EDITORIAL

GERIATRICS IN THE 21ST CENTURY

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Over this century we can expect to see older persons live longer, be more resilient and less frail.

Research and care have been built to identify and treat diseases, but not to maintain functional capacities (eg, mobility, cognition, immune functions, etc.) during aging. As a consequence, individuals do not receive the healthcare they need to prevent/delay the onset of dependency (an almost irreversible and economically burdensome condition). For the W.H.O (1, 2), healthy aging is not a life without diseases, we have diseases at any age, but it is a life where we are able to maintain the functions we need to be able to do what we value.

To make it possible we will have to:

- identify biological profiles predictive of functional loss, and to discover, validate, and implement innovative rejuvenative strategies for delaying age-related functional loss (3);
- to increase functional reserves in early aging (50-70yrs) and prevent declines in functions and recover impaired functions in late aging (70 yrs or over);
- to translate the innovative procedures, tools and products into a new care model for aging populations using new technologies (ICT solutions);

One of the tasks of the geriatrician will be to undertake the stewardship of the emerging "senolytics" and determine for whom and at what stage prescribing these drugs is appropriate (4). Clustered Regularly Interspaced Short Palendromic Repeats (CRISPR/Cas9) genomic editing will be mainly used to eradicate congenital diseases at the embryonic stage before birth, but using an adenovirus vector, techniques will emerge to treat sarcopenia, frailty and dementia in older persons (5). This is already being done for the treatment of some cancers (6). An example that should develop over the next decade is using CRISPR/Cas9 to silence the myostatin gene (7). The rapid development of biological drugs will require the geriatrician to be an expert on these emerging drugs and their side-effects, e.g., antibodies against myostatin or activin receptors to treat sarcopenia (8). Geriatricians are already aware of the problems produced by polypharmacy and inappropriate drug use in older persons (9-17), and this will only become worse with the interactions with biologics which will only become obvious after many years of use. All of this will drive geriatricians to become prime users of personalized (P4) medicine (i.e., predictive, preventive, personalized and participatory), assisted by computers (18).

The other area in which geriatricians will need to develop new skills will be in disruptive technology (19-21). The ability of older persons to "age-in-place" will be highly dependent on home electronic monitoring and the availability of robots such as "companionable" (22-24). Exoskeletons and other devices will allow persons who are functionally impaired to be able to continue to function (25-27). Telemedicine will become central to providing home care (28-30). Entertainment robots, such as Paro and Aibo (31-34) and exercise robotic trainers will become important for elder care (35).

Many geriatricians will focus on being geriatric hospitalists providing care for persons over 70 years in hospital, balancing the need for maintaining function as well as treating disease, as is done in Acute Care for the Elderly (ACE) units (36). Geriatricians will play a key role in enhancing care for older persons with hip fractures (37-40), trauma (41, 42), delirium, utilizing Delirium Intensive Care Units and other techniques (43-46), and stroke patients (47, 48). Working with dietitians they will have a specific role on preventing and treating undernutrition and cachexia in the hospital setting (49-53).

Modern Geriatric Giants

A major role of the geriatrician will be to train family practitioners to recognize and where possible provide care for the major geriatric syndromes, i.e., frailty, sarcopenia, anorexia of aging and cognitive dysfunction (54). Already a number of approaches have been developed to increase awareness of these syndromes (55, 56). These approaches include the Kihon Index (57, 58), EasyCare (59, 60), Vulnerable Elder Survey (61), the Gerontopole Frailty Index (62-65), and the Rapid Geriatric Assessment (66, 67).

-Frailty has become central to geriatric syndromes, either as the physical phenotype (68, 69), or as the Frailty Co-morbidity Index (70, 71). Studies have suggested that exercise and nutrition interventions can improve outcomes in frail older persons (72-75). A rapid screen – the FRAIL – can be utilized both in hospitals (76, 77) and in the outpatient setting (78-81). A computerized algorithm has been developed to allow health professionals to recognize and treat frailty (82). The Asia Pacific Conference has developed guidelines for the treatment of frailty (83). A Mediterranean diet and polyphenols appear to decrease the chance of developing frailty (84-87).

A number of definitions for sarcopenia have been developed.

They all recognize that it consists of poor function (walking speed or grip function) in the presence of low muscle mass (88-93). The primary treatment consists of resistance exercise (94-98). Leucine enriched essential amino acids (whey protein) or possibly hydroxymethyl butyrate are the treatment of choice to act synergistically with exercise through direct stimulation of mTOR (99-103). The SARC-F is a quick screen that is available for use by primary care professionals (104-107).

It is now well recognized that the anorexia of aging puts older persons at risk for weight loss and undernutrition (108,109). Numerous studies have shown that the MNA is an excellent screening test for malnutrition (110-118). The SNAQ has been shown to be a reasonable test to predict anorexia and identify persons at risk of weight loss (119-122). The MEALS-ON-WHEELS mnemonic provides the major reversible causes of weight loss (123). Cachexia is predominantly due to inflammatory cytokines (124, 125). It can be recognized, using the Glasgow Cachexia Scale, by finding a low albumin and an elevated CRP (126). Anamorelin, a ghrelin agonist, increases food intake and muscle mass but not function in persons with cachexia (127).

There are numerous causes of cognitive dysfunction and dementia. The three most common causes of dementia are Alzheimer's disease (45%), vascular dementia (32%) and Lewy-Body Dementia (10%) (128). There are a number of reversible causes of mild cognitive impairment and early dementia (129). A Mediterranean diet with extra virgin olive oil delays the loss of cognition and may prevent Alzheimer's disease (130-132). A number of other nutritional approaches have been tried with limited success (133-136). Dementia has decreased in the USA most probably because of increased treatment of cardiovascular risk factors (137). At present, the drugs available to treat Alzheimer's disease have been somewhat disappointing. With the new imaging techniques giving an improved diagnosis of Alzheimer's diseases, it is hoped that new drugs will be developed to improve treatment. Antisenses (oligonucleotides) to Amyloid Precursor Protein are one class of drug with positive effects in animals that have yet to be tested in humans (138, 139). The recent recognition of the "diabetic brain" as a unique cause of cognitive loss opens up the possibility of new drugs to treat this condition (140). The Rapid Cognitive Screen (RCS) has been shown to be an excellent, quick screening test for mild cognitive impairment and dementia (141). Cognitive Stimulation Therapy has shown promise in treating moderate dementia (142-145). The recognition and management of cognitive frail will be a major area in this century (146-152).

Long-Term Care

The improvement of the quality of care and long-term care research, as well as better recognition for the health care professionals who work in this arena is clearly an important role of the geriatrician (153, 154). A research agenda has been set by

the IAGG-GARN nursing home group (155). The FRAIL-NH has been shown to be an excellent tool for recognizing those at major risk of poor outcomes (156). The use of advanced practice nurses in this arena is likely to greatly improve quality of care (157). It has been suggested that nursing homes may be excellent venues to provide exercise therapy and other support for community living adults (158).

Conclusion

It is likely that this century will produce many exciting and unimagined improvements in care for the aging population. As an example, in 1917, no one imagined the existence of penicillin which was only discovered 11 years later. Geriatricians will need to keep up to date with numerous biochemical and pharmaceutical studies while continuing to recognize the need to focus on person centered care and to develop new systems, if we are to remain the "Superspecialists" that we are today (159). It is to be hoped that this century will be "the best of times...an epoch of incredulity...and a spring of hope."

It is our hope that the Journal of Nutrition Health and Aging will be a beacon leading geriatricians and other health professionals into this exciting new world which will increase resilience and decrease frailty in the aging population.

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