WHY GERIATRICS? The Rationale Behind The Science
http://www.lebanesemedicaljournal.org/articles/60-4/review1.pdf

Ramzi R. HAJJAR¹, Maria SABRA², Serpouhi TORIGUIAN²


May you live all the days of your life
Jonathan Swift

Why geriatric medicine? Many have asked this question... residents considering specialization; specialists reluctant to acknowledge change in their aging patients; and anxious patients narrowly defining geriatric medicine as end-of-life care. All have wondered how caring for older patients differs from that of younger adults. The difference, in fact, is immense. The transition from a disease-focused model of care to a comprehensive approach aimed at preserving functional independence means that new skills must be employed and new doctrines adopted. As new treatment methods were investigated and applied to the previously neglected elderly, clear evidence of their effectiveness emerged over the past decades. Yet, for many reasons, the integration of well-established standards of geriatric care into the culture of modern medicine has been incomplete and contentious. The growth of geriatric medicine, particularly in developing countries, is further hampered by indifference of the medical community towards elderly patients. Consequently, many healthcare providers continue to have a poor grasp of the fundamental principles of geriatric medicine despite an increasing load of older patients in their practice. A failure to disseminate awareness of age-appropriate care is a failure to preserve the independence and quality-of-life of older adults.

So... why geriatrics? This introductory article, and the ones that follow, will start to answer this question, and hopefully showcase the art and science of geriatric medicine in new light. Read on!

OLD AGE IN A NEW CENTURY

The twentieth century saw unprecedented advances in medical knowledge and technology – advances that changed the way we perceive disease and practice medicine. With the introduction of antibiotics, micronutrients, preventive medicine, anesthesia, and aseptic surgery, many diseases that were lethal then are now routinely treatable or preventable. Improved sanitation, housing, and working conditions additionally increased survival expectation of young adults. At the same time, birth rates declined due to family planning and the use of contraceptives. As a result, the relative and absolute number of older people in developed and developing countries has grown steadily (Fig. 1), and life expectancy nearly doubled over the span of a century (Table I) [1-3].

Life expectancy for a population is defined as the average number of years of life remaining at a specific age, based on statistical averages. As more people survive into old age, life expectancy, by definition, increases. The upper limit of life expectancy, however, is determined by life span, or the maximum number of years a species can live. Life span is genetically determined and an inherent constant for every species. For humans 120 years is the generally accepted limit, though many actuarial computations use the more pragmatic 100 years as an acceptable end-point. Throughout history, and up to the dawn of last century, life expectancy remained well below 45 years, even after correcting for infant mortality. Closing the gap between life expectancy and life span is a hallmark of twentieth century medicine and a testament to the success of public health measures. Future medical breakthroughs, such as organ regeneration by stem cell manipulation, are not likely to extend life span; they will only allow more people to live to 100 years. Interventions that tout survival to 140 years and beyond shall remain in the realm of fiction and late-night telemarketing.

FIGURE 1. Growth of population over age 65 years by region. Compiled from multiple sources and rounded to nearest half percent [1-3]. MENA: Middle East and Northern Africa.

¹Department of Internal Medicine, American University of Beirut Medical Center (AUBMC), Beirut, Lebanon & Division of Geriatric Medicine, Department of Internal Medicine, St. Louis University School of Medicine, St. Louis, Missouri, USA; ²Hariri School of Nursing, AUBMC.

Correspondence: R.R. Hajjar, MD.
e-mail: rh110@aub.edu.lb

Percent

<table>
<thead>
<tr>
<th></th>
<th>1970</th>
<th>1990</th>
<th>2010</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>MENA</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>Lebanon</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>United States</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Western Europe</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

188 Lebanese Medical Journal 2012 • Volume 60 (4)
Today in Lebanon, almost 10% of the population is above the age of 65 years, and 2.5% above the age of 85 [1-3]. Among Arab countries, Lebanon has the oldest population, but this pales in comparison to developed countries of Europe and North America where the proportion of elderly is estimated at 18% and 14% respectively (Fig. 1). It is projected that in 35-40 years, the number of Lebanese older than 65 will double. Life expectancy in Lebanon (74 for men, 77 for women) lags only slightly behind that of the US. But all is not well in the Levant. With longevity comes chronic disease and increased resource utilization, and Lebanon is ill-prepared to handle either. Older patients consume a disproportionately large amount of healthcare cost. Half of lifetime healthcare expenditure occurs in the last few years of life. Furthermore, an aging community gives rise to a shrinking workforce available to support dependent elderly. The US is currently entering the mass retirement period of the baby boomer generation – those born during the post-World War II growth spurt – and the ratio of persons consuming healthcare to those paying into it will steeply increase. Lebanon will be entering a similar phase in forty years as a result of the post-civil war boom. It is during this intervening period that an infrastructure of geriatric services, and medical management of older persons differs in several key respects vis-à-vis their younger counterpart (Table II).

### BEYOND THE AGING IMPERATIVE

Medical management of older persons differs in several key respects vis-à-vis their younger counterpart (Table II). In what follows, some of the fundamental principles of clinical geriatrics will briefly be discussed. A detailed discussion can be found elsewhere [5-6].

#### Normal versus pathologic aging

Part of the art of geriatric medicine is knowing the difference between normal aging and disease, and being able to convince patients and other healthcare providers of the difference [5]. Our challenge as clinicians is to avoid dismissing treatable conditions as attributes of old age, or treating symptoms of natural aging as though they were diseases [5].

Our understanding of normal aging continues to evolve. It is mostly derived from cross-sectional observational studies, and is therefore subject to modifiable influences such as preventive measures and advances in medicine. For example, future generations may have less osteoporosis due to smoking cessation and lifelong intake of calcium and vitamin D. What we consider normal bone aging today might subsequently be viewed as pathologic [5].

There is an ongoing debate about when old age begins.

#### TABLE II

**CLINICAL CHARACTERISTICS OF AGING**

<table>
<thead>
<tr>
<th>What is different about the geriatric population?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Heterogeneity of health status</td>
</tr>
<tr>
<td>2. Age-related physiologic changes</td>
</tr>
<tr>
<td>3. Limited physiologic reserve</td>
</tr>
<tr>
<td>4. Increase incidence of comorbidities</td>
</tr>
<tr>
<td>5. Atypical disease presentation</td>
</tr>
<tr>
<td>6. Increased incidence of iatrogenic illness</td>
</tr>
<tr>
<td>7. Higher need of social support</td>
</tr>
<tr>
<td>8. Differing goals of therapy and alternative treatment end-points</td>
</tr>
<tr>
<td>9. Changing interplay between life expectancy and the natural course of disease</td>
</tr>
<tr>
<td>10. Paucity of evidence-based studies to guide therapy</td>
</tr>
</tbody>
</table>
Nothing magical occurs at the age of 65 that makes a person old, and chronologic age is not a good predictor of function [7]. What is clear to gerontologists is that the aging process starts decades earlier. By the age of 30 years, or shortly thereafter, most organ systems start losing function at a rate of about 1% per year. This steady decline occurs in the absence of disease and is considered a normal part of aging, though some experts contest both these points. The ability to maintain homeostasis is not compromised initially due to tremendous built-in redundancy. But by old age, significant loss of reserve has occurred and the response to external stress is considerably impaired. On the other hand, pathologic aging, as you guessed, occurs when functional deterioration exceeds the “normal” 1% per year. This may result from lifestyle choices (smoking, inactivity, diet, excessive alcohol, etc.), psychosocial factors (stress, social isolation, depression, etc.), comorbid conditions (diabetes, hypertension, etc.), or the misfortune of being born into a high-risk gene pool. The latter is a particularly strong determinant of longevity, and, at least for now, non-modifiable.

We are best advised, then, to view old age in terms of thresholds [5]. Loss of physiologic function becomes clinically evident when the rate of decline and level of demand converge. For example, an older person may have a normal resting heart rate and cardiac output but may not be able to increase either sufficiently in response to exercise, anemia, or infection. The sine qua non of aging, therefore, lies not in the resting level of performance but in how the organism responds to stress. Fundamental to the practice of geriatrics is addressing modifiable risk factors early and aggressively, and anticipating the consequence of limited physiological reserve.

**Competing morbidities and focus on function**

As clinicians we are trained to find the disease and cure it. Geriatric patients rarely have a single active diagnosis (average is four) or curable disease, and the management of one condition will inevitably affect the course of others – not always favorably. Two related principles of clinical geriatrics emerge as a result of late life comorbidities: 1) the clinical discrepancy, and 2) the survival discrepancy of acute disease management. The aphorism “what is good for the disease is not always good for the patient” puts it best. While seeming paradoxical, all clinicians have witnessed this at some point. For example, lowering blood pressure can prevent heart disease but cause fatigue, dizziness, falls, and fractures. Feeding tubes provide enteral access but increase the risk of agitation, delirium, aspiration, and possibly death. Weight-bearing physical activity delays progression of osteoporosis but increase the risk of falls and joint injury. The dilemma of introducing one problem as we solve another is not unique to geriatrics, but it is greatly amplified in the elderly as a direct consequence of limited functional reserve.

Following this argument to its logical conclusion leads to the second dilemma. Aging societies experience a “squaring off” of the survival curve, meaning people are living longer and dying at a higher frequency in the older years. The mortality rate at age 65 years in the US is approximately 1% per year; at age 85 it is 16% per year. Since the survival curve is approaching the limit dictated by life span, disease prevention in the very old will not result in significant prolongation of life. Consequently, decreasing mortality from one disease will necessarily increase mortality from another. Supporting evidence abounds. Early hypertension studies, such as the Systolic Hypertension in the Elderly Program (SHEP) trial, showed a statistically significant decrease in cardiac and stroke mortality in the treatment group, but not in all-cause mortality. Aggressive preventive interventions over the past decades have resulted in a systematic decrease in disease-specific mortality – first cardiac, followed by stroke, and very recently cancer. These achievements, however, were tempered by reports of setbacks in other diseases (e.g. infections, lung disease), the reasons for which this discussion has now made clear.

For both the above reasons, particular attention is given to preserving function. If aggressive disease management neither improves all-cause mortality nor eliminates symptoms, a worthy goal – in fact, a cornerstone of geriatric medicine – is to optimize the quality of life for the remaining years. Disease management has suddenly taken an odd twist. With every intervention, we must ask not only how it affects disease outcome, but also patient function. As clinicians, we must act as mediators between treating the disease and treating the patient; between what can be done and what should be done.

**Iatrogenesis and polypharmacy**

Diminished functional reserve puts older patients at exceptionally high risk for iatrogenic illness. Iatrogenesis can occur in any setting and is a common hazard of hospitalization. It is associated with significantly increased length of stay, mortality, and cost. In a study of 815 consecutive admissions to a university hospital, Steel et al. reported more than one-third of illnesses were iatrogenic, nearly one in ten was considered serious, and 2% resulted in death [8]. Iatrogenic illness can take many forms. Some conditions are easily recognizable such as delirium following a surgical procedure, while others are more subtle and require investigations and insight such as sarcopenia due to immobility. Multiple diseases, physicians, and medications significantly increase the risk. A particularly pervasive cause of iatrogenic illness is polypharmacy and adverse drug events (ADE). In 2000, the Institute of Medicine (IOM) reported that “for every dollar spent on ambulatory medications, another dollar is spent to treat new health problems caused by the medication ... and for every dollar spent on drugs in nursing facilities, $ 1.33 is consumed in treating drug-related morbidity and mortality” [9]. The incidence of ADEs increases rapidly when seven or more medications are consumed. Even more insidious, iatrogenic anxiety and poverty occur from over diagnosing and over treating, and are only now starting to be investigated.
Heterogeneity

There is growing appreciation that all people do not age the same way or at the same rate [5]. These differences accrue with age so as to make it meaningless to define a “typical” 85-year-old. Given this heterogeneity among elderly individuals, it is difficult, indeed hazardous, to make treatment generalizations [7]. Again, the SHEP trial serves as an example. Of 1000 consecutive admissions to a geriatric primary care clinic, only 53% of those over the age of 75 would have qualified for the study based on the study’s own exclusion criteria. Yet, the results are applied to all elderly, for lack of alternatives. The validity of treatments proven beneficial in younger adults do not necessarily extend to the very old age, but are often applied in good faith due to the absence of evidence-based standards of care for the elderly.

CONCLUSION

With these concepts firmly rooted in our minds, we can start viewing the elderly for what they are, not merely a sum of illnesses that must be redirected, and review the literature more critically. The remaining principles of aging (Table II) have been eschewed due to space constraints, but will hopefully become self-evident through the remaining articles.

REFERENCES