Comprehensive Geriatric Assessment

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2.1 Background

2.1.1 Overview

Comprehensive geriatric assessment is defined as a multidisciplinary diagnostic and treatment process that identifies medical, psychosocial, and functional limitations of a frail older person in order to develop a coordinated management plan [1]. The geriatric assessment differs from a standard medical evaluation by emphasizing functional capacity, quality of life, and a holistic approach to the older adult. It requires evaluation of multiple issues, including physical, cognitive, and other psychiatric components, as well as social, financial, environmental, and other components that influence an older adult's health [2]. In many settings, the comprehensive geriatric assessment process relies on a core team consisting of a clinician, nurse, and social worker and may also draw upon an extended team of physical and occupational therapists, nutritionists, pharmacists, dentists, and other clinicians. Core components of comprehensive geriatric assessment that should be evaluated during the assessment process are as follows: cognition, mood, functional ability, physical health, medication review, and social supports [1, 2].

2.1.2 Cognition and Mood

Early diagnosis of neurocognitive, depressive, anxiety, and other psychiatric disorders can be beneficial in facilitating timely access to services and medications. In addition, it can also help in the management of other physical and functional issues. Assessment of cognition and mood falls within the mental status examination, and psychiatrists will already be familiar with the common screening tests, diagnoses, and management.

2.1.3 Functional Ability

Functional status refers to a person's ability to perform tasks required for daily living and is a key component of the geriatric assessment. This information is important for planning, for monitoring response to therapy, and for determining prognosis. Activities of daily living (ADL) are tasks of self-care and include dressing, bathing, toileting, transferring, continence, and feeding. Instrumental activities of daily living (IADL) are tasks that are required to live independently (e.g., housework, meal preparation, medication administration, managing finances, and using a telephone and other communications devices). Deficits in the ability to safely complete tasks may signal a worsening disease process or the need for additional assistance.

> **Teaching Point**
> The level of functional impairment may be determined by self-report, proxy report, and/or direct observation. Two commonly used instruments to assess functional ability include the Katz ADL scale (Table 2.1) and the Lawton IADL scale (Table 2.2) [3, 4].

2.1.4 Physical Health

The geriatric assessment incorporates all aspects of a conventional medical history as well as topics specific to older adults, including vision, hearing, urinary/fecal continence, nutrition, fall prevention, and polypharmacy.

Vision and Hearing

Common causes of visual impairment in older adults include presbyopia, cataracts, age-related macular degeneration, glaucoma, and diabetic retinopathy [5]. Presbycusis is a common chronic condition in older adults affecting one-

Table 2.1 Basic activities of daily living [3]

Function	Independent, no difficulty	Independent but having some difficulty	Independent, having lots of difficulty	Can't do	Getting some help	Getting lots of help	Who helps?	Cause(s) for difficulty or dependence
Bathing								
Dressing								
Toileting								
Transfer								
Feeding								

Instructions: Place a check in each column that characterizes the patient. If the patient cannot perform or is having difficulty with a self-care task, ask the patient why he or she is having difficulty and who helps with the task. Patients who cannot perform or have lots of difficulty with a task, and who do not have someone who regularly assists them with it, have an unmet care need and may need referral to the social worker

▣ **Table 2.2** The Lawton Instrumental Activities of Daily Living Scale [4]	
	Score
A. *Ability to use telephone*	
1. Operates telephone on own initiative; looks up and dials numbers	1
2. Dials a few well-known numbers	1
3. Answers telephone but does not dial	1
4. Does not use telephone et all	0
B. *Shopping*	
1. Takes care of all shopping needs independently	1
2. Shops independently for small purchases	0
3. Needs to be accompanied on any shopping trip	0
4. Completely unable to shop	0
C. *Food preparation*	
1. Plans, prepares, and serves adequate meals independently	1
2. Prepares adequate meals if supplied with ingredients	0
3. Heats and serves prepared meals or prepares meals but does not maintain adequate diet	0
4. Needs to have meals prepared and served	0
D. *Housekeeping*	
1. Maintains house alone or with occasional assistance	1
2. Performs light daily tasks such as dishwashing, bed making	1
3. Performs light daily tasks but cannot maintain acceptable level of cleanliness	1
4. Needs help with all home maintenance tasks	1
5. Does not participate in housekeeping tasks	0
E. *Laundry*	
1. Does personal laundry completely	1
2. Launders small items, rinses stockings, etc.	1
3. All laundry must be done by others	0
F. *Modes of transportation*	
1. Travels independently on public transportation or drives own car	1
2. Arranges own travel via taxi, but does not otherwise use public transportation	1
3. Travels on public transportation when assisted or accompanied by another	1
4. Travel limited to taxi or automobile with assistance of another	0
5. Does not travel at all	0

▣ **Table 2.2** (continued)	
	Score
G. *Responsibility for medications*	
1. Is responsible for taking medication in correct dosages at correct time	1
2. Takes responsibility if medication is prepared in advance in separate dosages	0
3. Is not capable of dispensing own medication	0
H. *Ability to handle finances*	
1. Manages financial matters independently (budgets, writes checks, pays rent and bills, goes to bank), collects, and keeps track of income	1
2. Manages day-to-day purchases but needs help with banking and major purchase	1
3. Incapable of handling money	0

Instructions: Circle the scoring point for the statement that most closely corresponds to the patient's current functional ability for each task

third of individuals over age 65 and is characterized by loss of acuity to high-frequency sounds that can affect comprehension of sibilant ("hissing") sounds like "sh" and "ch." Poor vision and hearing can adversely affect older adults' independence, can lead to isolation and loss of pleasurable stimulation, and have been associated with depressive symptoms [6]. The whispered voice test is an easy test to perform at the bedside to ascertain how well the patient can hear the examiner, with sensitivities and specificities ranging from 70 to 100% [7]. To perform the whispered voice test, the clinician should stand at arm's length behind the patient and whisper a combination of numbers and letters that the patient is asked to repeat. With high-frequency-loss presbycusis, lower-pitched, concussive tones like "k" and "d" may be heard better than high-pitched, sibilant ones. Thus, asking the patient to repeat a sibilant-heavy phrase like, "*Sh*e was *ch*astised at *ch*urch for *ch*anting and *sh*outing and was *hu*shed," may help uncover high-frequency hearing loss. It is not uncommon for family members to express concern over a patient's memory when, in fact, the patient could not hear properly. Older patients who report complex visual hallucinations without other signs or symptoms of psychosis or major neurocognitive disorder should be screened for visual impairment. Complex visual hallucinations in the presence of substantial visual impairment characterize the Charles Bonnet syndrome. There has been debate whether the Charles Bonnet syndrome represents a *forme fruste* of a major neurocognitive disorder, but the research to date has been inconclusive because of the lack of adequately powered prospective studies [8].

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Urinary Incontinence

Urinary incontinence affects approximately 15–30% of community-dwelling older adults, and its prevalence rises to 50–75% of persons in institutions. This symptom often goes unreported due to a reluctance to discuss the condition. Urinary incontinence can have significant medical and psychosocial consequences, including urinary tract infections, decubitus ulcers, and restriction of activities.

> **Teaching Point**
> In many cases, urinary incontinence may be a key feature in deciding upon nursing home placement.

Urinary incontinence, frequently but inconsistently, has been associated with depressive disorders in older women, depending upon the incontinence screening instrument used and the population studied [9]. Given its potential psychosocial impact, urinary incontinence can be an important, potentially treatable contributor to depressive symptoms. Screening for its presence should be performed when a depressive disorder has been diagnosed in an older adult, especially an older women. Because of the sensitivity of the topic, discrete introductory questions are advisable, followed by more directed questions utilizing a brief, validated screening instrument like the Incontinence Severity Index [10] (see ◘ Table 2.3). An assessment of urinary incontinence should include the evaluation of fluid intake, cognitive function, mobility, and medications [11, 12]. ◘ Figure 2.1 describes the four principal types of urinary incontinence, common causes, and their relationship to common medications, including psychotropics.

Nutrition

Screening for nutritional status is an important part of the comprehensive geriatric assessment, as unintentional weight loss and inadequate micronutrient intake are common in older adults. In one study, the prevalence of malnutrition in hospitalized older adults was over 38% [13]. There are numerous risk factors for undernutrition and malnutrition in older adults, and a high body mass index due to obesity can mask underlying protein-calorie malnutrition, micronutrient deficiency, and low muscle mass (sarcopenia). Poor dentition, dysphagia, chronic inflammation, acute and chronic illness, psychiatric (including neurocognitive) disorders, functional dependence, and medications can adversely affect appetite, taste, and ability to ingest adequate kilocalories to prevent weight loss or an imbalance of essential micronutrients. Older adults meeting criteria for frailty (see ► Chap. 1) commonly have multiple micronutrient deficiencies [14].

Folate deficiency is common in older adults due to reduced dietary intake or age-associated reduction in gastric acid production, leading to intestinal malabsorption; this problem can

◘ **Table 2.3**   Screening for urinary incontinence
Screening questions:
Do you ever not make it to the toilet in time?
Do you wear a pad or other garment because you are afraid of leaking urine?
Evaluation of severity [10]
A. How often do you experience urinary leakage?
— Less than once a month
— One or several times a month
— One or several times a week
— Every day and/or night
B. How much urine do you lose each time?
— Drops or little
— More
Severity index: Multiply the results of A and B
1–2: slight
3–5: moderate
6–8: severe

be caused or worsened by inhibitors of gastric acid production (e.g., proton-pump inhibitors). Anticonvulsants also can contribute to folate deficiency [15]. Studies have found an association between low serum folate and the development of minor and major neurocognitive and depressive disorders, although folic acid supplements have not been shown to reverse or stop cognitive decline [15].

Major neurocognitive disorders constitute an especially important risk factor for malnutrition due to associated neurological changes that affect olfaction, taste, swallowing, and the cognitive skills required to obtain and ingest adequate amounts of nutrient energy sources (see ◘ Fig. 2.2) [16]. Patients who have reduced calorie intake also likely have inadequate micronutrient intake and should receive an adult multivitamin with trace minerals or a commercial nutritional supplement, which usually contains the recommended amount of vitamins and trace minerals.

> **Teaching Point**
> Psychiatrists should be aware that some systemic medical conditions, such as advanced chronic kidney disease, heart failure, and liver failure, can influence the safe amount of some minerals and macronutrients. Thus, the recommendation for a nutritional supplement should be done in conjunction with the patient's primary care physician.
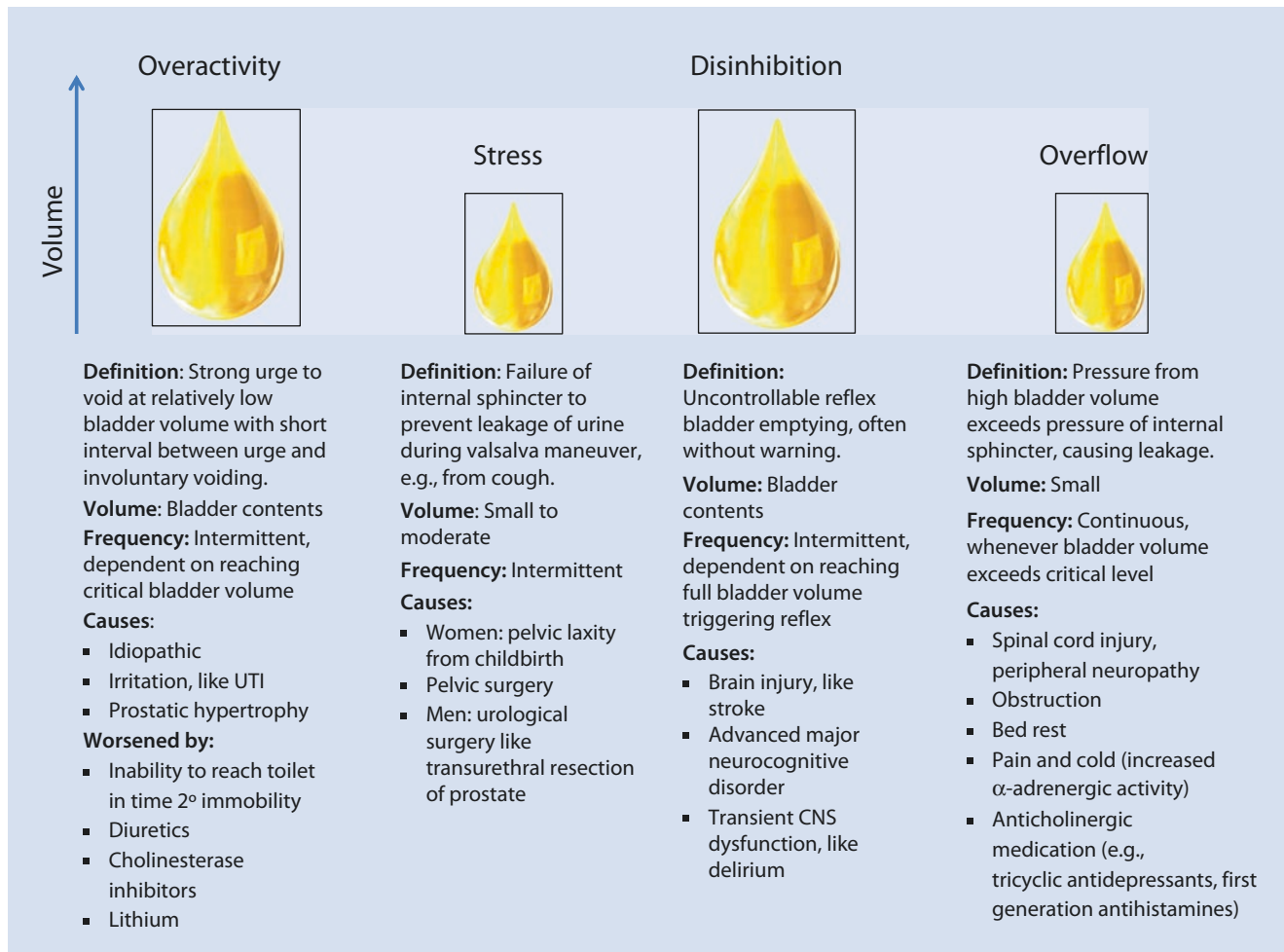
Overactivity

Stress

Disinhibition

Overflow

Volume

Definition: Strong urge to void at relatively low bladder volume with short interval between urge and involuntary voiding.

Volume: Bladder contents

Frequency: Intermittent, dependent on reaching critical bladder volume

Causes:
- Idiopathic
- Irritation, like UTI
- Prostatic hypertrophy

Worsened by:
- Inability to reach toilet in time 2° immobility
- Diuretics
- Cholinesterase inhibitors
- Lithium

Definition: Failure of internal sphincter to prevent leakage of urine during valsalva maneuver, e.g., from cough.

Volume: Small to moderate

Frequency: Intermittent

Causes:
- Women: pelvic laxity from childbirth
- Pelvic surgery
- Men: urological surgery like transurethral resection of prostate

Definition: Uncontrollable reflex bladder emptying, often without warning.

Volume: Bladder contents

Frequency: Intermittent, dependent on reaching full bladder volume triggering reflex

Causes:
- Brain injury, like stroke
- Advanced major neurocognitive disorder
- Transient CNS dysfunction, like delirium

Definition: Pressure from high bladder volume exceeds pressure of internal sphincter, causing leakage.

Volume: Small

Frequency: Continuous, whenever bladder volume exceeds critical level

Causes:
- Spinal cord injury, peripheral neuropathy
- Obstruction
- Bed rest
- Pain and cold (increased α-adrenergic activity)
- Anticholinergic medication (e.g., tricyclic antidepressants, first generation antihistamines)

▣ **Fig. 2.1** The four principal types of urinary incontinence

Because inadequate nutrition is associated both with neuropsychiatric disorders and their treatment in older patients, clinicians should screen for risk factors for malnutrition. This can be done efficiently using a brief, validated screening tool like the five-item Mini Nutritional Assessment (Short Form) [17]. Although copyrighted, it is available for free download and clinical use (▶ http://www.mna-elderly.com/mna_forms.html).

Falls

Approximately one-third of community-dwelling older adults fall at least once per year, with many falling multiple times. Falls are a leading cause of hospitalization and injury-related death in older adults. The US Centers for Medicare and Medicaid Services considers falls a quality indicator for hospital operations and does not reimburse hospitals for patient injuries resulting from nosocomial falls. Falls are associated with delirium and may be the result of lower extremity weakness, cerebellar or vestibular dysfunction, peripheral or autonomic neuropathy, neuro-

degenerative disorders (e.g., Parkinson disease), visual impairment, orthostatic hypotension, prior stroke, cardiac arrhythmias, and/or the effects of medications. All classes of psychotropic medications have been associated with falls, with a combined 78% increased risk compared to patients not taking a psychotropic drug [18]. In many cases, there is more than one contributing factor. Patients who fall require an evaluation to assess for injury as well as the etiology.

Although amnesia for the fall often limits the accuracy of the history [19], as much information as possible should be obtained from the patient and any witnesses in order to ascertain preceding symptoms (e.g., lightheadedness) and the exact circumstances surrounding the fall. Vital signs should be obtained immediately. Loss of consciousness, even if transient and not accompanied by injury, must be evaluated. Once the patient has been ruled out for injuries (see below), lying, seated, and standing blood pressures should be obtained to evaluate for orthostatic hypotension.
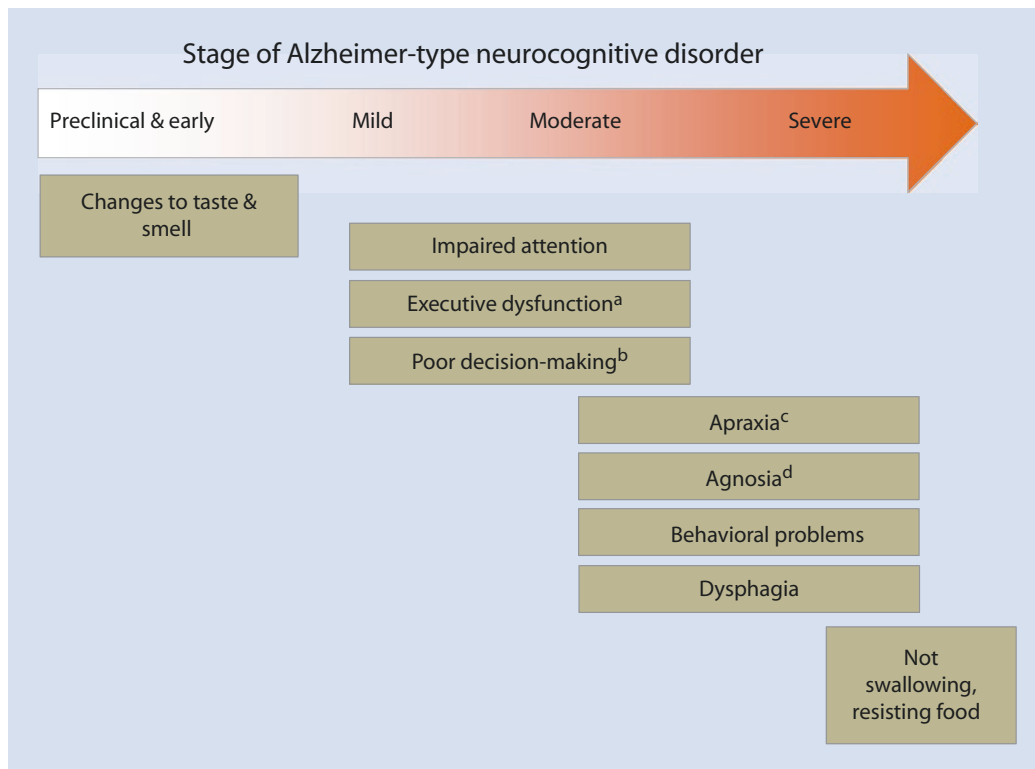
Stage of Alzheimer-type neurocognitive disorder

| Preclinical & early | Mild | Moderate | Severe |

Changes to taste & smell

Impaired attention

Executive dysfunction[a]

Poor decision-making[b]

Apraxia[c]

Agnosia[d]

Behavioral problems

Dysphagia

Not swallowing, resisting food

Fig. 2.2 Factors involved in the development of nutritional deficiencies in major neurocognitive disorders. [a]Examples: shopping, preparing food; [b]Examples: unhealthy food choices, forgetting to eat; [c]Example: loss of ability to manipulate eating utensils; [d]Not recognizing food as food [16]

An electrocardiogram with rhythm strip should be obtained; if an explanatory arrhythmia for loss of consciousness is not revealed, the patient will require telemetry and thus admission to a medical ward. The most common causes of syncope in geriatric patients include orthostatic hypotension, neurally mediated syncope ("vasovagal syndrome"), carotid sinus syndrome, and arrhythmias [19].

A careful neurological examination is mandatory for all fallers, looking for new, abnormal neurological signs and symptoms that may suggest stroke or intracranial bleed. As part of the motor exam, the patient also should be assessed for musculoskeletal injuries, and the ability to bear weight and walk without new or worsened pain should be assessed.

Because cervical spinal injury can occur without evidence of spinal cord injury, in an unwitnessed fall, the patient's neck should be immediately immobilized in a rigid collar, pending obtaining cervical spinal X-rays. Following head trauma, intracranial bleeding can occur insidiously, delaying the development of neurological symptoms for hours to days. Computed tomography (CT) of the brain is therefore recommended—and *must* be obtained if the patient is taking an anticoagulant. If a head CT is not available, nurses should perform frequent neurological checks (evaluating level of consciousness and gross motor and cognitive function) for at least 48 hours.

Gait stability should be assessed following the fall to determine if a new walking aid and/or physical therapy should be prescribed:

- Can the patient stand without pushing off with his/her hands? If not, the quadriceps muscles may be weak, constituting a risk factor for future falls.
- With the patient 1 step in front of a chair (for safety if he/she falls backward), can the patient stand with feet together and eyes closed for 10 seconds without holding on for support? If no, proprioceptive, vestibular, or cerebellar function may be affected. Does the patient tend to fall backward when attempting to stand? If so, check for other signs of parkinsonism.
- What does the gait look like? Look for stride length and arm swing, posture (stooped vs. erect), ability to walk in a straight line vs. staggering, reaching out to touch walls or furniture for support (reflecting a fear of falling), and the stability of the 180° turn to return to the original location.

2.1.5 Medication Review

The majority of older patients admitted to psychiatric units and general hospitals have multiple comorbidities and are prescribed multiple medications. In an epidemiological

sample, 80% of US veterans with unplanned hospitalizations (mean age, 76 years) were taking ≥ 5 drugs at the time of admission [20]. The Australian National Census of Medicines Use determined that nearly 50% of women and 35% of men aged 75 years and older took 5 or more medications in the previous 24 hours, underscoring the prevalence of polypharmacy in older adults [21]. Patients are usually continued on their prescribed outpatient medical regimen for "stable" chronic conditions not directly affected by the admitting diagnosis. However, medications prescribed to older patients may not necessarily be the most appropriate, effective, or safest for them.

In addition to a medication reconciliation (*what the patient says they are taking* versus *what the patient has been prescribed*), a thorough medication review for appropriateness should be conducted. Drugs with anticholinergic properties can cause cognitive impairment ranging from subtle changes detectable only by neuropsychiatric testing to frank delirium. Even drugs with individually weak anticholinergic activity (e.g., furosemide, digoxin) can add to the overall anticholinergic burden. Antihypertensive medications and diuretics can contribute to orthostatic hypotension. (For more discussion on potentially inappropriate medications in older adults, see ► Chap. 5.) It may be necessary to contact the primary care physician if a review of the medical record does not elucidate the rationale for a medication that may appear to be inappropriate.

2.1.6 Social Supports

Screening questions regarding formal and informal social supports as well as financial resources may be helpful in designing realistic management plans. Caregivers should also be interviewed to assess the level of caregiver stress and the potential of burnout. Vulnerable older adults should also be screened for potential elder mistreatment.

2.1.7 Focused Geriatric Physical Examination

The ability to perform a basic physical examination remains an essential part of the psychiatrist's skill set, and it is essential that the psychiatrist be able to evaluate acute systemic medical conditions or exacerbations of chronic ones in order to determine if the patient requires an urgent internal medicine consultation or visit to the emergency department. Although it is impossible to review the entire physical examination, this section will emphasize important clinical findings that are more commonly encountered in older patients.

Vital Signs

The screening blood pressure should be checked in a seated position after the patient has had a chance to rest. Anxiety related to medical care can increase the blood pressure (so-called white coat hypertension), so, if initially high, it should be checked again after the interview. Taking the pulse for at least 30 seconds will increase the ability to detect an irregular rhythm. Blood pressure may be overestimated in geriatric patients due to calcification in their blood vessels that cannot be compressed. This is known as "pseudohypertension" and should be suspected if dizziness develops after antihypertensives are begun or doses are increased to treat elevated systolic BP [22]. Patients over age 65 should be evaluated for orthostatic hypotension due to its high prevalence, as it may affect the choice of psychotropic medication or reflect a need to refer back to the primary care physician. The blood pressure and pulse first are measured with patient in the supine position and then after standing for 3–5 minute. If systolic blood pressure falls ≥ 20 mm Hg or the diastolic blood pressure falls ≥ 10 mm Hg while standing, compared to the supine values, orthostatic hypotension is diagnosed. The failure of the pulse to rise by ≥ 10 beats per minute in the presence of orthostatic hypotension also indicates autonomic dysfunction, unless the patient is taking a beta-adrenergic blocker. Measuring the patient's current weight and comparing to baseline values can identify significant weight loss or gain; both may be indicators of psychiatric illness and/or its treatment. A respiratory rate greater than 20 breaths per minute indicates tachypnea and should prompt a measure of oxygen saturation, even if the patient denies dyspnea.

Head and Neck Examination

Inspection of the mouth can provide important clues about the patient's hydration status, self-neglect, self-image, and ability to chew. Missing, broken, or carious teeth may reflect self-neglect or neglect by others and can adversely affect nutrition. If the patient is missing teeth or is edentulous, ascertain if the patient has a well-fitting dental appliance or dentures. Inspect the tongue for normal papillae. A red, smooth, beefy-looking tongue suggests B_{12} or folate deficiency. Dryness of the mucus membranes may indicate volume depletion, sicca syndrome (inability to generate adequate saliva), or the use of anticholinergic medication. In patients complaining of headache, tender scalp, and/or weakness or achiness in the shoulders, the temporal arteries should be palpated for tenderness or nodularity which may indicate temporal arteritis, which is a vision-threatening condition requiring immediate referral to the emergency department or an ophthalmologist for evaluation and possibly temporal artery biopsy. Vision should be checked either with a wall-mounted Snellen chart or a handheld pocket card in both eyes with corrective lenses in place. If the visual acuity is < 20/100 corrected in either eye, the patient's vision is severely impaired, which can impact gait safety and increase fall risk. Bifocal and trifocal lenses distort vision when the patient looks down and can be a risk factor for falls.

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Cardiopulmonary Examination

In patients with shortness of breath, the use of intercostal and neck strap muscles (accessory muscles) and worse shortness of breath when reclining indicate higher medical acuity and require urgent internal medicine evaluation. Pursed-lip breathing (i.e., exhaling with the lips close together as if blowing up a balloon) helps to keep the airways open and is a sign of severe bronchospasm or chronic obstructive lung disease. If the patient stops and bends forward to catch their breath (known as the "tripoding" sign), acute respiratory distress should be assumed and the patient immediately evaluated. At a minimum, the psychiatrist should be able to recognize the important key visual and auscultated lung findings (◘ Table 2.4).

Auscultation of the heart permits more accurate assessment of an irregular pulse as well as detection of murmurs, rubs, and gallops. Although accurate auscultation of heart murmurs in the stable patient has become less important with the increased availability of echocardiography, it is important to recognize new or worsened murmurs in patients presenting with a suspected myocardial infarction or experiencing new or acutely worse heart failure. Measurement of the jugular venous pressure may be very useful in determining volume status. To measure the patient's venous pressure, the clinician should examine the veins on the right side of the neck, as they have the most direct route to the heart. An elevated jugular venous pressure is defined as the top of the internal jugular vein pulsations which are more than 3 cm above the sternal angle, with the neck and torso raised to 30° above the horizontal. The internal jugular vein is located lateral to the carotid artery. Inspection of the neck for the internal jugular pulsation is facilitated by shining a light obliquely against the neck from the side, which allows the internal jugular pulsations to be seen under the skin. Unlike the single pulsation of the carotid, the internal jugular pulsation is characterized by three separate waves, which produce a fluttering.

If heart failure is suspected, the feet and ankles should be inspected for edema. It is important to press gently over the tibia or malleoli for up to 40 seconds to fully displace the interstitial fluid before rating the edema from trace to 4+.

Abdominal Examination

Patients who are unable to assume and maintain the supine position (e.g., kyphoscoliosis, cardiopulmonary disease) may give the appearance of having abdominal distension. It is important to remember that not all abdominal pain denotes pathology inside the peritoneal cavity. When the patient

◘ **Table 2.4** A psychiatrist's mini-primer on essential lung findings

Sign	Description	Significance
Accessory muscle use	Strap muscles of the neck are employed to lift up the lung; intercostal muscles separate ribs to allow lung expansion	Significant air trapping, seen in advanced chronic obstructive pulmonary disease, severe asthma, or respiratory failure with hypoxemia
Tripoding	Patient has to lean forward and lean on knees to catch breath	Sign of respiratory distress
Ronchi	Gurgling sounds on inspiration or expiration	Fluid in airways, suggesting patient cannot cough out airway secretions, a sign of respiratory distress
Wheezes	Musical sounds on expiration. Important to note when in expiration they are heard: Throughout or just part way? How loud are they? Where are they?	Indicates bronchospasm. Holo-expiratory more serious than end-expiratory. Loud holo-expiratory wheezes indicate decent air movement. Softer holo-expiratory wheezes can indicate very severe bronchospasm preventing enough airflow to produce the wheezes. Localized wheezes could be a sign of a foreign body aspirated into an airway or a sign of a focal pneumonia
Crackles (aka rales)	Very fine, late-inspiratory crackles (rales; like Velcro™ being peeled open or the sound of hair being twirled) indicate the popping open of alveoli (air spaces)	Can be heard in pulmonary edema or early pneumonia
	Fine, holo-inspiratory crackles (rales)	May indicate interstitial fluid (pulmonary edema) or another interstitial process
	Coarse crackles	Can indicate airspace consolidation, as in a pneumonia
Egophony	As the patient says "Eeeeee," the sound goes from "Eeeee" to "Ahhhhh" or "Aaaaa"	Indicates airspace consolidation consistent with pneumonia. A pleural effusion will produce decreased sound but not conversion of "E" to "A"
Decreased breath sounds	A localized area of decreased breath sounds compared to the rest of the lung fields	Indicative of airspace consolidation, pleural effusion, or a section of the lung not receiving air from the bronchi (e.g., pneumothorax)

complains of abdominal pain, the location of the pain should be assessed by gentle, deep palpation. In older, frailer patients, intraperitoneal pathology may not immediately localize and the patient may simply complain of diffuse pain or discomfort; the physical exam may facilitate localization. Pain which is made worse when the hand is pulled away (rebound tenderness) suggests peritonitis and is a medical emergency. Early on, geriatric patients with peritonitis may lack classic peritoneal signs of rebound and guarding. Pain in the right upper quadrant may reflect liver or gallbladder inflammation. An involuntary gasp as the right upper quadrant is firmly pressed (Murphy's sign) suggests cholecystitis. If the pain is reproduced with fairly superficial pressure, the patient should be asked to sit up. If tensing the abdominal muscles worsens the pain, an abdominal wall hernia should be suspected and the affected area gently probed with a finger, feeling for a defect in the abdominal wall.

Pain that radiates from the flank to the groin, especially if it comes in waves and is very intense, may reflect passage of a kidney stone and, if severe, should prompt immediate referral for internal medicine evaluation and either an ultrasound or computerized tomogram of the abdomen. If urinalysis is readily available, it should be obtained to look for hematuria and crystals. Pain that seems localized to the side, beneath the rib cage, especially if the patient is thin, could reflect "floating rib syndrome." In floating rib syndrome, the pain is worsened by lateral bending of the trunk or coughing/sneezing and can be reproduced by hooking the examiner's fingers under the rib cage. It is usually caused by the 12th (floating) rib poking the oblique muscle and tissue adjacent to it. Although uncomfortable, the floating rib syndrome is not a medical emergency.

In some thin older adults, a normal aorta is palpable, but the vessel and pulsations do not extend laterally. Most abdominal aortic aneurysms are palpable as a pulsatile mass and their lateral width can be measured on physical examination. For patients with symptoms of constipation, palpation may reveal hard, palpable stool in the ascending, descending, and sigmoid segments of the colon.

Lower Extremity Examination

On general observation, look for swelling at the ankles, feet, and legs (see previous discussion). In patients who are bed-bound, edema may also be present in the sacral and coccygeal areas. Lower limb edema that is symmetric in both limbs may indicate right heart failure. Unilateral swelling may represent venous thromboembolism, and if the patient also has concurrent complaints of chest pain or dyspnea, then consider an urgent evaluation for pulmonary thromboembolism.

Neurological Examination

The neurological examination seeks to identify asymmetric neurological findings suggestive of local pathology or multi-focal disease. The neurological examination is an integral part of neurocognitive testing and can provide important clues to the etiology of neurocognitive disorders, fall risk, and neurotoxicity from medications (e.g., lithium, anticonvulsants). The examination consists of the mental status examination (which is discussed elsewhere), cranial nerves, motor exam, sensory exam, and tests of coordination, gait, and reflexes. Proper interpretation of the neurological exam requires an understanding of normal findings in the healthy older adult. It is beyond the scope of this chapter to review all parts of the neurological exam.

Level of Consciousness

The neurological examination of the unconscious patient is by necessity brief and focused and the goal is to determine underlying etiology. The Glasgow Coma Scale (GCS) is commonly utilized to assess the severity of impaired consciousness both on initial and subsequent assessments. Mild brain injury is classified as GCS ≥ 13, moderate injury as GCS 9–12, and severe with GCS ≤ 8, which may require intubation [23]. Note that a depressed GCS can reflect excessive sedation as well as brain injury.

Cranial Nerves (CN)

On routine examination, testing olfaction (CN I) is often omitted. A diminished sense of smell occurs in half of individuals aged 65 and older. Notably, deficits in odor identification occur early in the course of major neurocognitive disorder due to Alzheimer disease, with neurofibrillary tangles appearing in the entorhinal cortex. An impairment of odor identification (a sort of olfactory agnosia) precedes the onset of cognitive symptoms and predicts progression from mild cognitive impairment to syndromal neurocognitive disorder due to Alzheimer disease [24]. Thus, neurological examination of older patients presenting with cognitive impairment should include a test of smell using a substance readily identified by its odor, such as fresh, ground coffee.

Near and distant vision (CN II) should be tested in both eyes, as vision affects critical life skills (e.g., reading, driving), and older patients may not report impairment. Bedside assessment of visual fields is performed by confrontation testing (finger counting) in the four quadrants of each eye separately. With aging, the size of the pupil for a given amount of ambient light becomes smaller, increasing intraocular light scatter and reducing spatial contrast. From a practical standpoint, this impairs nighttime driving and seeing in the dark, contributing to the risk of nighttime falls [25].

Fundoscopy can reveal causes of visual loss such as cataracts, optic atrophy, as well as optic disc edema. Impairment of the optic nerves or entrapment of ocular muscles by infiltrative processes (e.g., Graves' ophthalmopathy) is revealed on examination of extraocular movements. Nystagmus (rhythmic side-to-side, up-and-down, or rotatory motion of the eye with fast and slow components) can be seen due to vestibular (peripheral) disease (e.g., Meniere's disease, positional vertigo from otolith) and from pathology in the central nervous system (e.g., vestibular nucleus, cerebellum).

Facial motor function and sensation can be assessed by examining the facial (CN VII) and trigeminal (CN V) nerves. CN VII controls taste on the anterior two-thirds of the tongue and controls the muscles of facial expression. CN V is responsible for sensation in the face and also controls oral muscles

2

used in biting and chewing. The face should be inspected for symmetry and the examiner should test the ability to close the eyelids against resistance. The patient should be asked to purse their lips, blow out their cheeks, and show their teeth. Knowledge of neuroanatomy permits the differentiation of Bell's palsy, a peripheral neuropathy, from acute ischemic stroke. Fibers of CN VII that control the lower half of the face fully decussate (crossover) in the brain stem to the side opposite their hemispheric origin, whereas half of the fibers of CN VII that control the upper half of the face (eyes and forehead) decussate, while the other half remain on the same side. This means that in an acute stroke involving CN VII, the patient retains the ability to close both eyes and wrinkle the forehead symmetrically, even though one-half of the lower face remains paralyzed. In contrast, peripheral injury to CN VII affects one-half of the entire face.

The psychiatrist may be asked to evaluate a patient with the rapid onset of unilateral facial paralysis, consisting of inability to close the eye, drooping of the corner of the mouth, and loss of the nasolabial fold. In the absence of any other acute neurological abnormality, the facial paralysis most likely represents Bell's palsy, an idiopathic injury of the ipsilateral CN VII. Other symptoms may include loss of taste on the anterior two-thirds of the tongue as well as either decreased hearing or hyperacusis in the ipsilateral ear. Contrast-enhanced head computed tomography or magnetic resonance imaging of the head can be performed and a formal neurological consultation obtained if differentiating Bell's palsy from stroke cannot be done with certainty. Glucocorticoids remain the mainstay of treatment for Bell's palsy, and symptoms can persist for months.

Hearing (CN VIII) can be crudely tested by whispering in each ear while covering the other ear. Cranial nerves IX and X are tested in tandem and manage the gag reflex and palatal movement, respectively. Ask the patient to say "Ahhh" or to pant (driving the base of the tongue to the floor of the mouth) and look for smooth upward palatal movement. CN XI is tested by asking the patient to shrug their shoulders (trapezius muscles) and turn their head (sternocleidomastoid muscles) against resistance. To test cranial nerve XII, ask the patient to stick out their tongue and observe for fasciculations and tongue deviation. If there is unilateral weakness, the tongue will deviate toward the weaker side.

Motor Exam

The motor examination first consists of inspection, looking for *fasciculations* (fine, intermittent contractions of muscle visible beneath the dermis) and muscle bulk. Benign causes of fasciculation include caffeine, beta-adrenergic agonists, and anticholinergic medications used over a long period of time. *Tone* is defined as the resistance of a muscle to passive movement and can be rated as increased, normal, or decreased. Testing for tone in the upper extremities can be performed by brisk supination of the relaxed forearm. Increased tone can be described as spastic or rigid. Corticospinal spasticity leads to resistance to flexion or contraction that releases toward the end of the motion, analogous to opening a folding pocket

knife, leading to the descriptor "clasp-knife" spasticity. Rigidity is a velocity-independent "lead pipe" response that affects the flexor and extensor muscles equally and is associated with parkinsonism. Parkinsonism also is associated with cogwheel rigidity, consisting of a ratcheting or stuttering sensation as the joint resists, permits, resists, and permits movement along the arc of flexion or extension. This stuttering often can be visualized as well as felt. The examiner grasps the hand in a handshake and, after asking the patient to let the hand muscles go limp, then supinates and pronates the wrist. Above the elbow, the examiner places a thumb on the biceps tendon while flexing and contracting the arm. Muscle *strength* testing identifies patterns of weakness between upper and lower extremities and right and left sides. The six-point Medical Research Council (MRC) grading scale is commonly used to describe strength:

- 0—No contraction
- 1—Muscle contraction but no movement
- 2—Can move but not against gravity
- 3—Can move against gravity but not resistance
- 4—Weak movement against resistance
- 5—Normal power

Manual muscle testing is limited by the cooperation of the patient, and the examiner's arm strength easily can be overwhelmed by the more powerful leg muscles, allowing mild-moderate weakness to be missed even with "5/5" strength. Manual muscle testing consequently is not sensitive for detection of mild lower extremity weakness that can affect mobility and increase the risk of falls. A neurological examination is not complete without asking the patient to stand from a seated position and walk. With the patient seated in a standard armless chair, ask the patient to fold their arms across the chest and then stand. If the patient must rock back and forth to gain momentum to stand, or must push off with their hands, there is significant weakness in the quadriceps muscles.

> **Teaching Point**
> Pain or severe arthritis of the hip or knee can produce a pseudo-weakness of the hip and knee muscles that can be mistaken for intrinsic muscle weakness. That stated, patients with symptomatic hip or knee arthritis commonly have lower strength in the affected limb.

Abnormal Muscle Movements

Myoclonus Myoclonus represents involuntary muscle activity that appears as a sudden, brief jerk. The etiology of myoclonus can be broken down into essential, physiological, epileptic, and symptomatic [26]. Essential is a nonprogressive, rare, and largely autosomal-dominant form of myoclonus. Physiological myoclonus is benign myoclonus that can be recognized in most healthy individuals. The prototypic physiological myoclonic jerk is the hiccough, and patients commonly report spontaneous jerks during sleep (hypnic jerks) or while awake and at rest. Fatigued muscles after exercise may spontaneously jerk. Epileptic myoclonus, as the name implies, occurs as part

of a seizure disorder. The jerks may remain isolated without progression into a full seizure, can sometimes be induced by specific stimuli, and may occur as part of *epilepsia partialis continua*. Under symptomatic myoclonus is subsumed a long list of etiologies, of which the most important types in older adults include congenital and acquired spinocerebellar degeneration, neurocognitive disorders, central nervous system infections, metabolic disturbances, delirium/encephalopathy following physical injuries, direct nervous system damage, and miscellaneous causes that include paraneoplastic syndrome and hereditary startle response.

Asterixis   Asterixis is effectively the opposite of myoclonus (a spontaneous motor contraction) and instead consists of a brief loss of muscle tone in agonist muscles, followed by a compensatory twitch of the antagonistic muscles. Asterixis usually is bilateral and most commonly seen in advanced cirrhosis, usually in the presence of hepatic delirium/encephalopathy. However, it also can be seen in severe azotemia from advanced kidney disease. It may occur as a neurotoxic side effect of anticonvulsants, principally phenytoin, valproic acid, and carbamazepine, and has been described as a toxic reaction to barbiturates, benzodiazepines, metoclopramide, lithium, and the antibiotic ceftazidime. Hypomagnesemia and hypokalemia may also cause asterixis. Focal brain lesions, particularly in the thalamus, can produce unilateral asterixis [27].

Tremor   Tremor is the most common movement disorder and is characterized by an involuntary, rhythmic movement. Clinicians often have difficulty distinguishing a resting tremor, the hallmark of Parkinson disease, from essential tremor. Differentiating features are shown in ▪ Table 2.5. A resting tremor occurs when the body part is fully supported against gravity without voluntary motor activity. An action tremor presents during voluntary movement of the body part and can be subdivided into five types [28]:

- Isometric tremor: when a limb muscle contracts isometrically against an immovable object (e.g., the examiner's hand that is resisting the movement), a tremor in the contracting muscle group occurs.
- Task-specific tremor: the tremor is induced or increased by a specific movement.
- Postural tremor: a tremor emerges when the appendage tries to hold a position against gravity, exemplified by a tremor induced by extending the arms.
- Kinetic tremor: the tremor emerges during a voluntary movement of a limb and continues, without change in amplitude, through the entire movement.
- Intention tremor: the tremor increases in amplitude as the appendage approaches its target.

Miscellaneous Pathological Movements   Other involuntary movements can be identified during the motor exam. Clonus consists of an involuntary rhythmic movement at a joint when the muscle is stretched and represents a hyperactive stretch reflex. Clonus can extinguish after several beats or be sustained.

▪ **Table 2.5**   Differentiating features of Parkinson disease-related tremor and essential tremor [28]

Clinical feature	Parkinson tremor	Essential tremor
Tremor		
Improves with alcohol consumption	No	Frequently
Sidedness	Begins unilaterally, progresses to bilateral	Bilateral in upper extremities
Phase of movement	Resting (common) Sustained voluntary movement against gravity Prominent when walking	Visible with voluntary movement and when limb held against gravity (e.g., out-stretched arms) Resting in severe cases Quiescent with walking
Frequency	4–6 Hz	7–12 Hz
Other sites for tremor	Mouth, tongue, legs Normal voice	Head (titubation—side to side or up and down) May have tremulous voice
Other features		
Family history	Rare	Frequent
Handwriting	Micrographia with decreasing size of movements while drawing a spiral	Sloppy, with sine-wave-like strokes throughout drawing of a spiral
Face	Mask-like facies Blunted emotional expression (seems sad all the time) Reduced blink rate	Normal facial expression and blinking
Gait	Stooped posture Shortened stride length Reduced and often asymmetrical arm swing	Normal gait

It is invariably pathologic after ten beats. Dystonia consists of inappropriate muscle contractions arising from aberrant motor impulses from the central nervous system and can present as abnormal posturing, that is, sustained, abnormal, and frequently painful contractions of muscle groups. Dystonic reactions are frequently seen as a result of an idiopathic reaction to dopamine-blocking drugs, such as antipsychotics and metoclopramide, or as a result of brain injury (e.g., cerebral palsy, severe hypoxic injury). Dyskinesias are distinguished from dystonia by more flowing, large involuntary movements without tonic contraction of muscle groups. They can be part of the spectrum of movement disorders induced by chronic dopamine blockade by antipsychotics (tardive dyskinesia) or from long-term use of

dopamine agonists and thus often is seen as a complication of more advanced Parkinson disease. Within the spectrum of dyskinesias, chorea is an involuntary, writhing movement arising from dysfunction in the basal ganglia due to inherited, autoimmune, pharmacologic, or metabolic disturbances [29].

Coordination and Gait

Cerebellar function does not change during normal aging. Ischemic stroke and degeneration from chronic ethanol ingestion are the most common causes of cerebellar dysfunction in older adults. In psychiatric patients, irreversible cerebellar damage can occur from lithium toxicity; in the geriatric patient, lithium levels in the usual therapeutic range have been associated with cerebellar dysfunction. Chronic use of anticonvulsants, either for epilepsy or as treatment for bipolar disorder, also may lead to cerebellar dysfunction. Pan-cerebellar dysfunction may result from a form of multisystem atrophy and can occur as a paraneoplastic syndrome. Examination of cerebellar function involves testing the trunk for balance and the limbs for coordination. Limb ataxia is assessed by the finger-to-nose test in the upper extremities and the heel-to skin test in the lower extremities. For patients with cerebellar ataxia, there may be dysmetria (overshooting or undershooting of the intended target). Truncal imbalance from cerebellar dysfunction or peripheral neuropathy requires the patient to assume a broader stance to maintain balance. Cerebellar dysfunction impedes the ability to perform a tandem gait, and during ambulation the patient shows a wide-based gait with truncal imbalance, mimicking acute ethanol intoxication. Such a gait can become chronic with alcohol-related cerebellar degeneration. The latter affects the paleocerebellum and thus tends to occur without an accompanying intention tremor.

Patients with parkinsonism or other neurodegenerative processes involving the basal ganglia and related motor pathways can have postural dysequilibrium, characterized by redirection of the legs and trunk to a centrally reset, displaced center of gravity. As a result, the patient may have difficulty standing because of placing the feet too far forward or tend to lean backward when upright, leading to backward falls with high risk of closed head injury. When walking, patients try to compensate for their incorrect center of balance by bending forward at the waist. Historically, these patients or their family report having a tendency to fall back into the chair when they attempt to stand. Gait assessment is also discussed in ▶ section Falls. Two structured gait assessments are commonly performed in comprehensive geriatric assessment, the Up-and-Go test and the Tinetti Gait and Balance test, which is open access. The Up-and-Go is a quick, qualitative test of gait and balance. The patient is asked to stand from a seated position without using their arms, walk 10 feet (3 m), turn, return to their seat, and sit down. With the patient instructed to walk at their usual pace, the examiner checks for unsteadiness, loss of balance, grabbing at the walls, staggering, shuffling, using an assistive device (if any) improperly (e.g., carrying cane), and whether they turn en bloc (in a series of short steps rather than pivoting on 1 foot). Taking more than 12 seconds to complete the entire Up-and-Go test predicts

falls. The Tinetti test divides balance into nine components and gait into seven components, each of which is scored and added together. Higher scores reflect better performance. Out of a possible 28 points, ≤ 18 corresponds to a high fall risk, 19–23 an intermediate risk, and ≥ 24 low risk [30].

Reflexes

Deep tendon reflexes (DTR) are routinely tested and the results are described based on their presence or absence and whether or not they are symmetrical. These reflexes tend to diminish with aging, and it is often necessary to use reinforcement techniques (e.g., teeth clenching, grasping the fingers of each hand, and pulling) to bring out reflexes that appear absent or diminished. The National Institute of Neurological Disorders Myotatic Reflex Scale grades reflexes as follows:
- 0—Absent
- 1—Trace response or reinforcement required
- 2—Reflex in lower half of normal range
- 3—Reflex in upper half of normal range
- 4—Reflex greater than normal, including clonus

Reflexes that are significantly diminished or absent suggest peripheral nerve disease. Hyperreflexia is abnormal in older patients and suggests a brain lesion in the motor cortex or damage along the spinal pyramidal tract above the level of the spinal motor nerve arising from the anterior horn. Although hyperreflexia can be associated with hyperthyroidism, this association is seen less in older, compared to younger, patients. Unilateral hyperreflexia may be a residual finding from prior stroke. Sustained rhythmic beating at a joint during forceful flexion (e.g., the ankle) indicates clonus. Up to 3–4 beats can be within normal limits. Non-sustained clonus will extinguish after 5–10 beats and sustained clonus lasts > 10 beats; both are pathologic.

Babinski Reflex   The extensor plantar response is not part of normal aging and its presence suggests an interruption in the corticospinal tract (e.g., stroke, mass lesion, spinal cord compression). To test the reflex, the patient should first be placed in the supine position. Using a thumbnail, key, thin stick, or the pointed tip of a neurological reflex hammer, gently stroke along the lateral aspect of the sole starting near the heel, and sweep upward in an arc across the base of the toes to the first metatarsal head. The normal response is a downward flexion of the toes. The classic abnormal response is the up-going great toe with or without spreading of the rest of the toes.

> **Teaching Point**
> Be careful to avoid producing pain or tickling the patient in order to avoid a withdrawal response, which often involves extension of the big toe and can be mistaken for a positive Babinski reflex. Rubbing the knuckles down the shin or running the key or sharp object strictly on the lateral aspect of the foot often can induce the plantar response with tickling the patient.

Primitive Reflexes   Primitive reflexes (frontal release signs) are present in infancy and disappear with development of the central nervous system. The six reflexes include the snout, palmo-mental, glabellar, sucking, rooting, corneo-mandibular, and grasp. Reappearance of these reflexes may occur in late life both in normal older adults and in certain disease conditions. For example, an abnormal glabellar tap may be seen in neuro-degenerative conditions such as more advanced neurocognitive disorder and Parkinson disease. The reflex is elicited by tapping the area above the nose on the forehead (glabella) at 1-second intervals. In a normal patient, the blink reflex will occur after each tap for several repetitions and then extinguish. In a patient with frontal lobe injury or Parkinson disease, this blinking does not extinguish.

Sensory

Spinothalamic (pain, temperature, and light touch), dorsal column (vibration, proprioception, and touch localization), and hemispheric (graphesthesia) sensory functions should be assessed. The stimulation should be applied lightly and should be compared bilaterally as well as distally versus proximally. Vibration sensation is reduced in the lower limbs of normal older adults and may not be attributable to disease. Loss of proprioceptive position sense in the great toes is pathologic and can occur in B_{12} deficiency or after peripheral nerve injury. With the patient's eyes closed and the patient instructed not to move the toe, the examiner grasps the great toe on the sides and moves it up and down several times before asking the patient if the toe is "up or down." The test should be repeated several times to ensure consistency of response (correct or incorrect localization). There are age-related increases in sensory thresholds for sensory modalities, but these changes are not clinically apparent on bedside testing.

The Romberg tests evaluate sensory (proprioceptive) function of the feet and require healthy dorsal columns of the spinal cord. With the patient standing with the feet together just in front of a chair next to a wall in case they should lose balance, the examiner asks the patient to shut their eyes. Romberg's *sign* is excessive swaying or falling with the eyes closed. This test is enhanced by pushing the sternum forcibly (calibrated to the patient's size and estimated strength), while the patient has their eyes closed. A positive Romberg test indicates peripheral neuropathy and/or delayed motor reflexes arising from midbrain or motor-tract degeneration (e.g., Parkinson disease) and/or slowed motor conduction.

2.1.8 Special Challenges with Geriatric Patients

Atypical Presentation

Most older patients present with the *typical* signs and symptoms of an illness, but an increased proportion present *atypically* [31, 32]. An atypical presentation may take several forms:

1. *Failure to manifest many of the usual and expected features of a disease process.* Examples include lack of cough and sputum production or even leukocytosis with a pneumonia, lack of the typical rhinorrhea, nasal congestion, and sore throat with influenza and the absence of chest pain with acute coronary ischemia. Using ambulatory electrocardiographic monitoring, asymptomatic ("silent") coronary ischemia can be detected in > 30% of geriatric patients with known coronary heart disease. The incidence of silent coronary ischemia is higher in older diabetics with coronary heart disease [33].

2. *Symptoms apparently unrelated to the involved organ system.* A disturbance in an organ system that is remote from the involved organ may be the first presentation of an acute illness in a frail, older patient. For example, central nervous system dysfunction manifesting as delirium, falls, and/or urinary incontinence may be the clinical presentation of pneumonia. Physical signs and symptoms developing from pathology in a seemingly unrelated organ system are thought to arise from the inability of the patient, as an integrated organism, to respond to physiologic challenges to homeostasis due to reduced physiologic reserve and resilience. A variation of this phenomenon is acute dysfunction in a previously damaged but functionally recovered organ when exposed to severe physiologic stress. For example, a patient with no apparent residua from a previous stroke may appear to be experiencing a recurrence of the same signs and symptoms of that stroke during the stress of sepsis. A patient with well-compensated heart failure may experience an exacerbation of heart failure because of a respiratory infection.

3. *Nonspecific symptoms.* Nonspecific symptoms do not readily suggest a specific cause. A patient experiencing a myocardial infarction may only complain of acute fatigue or nausea rather than crushing substernal chest pressure. A woman with a urinary tract infection may simply feel tired without complaints of dysuria and frequency. A patient with acute appendicitis initially may complain of generalized abdominal discomfort, nausea and vomiting, or merely loss of appetite instead of classic right lower quadrant pain.

4. *Presentation of symptoms due to failure to mount an appropriate physiologic response.* Age-associated dysfunction in one or more organ systems may prevent an adequate compensatory response to a stressor that would mitigate symptoms. For example, otherwise healthy older adults may not feel thirsty and drink enough water to correct a hyperosmolar state from volume depletion due to a blunting of the normal thirst response to volume [34], making older adults susceptible to hypotension, lightheadedness, and acute kidney injury from illnesses that cause volume loss (e.g., diarrhea) or reduced intake (e.g., gastroenteritis). Roughly 30% of older adults have impaired vasoconstriction during assumption of an upright posture,

leading to orthostatic hypotension [35], typically defined as a drop of 20 mm Hg in systolic blood pressure or 10 mm Hg of diastolic blood pressure upon standing. The result may be lightheadedness or syncope. When the upright posture is maintained for more than 3 minutes, the prevalence of orthostatic hypotension rises to as high as 40% [36]. Orthostatic hypotension may be worsened by the failure of the heart rate to increase cardiac output due either to conduction-system disease or autonomic dysfunction. These maladaptive age-related changes can be worsened further by medications that affect an organ's compensatory response (e.g., beta-adrenergic blockers that prevent compensatory tachycardia).

The Older Psychiatric Patient as Poor Historian

The history alone is sufficient to arrive at an accurate diagnosis in approximately 20% of patients admitted to a medical inpatient service. The history coupled with the physical examination yields an accurate diagnosis in 80% of cases [37]. However, psychiatric (including neurocognitive) disorders can impair history taking and delay diagnosis, with potentially dire consequences for the patient. An accurate informant who is knowledgeable about the patient and the circumstances leading up to the present constellation of symptoms therefore becomes critical. Psychiatric patients may develop strong beliefs about the cause of symptoms, potentially misdirecting the workup or causing the clinician to dismiss the symptoms as fictitious.

2.2   Case Studies

In older adults with psychiatric illness and often comorbid chronic systemic medical conditions, the medical, functional, and psychosocial statuses are essential elements to address in the assessment process in order to inform the development of the medical and nonmedical components of the treatment plan to maximize overall health with aging. The following two cases reflect the interplay of common elements of the comprehensive geriatric assessment.

2.2.1 Case 1

Case 1 History

Ms. C. was the 67-year-old chief food and wine critic for the major newspaper of a large metropolitan area. Over the years she had had a tendency to engage in periodic binge eating of food in favored restaurants (though she remained moderate in her wine consumption), which resulted in obesity, diabetes mellitus, and hyperlipidemia, for which her internist prescribed glipizide, metformin, and atorvastatin. She also had been taking the proton-pump inhibitor, lansoprazole, for a number of years to manage severe heartburn. Following the periods of over-indulgence, she usually became morose and sullen for several days, but after one of

her bingeing episodes, she developed a major depressive episode requiring psychiatric hospitalization. She was diagnosed with bipolar II disorder and placed on divalproex 1000 mg at bedtime for mood stabilization and sertraline 100 mg daily. Although her food consumption normalized, she had difficulty losing weight and controlling her blood glucose and eventually required insulin glargine at bedtime and insulin aspart at mealtime, with discontinuation of glipizide.

One morning she awoke and was horrified to see that the right side of her face from the forehead to the chin was sagging. She could not close her right eye or curl the right side of her mouth into a smile. She went immediately to the emergency department, fearful that she had had a stroke. There, her neurological examination was completely normal except for right-sided facial droop. She could not furrow the right half of her forehead or close her right eye on command. The emergency physician ordered a non-contrast computerized tomogram of her brain, which was negative for evidence of an acute stroke, but did reveal moderate periventricular white matter disease, considered above average for her age. She was given an aspirin and admitted overnight for observation. By morning, the facial droop had improved considerably, and she was able to close her right eye two-thirds of the way. She was told to take an 81 mg aspirin daily, an ophthalmic lubricant to prevent corneal damage, and was discharged home with follow-up with a neurologist.

Case 1 Questions and Answers

Case 1 Questions

❓ Question 1. Is this a stroke, transient ischemic attack, or Bell's palsy?

❓ Question 2. Can you create a differential diagnosis for the decline of Ms. C.'s career following her Bell's palsy?

❓ Question 3. What is your differential diagnosis for her falls, and what might these recommendations have been?

Case 1 Answers

Case 1 Answer 1   (Question 1—Is this a stroke, transient ischemic attack, or Bell's palsy?)

Ms. C. experienced an acute onset of right facial paralysis involving the upper as well as lower half of her face. Half of the fibers of the seventh cranial nerve that ultimately innervate the forehead and eye muscles cross the brain stem to the opposite side and innervate the opposite side of the face; the other half innervate the ipsilateral side. The fibers ultimately innervating the lower half of the face only travel to the opposite side. Thus, in a unilateral stroke affecting one of the CN VII tracts within the central nervous system, the patient should retain the ability to wrinkle the forehead and close both eyes while having hemi-paralysis of the face. The remainder of Ms. C.'s neurological exam was within normal

limits. Thus, it is highly likely that she experienced Bell's palsy and was fortunate to achieve rapid improvement within 24 hours. Bell's palsy stems from idiopathic inflammation of the peripheral portion of the CN VII, and so the entire side of the face is affected. Often, resolution can take months. Corticosteroids may reduce the inflammation and hasten recovery; she did not receive any.

Case 1 (Continued)

After returning home, Ms. C. was distressed to find that the sensitivity of her taste had precipitously declined, such that most foods that she tasted seemed bland unless she heavily seasoned them. At first she did not realize the fault was hers, and wrote scathing reviews about several restaurants and collected, in return, surprised comments from readers who praised the food. She lost interest in food and began to focus on restaurants' ambience. She went out less often and wrote fewer reviews and was put on probation by the editorial staff. She once again became moody and sullen and her psychiatrist increased the sertraline to 200 mg per day. She used to write eloquently, with pithy, image-full descriptions of food and wine, but the quality of her writing deteriorated. She visited an ear, nose, and throat specialist who did formal testing of her sense of taste and found that it had returned to normal. Ms. C. complained that she still could not smell the food or could not recognize their odors, which was her rationalization for abandoning her famous descriptions like, "A voluptuous flan with perfectly seared brown sugar, imparting a decadent caramel flavor that embraced the tongue like a passionate lover...." One year after Bell's palsy had resolved, Ms. C. was fired from the newspaper.

Case 1 Answer 2 (Question 2—Can you create a differential diagnosis for the decline of Ms. C.'s career following her Bell's palsy?)

The differential diagnosis must include relapse of a major depressive episode. Certainly this affected her ability to write her column, as did her hypogeusia. CN VII subserves taste on the anterior two-thirds of the tongue and likely altered her taste perception for weeks. The loss of taste likely contributed to her recurrent depressive episode. However, after her taste returned, based on objective testing, the quality of her writing continued to be poor. She attributed this to a gradual deterioration in her sense of smell, which is almost as important as taste for a connoisseur and critic of fine food. However, another explanation exists. Alterations in odor perception occur early in neurocognitive disorder due to Alzheimer disease and can be found well before clinical symptoms develop. Reduced sense of smell commonly goes unnoticed by patients and is rarely checked by physicians. However, this is something a food critic would notice. An alternative explanation for the worsening quality of her columns is mild cognitive impairment or major neurocognitive disorder. Her white matter disease may have made her more vulnerable to concomitant neurocognitive disorder due to Alzheimer disease and/or vascular disease.

Case 1 (Continued)

Two months after she was fired, Ms. C.'s psychiatrist referred her for comprehensive neuropsychiatric testing, which found that she was performing at a lower-normal IQ level and suspected that she was in the very early stage of a neurocognitive disorder. Around this time she began experiencing intolerable burning pain in her feet, which her internist diagnosed as diabetic peripheral neuropathy and prescribed gabapentin, which was slowly titrated to the maximum dose of 600 mg three times daily. After she reached this dose, she began to lose her balance when walking and turning and experienced three major falls over the course of 2 months, one resulting in a Colles' wrist fracture and another in facial trauma including a broken nose. For each event she was seen in the emergency department, and her ethanol level each time was zero. She was referred to a geriatrician, who performed a thorough neurological exam. Her vibration sensation was very poor in her lower extremities. She could not hold a tandem or hemi-tandem stance with her eyes open and, when walking, tended to stagger and clutch the walls. A B_{12} level was obtained and she was prescribed a four-wheel walker with handbrakes. The geriatrician additionally made recommendations regarding her medications.

Case 1 Answer 3 (Question 3—What is your differential diagnosis for her falls, and what might these recommendations have been?)

Ms. C. began falling shortly after her gabapentin reached the maximum dose. Gabapentin is in the anticonvulsant family of drugs and can affect cerebellar function; it also is known to increase the risk of falls. In addition, she presumably still was taking the divalproex, also an anticonvulsant associated with increased fall risk. Finally, she was presumably still taking her sertraline, a selective serotonin reuptake inhibitor, which also has been independently associated with an increased risk of falls. On examination she had clear sensory neuropathy, which could affect her balance and gait. Finally, she had been taking a proton-pump inhibitor for years. The loss of an acid milieu in the stomach impedes absorption of vitamin B_{12} through intrinsic factor. Vitamin B_{12} deficiency further could have added to her peripheral neuropathy and might have contributed to her cognitive decline. The geriatrician's recommendations may have included:

- Vitamin B_{12} replacement.
- Stop the gabapentin and find safer ways to treat her neuropathic pain (e.g., around-the-clock acetaminophen (paracetamol)).
- Replace the sertraline with duloxetine, a serotonin norepinephrine reuptake inhibitor that may help both with her depressive symptoms and peripheral neuropathy.
- Physical therapy for gait and balance training.
- Home safety check for throw rugs, other fall hazards, and need for safety equipment such as grab bars in the shower.

Case 1 Analysis This case emphasizes the holistic approach required in the comprehensive geriatric assessment of the older adult. It illustrates how the evaluation of multiple issues, including physical and neuropsychiatric health, medication review, occupational, financial, environmental, and social components can all influence an older adult's health. A comprehensive geriatric assessment process relies on a core team consisting of clinicians, nurses, social workers, and physical and occupational therapists, nutritionists, pharmacists, dentists, and other specialty clinicians.

2.2.2 Case 2

Case 2 History

Mr. A. was an 86-year-old man who presented to his psychiatrist in early October for routine follow-up of major depressive disorder stemming from a difficult and costly lawsuit with neighbors stemming from roots from one of the neighbor's trees undermining the patient's foundation and the neighbor's refusal to contribute to the expensive foundation repair. He previously had been in fair health with well-compensated diastolic dysfunction, hypertension, a history of atrial fibrillation treated by ablation and a pacemaker, chronic constipation, a history of prostate cancer with resection with a rise in his prostate-specific antigen from 2 to 6.2 ng/mL over the past 6 months, and stage III chronic kidney disease. At baseline, he was able to walk slowly at least twice around the block without stopping; his walking was chiefly limited by sciatica in his left leg. At his last visit 2 months earlier, his depressive symptoms had improved. On presentation to the clinic, he complained of mild but worsening shortness of breath and dry cough after returning 4 days earlier from a Hajj to Mecca. He also reported mild diarrhea, with 2–3 loose stools daily for the previous 2 days; normally, he reported chronic constipation. He complained of feeling weak, had no appetite, and had recently refused most meals except for some yogurt and fruit in the morning. Mr. A. reported that he heard a few passengers coughing on the flight from Mecca to Paris, but no one near him seemed sick, and his wife was in her usual state of health. His medications at the time included bumetanide 1 mg twice daily, sertraline 50 mg every morning, metoprolol succinate 25 mg daily, gabapentin 100 mg every 8 hours for neuropathic pain related to sciatica, and vitamin D_3 1000 IU daily.

Case 2 Questions and Answers

Case 2 Questions

❓ Question 1. How concerned should you be about Mr. A.'s shortness of breath and cough, and what sort of evaluation should you do?

❓ Question 2. What are the specifically "geriatric" features of this case thus far?

❓ Question 3. Do you have any concerns about the way he was managed?

Case 2 Answers

Case 2 Answer 1 (Question 1—How concerned should you be about Mr. A.'s shortness of breath and cough, and what sort of evaluation should you do?)

The differential diagnosis for Mr. A.'s new-onset asthenia is broad, ranging from a relapse of major depressive disorder resulting from the stress of travel and disrupted sleep patterns to new heart failure or an infection. Before simply referring him to his primary care physician, some medical triaging is important, some of which can be done without a formal physical examination. Much can be gleaned about his current functional status by observing him walk and arise from his chair. However, his baseline physical function, apart from reportedly being able to walk two blocks, is not known. Did he have baseline difficulty performing any of his physical IADLs or ADLs? At baseline how hard was it for him to stand from a chair, i.e., could he bound up quickly and easily, or did he have to regularly push off with his hands? A functional assessment emphasizing IADLs and ADLs, baseline mobility, and psychosocial support would have been appropriate to have on file but can be gleaned at this appointment. He was not coughing and did not appear ill, although he was moving slowly and complaining of fatigue, which is reassuring, but his oral intake had been poor while taking his daily furosemide. Because acute illness in older and especially frail individuals may not present typically, a limited physical examination including vital signs (including orthostatic blood pressure for increased sensitivity to intravascular volume depletion), evaluation of the oral mucosa, and auscultation of the heart and lungs is indicated.

Case 2 (Continued)

Mr. A.'s blood pressure was 102/68 mm Hg, heart rate 60 beats/minute and regular, temperature 38 °C (100.4 °F). His mouth appeared dry, corresponding to the patient speaking more "thickly" than usual and having to lick his lips frequently. Chest exam revealed very slight wheezing but no other adventitious sounds. His heart exam revealed a regular rate and rhythm with a soft, early-peaking 2/6 ejection murmur at the right base. Today he shuffles and seems unsteady on his feet, and he had had to rock back and forth and then get help from his wife while pushing with his hands to get out of the examiner's sofa. Normally he could arise with minimal pushing off, which the patient attributed to his knee osteoarthritis. A more extended social history revealed that his wife suffered from chronic shoulder and back pain and had a recent compression fracture resulting from a misstep on the Hajj. She was worried about being able to help her husband in this condition. Despite admonitions from the psychiatrist that the low-grade fever and low blood pressure could reflect a serious developing infection and that he should go see his primary care physician or go to the emergency department today, Mr. A. dismissed the idea, stating that he suspected he caught a virus while on the Hajj and just needed rest. He agreed to stop at the laboratory before leaving the clinic for a complete blood count, electrolyte panel, chest X-ray, and a urinalysis.

The results of the laboratory studies came back to the psychiatrist's office 36 hours later. Mr. A.'s white blood cell count was 8.7 K/mm3, and his chest X-ray showed mild cardiomegaly but no evidence of an infiltrate or heart failure. His chemistry panel was notable for a serum sodium of 128 mEq/L (128 mmol/L) and serum creatinine of 1.9 mg/dL/168 μmol/L (baseline 1.5 mg/dL/133 μmol/L). The urine dipstick was negative except for 2+ glucose. The psychiatrist called the patient's internist about the results, who in turn called the patient to go to the emergency department. His wife answered the phone (his mobile) stating that he already was there after experiencing more intense, nonproductive coughing and worsening shortness of breath, to the point that he had to sit up in his lounge chair to breathe and became dyspneic walking to the bathroom and had fallen twice.

In the emergency department, his temperature was 39.2 ° C (102.5 ° F), blood pressure 98/54 mm Hg seated, respiratory rate 28 breaths/minutes, and pulse 60 beats/minutes and regular. His oxygen saturation (SaO_2) was 91% on room air. There was diffuse wheezing on lung exam that masked any other sounds, but the chest X-ray showed a small retrocardiac infiltrate. His serum sodium remained 128 mEq (128 mmol)/L, but his creatinine had now risen to 2.7 mg/dL (239 μmol/L). His ECG showed a fully paced rhythm with left bundle branch block and no acute ischemic changes. A serum troponin I as surveillance for cardiac injury was obtained and came back as 0.09 ng (μg)/L (upper limits of normal 0.04 ng/L). Mr. A. was lethargic and not able to answer questions coherently, with most of the history coming from his wife. He was empirically given azithromycin 250 mg and ceftriaxone 1 gm IV, bronchodilators, and 40 mg IV of prednisolone with a presumptive diagnosis of community-acquired bronchopneumonia, started on 5% dextrose in 0.9 normal saline, and admitted to the medical service on call, which continued the antibiotics, added oxygen at 2 L/minute as needed for a SaO_2 < 90%, ordered vital signs every 4 hours, as well as albuterol/ipratropium nebulizers every 4 hours up to every 2 hours as needed.

In the morning of hospital day 2, Mr. A. was delirious and agitated, with a RASS score of +1 (restless), for which he received olanzapine 5 mg (rapid-dissolving) with subsequent calming. He now required O_2 at 6 l/minute to maintain a $SaO_2 \geq 90$ and his chest X-ray showed extension of his left lower lobe infiltrate, along with new pleural effusions and cephalization of his pulmonary vasculature, consistent with acute heart failure. A nasal swab for upper respiratory viruses came back positive for influenza A, and he was placed on respiratory isolation and begun on oseltamivir for the influenza. His troponin I peaked at 6.9 ng (μg)/L and he was given a diagnosis of a non-ST-elevation myocardial infarction. A serum albumin was 2.2 g/dL (22 g/L).

Case 2 Answer 2 (Question 2—What are the specifically "geriatric" features of this case thus far?)

Mr. A.'s initial presentation showed multiple atypical features. At the outset, his only symptoms of the "flu" were a low-grade fever and a dry cough. He did not have rhinorrhea, nasal stuffiness, headache, or sore throat. He also displayed the nonspecific symptoms of weakness, lethargy, and poor appetite. His diarrhea, in retrospect, was likely part of the acute influenza. Oseltamivir would have been more effective in blunting the course of his influenza and possibly could have averted secondary heart failure had it been administered early in the course, but because of the atypical presentation, influenza was not suspected until he worsened, despite antibiotics.

The heart failure typifies how dysfunction in one organ system can have an effect on another organ, in this case the effect of lung pathology on cardiac function. In addition, he began falling at home and later became delirious, demonstrating how remote organ systems (in his case, the brain) can be affected. Here, it is impossible to tease out whether the delirium arose because of the myocardial infarction, the influenza A bronchopneumonia, and/or multiple risk factors working additively or synergistically. Mr. A. had multiple risk factors for delirium, including age, acute infection, intermittent hypoxemia, and baseline depressive disorder.

Case 2 Answer 3 (Question 3—Do you have any concerns about the way he was managed?

When seen by his psychiatrist, Mr. A. admitted to poor oral intake, yet continued to take his bumetanide for compensated heart failure. He was hypotensive in the office. His psychiatrist should have stopped the diuretic and ordered the chemistry panel *statim* because of the risk of pre-renal azotemia and either hyponatremia or hypernatremia. The former was a possibility because he was on a loop diuretic plus a selective serotonin reuptake inhibitor (SSRI), which can cause the syndrome of inappropriate antidiuretic hormone (SIADH). If volume depleted, his kidneys, despite the baseline chronic kidney disease, would have avidly retained as much water as possible, and if he was losing salt from the diuretic and not taking enough in, he could become hyponatremic, especially if he was drinking some fluids. He also could have become hypernatremic if the water loss from the diuretic exceeded salt loss, his kidneys could not adequately retain water, and he was not ingesting enough salt or water.

In the emergency department, he already displayed the hypoactive form of delirium and was given high-dose corticosteroids, which could exacerbate the delirium. On the medical unit, no apparent mental status evaluation was done beyond that done in the emergency department, and no non-pharmacologic delirium preventive measures were employed. Moreover, he was placed in restraints when he became agitated, which likely aggravated his delirium and agitation. No sitter was obtained to minimize the use of restraints. The team also should have encouraged his wife to be at his bedside as much as possible and to recruit additional family members, if available, to provide frequent reorientation and reassurance.

At baseline the patient had mild mobility impairment and therefore was at extremely high risk for further deconditioning and loss of ADL independence. A mobilization program with physical therapy and occupational therapy should have begun as soon as the patient was able to cooperate, and he

should have been moved to a chair for all meals and as tolerated. He was malnourished at admission, and aggressive nutritional repletion should have been implemented early on with the help of a dietician, notwithstanding his delirium and concern for aspiration.

Case 2 (Continued)

The patient's pulmonary and cardiac status improved. The psychiatry consultation-liaison/psychosomatic medicine service provided consultation for his delirium and recommended the use of a sitter instead of restraints and haloperidol for delirium-associated agitation and educated his wife about providing gentle stimulation by conversing with him and playing simple card games when he was alert. They also encouraged that he be out of bed for meals. Although the patient became more behaviorally appropriate and able to engage in conversations, he remained intermittently disoriented to time and circumstance, and he demonstrated very poor short-term memory. His delirium by CAM-ICU assessment became negative on the 7th hospital day, but his Mini Mental State Examination score was 18/30 with 0/3 on short-term recall and errors on most of the orientation questions. Physical therapy became involved, but by discharge on hospital day 9, he was non-ambulatory, required moderate assistance for transfers, and required discharge to a skilled nursing facility for rehabilitation.

Case 2 Analysis   This case illustrates how an older patient can present atypical signs and symptoms of an illness, which has taken several forms. He demonstrated a presentation of atypical symptoms due to failure to mount an appropriate physiologic response. This case demonstrates how dysfunction in one organ system could have an effect on another organ (i.e., lung pathology on cardiac and brain function). Age-associated dysfunction in one or more organ systems may have prevented an adequate compensatory response to a stressor that would have mitigated his symptoms.

2.3   Key Points: Comprehensive Geriatric Assessment

- Comprehensive geriatric assessment consists of the systematic evaluation of an older patient's functional and psychosocial status as well as their medical conditions; places special emphasis on the patient's ability to perform daily activities and on quality of life; and investigates through questions, objective testing, and systematic observation risk factors for, or causes of, common pathological conditions affecting older adults, including cognitive impairment, impaired mobility, falls, incontinence, and polypharmacy.
- Geriatric assessment explicitly looks for clinical manifestations of age-associated physiological changes, which can be harbingers of organ-system dysfunction and chronic disease, and tries to incorporate interventions that either mitigate these age-associated changes or help the patient to adapt to them.
- Older adults as they become frail are at risk for malnutrition from inadequate energy and micronutrient intake.
- Aging causes an inevitable decline in motor function, leading to impairments in gait and balance. However, strength and balance training can mitigate these declines.
- Standardized tests have been developed in geriatrics to systematically assess and quantify performance and can be used both as prediction tools and the basis for individualized interventions.

2.4   Comprehension Multiple Choice Question (MCQ) Test and Answers

❓ **MCQ 1.** Mrs. M. was a 74-year-old obese woman with severe obsessive-compulsive disorder, who was admitted for suicidal ideation with a clear plan. Her past medical history was notable for hypertension, hypercholesterolemia, osteoarthritis, and gastroesophageal reflux disease (GERD). Although taking a daily proton-pump inhibitor, she intermittently complained of substernal chest pain. ("I know it's my heartburn, and it's getting worse! Please give me something for it!") The on-call psychiatrist acquiesced and prescribed 30 mL of aluminum hydroxide/magnesium hydroxide antacid as needed, usually with relief of symptoms after 15–20 minutes. On hospital day 6, she was found unresponsive in bed at 6:00 AM. A "code blue" was called, but after 15 minutes of unsuccessful resuscitation efforts, she was declared dead. An autopsy revealed pathological features of acute and healing myocardial infarctions. What was the underlying cause of death in this case?
A. Stroke
B. Suicide
C. Peptic ulcer perforation
D. Pneumonia
E. Myocardial infarction

✅ Answer: E

Mrs. M. had several vascular risks factors to indicate a possible cerebrovascular ischemic cause for her sudden death, but the pathological evidence *did not support* this conclusion. Sudden death is defined as any death that occurs less than 24 hours after the onset of first symptoms. She complained of epigastric pain which could have indicated a peptic ulcer complication, but this would unlikely result in sudden death. Aside chest pain, she did not present symptoms or signs of an acute respiratory illness such as pneumonia. Given the admission reason of suicidal ideation with a plan, a completed suicide would have been plausible. However, this was not supported by the pathology report findings. Mrs. M.'s frequent

chest pain represented an angina equivalent. Because the patient had a history of GERD, the psychiatrist assumed the patient's belief that she had heartburn was accurate; instead, the psychiatrist needed to take a careful history and perform an exam to rule out other causes of chest pain. The patient's underlying cause of death was acute myocardial infarction (statement E), which was supported by the autopsy findings.

❓ **MCQ 2.** What is the correct statement about Charles Bonnet syndrome?
   A. It indicates the presence of a psychotic disorder.
   B. It occurs in major depressive disorder with psychotic features.
   C. It occurs in major neurocognitive disorder with Lewy bodies.
   D. It is associated with visual impairment.
   E. It represents a *forme fruste* of a major neurocognitive disorder.

✅ Answer: D

Complex visual hallucinations in the presence of substantial visual impairment characterize the Charles Bonnet syndrome (statement D). Onset of complex visual hallucinations in older adults without other symptoms of psychosis, mood, or neurocognitive disorder should be screened for visual impairment as it could indicate a diagnosis of Charles Bonnet syndrome (which will exclude the statements A, B, and C). However, there has been debate whether the Charles Bonnet syndrome represents a *forme fruste* of a major neurocognitive disorder, but the research to date has been inconclusive (statement E).

❓ **MCQ 3.** Which of the following statements about urinary incontinence is *not* correct?
   A. Prevalence is 15–30% of community-dwelling older adults.
   B. Prevalence is 50–75% of older adults in institutions.
   C. Urinary tract infections, decubitus ulcers, and restriction of activities are common complications.
   D. It is a key feature in deciding upon nursing home placement.
   E. It is associated with depressive disorders in older men.

✅ Answer: E

Urinary incontinence affects 15–30% of community-dwelling older adults and 50–75% of persons in institutions (statements A and B). Urinary incontinence can have significant complications, including urinary tract infections, decubitus ulcers, and restriction of activities (statement C). Urinary incontinence may be a key feature in deciding upon nursing home placement in some cases (statement D). Urinary incontinence has been associated with depressive disorders in older women (but not in men as in statement E) depending upon the incontinence screening instrument used and the population studied; therefore, statement E is the correct answer.

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