

Frailty and aging medicine

People do not age at the same rate. Variability in the rate of aging gave rise to the statistical construct of “frailty” to indicate variability in the risk of death amongst people of the same age.¹ An analogous clinical approach to frailty is to understand it as variability in the rate of health deficit accumulation.² This approach says that one of the reasons that people of the same age have varying risks of death is that they have varying numbers of health deficits. People with more deficits are at greater risk.³ The broadly contrasting view – that frailty consists in a specific phenotype – offers an alternative approach to identifying who is frail.⁴ Each approach to frailty has its passionate advocates. Multiple studies comparing the two approaches have been done. Although both approaches identify people at risk, they often do not identify the same people as frail. Some of this reflects the perils of dichotomization, for which a likely remedy is to identify grades of frailty – but some represents differences that usefully can be explored.⁵ A better explanation should account for the utility of both approaches, without invoking dubious contingencies. While we look forward to that work – and I believe that we have hints of it^{6,7} much is being accomplished in the meantime. *Aging Medicine* has begun to highlight studies on frailty, including several in this issue⁸⁻¹⁰ with more in issues to come. As a matter of policy, *Aging Medicine* welcomes papers that use either the phenotype approach, and its many modifications, or a frailty index and its variants.

A great many other frailty measures exist, many developed for specific adaptations, both for screening and assessment. Some frailty measures are whimsical, whereas others function largely as renamed comorbidity counts. A few frailty measures apparently were developed as mortality prediction models, for which the inclusion of age enhances prediction, but is self-defeating in relation to understanding variability in risk for people of the same age. The plethora of frailty measures is seen as an impediment to progress, which has brought about calls for a “final consensus”. Advocates are of course strongly committed to their views, but much of the heat around debate is psychological: where some imagine chaos in multiple variations of a measure, others see robustness. Chaos and robustness however exist only to the extent that variations differ from or converge on similar findings. If a minor variant in a measure greatly changes the estimates for prevalence or risk, then variation is chaotic. Even so, it is also likely to be informative: what about such apparently small changes yields such big differences? If the small variations within a measure do not give big differences, again what do the variant measures have in common?

Studies of frailty in China using the frailty phenotype¹¹⁻¹³ and the frailty index¹⁴⁻¹⁷ are well established. Comparative work is also emerging.¹⁸⁻²⁰ To be useful such work is best done in the same dataset, given the extent to which variation in samples, sampling, inclusion/exclusion criteria, response rates and attrition will influence estimates of frailty prevalence and associations. Finally, feasibility must also be considered: if one approach includes many more people than the other approach does, that is an argument in its favor, not a technical detail especially if the goal is widespread implementation into practice.^{21,22}

The plethora of frailty measures has also brought about a call for alternative approaches. Two are emerging. One, pending more data, invokes the authority of the World Health Organization in support of the concept of intrinsic capacity. In this issue, Prof Jean Woo lends support to that approach.¹⁰ She cites, amongst other reasons, its more positive conceptualization of what happens with aging – it is less that people accumulate health deficits or frailty-defining characteristics and more a matter of their running out of intrinsic capacity. One concern with such an alternative is that a quantitative understanding of frailty would be set aside on aesthetic grounds. To be a contribution, advances will need to be substantive not semantic. Time will tell.

Another approach, that of “resilience” is likewise promoted, in part on aesthetic grounds as sounding more pleasing than does frailty. For resilience however, a quantitative approach is at least possible, and might borrow from its twin conceptualizations in engineering. The materials engineering view of resilience includes notions of the ability of a material to resist deformation, or to recover its strength once deformed. In communications networks, resilience reflects the numbers of nodes or links that can be removed without compromising the overall service level. Each approach and its variants offer ready-to-hand mathematical apparatus that can be invoked to understand ageing (and thereby frailty). Even so, these quantitative approaches exist alongside a great many narrative approaches to resilience, or definitions that are based on responses to questionnaires. Here again, where quantitative approaches to frailty are proving to be informative, substituting an ill-defined term would be no advance.

Whatever idea is proposed as an alternative to frailty also must explain what we now know about both deficit accumulation and the importance of the features that are said to define a frailty phenotype. For example, the idea of resilience might prove to be

informative in relation to some of the systematic variation readily observed in deficit accumulation. One source of such variation is sex. At any age, men have fewer deficits than do women.²³ Likewise people who are socially privileged have fewer deficits at any age than do people who are socially vulnerable.²⁴ Even so, deficit accumulation is not destiny: socially privileged people, for example have both fewer deficits and a lower mortality rate in relation to their deficits. In contrast, men have fewer deficits than do women, but men die at a higher rate in relation to their degree of frailty.

Individual deficit accumulation appears chaotic, but remarkably, deficit accumulation is orderly, in both people and in preclinical models.^{5,25-27} Understanding this allows insights into age-related disease and its management. It makes clear, for example, why medicine in old age must move past the disease era. It illustrates why we need to accompany complex management (e.g. interdisciplinary, comprehensive geriatric assessment that allows individualized care plans) with complex outcome measurements that, for example, extends much beyond “average length of stay”.

The complexity of frailty animates and motivates the management of older people with multiple, interacting medical and social problems. It has important consequences for how we must offer health care to an older population, which no longer is well served by a “one disease at a time” model of care.

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