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Integrated Care for Older Patients: Geriatrics

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Abstract

Integrated care models for older adults are key to addressing their complex, often coexisting, health, and social needs. In this chapter, we explore their main characteristics and the challenges associated with geriatric care, such as multimorbidity, declining intrinsic capacity, frailty, geriatric syndromes, fragmentation of care, and the role of place of living and informal caregiving.

Through examples of successful models, we present strategies that have been shown to reduce service use, improve well-being, and increase older adults and caregiver satisfaction. In addition, evidence is provided on supportive resources and strategies, such as care transitions, intermediate care, home hospitalization, preventive care, and social prescribing. The need to evaluate the impact of these models through patient-reported outcome measures (PROMs) and patient-reported experience measures (PREMs) is emphasized, and qualitative research is presented.

Technology has an essential role in facilitating integrated care, although there are still challenges to its adoption. The importance of user-centered design and human factors is highlighted. Finally, the need to improve in training professionals to provide sustainable and effective integrated care for the older person is emphasized.

Introduction

Since the first edition of the *Handbook of Integrated Care* in 2017 (Handbook of Integrated Care, 2017), the focus and the literature on integrated care have increased considerably, including in the field of geriatrics.

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Integrated care models for older and frail persons require specific features and are often considered as a specific group of initiatives (WHO Regional Office for Europe, 2016a). Older people are more than the sum of their conditions, and their complex needs frequently consist of health and social needs and of a coexistence of both physical and mental health issues. The Commonwealth Fund Report (2017) advocates for a holistic approach to integrated care, highlighting the importance of designing high-performing healthcare systems for individuals with complex needs, by integrating health and social services and addressing both physical and mental healthcare. According to the report, the separation of health and social care fails to recognize patients' closely related needs for both types of care, whereas multi-disciplinary teams should ensure that physical and mental health needs are addressed together in a timely fashion; also, constrained social service spending may also lead to inefficient use of healthcare resources, for example, when patients are unable to be discharged from the hospital because of a lack of support in the community.

According to the more recent WHO framework for integrated long-term care for older adults, care should be delivered by integrated primary healthcare services together with social services, involving the caregivers and with the support of specialized resources such as geriatric rehabilitation and palliative care (WHO, 2021). The care for older people should address more than their health conditions and even more than the formal social services provision, involving leisure resources, services providers, commerce, home, and public environment, being networking and communication between the several stakeholders crucial to deliver a coherent intervention (which can include healthcare interventions or not). The ultimate form of integrated care should encompass an integrated governance of all these agents, aligned to the goal of providing opportunities for older adults to age according to their preferences and values (WHO, 2020a). *Integrated governance* involves systems, processes, and behaviors that enable an organization to achieve objectives, ensure safety and quality of services, and combine corporate and financial accountability with clinical and management accountability, adopting a risk-sensitive approach (NHS Halton Clinical Commissioning Group, 2017).

2020–2030 has been declared as the Decade of Healthy Aging by the WHO and the UN (World Health Organization, 2020a, b). These institutions wish to pave the road to a society of longevity through four main action areas:

1. Changing how people think, feel, and act toward age and aging or, in other words, combating ageism
2. Ensuring that communities foster the abilities of older people or promoting aging friendly environments
3. Delivering person-centered, integrated care, and primary health services responsive to older people
4. Providing access to long-term care for older people who need it

They also indicate four enablers to reach these goals, including the following:

- Listen to diverse voices and enable meaningful engagement of stakeholders, especially older people.
- Build capacity and nurture leadership to take appropriate action integrated across sectors.
- Connect stakeholders around the world to share and learn from the experiences of others.
- Strengthen data, research, and innovation to accelerate implementation.

Challenges in Providing Care for Geriatric Patients

In humans, aging refers to a multidimensional process of physical, psychological, and social change, potentially leading to functional decline. However, aging is not a uniform process, and there is a large interindividual variety.

Factors that lead to clinical, social, and organizational complexity in older adults are multiple and can be seen as internal and external or environmental factors, including multiple chronic diseases, geriatric syndromes, polypharmacy, functional and cognitive impairments, multiple healthcare providers, loneliness, being homebound, lack of caregivers, poor social support, poverty, lack of knowledge and training about older patient specificities among healthcare providers, lack of health literacy among older persons and their caregivers, and interindividual heterogeneity. This complexity makes the care of older patients a challenge.

Multimorbidity, Frailty, and Geriatric Syndromes

Multimorbidity, the cooccurrence of two or more chronic conditions in an individual, is prevalent among older adults and correlates with age (Barnett et al., 2012). This condition involves complex disease interactions, rendering single-disease-focused medical care insufficient, necessitating new care models (Roland & Paddison, 2013).

Usually, the geriatric patient presents with several chronic diseases and geriatric syndromes simultaneously. Geriatric syndromes are common clinical presentations that do not fit into specific disease categories but have substantial implications for functionality and quality of life in older adults. Examples include immobility, falls, impaired cognition, incontinence, sensorial impairments, and dependency in activities of daily living (Inouye et al., 2007). Common chronic conditions in older adults include heart failure, cerebrovascular disease, chronic obstructive pulmonary disease, osteoarthritis, dementia, diabetes, and cancer. Although there is considerable evidence-based knowledge about management of single chronic diseases, little evidence exists about the management of the same chronic conditions in multimorbid geriatric patients. Not rarely, recommendations for a single disease are contraindicated in the management of other conditions. Disease-based care pathways are neither feasible nor sustainable for older adults, advocating for a person-centered care approach (Røsstad et al., 2013).

Frailty is a dynamic state of vulnerability toward internal and external insults (e.g., a new or exacerbated disease, a change in the social situation of the person), which can lead to an accelerated functional decline or other negative health outcomes. It is caused by an unstable altered reserve of many organs and systems, and it might be reversible. Measures of frailty can be obtained through the so-called frailty indexes (a sum of diseases and deficits of the person), which lead to a standardized continuous indicator, so that frailty can range from early stage (pre-frailty or initial frailty) to advanced stages, requiring a different approach according to the situation (Kim & Rockwood, 2024).

A decade ago, the World Report on Aging and Health introduced the concepts of intrinsic capacity (i.e., the composite of physical and mental capacities of the person) and functional ability (i.e., the health-related attributes that enable people to be and to do what they have reason to value, resulting from the interaction between intrinsic capacity and the environment) (World Health Organization, 2015). Intrinsic capacity represents the long-life reserve of the individual and should be potentiated from early life at every latitude. At old ages, it has an inverse association with frailty, requiring to set adequate goals for each stage (e.g., survival, functional independence, or comfort care) and to establish specific tailored, person-centered care plans.

Chronic diseases, geriatric syndromes, and frailty are associated with functional decline, like gait impairment or inability to perform basic or instrumental activities of daily living. This decline reduces autonomy, quality of life, and well-being while hindering access to healthcare and adherence to medical advice. In this scenario, functional limitations and reduced mobility can drive social isolation and loneliness, exacerbated by socioeconomic inequalities.

Fragmentation of Care

Typically, several healthcare and social care professionals of different levels participate in the management of the multimorbid geriatric patient. In current healthcare provision, fragmentation, rather than integration, is still the norm. Fragmentation of care for older persons is associated with gaps in information delivery, patient confusion and distress, duplication of services, unnecessary hospitalization, higher costs, and negative health outcomes (Joo, 2023). Fragmentation of care leads to inefficiency, ineffectiveness, and inequality (Stange, 2009). This challenge is addressed by the Geriatric Medicine through care driven by the Comprehensive Geriatric Assessment, which identifies all clinical, functional, mental, and socioeconomic needs and supports planning appropriate interventions to be delivered by a multidisciplinary team. Geriatric Medicine methodology aligns perfectly with the integrated care approach, as it emphasizes a person-centered model that facilitates proactive, individualized care through continuous, multidisciplinary collaboration and coordination among various care providers (Yip et al., 2021).

Place of Living and Informal Caregiving

The place of living of the geriatric patient depends not only on the health, functional, and cognitive status and needs but also on the patient preferences and community and social resources available in a specific place or society. Older adults generally prefer to continue living at home and to participate in the society as long as they can, even if they have some limitation that impairs their ability to live alone, rather than transit to residential care or nursing homes (Lofqvist et al., 2013; Sixsmith et al., 2014; Wiles et al., 2012). This requires comprehensive social and community services, trained health, and social care professionals working in the community and increased awareness of aging in the community.

Ageing in place is defined as “the ability to live in one’s own home and community safely, independently, and comfortably, regardless of age, income, or ability level” (Centers_for_Disease_Control_and_Prevention, 2013). Older people view this as beneficial for their sense of attachment, feelings of security, and familiarity in relation to their homes and communities. “Aging in place” is seen to promote maintenance of independence, autonomy, social relationships, and therefore higher satisfaction and quality of life (Wiles et al., 2012).

In most EU countries, informal caregivers provide approximately 80% of the long-term care, vital to maintaining health and social service systems. These caregivers, predominantly women with familial relationships, such as spouses, mothers, and middle-aged daughters (Villa-García et al., 2024), offer emotional support, supervision, and assistance with activities of daily living on a regular and uncompensated basis. They frequently address gaps in care and facilitate the coordination and integration of services (Kim et al., 2023).

Although caregiving can be rewarding, it often negatively affects health, social life, career, and finances (Villa-García et al., 2024). The growing complexity and demands of informal caregiving are intensified by an aging population, aging-in-place policies, and fragmented care. The capacity to meet the needs of the aging population is challenged by declining numbers of caregivers due to changing family structures, decreasing fertility rates, increasing female labor market participation, extended working lives, and significant caregiving burdens (Spann et al., 2020). Some predict a shift to professional caregivers, potentially raising public or private costs and worsening social inequalities. Thus, supporting caregivers through interventions and policies is crucial. In addition, informal caregivers should be involved in the design of services and person-centered care as part of the team.

Models of Integrated Care for Older People and Outcomes

Introduction

As mentioned above, the growing aging population and the specific health and social needs of older adults require integrated care models tailored to their unique characteristics, aligned with the challenges exposed in section “[Challenges in Providing Care](#)

for Geriatric Patients.” These models need to address their overall well-being (Ahmed et al., 2021) through a comprehensive approach. Care models should consider local healthcare systems, cultural, economic, and societal factors, and the available assets and resources within the healthcare system, social sector, and community.

According to Kirst et al. (2017), the higher utilization of healthcare services among older adults may result from a lack of coordination between services, excessive demand for acute care, and service duplication. Integrated care models aim to enhance coordination, reduce costs, and improve satisfaction among patients and caregivers. However, to provide value-based care to older adults, a one-size-fits-all model is unrealistic, and adaptation to the local context is necessary. In a review of integrated care programs for older adults with complex needs, Kirst et al. identified two key context-mechanism-outcome configurations (CMOCs): trusting multidisciplinary team relationships and provider commitment to and understanding of and belief in the care model. Context dimensions include geographical, epidemiological, sociocultural, socioeconomic, ethical, legal, and political factors (Pfadenhauer et al., 2017). These factors are crucial when planning, implementing, and evaluating integrated care programs (Yip et al., 2021). Key factors for successfully implementing include team collaboration, effective communication and clear roles of multidisciplinary team members, expertise, joint governance, strong leadership, organizational culture, allocating sufficient time to build the necessary infrastructure and implement the program, flexibility in the implementation process, funding models that includes incentives for providers, and establishing clear goals (Kirst et al., 2017). Additionally, information technology (IT) solutions can enhance collaboration and communication among stakeholders. IT can enable information sharing, facilitate interaction between patients and providers, promote patient engagement, and support evidence-based practices. We will approach the specific contribution of IT in a further section of this chapter.

A rapid realistic review by Ahmed et al. (2021) emphasized the interaction between context, mechanisms, activities, and outcomes from the perspectives of the healthcare system, organizations, service delivery, healthcare providers, and patients. Key features include competent multidisciplinary teams, person-centered care, active engagement of older adults and their informal caregivers, and alignment of funding, technology, and organizational structures. Including case managers and healthcare professionals with expertise in hospital discharge planning in the multidisciplinary team is a key component (Ahmed et al., 2021; Briggs et al., 2018). Key activities include individual care planning, geriatric assessments, prevention, hospital discharge planning, follow-up appointments, medication management, home visits, and case management (Ahmed et al., 2021). Briggs et al. (2018) have also highlighted other activities such as systematic risk factor screening and professional and patients' education. Discharge planning is a critical and demanding task that requires early assessment and intervention in collaboration with the patient, informal caregivers, and healthcare and social service providers. Timely and personalized discharge planning can also help reduce healthcare costs (Ahmed et al., 2021). In their review, Briggs et al. (2018) also advocate for cross-sectorial organizational and integration strategies requiring the involvement of stakeholders at all levels of healthcare and social system.

Yip et al. (2021), on behalf of the INSPIRE consortia, identified key components as comprehensive assessments, tailored care plans, multidisciplinary care teams, case management, and a proactive and patient-centered approach.

The WHO framework for integrated people-centered health services outlines five interconnected strategies (WHO, 2016): empowering and engaging people and communities, strengthening governance and accountability, reorienting the model of care, coordinating services within and across sectors, and creating an enabling environment. Simultaneous adherence to these strategies is crucial for building more effective health services, as neglecting any one of them could undermine progress in other areas. Of these, creating an enabling environment and strengthening governance and accountability were most frequently addressed in integrated care models (Ahmed et al., 2021).

Common outcomes include reducing healthcare service utilization, delaying placement in a nursing home, improving health status, enhancing the experiences of both patients and caregivers, improving provider experience, and reducing costs (Kirst et al., 2017; Ahmed et al., 2021). Outcomes related to health status and quality of life may not always be appropriate and realistic for frail older people whose health is deteriorating (Islam et al., 2021). Identifying meaningful and relevant outcomes for older adults is challenging due to the older population's heterogeneity and the influence of social and cultural determinants. Additionally, traditional cost-effectiveness studies may fail to demonstrate the benefits of integrated care models for older adults (Islam et al., 2021). The lack of impact observed in these models may be due to the choice of outcomes measured and the tools used (Yip et al., 2021). This highlights the importance of effectiveness analyses that incorporate process evaluations, contextual analysis, and the measurement of implementation outcomes to determine whether, how, and why community-based integrated care for frail older adults succeeds in practice (Yip et al., 2021).

Some insights into the factors that may affect the clinical effectiveness of integrated care models for older adults and/or are related to its assessment are provided, for example, by multicentric RCT such as Embrace. Conducted in the Netherlands, this study supported community-dwelling older adults over 12 months through a multidisciplinary team including a general practitioner, a nursing home physician, and two case managers (a district nurse and a social worker) vs standard care. Data from the 1456 eligible participants revealed nonsignificant improvements in self-management and significantly greater health deterioration compared to standard care (Spoorenberg et al., 2018). Also, Embrace was not cost-effective (Uittenbroek et al., 2018). The poor results may be attributed to the intervention's duration, the nature, the high quality of standard care, and the heterogeneity and instability of older patients but also to the selection of outcomes.

A rapid scoping review summarized the facilitators and barriers to implementing integrated care models for older populations, detailed in Table 1.

While directly replicating care models may not be ideal for specific context, existing examples offer valuable insights.

Frailty-specific integrated care models are essential, and designing such systems is a priority for some governments. A horizon-scanning review compared various

Table 1 Barriers and facilitators to implement integrated care models in older populations. (Adapted from Threapleton et al. (2017))

Factor	Barriers	Facilitators
External context	Cultural inertia Health system instability	Strategic direction for improving services Wider health system stability Laws and regulation regarding professional competency, scope of practice, care standards, and safety
System organization	<i>Funding/finances</i> Funding silos Competitive funding among stakeholders Unclear financial attribution	<i>Funding/finances</i> Common governance Incentives for integration Funding realignment, ring-fencing, and pooling Funding systems for integration
	<i>Organizational leadership</i> Lack of control over interventions Implementation of interventions by external groups Lack of support for innovation and collaboration Lack of sustained project management	<i>Organizational leadership</i> Strong project management Collaboration between implementers Strong leadership Clearly communicated strategic visions
	<i>Structure of existing services</i> Division between primary and secondary services Division between health and social services provision Time pressure Staffing levels Complexity in the care system	<i>Structure of existing services</i> System-level policies and procedures
	<i>Philosophy/culture</i> Poor institutional philosophy Permission/command-based culture Risk averse culture Bureaucratic environment Control-based management approach	<i>Philosophy/culture</i> Encouraging innovation culture Adaptive system Self-organization
Intervention organization	<i>Intervention size and complexity</i> Large, multicomponent interventions Complex interventions Multiple stakeholders	<i>Intervention size and complexity</i> Small/focused teams Mutual understanding Roles clarification
	<i>Intervention resources</i> Insufficient additional resources and funds	<i>Intervention resources</i> Suitable conditions Funding
	<i>Credibility</i> Lack of credibility Endorsement	<i>Credibility</i> Commitment of leaders Staff trust in leadership

(continued)

Table 1 (continued)

Factor	Barriers	Facilitators
Providers and research staff	<i>Shared values and understanding</i> Staff attitudes Lack of shared values Disagreement over the goals Lack of understanding Disagreement over roles and responsibilities of team members	<i>Shared values and understanding</i> Training on objectives Joint training (different HCP) Staff consultation HCP self-perceived involvement
	<i>Engagement</i> Lack of professional engagement HCP self-perceived lack of involvement HCP self-perceived lack of preparation	<i>Engagement</i> Identification/appointment of champions (among peer groups) Engage workforce with a simple vision Staff autonomy Staff motivation
	<i>Communication</i> Insufficient communication Lack of working relationships Teams and team-members physically separated Lack of robust record sharing across services Data security concerns and access privileges Lack of proactive in sharing data Unclear purpose/objectives of interventions Unclear HCP roles and responsibilities	<i>Communication</i> Time to build relationships Colocation of teams Regular, ongoing, and preplanned communication Rules and agreement on partnership/collaboration Electronic record sharing Integrated information system Consulting staff culture Clear roles and responsibilities of staff members Encouraging staff to autonomous decision-making

models through focus groups that evaluated innovation, implementation, and impact on a low, moderate, and high scale. The Walcheren Integrated Care Model (WICM) rated highest for its implementation potential and moderate to high impact on older adults with frailty, emphasizing teamwork and caregiver involvement. Other classic models reviewed included PRISMA, SIPA, PACE/ON LOK, and GRACE (Kjelsnes & Feiring, 2022), which provided insightful learnings to design new models and programs (see some of the most recent examples in Table 2).

Overall, integrated care models for older adults must aim to shift the paradigm from acute and reactive clinical interventions to proactive, preventive, evidence-based interventions that prioritize the maintenance of functional ability, quality of life, and what matters most to the patients. The coordination and continuity of care are essential features to achieve the success of integrated care models.

According to the ICOPE strategy by WHO (2019), core activities for the management of declining intrinsic capacity include screen for losses in intrinsic capacity (including domains such as mobility, cognition, mood, vitality, and nutrition but also

Table 2 Example of integrated care models for older adults

Model	Country	Target population	Key features	Key outcomes
PACE Program of All-Inclusive Care for the Elderly (Mukamel et al., 2007)	United States	Frail older adults eligible for nursing home admission	Daycare center-based Multidisciplinary team Personalized care plans Funded by the Medicare and Medicaid	Reduction in nursing home admissions and hospitalizations Improvement in perceived health status, quality of life, and functionality
HealthOne Mount Druitt (McNab & Gillespie, 2015)	Australia	Older adults with complex health conditions	“Virtual” hub-and-spoke organization Case management and conferences Multidisciplinary team and IT System for coordination Liaison nurses working with GPs	Reduction in emergency visits and hospital stays Improved coordination, quality of life, and patient and provider experience
COPA <i>Coordination Personnes Ages</i> (de Stampa et al., 2014)	France	Very frail community-dwelling older adults	Case management led by nurses and primary care physicians Support from geriatricians Home-based geriatric assessments and personalized care planning Integrated IT system	Reduced risk of hospitalization, depression, and dyspnea
PRISMA (WHO Regional Office for Europe, 2016a)	Canada	Frail older adults at risk of nursing home admission	Single entry-point Care coordination across a provider network Multidisciplinary team, and case-management service planning	Maintenance of functional stability Reduced unmet needs, hospital readmissions, and caregiver burden Improved patient satisfaction and empowerment
INSPIRE project (Yip et al., 2021)	Switzerland	Frail older adults at risk of nursing home admission	Frailty screening Geriatric assessments by nurses Development of personalized care plans Continuous follow-up Integration of health	Framework for integrated care interventions Contextual analysis to adapt implementation strategies

(continued)

Table 2 (continued)

Model	Country	Target population	Key features	Key outcomes
			and social care across levels	
PCMH Integrated Patient-Centred Medial Home (Sum et al., 2023)	Singapore	Community-dwelling older adults with biopsychosocial needs	Integrated primary care and home-based care management	Reduced emergency visits and outpatient consultations
Holistic continuity of patient care (Islam et al., 2021)	Norway	Frail older adults with multimorbidity and recent functional decline	Systematic collaboration between municipalities and hospitals Early assessment of functional status Promotion of “everyday rehabilitation” aligned with the patient’s personal goals for daily activities Patient-centered follow-up Early involvement of the patient’s general practitioner (GP). Assigning a designated primary care contact (nurse or social worker) from municipal services to coordinate and oversee individual patient follow-up	Improved psychological well-being Increased social participation Enhanced enjoyment of life

hearing and visual deficits) and person-centered assessment, develop personalized care plan and monitoring of the care plan, and engage communities and support caregivers.

Examples of Integrated Care for Older Persons

Table 2 presents a summary of models of integrated care for older adults, focusing specifically on models implemented in the last 10 years or currently well established in the respective countries, such as PACE.

Activities and Resources to Support Integrated Care for Older Adults

Care Transitions and Intermediate Care

Frail older adults frequently experience transitions between hospital and home, which increase the risk of adverse outcomes. Transitional care models (TCMs) address these challenges.

In a systematic review conducted by Leithaus et al. (2022), key components of TCMs included small multidisciplinary teams, intensive monitoring, shared decision-making, and active involvement of informal caregivers.

In many countries, expert services at the interface between the hospital and home or primary care exist, in order to promote safer transitions, maximizing functional status and reducing disability associated with health crises when possible. This is a range of services, which usually pivot on the healthcare component and geriatric rehabilitation, but which integrates a balance with comfort care and the approach of social needs of the person, can be grouped under the umbrella of “intermediate care” (Sezgin et al., 2020a, b). In the United States, these services are usually provided by postacute care or in skilled nursing facilities.

Hospital at Home

Hospital at home can be a very valuable resource to extend the capacity of care and follow-up of primary and community care, in order to increase the days at home, without a rise in mortality and prevent unnecessary hospitalizations (Mazzarone et al., 2025). In a quasiexperimental longitudinal study, with 30-day follow-up, Mas et al. (2018) compared clinical outcomes in older patients with acute medical crises attended by a geriatrician-led home hospitalization unit (HHU) vs an inpatient intermediate-care geriatric unit (ICGU) in the Barcelona area. Both groups showed recovery, with no differences in a 30-day mortality. The hospital at home (HaH) group exhibited a trend toward lower 30-day readmissions, higher functional gain, and slightly longer stays.

The results suggest that the geriatrician-led HHU effectively resolves acute crises in older patients with chronic disease. Positive results were also achieved with HaH for geriatric rehabilitation in the Barcelona area, that is, the same functional outcomes as in the bed-based geriatric rehabilitation unit but shorter stays (Mas et al., 2017). These studies emphasize the benefits of a HaH model integrating the idea of a multidisciplinary team (physical and occupational therapists, plus social workers and the support of remote speech therapy and clinical pharmacy) and a polyvalent approach directed to both admission avoidance and early discharge within the same team. This model proven valuable also to support the healthcare system during the COVID-19 pandemic (Inzitari et al., 2023).

HaH models are spreading in Western countries, providing benefits for patients (more person-centered, more contextualization of recovery, less hospital-related

complications) and for the system (probably lower costs and a rapid option to expand delivery of care). A recent systematic review by the Cochrane collaboration reviewed and consolidated the outcomes regarding admission avoidance HaH for older people, a model which can prevent unnecessary admissions to the conventional hospital, reducing discomfort for patients, complications, and, potentially, costs. Outcomes were similar to hospitalization, with a prompter resolution of some geriatric syndromes and less hospitalizations in the long term (Edgar et al., 2024). The publication is paralleled by an article on factors influencing early discharge and admission avoidance HaH (Wallis et al., 2024). An editorial supporting the review advocates in favor of more implementation of such models, in light of a consolidated evidence (Lai & Ko, 2024).

Preventive Care for Frail Older Adults in an Integrated Way

The 2024 Ageing Report Economic and Budgetary Projections for the EU Member States outlines a scenario aiming to ensure half of the future life expectancy gains are spent in good health, focusing on health promotion and prevention strategies for healthy aging (European Commission, 2024).

The +AGIL program exemplifies this approach through a 10-week personalized intervention for community-dwelling prefrail or frail older adults, targeting all intrinsic capacity domains as per the ICOPE recommendations (Inzitari et al., 2018). The program has demonstrated efficacy in improving physical function at 3 months, which was maintained after 6 months, with participants exhibiting varying levels of frailty at baseline (Pérez et al., 2019; Ferrara et al., 2023). A recent study, participants reported that engagement in the program was a highly positive experience with perceived direct benefits to their health and emotional well-being (Canet-Vélez et al., 2023). While mHealth interventions boost physical activity, barriers to large-scale implementation persist, including personal, social, technological, and organizational challenges. A recent study identified strategies like digital literacy training, tailored exercises, small group sessions, family technology support, and personalized feedback to enhance adoption (Villa-García et al., 2023).

The principles for the design of this sort of preventive interventions for frail older adults include design a multifactorial strategy; design a person-centered approach; design an evidence-based but sustainable and contextualized intervention; promote users' participation (older adults, caregivers, professionals); use an opportunistic case-finding/recruitment strategy; move the intervention close to the person (primary and community care); build integrated care models, involving community agents; empower the person and its caregivers; raise awareness and sensibility in decision-makers and the general population; and make an adequate plan for investments and assessment (Inzitari et al., 2018).

Social Prescribing

Social prescribing (SP) aims to enhance well-being and self-care and reduce demand on the NHS and social services. The SP experience in the Torbay and South Devon

NHS Foundation Trust was directed to older adults (50 years) with complex health needs (two long-term conditions). SP is a way of connecting patients to practical, community-based support, including access to advice on employment, housing, and debt (NHS England). A study found significant improvements in health, well-being, activation, and frailty scores. Forty-four percent of participants saw a decrease in service use or no change (Elston et al., 2019).

Matters of Integration in Technology Design for Aging People

The number of reports and protocols on technologies and services that facilitate integrated care has increased considerably. A recent review identified 12 ICT tools supporting integrated care, including electronic prescriptions, messaging between clinicians and patients, electronic health records, interconsultation, call centers, virtual conferences, personal health folders, nurse information systems, educational platforms, collaborative platforms, telemonitoring, and multichannel centers. The most commonly used technologies in integrated care models are digital communications, electronic health records, clinician and patient information systems, electronic medical records, electronic assessment tools, wearable monitoring devices and sensors, personal health folders, digital educational materials, electronic prescriptions, and social robots (Tian et al., 2022). According to Khosravi and Ghapanchi (2016), assistive technologies for older adults encompass general ICT, robotics, telemedicine, sensor technology, medication management applications, and video games, effectively addressing challenges such as chronic illnesses, social isolation, and reduced quality of life.

The new technologies to assist seniors have proven acceptable, useful, safe (Hein et al., 2019), effective (Khosravi & Ghapanchi, 2016), and economically attractive (Schneider et al., 2019).

Patient involvement is a core component of an integrated care approach. The INTEGRATE Project (Kiselev et al., 2018) used mixed methods to understand patient involvement in geriatric care. Older individuals without medical issues showed a higher desire for shared decision-making compared to those needing medical care. Patients demanded a comprehensive and understandable information and education process, while the health professionals' view was very task-specific, leading to a trust deficit. The study concludes that a gap exists between patients' and health professionals' perspectives on involvement, necessitating a comprehensive process considering varying health literacy levels.

Limitations and barriers of Information and Communication Technology (ICT) were extensively studied in the iCOACH case studies, and Steele-Gray et al. (2018) explored how ICT is used to support activities of integrated care and the organizational and environmental barriers and enablers to its adoption. ICT systems are frequently used to support care coordination by interprofessional teams, but providers face limitations in efficiently sharing patient data to access issues and system functionality limitations, such as a lack of interoperability. Even in innovative models of care, managers and providers mainly use technology to enable traditional ways of working. Barriers to innovative technology use include information access

barriers, limited functionality of available technology, and organizational and provider inertia (Steele-Gray et al., 2018).

In addition, many factors impair a broad use of technology in older age, including psychosocial and ethical issues, costs, and fear of losing human interaction. A lack of appropriate clinical trials to establish the clinical role of technologies to improve physical or cognitive performances and/or quality of life of subjects and their caregivers suggests that the classical biomedical research model may not be the optimal choice to evaluate technologies in older people (Pilotto et al., 2018).

Higgins et al. performed a concept analysis of the scientific literature in the health disciplines using the Rogers method. They have found four attributes of patient engagement: personalization, access, commitment, and therapeutic alliance. Patient engagement is defined as the desire and capability to actively chose to participate in care in a way uniquely appropriate to the individual, in cooperation with a healthcare provider or institution, to maximize outcomes or improve experiences of care. They have concluded that patient engagement is both process and behavior and is shaped by the relationship between the patient and provider and the environment in which healthcare delivery occurs.

Despite reported limitations and shortcomings, recent literature yields many positive reports on how technology can be applied to improve integrated care for older persons. Economic evaluations point toward effectiveness (Khosravi & Ghapanchi, 2016) and possible cost savings (Schneider et al., 2019). Applications of design and technology can contribute to autonomous aging, for example, independent living and lifestyle support (Van der Cammen et al., 2017).

It is important to consider the principles of human factors (HF) when applying technology to improve integrated care for older people. HF, or ergonomics, which studies human-system interactions, ensures that technology developments meet older people's needs, wishes, and expectations by accounting for age-related changes in physical, cognitive, and visual capabilities, as well as their aspirations. Applying HF is not only about addressing the reduced capabilities of older adults but also about focusing on their potential capabilities, such as mental growth (strategic thinking, language skills, motivation, commitment, work expertise) and some aspects of social capabilities (ability to adjust their behavior) (Dul et al., 2012). Considering the principles of geriatric medicine and aging ergonomics, remarkable similarities can be found between the two disciplines, as is shown in Fig. 1 (Van der Cammen et al., 2019).

Both disciplines apply the same multidisciplinary approach to aging and aging individuals, which opens a broad perspective for successful interventions.

These interventions can only be successful by following a user-centered design approach as a bridge between the two disciplines. In the White Paper Human Factors for Health and Social Care, the authors describe how human factors and ergonomics can bring depth and clarity of understanding to health and social care issues (Hignett & Lang, 2018). In this regard, HF has a critical and fundamental part to play in patient safety by providing methods and approaches which address known issues of integration, impact, and sustainability of change.

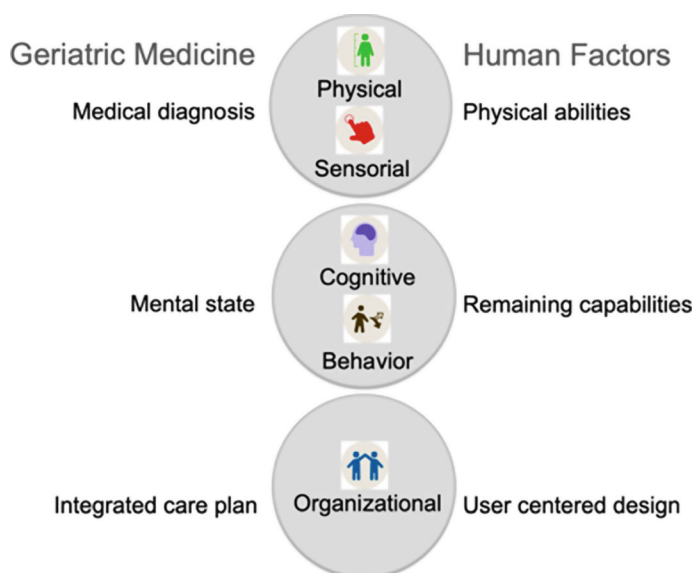


Fig. 1 Similarities between the principles of geriatric medicine and human factors. (Adapted after Van der Cammen et al. (2019))

For successful integration of technology in the care of older adults, a further effort in interdisciplinary collaboration will be required in order to integrate technologies into the existing health and social service systems with the aim to fit into the older adults' everyday life (Pilotto et al., 2018; Van der Cammen et al., 2017). Since the home is the context of everyday life, bringing care home will be one of the challenges in the near future.

Aging in Place and Technology

As mentioned, home is the preferred environment to live and to receive care for many older adults. For this purpose, the concept of “Aging in Place” (AiP) is often used. AiP improves quality of life [QoL] and has the potential to relieve an overburdened healthcare system (Schomakers et al., 2018). AiP is a complex situated and individual journey (Greenfield, 2012) that can often involve different challenges showing up in unique ways over time. For instance, when a single individual experiences loneliness (Vos et al., 2020) and difficulties in daily activities, he/she faces cognitive decline.

Most older adults prefer to age in place, and technologies, including Internet of things (IoT), Ambient/Active Assisted Living (AAL) robots, and other artificial intelligence (AI), can support independent living (Wang et al., 2019). A concern is how to orchestrate the delivery of the relevant technology to the right person at the right time. Data-driven platforms are digital networks that purposefully connect people, products, and services through data. What is promising about data-driven

platforms is that they have the power to provide individually tailored and preventive support. This can greatly benefit aging adults as well as their informal and formal caregivers. However, taking a top-down design process creates mismatches between technologies and older adults' needs. Therefore a human-centered design approach should be used to understand the human needs in their context and to design interventions that can respond to these needs (Melles et al., 2021).

Education, Challenges, and Impacts of Healthcare Workforce

The aging society requires professionals who can deliver integrated care, so there is a need for educational programs that prepare (future) professionals to deliver integrated care while addressing components and outcomes of the interventions.

In a scoping review, Van Wijngaarden et al. (2023) found 17 educational program settings, all aligning with the WHO definition. These programs primarily focused on care for individual patients (microlevel) and the outcomes suggested that experiencing the complexity of care is key. The authors conclude that the review revealed the limited evidence on educational programs about integrated care for older persons, that their findings suggest that educational programs on integrated care should not be limited to the microlevel, and that students should obtain adaptive expertise by experiencing complexity. Future research should explicitly define integrated care.

In a study by Frances Barraclough et al. (2024), a modified Delphi consensus-building method with global panelists with experience in delivering and designing training in Integrated Care (IC) was used, to ascertain which competencies are important in an international framework guiding workforce development in IC. A list of 8 domains and 40 competencies was generated. The highest importance rankings were allocated to person-centered care, interprofessional teamwork, and care coordination. The lower-ranking domains focused on professional workforce attributes. The study provides a global consensus on the competencies required for workforce training and development in IC and offers recommendations on how these competencies can be implemented in higher education and vocational institutions and workplace settings.

The WHO Regional Office Europe report addresses the challenges for the health and care workforce (HCWF), focusing on identifying effective policy and planning responses (WHO, 2023). It identifies five workforce crises, labor, mental health, education, gender equality, and financial investment, and suggests possible solutions. The report presents an overview of the HCWF situation in the region (focusing on medical doctors, nurses, midwives, dentists, pharmacists, and physiotherapists, for whom data are available) and identifies relevant policy options, their expected benefits and potential facilitators, or barriers to successful implementation (Azzopardi-Muscat et al., 2023; WHO, 2023).

Relevant Considerations for Evaluation

Assessing Meaningful Outcomes

Recently, the concept of PROMs and PREMs has been introduced. Patient-reported outcome measures (PROMs) and patient-reported experience measures (PREMs) are measures that provide a patient-centered view of healthcare. PROMs are standardized, validated questionnaires that are completed by patients and focus on their perceived health status and health-related quality of life; they are a means of measuring clinical effectiveness and safety.

Hughes et al. (2024) performed a scoping review of peer-reviewed literature on patient-reported outcomes in integrated health and social care, with the aim to identify PRO measures utilized in integrated care and adult social care research and practice and to chart the evidence of implementation factors influencing their uptake. They identified 159 articles reporting on 216 PRO measures deployed in a social care or integrated care setting. Most articles used PRO measures as research tools. Eight (5.0%) articles used PRO measures as an intervention. Articles focused on community-dwelling participants (35.8%) or long-term care home residents (23.9%), with three articles (1.9%) focusing on integrated care settings. Stakeholders viewed PROs as feasible and acceptable, with benefits for care planning, health, and well-being monitoring as well as quality assurance. Patient-reported outcome measure selection, administration, and PRO data management were perceived implementation barriers. The authors conclude that there is increasing utilization of PROs in adult social care and integrated care.

Further research is needed to optimize PROs for care planning, design effective training resources, and develop policies and service delivery models that prioritize secure, ethical management of PRO data.

In general, literature on PREMs and related outcomes is still scanty. In a scoping study of PROMs and PREMs to analyze the prevalence of using patients' reported outcome measures and experiences (PROMs and PREMs) in relation to integrated care (IC), Bandurska (2022) found that PROMs and PREMs were most commonly used in studies from the USA and Netherlands, but in general, the use of PROMS/PREMS is becoming more popular.

Qualitative Research and Integrated Care

In a scoping review, Lawless et al. (2020) highlight the salience of the relational, informational, and organizational aspects of care from an older person's perspective. Participants across the 30 included studies desired accessible, efficient, and coordinated care that respected their needs, preferences, rights, and safety.

In an analysis of the implementation of an integrated care model for older adults in Quebec, Breton et al. (2019) explored the views of policymakers, providers, managers, older adults, and caregivers, along the lines of the six dimensions of the Rainbow Model of Integrated Care. Patients and caregivers focused on unmet

individual needs, while policymakers, managers, and providers highlighted structural barriers to integrating care. Mandated systemwide integration appears to have structural, organizational, functional, and normative transformations, but its clinical changes are more uncertain in view of the observed divergent perspectives of actors.

Kuluski et al. (2018) conducted one-to-one interviews with 80 caregivers from Canada and New Zealand where roles, experiences, and needs were explored. The objective of this paper was to explore the unmet needs of caregivers of older adults with complex care needs receiving CBPHC. The authors conclude that to support caregivers, CBPHC models should engage them meaningfully, address their needs, and value their insight as crucial evidence for health and social care improvements.

Conclusion

Integrated care for older adults can provide a series of benefits for users, professionals, and society and represents one of the pillars of the UN and WHO strategy included in the “Decade of Healthy Aging.” However, implementation is challenging, as well as measuring its impact with the correct metrics.

In light of the complex and often concurrent health and social needs of this segment of the population, integrated care has specific features and likely requires specific initiatives. In order to succeed, integrated care models for older adults should rely on a set of components and delivery strategies. The components associated with successful integrated care models include enabling patient engagement and self-management support, developing multiprofessional working culture, adopting evidence-based clinical pathways and protocols, aligning incentives, effectively managing resources, continuously monitoring and improving performance, and investing in supporting information technologies (WHO Regional Office for Europe, 2016b). New concepts such as Aging in Place supported by technology (e.g., AI, internet of things) might be promising provided that they use a human-centered approach. In general, multicomponent approaches can be characterized as the optimization and innovation of service delivery processes.

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