EDITORIAL

From Occam's razor to multimorbidity: geriatrics comes of age

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Scientific and clinical progress related to human health and healthcare in the last century have catalyzed the parsing of medicine into many disciplines. Until recently, this dividing has increased sub-specialization on individual organs, organ systems, or diseases. Two recent exceptions, geriatrics and palliative medicine, run counter to this "splitting" trend. These specialties address the whole patient, including the social and psychological contexts of biomedical disease.

Our understanding of the differences between older and younger patients continues to evolve, impacting the way we study and manage clinical care. Boyd et al. report on this theme from the American Geriatrics Society/National Institute on Aging Research Conference in 2005 (1). Their report moves forward a research and healthcare approach that accounts for the whole of the older person, not just for the vehicle in which disease travels. A crucial distinction here is the difference between co-morbidity and multi-morbidity (originally named "multiple pathology in the mid-20th century by Scottish geriatricians). Co-morbidity, popular as a risk-stratifying tool in the latter part of the 20th century, refers to the impact of multiple co-existing conditions on the presentation, clinical course, response to treatment and outcomes of the disease of interest; e.g., the impact of coexisting diabetes and heart failure on an elderly woman hospitalized for a fragility hip fracture. In contradistinction, multi-morbidity, or multiple pathology, shines a light on the aggregate and interacting impact of numerous conditions on one older person. Multi-morbidity perhaps presents a greater challenge for the researcher and sub-specialist than for those primary care clinicians who manage their patients holistically and independently (much like geriatricians), and use consultants sparingly. Nevertheless, primary care clinicians and geriatricians alike have had to cope with applying evidence-based medicine focused on specific diseases and their co-morbidities to older patients for whom the major concern is the totality of their disease burden, rather than a single condition. Accordingly, the majority of current evidence, especially from carefully designed randomized trials, is not generalizable to the older patients who increasingly dominate the healthcare landscape - very old, functionally impaired and with multi-morbidity. The co-morbidity model underestimates the synergies of the various conditions in reducing quality of life (2), and producing disability, frailty, and dependence (3), and driving health care utilization (4).

The authors considered multiple morbidity, concurrent conditions, condition clusters, and physiological and overall health as conveying similar albeit slightly different meanings in several contexts - clinical trials, practice guidelines, pay for performance schemes, research and gaps in knowledge. The differentiation of multi-morbidity from clusters and co-morbidity provides the conceptual leap that geriatricians and gerontologists must teach to students, residents and our sub-specialist colleagues, who still think in the context of individual or select combined conditions. In some respects, we already have begun thinking about multi-morbidity differently. For example, many of us already understand that physiologic reserve and healthy lifespan capture more about a patient's prognosis, and the risks and benefits of individual treatment than do individual diseases. We see the influence of physiologic reserve in outcomes of elective compared with emergency surgeries in our seniors. Risks of mortality and complications following major operations compare favorably between younger and older populations when performed electively, but differ dramatically when performed urgently. The importance of the distinction between co- and multi-morbidity also arises in palliative medicine, in which the interaction of chronic conditions challenges the care construct to manage the entire patient in a socially and psychologically sensitive way.

Reports on clinical trials recruiting multi-morbid subjects occur more frequently in the long-term care literature, but have only recently begun to emerge in studies from other settings. Our clinical and research training over the last century has centered on diseases as reference points on which to anchor the analyses. Clinically, the construct leads to collecting out-

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comes, and by the Oslerian teaching of Occam's razor (5), distill a single diagnosis, *lex parsimoniae*, to explain the presentation. While this diagnostic approach has extraordinary usefulness for the presentation of acute disease and disability, it has declining utility in chronic disease and the chronic care model. The contemporary clinical construct of an aging patient combines several diseases, the multiple medications used to manage them, and the impact on the patient's daily routines and quality of life, all contributing incrementally to the patient's presentation. Not coincidentally, chronic disease and patients with many of them were less common during Osler's time.

The utility of the razor diminishes with the increasing complexity of multiple diseases (6). For example, in a 90-year-old man with mild anemia, the evidence available a few years ago would have suggested that the likely etiology would be chronic renal insufficiency, especially if the confirming elevated serum creatinine were known in advance. The contribution of a colon polyp, colonic angiodysplasia, dietary insufficiency, cognitive impairment, malabsorption or hypogonadism, individually or collectively may be lost in the Oslerian approach. Today, this patient could qualify for treatment with an erythropoietic-specific peptide, a treatment that could add an iatrogenic complication, while not addressing the potential impact of multi-morbidity on the outcomes of falls, dietary intake and socialization. Alternatively, this 90-year-old mildly anemic and orthostatic patient may have presented after a fall. Renal insufficiency could well have risen to the top of the differential diagnosis as a cause of the anemia, and vitamin D deficiency and other contributors missed. The astute clinician would also more likely have linked the contribution of cognitive impairment to food choice, shopping, nutrition, socialization and other less classically "medical" issues. Payment misalignments, the style of busy practices and hospital rounds, and "quota care" driven by business models undermine addressing these common multi-morbidity complexities in aging patients.

Gerontology's struggle with terminology concerning the impact of aging on human beings intrudes on our consideration of multi-morbidity. "Normal," "normative," "usual," "pure" and "successful" have been used to describe the phenotypes of aging. For our purposes, we will use three terms - pure, usual and successful aging. Pure aging is the optimal physical and cognitive function achievable with current knowledge. Thus, for the pure aging definition we combine the absence of disease with the benefits of the full application of all health promoting and disease preventing interventions (HP-DP). Usual aging describes the common phenomena of sub-optimal HP-DP and common chronic diseases superimposed upon pure aging. Successful aging, like usual or normal aging, has had several meanings. Successful aging has identified the few individuals who manifest only the pure aging syndrome into extreme old age. Alternatively, successful aging has described older persons who, in spite of deleterious biological or psychological effects of disease or behavioral factors, report high satisfaction with health-related quality of life and remain socially engaged. Although both useful concepts, they need not distract from the conversation about multi-morbidity.

Geriatrics syndromes emerged as important in conceptualizing the interaction of pure aging and disease. We know that changes of aging, even in the healthiest persons, lead to a restriction of the capacity to maintain homeostasis. Reduced homeostatic capacity, in turn, results in the losses of integrated function that define the syndromes, such as falls and delirium. We can now add multi-morbidity to the list of geriatrics syndromes; the clinical impact of multi-morbidity applies most often to patients who have chronic disease burdens far beyond those captured by the term "usual aging" (7). These syndromes now lead us to attempts to identify the proportional impact not only of each of the multiple conditions on the older individual, but also their aggregate effects, including mortality (8). Such efforts are essential to the understanding of the key concepts of frailty and its *sine qua non* of reduced homeostatic capacity, and physiologic age.

With this report, and refining the lead originally taken from our European colleagues (7), multi-morbidity advances into the formal American vocabulary of geriatrics and gerontology. This step, following from the 2005 Research Conference, counts among those necessary to formally introduce the concept to our colleagues. This requisite growth in our clinical and scientific vocabulary of gerontology will improve the quality of the evidence developed to inform how we treat our frailest elders. We have far to go to move gerontological thinking into the broader realm of general medical care and research. We look forward to a new era of clinical research in which older persons with multi-morbidity are recruited into clinical trials that illuminate not only treatment of multi-morbidity, but also its prevention.

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