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Effect of frailty on healthcare utilization: policy analysis and recommendations to the Swiss health system

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Aging; Frailty; Healthcare utilization; Healthcare access; Integrated care; Psychological frailty; Social frailty.

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List of abbreviations

cFI	clinical Frailty Index
CFS	Clinical Frailty Scale
CGIC-PF	Clinical Global Impression of Change in Physical Frailty
EFS	Edmonton Frail Scale
eFS	electronic frailty score
EMRs	Electronic Medical Records
EHRs	Electronic Health Records
FOPH	Federal Office of Public Health
FI	Frailty Index
FI-CGA	Frailty Index Comprehensive Geriatric Assessment
FP	Frailty Phenotype
GFE	Geriatric Functional Evaluation
GFI	Groningen Frailty Indicator
HMOs	Health Maintenance Organizations
HFRS	Hospital Frailty Risk Score
IANA	International Association of Nutrition and Aging
IC	Integrated Care
interRAI-AC	InterRAI-Acute Care
interRAI-HC	interRAI-Home Care
IRR	Incidence Rate Ratio
MC	Managed Care
OR	Odds Ratio
RAIs	Resident Assessment Instruments

SES	Socio-Economic Status
CSSS-N	Social Security and Health Commission of the National Council
SOP	Study of Osteoporotic Fractures
SHARE	Survey of Health, Ageing and Retirement in Europe
LAMal	Swiss Federal Law on Compulsory Health Care
SFNR	Swiss Frailty Network and Repository
SLHS	Swiss Learning Health System
SPHN	Swiss Personalized Health Network
TFI	Tilburg Frailty Indicator
VES	Vulnerable Elders Survey

Policy Briefs and Stakeholder Dialogues of the Swiss Learning Health System

The Swiss Learning Health System (SLHS) was established as a nationwide project in 2017, involving academic partners across Switzerland. One of its overarching objectives is to bridge research, policy, and practice by providing an infrastructure that supports learning cycles.

Learning cycles enable the continuous integration of evidence into policy and practice by:

- continuously identifying issues relevant to the health system,
- systemizing relevant evidence,
- presenting potential courses of action, and
- if necessary, revising and reshaping responses.

Key features of learning cycles in the SLHS include the development of **Policy Briefs** that serve as a basis for **Stakeholder Dialogues**.

A **Policy Brief** describes the issue at stake by explaining the relevant contextual factors. It formulates a number of recommendations to address the issue (evidence-informed recommendations, when available), and for each possible recommendation, it explains relevant aspects and potential barriers and facilitators to their implementation.
Policy Briefs serve as standalone products to inform interested audiences on potential courses of actions to address the issue, as well as input for Stakeholder Dialogues.

A **Stakeholder Dialogue** is a structured interaction where a variety of key stakeholders are brought together for the purpose of defining a common ground and to identify areas of agreement and disagreement on how to solve issues in the Swiss health system. Based on a Policy Brief, stakeholders discuss the issue, recommendations, and barriers and facilitators, and work collaboratively towards a common understanding of the issue and the best course of action. The dialogue takes the form of a deliberation to ensure that stakeholders work together to develop an understanding and solutions that are acceptable to all parties.

Key Messages

Background and Context

Frailty is increasingly seen as a problematic expression of population aging. Given its major implications for clinical practice, public health, and financial sustainability, it represents an emerging challenge for health systems.

The Issue

The most widespread instruments to measure frailty are limited to its physical domains, albeit recently, it has been argued that the concept should be widened to adopt a multidimensional approach, including psychological and social aspects, because disregarding a holistic approach may lead to care fragmentation and consequent negative health outcomes. Moreoever, there is a considerable inconsistency and a lack of consensus even in the tools for measuring frailty within the same setting or context, resulting in consistent differences in how the “same” elderly is classified, interventions implemented, and prevalence estimated. Despite Switzerland falling among countries with the lowest prevalence rates, physical frailty has increased over time, while psychological and social frailty has fluctuated. Physically and psychologically frail individuals are more likely, while socially frail individuals are less likely, to be hospitalized and to see a doctor. In addition, physical frailty is more burdensome than multimorbidity. The frail elderly, who are socially isolated, may forego healthcare due to their inability to reach healthcare facilities or the lack of availability of a caregiver. Ignoring psychological frailty, similarly, may prevent the detection of patients that are at higher risk of institutionalization and that may in turn lack appropriate interventions.

Recommendations for Action

Reach a consensus on the definition of frailty and define a comprehensive measurement instrument

Design frailty-specific, integrated care strategies to appropriately address the frailty needs and shift the clinical and economic burden from hospitals to primary and home-care care settings

Adopt a nationwide harmonized electronic frailty index, built using existing primary care data, to increases the likelihood of identifying individuals most at risk

Implementation Considerations

Facilitators to implementations include:

- the Swiss Frailty Network & Repository and of the Swiss Society for Geriatrics;
- the ongoing debate on Coordinated Care at the Federal level;
- the ongoing debate on Electronic Patients Records (EPRs).

Barriers to implementation include:

- an overall neglection of the complexity and multidimensionality of frailty;
- the current financing system;
- The Federal Law on Data Protection (LDP);
- approximately half of the hospitals being reluctant to EPR adoption.

Background and Context

In the last decades, increased life expectancy and the need to deliver appropriate health and social care to a rising number of elderlies has raised concerns on the sustainability of healthcare systems, especially in developed countries, where policymakers view aging as a major driver of the rapid growth of health expenditures (1–8).

The significant role of aging on the financial sustainability of health systems has been debated in the literature. The well-known hypothesis of "*the red herring theory*" argued that health care expenditures are positively correlated with age mainly because the likelihood of mortality rises with age. According to this argument, proximity-to-death is a far better proxy of morbidity status than age (9–12), and consequently the most likely driver of increasing health expenditures for the elderly.

However, de Meijer and colleagues (2013) argue that health service utilization is driven by three categories of factors: *predisposing*, *enabling*, and *need determinants*. *Predisposing factors* influence the likelihood of service use without being directly responsible for it and are represented by age, sex, marital status, co-residence status, Socio-Economic Status (SES), health behavior, and living and working conditions. *Need factors* are the immediate reason why an individual, given the presence of predisposing and enabling determinants, seeks healthcare and are thus directly responsible for using health services. Poor health, declined in its various dimensions - such as the presence of chronic diseases, self-assessed health, and physical and mental illness, as well as disability and frailty - are the main *need determinants* of health care utilization. Finally, *enabling determinants* represent the resources that facilitate healthcare use and include the level of health insurance coverage, the individual or household income, and the informal care supply (2,13).

The health status remains the major determinant of healthcare utilization (14). Once controlled for the *need determinants,* the effect of aging on acute healthcare use is modest (2,15), while such effect holds strong when analyzing long-term care and primary care expenditures (2,16). Therefore, the relationship may change across care levels and needs. However, enabling and predisposing factors play an important role in predicting healthcare use and the consequential expenditures.

It is thus paramount, for policymakers and health professionals, to detect specific clusters of patients with specific needs and conditions to predict the level of healthcare use better and minimize potential inequities, inefficiencies, and unnecessary expenses.

The Issue

Frailty as an increasing challenge

Frailty is increasingly seen as a problematic expression of population aging (17). Given its major implications for clinical practice, public health, and financial sustainability, it represents an emerging challenge for health systems (18).

Frailty is a clinical geriatric condition characterized by increased vulnerability resulting from a diminished physiological reserve and function of multiple organs, compromising the ability to cope with everyday or acute stressors (17,19–23). Nevertheless, no consensus on its definition has yet been achieved at the international level, and the concept is in constant evolution (17,24,25).

The most widespread instruments to measure frailty build on the above-mentioned definition and were developed in the 2000s. These are the Frailty Phenotype (FP) (22) and the Frailty Index (FI) (23), both having been shown to associate with adverse outcomes in older people (22,26–29). More specifically, they help predict disability (22,30), hospitalization (22,31) and length of stay (32), admission to long-term care (31,33), and mortality (22,31). Evidence has also shown that both instruments represent a useful risk assessment tool because they predict health outcomes in specific sub-conditions or treatments, such as elective surgery (32), cardiac surgery (34), and cancer (35–38).

More recently, however, it has been argued that the concept should be widened to adopt a multidimensional approach and also include psychological and social aspects (39). Gobbens and colleagues, with their Tilburg Frailty Indicator (TFI), define frailty as “a dynamic state affecting an individual who experiences losses in one or more domains of human functioning - physical, psychological, social - and which increases the risk of adverse outcomes” (25). Adopting a definition of frailty that is limited to its physical domains by disregarding a more holistic approach, may thus lead to care fragmentation and consequent negative health outcomes (25). In their view, an appropriate definition of frailty would have to reflect multidimensionality and dynamicity, capacity to predict adverse outcomes, clear differentiation from comorbidity and disability, clinical sensibility (i.e., acceptance of the definition by its practical users), and practicability (i.e., the inclusion of aspects which are the object of preventive interventions).

Despite several studies providing evidence on adverse health outcomes attributable to social and psychological frailty (40–43), cognitive and social aspects are mostly neglected.

The extant literature has focused on the effects of physical frailty on the patterns of healthcare utilization and costs in different contexts: Canada (44), United States (45), France (46), Belgium (47), Germany (48,49), England (50), Spain (51,52), Ireland (53), Sweden (54), ten European countries (55). Contrarily, there is paucity of evidence regarding the effect of multidimensional frailty on healthcare utilization and no existing study for Switzerland. Yet, the importance of adopting a more comprehensive definition of frailty is gaining increasing consideration and the risks derived from omitting important psychosocial characteristics of the condition, in terms of sensitivity in detecting health outcomes and choice of targeted interventions are more often highlighted (56,57).

A comprehensive assessment: current and future landscapes

Aging affects not only physical, but also psychological, cognitive, and social domains and this reflects the impairments that frail older people experience.

Frailty is, as of today, measured using a number of instruments, ranging from short, fast, and crude tools to sophisticated and time-consuming measures. Notably, some instruments merely focus on physical frailty while few aim at measuring also its cognitive and socio-psychological domains.

Different frailty instruments may serve different purposes. Therefore, the choice may be driven by several reasons, including: the measurement aim, the care setting, time constraints, and the subject performing the measurement (58,59). Some instruments perform better for population-level screening, while others are more suitable for clinical settings or specificions (24). For instance, if the objective consists of preventing falls or improving physical strength, then assessing frailty based on a tool emphasizing the physical domain may be most appropriate. If, however, the purpose is to determine the burden of frailty in a community setting and to promote healthy aging in place, then a measurement that neglects psychological and social domains would likely cause the design of interventions and policies to be inappropriate.

The most important associations with an interest in aging and frailty - the International Association of Nutrition and Aging (IANA), the joint-action ADVANTAGE, the Royal College of Physicians, the French Society of Geriatrics and Gerontology - have been working to reach an agreement on a uniform definition. Nevertheless, they ultimately noted how times might not yet be mature for the establishment of a consensual definition or assessment tool (60–63). A consensus has, however, been reached on the need for frailty tools to be quick to administer and easy to use in clinical settings; validated and reliable; meant for screening; inexpensive and requiring no special equipment. According to these recommendations, instruments such as the FRAIL or the Edmonton Frail Scale (EFS) would fulfill the conditions mentioned (64), where only the latter aims to measure physical, social, and psychological frailty. Moreover, the practicability of the application of the most used Frailty Phenotype (FP) as well as of the Frailty Index (FI) have been somewhat debated, due to the need for special equipment for the measurement of the first one and the time needed to calculate the second one (24), unless automatically done by using electronic medical records (EMRs) (64). Ultimately, easy-to-use instruments could allow a two-step approach, according to which frailty would be measured in a first step via simple "rules of thumb" by physicians, establishing a preliminary and rapid identification of frail older people at risk and defining appropriate interventions and in a second step, a more complex assessment could be then passed on to a nurse, practice assistant, and sometimes secondary care (65).

Nevertheless, there is still considerable inconsistency and a need for more consensus even in the tools for measuring frailty within the same setting or context[1]. As a result, there may be

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[1] Physical frailty, for instance, is measured through a wide variety of instruments, such as the FP, several modifications of the latter, grip strength as a single marker, the Study of Osteoporotic Fractures (SOP), and the Vulnerable Elders Survey (VES), among others. The same can be stated about the multidimensional scales, including the FI, the Tilburg Frailty Indicator (TFI), the Groningen Frailty Indicator (GFI), the EFS, the Clinical Global Impression of Change in Physical Frailty (CGIC-PF), the Geriatric Functional Evaluation (GFE), the Frailty Index Comprehensive Geriatric Assessment (FI-CGA), among others (59).

consistent differences in how the “same” elderly is classified, in the interventions put in place to improve healthcare outcomes, and in the estimated prevalence of frailty. This adds complexity or makes it inappropriate to perform comparisons and draw conclusions across different studies. In fact, more comprehensive definitions of frailty would presumably result in a larger estimated prevalence (66) and likely in a stronger association with health care expenditures, making the burden of frailty of even greater policy relevance.

The burden of the frailty syndrome

Using data from the Survey of Health, Ageing and Retirement in Europe (SHARE), we estimated the prevalence of physical, social, and psychological frailty[2], in the period 2011-2020, in community-dwelling elderly individuals of 12 European countries including Switzerland.

Frailty increases with age and with concomitant multimorbidity and differs widely across European countries (70–73). Countries, such as Spain and Italy, for instance, exhibit higher physical frailty rates (15-18%) compared to others, such as Switzerland and Sweden (4-5%); which is in line with what has been reported in a recent systematic review and meta-analysis (74). Similarly, psychological frailty is more prevalent in countries such as Italy and Estonia (7-9%) compared to others, such as Austria and Switzerland (less than 2%). Finally, France and the Czech Republic exhibit higher rates of social frailty (about 6%) compared with countries such as Germany, Denmark, and Slovenia (about 2%).

Notably, despite Switzerland falling among countries with the lowest prevalence rates, physical frailty has increased over time (Table 1), while psychological and social frailty (Table 2 and 3) have fluctuated. Moreover, in line with the European average, physical frailty in Switzerland is more burdensome than multimorbidity regarding hospital access and number of doctor visits −Table 1.

The prevalence of hospitalization and doctor visits is higher in individuals with physical and psychological frailty compared to unfrail ones - Table 1 and 2. Contrarily, a lower share of high socially frail respondents is hospitalized and experience a high number of doctor visits compared to unfrail ones - Table 3.

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[2] We measured physical frailty using the Fried’s FP (22) and social and psychological frailty using the TFI (25,57,67).

Table 1: Physical frailty in Switzerland: prevalence over time, hospitalization, and doctor visits by frailty status

		Physically frail	***Physically pre-frail***	***Physically robust***	***Multimorbid***	***Non-multimorbid***
Prevalence	*2011*	3.58%	36.56%	59.86%	48.35%	51.65%
	2013	3.44%	35.97%	60.59%	48.62%	51.38%
	2015	3.83%	35.31%	60.86%	48.98%	51.02%
	2019/2020	4.83%	36.51%	58.66%	53.98%	46.02%
Hospital admission		37.94%	19.93%	11.17%	22.29%	9.87%
N. of doctor visits	*Low*	7.21%	21.32%	36.29%	17.25%	47.04%
	Middle-low	12.22%	22.60%	28.61%	19.91%	21.82%
	Middle-high	22.10%	25.16%	20.81%	27.34%	18.15%
	High	58.48%	30.92%	14.28%	35.50%	12.99%

Source: Survey of Health, Ageing and Retirement in Europe (SHARE) – waves 4, 5, 6, 8

Table 2: Psychological frailty in Switzerland: prevalence over time, hospitalization, and doctor visits by frailty status

		Psychologically frail	***Psychologically pre-frail***	***Psychologically unfrail***
Prevalence	*2011*	1.84%	61.77%	36.39%
	2013	1.65%	60.84%	37.51%
	2015	1.87%	60.73%	37.40%
	2019/2020	1.70%	59.80%	38.51%
Hospital admission		23.89%	16.65%	12.90%
N. of doctor visits	*Low*	8.68%	26.12%	36.62%
	Middle-low	13.73%	25.05%	27.55%
	Middle-high	22.40%	23.97%	19.93%
	High	55.19%	24.87%	15.91%

Source: Survey of Health, Ageing and Retirement in Europe (SHARE) – waves 4, 5, 6, 8

Table 3: Social frailty in Switzerland: prevalence over time, hospitalization, and doctor visits by frailty status

		Socially frail	***Socially pre-frail***	***Socially unfrail***
Prevalence	*2011*	4.20%	89.60%	6.20%
	2013	2.78%	90.81%	6.42%
	2015	2.97%	87.93%	9.10%
	2019/2020	2.93%	85.63%	11.44%
Hospital admission		18.8%	14.55%	23.38%
N. of doctor visits	*Low*	26.46%	30.62%	21.09%
	Middle-low	22.50%	26.10%	23.39%
	Middle-high	23.91%	22.17%	24.76%
	High	27.14%	21.11%	30.76%

Source: Survey of Health, Ageing and Retirement in Europe (SHARE) – waves 4, 5, 6, 8

Effect of frailty on access to healthcare

The percentage of hospitalizations and the number of doctor visits, in physically, psychologically, and socially frail individuals, however, may not represent the “pure” effect of frailty on access to healthcare. In other words, there could be other reasons why frail patients are hospitalized or see a doctor more frequently, e.g., frail patients may have other concomitant diseases, or have a lower ability to pay for care, among other factors. The actual effect of frailty on healthcare access can however be assessed by controlling for all other potential *need, predisposing*, and *enabling factors*, by means of regression analyses.

To this regard, only few Swiss studies have investigated the effect of physical frailty on healthcare utilization while no one has investigated the effect of multimensional frailty. A retrospective observational study conducted in a Swiss university hospital found that physical frailty is associated with increased length of stay and a lower likelihood of complete cost coverage (75). Another study found an association between grip strength, a measurement used to build the physical frailty index according to the FP definition, and ambulatory care, measured by the number of physicians’ appointments (76).

Using the SHARE data, we investigated the effect of multidimensional frailty on healthcare utilization (12 European countries including Switzerland)[3]. We found that physical, social, and psychological frailty predict acute and ambulatory care - i.e., hospital admission and number

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[3] We did this by means of two econometric models, whose choice was based on: (1) the longitudinal structure of the data; (2) the nature of the outcome data. For the occurrence of hospitalization in the last 12 months (i.e., a binary dependent variable), we used a logistic regression model; for the number of doctor visits in the last year (i.e., a count dependent variable), we used a Poisson regression model. The results are thus interpreted as Odds Ratios (ORs) in the first model and as Incidence Rate Ratios (IRRs) in the second one, respectively. Our models include the three frailty dimensions and several additional control variables grouped into: health status, socio-demographic status, socio-economic status, behavioral risks, country, and year. Multimorbidity and disability, two main correlates of frailty, fall among the health status controls (77,78).

of doctor visits. The effect of physical frailty confirms previous results according to which physically frail and pre-frail individuals without multimorbidity are more likely to be hospitalized (respectively, +90% and +27%) and to have a higher number of doctor visits (+30% and +13%, respectively), compared to robust, non-multimorbid subjects. The most important findings, however, concern the ability of psychological and social frailty to predict healthcare access: psychologically frail and pre-frail individuals are more likely be hospitalized (30% and 7% higher odds) and to see a doctor (7% and 6% higher incidence rate), compared with psychologically unfrail, non-multimorbid subjects; socially frail and pre-frail individuals are less likely to be hospitalized (OR= 0.53 and OR= 0.73, respectively) and to see a doctor (IRR= 0.90 in both groups), compared with socially unfrail, non-multimorbid subjects. Importantly, physical frailty is confirmed as more burdensome than multimorbidity, in accordance with previous studies[4] (54,55) and the effect of the three dimensions on hospital admissions is stronger than the effect on doctor visits .

Results pave the way for paying more attention to social and psychological frailty in health policies, including the Swiss ones, as a strategy aimed to contain expenditures and avoid potential health care inequalities. The elderly frail, who are socially isolated, may forgo health care due to their inability to reach health care facilities or because of the lack of availability of a caregiver, whenever they cannot count on an informal network. Ignoring psychological frailty, similarly, may prevent the detection of patients that are at higher risk of institutionalization and that may in turn lack appropriate interventions. To this regard, a study conducted in Switzerland found that, a much higher percent of home-based frail older adults reported more need for support (80) compared to the Dutch counterpart (81). These are all issues that may be tackled by rethinking home and social care on top of traditional medical care (79).

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[4] Frailty per se tends to increase the odds of being hospitalized and the expected number of doctor visits (+90% and +30%, respectively) much more than multimorbidity without concomitant frailty (+34% and +18%, respectively).

Recommendations

Recommendation 1: Reach a consensus on the definition of frailty and define a comprehensive measurement instrument.

Frailty is a multidimensional condition deserving a relevant position among *need* and *enabling determinants* of healthcare access and utilization, especially in high-income, aging societies such as Switzerland. Its multidimensionality represents a key factor of effective health-related risk stratification. The objective to measure it through a harmonized, comprehensive, instrument is thus be the first step towards its prioritization in health policy agendas (63). However, a convergence towards a standardized definition of the condition is a “work in progress” still lagging at the international level.

In Switzerland, studies aimed at measuring frailty within the hospital setting use a variety of scores such as the Clinical Frailty Scale (CFS), the FI, the FP, the Hospital Frailty Risk Score (HFRS) (84,85). The same variety of frailty measurement approaches can be observed in the community setting, where the prevalence of frailty and the risk of negative outcomes has been estimated using several measures, including a revised version of the FP (87), the Groningen Frailty Indicator (GFI)[5] (80), and the FI (88).

In the nursing home and home care setting of different countries, Switzerland included, frailty scores are generally derived from the Resident Assessment Instruments (RAIs) – which include the interRAI-Home Care (interRAI-HC), the InterRAI-Acute Care (interRAI-AC) and the Swiss RAI-Home Care (89)[6]. However, the external validity of the FI derived from the RAIs, must still be assessed in community-dwelling and other settings (89).

Besides, a Swiss study concluded that the electronic frailty score (eFS) may be applied to both hospitalized and community-dwelling older adults. However, the conclusion holds provided that subjects had at least one hospital admission in the year before the frailty assessment (86), making the practice not applicable to community-dwelling frail elderly which where never hospitalized.

The appropriateness of using a two-steps approach to measure frailty has been debated. According to such an approach, in a first step frailty is measured via simple “rules of thumb” and easy-to-use instruments, while in a second step the measurement is based on a more complex assessment (65). This may allow, in a first phase, a preliminary and rapid identification of frail older people at risk in settings where complex and time-consuming assessments may be impractical, such as for GPs or non-geriatricians, and in a second phase, to delegate a more in-depth and formal assessment to a geriatrician, a nurse, a practice assistant, and sometimes

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[5] A tool that measures frailty according to a multidimensional perspective that includes psychological, social, and cognitive domains, other that the physical ones.

[6] The interRAI-HC is designed to be a user-friendly, reliable, and person-centered instrument. It focuses on the person's functioning and quality of life by assessing needs, strengths, and preferences. It also facilitates referrals when appropriate. When used on multiple occasions, it provides the basis for an outcome-based assessment of the person's response to care services. The interrail-HC Assessment System can be used to assess persons with chronic needs for care, as well as with post-acute care needs (e.g., after hospitalization or in a hospital-at-home situation) (89).

secondary care (65,90,91). Frailty instruments, short and easy-to-use and proven to be of clinical value in a stepwise assessment, exist (90,92), Nevetherless, it is unclear how such an approach should be implemented in practice.

Using a harmonized, comprehensive, instrument to consistently measure frailty, would help identifying the frail population and use frailty as a risk stratification tool, correctly estimate the clinical and economic burden, designing targeted intervention strategies, and making comparisons across different studies and care settings (19,60,82).

Recommendation 2: Design frailty-specific, integrated care strategies to appropriately address the frailty needs and shift the clinical and economic burden from hospitals to primary and home-care care settings.

The complexity and multidimensionality of frailty suggest the importance of designing and implementing integrated and comprehensive care strategies, carried forward by all the providers and professionals from different sectors: health care, social care, housing, and community support (42,53,64,82,93–97). Such a strategy would improve older frail adults' quality of life and functional ability.

Since the influence of frailty on the likelihood of hospitalization is larger than on doctor visits, one might hypothesize that improving the assessment and treatment of frailty might help shifting the burden from the acute to other care settings, with consequential economic effects at the system level, provided appropriate care integration across care settings (61,96,97). In fact, regardless of the setting in which frailty is detected, a greater level of coordination between emergency and acute medical units, primary and geriatric care, would enable the reduction of duplications and improve outcomes (61). The systematic coordination between levels of care and sectors is precondition or facilitator of care integration and would not only improve the quality of life and functional ability of the frail elderly, but also reduce health services utilization and, consequenty, healthcare costs.

In a prospective controlled study, conducted in Geneva in frail and dependent people over 60 years old, additional home visits provided by multidisciplinary geriatric team, as part of an integrated care program, proved to have a significant effect in reducing unnecessary hospitalizations and emergency room visits (108). Other two recent studies reported how Integrated Care (IC) has a potential overall positive impact on hospitalization and length of stay (109) and a possible positive impact on hospital readmission (109), patient satisfaction (109,110), perceived quality of care (110) and access to services (110).

Nevertheless, the effect of integrated care strategies on outcomes such as the number of hospitalizations, especially in the short run, has been also found to be non-significant (110,111). This may be due to longer time frames needed to see the effects of such complex changes that need to come with a change in culture; additional identification of unmet needs because of holistic, more comprehensive approaches, thus resulting in increased healthcare use; sub-optimal desing and management of integrated care strategies (112).

Integrated care models specifically designed to prevent and manage frailty are scarce (97) and have only recently been given further attention. Most European countries, with few exceptions, do not have frailty-specific programs in place and, overall, health systems tend to seek integration within the health care sector, yet neglecting the lack of continuity between primary and hospital care, as well as between health and social care.

In Norway (98) and in the Netherlands (99), integration of health and social care is considered a political priority to address unmet needs of frail elderly. The Dutch "Care Chain Frail Elderly" program targets community-dwelling frail elderly patients, defined according to "loss of functional abilities and control over one's life due to case and care complexity". Its objective of fostering patient-centered coordinated, structured multidisciplinary, care is dual: to keep patients as much as possible at home and to rely on well-defined primary care pathways to reduced secondary and long-term care and consequently costs (99). In the UK (100) and Scotland (95), such models are considered key and have been implemented for complex older patients. In Cataluña, five-year regional health plans foster integration of health and social services with attention to frail chronic patients (101) and in the Basque countries the process is ongoing despite the focus is on multimorbid patients (102).

In Switzerland, the project "coordinated care" has been launched in January 2015 by the Federal Office of Public Health (FOPH), on occasion of the conference Health 2020 (103). The main objective was to improve care coordination across the treatment pathway, namely within hospital units or between care settings (ex., hospital and home) for very old multimorbid patients – i.e., suffering of two or more chronic diseases or of advanced frailty, generally older than 80 years of age. As part of this project, in December 2016, service providers, associations, cantonal authorities and insurers have joined forces, meeting at the invitation of the FOPH and the Swiss Conference of Cantonal Health Directors, with the aim to optimize the hospital discharge of frail patients with multiple conditions (104). From the discussion, it emerged how Switzerland already has some interesting models, showing that patients' outcomes improve while rehospitalizations and costs decrease when the interfaces between acute care and follow-up (at home or in a medico-social institution) are professionalized and when the resources devoted to their coordination are sufficient. However, it also emerged how such models are not directly trasferables to other Swiss contexts.

The Health2020 objectives and lines of action have been further renewed in the Health2030 program, where it is stated that "Targeted incentives can lead to better coordination between service providers; payment sys¬tems should be based as far as possible on the success of treatment rather than on the number of steps taken in the examination and treatment pro¬cess. Duplication needs to be avoided, treatment more evidence based, and quality must be assured" (Objective 5, Line of Action 5.1) (105).

On September 7th, 2022, the Federal Council submitted the draft law 22.062 «Measures for cost containment – Package 2», regarding the modification of the Swiss Federal Law on Compulsory Health Care (LAMal), in which it is proposed to «strengthen coordinated care, by defining coordinated care networks as stand-alone service providers» (106). As of mid-March 2023, however, no final decision has been made as the draft still needs to pass through the Chamber. In this regard, it's also worth recalling that in June 2012, the population rejected the Managed Care (MC) project proposal (106). Moreover, no mention of «integration» of care, detailed funding, or financing options to optimize long-term care has been made in such institutional documents.

Delivery of care is often fragmented and organ- or disease-specific, and health care provision is mostly driven by the need for cost containment, relying on easily measurable proxies for illness or disability such as multimorbidity, polypharmacy, or symptoms, rather than on treatment pathways and the patient journey.

Appropriate care for frail patients requires healthcare systems to shift away from such an approach. Frailty shall represent a turning point to shift towards integration and coordination of health and social care, embracing a holistic, multidimensional, bio-psycho-social approach (107): a view also advocated by the WHO and the joint-action ADVANTAGE (19,60,82). This should encourage policy makers, health care professionals, researchers in geriatrics, and general stakeholders to shift from disease- to *healthy aging*-focused care.

Recommendation 3: Adopt a nationwide harmonized electronic frailty index, built using existing primary care data, to increases the likelihood of identifying individuals most at risk.

In Switzerland, the promotion of digitalization and the utilization of health data is stated as one of the main challenges for the future of the healthcare sector. Such an objective is detailed, albeit shortly, in the Health2030 program, where there is a reference to "coordinated digitalization" to boost efficiency gains. The data would be detected only once and then shared for different purposes (105).

The Swiss Frailty Network and Repository (SFNR) is currently aiming at establishing a nationwide harmonized electronic Frailty Index (eFI), derived from routinely available acute-care Electronic Health Records (EHRs) data of five Swiss University Hospitals' Geriatric Departments; a project curated within the Swiss Personalized Health Network (SPHN) BioMedIT ecosystem. Another aim is to analyze the correlation of the eFI with a harmonized clinical Frailty Index (cFI) based on the FP, complemented by a short test to measure cognitive impairment, as well as their comparative performance and predictive ability (i.e., length of stay and in-hospital mortality) in acute geriatric care settings (83). However, the eFI would only be applicable in acute care settings, thus disregarding any integration across different health care settings and between health and social care.

A study conducted in community-dwelling, non-institutionalised residents of Lausanne, concluded that the electronic Frailty Score (eFS) is an inexpensive, transportable (i.e., applicable to different contexts) , and valid tool allowing reliable group stratification and individual prioritization for comprehensive frailty assessment. The authors also concluded that the eFS may theoretically be applied to both hospitalised and community-dwelling older adults, provided the latter had at least one hospital admission in the year before the frailty assessment (86). However, as the measurement is conditional on having been hospitalized in the previous year, it makes the tool inappropriate for measurement in primary care or other settings whenever the individual hasn't been institutionalized.

In the UK and Scotland, the eFI is used to identify people with frailty on a population basis, using routinely collected primary care data instead. The eFI, which uses a cumulative deficit model for frailty, was developed in England using GP data and was validated against a population of over 900,000 people aged 65 years and over (113). The practical application of the tool has also been tested in Scotland, on over 70,000 people across nine GP practices in three health and social care partnerships; the tool has now been made available through infrastructure that enables its implementation at scale (114). Assessing an individual's condition using existing data from primary care systems increases the likelihood of identifying individuals most at risk before they experience a crisis and ensures their care is appropriately tailored to meet their individual needs and preferences (115,116). Timely identification of frailty followed by appropriate evidence-based interventions, can help to reduce the likelihood of progression of frailty and hospital admission, by reducing the risk of people experiencing falls and adverse effects of medication, and by supporting the long-term management of people's health and wellbeing (116). Finally, the use of the eFI may also support the thesis of the two-steps approach, where the eFI would represents the fast and easy-to-use, yet clinically valid, tool for a preliminary and rapid identification of frail older people at risk.

The management of complex patients such as the frail ones, often requiring a multitude of services, calls for an integrated approach and therefore enhanced collaboration and shared decision-making among healthcare and social care professionals. A harmonized information system and the wide-use adoption of appropriate EHRs would also help professionals and researchers measuring the impact of integrated care more efficiently.

It is often claimed that one of the main aims of EHRs consists of improving collaborations across the whole care process and reducing duplications: how can this happen if the implemented EHR does not share systematically information across care settings? A harmonized information system and the wide-use adoption of appropriate EHRs would help professionals and researchers measuring the impact of integrated care more efficiently (117) .

Implementation Considerations: Barriers and Facilitators

Answering the question of how best to predict healthcare utilization and design appropriate, coordinated interventions in frail patients as well as to adopt a nationwide harmonized electronic frailty index may be enabled by:

1. the existence of the Swiss Frailty Network & Repository and of the Swiss Society for Geriatrics, which may contribute to the decision on commonly agreed, comprehensive definition of frailty;
2. the ongoing debate on integrated (or coordinated) care-oriented policies at the Federal level;
3. the ongoing Federal Council consultation on Electronic Patients Records (EPRs), which aims at boosting the adoption EPRs to facilitate data sharing and cooperation among healthcare providers.

However, the implemention of the above-mentioned recommendations is hindered by:

1. an overall neglection of the complexity and multidimensionality of frailty;
2. the current financing system, which does not create incentives for managing the patient as a network and/or according to a defined care pathway;
3. The Federal Law on Data Protection (LDP), strictly enforcing data protection and sharing;
4. approximately half of the hospitals having either not joined the electronic patient record system or refused to work with it.

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