as home care nurses or household services. *Informal care* occurs when care is provided without payment or formal training, typically provided by a spouse, children, family and friends or neighbours (10, 20). Informal care includes assisting with activities of daily living (e.g., bathing and eating), or instrumental (e.g., transportation and finances), assisting with medical or nursing tasks, or providing emotional support (10). Due to the challenges which occur as a result of the fragmentation between health and social care, integration has been promoted and researched for many years (21-23). Both formal and informal care are also well-researched; however, only more recently have researchers and policy-makers considered the intersection of these two approaches to caregiving for home-dwelling frail older adults (20, 24-27), an area of growing interest (25). One study suggests that while non-frail older adults used informal care often as a *substitute* for formal care, frail older adults appeared to use both in *compliment* (8). Although formal and informal caregivers should ideally work together, this is another gap recognized in community-based care for older persons (20, 25). Bridging this "problematic divide" is important when moving towards care integration (17, 28), i.e., optimally

collaborating and communicating on aspects such as shared decision-making and care planning (29, 30), and all caregivers fulfilling their key roles in supporting the older person according to their needs and preferences (5, 17). Therefore, it is helpful to first understand the specific sources and contributions from formal health and social care as well as informal care and social support used and preferred in future by the frail population.

To help meet the needs of home-dwelling frail older adults living at home, the various individuals involved in their care and support have often been studied as "care networks" (5, 8, 27, 31-33), or more recently as "care convoys" (24, 34). Researchers identified the diversity within the structure of care networks or convoys (27), reporting multiple different combinations of informal and formal care use (34, 35). One question that often arises within these studies is whether frail older adults perceive their care and support to meet their needs (5, 34). As shown by Verver *et al's* (2018) study, although frail participants living independently had more formal and informal care providers than their non-frail counterparts, 33.7% of frail individuals did not receive the amount of care and support that they needed, such as social contacts (5). Lambotte *et al* (2020) also noted that a frail person's satisfaction with his/her care convoy did not necessarily mean they had sufficient help, and vice versa (34). Although these needs are bound to increase over time and would likely need to be iteratively re-assessed, it is important to understand in what ways the care and support of frail older adults are meeting their needs and to detect any gaps in care and support.

The present study is part of the larger INSPIRE (ImplemeNtation of a community-baSed care Program for home dwelling senIoR citizEns) parent study taking place in one canton, Basel-Landschaft (BL), an area in the North-western part of Switzerland. A cantonal care law enforced in 2018 ensued that older adults living at home will have access to a new information and advice center (IAC) for advice related to care and nursing in old age, as well as an assessment of needs, and either care coordination or potential nursing home referral (36, 37). In light of the need for care models which integrate health and social care for home-dwelling older adults, the INSPIRE project aims to develop, implement, and evaluate an integrated care model for these IACs (37). A contextual analysis was conducted during the development phase, which included a large population survey (38) followed by interviews with older adults (39) to create an IAC care model which was suited to local health and social needs and preferences. More information on the overall parent study can be found elsewhere (37-39). This article investigates the type and

frequency of formal health and social care as well as informal care and social support that frail older adults are currently using and their future preferences, and to what extent the older adults perceive their support in place meets their current needs. Subsequently, we aimed to gather a more in-depth understanding of their experience and preferences with their care and support.

4.3 Methods

Study Design

We used an explanatory sequential mixed methods design (Figure 1) (40). First, we conducted secondary analysis on a subset of data from the cross-sectional INSPIRE population survey (38) (which was part of the parent study) to understand the composition of individuals/professionals/organizations commonly involved in care, the rates of care/support use and whether support matches needs. To help explain and expand on these results, we used data from interviews with older adults in the INSPIRE parent study (39) (which used Interpretive Description [41]) to gather a deeper grasp of care experiences and add an integrated care lens (40, 42). Hence, we unified this data to quantify and understand the current picture and preferences of frail older adults' formal health and social care as well as informal care and social support.

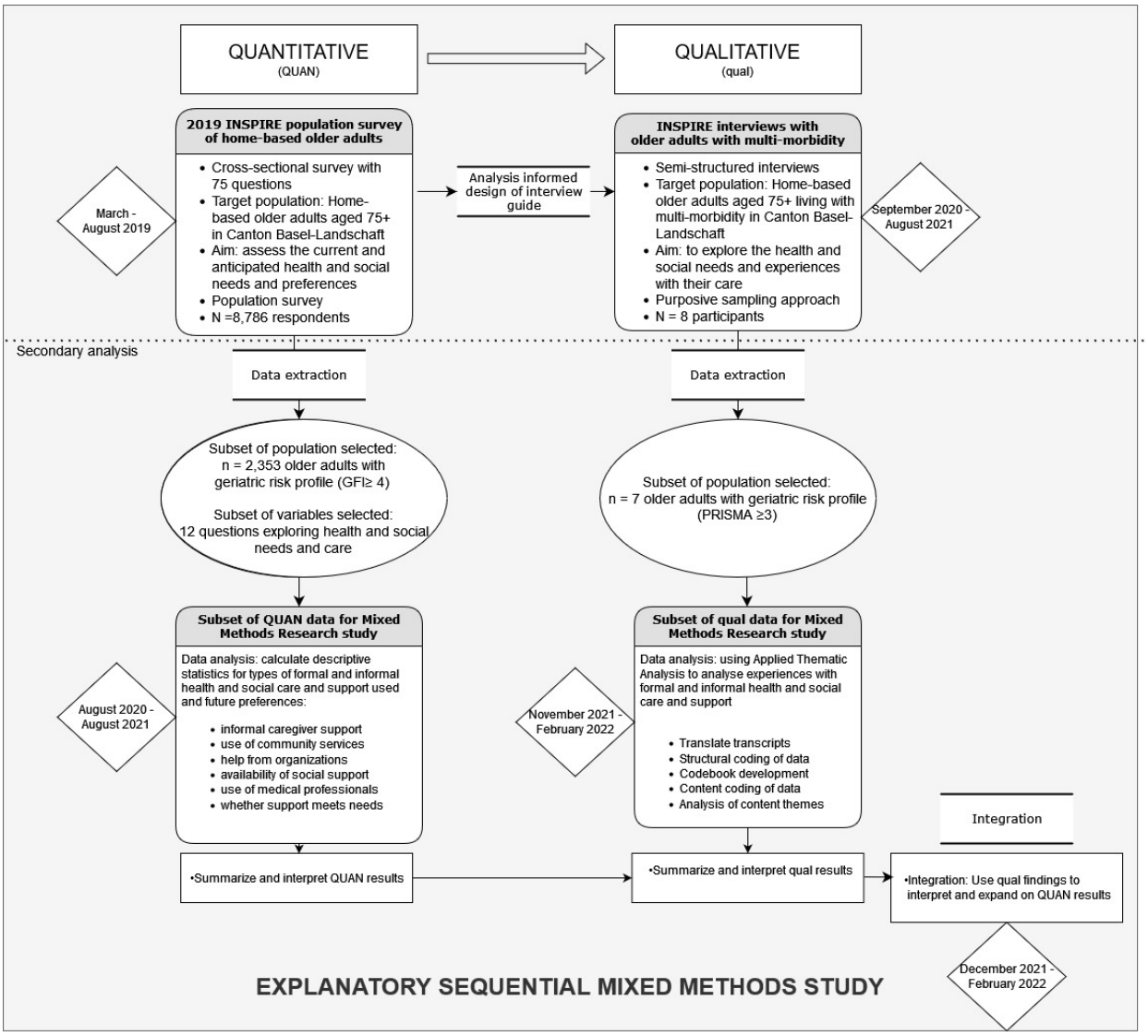

Figure 1. Design of the explanatory sequential mixed methods study of frail older adults' health and social care and support

GFI: Groningen Frailty Indicator (screening tool); PRISMA-7: Program of Research to Integrate Services for the Maintenance of Autonomy (screening tool)*; Note.* The research method which was conducted first is denoted in capitalized letters (QUAN).

Phase 1: Quantitative

Sample

The current study included a sub-sample of frail older adults from the INSPIRE population survey in the parent study. In the population survey, the Groningen Frailty Indicator (GFI) (43, 44) was used to assess the geriatric risk profile of the survey participants (N=8,786; response rate = 30.7%). Regardless of whether participants answered all 15 GFI questions, the quantitative arm of the present study included only those with a GFI score of 4 or more (i.e., considered frail), resulting in a sample of n=2,314 frail older adults.

Variables and Measurements

The development of the questions for the INSPIRE population survey is described in detail elsewhere (38). From this survey, we selected variables which investigated aspects of formal health and social care as well as informal care and social support for this study, as presented in Supplementary file 1. Except for sample characteristics, variables are presented according to adapted domains (i.e., *Individual with multi-morbidity and their environment*, *Workforce, and Leadership and governance*) and concepts (e.g., needs, social support, community services, transport, informal caregiver support, professionals, care organizations, named coordinator, multi-disciplinary team, individualized care planning) of the SELFIE framework, to stay consistent with the organization of results (29). The SELFIE (Sustainable intEgrated chronic care modeLs for multi-morbidity: delivery, FInancing, and performancE) framework has been commonly used in European studies to support development, description, implementation and evaluation of integrated care initiatives, and emphasizes important concepts within integrated care, such as presence of a care coordinator (29).

Socio-demographic information and frailty status

Participants' socio-demographic characteristics were summarized, including age (year of birth), gender, education level, monthly household income, and household members. Additionally, the geriatric risk profile was determined by the individual's GFI score. The GFI is a reliable and valid 15-item instrument for frailty screening (43-45). A GFI score of greater than 4.0 indicates frailty (44).

Individual with multi-morbidity and their environment

Unmet needs: one investigator-designed binary question with a "yes/no" option measured whether the support they receive in everyday life meets their needs; however, it did not differentiate between health versus social support.

Current social support was assessed using the validated German version of the Brief Social Support Scale (BS6) (46). There are six items to be rated on a 4-point Likert scale, divided by tangible support (e.g., how often is there someone available to prepare your meals if you are unable to do it yourself) and emotional-informational support (e.g., how often is there someone available who understands your problems). Responses were dichotomized ("never" versus "sometimes", "often", and "always") for the analysis.

Use of community services (formal care) was measured through two questions to capture the types of community services (e.g., meal services, transportation services) needed or used in 2018 and services which would be considered if they become more in need of help in the future.

Workforce domain

Informal caregiver support in everyday life and preferences for future (if they become more in need of help) was captured through two questions designed by the research team which contained different options for sources of support (i.e., relatives of the same age [e.g., spouse]; younger family members; friends and neighbours; or none).

Whether participants were caregivers themselves was determined through one binary question designed by the research team which asked if they looked after, cared for or supported another person (i.e., children, older persons, or someone with a disability).

Utilization of health care professionals (formal care) in 2018 was measured using three questions which examined frequency of General Practitioner (GP) visits, specialist visits, and an open-ended question for other medical services used.

Use of care organizations (formal care) was measured through two questions to capture the current care organizations providing regular support in everyday life and care organizations preferred in future if they become more in need.

Statistical methods

Consistent with the INSPIRE population survey in the parent study (38), selected socio-demographic variables were descriptively analysed and reported as frequencies, percentages, medians, and interquartile range (IQR) to describe the sample of survey participants. We also included a description of *household members* to support interpretation of care use. Frequencies were reported for dichotomized or categorical survey variables. However, many of the survey questions were set-up to allow each participant to give multiple responses per question. For these questions with multiple response options, the proportion of respondents accounted for by each item were reported. When respondents provided inconsistent answers (i.e., provided a contradictory answer to the question), we excluded them from analysis within the respective survey domain (Supplementary File 2).

For the analysis of the three survey variables, use of *community services, informal caregiver support, and care organizations*, we first dichotomized the responses to indicate whether this type of support was currently used or not. We then selected only those who provided an answer for both current use and future preferences in order to compare them, excluding those who did not provide an answer for future preferences. Following principles of a sensitivity analysis, we analyzed our data with and without the excluded individuals to confirm that the results were not

impacted. Finally, we separately analyzed those who did not currently use the support, but provided data on future preferences, to further inform future predictions.

Missing data was assumed to be missing at random for all questions (except *formal care services*) and therefore excluded, but amount of missing data was reported throughout.

A brief sensitivity analysis was performed to address how we calculated the GFI score. We calculated the total GFI score by summing each score of "0" or "1" to the 15 items that comprise the GFI. We categorized anyone with a GFI score greater than or equal to four as frail, regardless of how many total GFI-items they answered, to avoid losing power. We analyzed to see if the results would have been different had we required an answer to all 15 questions, but values remained consistent.

Analyses were performed using SPSS version 26 (47).

Phase 2: Qualitative

Sample

Using purposive sampling, semi-structured interviews were conducted in the INSPIRE parent study between September 2020 and August 2021 with eight home-dwelling older adults with multimorbidity, defined as the occurrence of two or more chronic diseases (48). Furthermore, individuals had to be using health services provided by at least two care organizations, or three or more different health services provided by one organization. In the current study, we included interview data from individuals who indicated frailty based on the PRISMA-7 frailty screening assessment (49) and considered information power (50) (n = 7). The PRISMA-7 includes seven short dichotomous questions, and was completed by the researchers according to the participants' responses and interactions with them during the interviews, as well as the demographic data collected. The lead author (OY) screened the original interview participants' anonymous PRISMA-7 scores to identify the eligible participants (i.e., scoring ≥3 which is indicative of frailty [49]) for this mixed methods study. The PRISMA-7 assessment instead of the GFI was used in the interviews to reduce burden on the participants, given the majority of the information collected through the PRISMA-7 was easily observable by the researchers or already embedded within the interview questions.

Instruments

The interview guide (see Supplementary file 3) was developed in the parent study to build on the INSPIRE population survey findings and further explore multi-morbid older adults' health and social needs and experience of their care and support. We also incorporated key integrated care

concepts (e.g., person-centered, informal caregiver involvement, a coordinator) from literature such as the SELFIE framework into the interview guide (29).

Analysis

The original, anonymous interview transcripts were translated into English (as the lead author was not fluent in German) according to the following steps: 1) The German transcripts were cleaned from all filler words. 2) As these original transcripts were written in High-German, with Swiss-German nuances included, the transcripts were further cleaned to be fully in High-German. 3) The transcripts were translated from High-German to English. 4) Validation of content was performed only for discrepancies between the two German dialects, or between the German and English languages. Applied Thematic Analysis was then used to analyse the transcripts (51). First, the lead author (OY) created a research map to establish structural codes based on the domains in the interview guide. Next, the lead author performed structural coding on the data using NVivo (52), to organize the data by the structural codes (i.e., according to the concepts from the interview guide or discussion of the concept during the interview), which led to a coding report for each structural code (53). Thereafter, content coding was performed, to analyse the data within each structural coding report (53). A separate codebook was created for each structural code to contain all content codes. For each structural coding report, a memo was written to describe the content codes and help to derive themes.

Techniques to enhance trustworthiness

Given the nature of this study, we considered the following techniques to enhance trustworthiness (54).

Context

The original interviewer made the context of participants' responses fully available through providing access to the transcripts and a thorough written description of the interview setting. Consistent with participants' preferences, most interviews took place in the individual homes of the participants in Canton BL, with one interview taking place at a nursing home during a short stay. Some participants had a family member present during the interview, while others were alone. In most cases, there were two INSPIRE interviewers present.

Rigor

In aiming for consensus, initial results were presented to the larger research team and original interviewers throughout the analysis, to gather feedback and input based on their methodological, clinical and local expertise. A precise codebook was also developed. To maintain

an audit trail, all notes, memos, changes to the codebooks, and analytical documents which were prepared during the study have been archived.

Data Integration

For analysis, we organized the quantitative and qualitative findings according to the adapted domains (e.g., workforce) and concepts (e.g., informal caregiver support) of the same theoretical framework, SELFIE (29). At the interpretation and reporting phase, the quantitative and qualitative findings were first integrated through a joint display table and later synthesized via weaving (i.e., written up together on a concept-by-concept basis), with an explanation of how the themes helped to explain and expand on the statistics (40, 42, 55). With the goal and principles of conducting a value-adding qualitative analysis in mind (56), the original findings from the interviews within the INSPIRE parent study were occasionally included in the results section of this paper, to help explain the survey findings and allow for discourse and reflections targeting integrated care.

Ethical consideration

For ethical review, the population survey was submitted to the Ethikkommission Nordwest- und Zentralschweiz (EKNZ) in Switzerland, BASEC Nr Req-2019-00131. It did not meet the definition of a research project requiring further review as per the Human Research Act ART.2, and was able to move forward as it met the general ethical principles for research involving humans (cf. Art. 51 para. 2 Human Research Act). Data collection for the interviews was approved by the EKNZ under Project ID: 2020-01755. To conduct the mixed methods study, a clarification of responsibility was submitted to the EKNZ, however it did not require further review (Project ID: Req-2021-00170).

4.4 Results

Survey Participants

In total, 2,314 INSPIRE population survey participants were eligible for this study, but not all participants responded to each survey question (Supplementary File 2). There were 594 participants who provided a response to all survey questions discussed in this paper. Participant ages ranged from 75 to 107 years with 60.3% being female (Table 1). The median GFI score was 5.0.

Table 1

Participant characteristics of the INSPIRE Population Survey, for frail respondents (n = 2,314)

Characteristics		% (*n*)	Median [IQR]
Age			83 [79 – 87]
	75-79	27.1% (628)	
	80-84	33.4% (774)	
	85-89	26.0% (601)	
	90-94	10.1% (234)	
	95-99+	3.3% (77)	
Female gender		60.3% (1385)	
Education			
	No degree	1.9% (43)	
	Elementary school	18.6% (421)	
	Vocational training [a]	48.1% (1091)	
	High School [b]	4.9% (112)	
	University [c]	21.5% (488)	
	Other	4.9% (112)	
Household Income (monthly) [d, e]			
	<3000 CHF	14.4% (315)	
	3001-6000 CHF	39.9% (873)	
	>6000 CHF	29.5% (644)	
	Do not know	1.8% (40)	
	Do not wish to answer	14.4% (314)	
Household members [f]			
	Live alone	44.7% (1026)	
	Live with spouse/partner	51.7% (1188)	
	Live with siblings	0.2% (5)	
	Live with adult children	3.2% (73)	
	Live with other[g]	3.4% (79)	
GFI Score [h]			5.0 [4-6]

[a] indicates completion of an apprenticeship (e.g., hairdressing; electrician); [b] High School = a preparatory step for University; [c] University of Applied Sciences or University; [d] Missing data: household income (n=128; 5.5%); [e] a monthly income of 2459CHF was used as the threshold to consider a person at-risk-of-poverty in Switzerland for 2018 for a single person (57); [f] Multiple responses possible, therefore percent of respondents shown; [g] combined response for other adults, professional help or other; [h] possible GFI score range: 4-15

Interview Participants

The characteristics of the seven interviewees in this study are reported as part of Esser *et al*'s (2022) study (39). In summary, four of the interview participants were men; most were single

and living alone; had an education level of vocational training or higher; and had a range of four to eight chronic diseases. The mean PRISMA-7 score was 5.6.

The integration of quantitative and qualitative findings through a joint display table (Supplementary File 4) informed the presentation of results below.

INDIVIDUAL WITH MULTI-MORBIDITY AND THEIR ENVIRONMENT

Needs and preferences

Overall, most survey respondents (94%) perceived that the support they receive in everyday life meets their needs (Table 2). Interviewees described care and support from multiple services or professionals as going well, such as physiotherapy, social, or home care services, the latter described by one as "impeccable" (M3). As also acknowledged by Esser et al (2022), all discussed their strong desire to continue living at home "for me it has always been my goal in life to avoid the nursing home" (M4), and some interviewees occasionally mentioned care challenges they experienced such as difficult relationships with providers (39). Interviewees were pleased when they received personal care which helps them to meet their goals "it's nice when you find the person who can treat you individually. That is a gift" (F4), but also recognized that personal care "is not easy at all, because every person is special in their own way" (F4). Interestingly, while a lack of continuity was occasionally discussed as challenging, others experienced this not to be problematic. One participant pointed out the gaps she sees for others "But where I actually have a big problem… is that I know people who are in a similar situation to mine, who are alone and have no one to help them" (F2). Interviewees mostly felt that an overall assessment of their needs was often not performed but two could see this would be beneficial, while a few believed this had been performed by their home care service.

Social network

Availability of social support was lower for the 'tangible' support items (e.g., having someone to take them to the doctor) ranging from 44-70%, and higher for 'emotional-informational' items (e.g., having someone to talk to about their personal problems) (range: 76-88%). Interviewees gave examples of receiving both types of tangible and emotional-informational support, as one described about their friends:

> "to do with rides, to do errands with and they just do me good mentally, too. ...I just know that I can turn to, so when I have them, when I also, difficulties, that I can go to them, so their help, that I can just share my thoughts. That they understand me" (F4).

Moreover, it was stated that they can "give each other courage" (F4) when discussing with their peers about what can be improved in their situation and that sharing experiences is important. Maintaining a social network was important and sometimes described as feasible, but easier for some to continue in-person contact than others, "I have a lot of visitors. And I didn't know that when you look after your friends that it would come back one day. And it does come back" (F2).

Community services (formal care)

Use of at least one community service was 58% (Table 2); meanwhile a large proportion (42%) reported that they did not need help in 2018 (Supplementary file 2). Of those using services, most participants (57%) appeared to be using multiple different services. Among current and future service users, the highest frequency of responses for current use was for help with the housework (57%), which will be a continued demand in future. Care and assistance at home dramatically increased, becoming the most preferred choice in future (86%), even for those who did not use current services in 2018 (86%; Supplementary File 5). Interviewees also often described their need for support with housework and home care, which also benefits them in additional ways, such as through motivating them "if they didn't come tomorrow… I don't get dressed or I don't wake up and I don't open shutters" (F2). Most types of service use doubled between 2018 and future preferences. Interviewees described various purposes for transportation services, such as to take them to the hospital, a doctor or community service.

There was currently a low use of meal services (13%) despite that many reported they never had someone to help prepare food for them when they are not able to in the Brief Social Support Scale (BS6) questions, yet strong demand for meal services in future (Table 2 and Supplementary File 5).

WORKFORCE DOMAIN OF THE SELFIE FRAMEWORK

Informal caregiver support

Three-quarters of the survey respondents indicated having at least one source of informal care (Supplementary file 2). Of those receiving informal care, 71% of respondents relied on one source while 29% relied on two or more sources listed, and interviewees likewise described diverse informal care sources (i.e., children, spouses, grandchildren, friends and neighbours). Support from family members of the same age (56%) will continue to be sought in future by those who will still want informal care, but the largest increase was seen for younger family members. Of those who did not use informal care in 2018, 55% preferred younger family members provide them support in the future if needed, with many also desiring support from

others e.g., neighbours. As similarly identified by Esser et al (2022), the roles of informal caregivers were diverse, with neighbors helping with mail, transport or checking-in on them, while relatives provided the widest support (e.g., communicating with formal caregivers, arranging services and appointments, cleaning, cooking, accompanying to appointments, managing bank payments) (39). Some interviewees indicated complete reliance on informal caregivers, such as "so if I didn't have her [the daughter], and the son-in-law, then we would be, I would be lost" (M2). Two described how their daughters help encourage their mobility or independence, and one interviewee described his appreciation for his daughter emotionally, "sometimes when she comes and when she leaves I have tears. Because she always helps me so much and does everything for me" (M2). Yet on the other hand, some interviewees stressed the importance of avoiding burden on their family "I'm very happy that I have family (…) but I didn't want to involve them (…) in my care and in my dependence... I want my children to be free of this burden" (M4). Meanwhile, M4 also implied that informal care would come first before being dependent on help. With respect to their own role in informal care, one-fifth (20%) of the survey participants reported also looking after/caring for/supporting someone else (e.g., children, older persons, or someone with a disability).

Professionals (formal care)

Participants were asked how often they visited their family doctor and a specialist in 2018. The majority (60%) had 1-6 visits to the family doctor and a large proportion (37%) had 7-10+ visits. During the interviews, GPs appeared quite central in the older adults' discussions about their care, and were often reported as the main contact person for their health questions, as also seen in Esser *et al* (2022) (39). Likewise, for specialist visits, the majority (67%) also had 1-6 visits, with a decent share having more than 7 visits. Thirty percent indicated they used physiotherapy services in the past year, and many (59%) provided at least one response when asked in an open-ended question about any other medical services they used in 2018, such as a dentist or eye doctor. All interviewees used physiotherapy, who on top of mobility support and exercises, could provide unique value in helping them to practically cope with their situation and for example, taking them for walks in the forest where they would otherwise be restricted to get to:

> "… walked into the woods with the rollator and with our feet in the leaves. And it was just beautiful for the eyes, for the taste, for the walking, that was just beautiful. And she didn't actually do much, she just made sure that nothing happened to me. Isn't that nice?" (F2).

This same interviewee mentioned her appreciation for the (apparently rare) approach taken by her physiotherapist "But that she looks at my physiotherapy holistically … she always asks how I'm doing, she really asks, and this morning she said I should show her how I get out of bed and back in again" (F2). Interviewees often discussed the importance of having interesting or meaningful conversations with professionals (e.g., physiotherapist or home care), and also highlighted when this relationship or obtaining support for tasks has been problematic for them due to language barriers or lack of continuity.

Care organizations (formal care)

The survey question about current use of care organizations had the largest proportion of missing data, as 56% of participants did not answer; however, we assume this is because there was not an answer option available if no organizations were needed. Survey participants using at least one organization in 2018 were 44%, and of those using an organization, most (77%) reported only using one. An interviewee recognized the unique situation they are in to be aging in Switzerland, "we in Switzerland are actually very well provided for with these organizations and associations" (F2). Yet, another recognized that even a good system can be improved. Private help (self-payment) was most commonly used (47%) in 2018 for those indicating both current and future organizational use, although slightly less preferred in future (43%). There was an increase in responses for almost all care organizations, with non-profit aid (e.g., home care support) more than doubling in value, and still anticipated by almost all (88%) who did not respond about current organization use. Interviewees described many formal caregivers from organizations who were involved in their care, providing support with basic and instrumental activities of daily living, as well as household services or taking them out for a walk. Interviewees discussed how they can also count on these care organizations, and their dependence on these organizations, as one described they need accompaniment now to go out for a walk, "so I walk with this bodyguard" (M4). Two of the interviewees brought up challenges during the initial phase of receiving support from care organizations, however expressed that these problems improved over time.

Multi-disciplinary team

While there was no survey data on the remaining topics, additional integrated care concepts were touched on during the interviews. However, it should be noted that while there was no emergence of strong themes in this section, the occasional references made to these concepts shed light on integrated care. When asked about cooperation between providers, one interviewee could imagine challenges with providers trying to cooperate together "there only

has to be a family doctor who has no time and says: 'Who pays me? What's going on? Now I have to go out to the house'. … 'and then we have scheduling difficulties, and who pays for that?'" (F2). Still in relation to cooperation, one imagined that their professionals communicated and two felt there was good cooperation between their home care and their GP. With respect to coordination, while interviewees sometimes experienced lack of coordination between providers (39), they could also envision the benefits of bringing them all together to discuss planning their care, "I could even invite the priest, the oncologist and the psychiatrist… and of course the doctor and home care. That they come and that this [future care] is managed" (F2).

Named coordinator

Esser *et al* (2022) also determined that many interviewees felt no one, except for themselves perhaps, had an overview of their situation (39). While some individuals could imagine this to be beneficial, many were still capable of booking their appointments by themselves or in collaboration with professionals or family members. One gave an example of a care coordination office offered by their home care support provider. Interviewees each mentioned someone different who initially organized their home care support, varying from a family member, their GP and a hospital social worker.

LEADERSHIP AND GOVERNANCE DOMAIN OF THE SELFIE FRAMEWORK

Individualized care planning

One interviewee discussed an interest in having a transparent discussion about care with all stakeholders: "questions come, 'nursing home? In need of care? Can the relatives still handle it?'. I think that should be discussed transparently. And it should be done at a round table" (F2). In comparison to fragmented care she experienced in the hospital, she provided an analogy of how an architect builds something to describe how she could imagine coordinated care planning:

> "[he] was an architect...and when he had to build something, that he always had the carpenter, the electrician, the plumber, the bricklayer, all at one table. And he said: 'So, how is it going? Scheduling: you are dependent on that, he is dependent on that'. This is the only way to get to their goal" (F2).

Table 2

Concepts related to care and support of frail older adults in 2018 and preferences for future, mapped to adapted domains of the SELFIE framework (N = 2,314 unique participants).

	In 2018 % (*n*)	Future preferences % (*n*)
INDIVIDUAL WITH MULTI-MORBIDITY AND THEIR ENVIRONMENT		
Needs		
Support matches needs [a]	93.5% (1947/2083)	
Social support *(Sometimes, often or always)* [b]		
Someone who will take you to the doctor if necessary	61% (1293/2114)	
Someone who prepares food for you when you're not able to	44% (881/1997)	
Someone to help you with your day-to-day work when you're sick	70% (1408/2014)	
Someone who can give you good advice in difficult situations	76% (1556/2046)	
Someone you can trust or talk to about personal problems	88% (1883/2132)	
Someone who understands your problems	88% (1809/2053)	
Community services [c, d, e, *]		
Help with the housework	57% (650/1132)	81% (919/1132)
Care and assistance at home	35% (398/1132)	86% (978/1132)
Meal service	13% (143/1132)	49% (550/1132)
Elderly day care centre[f]	4% (41/1132)	6% (62/1132)
Apartment for older adults	3% (36/1132)	22% (251/1132)
Short stays in a Nursing home	3% (36/1132)	22% (246/1132)
Care centre with nighttime services	1% (16/1132)	2% (25/1132)
Other (e.g., Hospital, cleaning)	14% (157/1132)	3% (37/1132)
I do not know		13% (147/1132)
Transport [c, d, e, *]		
Transportation and assistance services (e.g., to doctor's office, shopping)	24% (274/1132)	51% (572/1132)

DOMAIN: WORKFORCE		
Informal caregiver support [c, e, *]		
Family members of the same age (e.g., spouse, partner)	56% (863/1542)	56% (870/1542)
Younger family members (e.g., children, grandchildren)	55% (845/1542)	67% (1033/1542)
Friends and neighbours	23% (350/1542)	30% (454/1542)
Professionals [d]		
Physiotherapy [c, e]	45% (505/1132)	43% (486/1132)
GP visits[g]		
0 visits	2% (46/2163)	
1-6 visits	60% (1307/2163)	
7-10+ visits	37% (810/2163)	
Specialist visits[g]		
0 visits	16% (328/2045)	
1-6 visits	67% (1376/2045)	
7-10+ visits	17% (341/2045)	
Other medical services (e.g., dentist, eye doctor)	59% (1368/2314)	
Care organizations [c, h, d, e]		
Private help (self-payment)	47% (466/996)	43% (425/996)
Non-profit aid (e.g., home care support)	42% (417/996)	86% (855/996)
Pro Senectute (a non-profit foundation serving older adults)	9% (92/996)	26% (261/996)
Red Cross Baselland	6% (63/996)	10% (100/996)
Associations [i]	3% (27/996)	6% (58/996)
Nursing home		23% (227/996)
Other (e.g., help with cleaning)	20% (195/996)	7% (74/996)

Note. Participants had the opportunity to express their use of health and social care and support across multiple domains. The content domains are not mutually exclusive. Grey boxes indicate that the answer option was not available.

[a] Missing responses = 10%
[b] Missing responses: a) n=200, 9% b) n=317, 14% c) n=300, 13% d) n=268, 12% e) n=182, 8% f), n=261, 11%
[c] % of responses = The proportion of the respondents accounted for by this category due to multiple responses possible. To record responses to questions where respondent can give more than one answer
[d] considered to be "Formal care" in this paper
[e] denominator was restricted to only respondents who answered both questions for current use and future preferences

[f] day care center (e.g., providing advice, support, care and integration)
[g] missing responses – GP: 7%; Specialist: 12%
[h] missing responses – 56% who did not respond and/or are not receiving help from an organization
[i] Associations: Combined values for Alzheimer's association, Parkinson's association and Diabetes association
*older adults who responded that they did not need support were reported in Supplementary file 5

4.5 Discussion

Given the pressing need to organize community-based care and support which helps frail older adults continue to live at home (58, 59), this study aimed to first understand their current and anticipated health and social care and support in context (60), using a large population survey and interviews from the INSPIRE parent study. Overall, the synthesized data indicates home-dwelling frail older adults reported being supported from various formal and informal caregivers. Nevertheless, it is concerning that there remains a small subset of this population who have unmet needs. This is especially true given that the population of older adults in this Canton and Switzerland overall is anticipated to increase (61, 62), along with the demand on formal and informal care as dependency increases (8, 9). When combining our current findings with existing literature, it points to focal elements (e.g., assessment of needs, named coordinator) which merit further attention to optimize integrated care (29), benefiting frail older adults, the system and reducing potential burden on informal carers.

Most home-dwelling frail older adults in our study appeared to receive support which met their perceived needs, although this was a subjective self-reported assessment of needs which we did not further evaluate objectively in this study. Nevertheless, this low rate of unmet needs may be attributed to the reported formal and informal care which also helps them pursue their goal to live independently at home. There is an abundance of care organizations and services available for older adults in this Canton which is consistent with Switzerland generally (63) – a country renowned for its good health care system (64). We postulate that this has contributed to why less than one-tenth of our survey participants perceived a need for more care and support, even when facing frailty. However, the 6.5% of frail older adults with unmet needs are of major concern. When comparing this to a study in the Netherlands, a much higher percent of home-based frail older adults in their survey reported more need for support, albeit their study included a smaller sample and a different measure of frailty (5). Our results also showed that there are several frail older adults who are not using care organizations or services, suggesting that they are less dependent. A fraction of frail older adults themselves were even providing help to others, a finding that has been observed before in Switzerland and believed to "be a good indicator of people's health" (65, p. 14) and helps maintain their "sense of independence" (34, p.591). However, if dependence increases in our population, our findings indicate a potential increased demand on care organizations and services in future to meet the needs of frail older adults. Therefore, to avoid duplication of services and fragmentation in future, this implies that coordination and communication should become progressively important for them to function

together effectively as a care network and also meet the needs of the frail older adult (27, 29). Use of information and communications technology (ICT) could help support care coordination (29, 66).

The synthesis of our findings support insight into the dynamics with involving informal caregivers in frail older adults' care. Some frail older adults reported reliance on their sources of informal care. However, despite increased need, others did not intend to use informal care in the future, due to a fear of burdening informal caregivers, as expressed by interviewees. Our finding corroborated with existing literature which has frequently reported older adults' fear of burdening informal caregivers or asking for help (5, 67-69). Given the diverse roles of informal caregivers noted in our study and the expected demand in future, coupled with the well-known concern that informal caregivers are at risk of burden (10, 29), informal carers - especially relatives - are an important target. It is imperative to intervene as caregiving can impact them in many ways, such as financially, emotionally and psychologically (70, 71). We therefore support Ambugo's suggestion that informal caregivers' needs should also be assessed when assessing the needs of frail older adults, and connected with support (72).

Informal caregivers have an important role from an integrated care perspective in contributing to the care planning and shared-decision making processes for older adults with multimorbidity and/or frailty (29, 73, 74). Furthermore, integrated care may positively impact informal caregivers of frail older adults (75). Some of the burdensome responsibilities of informal caregivers could be alleviated through professionals in the system, for example by the Information and Advice Center (IAC) in the INSPIRE parent study, through helping them to find appropriate services within the system (70). There needs to be a balance between following best practices with involving informal caregivers, yet ensuring frail older adults' preferences are taken into consideration for the level and timing of involvement, and the type of information shared with the informal caregiver. This points to a consideration that professionals or coordinators providing care to frail older adults should be aware of and consider how to navigate and manage.

Our qualitative results regarding integrated care concepts were quite heterogenous and did not generate strong themes. For example, care coordination was a topic which seemed to be of greater familiarity to the researchers (39). Nevertheless, the findings raised a few concerning points from an integrated care perspective, such as suggesting that the needs of home-dwelling frail older adults are not consistently evaluated, yet two interviewees could imagine that someone assessing their needs would be helpful. Integrated care guidance for older adults

confirms that a comprehensive assessment of health and social needs is a key first step in the intervention of older adults with frailty (74). Further, this assessment can help to identify priority conditions associated with declining intrinsic capacity, the type of care needed, and lead to creation of a care plan which is coordinated and tailored to their needs (29, 74, 76). Aside from assessing their original needs, the literature recommends a key person has an overview of their situation, or that there is one consistent point of contact who manages referrals and coordinates care, among other duties (29, 66, 77). Yet, consistent with our quantitative findings, our qualitative data indicated these are relevant gaps in frail older adults' care, from our view as health researchers. Informal caregivers have also suggested that they would rather turn to one person to arrange care (70, 78).

Overall, our study largely confirms what is existing in the literature on these topics, but brought more light to the power of understanding each individual older adults' care situation in context, which is fostered by person-centred integrated care. These results have meaning on a local level for the IAC, and could also be applied to similar community-based services aiming to assess older adults' needs and support care coordination and integration, if appropriate in context. In the context of our research where the care law requires the IAC to be independently-run and include a specialist nurse to assess needs, the IAC staff will also need to collaborate well with the many formal and informal carers involved, could maintain an overview of the frail older adults' situation, and help to relieve the burden on informal caregivers. Furthermore, by identifying each individual's formal and informal caregivers involved and understanding their roles, a named coordinator can for example "map a care network," as a starting point for care planning discussions between the older person as well as all relevant caregivers, as suggested by Grol *et al* (15). As a next step from our research, we support building from Janse *et al*'s (2017) work in aiming to capture the evolving dynamics between informal and formal care when studying integrated care of home-dwelling frail older adults (25).

Strengths and limitations

Given the complexity and diversity of frail older adults' care, our study is one of the first mixed methods studies to gather a more comprehensive understanding of the types of care and support used, as well as experience and future preferences of home-dwelling frail older adults, as a precursor to implementing an integrated care model. This leveraged the strengths of both quantitative and qualitative approaches to address our research question (40, 42). However, our study comes with some limitations which need consideration. First, as mentioned in the population survey and interviews within the INSPIRE parent study, the non-random sampling

strategy used for the population survey and limited sample size for the interviews (due to recruitment issues which may have been related to the Covid-19 pandemic), could result in biases, weakening the generalizability and transferability of our results (38, 39). Furthermore, all interview respondents were using multiple services (due to inclusion criteria), which appeared to always include home care services, therefore not representing the segment of the frail older population with no home care support. While appropriate for our research question, this leaves uncaptured voices of those who need help and support but are not receiving it, which may also be a relevant point about our survey respondents. In addition, given that care is dynamic whereby different caregivers are relied on throughout time (79), this study is only capturing a snapshot in time. Nevertheless, it gives some insight into perspectives of our target population and points to areas which could benefit from future research. In hindsight, it would have been ideal to be able to capture more questions specific to integrated care during the INSPIRE population survey, but we were limited with the survey length in accordance with stakeholder input. Fortunately, the interviews provided the opportunity to expand and collect some qualitative information on topics where we were not able to collect quantitative data first. Finally, use of some formal care providers (e.g., pharmacists, dentists) were not assessed in the survey. Future research that explores care networks of frail older adults should include all possible constituents.

4.6 Conclusion

Most frail older adults in Canton BL appear well-supported, receiving formal health and social care as well as informal care and social support from various sources. Given the anticipated demand for future care and support of home-dwelling frail older adults, we recommend that efforts are in place to prevent fragmentation between health and social care as well as formal and informal care. Further research could also explore dynamics within the care networks of home-dwelling frail older adults as well as older adults with unmet needs.

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4.8 Supplementary material

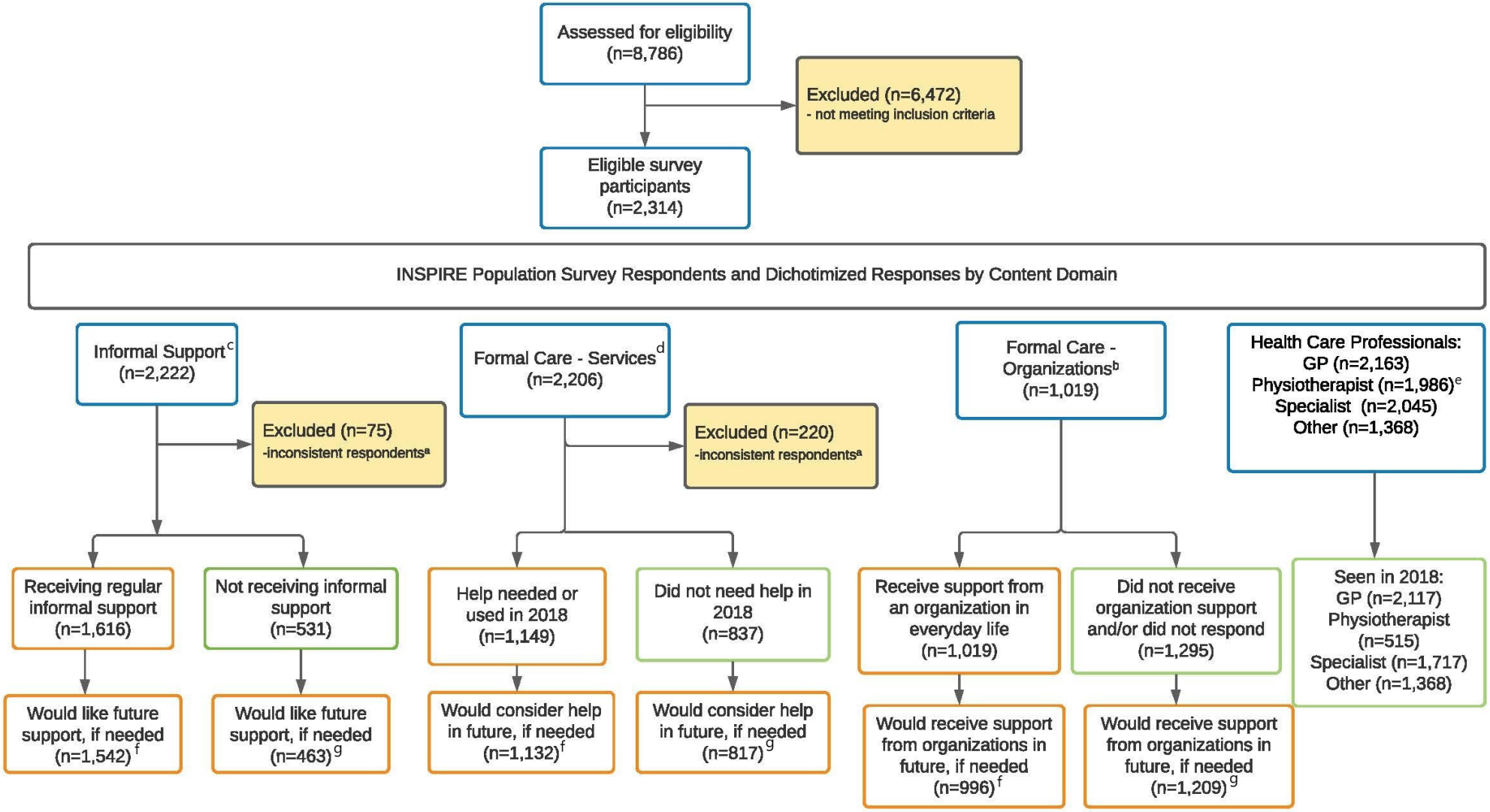
4.8.1 Supplementary File 1. Survey questions extracted from the original INSPIRE Population Survey (translated from German) (38)

Survey Section	Survey question	Response options
What support are you currently receiving?	From whom do you receive regular support in everyday life? *Please check all possible answers.*	Family members of the same age (e.g., spouse, partner), younger family members (e.g., children, grandchildren), friends and neighbours, I don't need
	From which organisations do you receive regular support in everyday life? *Please check all possible answers.*	Non-profit aid (e.g., Spitex), Private help (self-payment), Alzheimer's Association, Parkinson's Association, Diabetes Association, Red Cross Baselland, Pro Senectute, Other
	What kind of help do you need or did you use in 2018? *Please check all possible answers*	I didn't need any help in 2018, Care and support at your home (public organization, private organization), Help with the housework (public organization, private organization), Meal service, Physiotherapy, Transport and assistance services (e.g., to the doctor, shopping), Day clinic, Night clinic, Old-age flat, Short stays in old people's homes/nursing homes, Other
	How often is the following support from other people available to you?* *Whether by professional people or support from family/friends* a. someone who will take you to the doctor if necessary b. someone who prepares food for you when you're not able to c. someone to help you with your day-to-day work when you're sick d. someone who can give you good advice in difficult situations e. someone you can trust or talk to about personal problems f. someone who understands your problems	Never, sometimes, often, always (repeated for sub-questions a-f)
	Does the support you receive in everyday life meet your needs?	Yes, I'm getting the support I need; No, I need more support
	Do you look after, care for or support another person yourself? E.g., children, elderly people, people with a disability	Yes; No
What about the support in the future?	If you become more in need of help, which people do you prefer to receive regular support from in everyday life? *Please check all possible answers*	Family members of the same age (e.g., spouse, partner), Younger family members (e.g., children, grandchildren), Friends and neighbours
	If you become more in need of help, which organizations do you prefer to receive regular support from in everyday life? *Please check all possible answers*	Non-profit aid (e.g., Spitex), Private help (self-payment), Alzheimer's Association, Parkinson's Association, Diabetes Association, Red Cross Baselland, Pro Senectute, Other

	If you become more in need of help, which of the following services would you consider? *Please check all possible answers*	Care and support at your home (public organization, private organization), Help with the housework (public organization, private organization), Meal service, Physiotherapy, Transport and assistance services (e.g., to the doctor, shopping), Day clinic, Night clinic, Old-age flat, Short stays in nursing homes, Don't know, Other
How often did you need medical help in 2018?	How many times did you visit your family doctor in 2018?	__ times; or more than 10
	How often did you visit a specialist in 2018?	__ times; or more than 10
	What other medical services did you use in 2018?	*Open-ended question*

Pro Senectute: a non-profit foundation serving older adults; * = BS6 questions

4.8.2 Supplementary file 2: INSPIRE population survey respondents and dichotomized responses by content domain



Note: There were 2,314 unique survey participants. This figure shows the number of respondents per question of each content domain on the top level (blue), and the dichotimized responses per question within each domain below (orange and green). The respondents across the domains are not unique.

[a] inconsistent respondents = individuals who provided a contradictory answer to the question
[b] the survey question about use of current formal care organizations did not provide an answer option to indicate not using any organizations
[c] missing data = 4%
[d] missing data = 5%
[e] physiotherapy values shown excluded inconsistent respondents
[f] reported in Table 2
[g] reported in Supplementary file 5

4.8.3 Supplementary File 3. Interview Guide from parent study (translated from German) (39)

Introductory question	**Enquiries (general)**
• Can you tell me something about what health and physical complaints are currently (most) bothering you?	• How do you feel about it? • Can you tell me more about it? • Did I understand you correctly ...? • I am not sure if I have understood this correctly, can you please explain it to me again? • What happened then? • How was that for you? • Can you give me an example/examples?
Overview of everyday life	
• Can you tell me about the support you receive for your care, health and day-to-day needs during an ordinary week?	
Reference to socio-demographic data	**Enquiries (specific)**
• You have indicated that you currently receive support from XXX *(check all supporting organisations).* Can you please describe to me what your day-to-day care and support is like from these organisations/professionals? • You have stated that you currently receive support from your relatives/friends/neighbours. Can you tell me how this came about and how exactly they support you?	• How did it come about that these organisations in particular support you? Was there anyone who told you about it or advised you beforehand? • What is the current situation for you?
Questions about the current care situation	
• How does the involvement of the supporting organisations affect you and your daily life? • Can you tell me what works well in your current care situation? • In what way does your current care and support situation meet your (personal) needs? • Can you tell me about difficulties in the current situation? • Are there any age-related problems that you can't get help with?	• How are your personal needs and goals taken into account by the organisations supporting you? • Can you tell me who you contact when they have questions about your current care situation or health? • Are there any issues where you would like more advice or information? Can you tell me more about why this would be important for you?
Needs assessment	

• Can you tell me if anyone has ever looked at your situation as a whole with you and considered what kind of support you need?	**If yes, one or two follow-up questions as examples:**
	• To what extent was your _____ discussed with you?
	  ○ housing situation
	  ○ social network
	  ○ physical condition, for example pain or mobility
	  ○ mental state
	  ○ medical situation, for example illnesses and medication
	• What other topics would you have liked to discuss?
	• How were you informed about and prepared for the coming changes and new organisations?
	If No
	• What would be different for you if someone looked at your overall situation with you?

Coordination and communication	
• Can you tell me something about the extent to which the professionals you deal with collaborate or consult with each other about your situation and needs? • Is there someone who, in your opinion, keeps an eye on and manages your care as a whole?	• What did you experience as positive in the cooperation or communication with the professionals? • What is difficult in the cooperation or communication with the professionals? • Can you tell me if there is someone you turn to when it comes to planning and organising upcoming appointments? • Which appointments are all planned and organised by this person? What role do their relatives/friends/neighbours play in planning appointments or the communication with professionals?
Needs / Imagination of future care	
• Can you tell me what your ideas and wishes are for future care and support if you imagine your current complaints increasing or new complaints being added? • What would good cooperation between all the professionals, organisations and relatives/friends/neighbours supporting you look like? • When planning future care and provision for older people, what should special attention be paid to?	• What could be improved so that your personal needs are given more weight? • What is particularly important to you?
Closing	
• Is there anything else that has not yet been addressed but that you would like to say?	

4.8.4 Supplementary file 4: Joint display table integrating study findings from the INSPIRE population survey and interviews

	INSPIRE population survey	INSPIRE interviews	
Concept from SELFIE framework	**Findings**	**Themes / explanation of survey finding**	**Examples of supporting illustrative quotes**
Individual with multi-morbidity and their environment			
Needs and preferences	• 94% perceived their support matches their needs	• Satisfaction with care from services/ professionals • Dependence on providers/services • Strong preference to stay living at home (39) • Desire personal care • Occasional care gaps and challenges (39) • Assessment of needs (+/-)	"Tip top" (M2) "I have to have Spitex [home care] anyway" (F3) "So, no, I never discussed the overall situation with anyone" (M4)
Social network	• Availability of social support was lower for tangible items and higher for emotional-information items	• Receive tangible and emotional-informational social support • Importance of social network	"The neighbours would also do errands for me, take care of errands, do the shopping" (F4) "Sharing experiences is important with peers and with others" (F4)

Community services (formal care)	• 58% using at least 1 service (and of those, over half using 2+); 42% did not need any services
	• Most common services used now and preferred in future:
	  ○ Help with the housework
	  ○ Care and assistance at home
	• Large increased demand for services from now to future (e.g., meal services)
		• Often described their need for support with housework and home care
		• Commonly received support with ADLs and IADLs
		• Provides social interaction or motivates them
			"That means they clean my flat, cook for me if I want them to, take me for walks and go shopping with me. She makes my bed, so she actually does the housework for me" (M4)
			
			"I like to talk to this woman" (M4)

Workforce			
Informal care	• 75% had at least one source of informal care • Over half currently use support from family members of the same age, and largest increase to future was for younger family members • Those not using informal care now most commonly prefer younger family members in future.	• Multiple informal caregivers involved who fulfill various roles • Reliance on informal care, especially relatives • Dynamics with informal caregivers • Fear of burdening informal caregivers	The wife "does everything" (M3) "You have to get up alone. You have to do it alone" (F3) "I don't want to be the center of my family's attention with the illness" (F2)
Professionals (formal care)	• 60% had 1-6 visits with GP, 37% had 7-10+ visits • 67% had 1-6 visits to specialist • 30% used physiotherapy • 59% had visits with other medical professionals	• Various formal providers involved serving variety of functions • GP as the main contact person for questions about their health (39) • Physiotherapist often involved in care - unique value • Importance of relationships with professionals	"If I have special questions then I discuss it with the family doctor" (M1) "And with the physio or certain other acquaintances I can still discuss other topics" (M4)
Organizations (formal care)	• 56% did not answer this question • 44% using at least 1 organization • If still wanting help in future, currently private help was most common (47%) but dropped for future • Non-profit help doubled in value and was also most popular in future for those not receiving help currently	• Multiple organizations involved • Satisfied with organizations and grateful to be in Switzerland • Dependence on organizations • Challenges during initial phase of receiving support from the organization, but problems improved over time.	"can also count on" [the organizations] (F2) "we in Switzerland are actually very well provided for with these organisations and associations" (F2) "But at the beginning, of course, it's a mad tangle (F2)"

4.8.5 Supplementary file 5. Concepts related to care and support of frail older adults in 2018 and preferences for future, mapped to adapted domains of the SELFIE framework, including only respondents who indicated no current use for each question respectively, but responded for future preferences

	In Future % of respondents [a] (n)
CORE: INDIVIDUAL WITH MULTI-MORBIDITY AND THEIR ENVIRONMENT	
Community Services and Transport [b]	
Help with the housework	76% (620/817)
Care and assistance at home	86% (706/817)
Transportation and assistance services (e.g., to doctor's office, shopping)	37% (302/817)
Meal service	49% (399/817)
Elderly day care centre[c]	5% (39/817)
Apartment for older adults	25% (206/817)
Short stays in a Nursing home	14% (112/817)
Care centre with night services	1% (11/817)
Other (e.g., Hospital, cleaning)	2% (18/817)
DOMAIN: WORKFORCE	
Informal caregiver support	
Family members of the same age (e.g., spouse, partner)	44% (202/463)
Younger family members (e.g., children, grandchildren)	55% (254/463)
Friends and neighbours	43% (198/463)
Professionals	
Physiotherapy [b]	25% (204/817)
Organizations [b]	
Private help (self-payment)	25% (309/1209)
Non-profit aid (e.g., Spitex home care)	88% (1064/1209)
Pro Senectute (non profit foundation serving older adults)	30% (359/1209)
Red Cross Baselland	7% (82/1209)
Associations [d]	5% (59/1209)
Nursing home	24% (287/1209)
Other (e.g., help with cleaning)	3% (37/1209)

Note. The content domains are not mutually exclusive

[a] % of responses = The proportion of the respondents accounted for by this category due to multiple responses possible
[b] considered to be "Formal care" in this paper
[c] day care center (e.g., providing advice, support, care and integration)
[d] Associations = Combined values for Alzheimer's association, Parkinson's association and Diabetes Association

Chapter 5
Protocol for a mixed methods feasibility and effectiveness-implementation hybrid study of a community-based integrated care model for home-dwelling older adults (INSPIRE)

Olivia Yip[1], Maria Mendieta Jara[1], Matthias Briel[2], Carlos Quinto[3], Matthias Schwenkglenks[4], Flaka Siqeca[1], Mieke Deschodt[1,5,6], Samuel Stenz[1], Andreas Zeller[7], Leah L. Zullig[8,9], Franziska Zúñiga[1], Sabina De Geest[1, 10 *], Suzanne Dhaini[1]

[1] Nursing Science, Department of Public Health, University of Basel, Basel, Switzerland

[2] Department of Clinical Research, Basel Institute for Clinical Epidemiology and Biostatistics, University Hospital Basel, Basel, Switzerland

[3] Aerztegesellschaft Baselland, Basel, Switzerland

[4] Department Public Health, Institute of Pharmaceutical Medicine (ECPM), University of Basel, Basel, Switzerland

[5] Gerontology and Geriatrics, Department of Public Health and Primary Care, KU Leuven, Leuven, Belgium

[6] Healthcare and Ethics, Faculty of Medicine and Life Sciences, UHasselt, Hasselt, Belgium

[7] Department of Clinical Research, Centre for Primary Health Care, University of Basel, Basel, Switzerland

[8] Department of Population Health Sciences, Duke University School of Medicine, Durham, North Carolina, United States of America

[9] Center of Innovation to Accelerate Discovery and Practice Transformation, Durham Veterans Affairs Health Care System, Durham, North Carolina, United States of America

[10] Academic Center for Nursing and Midwifery, Department of Public Health and Primary Care, KU Leuven, Leuven, Belgium

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5.1 Abstract

Background

Evaluations of integrated care models for home-dwelling frail older adults have shown inconclusive results, yet limited research has focused on the implementation. Implementation science methods may facilitate the potential of integrated care models to generate positive outcomes. This study aims to determine the feasibility and effectiveness of a contextually-adapted integrated care model (including screening, a comprehensive geriatric assessment, an individualized care plan and follow-up) in a community-based center for home-dwelling older adults in Switzerland. The feasibility study will assess recruitment feasibility; implementation outcomes; and perceptions of service users and care professionals about the care model. The effectiveness study will 1. determine the impact of the integrated care model on person-centred coordinated care (primary outcome) for frail home-dwelling older adults compared to usual care, as well as other secondary outcomes, and 2. assess implementation and process outcomes through a process evaluation.

Methods

The feasibility study uses a descriptive design and a parallel convergent mixed methods design, to ultimately inform adaptations to the care model and implementation strategies to support its use. The effectiveness study is a quasi-experimental pre-post study with a hybrid type 1 effectiveness-implementation design. The control and intervention groups will each include a convenience sample of 93 home-dwelling frail older adults, comparing outcomes such as person-centred coordinated care at baseline, 3- and 6-months. Interviews with the intervention group and their informal caregivers will further explore person-centred coordinated care. Data on fidelity, coverage and sustainability will be synthesized for the process evaluation. Implementation costs will be calculated using time-driven activity-based costing methods.

Discussion

This study of a contextually-adapted integrated care model may improve person-centered, coordinated care for home-based frail older adults and contribute knowledge about the feasibility and implementation process.

Trial Registration

Feasibility study registration ID with clinicaltrials.gov: NCT05302310; registration ID with BMC: ISRCTN12324618

Keywords
Hybrid type I implementation/effectiveness; Implementation Science; Delivery of healthcare, Integrated; Community-care; Frail elderly

5.2 Introduction

Care fragmentation is a prominent issue in the care of home-dwelling older adults (1, 2). Home-dwelling older adults are a growing population, often striving to maintain independence despite their rates of multimorbidity and/or frailty (3), and complex health and social needs (4, 5). Health and social care systems can encompass integrated person-centered care to meet home-dwelling older adults' needs (1). Achieving integrated person-centered care requires actions at the system, service and clinical levels, such as conducting comprehensive assessments of older adults at risk and forming networks between providers, to help improve service coordination within and between sectors (6). Despite the strong evolving frameworks and guidance on planning and delivering integrated care for this population (7-9), implementation of integrated care is complex and challenging (10, 11). Moreover, evaluations of integrated care for home-dwelling older adults have demonstrated limited evidence of effectiveness (12-15); however, these evaluations have rarely assessed the implementation during their evaluation (10, 15, 16), which is a critical gap in integrated care research.

Systematic reviews on integrated care for home-dwelling older adults with multi-morbidity and/or frailty have found inconclusive results for health and service outcomes, and heterogeneity in view of the intervention components and delivery, as well as outcomes selected (13-15, 17-19). Kumpunen et al. (2020) propose three ideas behind why integrated care initiatives often fail to produce the results expected, relating to their design, delivery, or evaluation (20). With respect to their delivery, there are many known barriers to implementing integrated care, including training, leadership, trusting relationships, unclear roles, among others (11, 20). Therefore, studies should include a major focus on the implementation of integrated care, by for example engaging stakeholders, measuring implementation outcomes (e.g., fidelity) and investing in implementation strategies (e.g., educational outreach visits) to overcome implementation barriers, which is a common gap in studies in the field (10, 15, 16). Incorporating principles and methods from the implementation science field should help facilitate the uptake of integrated care in practice (10, 15, 16, 21, 22) and thereby enhance their effectiveness.

With respect to integrated care models in Switzerland, three important factors can help contextualize this study: Switzerland is known to have a fragmented system; integrated care initiatives are less advanced than in other European countries (23, 24); and while there are many health and social offers available to older adults, they are not centrally coordinated or easy to navigate (25). As previously described (26), a new care law in the Canton Basel-Landschaft (BL; an area in the north-west of Switzerland), required re-organization of the Cantonal municipalities into 8 new care regions. Furthermore, each care region needed to establish an Information and Advice center (IAC) to support older adults with questions about care and nursing in old age. Our research team collaborates with the Canton and care regions on a multi-phase implementation science project, INSPIRE (ImplemeNtation of a community-baSed care Program for home dwelling senIoR citizEns; *See Chapter 1, Figure 1*), aiming to develop, implement and evaluate an integrated care model for the IAC. The INSPIRE project includes three phases based on the Medical Research Council framework for developing and evaluating complex interventions (27), with phase one described elsewhere (26). This study protocol describes phase two, where we will conduct a feasibility study, and phase three, where we will evaluate the effectiveness of the integrated care model and conduct a process evaluation.

5.3 Methods

The methods below are reported according to the StaRI (28, 29) and SPIRIT 2013 guidance (30).

Overall project: Study setting

The overall study will be conducted in the community-based IAC in one care region of Canton BL, Switzerland. The IAC is a new center which employs a manager, administrative support, a nurse and a social worker.

5.3.1 Phase 2: Feasibility Study

Study objectives

The primary objective of the feasibility study is to 1) assess feasibility of recruitment to the IAC and evaluate recruitment strategies, 2) assess the implementation of the integrated care model at the IAC with respect to adoption, acceptability, feasibility, fidelity, implementation and feasibility costs, and implementation processes related to collaboration, and 3) explore

perceptions of older adults and their caregivers, the IAC nurse and social worker, and collaborating health and social care providers (e.g., GP, home care nurse) towards the implemented care model, and if adaptations are needed to the care model or the implementation strategies.

Study design

For objective 1, a descriptive design will be conducted to monitor and evaluate the IAC recruitment strategies. To address objectives 2 and 3, a parallel convergent mixed methods observational design will be used, integrating data on the care model implementation from quantitative (e.g., IAC administrative data) and qualitative sources (e.g., interviews).

Study context, population, eligibility criteria, and sample size

A contextual analysis was previously performed using the Context and Implementation of Complex Interventions (CICI) framework (31), resulting in a rich description of contextual factors and the implications on the intervention and implementation strategies, which is reported in detail elsewhere (26).

This study is comprised of multiple samples, divided here into service users and care professionals.

Service users: Older adults and informal caregivers

"All visitors": all individuals who visit/contact/have a home-based appointment with the IAC.

"Older adults": a consecutive sample of consenting German- or English-speaking older adults who had a visit at the IAC or at their home; had an IAC health record created; are aged 64+ and live at home. Individuals who are residing in a nursing home or are receiving end-of-life care will be excluded. We estimate a maximum of 18 older adults will participate.

"Older adult - interviewees": Using a purposeful sampling strategy, a nested sample of "older adults" (described above) who have a frailty screening score (using the Groningen Frailty Indicator [GFI]) of ≥4, receive a Comprehensive Geriatric Assessment (CGA) by the IAC staff, are aged 75+ and consent (or by proxy), will be invited for interviews. Individuals would be excluded from interviews if they are participating in another study with health-related interventions within the 30 days preceding or during the present study. We estimate approximately 8-12 interviewees. As analysis will be occurring in parallel with data collection, we believe information power (a concept proposed by Malterud et al. (2015) which can help inform sample size) could likely be achieved in a minimum of 8 interviews (32).

"Informal caregivers": described in table 1.

Care professionals: IAC nurse and social worker and external collaborators

Criteria and sample size for "IAC staff" and "External collaborators" are described in Table 1.

Table 1. Inclusion and exclusion criteria for informal caregivers, IAC staff and external collaborators

	Inclusion criteria	Exclusion criteria	Sample size
Informal caregivers	• a participating older adult agrees they can be contacted • attendance at the IAC appointment with the older adult	• the older adult did not allow their study invitation • no attendance at the IAC appointment	• 8-12
IAC staff	• IAC nurse (i.e., a geriatric nurse expert) and IAC social worker	• IAC administrative support and IAC manager	• 2
External collaborators	• health or social care providers (e.g., GPs, home care nurses) who according to the IAC health record have worked together with the IAC staff in coordinating care for a participating older adult	• Providers who have not contributed to the coordination of care with the IAC staff	• 18

Supplementary file 1 describes the flow of selected sample sets to collect the study data.

Recruitment

Recruitment strategies, such as letters, flyers, and outreach meetings (which were selected based on the literature and stakeholder collaboration to be culturally appropriate), will be used to promote the IAC across the community. The recruitment strategies and respondents will be tracked for assessment. Study recruitment of service users and care professionals will last for around two to three months.

Service users: Older adults and informal caregivers

The IAC nurse will inform eligible older adults about the study. The research team will contact older adults and their informal caregivers to invite them to participate.

Care professionals: IAC nurse and social worker and external collaborators

The IAC staff and collaborating external professionals (identified via IAC health records) will be invited to participate by the research team.

The INSPIRE care model – a complex intervention

As a result of the activities in the development phase (i.e., a literature review, contextual analysis, and stakeholder involvement) (26), we developed the care model (i.e., a complex intervention) concept for the IAC and described the underlying program theory using a logic model. Though originally outlined in our development paper (26), the care model starts with screening of older people for risk of frailty using a frailty screening tool, the Groningen Frailty Indicator. This tool will be administered at intake to identify the appropriate care required. Older adults with low risk of frailty (GFI < 4) will receive health promotion and preventive care from the IAC social worker. Older adults at risk of frailty (GFI ≥ 4) will receive a Comprehensive Geriatric Assessment (CGA), which will be delivered by the IAC nurse and social worker over two to three appointments. The IAC nurse will complete the WHO ICOPE guidance for person-centred assessment and pathways in primary care (ICOPE Handbook) screening tool (7) to identify six "priority conditions associated with declining intrinsic capacity" (i.e., cognitive decline, limited mobility, malnutrition, visual impairment, hearing loss, and depressive symptoms). Any areas that require further assessment as well as additional domains (e.g., sleep and medications) will be assessed, providing interventions and referrals when needed. This first section of the CGA is expected to take between 30 to 60 minutes, depending on the number of assessments required and the older adults' situation.

The IAC social worker will conduct the second part of the CGA (approximately 30 minutes) in the older person's home, assessing social care and support (e.g., finances, living environment) following an adapted version of the respective WHO ICOPE care pathway. Based on the assessment data, an individualized care plan will be created by the IAC nurse and social worker, and discussed with the older person as well as their informal caregivers and professionals involved in their current care. The IAC staff will coordinate the care plan and

follow-up accordingly. However, for older adults at highest risk and/or who have come to the IAC with a recommendation from a care professional for referral to a Nursing Home, the IAC staff will determine whether a potential Nursing Home referral is needed in collaboration with other professionals involved in their care.

Implementation Strategies

We selected and operationalized implementation strategies to support the care model based on factors identified in the development phase (e.g., our contextual analysis, evidence from the literature), and input of our operational partners (26). Consistent with the Expert Recommendations for Implementing Change (ERIC) taxonomy, the strategies included: *use evaluative and iterative strategies; adapt and tailor to context; develop stakeholder interrelationships; train and educate stakeholders; support clinicians;* and *engage consumers* (33), all of which are contextually-adapted and reported in more detail elsewhere (26). To expand on one essential strategy, *train and educate stakeholders,* the training curriculum (e.g., physiology of ageing and geriatric syndromes, CGA competencies, community health leadership and communication) was carefully designed by the research team for the IAC nurse and social worker. Extra training was given on requested topics such as delirium and dementia. The training program for the IAC nurse and social worker has taken approximately 31 hours to date (as part of the IAC staff's regular hours) and includes consulting by the research team when needed. Additional implementation strategies have since been added, which are described in Table 2.

Table 2. Additional implementation strategies for INSPIRE presented using the Expert Recommendations for Implementing Change (ERIC) compilation

ERIC cluster	ERIC Implementation strategy	Description of the implementation strategy in the INSPIRE project
Change infrastructure	Change record systems	The INSPIRE team will meet with IAC staff to adapt the software used in the IAC.
Train and educate stakeholders	Provide ongoing consultation	The INSPIRE team will provide ongoing support to the IAC staff (e.g., coaching, telephone calls, and/or supervision).

Supplementary file 2 describes the research team roles, the roles of the IAC staff who are delivering the care model, and the areas reflecting collaboration.

Outcomes

Individual characteristics of consenting older adults will be collected weekly from the IAC health record to describe this sample. These include: Demographic data (i.e., year of birth, gender, education, number of people living in the same household, and household constituents), Geriatric risk profile (via the Groningen Frailty Indicator (34)), Cognition (via the ICOPE Screening questions and mini-cog [7]), Depressive symptoms (via the ICOPE screening questions and mood assessment [7]), Multimorbidity, Nutritional status (via the ICOPE screening questions and Mini Nutritional Assessment – Short Form [35]), and Fall history.

For objective 1, outcomes related to recruitment feasibility and strategies are derived from external and internal processes. For example, outcomes include the types of outreach strategies (e.g., letters, flyers) used to promote the IAC, the respondents (e.g., # of hospitals who administer flyers to staff) to those strategies, and the referral source for an older adult. For objectives 2 and 3, there are six implementation outcomes: *adoption, acceptability, feasibility, fidelity*, *implementation processes* related to collaboration, and *implementation and feasibility costs*. *Implementation processes* related to collaboration with the IAC staff will be assessed from the perspective of the external collaborators through the NoMAD survey. All outcomes are summarized in Table 3.

Table 3. Summary of feasibility study variables and data sources

Variables	**Variable description/definition**	**Data source (and data type[1,2])**	**Data collection timeframe**
Objective 1			
External processes: Recruitment feasibility and strategies			
Outreach strategies to promote the IAC	Strategies (e.g., letters, flyers, meetings) to promote the IAC to GPs, Specialized physicians, Hospitals, organizations caring for older adults (e.g., home care, Red Cross), Nursing homes and day/night center, older adults and their families, community venues, Seniors' organizations and general public	• IAC administrative data[1]	• Weekly
Respondents to outreach strategies	Individuals who respond to an outreach strategy		
Internal processes: Recruitment feasibility and strategies			

# of service users and appointments	The total number of visitors to the IAC or home-based appointments, and the number of appointments	• IAC administrative data[1]	• Weekly
Visitors' socio-demographics	Age, gender, municipality of residence		
Reason for appointment/ contacting the IAC and referral source	The primary reason for contacting the IAC/booking an appointment and the source of referral for each older adult who visits the IAC		
Type of service received by visitors	The number of older adults who during their IAC appointment receive either a) health promotion and prevention; b) a full CGA; c) a brief assessment to confirm whether a nursing home referral is warranted; or d) other		
Objectives 2 & 3			
Implementation outcomes			
Adoption	The intention or action of the IAC staff to employ the care model (53)*.	• IAC staff meeting log[2]	• Regular meetings will be held with the IAC staff
Acceptability	The perception among IAC staff and service users that the care model is agreeable (53)*.	• IAC staff meeting log[2] • Older adults & informal caregiver interviews[2]	• Regular meetings will be held with the IAC staff • Interviews will be held within two-weeks of second appointment
Feasibility	The perception among the IAC staff and service users that the care model is feasible (53)*. Feasibility will be assessed for each component of the care model and overall.	• IAC staff meeting log[2] • Older adults & informal caregiver interviews[2]	
Fidelity	The degree to which the care model is implemented according to protocol (53)*, primarily based on the assessments conducted.	• IAC health record[1] • IAC staff meeting log[2]	• Weekly and at the end of the study

Implementation processes – collaboration	The implementation processes related to collaboration between IAC staff and external health and social care professionals to coordinate care for an older adult (36). This will be captured from the perspective of the external professionals who collaborate with the IAC staff.	• The Normalization MeAsure Development questionnaire (NoMAD [1]) (36)	• Towards the end of the study
Implementation + feasibility costs	The time-driven activity-based cost of the implementation and of the feasibility evaluation (37)	• IAC administrative data[1] and INSPIRE document-ation[1]	• Daily

[1] Quantitative; [2] Qualitative; * Definitions adapted from Proctor et al. (2011)

Data collection methods

External and internal processes: Recruitment feasibility and strategies

Summarized IAC administrative data will be provided to the research team. The IAC health records of participating older adults will be reviewed by the research team to capture individual sample characteristics and assess fidelity using the investigator-created fidelity tool (Supplementary file 3).

Implementation outcomes

To collect perceptions of implementation outcomes, the research team will individually interview eligible older adults, i.e., “interviewees”, and their informal caregivers (separately) during 45-minute semi-structured interviews. Meetings will be held with the IAC staff to explore their perspective on implementation outcomes. To assess the IAC implementation processes regarding the collaboration with external professionals for care coordination, external collaborators will be asked to complete the NoMAD questionnaire (36). To calculate implementation costs, data will be extracted from the IAC administrative data and the research team’s documentation on frequency of activities, time spent per activity per actor, and non-personnel resources invested.

The interview guides/meeting logs were created by the research team and piloted with their respective target audience. Data collectors will be trained on appropriate procedures regarding consent, confidentiality, techniques for conducting interviews, and the fidelity tool.

Data management

Study data on older adults, informal caregivers, and IAC staff will be securely stored in Castor Electronic Data Capture (EDC).

Statistical methods / Data Analysis

For objective 1, we will calculate descriptive statistics to describe the recruitment feasibility data. For objectives 2 and 3, descriptive statistics (e.g., mean and SD, median and IQR) and frequencies will be calculated and reported to describe participant demographics, study fidelity and survey results. Our research team will use rapid qualitative analysis as described by Hamilton (38), to analyze qualitative data from the interviews and meeting logs. Two INSPIRE researchers will participate in the interviews/meetings and take notes on a pre-structured meeting log consistent with the conceptual model domains. A template will be prepared *a priori* with the main topics to summarize the researchers' notes (38). These notes will be coded, analyzed for themes, and further analyzed using a matrix analysis (38). Interviews will also be audio recorded should further verification or transcription be needed. The main actionable findings will be shared to guide further implementation in real time.

We will collect and analyze quantitative and qualitative data in parallel before the quantitative and qualitative results will be merged through side-by-side comparisons in joint displays or in discussions. Similarities and differences will be described between data types.

Time-driven activity-based costing methods will be used to calculate implementation costs and feasibility costs, based on estimations of activity frequency and time invested per job category (37).

Adaptations to the intervention and implementation strategies

Any adaptations that occur during the feasibility phase will be tracked using the updated Framework for Reporting Adaptations and Modifications – Expanded (FRAME) for the intervention adaptations (39), and FRAME for Implementation Strategies (FRAME-IS) for modifications to the implementation strategies (40).

5.3.2 Phase 3 – Evaluation: Effectiveness Study

Study aim

The primary objective of the effectiveness study is to evaluate the impact of the IAC integrated care model on the perception of person-centred, coordinated care for frail home-

dwelling older adults – and their informal caregivers – compared to usual care. The secondary objective is to determine the impact of the IAC care model on patient outcomes (i.e., treatment burden, symptom burden, functional decline, potentially inappropriate medications [PIMS], health-related quality of life) and on health care utilization outcomes (i.e., incidence of emergency department visits, unplanned hospital admissions, and nursing home referrals), compared to usual care. The third objective is to conduct a process evaluation to determine fidelity to the care model components, as well as coverage and potential sustainability of the care model. The fourth objective is to assess the implementation costs.

Study design

For objectives 1 and 2, a quasi-experimental pre-post study with a hybrid type 1 implementation-effectiveness design will be used to evaluate the effectiveness of the integrated care model. For objective 3, the process evaluation, a parallel convergent mixed methods study will take place, synthesizing data on fidelity, coverage, and potential sustainability from quantitative (e.g., IAC health records) and qualitative sources (e.g., focus group). The specific methods of objective 4 are still under development, pending stakeholder input, and will focus on economic outcomes.

Study population, eligibility criteria and sample size

Service users: Older adults and informal caregivers

"Older adults – intervention group": a sample of German or English-speaking older adults aged 75+ who live at home in the care region under study, have their first IAC -or home-appointment, a GFI score ≥4, and give informed consent (or proxy). Integrated care is especially relevant for these individuals who have complex health and social needs.
"Older adults – control group": German-speaking older adults aged 75+; living at home; attending their GPs practice; have a GFI score ≥4 and provide informed (or proxy) consent.

For a clinically significant difference of two points in the Person-Centered Coordinated Care Experience Questionnaire (P3CEQ) (mean= 8.5 points, SD±4.5 vs. mean=10.5 points, SD±4.5) (41) to become statistically significant with an α of 0.05 and a power of 80%, we should recruit a total of 162 older adults (81 intervention; 81 control). However, accounting for a drop-out

rate of 15% due to loss-to-follow-up and mortality, 186 participants will be recruited (93 intervention; 93 control).

"Intervention group – interviewees": To be included in the interviews, older adults from the intervention group (described above) must have received the full CGA by the IAC staff. We will interview a randomly selected nested sample of up to 20 older adults.

The same exclusion criteria apply for all older adults: if they reside in or have a planned permanent admission to a nursing home; were previously enrolled in the INSPIRE feasibility study or are participating in another study with health-related interventions within the 30 days preceding or during the present study; have a GFI score <4; or are receiving end-of-life care.

"Informal caregivers": See table 1 for a description of the 20 informal caregivers who will be interviewed.

Care professionals: IAC nurse and social worker and external collaborators

"IAC staff" and "external collaborators": See table 1 for a description of the 2 IAC staff who will be part of the focus group and 93 external collaborators.

Outcomes

Baseline variables

The same baseline variables as those described in the feasibility study will be collected from older adults in the intervention and control groups of the effectiveness study, with the addition of two variables: polypharmacy (i.e., consumption of 5 or more medications) (42) and instrumental activities of daily living (IADL). Data on IADL will be collected using the Lawton and Brody scale, which measures (in)dependency for eight functional activities (43).

Effectiveness outcomes

Table 4 summarizes the effectiveness, implementation and process outcomes.

Person-centred coordinated care is the primary outcome measured through assessment of five core domains in the Person-Centered Coordinated Care Experience Questionnaire (P3CEQ) (41). This outcome reflecting care experience is especially pertinent to capture given the critique of outcomes selected for past similar studies (13, 14). Additionally, the perception

of P3CE will be explored through interviews with the intervention group and their informal caregivers.

Secondary outcomes will be collected from both the intervention and control groups: *Functional status, treatment burden, symptom burden, health-related quality of life, Emergency Department (ED) visits, unplanned hospitalizations,* and *nursing home admission rate.* In addition, *number of potentially inappropriate medications (PIMs)* will be measured by asking older adults the number and types of medications they are taking during the study period. This information will be analyzed by the research team using the Screening Tool of Older Persons' potentially inappropriate Prescriptions/Screening Tool to Alert doctors to the Right Treatment (STOPP/START) criteria, which helps identify potentially inappropriate prescriptions (44, 45).

Process and implementation outcomes

Fidelity will be defined and measured in the same way as in the feasibility study. A focus group with the IAC staff will explore their experiences and identify factors that can affect dose and adherence to the care model.

Coverage will be estimated by dividing the number of frail older adults contacting the IAC by the estimated total home-dwelling frail older adults in the care region. To estimate the denominator, we will use the frailty estimate from the INSPIRE population survey (46) combined with Cantonal population data of the number of home-dwelling older adults. Additionally, we will explore factors that may facilitate or hamper coverage through the IAC staff focus group.

As an indicator for *potential sustainability* of the collaboration, the implementation processes related to collaboration between the IAC staff and external care providers will be assessed through the NoMAD. This data which reflects the integration into the external care providers' daily work will be compared to the NoMAD results from the feasibility study (i.e., baseline data). Barriers and facilitators for potential sustainability of the collaboration will be collected through the IAC staff focus group.

Implementation costs will be calculated using a time-driven activity-based costing model (37).

Table 4. Summary of effectiveness study variables and data sources

Outcomes	Outcome description/definition	Label of sample set	Data source (and data type[1,2])	Data collection timeframe
Primary outcome				
Person-centred, coordinated care	Assesses older adults' experiences of the five core domains of person-centered, coordinated care	• intervention + control group • interviewees + informal caregivers	• Person-Centered Coordinated Care Experience Questionnaire (P3CEQ) [1] (41) • Older adult and informal caregiver interviews[2]	• baseline, 3- and 6- months follow-up • approximately one month after their 2nd IAC appointment
Secondary outcomes				
Functional status	Assesses functional independence in the activities of daily living (ADL), in the domains of self care and mobility.	• intervention + control group	• Barthel index[1] questionnaire (10-item version) (47)	• baseline, 3- and 6- months follow-up
Treatment burden	Assesses the impact of interventions on treatment burden specifically for patients with multimorbidity		• Multimorbidity Treatment Burden Questionnaire (MTBQ) [1] (10-item tool) (48)	
Symptom burden	"as the sum of the severity and impact of symptoms" (49)		• 10 patient-reported symptoms[1] (49)	
Potentially inappropriate medications (PIMS)	Prescriptions will be identified which should be avoided and prescribing omissions to be used		• STOPP/START criteria[1] (44, 45)	
Health-related quality of life	An indication of health status based on health status in five domains (mobility, self-care, usual activities, pain/discomfort and anxiety/depression) and a self-rating of health state on a scale from best to worst imaginable.		• EQ-5D-5L[1] descriptive system and visual analogue scale (50)	
Emergency Department visits	The all-cause number of visits to the Emergency Department	• Intervention group • Control group	• P3CEQ[1] (baseline) • IAC health record (follow-up) • P3CEQ[1] (baseline) • GPs health record/phone calls (follow-up)	

Unplanned hospitalizations	"An unexpected admission for management of a severe disease or treatment-related event that cannot be controlled in the outpatient setting" (51)	• Intervention group • Control group	• P3CEQ[1] (baseline) • IAC health record (follow-up) • P3CEQ[1] (baseline) • GPs health record/phone calls (follow-up)	• baseline (for the previous six months) • 3- and 6- months
Nursing home admission rate	Referral date to nursing home	• Intervention group • Control group	• IAC health record[1] • GPs health record[1]	• 3- and 6- months
Process and Implementation outcomes				
Fidelity	*Defined in feasibility study above; table 3.*	• Intervention group • IAC staff	• IAC health record[1] • IAC staff focus group[2]	• Weekly and at the end of the study • End of study
Coverage	the degree to which the population that is eligible to benefit from an intervention actually receives it (52).	• Intervention group • IAC staff	• IAC administrative data[1] + INSPIRE population survey and Cantonal data[1] • IAC staff focus group[2]	• End of study • End of study
Potential sustainability of collaboration	the extent to which the collaboration between the IAC staff with external health and social care providers is maintained within the service setting (53)*	• External collaborators • IAC staff	• NoMAD [1] (36) • IAC staff focus group[2]	• At 6-months • End of study
Implementation costs	The time-driven activity-based cost of the implementation	• IAC staff and INSPIRE research staff	• IAC administrative data[1] and INSPIRE documentation[1]	• Daily

[1] Quantitative; [2] Qualitative; * Definition adapted from Proctor et al. (2011)

Recruitment

Recruitment of service users and professionals will last for approximately one year.

Service users: Older adults and informal caregivers

The recruitment procedures of "older adults – intervention group" and "informal caregivers" will be the same as described for the feasibility study. A randomization strategy will be used to select a nested sample of older adults to interview. The control group will be recruited through support from a home care agency.

Care professionals: IAC nurse and social worker and external collaborators

Same as feasibility study procedures.

Data collection methods

Primary and secondary outcomes

For the effectiveness study, the research team will review IAC health records of the intervention group to extract baseline data on three of the secondary outcomes, which will be collected from the GPs health record for the control group. Questionnaires will be mailed to the intervention and control group to measure the primary and remaining secondary outcomes, at baseline, as well as 3- and 6-months follow-up. Participants will be informed each time a questionnaire is sent, thus if the phone call recipient shares that the older adult is in the hospital, nursing home or has died, this data will be recorded. Individual 45-60 minute semi-structured interviews with the "intervention group – interviewees" and (separately) with informal caregivers will be held with the research team.

Process and implementation outcomes

For the process evaluation, the IAC health record of the intervention group will be reviewed to determine fidelity by completing an investigator-designed fidelity tool. A 45-60 minute focus group will be conducted with the IAC staff to explore implementation outcomes. We will extract data on coverage from the IAC administrative data. The NoMAD questionnaire will be administered in the same fashion as described in the feasibility study. Implementation costs will be calculated using IAC administrative data and the research team's documentation.

Statistical methods / data analysis

Baseline and outcome data will be explored using visual and descriptive statistics and analyzed for missing data. Categorical data will be expressed as number of cases and percentages. Continuous data will be expressed as means with standard deviations. All primary analyses will be conducted on the total sample.

For the primary outcome, we will use generalized linear mixed regression modelling to test changes on the P3CEQ score between baseline, 3- and 6- months follow-up.

Secondary outcomes will use the same analysis approach, except for unplanned hospitalization and nursing home admissions, where we will use Kaplan-Meier and Cox survival analyses for time to event variables and regression analysis will be done. Statistical

inference will be based on 95% confidence intervals, without correcting for multiple testing. All analyses will be conducted using R version 4.0.2 (54). We anticipate that the following baseline factors can influence the endpoints: older adults' geriatric risk profile (measured through GFI score), number of comorbidities, number of medications, and older adults' health care utilization. Hence, these variables will be controlled for as confounding factors.

Data from the interviews and focus groups will be analyzed using rapid qualitative analysis, as described in the feasibility study.

With respect to data synthesis, to assess the primary outcome, P3CE, results from the interviews will be used to help explain the results of the quantitative data. For the process evaluation, a parallel convergent mixed methods approach will be used, where all process-related data collected will be merged in joint displays for side-by-side comparisons.

Time-driven activity-based costing methods will be used to calculate implementation costs, based on estimations of activity frequency and time invested per job category (37).

Overall project: Ethical considerations and informed consent

The feasibility study was submitted to the Ethikkommission Nordwest- und Zentralschweiz (EKNZ) in Switzerland, EKNZ 2021-02430. The effectiveness study will be submitted to the EKNZ for ethical review and approval in April 2022.

For both phases 2 and 3, written informed consent is sought from the research team via signature from all study participants (except external collaborators whose consent is implied by survey completion) and proxy consent is requested for an older adult if the nurse is concerned about the older adults' capacity to consent to the research study.

Overall project: status

Data collection for the feasibility study will be from March – June 2022. Once analysis of the feasibility data is complete and any adaptations are made, the effectiveness study will begin, expected to be in summer 2022.

5.4 Discussion

To contribute knowledge about whether integrated care for frail older adults is effective in practice and fill an important gap of understanding *how* it could be successful, this study applies implementation science methods across all project phases. The contextually-adapted integrated care model in this study could generate positive outcomes on a patient-, provider-

, and system-level, including improved quality of life and care coordination; as well as reduced costs and hospitalizations. It could potentially transform health and social care provision and coordination for older adults in the Canton, as well as creating a blueprint for other Cantons in Switzerland and beyond. Meanwhile, the literature on integrated care is also awaiting studies which demonstrate *how* to effectively implement integrated care (10, 22, 55, 56), a gap which we attempt to address by incorporating implementation science methods and a process evaluation.

At the political level, study findings will be beneficial for the local policy-makers who introduced the APG care law, and may help determine encouraging aspects that promote care integration. However, given that integration processes are accepted as challenging, complex, and are fairly demanding on stakeholders and professionals (57), it is crucial to take into account lessons from previous research. Therefore, we are utilizing strategies suggested by Looman et al. (2021), such as building a multidisciplinary team culture, and shaping roles and competencies for integrated care (56).

The study brings unique attributes to help increase its chances for success. Of primary importance is the incorporation of implementation science methods, increasing the potential for the research findings to be usable in the real world (58). At its foundation, this began with heavy efforts invested into the development phase to ensure the care model and preliminary implementation strategies were evidence-informed, contextually-appropriate, and that there is clear logic underlying the program (26). To assess feasibility and effectiveness of the integrated care model, the current study incorporates key elements of implementation science such as measuring implementation and effectiveness outcomes; using implementation strategies and a hybrid effectiveness-implementation design; and stakeholder involvement (59). Furthermore, it incorporates a feasibility phase as a prerequisite to determine if any adaptations are needed before evaluating effectiveness (60). Likewise, a process evaluation will reveal how implementation is going and contribute information on the intervention sustainability (60). Study findings will be disseminated through reports and presentations, academic products, and the INSPIRE website and social media account.

A few potential study limitations should be noted. First, while an RCT design was originally planned, the local stakeholders opted for an alternative evaluation design to ensure a more inclusive approach for their community. Second, the COVID-19 pandemic adds unpredictable

variability to the study as pandemic measures could impact whether the center has to experience any temporary closures, older adults' comfort with visiting the IAC, and the IAC's ability to collaborate with other professionals. Third, although generalizability of the results may be slightly jeopardized as the care model is contextually-adapted, the core components should be an appropriate blueprint locally and beyond. Fourth, the collaboration with, and execution by, care professionals in the community instead of solely researchers presents as both a strength and limitation, as there is more potential for sustainability but also less researcher-control. Nevertheless, the pragmatic "real-world" nature of this study and the methodology used which is grounded in implementation science, remain major strengths.

In conclusion, this is among the limited studies to our knowledge which develop and assess the feasibility and effectiveness of an integrated care model for home-dwelling frail older adults using implementation science methods to increase its chance for success.

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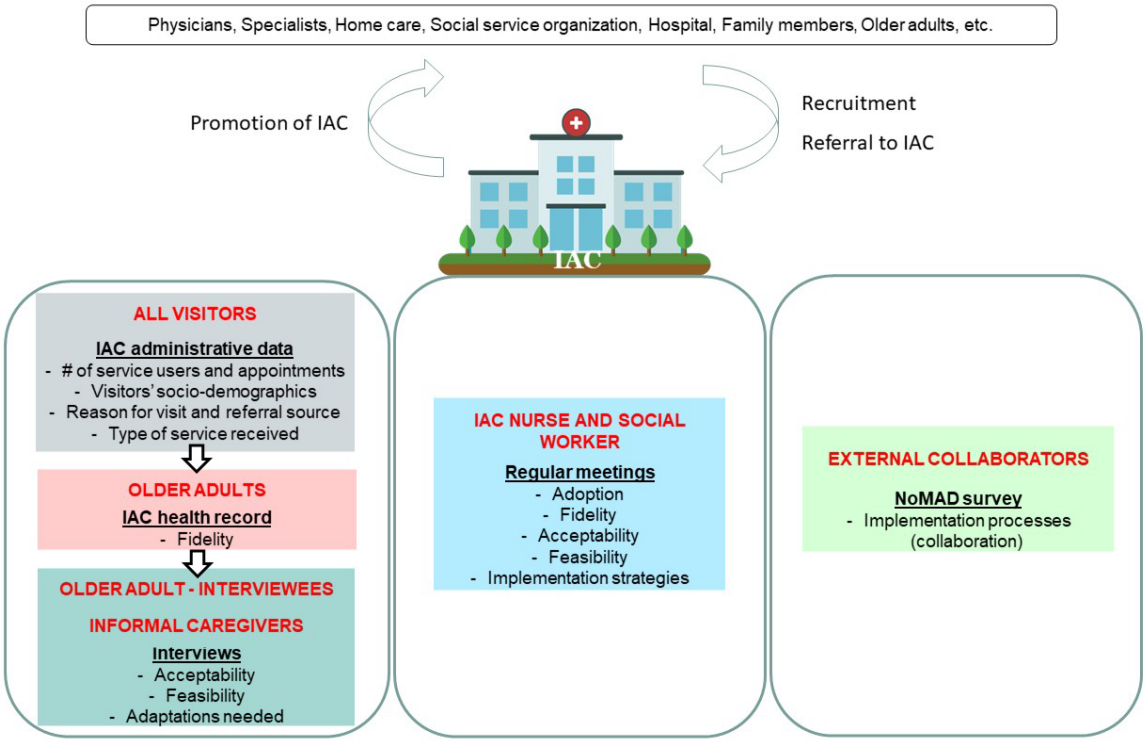
5.6 Supplemental Files

5.6.1 Supplemental file 1. Feasibility study samples, data sources, and outcomes



5.6.2 Supplemental file 2. Describing the roles/activities of the IAC staff and the INSPIRE research team during the feasibility study

IAC Roles		INSPIRE Roles
Research roles		
1A. informs eligible older adults about the study 1B. clarifies IAC health record information as needed	←→	1. collects data from IAC health records
		2. conducts interviews with older adults and informal caregivers
2. participates in meetings with INSPIRE staff		3. organizes meetings with IAC nurse and social worker
		4. analyzes data and prepares report
3. collaborates with external health and social professionals for care planning		5. develops and administers NoMAD survey to external professionals
		6. manages consent process for all participants
Implementation roles		
1. provides IAC services (e.g., provides health promotion and prevention; conducts CGA; nursing home referral) to home-dwelling older adults and provides input on documents	←→	1. creates process flow, develops educational materials, shapes roles and competencies, conducts ongoing training, organizes meetings with IAC staff
2. conducts outreach strategies to promote the IAC, provides input, and distributes educational materials	←→	2. develops educational materials for recruitment strategies and assesses recruitment feasibility
		3. tailor strategies

←→ denotes partnership or collaboration in planning/execution

5.6.3 Supplemental File 3. Fidelity tool

Purpose of tool: to determine the degree to which the intervention was implemented as it was planned in the original protocol. Fidelity will be measured with this tool using two data sources: 1) reviewing patients' IAC health record; 2) nurse and social worker's other notes to determine if the intervention was delivered as intended. The tool below describes the quantitative fidelity items.

- Types of files to be reviewed = INSPIRE study participants only
- # of files to be reviewed in feasibility study = consecutive sample of all eligible participants
- Individual responsible for data entry = INSPIRE research team
- Data entry schedule = every week and once at the end of the feasibility study to review completion of follow-up activities
- Scoring is done by tallying up the (1)'s at the end to calculate the percentage of the number of cases in which specific component was scored with "yes"/1 over the total number of IAC health records (FHR) reviewed.
- Comments section is for analysts to track any questions which may need clarification from IAC staff or any important details (e.g., if the CGA had to be paused because patient wasn't feeling well)

1. Was there a CGA for this client? ☐ **YES** ☐**NO**

If no, what type of service was completed for this client?

☐ **Health promotion and prevention** ☐**Nursing home referral** ☐ **Other: _____**

➔ **Stop data collection.**

If yes, please complete the tool below.

Participant Code: _____

	Data Source	**YES**	**NO**	**N/A**	**Comments**
SCREENING AND DOCUMENTATION					
1A. Was the GFI completed in the IAC health record (FHR)?	*FHR*	YES (1)	NO		
1B. Was a FHR created for each older adult seen by the nurse?	*FHR* IAC tracking of clients	YES (1)	NO		
COMPREHENSIVE GERIATRIC ASSESSMENT					
2A. Is the CGA section in the FHR completed by both the nurse and the social worker?	*FHR* *Definition of CGA completed: if the screening questions and further assessments are completed by the nurse and social assessment completed by the social worker during their first 1-3 appointments with the IAC*	YES (1)	NO		
2B. Which sections of the CGA were completed?	*FHR* *Assessment is considered "performed" if the questions were asked for each section.*				
Screening questions - Priority conditions associated with declines in intrinsic capacity					

○ Were screening questions completed on cognitive decline?		YES (1)	NO		
○ Was further assessment of cognitive decline completed?		YES (1)	NO	N/A If no further assessment was required based on screening results	
○ Were screening questions completed on limited mobility?		YES (1)	NO		
○ Was further assessment of limited mobility completed?		YES (1)	NO	N/A If no further assessment was required based on screening results	
○ Were screening questions completed on malnutrition?		YES (1)	NO		
○ Was further assessment of malnutrition completed?		YES (1)	NO	N/A If no further assessment was required based on screening results	
○ Were screening questions completed on visual impairment?		YES (1)	NO		
○ Was further assessment of visual impairment completed?		YES (1)	NO	N/A	

				If no further assessment was required based on screening results	
○ Were screening questions completed on hearing loss?		YES (1)	NO		
○ Was further assessment of hearing loss completed?		YES (1)	NO	N/A If no further assessment was required based on screening results	
○ Were screening questions completed on depressive symptoms?		YES (1)	NO		
○ Was further assessment of mood completed?		YES (1)	NO	N/A If no further assessment was required based on screening results	
Assessment questions – Additional health assessment					
○ Was an assessment of sleep performed?		YES (1)	NO		
○ Was an assessment of fall risk and history performed?		YES(1)	NO		
○ Was an assessment of pain performed?		YES (1)	NO		

○ Were health concerns and conditions collected?		YES (1)	NO		
○ Were medications reviewed and analyzed according to the STOPP/START criteria?		YES (1)	NO		
○ Was the GP contacted to get additional information on health history and medications?		YES (1)	NO		
Assessment questions – Social Care and Support					
○ Was a socio-environmental assessment performed?		YES (1)	NO	N/A No assessment with social worker	
○ Was an assessment of the activities of daily living completed?		YES (1)	NO	N/A No assessment with social worker	
○ Was an assessment of living accommodations completed?		YES (1)	NO	N/A No assessment with social worker	
○ Was an assessment of financial concerns completed?		YES (1)	NO	N/A No assessment with social worker	
○ Was an assessment of leisure interests completed?		YES (1)	NO	N/A	

				No assessment with social worker	
○ Was an assessment of elder abuse risk completed?		YES (1)	NO	N/A No assessment with social worker	
3. CARE PLANNING, INTERPROFESSIONAL COLLABORATION AND PATIENT/FAMILY INVOLVEMENT					
3A. Was a care plan created in the IAC health record?	*FHR*	YES (1) *Care Plan is considered created if the problems have been identified and the list of actions have been discussed with the patient (and caregiver) and discussed/shared with the GP within two weeks after the CGA was finished.*	NO	N/A	
3B. Have the IAC Nurse and Social Worker met at least once to discuss the care plan (within 10-working days of the CGA being completed)?	*FHR* *Nurse and social worker's records*	YES (1)	NO	N/A The patient didn't see the social worker	
3C. Have the IAC nurse/social worker shared or discussed the assessment or care plan with other relevant health and social professionals if they were part of the patients' current care (within 5 working days)?	*FHR* *Nurse and social worker's records*	YES (1)	NO		

(Eg health professionals, social support services, other support services (housing, meals, transportation)					
3D. Is there clear documentation of the goals of the older adult that has a care plan?	*FHR*	YES (1)	NO		
4. REFERRAL					
4a. In an older adult identified as needing referral to another health or social professional/service during the CGA, were referral suggestions included in the care plan?	*FHR*	YES (1)	NO	N/A *No referral was needed*	
4b. In an older adult identified as needing referral to another health or social professional/service during the CGA, were any referrals arranged?	*FHR*	YES (1)	No	N/A *No referral was needed*	
5. FOLLOW-UP AND COORDINATION					
5a. If the older person needed a follow-up appointment with IAC staff according to the care plan, was the appointment scheduled?	*FHR*	YES (1)	*NO*	N/A *No follow-up was needed*	
5b. If the older person needed a follow-up appointment according to the care plan, did the follow-up appointment take place in the time frame defined for the older person?	*FHR*	YES (1)	NO	N/A *No follow-up was needed*	
5c. Did the IAC nurse or social worker follow-up with an older person if there is any indication that their condition has changed (e.g., a report of hospitalization, a letter from GP, phone call from family?)	*FHR*	YES (1)	NO	N/A *No indication that the patient's*	

				condition had changed	
6. INTERVENTIONS					
6a. If the nurse detects problems during the CGA, are nursing actions (e.g., health counselling and prevention) taken as per the protocol? Examples include:	*FHR*	(1) IF EITHER OF THE BELOW ARE COMPLETED			
• Providing teaching and advice/recommendations when appropriate		YES	YES	N/A	
• Providing support and resources when needed		YES	NO	N/A	

Total score = ___ / 37 (or total score reduced by "1" for each N/A selected)

Chapter 6
Synthesis and Discussion

As described in the introduction, this dissertation describes the research conducted during the development phase of a large community-based integrated care project for frail older adults, using an implementation science approach. To fill gaps in the understanding of implementation of integrated care (1-4), this study lends insight regarding building and implementing a contextually-adapted integrated care model. Furthermore, the dissertation describes the evaluation plan for how we will assess the feasibility and effectiveness of the care model along with the implementation. This final section summarizes the unique approach which guided our development work using The Basel Heptagon of Implementation Science (5); our findings during the development phase; provides interpretation and discourse to the findings; and describes the methodological strengths and limitations. The dissertation closes with implications for practice, policy, and research of future integrated care projects.

6.1 Basel Heptagon of Implementation Science

To the best of our knowledge, the INSPIRE project is one of the few studies to apply various implementation science methods to the design and evaluation of an integrated care model for home-dwelling frail older adults. As outlined in the Basel Heptagon of Implementation Science, there are several key elements involved in this approach (Figure 1). Through INSPIRE, we demonstrate the value of understanding contextual factors, cultivating stakeholder relationships and gathering their input, assessing the evidence, and developing a logic model, which resulted in a contextually-adapted integrated care model. The care model will be supported by a selection of implementation strategies and its implementation and effectiveness will be assessed through a hybrid effectiveness-implementation design, measuring both summative and implementation outcomes. The Basel Heptagon will also be used as the outline for the discussion of the key findings.

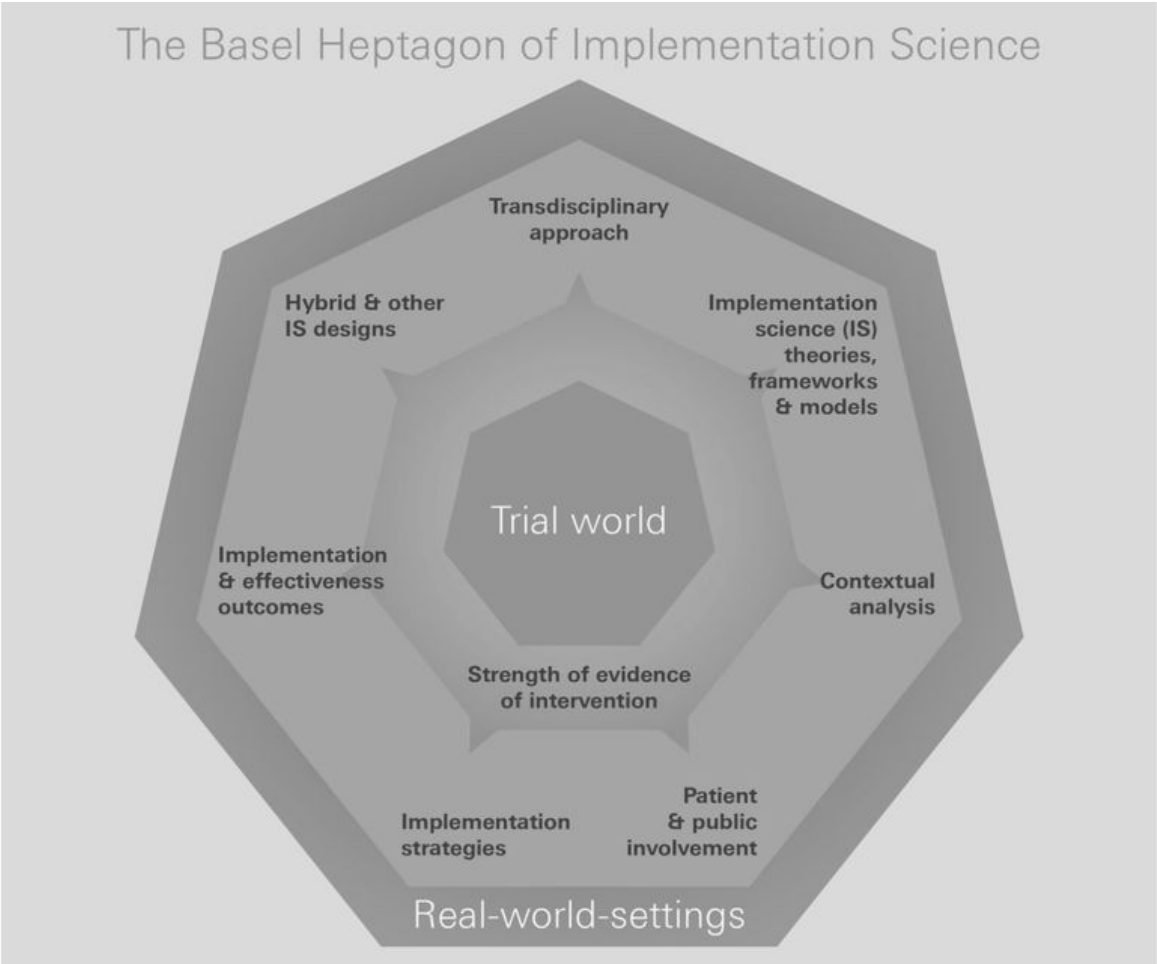


Figure 1. Key elements of implementation science (5)

6.2 Key Findings

We determined multiple relevant factors to consider in the context and setting before introducing a new integrated care model into the community (Chapter 3). Our contextual analysis identified some key findings, such as: a new local care law yet lack of integrated care regulations; numerous existing health and social organizations to coordinate care with but also prevent service duplication with the IAC; the future role of the IAC to assess needs of home-dwelling older adults using a CGA and support care coordination based on the current system. Additionally, we determined that a strong marketing plan with targeted recruitment strategies would be needed to promote the new IAC across the community. Furthermore, we detected the competencies needed for the IAC staff to fulfill their roles and that a care pathway and delineation of clear roles would be beneficial for the IAC staff to work together and with external collaborators.

We selected appropriate implementation strategies, such as *train and educate stakeholders, support clinicians,* and *engage consumers* (according to six of the ERIC clusters) (6) to try to address the contextual factors and improve implementation outcomes such as feasibility, acceptability, and adoption. The strong collaboration with the INSPIRE project stakeholders enabled the collection of contextual data from various sources. Stakeholders served a crucial role by keeping us aware of their local needs, preferences, inputs and concerns; helping to identify relevant barriers/facilitators; and helping to promote the project activities for the contextual analysis.

During the contextual analysis, we learned through the INSPIRE population survey findings that one-quarter of home-dwelling older adults showed signs of frailty. Subsequently, we conducted an in-depth exploration of contextual factors (e.g., needs and preferences, rates of care use) from the perspective of home-dwelling frail older adults. The synthesized data indicated that home-dwelling frail older adults in Canton BL are supported by various health and social care, informal care, and social support to enable them to live at home, in accordance with their preferences (Chapter 4). We propose that the diverse support available (Chapter 3) and utilized (Chapter 4) relates to why only 6.5% of older adults perceived to have unmet needs, despite showing signs of frailty. Furthermore, we found that if home-dwelling frail older adults in Canton BL become more in need, they may increasingly rely on diverse caregivers and services such as *help with the housework* and *care and assistance at home* (Chapter 4). Our findings also identified two important targets: 1) frail older adults who perceived living with unmet needs, requiring further support and research, and 2) informal caregivers, as they are a prevalent form of support and served diverse roles, yet interviewees were concerned to burden them. Moreover, we uncovered some potential areas of concern from an integrated care perspective such as potential lack of comprehensive assessments and a professional care coordinator.

Overall, the contextual factors confirmed an opportunity for the Information and Advice Center (IAC) to be established using a new community-based care model which integrates health and social care, and led to refinements of our care model. The resulting care model (i.e., a complex intervention) is made up of the following core components: screening for potential frailty; conducting a comprehensive geriatric assessment; creating and coordinating an individualized care plan; and follow-up as needed (Chapter 3). The logic

model illustrates the logical underpinning/pathway which connects the resources, intervention, outputs, and implementation and effectiveness outcomes. It also uniquely positions our preliminary implementation strategies within the overall program. Successful implementation and uptake of this care model is based on many assumptions, such as high awareness of the IAC and trust and strong communication with external professionals.

Fine-tuning of the intervention and implementation strategies evolved, as described in the study protocol to assess the feasibility and effectiveness of the integrated care model (Chapter 5). We determined that recruitment feasibility should be the initial focus, ensuring actions are taken to promote the IAC and that both the professionals in the community and target population engage with the new center, before a full evaluation will be logical. Furthermore, we will collect data using mixed methods to gather input from multiple perspectives and will measure the impact of the care model on person-centered integrated care (primary outcome). We will also assess secondary outcomes (e.g., health-related quality of life) and implementation outcomes (e.g., adoption, acceptability, feasibility and fidelity). We selected various tools and instruments which will generate important findings and procedures from an implementation and evaluative perspective.

6.3 Contextual analysis

A contextual analysis is important to collect and analyze contextual factors throughout the duration of a study, and to help other researchers consider the transferability of interventions to other contexts (7). During the INSPIRE contextual analysis, we used the Context and Implementation of Complex Interventions (CICI) framework to identify factors across multiple contextual domains, such as political and legal, epidemiological, and socio-cultural (8). The factors we identified and reported on are prospective in nature, which is rare yet valuable (7). A study by Balasubramanian et al. (2018) showed how the prospective approach to examine the context detected factors which affected implementation and reach (7). Overall, the contextual factors led to practical implications for refining the care model within the current care system, and implementation strategies. For example, we identified the importance of a strong marketing plan for the IAC which drove certain implementation strategies (e.g., mass media and educational outreach visits) and investment in recruitment strategies for the feasibility study.

Contextual factors are typically not analyzed or reported (9), yet they deserve more attention, as emphasized in implementation science research (10). We analyzed the contextual factors to facilitate an understanding of the context in which the intervention will be used and to adapt implementation strategies, as well as to help interpret implementation and intervention outcomes further down the road (7, 8, 11, 12). Barriers to integrated care have been reported in previous literature across the macro, meso and micro level, many of which we detected as relevant for consideration in our project, such as: funding silos and limited incentives; divides between health and social service provision; lack of professional engagement; technical barriers related to record sharing or incompatible information and communications technology (ICT) systems; and staff confusion about their own and others' roles and responsibilities (3, 13, 14). Meanwhile, examples of facilitators included: co-location of teams; clear outlines of roles and responsibilities; work needed to involve staff early in the process; and using champions (3, 13). In Switzerland, a recent survey that examined integrated care barriers from the perspective of healthcare stakeholders identified several barriers at the system level (e.g., lack of support and training for professionals; lack of recognition and compensation for professionals; and fragmented functioning of the health care system) and professional level (e.g., concerns for patient data sharing, threat to financial benefits) (15). While many contextual factors can dictate implementation strategies which are necessary to address them, it is important to keep in mind the factors which were difficult to address in our project, such as issues with financing models and incentives for integration. In the absence of further implementation strategies targeting funding and incentives for example, these factors will remain threatening to the INSPIRE project.

6.3.1 Frail older adults' health and social care use, experiences, and preferences

Our mixed methods study confirmed that home-dwelling frail older adults reported receiving care and support for their health and social needs from the various formal and informal caregivers available in Canton BL. These findings were consistent with the literature about the diversity of individuals providing care and support to frail older adults living at home (16, 17). While the literature has identified multiple different ways that informal and formal care use can be combined for home-dwelling frail older adults (18, 19, 20), this was beyond the scope of INSPIRE, yet is an interesting area for future research, especially to see if these dynamics change after integrating our integrated care model (21). Furthermore, we found the demand for support from many community services, organizations and informal caregivers in

Canton BL is expected to increase, especially if the population of frail older adults continues to grow as anticipated, with potential for increased dependency (19, 22). This generally aligns with the projections internationally (20, 23), and in combination with the literature, strengthened our belief that ensuring care integration across the overall health and social care, and formal and informal systems will be beneficial. Lastly, some of the frail older adult interviewees' shared a hesitation to involve their family in their care due to fear of burden; a finding which mirrored the literature (24).

As anticipated, frail older adults desired to stay living at home (Chapters 3 and 4). While many of them perceived that the support they received meets their needs, it will be important to specifically target, engage and support the group of home-dwelling frail older adults who reported living with unmet needs (6.5%), especially as this number could potentially have been underreported and could increase if dependency increases. Overall, the the mixed methods study data (Chapter 4) helped to emphasize the importance of assessing each older person individually, to understand the unique caregivers involved in their care network, as well as their personal health and social needs and preferences.

6.4 Stakeholder involvement

Two main project stakeholder groups were initiated by the INSPIRE research team which were composed of representatives from multiple sectors/levels, including a Cantonal stakeholder group and local stakeholder groups at the care region level. Stakeholders provided strong participation and contributions in the INSPIRE project. They provided their expertise and experiences in a variety of modalities; strengthened our understanding of the context; supported our efforts to collect data; and contributed to co-designing implementation strategies and refining how to operationalize the intervention.

The importance of involving stakeholders across multiple levels has been emphasized for both integrated care projects (3, 14, 25-27) as well as implementation science projects (11). In fact, collaborating with stakeholders was placed on the global agenda for implementation of integrated care proposed by Stadnick et al. (2019), where they specifically elaborated on the power of community-academic partnerships (1); a key feature of the INSPIRE project.

As Kumpunen et al. (2020) highlighted that stakeholders' contributions are necessary during the design phase (14), we predict this will lead to improved acceptability and sustainability of the care model (27). Similarly to the SUSTAIN project (26), we also hope that by bringing the stakeholders together, we may have helped support the communication between them and established a shared understanding of the goals of the IAC. One contributing reason to why the stakeholders maintained vested throughout the long duration of our project (and to date) could be the project's relation to the new APG care law. While we will continue to involve stakeholders throughout the next project phases, it is important to remember that this requires good facilitation skills and sufficient investment in terms of time, space, and resources (26). Furthermore, gaining consensus and creating change can be more time-consuming and challenging when a large number of stakeholders are involved (13, 28).

6.5 Strength of evidence of intervention

As mentioned in the introduction, evaluations of integrated care have shown inconsistent results and there is no known 'gold standard' for a care model for frail older adults (13, 29, 30). Our understanding is rapidly evolving on the components or "building blocks" for the approach and practical guidance on the delivery (26, 31-33). To build the care model according to the evidence and fit it within the context, the core components of the INSPIRE care model were determined through the contextual analysis, stakeholder involvement, and evidence available according to our previous systematic review and meta-analysis (34). In helping the care region to operationalize the IAC services, we aligned with the WHO ICOPE approach as our goal was to organize services for the IAC which are coordinated and delivered around the preferences, needs and goals of older adults in Canton BL (31). Specific components of our care model are also outlined in the WHO ICOPE approach, such as: comprehensive assessments, integrated care plans and multi-disciplinary teams. The ICOPE guidance for person-centred assessment and pathways in primary care (ICOPE Handbook) was also used to adapt the assessment tool for the IAC staff (32).

6.5.1 The INSPIRE integrated care model

The first step of the care model, screening for potential frailty, is intended to segment the population to receive care and further assessment according to their needs (35-38) and use healthcare resources efficiently. This is especially important given the proportion of frailty in the older population and that a Comprehensive Geriatric Assessment (CGA) is time-

consuming. While our original intent was for the screening to take place in the community (as described in Chapter 3), this was adapted based on operational partner input to take place upon intake to the IAC instead, ensuring inclusivity to this new community-based center (Chapter 5). The Groningen Frailty Indicator (GFI) has been proposed as the screening tool to indicate individuals with potential frailty. However, given the feedback from community operational partners about the tool length, we suspect a new tool may need to be considered in future, such as the PRISMA-7 which is also validated in the community setting and short to administer (39). For those that indicate signs of frailty, a CGA will be conducted (step 2), which is beneficial or the gold-standard in hospitals and other settings (e.g., home CGA programs) (40, 41). However, research on the effectiveness of the CGA for frail older adults in community-based settings is on-going (42), whereby our project will also contribute to the literature on this topic. The staff conducting the CGA will be co-located at the same center, which as mentioned earlier is a facilitator to implementing integrated care (13). As identified in a scoping review of CGAs in integrated care models for home-dwelling older adults, there was wide variation across studies in the CGA instruments and procedures used (43). After testing our original CGA template during development, we felt a less burdensome approach on frail older adults would be needed for the community setting. Therefore, we adapted the delivery to take place through multiple appointments. We also incorporated guidance from the WHO ICOPE handbook which includes screening for areas of decline in intrinsic capacity before conducting further assessments (32). The third step of the care model is creating and coordinating an individualized care plan, which requires many key concepts for integrated care such as shared decision-making, informal caregiver involvement, a named coordinator, and multi-disciplinary teamwork (44). The role of the care coordinator is integral to the success of care integration (25, 34, 45), and will require collaboration with diverse formal and informal caregivers, as discussed in Chapters 3 and 4. Findings from Chapter 4 added additional considerations for fine-tuning details or expanding the care model.

Follow-up and monitoring of the care plan requires remaining adaptable as the individual needs of frail older adults can change over time. In terms of the outcomes that are expected from the INSPIRE care model, we selected person-centered, coordinated care as the primary outcome to reflect a frail older adult's care experience (46, 47). Our future experiences using the P3CEQ (i.e., the instrument to measure the primary outcome) can be

combined with methodological findings from Reynolds et al. (2021) (48) regarding the use of this questionnaire as a patient-reported experience measure. As demonstrated in the INSPIRE logic model (Chapter 3) and study protocol (Chapter 5), examples of secondary outcomes which we hypothesize will improve through the care model include less emergency department visits, unplanned hospitalizations and nursing home admissions; reduced symptom burden and potentially inappropriate medications; and increased health-related quality of life.

6.6 Implementation strategies

As integrated care interventions are complex and challenging to implement (28), it is anticipated that a combination of implementation strategies are necessary to facilitate uptake and sustainment (49). Little is known regarding which implementation strategies are best to support integrated care (1); however, this is not unique to integrated care research and the research and guidance on methods for selecting implementation strategies is continuously evolving (50-52). It appears that some of the implementation strategies we chose are in fact supported by recent publications. For example, a study by Looman et al. (2021) of the 17 integrated care programs across 8 European countries included in the SELFIE project found ten mechanisms which led to successful implementation of integration care, such as: "applying collaborative governance; creating feedback loops and continuous monitoring; developing new roles and competencies for integrated care; and building a multidisciplinary team culture with mutual recognition of each other's roles" (3). Moreover, the SUSTAIN and INTEGRATE projects (i.e., other large European integrated care projects for older people), emphasize the need to focus on the inter-professional workforce (26, 53). Targeting the workforce involved is crucial, "empowering them" to deliver integrated care by focusing on their roles, resources, and skills, and creating opportunities for them to build trust (26, 53). The literature both guided and supported several of the preliminary implementation strategies selected for the IAC which are especially focused on the workforce, for example *revising professional roles*, *conduct ongoing training*, *develop and distribute educational materials*, as well as *audit and provide feedback*. To take this one step further, we believe that building awareness about benefits of integrated care, as well as skills and competencies for collaboration in care planning could be beneficial not just for the IAC staff but for all professionals who are involved in the care of older persons. Workforce development in

integrated care is an area of limited research, but according to the recent scoping review of Barraclough et al. (2021), majorly warrants further research and potential training programs (54).

6.7 Theories, models and frameworks

It has been previously postulated that integrated care initiatives may at times miss logical steps in the rationale for their activities, "meaning that expectations are built upon false assumptions (or none at all)" (55). In Kumpunen et al.'s (2020) recent work analyzing why integrated care initiatives may fail to generate the anticipated results, the experts recommended using logic models as a tool to support the design phase (14). As described in Chapter 3, the INSPIRE logic model was created during the development phase due to the gap described in the literature and as a tool for program planning, monitoring, communication and future evaluation. The act of creating a logic model helped to 'test the logic', ensuring that the pathways were plausible and visible between the inputs, activities, outputs and outcomes. Further, it made our assumptions explicit, helping to also derive implementation strategies which could support the care model. Executing some of the implementation strategies should help ensure these assumptions hold true. Although our logic model shares similarities with ones from other integrated care programs (56-58), unique to our logic model was the inclusion of implementation strategies. Researchers looking to create a logic model which accommodates implementation science frameworks and study designs can turn to the new guidance and templates from Smith et al. (2020) (59).

6.8 Hybrid effectiveness-implementation designs

INSPIRE selected a hybrid type I effectiveness-implementation design (60) to evaluate the effectiveness of the care model (Chapter 5) based on the level of evidence available for integrated care models for home-dwelling older adults. Traditionally, a hybrid type I is conducted when there is limited evidence for an intervention (60). A hybrid type I design focuses on establishing the clinical effectiveness (60). While we conducted a hybrid type I design, our approach is unique in that we build upon a strong prior foundation of contextual analysis from the development phase. The use of a hybrid design in the effectiveness phase will be especially valuable to facilitate us gathering evidence about the intervention while continuing to collect information about the implementation (60), and is one of the strengths of this study.

6.9 Methodological strengths and limitations

A major methodological strength of the INSPIRE project is that we approached the development phase using all areas of the Basel Heptagon of Implementation Science. We were able to reach stakeholders across multiple levels (e.g., older adults, health and social care professionals and organizations, volunteer sector, policy-makers) and maintained support and feedback from the start of the project to take action early based on their input. While the contextual analysis was also a strength of our work, not all research funding structures support the pre-work focused on contextual assessment to be able to undertake this process to the same scale. Furthermore, one major drawback of conducting implementation research is the substantial time investment required, especially in the early phases of a project. Researchers with less supportive funding structures or few resources can look into alternative methods to still gather contextual data, given that it has been considered "foundational" in implementation science projects (10). We believe this up-front investment has led to a contextually-adapted care model which will be supported by implementation strategies and is more likely to be successful and sustainable in future.

Another strength of the work was the mixed methods used to gather various perspectives during the contextual analysis, leveraging the strengths of both quantitative and qualitative approaches and offsetting each other's weaknesses (61). Such methods allowed us to gather a comprehensive understanding of care use, experience and preferences from the perspective of frail older adults. However, one limitation is the potential biases associated with these study samples, as discussed in Chapter 4. Mixed methods designs are also planned for the feasibility and effectiveness studies (Chapter 5).

The community-academic partnership leads to both benefits and challenges. Fortunately, we could leverage community professionals' connections with others in the community and were able to collect valuable feedback from them to inform the intervention and implementation strategies. While the INSPIRE team has less control in the implementation aspects as the implementation is not carried out by researchers but by care professionals, this also may result in more ownership and sustainability of the care model in practice.

Although the CGA is featured as a main component of our care model, the full procedures may not end up sustainable in the long-run given the time and resource

investment (and burden for the older adult). However, we hope that any concerns about the CGA will be surfaced during the feasibility study so that adaptations can be made accordingly. In addition, the expectation on external care professionals to collaborate with the IAC without financial incentives or accountability could threaten the multi-disciplinary characteristic of the CGA. For these same reasons, the CGA in its entirety may also not be feasible as part of a care model in other community-based settings.

With respect to frailty, the GFI was chosen as the tool to identify potential frailty for multiple aspects of the INSPIRE study. However, this screening tool is one of many options for research and in practice (62), and despite its good psychometric properties (63), still has the potential to have under- or over-estimated frailty.

For a final limitation, although both our findings and the literature indicated the importance of informal caregivers in the care and support of frail older adults, we did not specifically solicit informal caregivers to be stakeholders in the development phase. Informal caregivers should ideally have been given the opportunity to provide their voice in the preparatory work.

6.10 Policy implications

As seen in our contextual analysis when analysing the policy domain, the APG care law in Canton BL, Switzerland outlined several requirements. While the care law included specifications such as a nurse to assess the needs of older adults as part of the Information and Advice Center (IAC) (64), the law did not contain guidance on how to deliver integrated/coordinated health and social care for home-based older adults in the Canton, despite signs of political support for coordinated care (65). This can be considered a missed policy opportunity, as the success of the IAC in assessing needs and coordinating care for home-based frail older adults requires collaboration across the system, such as with various health and social care professionals, care organizations, and nursing homes. Furthermore, it could be worthwhile for policy-makers to establish incentives for integration and promote common governance, which were pointed out as facilitators for care integration in frail/older populations by Threapleton et al. (2017) (13, 30). Nevertheless, the INSPIRE team hopes to deliver policy-related recommendations if findings emerge about aspects which enhanced care integration.

Integrated care has been a topic of policy discussion in many European countries (66, 67). One encouraging sign of the policy direction in Switzerland has been described by Filliettaz et al. (2021), who explained that recent discussions about the mandatory health insurance law may suggest embracing integrated care concepts, such as through encouraging coordinated care networks and requiring a first point of contact, as well as adapting their respective reimbursement structure (68). While we can see from the literature that integrated care from a policy perspective generally comes with many challenges (66), we hope to see Swiss policies which promote and facilitate care integration in the future.

Combining the findings in our study with the ideas from the Policy Guide on Integrated Care (PGIC) created by Borgermans et al. (2017), developing a regulatory framework for 'collaborative entities and teams' could be considered by policy-makers, which the PGIC states would be aimed to improve aspects such as care coordination and integration of care across different sectors (69). Such a framework could include, for example, use of "multidisciplinary guidelines", "care plans" and care pathways (69), and could benefit from incorporating the expertise of implementation scientists during development of the framework. Implications from the INSPIRE contextual analysis led us to believe that defined care pathways could support collaboration and communication between the staff conducting the intervention as well as external collaborators.

Based on our awareness and recommendations in the literature, another potential policy agenda item could be related to workforce development for integrated care (54, 69). For instance, there could be a requirement within professional training or formal education to equip all health and social professionals with knowledge, skills and competencies to effectively collaborate with professionals across sectors as part of care integration (54, 69). This could even be considered as an indicator of a system that promotes integrated care.

6.11 Practical implications

Based on the contextual situation, INSPIRE had a unique opportunity to support the Information and Advice Center (IAC) in the development of a community-based integrated care model, including an IAC nurse who was required to assess needs of older adults and who we believe could closely collaborate with the IAC social worker, both also acting as care coordinators. Looman et al. (2021) points out one of the vital roles of a care coordinator, in

that they fulfill what he describes as “alignment work” by “aligning the different components of integrated care”, and that this alignment work is especially valuable as a “driving force of other mechanisms of integrated care” (3, p.9). Furthermore, as suggested by Grol et al.’s (2020) work, identifying and mapping the care network of frail older adults could be a task of the care coordinator during the assessment (70), which INSPIRE should explore as it could support coordination abilities.

To integrate health and social care, Goodwin (2016) advises that changes are required in both the organization of systems/services, but also the “relational aspects” by fostering support for change and collaboration (55). For INSPIRE and similar projects, this directs our focus to also facilitating these relational aspects through actions such as: encouraging multi-disciplinary teams; defining integrated care pathways; helping to improve collaboration within formal care as well as between formal and informal caregivers; facilitating trusting relationships; defining roles; and providing education and training (4, 13, 26, 53, 71). Many of these are discussed in the realist review by Kirst et al. (2017) which determined processes which drive effective implementation of integrated care for older adults with complex needs (4). Many implementation strategies are needed to support the network around the frail older adult – with a care coordinator well-positioned within the network – so that person-centered, integrated care can be achieved. Specialized training is needed for the IAC staff or staff fulfilling these roles in other community-based settings given the expectations of geriatric expertise, clinical reasoning and leadership abilities. Hence, this demonstrates one example of why we believe integrated care initiatives require support from implementation strategies.

Our work from Chapter 4 which examined frail older adults’ current use of care and support as well as experiences and preferences, inspired some ideas for the IACs and other community-based centers with a similar mission to assess needs and coordinate care. For example, if possible to expand the scope of the care model in future, the IAC nurse and social worker could possibly assess the needs of informal caregivers and connect them with support and resources to prevent caregiver burden, in alignment with previous research recommendations (72). The WHO ICOPE Handbook also includes a pathway for supporting informal caregivers which could be used as guidance (32). Given the rich data we gathered through some of the interview questions on older adults, perhaps some of these questions could be asked when assessing the older adult during the intervention, such as describing how

informal caregivers support them, or about any difficulties they have in their current care situation.

Next steps from INSPIRE's work include conducting the feasibility and effectiveness studies, before ultimately deciding how the INSPIRE care model can be scaled out to other care regions in the Canton, the rest of Switzerland and beyond. Lastly, it will be important to understand if and how the adaptable components of the care model were modified in other settings. If other care regions in Canton BL, other Cantons or international settings initiate a similar project, the following ideas could be recommended based on INSPIRE's experience: 1) conduct a contextual analysis using a broad perspective and mixed methods, 2) develop a logic model incorporating resources, activities, outputs, outcomes, implementation strategies and assumptions, 3) cultivate relationships with stakeholders at multiple levels (e.g., political, operational) to gather their various perspectives, needs, and preferences, 4) pilot all tools and procedures before implementation and conduct a feasibility study, and 5) plan an evaluation which assesses both the implementation and effectiveness, including a process evaluation.

6.12 Research implications

The research conducted as part of this dissertation has illustrated the need for incorporating implementation science components into the development of complex interventions such as integrated care studies. Our use of theory, a process evaluation and implementation outcomes throughout the study should help to differentiate between intervention versus implementation failure, which we suspect is one reason why many integrated care studies have yet to prove successful (34). While the INSPIRE integrated care model will be evaluated in practice, more studies and evaluations of integrated care are needed, especially to determine how best to facilitate integration of health and social, and formal and informal care of home-dwelling frail older adults. We highly recommend an implementation science approach to support and assess the care model implementation.

We expanded the knowledge base on the types of contextual factors to consider which can have implications when designing an integrated care model for frail older adults, and the associated implementation strategies. It could be helpful for future studies of this same topic to conduct a contextual analysis, and report their contextual factors and how they connected to the selection of implementation strategies. This could also help to create a bank of overall

strategies which could be most relevant for interventions aiming to integrate care. Furthermore, the field could profit from more evidence on which implementation strategies to prioritize for integrated care – especially in terms of scaling out (3) – and to understand the mechanisms behind them. Building from the work by Lewis et al. (2018) which looks at causal pathway models for implementation strategies could be an excellent starting point (73).

Based on the experience from INSPIRE, we believe all components of implementation science, as outlined in the Basel heptagon, have a valuable role in helping to successfully bring an intervention into a real-world setting. Specifically for the development phase, we suggest future researchers could follow the same methodological steps we embarked on to develop our complex intervention (as described in Chapter 3) and report on their process. This can generate a thorough analysis of the context to understand, for example, the needs and preferences of stakeholders and the current practice patterns within the area of interest. Furthermore, we recommend creation of a logic model to support program planning, design and evaluation of complex health interventions. When created prior to implementation, this activity can help preserve resources by ensuring that the activities which are chosen to produce the outcomes appear logical and feasible.

According to Chapter 3, our finding that there is a subset of the population with unmet needs calls for further exploration, as this group of frail older adults with complex needs is already recognized as at risk of institutionalization, hospitalization, and mortality (74, 75). This is especially important as we did not objectively evaluate whether support matched needs and the rate may have been underreported if those with unmet needs did not participate in the population survey or interviews. Furthermore, due to the diverse individuals supporting frail older adults at home, future research could use methods demonstrated by Smit et al. (2021) such as social network analysis to analyze network development and interprofessional collaboration (76) before and after delivering an integrated care model. In addition, we know of only one study which looks at "how the integration of community-based care for frail elderly people affects the dynamics between formal and informal care over time" (21), a topic which we think would be pertinent to explore in future.

Both the literature and our findings emphasize the importance of informal caregivers, yet due to logistical challenges, we did not successfully involve them in our stakeholder meetings, or conduct any data collection with them during the development phase. We

recommend other similar projects involve informal caregivers from the beginning of the project to incorporate their valuable voices early on.

Lastly, one area that was not explored during this study was stratifying the frail population into sub-groups by domains of frailty (i.e., psychological, physical, social and environmental) (20) or six "frailty profiles" as distinguished by Looman (2019) (77). Previous work has investigated whether frailty type influences care use patterns or effectiveness of integrated care (20, 77), which is an area worthy of continuous exploration.

6.13 Conclusion

To support the increasingly aging population, integrated, person-centered care models have the potential to drive promising outcomes on a patient, provider and system level. Given the complexity and challenges associated with implementing integrated care, an implementation science approach and a clear program theory can increase the likelihood that the benefits of integrated care will come into fruition. Findings from our extensive contextual analysis led to important implications for both the integrated care model and implementation strategies.

Diminishing the divides between formal and informal care as well as health and social care could result in a collaborative network which supports a frail older adult to continue living at home (16, 26). Therefore, efforts are required to foster such a collaborative network around frail older adults. As articulated by Goodwin (2019) "it is the 'softer' issues such as leadership and management, effective teams and networks, and positive cultures and behaviours that are the most likely to be deciding factors in whether innovations in integrated care succeed or fail" (78, p.1). Subsequently, this dissertation demonstrates how INSPIRE invested a great deal in implementation science methods such as understanding the context; preparing all stakeholders involved in the care model; and carefully selecting implementation strategies to support the behaviours needed to make integrated care led by the IAC possible in practice. Our carefully planned evaluation of the feasibility and effectiveness of the care model should provide much-needed information on whether, how and why integrated care can be both successfully-implemented and effective in practice. From a research, practice and policy perspective, the evaluation has the potential to make widespread contributions.

6.14 References

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