Frailty:
Basis, burden and challenges for public health

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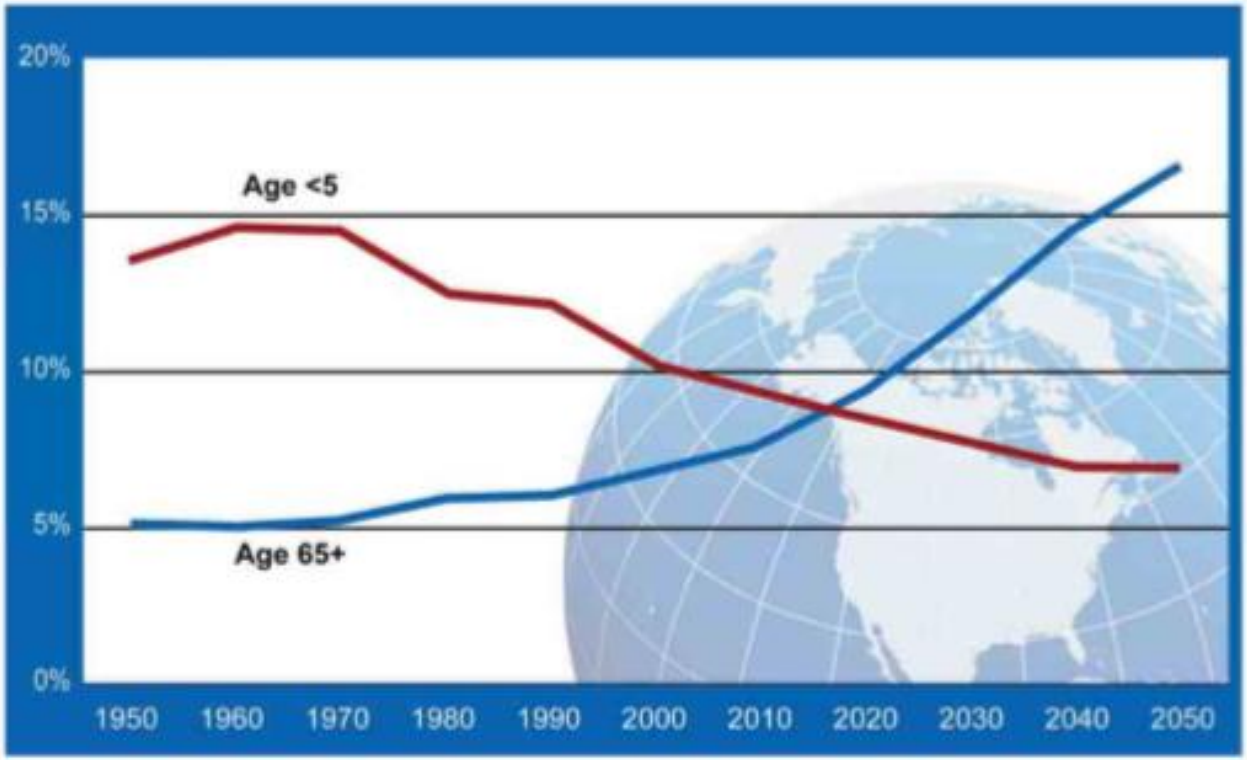
UQÀM

Worldwide aging

- Today, 8.5 percent of people worldwide (617 million) are aged 65 and over
- According to the demographic projections, this percentage will jump to nearly 17 percent of the world's population by 2050 (1.6 billion)



Source: United Nations. *World Population Prospects: The 2010 Revision.*

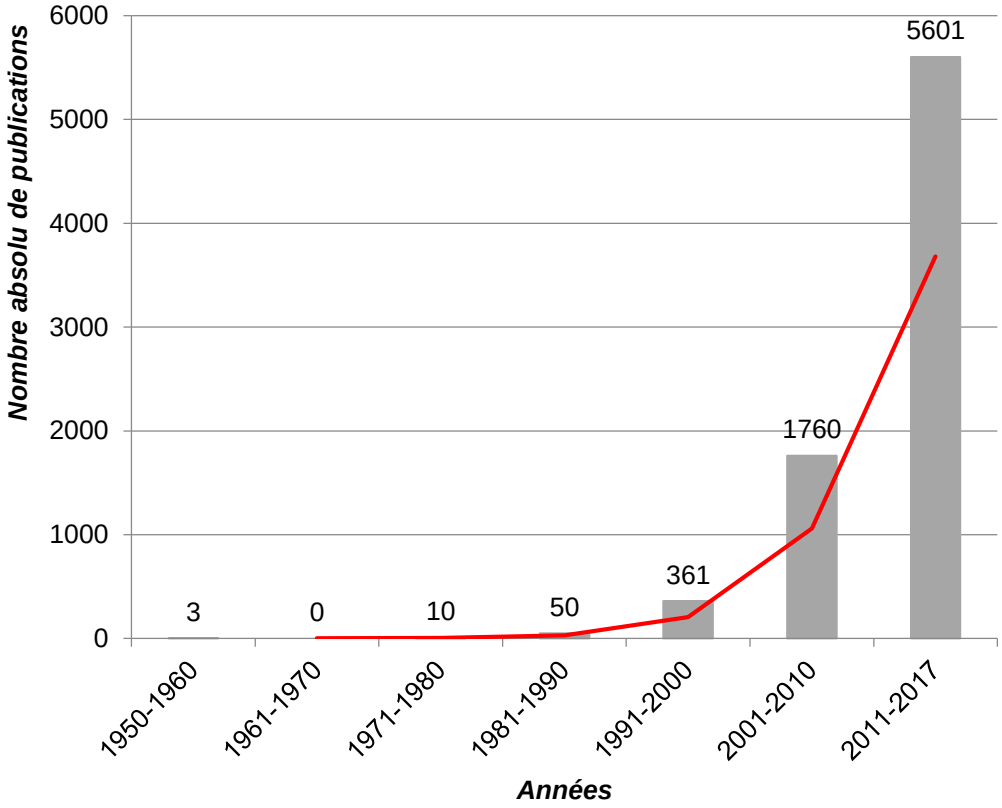
Worldwide aging

- Countries are facing ongoing challenges in caring for their elderly
- Multimorbidity and need for social support increase with age
- Age-related conditions are a significant burden for the person, his or her family, and public health care systems

Growing interest in frailty

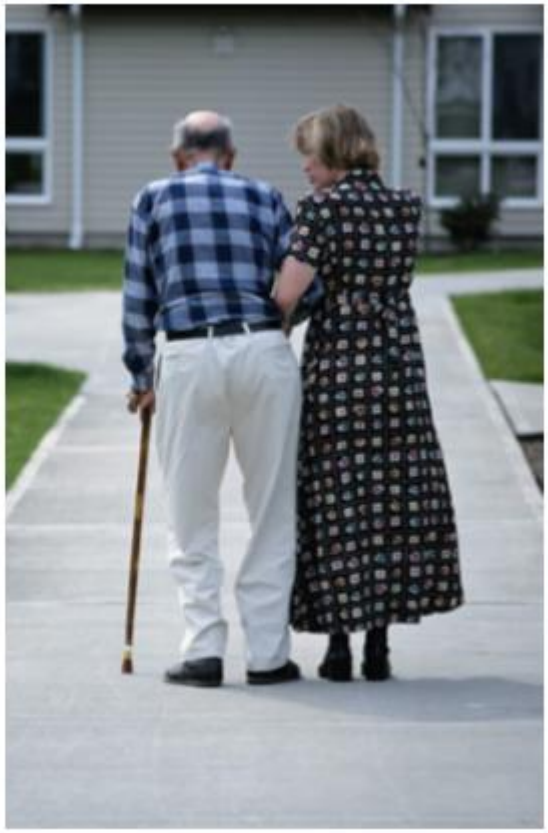
- Over the past 20 years, clinicians and researchers have shown increasing interest in frailty

Number of paper on frailty in the database « Pubmed » between 1950 et 2017



Update
Cesari et al. J Frailty Aging, 2013

What do you understand by the term “frailty”?



Which of these two individuals would you consider Frail and Why?

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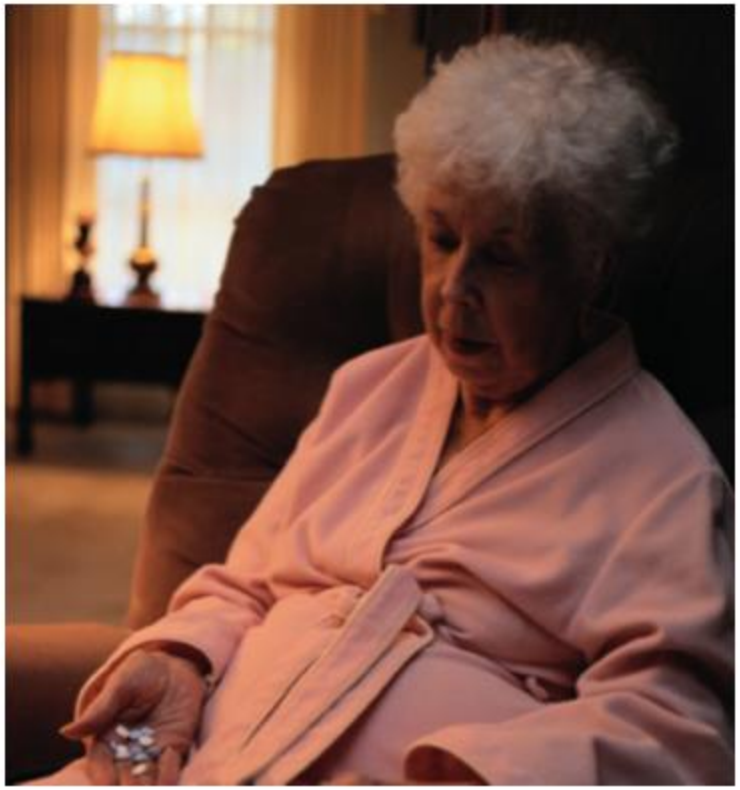

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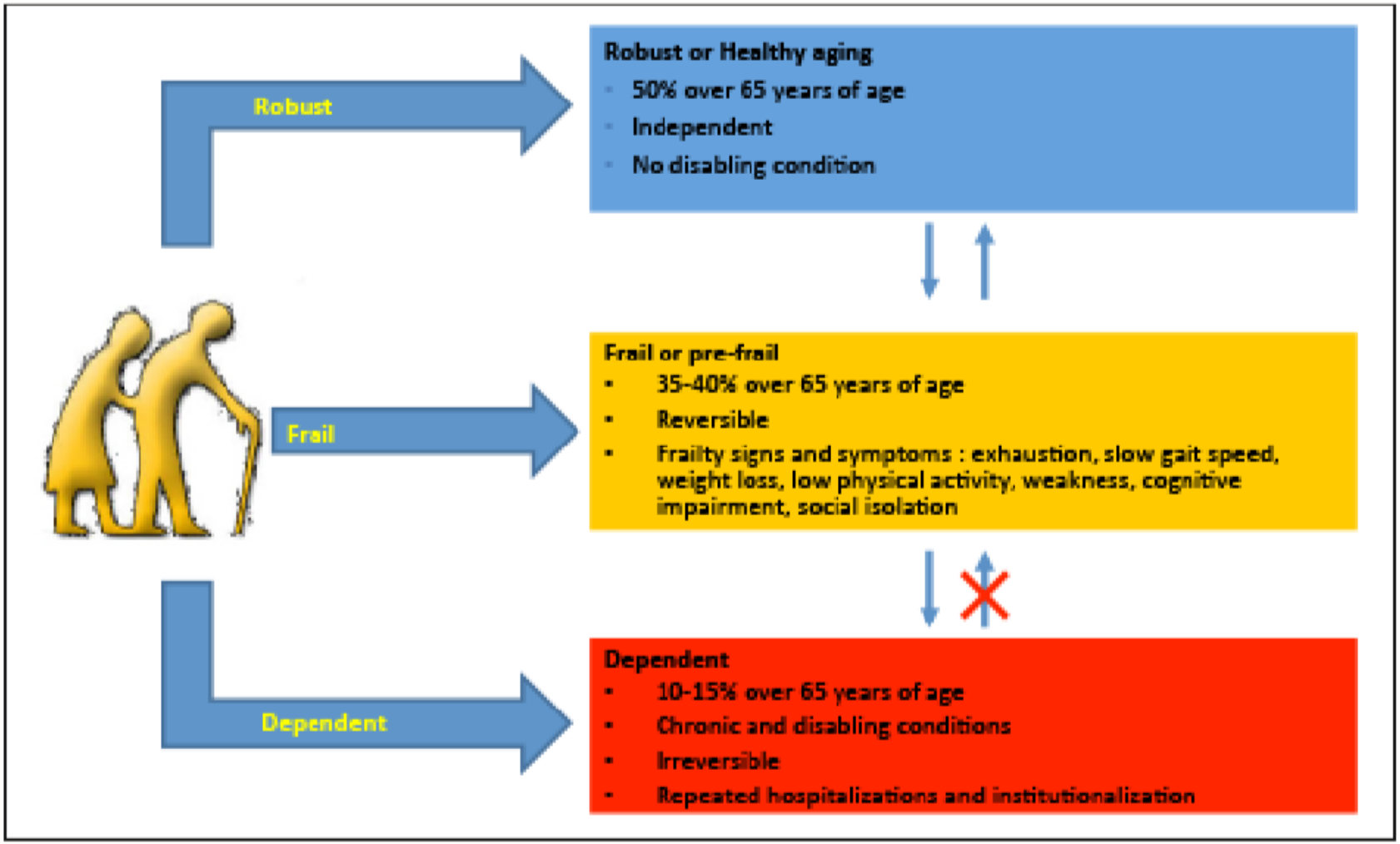
Concept of frailty

- Clinical state of decreased reserve and resistance to stressors, resulting from cumulative declines across multiple physiologic systems, and causing vulnerability to adverse outcomes

- Frailty has been defined:
  - to objectively describe a transitional stage between robustness and dependence
  - to identify a target population that would benefit from interventions to prevent loss of autonomy

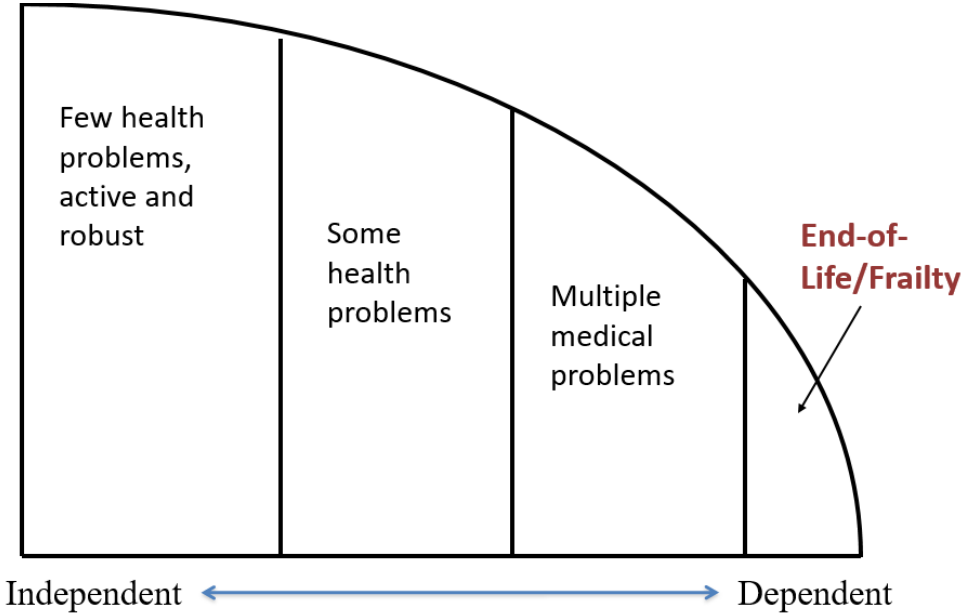
Fried et al. Journal of gerontology 2001
Morley et al. J Am Med Dir Assoc 2013
Clegg et al. Lancet 2013

Concept of frailty



Vellas and Sourdet. The Journal of Frailty & Aging 2017

Usual heterogeneity in health of older adults



Operational definition of frailty

- The concept of frailty is almost universally accepted
- Its operational definition remains controversial
- Several frailty scales have been proposed on the basis of different conceptual models of frailty
- Two approaches have become popular

Buckinx et al. Arch of Pub Health 2015

Operational definition of frailty

1) Frailty phenotype (Fried)

Syndrome resulting from cumulative decline across multiple physiological systems

Frailty phenotype is characterized by a constellation of symptoms including:

- Weakness
- low energy
- slow walking speed
- low physical activity
- weight loss

≥3 deficits : Frail
1 or 2 deficit(s): Pre-frail
Absence of deficit: robust

Fried et al. Journal of gerontology 2001

Operational definition of frailty

2) Deficit model (Rockwood)

- Consists of adding together individual's number of impairments and conditions to create a Frailty Index.
- This model consider frailty as a multidimensional risk state that can be measured more by the quantity than by the nature of health problems

Theou et al. J Am Geriatr Soc. 2013

Screening of frailty

- Around the world, many initiatives are setting up screening for frailty and its management

- From a Public Health point of view, the objective of screening frailty would ultimately reduce overall costs by reducing the rate of institutionalization and mortality rates and to experience fewer falls.
  - A French national initiative, the HAS, suggests implementing a screening for frailty among people over 70 years old using the questionnaire elaborated by the « Gérontopôle in Toulouse » for the identification of frailty in primary care
  - Another French initiative, the PAERPA, concerns people over 75 years old and aims to identify and to prevent the risk of frailty.
  - In Japan, a screening approach is being carried out widely using the Kihon checklist developed by the Japanese Ministry of Health

Theou et al. J Am Geriatr Soc. 2013

Etiology of frailty

Vulnerability to adverse outcomes resulting from an interaction of :

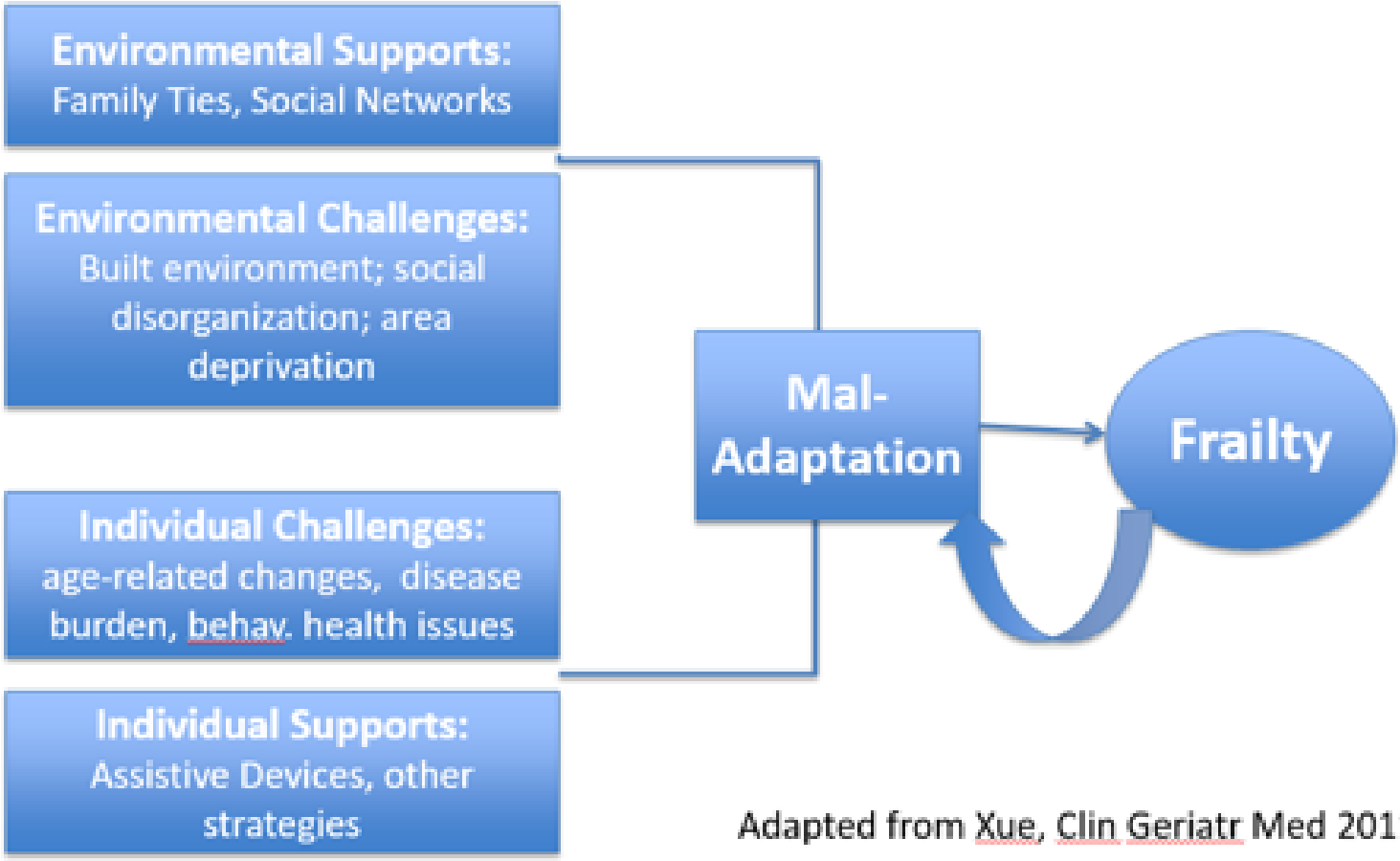
- Physical
  - Extreme age
  - Weight loss
  - Fatigue/Inactivity/Poor grip strength
  - Slow gait

- Socio-economic
  - Isolation
  - Caregiver gaps
  - Poverty: gender and immigration status

- Co-morbidity factors
  - Impaired cognition/mood
  - Polypharmacy especially sedative use
  - Multiple chronic disease

Putting them together → frail elderly

Theoretical Model of Association of Life Space with Clinical Frailty



Adapted from Xue, Clin Geriatr Med 2011

Public health problem

Frailty has been recognized by the World Health Organization and the U.S. National Academy of Sciences as a major public health concern among the elderly, although consensus on a definition of frailty remains elusive

- **High prevalence**
  - *~ Equal to Alzheimer's Disease in prevalence*
  - In community-dwelling older adults: 10,7% (frailty phenotype, 21 studies, 61500 participants)
  - > with age (65-69: 4%, 70-74: 7%, 75-79: 9%, 80-84: 16%, 85>: 26%)
  - > in women than in men (9.6 vs 5.2%)
  - > in people with lower education and income,
  - > with poorer health and higher rates of comorbid chronic disease and disability
  - > among nursing home residents than in community dwelling people (52,3%)

Collard et al. J Am Geriatr Soc. 2012
Kojima et al. J Am Med Dir Assoc. 2015
Buckinx er al. J Frailty Aging. 2017

Public health problem

- **Consequences**

Frail subjects are at risk of adverse health outcomes

- The Cardiovascular Health Study (CHS):
  - Incident falls
  - Worsened mobility or ADL disability
  - Hospitalization
  - Death
- The Canadian Study of Health and Aging (CSHA): an increased 5-year risk for death
  - Institutionalization
- The Women's Health and Aging Study (WHAS):
  - Death
  - Incident IADL and ADL disability
  - Institutionalization
- The Study of Osteoporotic Fracture (SOF):
  - Falls
  - Incident disability
  - Death

Fried et al. J Gerontol A Biol Sci Med Sci. 2001
Rockwood et al. J Gerontol A Biol Sci Med Sci. 2004
Bandeen-Roche et al. J Gerontol A Biol Sci Med Sci. 2006
Ensrud et al. Arch Intern Med. 2008

Public health problem

- **Cost**
  - It is admitted that frailty, because of the related adverse events, is costly for the patient and the society
  - However, few data exist on the potential financial gains of screening for frailty and there is no evidence on the economic implications of interventions targeting degree of frailty in the frail population
  - Identification of cost-effective interventions to reduce frailty may help health services to more efficiently allocate health care resources to those older people most at risk.

Fairhall et al. J Am Med Dir Assoc. 2015

Dynamic nature of frailty

- Research suggests that disability and dependence in the elderly may be preventable by targeting frail and pre-frail older adults

- Frailty is a dynamic process that can improve or worsen over time
  - Worsening is more common than improvement
  - The development of frailty frequently results in a spiral of decline that leads not only to an increased frailty status but also to a worsening disability, falls, admission to hospital and even death.
  - Epidemiological data on transitions between frailty states (i.e. non-frail, pre-frail, and frail) were first reported by Gill et al. in a 4.5-year longitudinal study of 754 community-living adults aged 70 years and above. During the follow-up, 58% of participants had at least one transition between any two of the three frailty states.

Clegg et al. Lancet. 2013
Morley et al. J Am Med Dir Assoc. 2013
Gill et al. Arch Intern Med. 2006

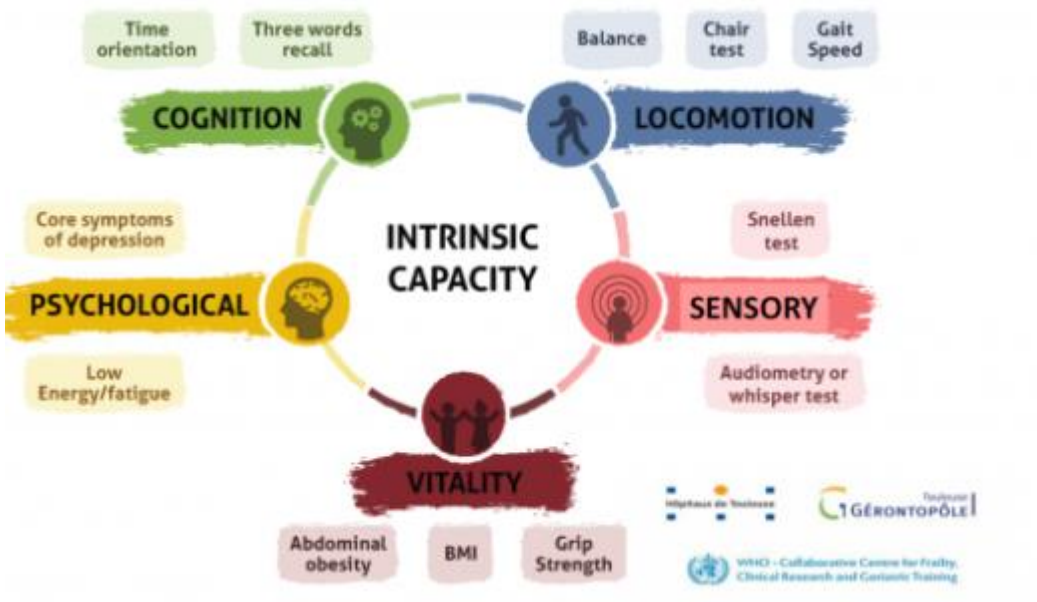
Management of frailty

- Frailty could be avoided, delayed and sometimes cured by the implementation of targeted interventions
- Several treatments seem to have a possible efficacy in the management of the components of frailty

Management of frailty: prevention and treatment

- 3 overlapping approaches across the lifespan:
  - Increasing intrinsic capacity reserves in early aging
  - Preserving function in late aging
  - Restoring function in frail older adults

→ WHO's concept of healthy aging : interaction of intrinsic capacity (combination of an individual's physical and mental capacity) and functional ability,



Intrinsic capacity can be explained by a combination of genetic factors, behavior, environmental exposures, and social determinants.

The fact that many of these factors are modifiable implies that intrinsic capacity may be improved.

Management of frailty: prevention and treatment

- 4 treatments appear to have potential to manage physical components of frailty:
  - Exercise
  - Caloric and protein support
  - Vitamin D
  - Reduction of polypharmacy

Management of frailty

- Exercise
  - To improve outcomes of mobility and functional ability in two systematic reviews of home-based and group-based exercise interventions for frail elderly people [
- Caloric and protein support
  - To enhanced weight gain and reduced mortality and complications in various studies
  - Protein supplementation could increase muscle mass, reduce complications, improve grip strength and produce weight gain
- Vitamin D supplementation
  - To reduce the number of falls and mortality even if the optimal modalities have not yet been defined
- Polypharmacy
  - Reducing medication could reduce costs and incidence of frailty among elderly subjects

De Vries et al. Ageing Res Rev. 2012
Theou et al. J Aging Res. 2011
Morley et al. J Am Med Dir Assoc. 2013
Morley. J Am Med Dir Assoc. 2012
Clegg et al. Lancet. 2013
Kojima et al. J Am Med Dir Assoc. 2012

Management of frailty

- Interdisciplinary multifaceted care program:
  - Van de Rest showed that resistance-type exercise training + protein supplementation was beneficial in the cognitive domain
  - Fairhall showed that multidisciplinary interventions, including exercises, nutritional and psychological management had a positive effect on various clinical outcomes for frail older people
  - A systematic review showed that overall interdisciplinary interventions had a positive impact on residents' outcomes in nursing home settings
  - SPRINTT project (The Sarcopenia and Physical fRailty IN older people: multi-componenT Treatment strategies): physical activity, nutritional counseling, and an information and communication technology intervention versus an educational program in older adults with physical frailty and sarcopenia

Cameron et al. BMC Med. 2013
Van de Rest et al. Mech Ageing Dev. 2014
Fairhall et al. BMC Geriatr. 2008
Nazir et al. J Am Med Dir Assoc. 2013
Landi et al. Aging Clin Exp Res. 2017

Management of frailty: prevention and treatment

- There is a lack of evidence to support the effect of these preventive and therapeutic treatments

Kane Tanaka, is 116 years old
She has a healthy diet.

Jiroemon KIMURA, lived to 116
He didn’t smoke, didn’t drink and ate small portion of food

Conclusion

- Frailty represents a huge potential public health issue
- at both the patient and the societal levels
- because of its multiple clinical
- societal consequences
- and its dynamic nature

Take home message

It seems thus essential for public health to implement the screening and multidisciplinary treatments of frailty.

"The ultimate goal of geriatric evaluation and management is the improvement of care outcomes and quality of life for frail elderly patients"

Consensus Conference on Geriatric Medicine
September 1989

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