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Corresponding Author	Family Name	Dominguez
	Particle	
	Given Name	Ligia J.
	Suffix	
	Division	Geriatric Unit, Department of Internal Medicine and Geriatrics
	Organization	University of Palermo
	Address	Palermo, Italy
	Phone	
	Fax	
	Email	ligia.dominguez@unipa.it
	URL	
	ORCID	
Author	Family Name	Barbagallo
	Particle	
	Given Name	Mario
	Suffix	
	Division	Geriatric Unit, Department of Internal Medicine and Geriatrics
	Organization	University of Palermo
	Address	Palermo, Italy
	Phone	
	Fax	
	Email	
	URL	
	ORCID	
Author	Family Name	Cucinotta
	Particle	
	Given Name	Domenico
	Suffix	
	Division	Past Chairman Department of Internal Medicine and Aging
	Organization	University Hospital of Bologna
	Address	Bologna, Italy
	Phone	
	Fax	
	Email	
	URL	

ORCID

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Abstract

Due to aging of the world population, older patients accessing health services are becoming continuously more frequent. This has increased the interest in assessing frailty and vulnerability in all specialties and general medicine. Although the term frailty has been recognized for over 30 years, there is not yet a universally recognized definition, and different care providers assess frailty and vulnerability with dissimilar tools, from very complex to very simple validated scales. Being treated with respect and dignity at the right time and place is the key message, as well as after undergoing a global evaluation both in urgency/emergency and in programmed surgery for all older surgical patients. Filling the gap will improve the results of any clinical intervention, both medical and surgical. Anesthesiologists, surgeons, hospitalists, and any member of the team of care providers must be trained into geriatric syndromes.

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2 **The place of frailty and vulnerability in the surgical risk assessment:**
3 **should we move from complexity to simplicity?**

4 **Mario Barbagallo¹ · Ligia J. Dominguez¹ · Domenico Cucinotta²**

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7 **Abstract**

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9 **AO1** This has increased the interest in assessing frailty and vulnerability in all specialties and general medicine. Although the term
10 frailty has been recognized for over 30 years, there is not yet a universally recognized definition, and different care provid-
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14 any clinical intervention, both medical and surgical. Anesthesiologists, surgeons, hospitalists, and any member of the team
15 of care providers must be trained into geriatric syndromes.

16 According to the 2016 World Report on Ageing and Health
17 [1], most people worldwide for the first time in history can
18 expect to live beyond their 60s, with profound implications
19 for health and health systems. Due to these demographic
20 changes, older patients accessing health services are becom-
21 ing continuously more frequent; hence, it is now common to
22 discuss about frailty and vulnerability not only in the geri-
23 atric field but also among other medical specialties, general
24 practitioners, and surgeons of various branches. Combining
25 the terms “frailty” and “elderly” in a pubmed search, there
26 are 6151 articles of which 65% have been published in the
27 last 5 years.

28 Although the term frailty has been acknowledged for over
29 30 years, there is not yet a universally recognized definition,
30 and controversies are still alive. Probably the main reason to
31 explain the disagreements lays in the fact that each defini-
32 tion was constructed for different purposes and to answer
33 very different questions. For example, while a clinician or an
34 epidemiologist can be interested into the early identification
35 of frailty and vulnerability to organize programs of preven-
36 tion or intervention, a surgeon is interested in evaluating

the operative risk, whereas a general practitioner might be
interested in defining a comprehensive assessment and pro-
gramming therapeutic interventions.

Frailty and vulnerability are terms widely used in discus-
sions on older people, in policy documents, and in daily care.
Nevertheless, are care providers diagnosing and evaluating
frailty and vulnerability straightforwardly and in a similar
manner? The answer to this question is most probably NO.

The vulnerable older population is commonly described
as the group of older people that presents the most complex
and challenging problems to physicians and other healthcare
professionals and often require geriatric care [2]. Vulnerabil-
ity should indicate an heterogeneous group of older people
with multiple chronic conditions and/or loss of function in
one or more domains (e.g., functional, somatic, psychologi-
cal and social domains).

The frailty phenotype, introduced by Fried et al. was
defined as meeting three or more of the following criteria:
unintentional weight loss, self-reported exhaustion, slow
walking speed, weak grip strength, and low physical activ-
ity level [3]. After the first definition, several studies have
shown its highly predictive value and a consensus interna-
tional conference defined major points on frailty [4], which
is usually caused by the interplay of the physiological age-
related decline with chronic diseases/conditions, result-
ing in decreased functional capacity, and increased risk of
dependency.

A1 ✉ Ligia J. Dominguez
A2 ligia.dominguez@unipa.it

A3 ¹ Geriatric Unit, Department of Internal Medicine
A4 and Geriatrics, University of Palermo, Palermo, Italy

A5 ² Past Chairman Department of Internal Medicine and Aging,
A6 University Hospital of Bologna, Bologna, Italy

Frailty and vulnerability are often used interchangeably when considering their relationship with risk: people are said to be “vulnerable or frail to..” or “at risk of”. Yet, too often, there is no clarity about what it is that people are vulnerable to, or frail for, or at risk for. That is the nature of what could happen. Vulnerability and frailty serve often to alarm or unhelpfully label someone and are used to indicate: (a) a category of people who are thought to be at risk; (b) a situation or event; or (c) an environment.

It is generally recognized that frailty is age-associated, common in older adults, and related to adverse health outcomes. Given that frailty is said to arise from the loss of “physiological reserve”, which itself diminishes with age, it is not surprising that estimates of the prevalence of frailty increase robustly with age. The WHO has recognized frailty as a target for implementing preventive interventions against age-related conditions [1, 5], and a large number of evaluation tools have been developing, which have shown a robust but variable predictive value of diverse health outcomes [6]. Simple screening questionnaires, e.g., FRAIL, SARC-F, and related algorithms perform as well as more complex testing for physical frailty and sarcopenia [7]. Researchers started investigating frailty and its implications on surgery 30 years ago [8], and currently most clinicians usually proposed a personal methodology of evaluation. It is important to keep in mind that frailty is a concept, not an illness. In the guidelines for the peri-operative care of the elderly 2014 from the Association of Anaesthetists of Great Britain and Ireland [9] there is a statement that literally says: “There is an age-related decline in physiological reserve, which may be compounded by illness, cognitive decline, frailty and polypharmacy”. All these factors combined may indeed constitute an excessive increased risk. In the same guidelines, it is stated that “the aims of perioperative care are to treat older patients in a timely, dignified manner, and to optimize rehabilitation by avoiding postoperative complications”.

Geriatrician and gerontologists proposed the use of the frailty index as a “clinical state variable”, meaning that it quantifies the underlying health status of the person [10]: people who were frailer were more likely to be older, female, and likely to die [11]. Thirty-six variables assessing health status at baseline, including medical conditions, health attitudes, symptoms, and functional impairments, were used in the analysis. This suggests that the frailty index is a robust measure in geriatric medicine, but it is difficult to be adopted in other specialties and in everyday clinical practice.

Does it make clinical sense to use so many items in all medical and surgical sectors? It is honest to recognize that in most part of clinical settings it is difficult to use an index based on numerous items, and time consuming. In surgical patients, other clinical state variables can be as well important. Attention and concentration, mobility and balance, function and social interaction, all may play

an important role in the preoperative assessment, in the prognosis of complications, and recovery after surgery.

Afilalo et al. [12] explored the boundaries of frailty and cardiac surgery. They provide three key observations in patients older than 70 years of age undergoing elective or urgent cardiac surgery. First, they found that patients with slow gait speed, defined as employing more than 6 s to walk 5 m, experienced a nearly threefold increase in risk after cardiac surgery. Second, importantly, their observations also showed that the addition of gait speed to existing cardiac surgery risk models vastly improved the predictive value of mortality and morbidity from these traditional models. In this regard, the authors are to be commended for expanding the outcomes beyond mortality, as many old individuals fear loss of independence as a fate worse than death. As such, their study showed that a slow gait speed doubled the chances that one would be discharged to a health care facility or would have a prolonged hospital stay. These data are sorely needed when facing older patients and counseling them regarding treatment options and expected outcomes. Third, of particular importance, the interaction of female sex and slow gait speed emerged as a particularly high-risk subgroup. Older women with slow gait speed had an eightfold increase in morbidity or mortality; clearly, this group deserves further study to explore the well-described adverse interaction of female sex and cardiac surgery. As stated in a comment [13], Afilalo et al. have given clinicians an important tool to help in the care for the expanding population of older patients with cardiovascular disease.

The same group of researchers very recently evaluated the predictive value of frailty in 1020 older patients undergoing surgical aortic valve replacement (SAVR) or transcatheter aortic valve replacement (TAVI) [14]. They used several different frailty scales, namely Fried’s definition, Fried + Rockwood definitions, Short Physical Performance Battery, Bern, Columbia, and Essential Frailty Toolset (EFT). They found that depending on the scale used, the prevalence of diagnosed frailty ranged from 26 to 68%, but frailty as measured by the EFT was the strongest predictor of death at 1 year. Therefore, this brief four-item scale encompassing lower-extremity weakness, cognitive impairment, anemia, and hypoalbuminemia outperformed other frailty scales and is strongly recommended for use in case of aortic valve replacement.

In other surgical settings, the predictive value of frailty on mortality has been evaluated after femoral neck fracture [15] or lobectomy [16] using the frailty index, or more complicated assessments. There are some reports that seem to be important to be published, but their results never have been used when clinicians are in the office in front of a patient who is a candidate for surgery, or when a physician is standing next to the patient’s bed.

170 To illustrate how it is possible to go from maximum
171 complexity to the minimum, Jones et al. [17] suggest that
172 a single variable can be used. They propose that a history
173 of a single fall within the previous 6 months would be an
174 accurate predictor of adverse events in colorectal cancer and
175 cardiac surgery.

176 It is difficult to define who is right or wrong, and who
177 truly practices a “Person-centered care” in surgical depart-
178 ments as well. “Person-centered care” means that individu-
179 als’ values and preferences are elicited and, once expressed,
180 guide all aspects of their health care, supporting their real-
181 istic health and life goals. Person-centered care is achieved
182 through a dynamic relationship among individuals, others
183 who are important to them, and all relevant providers [18].
184 Being treated with respect and dignity at the right time and
185 place is the key message, as well as after undergoing a global
186 evaluation both in urgency/emergency and in programmed
187 surgery for all older surgical patients. Who is in charge of
188 this evaluation? Specialists are different in various depart-
189 ments and specialties: in each team it is necessary to iden-
190 tify the suitable specialists and the methods for the global
191 evaluation and development of the care plan. Could teams
192 from different settings, nations, ethnicity, and with differ-
193 ent social and financial concerns use the same methods?
194 This is a challenging question to answer. It is essential to
195 keep in mind that the method of evaluation must consider
196 the intrinsic capacity [1] of the surgical patient as a guide-
197 line, considering sex, age, and education, among others, but
198 looking also for cognition, mood, communication, mobility,
199 balance, bowels, bladder, nutrition, sensory, psychosocial
200 and financial capacities, as well as vitality, and the number
201 of drugs used, calling data from the general practitioner, the
202 patient and caregivers.

203 Filling the gap will improve the results of any clinical
204 intervention, both medical and surgical. Anesthesiologists,
205 surgeons, hospitalists, and any member of the team of care
206 providers must be trained into geriatric syndromes.

207 Compliance with ethical standards

208 **Conflict of interest** None of the authors has any conflict of interest to
209 declare.

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