

# Geriatric syndromes: medical misnomer or progress in geriatrics?

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## ABSTRACT

Both in geriatric and internal medicine journals, and in medical textbooks certain (aggregates of) symptoms are labelled as 'geriatric syndromes'. In frail elderly patients a large number of diseases present with well-known and highly prevalent atypical symptoms (e.g. immobility, instability, impaired cognition and incontinence), which are referred to as geriatric syndromes. While classically the term syndrome is used for grouping together multiple symptoms with a single pathogenetic pathway, geriatric syndrome primarily refers to one symptom or a complex of symptoms with high prevalence in geriatrics, resulting from multiple diseases and multiple risk factors. The geriatric workup should therefore consist of both a search for and treatment of the aetiologically related diseases and a risk factor assessment and reduction. Effectiveness and efficiency of this specific geriatric syndrome workup has been demonstrated predominantly for combinations of geriatric syndromes that often serve as targeting criteria for geriatric interventions, and for some specific geriatric syndromes. Therefore, we argue that the concept of geriatric syndromes is valuable as a theoretical frame, a directive for diagnostic analysis and as an educational tool in teaching geriatrics to medical students and trainees. Added to this, explaining the heterogeneous way 'syndrome' is used in current clinical practice, as opposed to 'disease', will also substantially improve clinical reasoning both in geriatrics and general internal medicine.

## INTRODUCTION

The collective 'geriatric syndrome' is frequently used in Northern American geriatric and internal medicine literature. Here we plead for the use of geriatric syndrome as a useful term, especially in teaching geriatrics, as it emphasises important principles in geriatric medicine. The primary principle of geriatrics is the decline of homeostatic reserve capacity of all organ systems with increasing age, generally called homeostenosis. This highly individual decline in organ function results from exposure to multiple individual risk factors and is further attenuated by chronic diseases. It leads to atypical disease presentations, which are typical for geriatric medicine and currently referred to as geriatric syndromes. These atypical presentations are found in the organ system most affected in homeostatic reserve function ('the weakest link'), and are precipitated by diseases that are often unrelated to the presenting symptom (e.g. urinary incontinence precipitated by pneumonia). The differential diagnoses of these geriatric syndromes are often highly similar. Generally, more than one risk factor and disease of this differential diagnosis is aetiologically related to the presenting symptom or geriatric syndrome. However, to serve a clear educational goal, the term geriatric syndrome first needs clarification and has to be contrasted to the way syndrome is primarily used in medical literature. In this article, we will subsequently describe how geriatric syndrome is used in practice and in the literature, clarify the historical, semantic, and medical roots of the terms syndrome and geriatric syndrome, and discuss the evidence base for geriatric syndromes.

## HETEROGENEITY IN GERIATRIC PATIENTS

Geriatric syndromes are used as nosological entities in clinical guidelines, health services research and teaching. An example of the application of geriatric syndromes in clinical guidelines is the decision rule, in which the number of geriatric syndromes in elderly patients are counted as a selection criterion whether to give life-prolonging oncological treatment or not.<sup>1</sup> Balduci and Santa consider patients who are suffering from one or more geriatric syndromes as too frail to have an acceptable risk-benefit ratio for life-prolonging therapy. An appropriate prognostic validation study of this oncological decision rule is lacking. Moreover, Balduci's list of geriatric syndromes slightly differs from other lists presented in important geriatric textbooks, such as the Geriatric Review Syllabus and the textbook edited by Hazzard *et al.*<sup>2,3</sup>

Other applications of geriatric syndromes can be seen in health services research in geriatrics. Winograd *et al.* investigated the possibility of using geriatric syndromes as targeting criteria to select case-mix groups that might benefit from hospitalisation.<sup>4</sup> They used 15 criteria (a mixture of medical diagnoses and geriatric syndromes) as targeting criteria. The authors point out, based on the finding of their large prospective clinical trial in 985 patients, that the persons who benefit most from a geriatric intervention are probably better identified with geriatric syndromes than with diagnoses. In contrast, Berlowitz *et al.* found that a short list of geriatric syndromes (i.e. urinary incontinence, pressure ulcers, falls and functional decline) cannot serve as a valid endpoint for quantifying quality of hospital care.<sup>5</sup> In teaching geriatrics, the Education Committee Writing Group (ECWG) of the American Geriatrics Society recommends that undergraduate students should be trained profoundly in the 13 most common geriatric syndromes (dementia, inappropriate prescribing of medications, incontinence, depression, delirium, iatrogenic problems, falls, osteoporosis, sensory alterations including hearing and visual impairment, failure to thrive, immobility and gait disturbances, pressure ulcers, and sleep disorders).<sup>6</sup> Resnick also stresses the importance of geriatric syndromes in his introduction on geriatric principles in Harrison's Principles of Internal Medicine.<sup>7</sup>

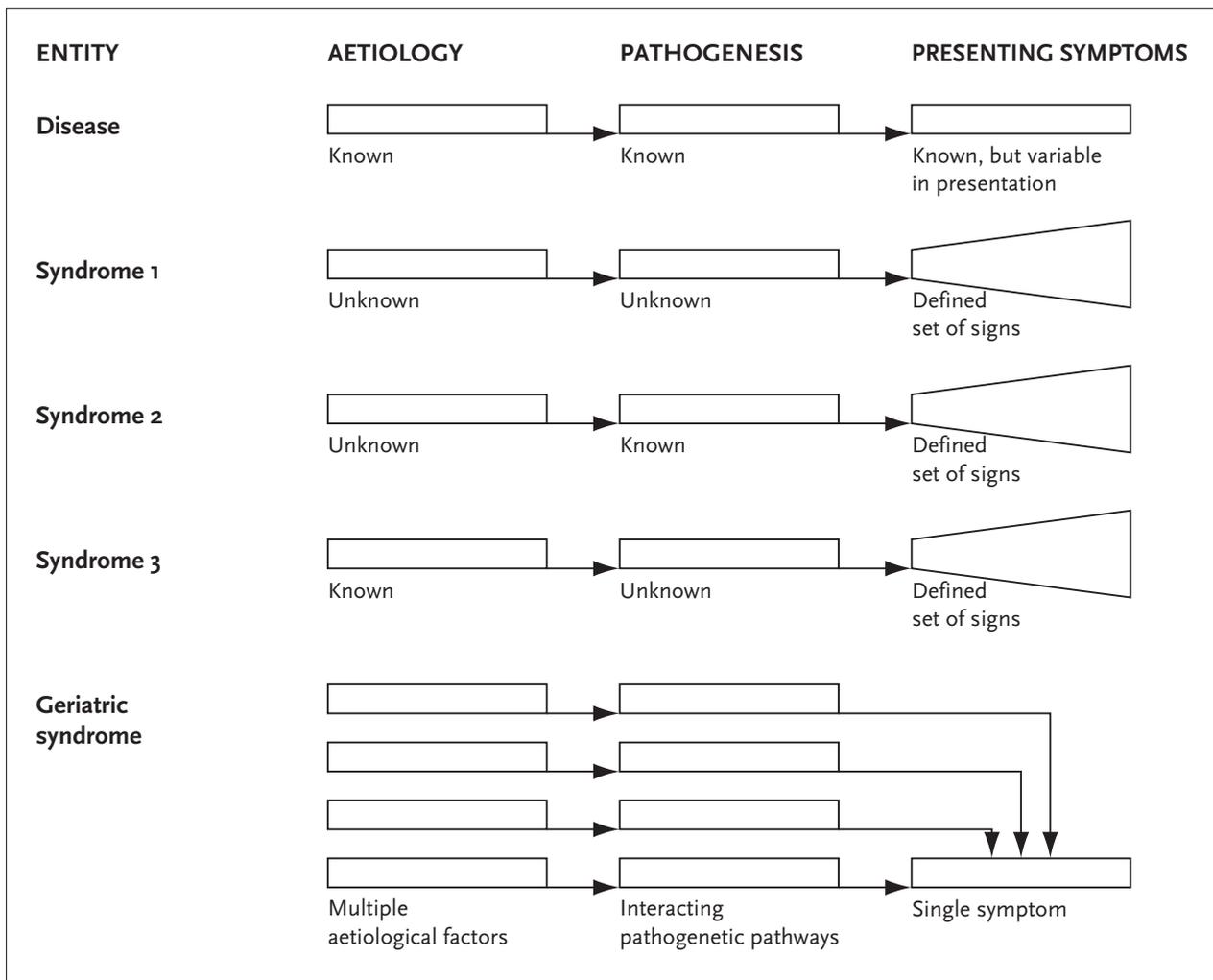
One may conclude that in the most important fields of geriatric medicine (clinical practice, teaching, research and management) geriatric syndromes play an important role, despite the fact that the definition of geriatric syndrome is heterogeneous. The term is probably still unclear for most clinicians, as the term syndrome itself is interpreted in many ways. All this asks for a careful reconsideration of the terms syndrome and geriatric syndrome, because as clinicians we are expected to eliminate misunderstandings associated with our concepts.

## DEFINITIONS

Syndrome is derived from the Greek συνδρομος, which means: to walk, run or group together. Probably the concept syndrome was first used by the empirists, who lived and worked in Greece, a century after Hippocrates.<sup>8</sup> Currently, the word syndrome is generally defined in medical dictionaries as the aggregate of signs, symptoms or manifestations, which together are considered to constitute the characteristics of a nosological entity. Often, without clearly defining it, syndrome and disease are regarded as poles that end the continuum of unclear (syndrome) and clear (disease) pathological conditions. Wulff and Gøtzsche started clarification of the position of syndromes in medical taxonomy by stating that a disease is a clinical entity that can be unequivocally defined by its pathogenesis and aetiology and is presented as a single symptom or clinical sign or a well-known combination of clinical signs.<sup>9</sup> This disease construct may be developed on an anatomic base (e.g. small-cell lung carcinoma), on a physiological or metabolic base (e.g. hypogonadism, hypothyroidism) or an aetiological base (e.g. pneumococcal pneumonia), or a combination of these bases (e.g. lung TBC, multinodular hyperthyroidism). In essence, according to this clinical nosology, a disease has a more or less known aetiology, pathogenesis, symptomatology and prognosis. In contrast to a disease, a syndrome is often unknown in its aetiology and/or pathogenesis and is mostly defined by a complex and often non-fixed combination of clinical signs and symptoms. Leiber *et al.* describe three types of clinical syndromes in which combinations of symptoms are grouped together without evidence of aetiology or pathogenesis (e.g. chronic fatigue syndrome), with evidence of aetiology but without clear pathogenesis (e.g. Marfan's syndrome), or with evidence of pathogenesis, but without evidence for aetiology (Cushing's syndrome) (*figure 1*).<sup>8</sup>

A syndrome in one of these meanings may evolve to the disease stage as clinical research succeeds in disentangling the cause or, in the absence of a single cause, in identifying the most important aetiological factors and/or the pathogenesis. An example is what used to be known as the Merseburg triad, which consisted of exophthalmus, goitre and tachycardia. In fact, this was the prototype of a (hyperthyroid) syndrome. As the pathogenetic pathway and the metabolic and endocrine causes of this triad of hyperthyroidism have been elucidated, this syndrome diagnosis has been replaced by a disease diagnosis (i.e. Graves' disease). As exceptions to this evolution of syndromes towards diseases, some rare diseases in which the aetiology and pathogenetic pathway has been elucidated, such as in the so-called Brugada's syndrome (a cardiac arrhythmia), are still being called a syndrome.

Clarification of a syndrome may also take place in individual patients. Without a careful diagnostic workup a patient with



**Figure 1**

*Symbolic presentation of 'disease', 'syndrome' and 'geriatric syndrome', in which the number of aetiological and pathogenetic factors and the complexity of outcome symptoms is reflected<sup>8</sup>*

tremor, rigidity and balance problems may be diagnosed as suffering from a hypokinetic rigid syndrome or a Parkinsonian syndrome. As diagnostic tests are performed this syndrome may evolve in the disease diagnosis (e.g. Parkinson's disease) of which aetiology is clarified to a certain extent.

Added to the multiple interpretations of the term syndrome, a geriatric syndrome is a specification of the syndrome for a number of highly prevalent, often so-called atypical, clinical presentations in geriatrics. The term geriatric syndrome can be clarified further by contrasting it to the general meaning of syndrome in younger non-geriatric patients:

- A geriatric syndrome refers to highly prevalent, mostly single symptom states, whereas a syndrome is defined by a group of symptoms that do not need to be highly prevalent. In fact many syndromes are rare in younger patients.

- In geriatric syndromes the leading symptom is linked to a number of aetiological factors or diseases in other organs. Generally, in a syndrome it is most likely that a single pathogenetic pathway, known or unknown, causes the symptoms.
- In geriatric syndromes there is a large overlap between the aetiological factors of different geriatric syndromes. In contrast, syndromes in younger patients are separate entities, and there is no overlap between aetiological factors of different syndromes.
- A geriatric patient often suffers from more than one geriatric syndrome, while in younger patients one usually finds a single syndrome in one patient.

Falls, incontinence and dizziness, although consisting only of one presenting symptom, and heart failure, delirium and dementia, consisting of a complex of symptoms, are frequently called geriatric syndromes,<sup>2-5</sup> and they fulfil the

above-mentioned criteria. The diagnostic workup of geriatric syndromes should consist of a search for both a possible single disease that may have precipitated the symptom(s), and of a multiple risk factor assessment.<sup>10</sup> One may say that using geriatric syndrome for these medical problems is just a misuse of the term syndrome.<sup>11</sup> However, 'syndrome' in geriatric syndrome does not violate the Greek origin of the word, in the way that risk factors and precipitating (chronic) diseases are now grouped together with a single symptom or multiple presenting symptoms. Similarly, multiple risk factor assessment and reduction per disease is becoming more and more common in internal medicine.<sup>12</sup> However, this is more often linked to diseases and not to single clinical signs or symptoms. Some examples may clarify the differences between geriatric syndrome analysis in the frail elderly and the correct and most efficient syndrome analysis in middle-aged persons. Acute confusion as geriatric syndrome is less often caused by a new brain lesion than in younger patients. Depression as a geriatric syndrome is usually not just a result of a psychiatric disorder; somatic causes play a major role in the pathogenesis of depression in old age. Similarly, incontinence as a geriatric syndrome is not only due to bladder dysfunction, falling results from more than neuropathy alone, and syncope is often not explained just by a single heart disease.<sup>7</sup> Therefore, the most efficient workup of young and middle-aged individuals differs from the workup needed in frail elderly subjects, although presenting with similar symptoms.

## EVIDENCE

The best evidence for the meaningful use of geriatric syndromes comes from the large series of randomised trials that evidenced efficacy, effectiveness and efficiency of geriatric inpatient and outpatient services when compared with regular practice on general medical wards. From the early trial by Rubinstein *et al.* until the recent study by Cohen *et al.* mostly patients with problems, currently classified as geriatric syndromes, were enrolled and both the diagnostic and the risk factor assessment and intervention were carried out by the interdisciplinary geriatric intervention team.<sup>13,14</sup> In the control groups on the medical wards, the medical model of a monodisciplinary search for single causes is more likely to have been the guiding principle. However, regular care is not often described carefully in those trials, so one can still argue about the precise differences between the clinical approaches. In the earliest trials the differences between geriatric syndrome analysis and regular care resulted in a significant decline in mortality and improvement in functional performance.<sup>13</sup> The differences in functional performance have been clearly present until now. However, the differences between geriatric and medical wards are declining, possibly by broadening the

general medical assessment for geriatric syndromes in internal medicine as well.<sup>13</sup>

Fairweather *et al.* and Fried *et al.* argued that diagnostic procedures in geriatric patients should also take into account the time sequence and the interaction of comorbidity.<sup>15,16</sup> Fried even presented different models of illness presentation, which are widely accepted although scarcely evidenced. Based on their own data, both authors state that simple, single diagnoses only explain geriatric health problems in less than 50% of the patients. The medical model, with its primary law of parsimony, does not suffice in geriatrics. The concept of geriatric syndromes may bridge this gap between classical medical diagnostics and the highly prevalent interaction of age, comorbidity and risk factors in geriatrics.

In a systematic search of the literature, the term geriatric syndrome appears to be primarily associated with delirium, falls, urinary incontinence and dizziness. Silent angina pectoris and emesis were also proposed as geriatric syndromes,<sup>17,18</sup> but this was not followed by other authors. Only Tinetti and Inouye *et al.* explain the term geriatric syndromes in their studies on dizziness, falls and incontinence and provide evidence for the multiple risk factor analysis.<sup>19-21</sup> Tinetti *et al.* found five to seven significant risk factors for the development of dizziness in the elderly. When the number of risk factors that is present in a patient increases, the total risk will increase proportionally. There is also sufficient evidence that falls, delirium and urinary continence are related to multifactorial aetiology in most patients, with multiple risk factor reduction being more effective than the regular medical model approach.<sup>22,23</sup> However, for most of the medical problems labelled as geriatric syndrome there is not yet sufficient evidence of the improved effectiveness by geriatric syndrome-driven combined diagnostics and multiple risk factor assessment and intervention. For example, to the best of our knowledge only Lipsitz *et al.* have performed a study on multiple risk factor aetiology in syncope. Among 97 geriatric syncope patients they found that in only 30% (n=34) syncope could be explained by one diagnosis, while in 58% (n=63) multiple factors were responsible.<sup>24</sup>

## CONCLUSION

In this article we have critically reviewed how symptoms and medical problems are labelled as geriatric syndromes, which currently implies a great similarity in aetiology, multiple risk factor involvement and atypical clinical/disease presentation. Similar to Tinetti *et al.* and Phelan, we advocate defining a geriatric syndrome as a symptom, or a fixed combination of symptoms, with a high prevalence in the elderly, in which the diagnostic process should consist of both a search for a single or for more diseases that

precipitated the symptom(s), and of a multiple risk factor assessment.<sup>10,19,20</sup> However, according to the principles of evidence-based medicine, the use of geriatric syndrome as tool in clinical practice, teaching and research in geriatrics is still preliminary and requires:

- unequivocal definition of diagnostic criteria for geriatric syndromes;
- proof of multiple risk factor causality for all geriatric syndromes;
- evaluation of cost-effectiveness of the use of the proposed geriatric syndrome workup in future trials.

The concept of geriatric syndromes can be used as an evidence base for dizziness, falls, delirium and incontinence in frail elderly patients. For other complex medical problems in the elderly, it may also improve effectiveness and efficiency of medical care and teaching on geriatric and internal medicine wards. Therefore, we argue that the concept of geriatric syndromes is valuable as a theoretical frame, a directive for diagnostic analysis and as an educational tool in teaching geriatrics to medical students and trainees. Added to this, explaining the heterogeneous way in which 'syndrome' is used in current clinical practice, as opposed to 'disease', will also substantially improve clinical reasoning both in geriatrics and general internal medicine.

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