219. Balance Gait and Fall in Elderly
   Kauser Usman, Azher Rizvi, Suraj Singh Yadav, Abhishek Singh

220. Anemia in Elderly
   Alpana Raizada, Ashish Goel

221. Comprehensive Approach in Providing Geriatric Care in India
   OP Sharma, AP Ambali

222. Severe Acute Respiratory Infections in Elderly
   YS Raju, Y Rahul, Y Sairam
Abstract

Gait and balance disorders in the elderly act as harbingers of underlying serious medical disorders and are the major cause of one of the classic geriatric syndromes, fall. The decline in cognitive function, sensory processes, and muscle strength that occur with aging aggravated by a number of neurological, musculoskeletal, sensory, cardiovascular disorders along with environmental factors increase the susceptibility to fall in elderly. Elderly patients presenting with falls should be thoroughly evaluated in order to identify the underlying risk factors along with complete neurological, musculoskeletal, and cardiovascular examination. Various clinical trials have concluded that a comprehensive multifactorial evaluation for identifying risk factors followed by targeted interventions can reduce the risk of fall by about one-third.

Introduction

Impaired mobility is one of the major concerns for physicians attending to the elderly patients. Gait and balance abnormalities are often considered to be a common phenomenon of aging. However, this is an erroneous assumption as studies have shown that up to 20% of adults have normal gait patterns even in advanced age. Gait and balance abnormalities act as harbingers of underlying serious medical disorders and are the major cause of one of the classic geriatric syndromes, fall. The annual prevalence of falls among adults aged 65 and above is 28% and it progressively increases with age with a higher incidence among women in contrast to men. Falls in the elderly have devastating consequences with significant morbidity and mortality. Falls leading to serious injuries are the fifth most common cause of death among the elderly. Other serious consequences include increased hospitalization, reduced functional ability, social isolation, depression, and fear of falling. Multiple factors are involved in the causation of falls and a multidisciplinary approach is required to identify and tackle them. With the expanding elderly population, globally and in our country, it becomes important to acknowledge the impact of this problem and develop an effective approach to manage it.

Physiology of Balance and Gait Disturbance in the Elderly

Balance is regulated through the complex integration of sensory input, central processing, and motor output. With aging, there occurs a gradual functional decline in all of these systems. Sensory information is relayed through vision, vestibular system, and proprioception. Diseases of the aging eye lead to dysfunction of acuity, depth perception, and dark adaptation. Vestibular impairment is a usual process of aging or can be seen in ischemia and head trauma. Peripheral proprioception may be weakened in older adults due to diabetes, peripheral vascular disease or any neuropathy. Studies have reported that visual decline contributes more to instability in elderly as compared to decreased proprioception.
The central nervous system structures like the motor cortex, basal ganglia, cerebellum, and spinal cord are involved in planning motor sequences and regulating balance. Damage to these structures from hypoperfusion, neurodegenerative diseases, trauma, or sedative drugs contributes to balance disorders and falls. The righting reflex which produces correcting movements when there is imbalance is impaired in extrapyramidal lesions increasing the risk of falls. Cognitive decline seen in various forms of dementia is also an important risk factor for falls.

Muscle and joints are effector organs of the motor system. Disorders of the peripheral nerves and neuromuscular junction contribute to muscle weakness. This combined with the progressive decline in muscle mass called sarcopenia leads to decreased muscle strength. Arthritis causes pain, restriction of motion, and joint deformities leading to altered gait, balance and increased risk of falls. Musculoskeletal disorders have a strong association with reduced physical activity further aggravating functional decline, frailty, and increased risk of falls.

**Risk Factors Associated with Gait and Balance Disorders**

Gait and balance disorders were found to be multifactorial in 75% of elderly patients. The most common associated underlying conditions were reported to be arthritis (37%) and orthostatic hypotension (9%). Acute medical conditions such as infections, electrolyte imbalances may precipitate falls in elderly with underlying subclinical balance disorders. Chronic conditions which increase fatigue such as congestive heart failure or anemia also increase the risk of falls.

**Cardiovascular Diseases**

Any condition which reduces cerebral perfusion due to hypoxia, hypotension can present as unsteadiness and falls. These conditions include arrhythmias, congestive heart failure, orthostatic hypotension, or thromboembolic disease.

**Neurologic Disorders**

Parkinson’s disease, cerebellar degeneration, multiple sclerosis, myelopathy, and stroke affect the vulnerable brain areas involved in maintaining gait and balance, increasing the risk of falls. Cognitive impairment seen in dementia is also associated with reduced attention, psychomotor slowing and increased susceptibility to falls. This is particularly apparent when cognitive stress is given along with performing a motor activity in an assessment called “dual tasking.”

**Sensory System**

Involvement can occur in the form of peripheral neuropathy due to diabetes and vitamin B12 deficiency. Vision can be impaired in age-related eye diseases like macular degeneration, glaucoma, cataracts, and presbyopia. Vestibular apparatus damage can occur in Meniere’s disease and benign positional vertigo.

**Affective Disorders**

Depression and sleep disorders increase the risk of falling. Fear of falling can further aggravate the risk of falls. Patients who fall limit their physical activity starting a vicious cycle which leads to functional decline, increased muscle weakness, and disability further amplifying the risk of falls.

**Medications**

Among pharmaceutical agents, psychoactive and sedative drugs such as benzodiazepines, barbiturates, opioids, haloperidol, and risperidone are often the culprit drugs associated with falls. Cardiovascular drugs leading to arrhythmias, electrolyte imbalances, and postural hypotension are also linked to increased risk of falls. This category includes antiarrhythmics, diuretics, and alpha antagonists. Polypharmacy by itself proportionally
increases the risk of falls. Antiplatelet and anticoagulation drugs further increase complexity as they can lead to grave consequences in case of fall.1,2

Environmental Factors
An often underestimated risk factor for fall is the interaction of the person with the external environment. Elderly people tend to fall at lower levels of challenge provided by the environment as compared to young, healthy adults. Commonly associated environmental factors include poor lighting, slippery floors, uneven surfaces, and absence of stairway railings.1,3

Clinical Assessment
It is important for clinicians to meticulously obtain history of fall from elderly patients as well as family members because patients may fail to remember due to dementia or intentionally hide history of fall for fear of relocation or restriction of activity. It is also important to identify patients at high risk for future falls. Patients at high risk of falls often have other geriatric syndromes such as incontinence, depression, delirium, or frailty.1

- While eliciting history of previous falls, it is crucial to inquire about the circumstances that led to the fall such as time of day, location, frequency, injuries, and associated symptoms such as dizziness, vertigo, palpitations, musculoskeletal pain, instability. An abrupt onset is usually associated with cerebral hypoperfusion, toxic, or metabolic abnormalities.
- The physicians should also question about the extrinsic factors such as lighting, uneven surfaces, absence of railing, etc. in the residential environment, which increase the risk of falls.
- Patients should be asked about their previous medical history of underlying neurologic, cardiovascular, musculoskeletal, and visual/sensory impairment.
- A careful drug history to identify offending drugs such as sedatives, antiarrhythmics, diuretics, and alpha antagonists is essential. Associating the falls with the dosing schedule of the medications is also helpful.
- Symptoms of depression and sleep disturbance should be identified.
- The functional status of the patient should be evaluated not only to indicate disability but also to monitor the response to treatment. This can be determined by documenting the instrumental activities of daily living (activities for independent living such as housekeeping, cooking, shopping, use of transportation, management of finances) and activities of daily living (ability to care for oneself such as dressing, toileting, continence, bathing, and mobility).5
- Gait should be carefully observed from the time the patient enters the examination room. Points to be noted include posture, stance, difficulty in initiation, step length, cadence (steps per unit time), instability, and need for assistance.
- Vitals signs with blood pressure measurement in the supine and standing position should be assessed. Pallor, signs of any diseases of the heart should be examined for recognizing underlying chronic illnesses that may cause fatigue.
- Cognitive impairment can be assessed using the Mini Mental State Examination (MMSE) and the Montreal Cognitive Assessment (MOCA).
- A complete neurological examination should be carried out with focus on sensory and motor examination. Testing for visual acuity, visual field, dark adaptation, and depth perception should be performed. Testing for vibration sense, light touch should be done to detect peripheral neuropathy. Romberg’s test can be performed to identify impairments in vestibular function and proprioception clinicians should look for focal neurological deficits, spasticity, hyporeflexia for identifying cerebrovascular diseases. Pattern of gait can give an insight into the underlying neurological condition such as frontal lobe involvement, cerebellar involvement, sensory impairment, or Parkinsonism. Signs of extrapyramidal dysfunction such as rigidity, tremors, hypokinesia should be identified. Cerebellar signs such as psychomotor slowing (finger to nose test, dysdiadochokinesia), scanning speech, ataxic gait should be looked for.
- Testing of muscle strength and joint mobility, deformity, and swelling should be carried out to characterize underlying musculoskeletal conditions like myopathy or arthritis.1,5
Special Clinical Tests in Evaluation of Fall

No studies are available to indicate a specific clinical test for gait and balance assessment, till date. The “Get Up and Go” test is easy to perform and can identify older adults prone to fall. Patients are scored on their time taken to get up from a chair, walk 3 meters, turn around, and get back to their original position. A score of 14 seconds or more is considered abnormal and associated with an increased risk of falls.

Other tests of mobility include the Berg balance test for predicting risk of falls and the performance oriented mobility assessment (POMA) test for dynamic and static balance. Nowadays balance testing is combined with a cognitive task in order to unmask underlying cognitive defects. Patients who fail to perform such dual tasks are at increased risk for falls.6

Laboratory Evaluation

Laboratory evaluation can be carried out based on the findings of history and physical examination. A 12-lead electrocardiography should be obtained, if arrythmias or cardiac causes are suspected. A complete metabolic panel can be considered for electrolytes and renal function. A complete blood and differential count to rule out anemia or any underlying infection. Serum vitamin B12, thyroid function test, and vitamin D levels should be measured as they are associated with peripheral neuropathy, proximal myopathy, and increased propensity to fall respectively.

Interventions

Lack of effective outcome measures make the assessment of interventions for gait and balance disorders inadequate. However, medical therapies for underlying chronic conditions may produce modest improvement in gait and balance. It is evident by various clinical trials that a comprehensive multifactorial evaluation for identifying risk factors followed by targeted interventions leads to 30–40% reduction in the evidence of fall.7

The focus of therapy to reduce falls should be on the reduction of risk factors. Use of visual and hearing aids for increasing sensory input, antiarrhythmic medications and pacemaker insertion for cardiac rhythm disorders, correcting acute metabolic defects that may precipitate falls, appropriate management of arthritis, osteoporosis, correction of vitamin deficiencies such as Vitamin B12 and Vitamin D have resulted in a reduction in the risk of falls. Surgical intervention may be needed for cervical myelopathy, arthritis of knee or hip and lumbar canal stenosis. It is more important to recognize the sedative/psychotropic medications in elderly that precipitate falls and gradually taper their dose appropriately in patients at high risk. All of the prescribed medications should be reviewed and the goal should be to minimize as much as possible the doses and the absolute number of drugs.

Physical activity should be encouraged among the elderly to maintain strength, balance, and flexibility. Tai chi has proven to be an effective intervention in elderly patients for improving balance and reducing risk of falls. The combination of exercise along with visual evaluation and treatment has shown to considerably reduce the risk of falls.8 Exercise plans should progressively increase physical activity over time with special focus on muscle strengthening and weight bearing. Physical therapists have an important role to play in management of patients with gait and balance disorders. Patients suffering from cerebrovascular diseases or Parkinson’s disease should preferably be enrolled in rehabilitation programs.

All efforts should be made to ensure safety of the elderly in their homes by eliminating the extrinsic risk factors. Adequate lighting, strong stairwell railings, switching to safer footwear, avoiding loose rugs, and slippery floors should be ensured to provide a secure and protected environment to the elderly.

In selected patients, assisted devices like canes, walkers, or wheelchairs improve mobility and stability by increasing the base of support and unloading of the painful joints. It is also important to ensure the appropriate size of such devices as incorrectly measured devices may actually increase the risk for falls.2,3

Conclusion

The major aim for clinicians treating the elderly is to ensure an independent lifestyle for as long as possible. Gait and balance disorders leading to falls deprive them of such a lifestyle by adversely impacting the day-to-day activities of the elderly. It is vital for clinicians to identify patients at risk of falls, start prevention strategies by individualized multicomponent interventions in order to reduce the morbidity and mortality that result from fall. Recent researches have strongly suggested that interventions to reduce falls are effective. With the growing elderly population the world over, there is an urgent need for implementing fall prevention strategies on a larger scale.
References

Abstract

Anemia in elderly is a common problem seen in out-patient as well as in-patient general and specialty medical care. The term, anemia of elderly has largely been replaced by anemia in elderly in current times to promote better understanding of the pathophysiology. Anemia in older persons has been found to be associated with increased hospitalization, longer hospital stay, and a higher mortality.

The present article presents an overview of the definition and epidemiology of anemia in older persons and discusses a broad etiological approach to the problem. Success of preventive medicine and infection control have resulted in an increase in the share of older persons in the Indian population. A wide variation has been noticed in the prevalence of anemia across different study groups in the Indian population owing to the variations not only in the definition employed but also in the cultural practices, nutrition and socioeconomic structure. Further, the chapter presents established therapeutic options such as iron and erythropoiesis stimulating agents. It revisits the role of blood transfusions and associated complications in older persons and provides a brief overview of newer therapies under development.

Introduction

The world population has witnessed a remarkable increase in the share of the older people owing to the success of public health measures over the last few decades resulting in an increase in life expectancy. Declining rates of fertility have also contributed to the changing demographic structure of the world population. As per World Health Organization (WHO), the 900 million population of elderly (>60 years of age) in 2015 is projected to increase to 2 billion by the year 2050, accounting for 22% of the world’s population and outnumbering those under 15 years of age.1 Parallel to these global projections, the population of elderly in India by 2050 is expected to be around 300 million accounting for 20% of the total population against 8% in 2015.2 This demographic transition is likely to bring unprecedented challenges of disease and disability associated with longevity. Falls, frailty, incontinence, dementia, and nutritional deficiency are few recognized geriatric giants that have been recognized in recent times.

In addition to the traditionally described geriatric giants, anemia has been increasingly recognized in older persons, and it often goes undiagnosed. The previously used term ‘anemia of elderly’ signified the acceptance of fall of hemoglobin to be a natural accompaniment of aging against the currently used term ‘anemia in elderly’ which considers declining hemoglobin with age as a disease entity. This change in terminology and thought has been evidenced based as anemia has been found to be independently associated with multiple adverse outcomes like loss of muscle power, increased risk of falls, cognitive decline and dementia. Culleton et al. in a longitudinal study conducted on patients more than 66 years of age observed that anemia was associated with increased risk of hospitalization, longer hospital stay as well as increased risk of death.3
The present chapter presents a review of literature to provide an etiological approach to diagnose anemia in elderly and offers a broad management plan for physicians involved in the care of older people.

**Definition**

The definition of anemia has been a subject of debate among geriatricians, and hemoglobin cut-offs to use have often been discussed. To address this issue WHO has launched a novel ambitious program to revise hemoglobin thresholds for different populations including the elderly. Until then, in most epidemiologic studies on anemia in elderly, the original WHO cut-offs of hemoglobin less than 12 g/dL for women and 13 g/dL for men are being used. However, in place of absolute hemoglobin cut-offs, it might be more relevant if the definition of anemia in elderly is based upon clinical outcomes. This is exemplified by the Cardiovascular Health Study (CHS) study wherein hemoglobin concentrations above 13.7 g/dL for men and 12.6 g/dL for women gave survival advantage against those with lower hemoglobin levels.

**Epidemiology**

Anemia in elderly (AE) is common, relevant, and rapidly increasing owing to an aging population round the globe. The overall prevalence of anemia in elderly ranges from 10% to 24% around the globe and is likely to depend on the level of hemoglobin used to define it. The prevalence of anemia is higher among older people who are hospitalized (40%) or those residing in nursing homes (47%). The prevalence of anemia rises rapidly with age, approaching nearly 50% in men older than 80 years.

The prevalence of anemia in elderly in India varies from 17.7% to 89%. The prevalence of anemia in elderly men and women residing in old age homes in India was 65.1% and 70.9%, respectively, with an overall prevalence of 68.7%. In a community-based cross sectional study 92.1% of the elderly subjects were anemic in high-altitude regions whereas anemia was documented in 38.2% elderly population of rural India.

**Characterization**

NHANES III study performed a laboratory evaluation of over 5,000 community dwelling elderly subjects. They reported that about 10% of men and women above 65 years of age had anemia according to the WHO criteria and that with increasing age beyond 65 years there was substantial increase in prevalence of anemia. According to NHANES III, anemia can be characterized on the basis of underlying etiology into the following subtypes:

- Nutritional deficiency anemia
- Anemia of chronic inflammation (ACI)
- Unexplained anemia of elderly (UAE)

It has been established that anemia in elderly should be evaluated promptly because even mild anemia is associated with adverse clinical outcomes and may often be the first visible pointer towards an occult or subclinical disease.

**Etiology**

The myriad of causes of anemia in elderly are mentioned in Table 1. More often than not, anemia in older individuals is the result of interplay of multiple factors. However, the underlying causes may be classified into the following three groups on the basis of pathophysiology.

| TABLE 1 | Etiology of anemia in elderly |
| --- | --- | --- |
| **Nutritional** | **Chronic inflammation** | **Unexplained/Undifferentiated** |
| Poor intake | Rheumatic disorders | An important category of anemia in older persons that remains unexplained after evaluation. Most of the unexplained anemia can be classified into one or the other defined causes after appropriate follow-up. Neoplasms and hematological malignancies are important among them |
| Malabsorption | Chronic infections such as tuberculosis, osteomyelitis |
| Iron deficiency anemia | Geriatric syndromes such as frailty |
| Deficiency of vitamins such as B12 or folate | Inflamming |
| Deficiency of trace elements such as copper | Neoplasms |

This table presents the common etiologies of anemia in elderly. However, it is not a comprehensive list of causes and does not discuss some of the important causes that should be considered in detailed evaluation including blood loss (often in stools), drugs, and endocrine causes.
Nutritional Deficiency Anemia

The leading cause of nutritional deficiency anemia is iron deficiency anemia (IDA). In the older individuals, iron deficiency is common due to occult blood loss from the gastrointestinal tract, which in turn may be chronic or acute as per the underlying etiology. It may be the result of nonsteroidal anti-inflammatory drugs (NSAIDs) use, a gastric ulcer, colon cancer, diverticulosis, or angiodysplasia. Killip et al. noted that gastrointestinal malignancy was present in 6% of patients with iron-deficiency anemia. Malnutrition is also responsible for IDA in elderly. Thus, iron replacement therapy should always be accompanied by a thorough gastrointestinal diagnostic workup in the elderly.

Folate deficiency may be present due to malnutrition as frequently seen in chronic alcoholics or can be secondary to medications like methotrexate or phenytoin. Pernicious anemia is another albeit a rare one. Malabsorption syndrome caused by Helicobacter pylori infections, anti-acidity drugs, or atrophic gastritis can also lead to cobalamin deficiency. Laboratory screening for Vitamin B12 and folate followed by prompt supplementation can correct both anemia and neurological manifestations associated with deficiency.

Anemia of Chronic Inflammation (ACI)

ACI, also known as anemia of chronic diseases, is the most prevalent anemia in older patients. It is a normocytic normochromic anemia found secondary to infections, which lead to activation of immune system, autoimmune disorders, various malignancies, chronic kidney disease, or to isolated age-associated inflammation. Underlying pathophysiological mechanisms in ACI are manifold and are overlapping (Fig. 1).

Franceschi et al. in year 2000 introduced the term “inflammaging,” a low-grade, chronic inflammatory state associated with ageing and having potential for tissue damage and degeneration. Inflammaging has been reported as a putative mechanism for some of the age-associated disorders like unintentional weight loss, frailty, anemia, and asthenia.

Unknown/Undifferentiated Anemia of Elderly (UAE)

Anemia, which cannot be classified into a specific etiology and is considered a diagnosis of exclusion, which is termed unknown anemia, undifferentiated anemia, or anemia of unknown etiology. This entity accounts for almost one third of all cases of anemia and is compounded by the fact that anemia in geriatric age group is often a result of multiple comorbidities. The various causes which underlie UAE are age-related renal insufficiency, decreased levels of testosterone, vitamin D insufficiency or deficiency, occult deficiency of iron, stem cell aging, and myelodysplasia (MDS). The diagnosis of UAE is largely a diagnosis of exclusion and is complicated as the classical cut-offs of laboratory parameters like mean corpuscular volume (MCV) and ferritin used in younger individuals do not perform well in elderly. However, hypoproliferative anemia, that is, one with a low-reticulocyte index coupled with inadequate erythropoietin level for the degree of anemia should raise the probability of UAE after excluding other common causes.

MDS is more common in older adults, and more than 75% of patients with MDS are older than 60 years of age at diagnosis. Patients are either asymptomatic or have fatigue, pallor, frequent infections, easy bruisability, and petechiae. More often the disease is detected during routine blood tests due to presence of one or more
peripheral blood cytopenias. An estimated 30% of MDS progress to acute leukemia.

The management of UAE is a continuous process often requiring regular interactions between the patient and the physician, since in the absence of an etiology there is no definite treatment.

**Diagnostic Evaluation**

The initial evaluation of AE should include laboratory parameters like hemoglobin, total and differential blood count, red blood cell indices, reticulocyte count, reticulocyte hemoglobin, serum iron studies, C-reactive protein, fibrinogen, vitamin B12, serum folate, lactate dehydrogenase, haptoglobin, liver enzymes, kidney function tests, erythropoietin level, and serum electrophoresis. This basic workup is helpful in identifying nutritional deficiency anemia, ACI, and CKD (Flowchart 1).

Due to higher possibility of underlying malignancies additional radiological investigations like ultrasound of the abdomen and kidney and gastrointestinal endoscopic procedures may be warranted as guided by clinical evaluation. The presence of anomalous blood counts or signs of clonal hematologic disease coupled with increased frequency of MDS in elderly may require performance of invasive procedures like bone marrow aspiration and biopsy. The invasiveness of such procedures makes it obligatory to weigh the benefits of establishing a diagnosis

---

**Flowchart 1: Initial evaluation and treatment of AE**

| SF: serum ferritin; TSAT: transferrin saturation; GFR: glomerular filtration rate; CKD: chronic kidney disease; ACI: anemia of chronic inflammation; UAE: unexplained anemia of elderly; MDS: myelodysplastic syndromes; HM: hematological malignancy; ESA: erythropoiesis stimulating agent |

---
followed by therapeutic intervention against its impact on life expectancy and functional improvement in the elderly. More specialized investigations like flow cytometry and cytogenetics may be required depending upon the findings of bone marrow aspiration and/or biopsy.

Treatment Options

Treatment plans need to be tailored according to the primary diagnosis and accompanying diseases. Anemia in the elderly is often complex and multifactorial necessitating more than one strategy for diagnosis and treatment. As no therapy is without the potential for adverse effects; therefore, it is important to introduce optimal age adjusted therapy, which can positively impact the quality of life of geriatric age group of patients.

Iron Therapy

Deficiency of iron either absolute as in IDA; or functional as in ACI is very commonly present as a factor in anemia in elderly and is complex due to multiple factors contributing to anemia in older individuals. Therefore, iron substitution is still the most recommended symptomatic treatment in IDA and ACI as well as in iron-deficient UAE.

Oral iron substitution is the cornerstone of treatment of anemia across all age groups. However, their use in geriatric patients may be relatively limited due to poor absorption of oral iron. The quest for an oral iron substitute with good efficacy and reliable absorption was over with the FDA approval of ferric maltol for treatment of IDA in adults in 2019. The safety and efficacy of ferric maltol was established by three placebo-controlled trials (AEGIS 1 and 2 (IBD), AEGIS 3 (nondialysis CKD), and led to its approval by FDA. Oral ferric maltol was found to be effective in raising hemoglobin without significant gastrointestinal side effects in patients with IBD. Thus, ferric maltol is an efficacious and safe alternative to intravenous iron for patients, especially geriatric patients who cannot tolerate salt-based oral iron therapies and wish to avoid parenteral treatment.

As much as oral iron substitution is the gold standard for patients with absolute iron deficiency, it is ineffective for functional iron deficiency as seen in anemia associated with chronic inflammation and inflammation-associated increase of hepcidin. Also in situations with ongoing blood loss, oral iron is insufficient. In such cases intravenous iron substitution is recommended. Complete or near-complete replacement of iron in a single setting using intravenous iron preparations is now the norm. Bygone are the fears of anaphylactic reactions with high molecular weight dextran preparations. The new and safer formulations like ferric carboxymaltose and iron isomaltoside are well tolerated though they too may rarely lead to severe hypophosphatemia with subsequent osteomalacia and bone fractures. These bone mineral metabolic disorders are associated with recurrent and high doses needed in patients with severe IDA. This can be occasionally of concern in geriatric patients.

Erythropoiesis Stimulating Agents (ESAs)

ESAs are so far registered for the treatment of anemia in CKD and in patients with low risk MDS as per recommendations of the American Society of Hematology/American Society of Clinical Oncology Clinical Practice guideline update. Data on efficacy of ESAs in other types of anemia are limited. The effect of epoietin alfa on hemoglobin and quality of life was studied in community dwelling older individuals aged 65 years or more. Erythropoietin was found to be safe and beneficial in chronic anemia. However, there is lack of clear evidence to support the use of ESA in undifferentiated anemia of elderly.

It is important to recognize the potential of ESAs to cause increased risks of death and thromboembolic events and these should be considered while prescribing these drugs.

Blood Transfusion

Blood transfusion is the mainstay of treatment of severe and symptomatic anemia across all age groups including that in elderly patients. No specific cut-off level of hemoglobin is available to guide blood transfusions in geriatric patients. However, these patients should be transfused after due consideration to comorbidities, especially cardiovascular disease. The number and frequency of transfusions should be tailored according to clinical condition. The level of hemoglobin to be achieved in the elderly with chronic anemia following transfusion is also not well defined. Overall, liberal transfusion practices are not advocated and patient outcomes with restrictive transfusions maintaining hemoglobin levels closer to 10 g/dL were similar to those targeting higher hemoglobin levels. In general, transfusions in elderly should be slower and on a unit to unit basis after close monitoring of clinical condition.
Therapeutics on the Horizon

New drugs are currently being developed mainly for anemia in chronic kidney disease and anemia in cancer patients, but may serve as future therapeutic agents for a well-defined group of elderly patients with anemia. The major groups of these investigational drugs are:

- Hepcidin inhibitors
- Hypoxia inducible factor (HIF)—prolyl hydroxylase inhibitors
- Activin type II receptor agonists

These drugs are awaiting approval for dearth of sufficient clinical data.

Conclusion

Anemia in elderly is a significant health issue. The etiology of anemia despite extensive workup may still be elusive in a substantial number of older persons. Several pathophysiological mechanisms, which decrease erythropoiesis are under study and a better understanding of these should provide critical entry points for intervention, which can improve survival and quality of life older people. Patient-specific management strategies for anemia in elderly must be employed after thorough evaluation for the underlying cause.

References

Abstract

The population of elderly (>60 years) is steadily rising in India, and health-care system is not yet ready to provide comprehensive geriatric health care. The more important issue is the elderly shall be living 17 added years after retirement age. The health and social issues in elderly people are challenging issues for the treating clinician. The presence of communicable disease, non-communicable diseases and their complications, degenerative diseases, and disabilities in elderly make them special group and requires multidisciplinary team to provide the comprehensive assessment and care. The role of preventive geriatrics like immunization, falls prevention should be emphasized before there is outbreak of health catastrophe in this segment of population.

The year 2021 will witness rise in number of medical colleges opting to start MD in Geriatric Medicine. As evident in any specialty, there is bound to be shortage in trained manpower. Hence, there is need to sensitize existing undergraduate and postgraduate students regarding geriatric medicine. The National Medical Council has already included geriatric medicine in undergraduate curriculum.

The majority of elderly are living in rural areas and seek health services from primary health centers. There is also need to sensitize medical officers of primary health centers regarding geriatric care. The National Program for Health Care of Elderly (NPHCE) is conducting training program for medical officers in few districts which needs to be across our country.

The clinician must restrain Ageism in all possible ways. We need to develop care system that meets the needs of elderly of India and not to copy western style. This chapter has reviewed the issues and possible solutions in providing comprehensive geriatric care.

Introduction

Ageing is progressive, generalized impairment of function resulting in loss of adaptive response to stress and in increasing risk of age-related diseases. The elderly constitutes the fastest growing age segment all over the world. Providing healthcare for the older people (>60 years) is a biggest challenge, the medical fraternity is facing today all over the world. The older people are blended with multiple diseases and are also associated with psychological, financial, and social issues. The approach toward healthcare in this set of population is holistic and multidisciplinary with a strong team coordination.

The majority of the older people reside in rural India. Hence, the healthcare services should concentrate more for older people residing in rural area. Now the scenario of family physician is slowly vanishing and there are specialist and super specialist to treat diseases of each organ in the body. This comes with riders for older people as this leads to multiple consultations and polypharmacy, which again need to be corrected by a geriatric physician or family physician.
The 542 medical colleges in India can become a role model for providing low cost, and quality healthcare for older people by initiating geriatric clinic in each college hospital.

The National Program of Health Care Elderly (NPHCE) has been launched in 100 district hospitals by Government of India from the year 2010-2011 with huge budgetary allocation.

Though the medical council of India had made it mandatory for all medical colleges to have geriatric clinic in their teaching hospital, unfortunately it has not been followed, citing shortage of doctors qualified in geriatric medicine.

The availability of palliative care, physiotherapy, and rehabilitation units should be ensured in all medical college hospitals, which will help provide comprehensive healthcare for older people of all walks of life.

**Aging Situation and Projections around the World and in India**

The elderly (>60 years) population in the world has been rising rapidly and the longevity is due to many factors, which include increasing health awareness and developments in medical field. In the year 1980, elderly population was 382 million, which by the year 2017 became 962 million and it is expected to be 2.1 billion by the year 2050. The 320 million people aged 60 years or over in upper-middle-income countries in 2015 represented a 64% increase over 2000 when older persons in those countries numbered 195 million. Between 2015 and 2030, upper middle-income countries are anticipated to continue to experience rapid growth in the number of older persons: the projected 545 million people aged 60 years or over in 2030 marks a 70% increase over the number in 2015 (Fig. 1).

The age division of Indian population (0–14) is 30.8%, (15–59) is 60.3%, (60+) is 8.6%. According to Population Census 2011, there are nearly 104 million elderly persons in India. It has increased from 5.5% in 1951 to 8.6% in 2011 and projected a rise up to 19% in 2050.

As regards rural and urban areas, 71% of elderly population resides in rural areas while 29% of elderly population resides in urban area. Among the challenges which India faces, UNFPA report says the feminization of ageing remained a key one.

At age 60, average remaining length of life was found to be about 18 years (16.7 for males and 18.9 for females) and that at age 70 was less than 12 years (10.9 for males and 12.4 for females). About 65% of the aged had to depend on others for their day-to-day maintenance. Less than 20% of elderly women and majority of elderly men were economically independent.

![Population aged 60-79 years and aged 80 years or over by income group, 2000, 2015, 2030 and 2050](image)

*Fig. 1: United Nations (2015). World Population Prospects. The 2015 Revision*
In rural areas 55% of the aged with sickness and 77% of those without sickness felt that they were in a good or fair condition of health. In urban areas the respective proportions were 63% and 78%.

The population of 80-plus people is on rise “with a predominance of widowed and highly dependent very old women” and so the special needs of such old women would need significant focus of policy and programs.³

**Comprehensive Approach**

The older people in India are diverse spread over 28 states. Their cultural background, economic status, lifestyle, behavior, nutrition, beliefs, family status, and disease pattern differ, hence ‘there is no one solution to all the problems’ for the older people in India.

The broad measures that can contribute toward comprehensive care to the older people are discussed here. Let us look at the health, financial, and social issues of the older people in India.

**Health**

The factors related to health of older people are:

- Multiple disabilities like blindness, locomotor disabilities, and deafness are most prevalent
- Multiple comorbidities, polypharmacy, and iatrogenic diseases
- Mental illness arising from senility and neurosis
- Complications of the chronic non-communicable disease
- Communicable diseases
- Absence of geriatric care facilities at hospitals in rural area.

**Financial**⁴

- Retirement and dependence of elderly on their children for basic necessity
- Sudden increase in out of pocket expenses on treatment.

**Social**⁴

The common social issues that are detrimental for the health status of the older people are:

- Elder Abuse and Neglect by the family members toward their old parents
- Disillusionment due to retirement

- Feeling of powerlessness, loneliness, uselessness and isolation, and widowhood

The geriatric care involves taking care of all the four aspects of the health, that is, physical, mental, social, and spiritual wellbeing. The challenge is during post discharge, as our social network and home services are still in nascent stage.

Apart from these four aspects, the care should continue to ensure quality of life, end of life care, and dignified death.

The most important issue in providing geriatric care is to prevent a disability. Because the older people fear disability more than death, it hampers the quality of life and makes them more dependent on family members. All these factors contribute of mental illness and social isolation. So, the main goal in providing the comprehensive care is to prevent a disability!

**Services Available in Geriatric Care in India**

The various medical colleges and district hospitals in India listed here are having geriatric care wards in their respective hospital. This has added special wards for senior citizens. The colleges are:

- Government Medical College, Chennai
- AIIMS, Delhi
- AIIMS, Cochin
- CMC, Vellore
- St John’s Health Sciences, Bengaluru
- KMC, Mangalore
- MGM, Navi Mumbai
- Yenepoya University, Mangalore
- JSS Medical College Mysuru
- Shri B M Patil Medical College Hospital, Vijayapura

Apart from inpatient services, the outpatient care for senior citizen is provided through Geriatric Clinics at:

- M S Ramaiah Medical College, Bengaluru
- Apollo Hospital, New Delhi
- Bangalore Medical College, Bengaluru
- BLDE DU, Shri B M Patil Medical College Hospital and RC, Vijayapura
- AIIMS, Bhubaneshwar
- JSS Medical College, Mysuru
- Deccan Medical College, Hyderabad
- KLEU Prabhakar Kore Hospital, Belagavi
- Bharati Vidyapeeth Medical College, Pune
GMCH, Miraj
BJGMC, Pune
Osmania Medical College, Hyderabad
SVS Medical College, Mahabubnagar, Telangana
St John’s Health Sciences, Bengaluru
Baptist Hospital, Bengaluru
Manipal Hospital, Bengaluru
Yenapoya Medical College, Mangalore.
S N Medical College, Bagalkot, Karnataka
JJ Hospital, Mumbai
MGM, Aurangabad
SMS Medical College, Jaipur
AFMC, Pune
Geriatric Psychiatry, NIMHANS, Bengaluru
Jubilee Mission Medical College and Research Institute, Thrissur
JLNMC Hospital, Srinagar
District Hospital, Lakhimpur Kheri, UP
Kasturba Medical College, Mangalore

Doctors who are trained in geriatric care and are not attached to medical college are also contributing in health care for senior citizens through private clinics. The important aspect of these services is that these clinics are in rural areas. To mention a few clinics:
- Dr. P. R. Patgiri Elderly Care Clinic, Guwahati
- Dr Pathak Geriatric Clinic, Gokak, Karnataka
- Anand Hospital, Vijayapura
- Masters Medical and Geriatric Centre, Thrissur, Kerala
- Gericare, Chennai
- Neo Geriatric Care Hospital, Haridwar

The academic contribution is also picking up slowly. There is creation of consultants in geriatric medicine through Diploma/MD Geriatrics courses and DM in Geriatric Psychiatry in following colleges. A total of 45 consultants and 400 diploma degree holders pass out through these colleges or University every year and are available for geriatric care.8
- Madras Medical College, Chennai
- AIIMS, Delhi
- Christian Medical College, Vellore
- Mahatma Gandhi Missions Medical College, Kamothe, Navi Mumbai
- Amrita School of Medicine, Ponekkara, Kochi
- Government Medical College, Aurangabad, Maharashtra
- Netaji Subash Chandra Bose Medical College, Jabalpur
- DM - Geriatric Psychiatry – NIMHANS, Bengaluru
- Institute of Medical Sciences, BHU, Varanasi
- All India Institute of Medical Sciences, Rishikesh, Uttarakhand
- Indira Gandhi National Open University

The Indira Gandhi National Open University (IGNOU) is providing postgraduate diploma courses in geriatric medicine all over India for MBBS and above degree holders. The duration of the course is 1 year. The exam conducted is at par of MD degree standards. It is recognized by Government of India. The IGNOU has been creating 400 qualified geriatricians every year in India for last 15 years. The need of the hour is to give due recognition for this huge cadre of geriatricians and utilize their services in primary health care centers across India with handsome salary.

Diseases Pattern among Elderly in India

The main presenting symptoms in one hundred older people presenting to geriatric clinic when analyzed by Ambali et al., it was found that the 30% of elderly presented with breathlessness as the main symptom, followed by pain abdomen (17%), fever, and loose stools (10%) each, chest pain and giddiness (4%) each. The other symptoms were seizures, hemiparesis, cough, joint pain, headache, and lack of sleep.

The common comorbid conditions either in single or multiple were noted in all the patients. The commonest comorbid was hypertension in 21%, followed by chronic obstructive pulmonary disease (17%), anemia (12%), coronary artery disease (10%), diabetes mellitus (9%), epilepsy (11%), frailty (1%), obesity (1%), benign prostatic hypertrophy, fractured spine, hypothyroidism (5%), and human immunodeficiency virus infection (1%).

In a study by Eram, the most common complaints in elderly were generalized bodyache (53%), diminished vision due to refractive error (60%), joint pain (30%), chronic cough (25%), Asthma and impaired hearing (21%), Gastrointestinal upset symptoms (11%), and urinary symptoms (10%).

The common comorbidities were hypertension in 22%, diabetes in 8%, dental problems in 27%, and cardiac illness in 5%.

The mental health issues like depression, loneliness, and attempted suicide are also on rise in Indian elderly and need to be addressed. The prevalence of depression in older people with chronic disease was highest among the
stroke patients (56.5%), coronary artery disease (47.8%), chronic obstructive airway disease (39.1%), diabetes mellitus (34.7%), and hypertension (26.1%).

The older people attempting suicide too is matter of concern. In a study by Ambali et al., organophosphorus compounds were commonly used by 70% of participants to end their life and factors like depression and abuse were common precipitating factors to attempt suicide. These need to be addressed are primary care level as well as tertiary care.

The Government of India has passed stringent law to curtail elder abuse. The act “Maintenance and Welfare of Parents and Senior Citizens Act, 2007” has been passed and is been implemented in few districts of India.

Approach

From healthcare point of view this group can be divided in three subgroups. Young old (60–74 years), who are independent and gainfully employed. Their Medical and Health needs are like young people and they may be looked after by physicians/geriatricians. Old old (75–84 years) need more of assistance and nursing care rather than medical help. Very old (>85 years) and above are mostly dependent requiring domiciliary Care or Hospital Care.

All the above three categories may be managed by a good general practitioner with an extra briefing on ageing, the clinical differences between adults and elderly, Geriatric syndromes, geriopharmacy and drug interaction, physiotherapy, diet, preventive aspects, and social issues like elder abuse needs to be carried out. Figure 2 describes that the briefing can be by short courses, telemedicine, bulletins and Mass Mailing Service in regional languages. Help centers established in five areas of the country managed by Central Government/State Government/NGOs/Pharma industry.

For the Population who is Approaching 60 Years

Regarding second category, that is, the people who are approaching old age; one can attempt to herald the process of ageing and prevent the diseases by:
- Lifestyle changes, which include a healthy lifestyle comprising of nutritious food, restrictions of calories to maintain proper body weight, regular exercises, adequate sleep, avoidance of alcohol, tobacco and other narcotics, and positive thinking.
- Appropriate management of comorbidities like diabetes, hypertension, etc.
- Prevention of diseases and risk factors by medicines (lipid lowering, antiplatelet drugs, etc.) and vaccinations.
- For those who are getting aged, the planning may be done by adding geriatrics in the medical curriculum as shown in Figure 3. We may sensitize budding doctors about special aspects of geriatrics in their teaching and training.

General Measures

- Ageing will continue and number of elderly populations will rise. Number of comorbidities will also rise, due to changes in lifestyle. Accidents and falls will also increase. Due to change in social setups and migrations, the family support will dip and the cost of living as well as treatment will continue to rise.
- We have to have improvements in nutrition by making diet a balanced one, improving cooking, minimizing the effects of insecticides and pesticides, check the adulteration and improve the process of storage. Use of local foods should be encouraged.
- Housing for elderly need provisions for sunlight, adequate ventilation, water, sewage, and non-skid flooring.
- The transport system should be elderly friendly.
People should be educated about the misuse of over-the-counter drugs like analgesics, painkillers, and antibiotics. The polypharmacy should be minimized/avoided in elderly as it causes increased incidents of drug interactions.

The use of vaccines like Hepatitis B, Influenza, Pneumococcal, T-dap, and Zoster, which are advised in elderly, should be encouraged.

Reach the unreached—healthcare services should reach the older people in villages with special attention to those who are bed-ridden, and differently abled.

Yearly they should undergo consultation with ENT, ophthalmology, and dental surgeon.

National Program for Healthcare of Elderly

The NPHCE provides free, specialized healthcare facilities exclusively for the elderly people through the state health delivery system. It also provides training services in geriatric care to the medical officer of primary health centers.

The main objectives of NPHCE\(^4\) are to provide comprehensive healthcare to the elderly by preventive, curative, and rehabilitative services and build capacity of the medical and paramedical professionals as well as the care-takers within the family for providing healthcare to the elderly.

Role of Caregiver and Training

The caregivers in our country are either a family member or relative or member of society without formal training. It is now recognized as very important service.

There is need to train the nurses in geriatric care. In fact, the trained nurses in geriatric care are in huge demand in urban areas.

The family members can be trained to a specific disease pattern like care of person with dementia, stroke, or person who is bed ridden. The larger aspects are rendered by nurse. The main goal is to assist in activities of daily living.

The caregiver should uphold the dignity of the elderly receiving the care.

Conclusion

The western countries became rich first and then their population grayed, while in India, its population is graying fast while we are yet to be a rich country.

We are still not prepared to face the so-called tsunami of older population and related problems. We need to provide services to the elderly who are above 80 years, bed ridden, and living with disabilities, dementia, and Parkinson’s disease.

The Government of India has priority for health issues related to infants, pregnant mothers, immunization in children, communicable diseases like tuberculosis to mention a few. The projects for older people are in process of implementation through regional research center across India.

The various programs for the benefit of older people have been launched a decade ago, but yet to reach the rural elderly population.

The new curriculum has included geriatric medicine in MBBS course. The postgraduate students in clinical subjects must undergo short course training in geriatric care.

The overall care should be promotive, protective, and preventive so that, active ageing is achieved.

The caregiver plays a vital role in providing care. A holistic approach is need of the hour in providing comprehensive care for the elderly in India.

References

7. Available from: HYPERLINK “http://www.ignou.ac.in/”\t*_blank* http://www.ignou.ac.in
Severe Acute Respiratory Infections in Elderly

YS Raju, Y Rahul, Y Sairam

Abstract
Estimates suggest that elderly (above 60 years of age) globally will increase from 12.5% in 2015 to 16.5% in 2030, suggesting need for greater emphasis on health care for elderly population globally. Lower respiratory tract infections (LRTIs) are the most common causes of death among infectious diseases in adults and are among the top ten causes of death in the elderly (aged more than 60 years). Severe acute respiratory infections (SARIs) by definition include a respiratory tract infection with history of fever more than or equal to 38°C and cough; with its onset within 10 days and requiring hospitalization. As the global burden of elderly population is estimated to increase, and older age is an important risk factor associated with increased mortality, there is a need for greater emphasis on health care for elderly population globally. In patients with influenza associated SARI, cough was the most common symptom and the low pulse oximetry (less than 90% on room air) was the most common sign. In elderly, getting admitted with COVID-19 most common symptom was fever followed by cough, fatigue, shortness of breath, and headache. In elderly patients presenting with SARI, empirical antimicrobial treatment should initiated awaiting culture and sensitivity reports; if there is respiratory distress, supplemental oxygen therapy should be initiated immediately. Recognition of severe hypoxemic respiratory failure even with supplementary oxygen mandates institution of ventilatory support. In case of non-invasive ventilation (NIV) failure or in patients with contraindications for NIV, endotracheal intubation and mechanical ventilation should be initiated. In the current situation of COVID-19 pandemic, with no available specific antimicrobial drugs for the treatment, universal hand hygiene precautions, avoiding touching mouth, eyes, and nose, maintaining social distancing likewise preventive measures are the need of the hour.

Introduction
Even after a century following Spanish flu pandemic, with the recent pandemic of coronavirus disease (COVID-19), respiratory tract infections continued to be one of the leading causes of morbidity and mortality among all diseases globally. Lower respiratory tract infections are the most common causes of death among infectious diseases accounting for 3 million deaths in 2016. Severe acute respiratory infections (SARIs) by definition include a respiratory tract infection with history of fever more than or equal to 38°C and cough; with its onset within 10 days and requiring hospitalization. Despite recent advances in the development of antiviral drugs and vaccines, seasonal epidemics of influenza contribute to significantly to workload for practitioners, emergency hospital admissions, and deaths as with the case of recent COVID-19 pandemic. Elderly (age ≥60 years) population compared to the young, suffer with several chronic illnesses, and comorbid conditions. In addition to that immune decline with aging makes them more vulnerable to infectious diseases.

Epidemiology
The pace of global population is accelerating and projections indicate that people above 60 years globally will increase from 12.5% in 2015 to 16.5% in 2030 compared to 2.3% increase from 2000 to 2015. By 2030, people above
60 years are expected to account for 25% in Europe and North America, 20% in Oceania, 17% in Asia, Latin America, and the Caribbean, and 6% in Africa.6 These projections indicate need for greater emphasis on health care for elderly population globally. Lower respiratory tract infections are among the top ten causes of death in both men and women aged more than 60 years.7 In a study conducted in United States over 12 years from 1997 to 2009, an annual average of 19,100 deaths were attributed to influenza and 11,300 deaths to respiratory syncytial virus (RSV) taking in to consideration of respiratory broad definition of any respiratory illness with symptoms of cough, breathlessness, and fever, with mortality rates of 6.61 (standard deviation: 2.66) and 3.91 (standard deviation: 0.65) per 1,00,000 population annually for influenza and RSV, respectively. When cardiorespiratory outcome for influenza death was considered, 9%, 14%, and 73% were found in the age groups of 50–64, 65–74, and 75 or more, respectively, indicating increased percentage of deaths associated with respiratory illness as the age advances.8 India, having the history of highest mortality with nearly 18 million deaths during the second wave of Spanish flu pandemic in 1918, has higher incidence of under five mortality compared to elderly being affected as in high-income countries.6,7 In the 2009 H1N1 pandemic, in a study from 2009 to 2017, revealed most commonly affected age group was 46–60 years accounting for 29.7% of total cases.8 With the recent COVID-19 pandemic, its strain variability, mutation rate, genetic selection during its interaction with the host population, and transmission across the nations creates a challenging scenario in both diagnosis and management.9

**Etiology**

Etiology of SARI varies with seasonality, region being affected and active infection with virulent organism associated. In a study conducted in Georgia from 2015 to 2017, Influenza was the most common etiology followed by RSV, Coronavirus, and Rhinovirus for SARI in people more than or equal to 65 years.10 In a study from Lisbon which was conducted on respiratory infections in elderly in 2013–2014, Rhinovirus was the most common etiology followed by influenza and human bocavirus.11 Viral and bacterial agents can occur as concurrent etiology with viral infections such as RSV, influenza, and rhinovirus along with bacterial causes like Streptococcus pneumoniae, Haemophilus influenzae, and Klebsiella species. RSV was the most common viral etiology and S. pneumoniae was the common bacterial etiology in those with concurrent etiology (Table 1).12 In India apart from influenza virus and RSV, human coronavirus was found to be an important cause of SARI in southwestern part, in a study conducted in 2011–2012.13

**Risk Factors**

Risk factors associated with increased mortality were age more than or equal to 65 years, comorbid conditions, virulence of etiological agent, being bedridden, admission to critical care unit, low PaO2/FiO2 ratio (<250), low platelet count (<1,50,000/µL), and increased creatinine concentration (>1 mg/dL). Seasonal vaccination has been observed to significantly reduce need for hospitalization in vulnerable population; and lack of seasonal vaccination appear to be one of the important factors in increased morbidity and mortality patients with SARI.14 In elderly affected with COVID-19, older age and decreased lymphocyte count at admission were found to be the most important factors associated with mortality along with others like presence of hypertension and previous respiratory problems.15

*TABLE 1* Etiology of SARI in elderly

<table>
<thead>
<tr>
<th>Viral etiology</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza virus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory syncytial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhinovirus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bocavirus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human metapneumovirus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coronavirus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parainfluenza virus</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bacterial etiology</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Streptococcus pneumoniae</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haemophilus influenzae</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>type b</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Klebsiella species</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Escherichia coli</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1420  SECTION 17  Geriatric Medicine
Clinical Features
In patients with influenza associated SARI, cough was the most common symptom and the low pulse oximetry (<90% on room air) was the most common sign. In elderly, getting admitted with COVID-19 most common symptom was fever followed by cough, fatigue, shortness of breath, and headache. Anorexia, weight loss, asthenia, and headache were observed in older age group. Running nose and intercostals recession were less common in elderly population. Along with low pulse oximetry, other signs include tachypnea, tachycardia, and those of lobar and bronchopneumonia. Median incubation period was 6.7 days.

Management
Laboratory Investigations
In adults with SARI, laboratory investigations revealed lymphopenia (<1000/µL), low platelet count (<1,50,000), hypoalbuminemia (<3.5 g/L), hyponatremia (<135 mEq/L), increased plasma lactate dehydrogenase (>250 UI/L), increased blood urea nitrogen concentration (>20 mg/L), increased serum creatinine concentration (>1 mg/dL), and increased serum C-reactive protein (>100 mg/L, 10 times the upper normal value) were evident. In elderly with COVID-19, lymphocyte count, amino-terminal pro-brain natriuretic peptide, aspartate transaminase, alanine transaminase, cardiac troponin-I, C-reactive protein, D-dimer, and serum creatinine levels were significantly different in survivors compared to non-survivors.

Treatment
Early Supportive Therapy and Monitoring
For the patients presenting with SARI and respiratory distress, supplemental oxygen therapy should be initiated immediately at 5 L/min to maintain percentage saturation of oxygen (SpO₂) ≥ 90%. Conservative fluid management is indicated when there is no evidence of shock with caution to avoid fluid overload as aggressive fluid management may worsen oxygenation. Empirical antimicrobial treatment should be initiated for SARI patients with shock within 1 hour of presentation. Likely choice of empiric antimicrobial treatment is based on the clinical diagnosis, local epidemiology, and susceptibility data. In case of suspected influenza infection neuraminidase inhibitors are to be given based on the travel history or exposure to persons with active infection. Invasive pneumococcal disease following influenza infection is much more common in elderly. Prophylactic broad spectrum antibacterial agents like third generation cephalosporins are considered in suspected cases of influenza to treat secondary bacterial infections, later can be changed according to culture and sensitivity reports.

Comorbid conditions must be appropriately managed along with tailoring the management plan of critical illness for better care of the patient. Signs of clinical deterioration such as rapidly progressive respiratory failure and sepsis must be carefully monitored and timely active interventional supportive therapies are to be considered, which forms the cornerstone of management.

Management of Hypoxemic Respiratory Failure and ARDS
Recognition of severe hypoxemic respiratory failure even with supplementary oxygen is essential in patients with SARI. Hypoxemic respiratory failure may lead to acute respiratory distress syndrome (ARDS) either from intrapulmonary ventilation-perfusion mismatch or shunt and usually requires mechanical ventilation.

Patients receiving a trial of noninvasive ventilation (NIV) should be carefully monitored and tracheal intubation is indicated in case the patient does not improve after a short trial or acutely deteriorates. Patients with altered mental status, hemodynamic instability, and multi-organ failure should not receive NIV.

In case of NIV failure or in patients with contra-indications for NIV, endotracheal intubation and mechanical ventilation should be initiated with airborne precautions. In patients with sepsis induced respiratory failure who do not meet ARDS criteria, implementation of mechanical ventilation with lower tidal volumes (4-8 mL/kg predicted body weight) and lower inspiratory pressures (plateau pressure <30 cm H₂O) was recommended. In patients with moderate or severe ARDS, higher positive end expiratory pressure (PEEP) is suggested. PEEP has to be titrated considering the benefits like reducing atelectrauma and improving alveolar recruitment and the associated risks, such as end-inspiratory overdistension leading to lung injury and higher pulmonary vascular resistance. Ventilation in prone position for a period of
more than 12 hours/day is recommended for patients in severe ARDS. Use of conservative fluid management strategy for patients with ARDS is to be considered without tissue hypoperfusion.17

**Prevention of Complications**

As the patients with SARI are getting treated in intensive care units (ICUs), with requirement of mechanical ventilation in some of them, it is of paramount important to prevent the predictable complications of prolonged ICU care.

**Reduction of days of Mechanical Ventilator Support**

Use of weaning protocols for readiness of spontaneous breathing trials daily have overall favorable outcome in patients on mechanical ventilator support. Weaning off from continuous to intermittent sedation and minimize the dose of sedation gradually till the point when sedation no longer required is mandatory for early weaning off from ventilator support in patients who have recovery from primary illness.

**Reduction of Incidence of Ventilator-associated Pneumonia**

Maintaining semi-recumbent position (head of bed elevation 30–45°), using closed suctioning system, periodically draining the condensate in tubing, changing ventilator circuit if it is soiled and changing heat moisture exchanger if it is soiled or once in 5–7 days aids in reducing the incidence of ventilator associated pneumonia.

**Reduction of Incidence of Venous Thromboembolism**

Pharmacological prophylaxis with low molecular weight heparin in patients without contraindications prevents deep venous thrombosis. Additional factors like intermittent pneumatic compression devices, compressive stockings, and early mobilization of patients prevent deep venous thrombosis.

**Reduction of Incidence of Catheter-associated Blood Stream Infections**

Using a checklist while inserting a catheter with sterile precautions, regular care of the catheter and daily assessing for the removal of the catheter if no longer needed helps in preventing catheter associated blood stream infections. Following a bundle care serves as a daily reminder for the care of the patients with central venous catheters.

**Reduction of Incidence of Stress Ulcers, Gastrointestinal Bleeding, and Pressure Ulcers**

Administering proton pump inhibitors or histamine-2 receptor blockers for patients at risk of gastrointestinal bleeding like mechanical ventilation, coagulopathy, renal replacement therapy, liver disease, multiple comorbidities prevents stress ulcers and gastrointestinal bleeding. In addition early initiation of enteral feeding avoids stress ulcers. Frequent change of position of the patient prevents pressure ulcers and their related complications.

**Reduction of Incidence of ICU-related Weakness and Psychosis**

Active limb physiotherapy and early mobilization of the patient prevent muscle weakness and atrophy in elderly patients. Allowing patients to interact with the family members while following sterile precautions helps in mood elevation and avoids ICU-related psychological problems.17

**Prophylaxis**

In the current situation of COVID-19 pandemic, with no available specific antimicrobial drugs for the treatment, universal hand hygiene precautions, avoiding touching mouth, eyes, and nose, maintaining safe distancing likewise preventive measures are the need of the hour.

In a study from United States over a period of six influenza seasons from 2010 to 2016, vaccination has prevented between 1.6 and 6.7 million illnesses, 39,000–87,000 hospitalizations and 3,000–10,000 deaths related to influenza each season, emphasizing the role of vaccination in influenza related illnesses.19

Concept of a universal influenza vaccine with features of being effective against asymptomatic influenza virus infection, protective against group I and II influenza A viruses, having durable protection that lasts at least 1 year and through multiple seasons and being suitable for all age groups is yet a farfetched reality.20
Conclusion

A century later following Spanish flu, yet with another pandemic of respiratory illness in the form of COVID-19 still poses a greater challenge to humanity affecting both developed and underdeveloped nations alike. With expected increase in elderly population, in developing countries like India where tertiary health care and ICU care facilities are not widely available, preventive measures play a major role in the management of such pandemics. Even with effective preventive measures, the challenge to face such pandemics likely poses the question “Are we yet ready?”

References