



Review Article

Geriatric multidimensional assessment for elderly patients with acute respiratory diseases

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ABSTRACT

The case of an 87-year-old woman who falls at home and is admitted to the Emergency Department of an acute hospital with delirium exemplify a common situation that physicians face in their everyday clinical practice. We describe the typical context of frailty in which acute illnesses frequently present in frail elderly patients and, in particular, the relationship between comorbidity, disability and frailty. We also report the current knowledge about frailty theories and we focus on the “atypical” presentation of many acute illnesses. Major attention is devoted on delirium and on mobility impairment, two of the most common atypical symptoms of elderly frail subjects. Finally we describe the evidence on the comprehensive geriatric assessment, i.e., the method that is required to identify and understand the ultimate needs of elderly complex subjects.

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An 87-year old woman is admitted to the Emergency Department (ED) with an acute confusional status, characterized by inattention and proneness to be drowsy. At arrival, she is unable to respond appropriately to nurse's questions and appears to be picking at things in air. The daughter, who lives close to her and, therefore, considered the formal caregiver, states the patient was found in the morning lying down on the floor in the bathroom reporting to be fallen one hour earlier. On clinical examination, patient's words are slurred and difficult to understand, she is unsteady on her feet and unable to walk without assistance. Her daughter reports she is not normally so sleepy and usually walks well. When questioned about independence in activities of daily living, the daughter reports that in the last 2 years her mother has progressively reduced social contacts and had two small car accidents. Furthermore, since her husband's death few months before, she noted her mother experiencing a decline in ability to care for herself, and increasingly she needed to be behind in her bills and, sometimes, in skipping meals. One week before, the daughter noted unwashed laundry in her home smells of urine. During the last two years, she had never been seen by the

general practitioner. Current medications include omeprazole for gastric pain, sertraline for depressed mood and lorazepam as hypnotic. Furthermore, she takes a short-acting β_2 -adrenergic receptor agonist for relief of bronchospasm. At first assessment at the ER, laboratory results show a non specific inflammatory syndrome with elevated C-Reactive Protein (CRP), leukocytosis with neutrophilia and mild normochromic normocytic anemia; D-dimer is within the normal range and also the myocardial enzyme profile and the Beta-natriuretic peptide (BNP). The electrocardiogram confirms atrial fibrillation, while chest X-ray shows bilateral reticular shadows and a right costodiaaphragmatic opacification. The brain CT scan shows diffuse cortical atrophy, especially in the temporo-parietal regions. The patient is admitted to the acute geriatric ward where she undergoes a comprehensive geriatric assessment (CGA) by the geriatric team, highlighting hypoactive delirium, mild pre-hospital disability and dementia and risk of malnutrition. Several medications are immediately discontinued, including sertraline, lorazepam and omeprazole. Furthermore, ceftriaxone and azithromycin are immediately started because of a suspicion of community-acquired pneumonia (CAP). The first day after admission the patient is sporadically agitated, while drowsy in the rest of the day. On day 2 of hospitalization her cognitive performances returns to the pre-hospital baseline status. On day 4, CRP and leukocytes become normal and, on day 6 the patient is discharged to a geriatric rehabilitation with the aim to improve overall functional status. Three weeks later the patient comes back home with a level of functional ability that overlapped that of pre-hospital admission.

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1. Aging, comorbidity, disability and frailty: definitions

Aging is a multifactorial process that results from the interaction between genetic factors and environmental stressors, and it is accompanied by biological changes that determine progressive decline in functional capacity, although with large inter-individual variability. Like other organs, lungs also age. Indeed, lung aging is associated with both anatomic and functional changes that result in a progressive decrease in expiratory flow rate [1,2]. In some elderly people, this decrease may become clinically significant, leading to increased susceptibility towards respiratory diseases and adverse clinical outcomes [3]. How to identify elderly who are more at risk to develop these events is becoming increasingly important in clinical practice. However, this is not always easy to do.

Generally, physicians tend to label older people who are prone to clinical complications and adverse events using the terms “comorbid”, “disabled” or “frail”. These terms are often used in an interchangeably manner while they’re not synonymous and it is important to define what exactly each of these terms means.

The comorbidity is generally adopted to identify an aggregation of chronic diseases. However, other terms (such as multimorbidity) have been proposed and there is lack of convergence about which terms is preferable. According to the landmark definition, comorbidity refers to a combination of additional diseases beyond an index disorder. This definition implies that the main interest is in the index condition and in the possible effects of the other disorders on the index condition, for instance, on the prognosis of the index condition [4]. In contrast, multimorbidity is defined as any co-occurrence of two or more chronic or acute diseases and medical conditions within one person, whether coincidental or not [5], indicating a shift of interest from a given index condition to individuals who suffer from multiple disorders [6]. In clinical practice, the term multimorbidity helps to shift from a disease-based perspective to an individual-based one [7]. The different way of defining the two conditions is the main reason why the prevalence of comorbidity and multimorbidity in epidemiological studies does not always coincide. In addition, prevalence may also depend on the number of chronic diseases evaluated in the single study or to the cluster considered [7,8]. However, it is commonly accepted that: a) one out of five subject older than 75 years in Western countries have at least three coexisting chronic conditions [9,10] and b) multimorbidity represents the biological substrate underlying the development of disability and frailty [11–14].

Functional capacity refers to the ability of a subject to carry out the daily activities in a normal or accepted way [15]. Disability, at the opposite, refers to the loss of this patient’s ability and also reflects its inability to positively interact with the environment [16]. Disability is profoundly different according to how and when it develops. Indeed, while among younger subjects disability is commonly due to a single disease, age-related disability usually can not be definitively attributed to a single acute pathology, with the exception of a catastrophic event, such as stroke or hip fracture [17]. However, in most cases, catastrophic problems arise in individuals who have already reduced their functional ability. Both the maintenance of functional capacity and disability are

important predictors of health in the elderly, and are strongly related to survival and morbidity [18]. According to recent epidemiological estimates, about 20% of older US adults have chronic disabilities, 7% to 8% severe cognitive impairments and roughly one-third mobility limitations [19–21]. A similar scenario can be observed in Europe [22]. For instance in Italy, according to the above mentioned report, the prevalence of disability (i.e., needing assistance in at least one ADL) is 13.9% among individuals aged 65 or more, and, in particular, 5.0 among those aged 65 to 74 years, 17.0% among those aged 75 to 85 years and 46.5% among those aged 85 years or more [22].

Frailty is one of the most important geriatric syndromes and it is associated with many other impairments, including neuroendocrine and immune dysregulation and sarcopenia [13]. What makes the concept of frailty important in geriatrics is that each clinical component included in the term “frailty” does not have the same significance as the whole elements considered together. In 2001 Fried et al. proposed a list of 5 items to identify frailty: unintentional weight loss, weakness, exhaustion, slow walking speed, and low level of physical activity. All these items may be combined in an index that can be used to classify people as frail (3 or more items), pre-frail (1 or 2 items) and robust (no item) [23]. This model, known as the “phenotype model” of frailty, has been used in several studies and has demonstrated to predict various adverse clinical outcomes, such as an increased risk of geriatric syndromes, disability, hospitalization, institutionalization and mortality [13,23]. However, this model has some criticisms. The data and variables considered were derived from a prospective cohort study that was not designed to investigate frailty and many potentially relevant factors (such as cognitive impairment) were not included [24,25]. This is why the original model has been expanded, including dementia or delirium, in order to have a stronger predictor of negative outcomes [26,27]. Some years later, Rockwood proposed a multidomain deficit model considering frailty as a consequence of cumulative decline in many physiological systems [24,28]. Based on this assumption, he developed and validated a frailty index in which many variables of symptoms, signs, laboratory values, morbid conditions and disabilities are considered [28]. This index is based on the concept of homeostatic reserve reduction: single deficit maybe not directly correlated with a negative outcome but contribute to increase the vulnerability of the patient. In the subsequent years, other instruments to measure frailty have been proposed, building on these two models [29–32].

As it has recently pointed out [33], the frailty phenotype and the Frailty Index are not alternatives, but, instead, complementary. Indeed, according to Fried et al. [23] “the syndrome of frailty may be a physiologic precursor and etiologic factor in disability”. This means an implicit identification of frailty as a key factor for the design and conduction of interventions against incident disability. Therefore, the frailty phenotype finds its ideal application in non-disabled older subjects. On the contrary the Frailty Index includes items of functional disability (e.g. problems getting dressed, problems with bathing and impaired mobility) in its computation [28] and does not make a clear differentiation between frailty and disability. The Frailty Index is therefore more interested at objectively estimating the amount of accumulated deficits/functional losses, whichever they are. The two measurements

Table 1
Delirium DSM 5 criteria.

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- A. A disturbance in attention (i.e. reduced ability to direct, focus, sustain, and shift attention) and awareness (reduced orientation to the environment).
 - B. The disturbance develops over a short period of time (usually hours to a few days), represents a change from baseline attention and awareness, and tends to fluctuate in severity during the course of a day.
 - C. An additional disturbance in cognition (e.g., memory deficit, disorientation, language, visuospatial ability, or perception).
 - D. The disturbances in Criteria A and C are not better explained by another preexisting, established, or evolving neurocognitive disorder and do not occur in the context of a severely reduced level of arousal, such as coma.
 - E. There is evidence from the history, physical examination, or laboratory findings that the disturbance is a direct physiological consequence of another medical condition, substance intoxication or withdrawal (i.e., due to a drug of abuse or to a medication), or exposure to a toxin, or is due to multiple etiologies.

Specify whether:

Substance intoxication delirium: This diagnosis should be made instead of substance intoxication when the symptoms in Criteria A and C predominate in the clinical picture and when they are sufficiently severe to warrant clinical attention.

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