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Introductory Chapter: Overview of Challenges in Geriatric Medicine in 2016

Edward T. Zawada

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Trained in nephrology from 1974 to 1976, I began to consider myself a geriatric specialist beginning in 1983 when I compiled what I believe was the first subspecialty textbook of geriatric medicine, *Geriatric Nephrology and Urology* [1]. I became board certified in geriatrics by the American Board of Internal Medicine in 1988, several years later but now nearly 30 years ago. In the 1990s, I helped to develop a Geriatric Assessment Program for Sioux Valley Medical Center in Sioux Falls, South Dakota, a MEDRED (*medication reduction*) clinic program for correction of polypharmacy [2] in rural South Dakota, and published original geriatric and gerontology research. My clinical research included the identification of nutritional deficiencies of the elderly [3] and the use of biomarkers such as brain natriuretic peptide (BNP) to assist in the prevention of readmission to the hospital for elders with chronic congestive heart failure [4]. My basic science research focused on the role of dietary control of obesity to slow renal senescence [5, 6]. After 2000, I assisted in the founding and ongoing teaching effort of a Fellowship in Geriatrics. Based on my dedication to the care of the elderly verified by the above experiences, I feel justified in providing a brief summary of the most common clinical problems I face daily in the year 2016 and summarize the importance of each of the chapters in this collection to geriatric medicine from my perspective.

The most frustrating clinical problems I now frequently face in caring for elders include intracranial bleeds due to falls in elders on new anticoagulants for atrial fibrillation, severe hypoxemia in elders with pneumonia, recurrent advanced congestive heart failure in those failing medical therapy, *Clostridium difficile* colitis refractory to oral antibiotics, acute renal deterioration associated with multiorgan dysfunction in patients with pneumonia or heart failure, morbid obesity resulting in pulmonary and hepatic dysfunction, and myelodysplasia resulting in refractory pancytopenia. I give a brief explanation of the difficulty in managing these problems and their relevance to chapters in this book.

Devastating neurologic diseases that are common in the elderly include dementia and stroke, which are difficult to prevent and unpredictable in occurrence. On the other hand, potentially avoidable but even more difficult to manage neurologic catastrophes for elders are the intracranial bleeds associated with falls [7]. The difficulty in controlling these bleeds is greater when patients have been receiving therapy with antiplatelet therapy or anticoagulants, especially the newer agents that are less readily reversible. Because of the high mortality of patients with this problem and possible reversibility, I devote the largest part of this introduction to details in managing this problem.

I start with a brief case which was so striking that I recall it frequently. A prominent attorney and past president of the board of our health system was reasonably fit in his mid-1980s tripped and hit his head during a strenuous morning of exercise. He had been taking clopidogrel for prior cardiac stent placement. After a brief delay, he collapsed and was in coma. He was found to have severe intracranial hemorrhage, which was refractory to an attempt at correction by transfusion of 10 units of platelets and administration of desmopressin (DDAVP) in the dose of 0.3 g/kg. Bleeding continued, and he did not survive.

The most common cause of death seen month after month as I sit in at our trauma morbidity and mortality conference is the patient receiving warfarin for atrial fibrillation who developed a subdural or other intracranial bleed after a fall. Warfarin must be reversed to lower the INR less than 1.4 in these cases with as many units of fresh-frozen plasma as needed or infusion of three- or four-factor prothrombin complex concentrate [8]. I recommend the four-factor prothrombin complex in the following doses:

If the INR is 2 to <4, give 25 units/kg; maximum of 2500 units

If the INR is 4–6, give 35 units/kg; maximum of 3500 units

If the INR is >6, give 50 units/kg; maximum of 5000 units

Recently, reversal of the factor Xa and direct thrombin inhibitors has become available [14]. Idarucizumab is now available for the reversal of dabigatran (i.e., trade name Pradaxa), the direct thrombin inhibitor. The dose should be 5 g intravenously (administered as two separate 2.5-g doses of no more than 15 min apart).

The factor Xa inhibitors include rivaroxaban (trade name, Xarelto) and apixaban (trade name, Eliquis). A reversal agent for factor Xa inhibitors is in development (andexanet alfa). It appears to act within minutes and persist for 2 h after intravenous administration of a dose of 400 (for apixaban) or 800 mg (for rivaroxaban). It may also be necessary to follow a bolus with a 2-h infusion of 4 mg/min (for apixaban) or 8 mg/min (for rivaroxaban). A review of some of the other common iatrogenic problems due to medications is presented in a chapter on “geriatric assessment” and a chapter on “polypharmacy”.

Community-acquired pneumonia (CAP) has a yearly rate of disease of 5 per 1000 population and a mortality of 13.6%. Several cases that require ICU admission have mortality as high as 36% which increases even higher for each decade above 60 years of age [9, 10]. The problem is made worse by the emergence of organisms resistant to frequently used antibiotics such as methicillin-resistant *Staphylococcus aureus* or MRSA. Newer life-support techniques for

managing severe hypoxia have been developed, which include pronation, extracorporeal membrane oxygenation, nitric oxide administration, and intravenous or inhaled therapy with prostaglandins. Details of each of these expensive, often invasive techniques are beyond the scope of this chapter. However, a daily question facing physicians caring for elders with severe hypoxia is whether these rescue life-support therapies should be made available to the advanced age groups. The chapter on ethics in this collection speaks about this issue.

Congestive heart failure remains one of the most common conditions requiring hospital admission. Newer strategies for prevention and management have exploded in the past 30 years. Angiotensin blockade, b-blockers, statins, very powerful diuretic combinations, newer inotropes, intraaortic balloon pumps, venoarterial extracorporeal membrane oxygenation (VA ECMO), and commercial availability of ventricular assist devices (VADs) illustrate the vast spectrum of management now available for this problem [11]. As mentioned previously, biomarkers have become increasingly useful in diagnosis and management of patients with heart failure. To distinguish cardiac from pulmonary causes of dyspnea, BNP has become an important diagnostic tool, and the test can be used in titrating the management of heart failure by repeating levels after diuresis. Other biomarkers used in managing patients with breathlessness include ST2 (an interleukin released in heart injury and stretch) and higher sensitivity troponin, which are both strong predictors of mortality. Finally, procalcitonin is used in such patients to diagnose concomitant pneumonia which requires antibiotic therapy [15, 12].

Gastroenterologic problems that I encounter the most include diverticulitis with and without bowel perforation, colon cancer requiring resection, and *C. difficile* colitis (Cdiff). The last issue may result from treating sepsis and infections associated with the first two topics and can be considered an epidemic in the geriatric segment of our society. It now stands as the most commonly reported nosocomial infection in the United States. While traditionally this infection has been an inpatient issue, it is now being recognized as a growing concern in the outpatient setting as well [13].

Some of these increased burdens are related to an epidemic strain that has been well described in the literature since the early 2000s. With regard to age, there is no group of patients that has experienced this problem with such dramatic consequences as the elderly. Those over the age of 65 years have the greatest incidence of disease as well as the greatest mortality rate. In addition, they demonstrate a higher recurrence rate, which not only contributes to a higher likelihood of death but leads to substantial morbidity and reduced quality of life. This recurrence rate is related to inadequate control of the infection due to a poor immune response with insufficient anti-toxin antibody production and inability to replenish a healthy microbiota within the colon.

This infection is diagnosed with clinical suspicion and fairly simple laboratory testing. Most patients have one or both of the dominant risk factors, which include recent contact with the health-care setting and recent use of antibacterial therapy. The dominant symptoms include diarrhea and abdominal discomfort. While the white blood cell count can be normal with this infection, it is usually elevated with more significant disease, and very high counts are not uncommon and may even point a clinician toward this diagnosis. With regard to testing, stool

can be sent for a variety of assays. Enzyme immunoassay that detects toxin has been utilized for many years but has reduced sensitivity. The newer amplification tests for the toxin genes were expected to help with this issue, but they may reveal positive results in a patient colonized with *C. difficile* who has other reasons for their symptoms. Thus, clinical suspicion and pretest probability need to be adequate for testing to be ordered. Other important rules of testing include only testing liquid stool, avoiding multiple consecutive tests, avoiding repeat testing while on appropriate therapy, and avoiding a “test of cure” when symptoms have resolved.

The management of this infection has been problematic due to the limited number of therapies and the recurrent nature of the disease. Metronidazole (oral or intravenous) and oral vancomycin have been the two dominant therapies that have been utilized over the past several decades. Metronidazole is now reserved for those with mild to moderate disease, while vancomycin can be used across the spectrum, including those with severe disease. Combination therapy is not well supported by data except in the critically ill population when impaired gut motility may be a concern. Unfortunately, the recurrence rate for each of these therapies is unacceptably high, and newer therapies are needed. One of those therapies may be fidaxomicin, which has shown a lower recurrence rate in clinical trials. While there have been concerns about the cost of this drug in the past, it has been debated that the cost of the drug may be more desirable than the cost of recurrent disease. Unfortunately, clear guidance does not currently exist on this matter, and even fidaxomicin carries some risk of recurrence. Thus, alternative therapy has been utilized that centers on a principle difference than eradication of the organism. Fecal microbiota transplantation is being increasingly used in an effort to replenish healthy bacterial flora within the colon and outcompete *C. difficile*, effectively breaking the recurrent cycle of infection. This can be administered through a post-pyloric nasogastric tube, through enema, or via colonoscopy. The importance of avoiding future antibacterial therapy should be stressed if this treatment is to have lasting effects for the patient.

As this disease poses great risk to elderly patients, the dominant approach should be prevention. Unfortunately, these patients are high utilizers of the health-care system, and they are often exposed to antibacterial therapy as well as sites within the system where the organism may be acquired. Clinicians need to take great care when deciding if antibacterial therapy is truly indicated for a given condition. Common conditions that are often treated with unnecessary antibacterial therapy include upper respiratory tract infections, asymptomatic bacteriuria, and skin conditions such as stasis dermatitis. Hopefully, with appropriate antibiotic stewardship, as well as adequate infection control measures, the incidence of this disease within this vulnerable population will fall. Further assistance may come with vaccine development, and clinical trials are currently ongoing.

Advances in dialysis and renal transplantation have led to wide availability of end-stage renal failure therapy offered to people of all ages [1, 6]. The financial impact has been staggering in elderly individuals, especially considering that such life support is provided to outpatients who are not very mobile and who have outlived members of their nuclear family. Hence, the cost must also include transport to and from dialysis centers. Renal deterioration is often silent until a final snowball of metabolic crises, which create life-threatening illness and subsequent

severe deconditioning. The chapter presented here on geriatric assessment deals with carefully ferreting out serious problems in stubborn, stoic elders, which might be buried by a multiplicity of other illnesses which create more symptoms.

Elders often suffer from a variety of cancers whose incidence increases with age. A particularly frustrating and not uncommon hematologic problem is the patient with refractory anemia, resistant leukopenia, and intractable thrombocytopenia. These may be the consequence of a primary cancer, a side effect of cancer chemotherapy, or due to the problem of myelofibrosis.

Primary myelofibrosis is a myeloproliferative neoplasm in which there is ineffective erythropoiesis and the bone-marrow deposition of fibrous connective tissue.

Most patients present with anemia, marked splenomegaly, early satiety, and systemic symptoms of severe fatigue, low-grade fever, night sweats, bone pain, and weight loss. Essential thrombocythemia and polycythemia vera can both undergo delayed disease transformation into a fibrotic state resulting in secondary myelofibrosis. Allogeneic hematopoietic cell transplantation is the only treatment modality with a curative potential in primary myelofibrosis for which most patients will not be a candidate. Other treatments can only be used for symptom management and will primarily consist of frequent transfusions. The patients become weaker and weaker, develop pancytopenia, and often die of sepsis. Ethics again plays a role in deciding how far to go with cancers and myelofibrosis, especially since treatments for cancers are often poorly tolerated, and adding advanced life support to sustain their lives for more of such therapy becomes a difficult decision for families and physicians more so than patients who will frequently request a transition to palliation or comfort care.

Morbid obesity management has become a science of its own—bariatrics. The year 2016 commonly results in a requirement for two skill sets in clinical medicine, bariatrics, and geriatrics. The bariatric geriatric patient is more susceptible to multisystem organ failure and requires different pharmacology, different medical devices, and different nutritional management of the frequent failure of lungs, heart, liver, and kidneys in these patients. These patients frequently develop sleep apnea, edema, skin infections and ulcers, diabetes, impaired mobility, hypertension, thromboembolism, pulmonary hypertension, cor pulmonale, and renal insufficiency. Pharmacokinetics of medication administration and nutrition during illness are complicated and confusing as to whether to base them on actual or ideal weight. When hospitalized, they require specialized beds, wheelchairs, and extra staff for assisted transfers at an increased cost. Special scans (computerized tomography (CT) and magnetic resonance imaging (MRI)) are often delayed or denied because of physical constraints of the scanner opening and weight limits on the imaging tables. There is a chapter in this collection on frailty in the elderly. The obese elder is frail but will not be recognized for this impairment because of the stereotype that a small thin person is frail.

In the past 20 years, there has been a new component to the health-care continuum, the long-term, acute-care unit (LTAC). Elders and even younger patients often have a lesser set of physiologic disturbances after hospital or ICU discharge but which persist for weeks or months. They require additional time for healing, for resumption of activities of daily life, and instrumental activities of daily life. They often require weeks of ongoing treatments for the

reason for hospitalization such as antibiotics for infections, wound management requiring ongoing debridement, enteral or parenteral nutrition, continued ventilator support by tracheostomy, and even dialysis. They require additional physical therapy, speech therapy, and occupational therapy to resume independent functional status. One of the chapters in this collection describes the growth of this new additional component of the health-care continuum: home, primary care, hospital, ICU, back to the hospital, long-term acute care, skilled nursing facility, and then back home.

In summary, this introductory chapter points to the direction for those which follow. The clinical problems I have described are often better diagnosed in a single visit by the tool of Geriatric Assessment. The above problems require complicated medication combinations, which require knowledge of pitfalls in initial boluses and maintenance dosing in the elderly as covered in a chapter to follow. The lack of cardiac reserve in complicated illnesses in the elderly can be monitored by biomarkers. The ethical dilemmas we face in the care of the most seriously ill elders with problems such as the above have led to an exponential growth in techniques of palliative care and hospice care including the legalization of physician-assisted suicide. Several chapters will deal with these moral, philosophical, and ethical issues. The principles of managing patients over 60 have resulted in the creation of a field of clinical specialists who can become board certified in Geriatrics. The anatomy, physiology, demographics, and social issues of aging have likewise expanded a body of knowledge, which has been identified as gerontology. This publication seeks to summarize several of the more common clinical problems and their management which have come to the fore in the care of elders in 2016.

Author details

Edward T. Zawada

Address all correspondence to: ezawada@sio.midco.net

Sanford School of Medicine, University of South Dakota, Sioux Falls, South Dakota

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