

Medical challenges at the end of the first ten decades of life

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Summary

Demographic changes worldwide challenge the health-care system. Advanced age is associated with a number of biological alterations that, together with concomitant comorbidities, increase the risk for functional decline by inducing functional disintegration. In this concept frailty and sarcopenia play an important role. Consequently the preservation of muscle mass and function are prominent targets of medicine in old age. In order to professionally care for persons in their last years of life several other factors influencing medical decisions regarding diagnostic and treatments are important. These factors concern the life expectancy, the person's functional status the physicians involved in care and the family system. Balancing between over- and undertreatment in very old patients can be optimised by a goal-oriented decision making approach. Very old persons with poor decision making capacity might benefit from decisions made in a team. To be able to manage the challenges associated with the last decade of life, we need physicians who have the knowledge, the appropriate attitude towards frail old patients and the skills to communicate with different groups involved in care. Ideally old age medicine should become an integrative part of a unified national medical curriculum.

Key words: very old patients, challenges, geriatrics

Introduction

Despite major continental variability, human life expectancy at birth is increasing worldwide. Between 2000 and 2015, global life expectancy increased by 5 years to 71.4 [1]. In the same period, smaller trends were observed in Europe (+1.3 years), with Switzerland having the highest life expectancy at birth (83.4 years) and Turkmenistan the lowest (66.3 years). Life expectancy at age 60 in Europe increased from 20.8 to 21.7 years. Persons age 60 from Moldavia live 16.3 years, whereas persons in France live an additional 24.8 years [1]. In contrast, the maximum human life span has been reported to remain stable around 115 years [2], while life extension interventions remain under debate [3]. Taken together, decisions on medical diagnostics and treatment at any given age range should consider life expectancy to avoid over- as well as undertreatment. The challenges in the management of very old patients in different clinical and primary care settings can

be explained by a tremendous number of concomitant biological alterations of the body. However, several at least as important factors are frequently overlooked. Medical management in the last years of life should not concentrate only on the management of polymorbid patients and their concomitant use of medication. Therefore, this minireview covers some relevant aspects of human biology and includes challenges associated with the care of very old persons. These aspects will be arbitrarily divided into four sections: biology of aging, patients, physicians and family members.

The impact of biology on aging

With ageing, all biological systems undergo dramatic functional changes. This includes organs, endocrine systems, neurotransmission, extra- and intracellular biochemistry and signal transduction. The aging process thus is a highly complex function of time, genetic predisposition, environmental influences and bio-social integration of a human. The sum of any system decline leads to what we clinically see as very old patients. However there is profound interindividual variability. The slow and steady decline in system function induces a narrowing of the gap between *normal physiology* and *pathology*. Two prominent examples of the close interaction between ageing and functional alteration are the frailty concept [4, 5] and sarcopenia [6, 7]. Both frailty [8] and the age-related loss of muscle mass are frequent in old persons [9], and are important determinants of functional decline and comorbidity [10]. Thus, the challenges associated with the management of these entities will be primarily covered by this review. Aging is also independently associated with increased disease risk. The high prevalence of cancer in older persons can be viewed as a mismatch between age-related genomic instability leading to mutations and the failure of the respective repair system [11], inducing increased cancer mortality [12]. In summary, understanding some aspects of the biology of aging is an important key element for the management of very old persons with acute or chronic disease. Decisions on any medical diagnostic and therapeutic intervention have to take into account that old persons from a biological perspective are "running on the edge" and thus are highly susceptible to unwanted adverse events and insufficient response and, even death to any medical intervention.

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The prevalence of sarcopenia defined as age-associated slow but steady loss of total body muscle mass increases with each decade. Although loss of mass does not necessarily translate into loss of strength in each individual, sarcopenia is an important factor for lower extremity function preservation on the one hand, and loss of independence and the risk of falls on the other. Muscle tissue is a key element for mobility and overall functional capacity [13]. Preservation of muscle mass and strength are, therefore, important interventions to counter sarcopenia. As a result of the multifactorial mechanisms involved and the complexity of the pathophysiology of sarcopenia, several interventions have been proposed. These include single and combined administration of nutrition, exercise and anabolic hormones [14–17]. Only recently, a new approach using a monoclonal antibody against a regulatory protein that inhibits muscle growth (myostatin) [18] has demonstrated promising effects [19]. Nevertheless sarcopenia remains a complex phenomenon and currently the only preventive measure that is recommended on a larger population basis is physical exercise [16]. Future studies will have to focus on tailored interventions based on the functional and muscular status of each older individual.

Very old patients

One of the most important threats to an old person is the loss of independence. Even small alterations of the human body, including hearing and vision disability, are important indicators that, if uncorrected, significantly decrease life expectancy [20]. On a larger scale, old persons are often confronted with functional disintegration. An individual's overall function can be viewed as the sum several highly integrated body systems. Acute and chronic disease, as well as the age related changes in biology, may induce a functional alteration that leads to a net decline. Recent data suggest that functional capacity is a predictor for longevity [21]. In contrast, old patients tend to underreport their functional deficits. In the case of co-existing diseases they often dissimulate the severity of their symptoms. Knowledge of the functional status is crucial because, for example, it predicts outcome after hip or knee surgery [22] and mobility disability is a risk factor for nursing home placement [23, 24]. Since people with a history of frequent falls fear to have to move an assisted living facility, they tend to deny falls that led to a significant trauma [25]. Old persons suffering from mild cognitive decline or early dementia try to mask the severity of their cognitive deficits. Therefore, they may uncritically agree to medical diagnostic or therapeutic procedures because they do not want the physicians discover their cognitive deficits. Thus, dementia is often underdiagnosed [26]. Consequently physicians dealing with old persons have to acquire specific knowledge in how to have person with functional or cognitive changes consent to any medical diagnostic and therapeutic procedures. In contrast, interventions that increase or stabilise independence are widely accepted and of great importance [27]. In summary, very old patients rate their medical problems not based on clinical symptoms but rather on the impact on their function.

Challenges for physicians

Today, medicine is driven by the fact that almost everything is technically possible. Medical students and physicians in training are taught to apply a medicine that is strongly influenced by this feasibility diktat. During their training they are confronted with a large number and variety of technical skills. Computers, robots and electronic devices dominate their day. The modern physician is rather a healthcare technology manager than a physician in the common sense. Contemporary medicine also is driven by the development of modern drugs and, finally medicine is a large and still growing business. Old patients not only generate costs but also produce revenues. Participation in this market is especially attractive for private hospitals. For example, in the year 2013, 37% of all hip implants and 48% of all knee implants were performed by Swiss private hospitals [28]. Very old and frail patients often do not fit into such a model of care and are thus more likely to benefit from a goal-oriented approach [29]. To date there are a few indicators available to predict which old person will benefit from maximal treatment and who will not. Whereas gait speed is a known indicator for overall survival [30], several other articles have reported that functional status and the presence of frailty are good predictors of chemotherapy toxicity [31] and adverse perioperative events [32, 33]. Currently, most of the old persons seem overwhelmed with the medical and technical progress. Thus they need a medical expert to trust. Family physicians often are in this position; however, their opinion is sometimes overwritten by their colleagues in the medical hospital centres generating competing opinions on treatment that do not help to solve the problem. The decision making process can be very time consuming, especially for persons with poor decision capacity or no advanced directives [34]. Physicians who care for old patients need a sound set of communication skills, an attitude that makes the old person feel comfortable. They need to generate trust and they have to accept that medicine will fail. The best medicine is not always is the best treatment. This, however, implies that they should actively communicate their personal opinion on starting or withholding a medical treatment, even it may be fatal. Given that life expectancy decreases with each lived year medical treatment should be adapted accordingly. For example, the role of secondary prevention reaches another dimension as age becomes the most important risk factor for mortality. Older patients also often think about the end of their lives. Physicians have to address such thoughts. Thus, a well-structured advanced care planning may help to avoid unwanted procedures and ease the decision making process, especially in patients with severe disability [35]. Nevertheless, age *per se* should not be a reason to withhold an operation, a medication, or a transfer to a hospital or rehabilitation. Age and functional changes, as well as outcome, should however be part of any equation balancing the risk and benefits of medical treatments in this patient population. In summary, old age medicine should focus on functional reintegration rather than on organ-specific medicine.

Challenging family members

Family members can become a challenging factor in the treatment of very old patients. This is owing to sometimes

very long relationships. We still find couples married for fifty and more years. Such persons know each other very well and have an intense relationship. Spouses have several roles. They are involved as information sources in patients with cognitive decline, although they might suffer from the same problems as the patients themselves. Some spouses have been managing a sick person for many years and thus have become a lay expert in patient care. Sometimes the care of a person over many years can be very satisfying and, for example, end of life decisions become an emotional burden because of the fear of losing not only a loved person but also an important duty. Therefore, spouses are important persons in the decision-making process. Decision making can be influenced by several factors: the spouses own opinion on the disease or procedure, the emotional bond between the spouses and the potential loss of a significant other if an intervention fails. Inclusion of family members in the treatment decision-making process is also challenging because of the burden on the family member induced by such a decision [36, 37]. Thus, a common approach to dealing with this problem is to not have the family member feel responsible for such a decision in order to not overburden them. In contrast, physicians should take the responsibility for the medical action and have the family members agree with it. Just as spouses are involved, sometimes adult children are also important resources as well as challenging individuals. The most prominent challenging factor can be described as “reversed care”. This means that adults who have been taken care of by their own parents over a defined period of time and then gained independence are now faced with the role of double care-taking, for their own children on one hand and for their parents on the other hand. This can induce an enormous pressure on a family system that may also compete with the decision-making process. Especially towards the end of life, deciding to withhold medical treatment can induce feelings of guilt on one side, whereas financial interests could be a motivation to decide differently on the other side [38, 39]. Consequently, physicians have to balance between the patients’ will, the spouse’s opinion and the children’s interests [40].

Summary and conclusion

In order to be able to deal with the challenges of the last decade of human life we need to educate more physicians who have a sound knowledge of the biology of old age [41], a positive attitude towards ageing and several soft skills such as communication, and the willingness to work in an inter-professional team and to invest time in addressing topics related to end of life and even death. Ideally, old age medicine should become an integrative part of each medical school curriculum at every level of teaching [42], delivered as a single unified national curriculum [43]. Together with a profound knowledge of biological and pathophysiological mechanisms, a very sound education in clinical medicine and understanding of the social and personal aspects of a patient and the corresponding family system the challenges that are facing us when treating patients in their last decade of life are manageable.

Disclosure statement

No financial support and no other potential conflict of interest relevant to this article was reported.

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