Late-Life Psychosis

Jessica E. Waserman and Karen Saperson

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15.1 Background

15.1.1 Definition

Late-life psychosis is a heterogeneous condition, representing a cluster of clinical features occurring as a result of diverse etiologies. Psychosis is defined by the *Diagnostic and Statistical Manual of Mental Disorders*, 5th edition (DSM-5), as the presence of hallucinations, delusions, disorganized thinking and speech, grossly disorganized or abnormal motor behavior, or negative symptoms [1]. The term *late life* has come to represent several different groups of older adults with psychosis, differentiated by age of onset and clinical features. A generally accepted broad classification of the condition, which will define the scope of the disorder for this chapter, includes groups of patients with the following:

- Aging with early-onset schizophrenia
- Late-onset (after age 40) and very late-onset (after age 60) schizophrenia and unspecified schizophrenia spectrum disorders
- Delusional disorder
- Psychosis as part of a major neurocognitive disorder (formerly dementia)
- Delirium
- Substance-induced psychosis
- Depressive disorder
- Bipolar disorder
- Systemic medical illnesses
- Neurological conditions

As in younger adults, the disease burden of psychotic disorders has enormous impact on the older patient, the family, caregivers, and society. There are unique characteristics of late-life psychosis that are important in determining etiology and informing appropriate treatment. This chapter will focus on late- and very late-onset schizophrenia, unspecified psychosis, delusional disorder, and psychosis as part of a major neurocognitive disorder. For psychosis related to depressive disorder, bipolar disorder, delirium, and major neurocognitive disorders, please refer to ▶ Chaps. 10, 11, 17, and 22.

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15.1.2 Epidemiology

It has been challenging to accurately determine the epidemiology of late-life psychiatric disorders in general. In particular, identifying cases and distinguishing those individuals who need treatment, as opposed to those experiencing the effects of normal aging, have been difficult. Psychiatric disorders and symptoms may interact with the aging process and other factors occurring in late life. Current classification systems such as DSM present challenges in differentiating psychiatric symptoms from those related to aging, physical illness, frailty, and cognitive impairment. Overall, the prevalence of psychiatric disorders appears to be lower in older adults compared to younger counterparts [2].

The precise prevalence and etiology of psychotic symptoms is further hampered by the occurrence of these symptoms in many systemic medical, neurological, neurodegenerative, and various psychiatric illnesses. Overall, at least 6% of older adults have paranoid symptoms, but most of these will have a neurocognitive disorder to account for their symptoms [3]. A recent review of late-life psychosis summarized the associated epidemiological and clinical features of various conditions, which will be discussed in the following sections [4]. In this review, schizophrenia diagnosed after age 45 and after age 65 has 1% prevalence and 0.3% prevalence, respectively. Delusional disorder has 0.18% lifetime prevalence. In patients with major neurocognitive disorder due to Alzheimer disease, approximately 40% have psychotic symptoms. In Parkinson disease there is a 43% prevalence of psychotic symptoms. In patients with major neurocognitive disorder due to Parkinson disease, the prevalence rate of visual hallucinations is 89%. In those with major neurocognitive disorder with Lewy bodies, the prevalence of hallucinations, misidentifications, and delusions is 78%, 56%, and 25%, respectively.

15.1.3 Etiology and Differential Diagnosis

The approach to the differential diagnosis or etiology of psychotic disorders at any age involves a thorough work-up to rule out reversible contributors, including a detailed history, physical examination, mental status examination, and additional laboratory and radiological investigations. These reversible factors include substances, medications, another primary psychiatric disorder, or an underlying systemic medical or neurological condition and will not be covered in detail in this chapter [5].

This group of disorders has been challenging to study, given the ambiguity of definitions. In evaluating older adults with psychosis, etiology is critically important in informing the correct management. A careful review of history and clinical presentation must be undertaken. Factors to consider include age of onset, acute versus insidious onset, duration of symptoms, family history of psychosis, clinical presentation, and setting. For example, psychotic symptoms appear to be more common in inpatient and institutional settings such as long-term care facilities than in the community or outpatient settings.

15.1.4 Clinical Description

Schizophrenia and Unspecified Schizophrenia Spectrum and Other Psychotic Disorders (Previously Psychosis Not Otherwise Specified)

This category encompasses schizophrenia in all older adults and includes aging individuals with early-onset symptoms, late-onset symptoms, and very late-onset symptoms. Risk factors for late-onset schizophrenia include genetic factors,

female sex, and premorbid paranoid or schizoid personality structure [6]. Very late-onset schizophrenia is likely a heterogeneous condition with multifactorial etiology. Unlike the late-onset schizophrenia, there is no association with a family history of schizophrenia, but a higher association with brain structure abnormalities and cognitive impairment.

The late-onset schizophrenia group is traditionally thought to exhibit distinct clinical features, with higher rates of visual, olfactory, and tactile hallucinations, and persecutory delusions. Auditory hallucinations tend to be less common and milder and, when present, are derogatory in nature, with a third-person running commentary [7–10]. Those with late-onset schizophrenia are generally thought to have lower rates of negative symptoms and thought disorder, although recent findings have challenged this notion and found no significant difference between groups in both negative and positive symptomatology.

Neuroimaging has not been particularly helpful in distinguishing features of late-life schizophrenia, with variable patterns of neurodegeneration and volume loss. Some studies have demonstrated increased periventricular white matter hyperintensities on MRI, and lower frontal and temporal lobe perfusion on PET and fMRI studies, but these conclusions remain variable and have limited correlation with clinical presentations [4].

Delusional Disorder

While its overall prevalence is low, delusional disorder should be considered as a cause of suspiciousness in older adults, in individuals who exhibit non-bizarre delusions (e.g., paranoid, somatic, erotomanic, grandiose) with otherwise intact functioning. Hallucinations are not prominent, but may be present if related to the delusional thought content. Common themes of delusions in older adults are those of persecution and conspiracy. Risk factors for delusional disorder include a family history of paranoid personality traits, personal history of paranoid or schizotypal personality traits, sensory impairment, and social isolation. Risk factors are interrelated, as sensory deficits may limit one's ability to interact with others and may fuel social withdrawal. There are no sex differences in presentation. Immigration and low socioeconomic status may also be risk factors, but the evidence is not compelling. Neuroimaging has not been helpful in distinguishing patients with delusional disorder from other forms of psychosis.

Major Neurocognitive Disorder Due to Alzheimer disease

Psychosis is very common in the context of Alzheimer disease and is a frequent source of agitation, particularly in inpatients. Psychotic symptoms may wax and wane as the major neurocognitive disorder progresses, and patients may also lose the ability to describe their symptoms, making it a challenging area to study. Psychosis in Alzheimer disease is often associated with more rapid cognitive decline, age, and duration of major neurocognitive disorder, but not with sex, education, and family history of psychosis or major neurocognitive disorder [3]. Psychosis in the setting of major neurocognitive disorder is distinct compared to psychosis in other non-dementing illnesses. Hallucinations in Alzheimer disease tend to be visual rather than auditory. Delusions are not as complex or well-formed, with common themes of misidentification, persecution, and theft. (See ► Chap. 22.) Other characteristics include greater executive dysfunction, increased risk of extrapyramidal symptoms and tardive dyskinesia, and increased neurodegeneration.

Major Neurocognitive Disorder with Lewy Bodies

Major neurocognitive disorder with Lewy bodies is recognized as one of the most common type of major neurocognitive disorders after Alzheimer disease-related and mixed (vascular and Alzheimer disease) major neurocognitive disorder. This disorder is often under-recognized yet important given the potential side effects to treatment, notably exquisite sensitivity to antipsychotics. (See ► Chap. 22.) The challenge to refine diagnostic criteria to enhance diagnostic specificity and sensitivity continues. Visual hallucinations, considered rare in Alzheimer disease, are a core clinical feature of major neurocognitive disorder with Lewy bodies, occurring in about two thirds of patients [11]. Visual hallucinations often occur early in Lewy body disease, may be simple or complex, and are considered to be one of the most helpful symptoms in differentiating major neurocognitive disorder with Lewy bodies from Alzheimer disease. The presence of visual hallucinations may give rise to delusions rooted in the visual misperceptions in up to 75% of cases [12]. While less common, patients may also experience auditory, olfactory, or tactile hallucinations, necessitating a work-up to exclude toxidromes or seizure disorders.

As in Alzheimer disease, severity of psychosis is positively correlated with severity of major neurocognitive disorder [13]. Similar to the psychosis of Parkinson disease, visual hallucinations in Lewy body disease are well-formed and often non-distressing. The two disorders are distinguished by the timing and sequence of motor and cognitive symptoms, anecdotally referred to as the "1-year rule." (See ► Chap. 20.) Lewy body neurocognitive disorder typically starts with cognitive impairment, with the motor symptoms of Parkinson disease developing within the first year. In neurocognitive disorder due to Parkinson disease, motor symptoms must be present for a minimum of 1 year prior to the onset of cognitive impairment.

Major Neurocognitive Disorder Due to Parkinson Disease

Patients with Parkinson disease, with or without neurocognitive disorder, are at high risk for developing visual hallucinations. Cognitive dysfunction is strongly associated with the presence of hallucinations, and in those with normal cognition, hallucinations may be a harbinger for later major neurocognitive disorder. Many antiparkinsonian drugs, including the commonly prescribed dopaminergic agents (e.g., levodopa/carbidopa, amantadine), can cause and exacerbate visual hallucinations [14].

Visual hallucinations are the most common psychotic symptom seen in Parkinson disease, which tend to be stereotyped and non-frightening, but hallucinations of any sensory modality may be seen. When present, delusions are generally non-bizarre and persecutory in nature [15]. Unlike in Alzheimer disease, the prevalence of psychosis in Parkinson disease-related neurocognitive disorder is not positively correlated with severity of major neurocognitive disorder [13].

Neuroimaging, while helpful to document gross changes in neuroanatomy representing advanced major neurocognitive disorder, has limited usefulness in diagnosis. It is most often used to rule out significant pathology in the context of sudden alterations in clinical presentations (e.g., subdural hematoma, stroke, tumor). Neuroimaging can help to document suspected neurodegeneration in one area of the brain.

Delirium

While not discussed in depth in this chapter, delirium can present with psychotic symptoms and must always be ruled out first. In brief, delirium is defined by DSM-5 as a disturbance in attention and awareness that develops over a short period of time, is a change from baseline, and fluctuates throughout the day [1]. (For more details, see ► Chap. 17.) Criteria stipulate that there must be an additional disturbance of cognition (i.e., memory, orientation, language, visuospatial ability, perception) [1]. Symptoms must not be solely attributable to preexisting major neurocognitive disorder or severely reduced level of consciousness. There must be evidence that symptoms are clearly linked to another systemic medical condition, substance intoxication/withdrawal, toxin exposure, or multiple etiologies [1]. Additional clinical features of delirium include disturbed sleep-wake cycle, emotional lability, and psychosis [16]. Delirium is frequent in individuals over age 70, more common in inpatient settings such as intensive care, postoperative care, and palliative care, and is usually multifactorial in causation. Common risk factors for delirium include premorbid cognitive and/or functional impairment, sensory deficits, substance abuse, and polypharmacy [16]. The importance of identifying and treating the underlying cause of delirium cannot be overstated, as psychotic symptoms may resolve without the need for long-term antipsychotic treatment.

15.1.5 Diagnostic Evaluation

Clinical History

It can be challenging to determine the cause of psychosis in older adults due to the heterogeneity of clinical presentations. Yet accurate diagnosis is crucial, as treatment is guided by the context within which the psychotic symptoms present. As with all medical problems, the first step involves taking a thorough clinical history. Ideally, both patients and their caregivers or knowledgeable informants should be interviewed to obtain collateral history. This is especially important when psychosis presents in the context of major neurocognitive disorder, where one's cognitive ability to provide an accurate history may be limited. As well, collateral sources can be helpful in describing one's premorbid personality structure and level of functioning. History taking should begin by targeting the patient's area of distress and addressing current symptoms, including symptom onset and age of first onset. This helps to determine whether this is an aging individual with an early-onset psychotic disorder versus a late-onset psychosis. Past psychiatric history should be elicited to identify comorbid psychiatric illnesses, prior need for hospitalization, and past trials of pharmacotherapy or electroconvulsive therapy.

Old medical records may be obtained to corroborate patient's history. Past medical history is essential, including recent infections, other medical illnesses, and recent hospitalizations, as this increases the clinical suspicion for delirium (discussed previously in ► section Delirium). In this vein, a complete medication review is essential, including current medications, those recently discontinued, over-the-counter substances, overall compliance, and medication misuse. It is helpful to have patients bring in their most updated pharmacy record for this purpose.

Substance use history must also be addressed, including both ongoing and discontinued substances, to rule out presentations due to intoxication or withdrawal. As with all history taking, it is important to elicit a family psychiatric history and to discuss social history, including recent or ongoing stressors that may impact one's presentation. A risk assessment should be performed to assess suicidality (discussed in ► Chap. 28, Psychiatric Emergencies in Older Adults) while maintaining vigilance for suspected elder mistreatment or abuse.

Physical Examination

A complete physical examination, including neurological examination, is part of the clinical evaluation of psychosis. Comorbid physical illnesses identified during the exam should be addressed and treated, with referral to the appropriate medical specialty or subspecialty if needed. When antipsychotic medications are initiated or continued, it is important to monitor for extrapyramidal symptoms, including tardive dyskinesia, and to document this in the patient's chart. A commonly used screening tool for extrapyramidal symptoms is the Abnormal Involuntary Movement Scale (AIMS) [17].

Investigations

Laboratory Examination Routine laboratory investigations are obtained to identify potential causes of delirium and to evaluate for systemic medical comorbidities. Screening laboratory studies for late-life psychosis generally include complete blood count, electrolytes (including calcium, magnesium, phosphorus), glucose, creatinine clearance, hepatic function, thyroid function, B_{12}, and folate. When initiating or continuing antipsychotic medications, metabolic monitoring includes fasting blood glucose, hemoglobin A1c, and fasting lipids. If

infection is suspected, urinalysis and chest x-ray should be ordered, given that the most common sources of infection tend to be respiratory and urinary tract. Electrocardiogram should be ordered in individuals with a cardiac history or on medications known to be associated with prolonged QTc, such as certain antipsychotics and antidepressants.

Neuroimaging The role of neuroimaging in late-life psychosis is somewhat controversial. Cases of new-onset psychosis merit imaging with CT of the brain to rule out a structural cause for the presentation. Particularly when psychosis arises in the context of neurocognitive disorder, neuroimaging can be helpful in establishing a clinical baseline for monitoring. Common abnormalities seen on neuroimaging with CT/MRI in late-life psychosis include increased white matter lesions and structural changes with ventricular enlargement, cortical atrophy, and smaller superior temporal gyrus. Abnormalities may also be seen on functional neuroimaging, showing increased dopamine uptake.

Cognitive Examination

Brief cognitive testing such as Montreal Cognitive Assessment (MoCA) and standardized Mini Mental State Examination (sMMSE) should be performed to obtain a cognitive baseline and to monitor cognition serially. Full neuropsychological testing may also be considered. Neuropsychological findings in late-life psychosis show overall decline in frontal lobe function and verbal memory. Late-life psychosis is thought to be related to degenerating cortical structures in the aging brain, resulting in disrupted neurotransmission, and deficits in maintaining attention and filtering information. Cognitive deficits noted are often progressive, but not all cases progress to frank major neurocognitive disorders. It can be challenging to detect deterioration when one's premorbid functional and cognitive baseline is low. As well, these individuals often perform poorly on standardized tests and may appear clinically better than their formal testing suggests.

15.1.6 Treatment

General Principles

Antipsychotics in geriatric patients are associated with various and often serious side effects and must be used judiciously. In general, non-pharmacological management strategies should be tried first, if possible. Safety is paramount, and antipsychotics are indicated when non-pharmacologic strategies have failed and/or psychotic symptoms place the individual or others in their living environment at risk. Is it important to establish therapeutic alliance with the patient and caregivers to promote adherence and to consider the ideal treatment setting for the individual (e.g., inpatient versus community). Decisional capacity to consent to treatment should be assessed prior to initiating treatment, and informed consent should be obtained from the patient or the substitute decision maker and documented in the medical record.

Age-related changes in the pharmacodynamics and pharmacokinetics of psychotropic medications (e.g., longer time to reach steady state, longer half-life, longer elimination time) should be taken into consideration. Lower doses, cautious dose adjustments, and regular reassessment of the need for continuing treatment in the geriatric patient should be considered. Older patients are more vulnerable to adverse effects, including sedation, anticholinergic effects, cognitive decline, extrapyramidal symptoms, and drug-drug interactions. Because of the tendency toward side effects, adherence to treatment may be a challenge. As well, clinicians should be aware of the relevant legislation and regulations in the jurisdiction where they practice, regarding the usage of antipsychotics in long-term care facilities.

Non-pharmacological Management

Non-pharmacologic therapies are used to reduce symptom burden and also to enhance the effectiveness of and adherence to pharmacological treatment [4, 18, 19]. By providing patients with the opportunity to express their fears and expectations regarding treatment, therapeutic rapport is bolstered. Simple distraction techniques may help alleviate the distress associated with psychotic symptoms and enhance self-efficacy and coping. In situations of acute behavioral crises, it is essential for safety purposes to remain calm, nonthreatening, and at a safe distance and to summon help when needed.

There are four general types of psychosocial therapy for schizophrenia: (i) cognitive behavioral therapy (CBT), (ii) social skills training, (iii) family therapy, and (iv) cognitive remediation [4, 18]. Of these, CBT is the most widely used, with evidence for the reduction of positive and negative symptoms, as well as some benefit for treatment adherence [4, 20]. There is limited data on the application of these interventions to geriatric patients with schizophrenia. Other psychosocial treatments have not been studied in late-onset schizophrenia, including supported employment, healthy lifestyle measures, illness self-management training, assertive community training, and family psychoeducation [4, 21, 22]. Exercise can be helpful in reducing cognitive decline and improving functional status, but there is no evidence specifically on the reduction of psychotic symptoms [4, 23].

Pharmacological Management

Schizophrenia

Antipsychotics are the mainstay of treatment in schizophrenia, yet there is limited data on their use in late-onset schizophrenia. There is some evidence supporting the use of atypical antipsychotics such as risperidone and olanzapine [24].

Delusional Disorder

Similarly there are no treatment studies specifically on late-life delusional disorder, and risperidone and olanzapine are most commonly used, with some evidence supporting their use [25].

Major Neurocognitive Disorders

Importantly, there are increased mortality and morbidity risks associated with the use of antipsychotics in the geriatric patients with major neurocognitive disorder, with an increased risk of sudden cardiac death and a small increased risk of cerebrovascular accident [26, 27]. There is no definitive pathophysiologic mechanism for the increased mortality risk, but it is thought to be due to oversedation and the increased risk of aspiration. A significant body of literature including 17 double-blind placebo-controlled trials led to the placement of the US Food and Drug Administration (FDA) black box warning on both typical and atypical antipsychotics in older individuals with major neurocognitive disorders [28]. Nonetheless, Health Canada does support the use of risperidone for "the short-term symptomatic management of aggression or psychotic symptoms in patients with *severe* dementia of the Alzheimer type unresponsive to non-pharmacological approaches and when there is a risk of harm to self or others" [29].

Antipsychotics have modest benefit for the treatment of behavioral disturbances in major neurocognitive disorder. The most efficacious and best-tolerated agents are risperidone, olanzapine, and aripiprazole [8, 30]. Haloperidol should be limited to brief use for the treatment of delirium-associated psychosis and agitation. Antipsychotics are generally not effective for wandering, social withdrawal, vocalizing, pacing, touching, or incontinence.

Antidepressants may also be considered to treat agitation and psychosis in major neurocognitive disorder due to Alzheimer disease, with evidence supporting the use of citalopram and sertraline [31]. In one study, citalopram has been shown to have equal efficacy to risperidone [32]. Individuals more likely to benefit from antidepressants are those with mild cognitive impairment and moderate agitation at baseline [33]. Due to the association of citalopram with QTc prolongation, it should be avoided in those at increased risk for cardiac arrhythmia or with QTc above 500 milliseconds.

Major Neurocognitive Disorder with Lewy Bodies and Major Neurocognitive Disorder Due to Parkinson Disease

Antipsychotics must be used with great caution in Lewy body disease due to the risk of extreme antipsychotic sensitivity in this population. Prior to initiating antipsychotics in Parkinson disease, dopaminergic parkinsonian agents should be reviewed and streamlined, as these can worsen psychosis. As in Lewy body neurocognitive disorder, antipsychotics must be used cautiously due to the risk of exacerbating parkinsonian motor symptoms. In both Lewy body disease and Parkinson disease, low-dose quetiapine is most commonly used. The largest body of evidence exists for the use of low-dose clozapine, although its use is limited by the need for hematologic monitoring and the risk of agranulocytosis [4]. Pimavanserin (a non-dopaminergic atypical antipsychotic) is the first recently approved drug by the FDA to treat hallucinations and delusions associated with Parkinson disease [34]. Cholinesterase inhibitors are recommended as first-line treatment for psychosis in major neurocognitive disorder with Lewy bodies and major neurocognitive disorder due to Parkinson disease, due to the lower comparative risk of toxicity and possible benefit for cognition [35]. A summary of common medications used to treat psychosis in major neurocognitive disorders is presented in ◘ Table 15.1 [36].

Neurostimulation

Neurostimulation refers to the use of electroconvulsive therapy (ECT), transcranial magnetic stimulation (TMS), and deep brain stimulation (DBS). Very limited data is available on the use of neurostimulation in exclusively older psychotic patients, with several ECT trials, no TMS trials, and no DBS trials to date in older adults with schizophrenia [4]. Of these, ECT is the most widely used, with evidence for benefit in treatment-resistant cases, catatonic schizophrenia and schizophrenia with a significant depressive component. As well, maintenance treatment with ECT plus antipsychotics is associated with lower rates of relapse than treatment with antipsychotics alone [4, 37, 38]. There is limited evidence for the use of ECT in psychosis in Parkinson disease [4, 39]. Otherwise, evidence does not generally support the use of ECT for psychosis in major neurocognitive disorder. While DBS can be used to treat motor symptoms in Parkinson disease, it does not improve psychosis and may actually worsen psychotic symptoms [4, 40].

15.2 Case Studies

This section emphasizes clinical case studies used to illustrate common diagnostic challenges and treatment concerns that are associated with managing a geriatric patient with psychosis. Case studies may be used as teaching tools for clinicians and trainees at various levels and may be particularly helpful as "quick-reference" tools in on-call or emergency settings.

15.2.1 Case 1

Case 1 History

You are working in an outpatient geriatric psychiatry clinic, and the following is your first consultation of the day, referred by the patient's primary care physician.

Ms. D. is an 81-year-old widowed female living alone in an apartment, with no past psychiatric history. At her recent checkup, she expressed concerns that her upstairs neighbors are

Table 15.1 Pharmacological management of psychosis in major neurocognitive disorders [36]

Medication category	Daily dosing	Side effect monitoring	Comments
Atypical antipsychotics (AAP)			
Risperidone	Initial: 0.25 mg od-bid Titration: 0.25–0.5 mg q3–7 days Max: 2 mg	Sedation Postural hypotension Falls Anticholinergic side effects (dry mouth, constipation, confusion) EPS, particularly parkinsonian side effects (rigidity, bradykinesia, shuffling gait, masked facies, tremor) Olanzapine and quetiapine are more sedating than risperidone or aripiprazole	Best supported AAP for NPS Most likely AAP to cause EPS
Olanzapine	Initial: 2.5–5 mg qhs Titration: 2.5–5 mg q3–7 days Max: 10 mg		Most likely AAP to cause metabolic side effects
Quetiapine	Initial: 12.5 mg bid Titration: 12.5–25 mg q3–7 days Max: 150 mg		Used for Parkinson disease-related and Lewy body-related NCD at lower doses
Aripiprazole	Initial: 2–5 mg daily Titration: 2–5 mg q3–7 days Max: 10 mg		Most likely AAP to cause akathisia (restlessness)
Typical antipsychotics			
Haloperidol	Initial: 0.25 mg bid Titration: 0.5 mg bid q3–7 days Max: 1.5 mg bid	Haloperidol more likely to cause EPS than AAP	Gold standard for delirium Given IM in ED when other formulations are unavailable
SSRI antidepressants			
Citalopram	Initial: 5–10 mg daily Titration: 10 mg q7 days Max: 20 mg	Headache Nausea (given with food to decrease GI upset) Diarrhea Sweating Insomnia Hyponatremia Risk of GI bleed QTc prolongation at higher dose of citalopram Risk of falls, fractures, and osteoporosis	Citalopram is best supported SSRI for NPS, with evidence for both citalopram and sertraline
Sertraline	Initial: 25 mg daily Titration: 25 mg q7 days Max: 100 mg		
Cholinesterase inhibitors (ChEIs)			
Donepezil	Initial: 2.5–5 mg daily Titration: 2.5–5 mg q4–6 weeks Max: 10 mg	GI upset (nausea/vomiting/diarrhea) Loss of appetite Decreased GI side effects with patch Insomnia, hyper-vivid dreams Bradycardia Urinary incontinence Muscle cramps	ChEIs are first-line agents for psychosis in Parkinson disease-related and Lewy body-related NCD Taken with food to minimize GI upset Rotate patch site
Rivastigmine (oral and transdermal)	Initial: 1.5 mg bid Titration: 1.5 mg q2 weeks Max: 12 mg		
	Initial: 5 cm^2 patch Titration: 5 cm^2 q4 weeks Max: 15 cm^2		
Galantamine (extended release)	Initial: 8 mg qam Titration: 8 mg q4 weeks Max: 24 mg		

Note: bid two times a day, *BZP* benzodiazepine, *ED* emergency department, *EPS* extrapyramidal symptoms, *GI* gastrointestinal, *IM* intramuscular, *NCD* neurocognitive disorder, *NPS* neuropsychiatric symptom, *SSRI* selective serotonin reuptake inhibitor, *tid* three times a day

stealing from her and spying on her. Please advise regarding assessment and treatment recommendations.

Ms. D. presents to the clinic along with her niece. She appears well-dressed and neatly groomed, well hydrated, and well nourished. She is pleasant and cooperative throughout the interview, but appears visibly worried as she tells you about the young couple upstairs who is spying on her. She says that they know when she is a way and break in to hunt for valuables to sell for drugs. She has no proof, but is certain this is happening. She has complained to the landlord, who has "done nothing." She denies any other delusions or hallucinations, and no mood symptoms are elicited. Her past medical history is significant for bilateral hearing loss, yet she refuses to wear hearing aids. She is an ex-smoker and a nondrinker. She is on no medications, other than the occasional acetaminophen for headache. There are no known drug allergies. There is no past psychiatric history.

Case 1 Questions and Answers

Case 1 Questions

Question 1. What additional information is needed to make an accurate diagnosis?

Question 2. What investigations should be ordered?

Question 3. What is the differential diagnosis in late-life psychosis? What is the working diagnosis in this case?

Question 4. What are the risk factors for the development of psychosis in the geriatric population?

Case 1 Answers

Case 1 Answer 1 (Question 1—What additional information is needed to make an accurate diagnosis?)

In general, the key elements to address as part of a thorough evaluation are presented in Table 15.2. In Ms. D.'s case, it would be important to obtain collateral history from her niece, including any safety concerns, cognitive and/or functional decline, and information regarding her premorbid personality structure and functional status. Although she is not on any regularly prescribed medications, the most updated medication list should generally be reviewed, including over-the-counter and herbal preparations, recent changes to medication, and overall treatment compliance. Delirium should always be ruled out with inquiry into acute medical illnesses and recent infectious symptoms (most common source as upper respiratory tract and urinary tract). Cognitive screening should be performed to rule out cognitive impairment and to establish a baseline.

Table 15.2 The work-up in late-life psychosis

History	Sources of information
Current symptoms within overall symptomatic context Age of symptom onset Past psychiatric history Comorbidity Past medical history (including acute systemic medical illness) Family history of psychiatric illness Medications (new, discontinued, over the counter) Substance use (past and present) Premorbid personality and function Stressors, losses	Collateral information from family members/caregivers Old medical records Medication record from pharmacy Laboratory investigations Neuroimaging (e.g., CT, MRI, SPECT) EEG (if justified) Cognitive screening (MMSE, MoCA) Neuropsychological evaluation

Collateral history obtained from her niece reports that Ms. D. has been "obsessed with her neighbors" for the past year. She telephones her niece weekly with these concerns, but has never called the police. There have been no difficulties with memory observed, and she is fully independent with basic and instrumental activities of daily living. She wonders whether her aunt is fearful of living alone, as her husband died several years ago. While she was close to her husband, throughout her life Ms. D. was otherwise "somewhat of a loner, mistrustful, and odd." She has never gotten along well with neighbors. She retired at age 65 from her secretarial job. There is no known family psychiatric history.

Case 1 Answer 2 (Question 2—What investigations should be ordered?)

A standard work-up includes investigations to rule out causes of delirium, including infection, metabolic and electrolyte disturbances, uremia, toxic ingestions, hypoxia, stroke, and myocardial infarction. Particularly in first episode psychosis, neuroimaging should be obtained to rule out structural causes, such as intracranial tumor or hemorrhage. Cognitive screening helps to establish whether the symptoms are occurring in the context of cognitive impairment and provides a baseline for future comparison. Recall that cognitive screening may yield variably valid results during conditions of fluctuating cognitive status such as an acute episode of delirium or other neuropsychiatric illnesses and should always be repeated when symptoms stabilize. The common investigations in the work-up of late-life psychosis are shown in Table 15.3.

Recent laboratory investigations forwarded by Ms. D.'s primary care physician are all within normal limits, and CT of the brain shows mild age-related atrophy, with no vascular changes noted.

Case 1 Answer 3 (Question 3—What is the differential diagnosis in late-life psychosis? What is the working diagnosis in this case?)

The most common cause of late-life psychosis is major neurocognitive disorder due to Alzheimer disease. However, psychosis can present in a variety of clinical conditions, including other types of major neurocognitive disorders, depressive and bipolar disorders, early- and late-onset schizophrenia and schizoaffective disorder, delusional disorder,

Table 15.3 Common investigations in the work-up of late-life psychosis

Laboratory	Neuroimaging	Cognitive
Complete blood count, basic and extended electrolytes, urea/creatinine, glucose Lipids, liver-associated enzymes, thyroid-stimulating hormone, B_{12}, folate Urinalysis Chest x-ray Electrocardiogram Creatine kinase and troponins if indicated	Computed tomography/ magnetic resonance imaging Electroencephalogram if indicated	Montreal Cognitive Assessment, Mini Mental State Examination, Frontal Assessment Battery Consider neuropsychological evaluation

Table 15.4 Differential diagnosis in late-life psychosis

Primary conditions	Secondary conditions
Schizophrenia (early vs. late onset) Schizoaffective disorder Delusional disorder	Major neurocognitive disorder due to Alzheimer disease Major neurocognitive disorder due to other causes (vascular, Lewy body, mixed, frontotemporal type) Major depressive disorder Bipolar disorder (manic or major depressive episode) Secondary causes (systemic medical illness, medication, substance)

Table 15.5 General risk factors for late-life psychosis [42]

Risk factors for psychosis in late life	Female sex Genetic predisposition History of previous psychosis Cognitive impairment Comorbid medical illness/ deteriorating physical health Medications (e.g., dopaminergic, anticholinergic) Substance misuse Sensory deficits Life stressors Social isolation Premorbid personality structure

and in the context of certain systemic medical and neurological illnesses and medication/substance-related conditions. Table 15.4 lists the differential diagnosis to consider in late-life psychosis.

In Ms. D.'s case, she presently does not exhibit any cognitive or functional impairment (MoCA score of 28 out of 30) and thus cannot be called major or mild neurocognitive disorder. However, she should be monitored closely, as late-onset psychosis is often a harbinger of major neurocognitive disorder. Delirium is unlikely in this case as there is no obvious medical cause. As well, her delusion is complex, and the delusions of delirium tend to be transient and poorly systematized, commonly with misinterpretations, illusions, and visual hallucinations. While she did not exhibit any depressive symptoms in today's consultation, psychosis commonly accompanies depression in the older adults, with mood congruent delusions of guilt, nihilism, and persecution.

Ms. D.'s current presentation is most consistent with a delusional disorder, a common cause of suspiciousness in geriatric patients. DSM-5 defines delusional disorder as the presence of at least one delusion of at least 1 month's duration, with no bizarre behavior, no functional impairment, and symptoms that cannot be attributed to the effects of substance use, medical illnesses, or other psychiatric disorders. Any hallucinations present must be related to the delusional theme. The individual cannot ever have met criteria for schizophrenia, and any past depressive or manic episodes must have been brief relative to the duration of the delusions [1]. The lifetime prevalence of delusional disorder is approximately 0.18%, with average age of onset in the late 40s [41]. Ms. D.'s delusions are of a persecutory nature, as is a classic theme in late-onset delusional disorder.

Case 1 Answer 4 (Question 4—What are the risk factors for the development of psychosis in the geriatric population?)

Table 15.5 presents the general risk factors for late-life psychosis [42]. Ms. D.'s case highlights multiple risk factors for late-life psychosis, including female sex, social isolation, and possibly the stressor of losing her husband several years ago. Her bilateral hearing impairment likely causes her to misperceive environmental stimuli, further fueling her delusional beliefs. Her premorbid personality is a particular risk factor, as she is described as somewhat paranoid and mistrustful of others.

Case 1 (Continued)

After completing your assessment, you begin to discuss the treatment plan with Ms. D. and her niece, including optimization of her hearing, trial of an antipsychotic, and involvement in a local day program for cognitive and social stimulation. At the mention of antipsychotics, Ms. D. decides she is not interested and does not wish to return to the clinic. You instruct Ms. D. and her niece to contact you as needed and attempt to book a home visit to follow up in 3 months, but she is not reachable and is ultimately lost to follow-up.

Six months later, you are asked to see Ms. D. again, this time as an inpatient on the acute psychiatric unit. She now believes that the neighbors are taking her to the basement of the building and "doing experiments" on her. She shows you a bruise on her arm as proof. She reports that they release a gas (which claims that she can smell) through the ceiling vents to "knock her out" and have planted a "chip" in her brain to monitor her. She believes they plan to harvest her organs, and she can hear them talking about her. She is no longer eating or attending to her hygiene. There have been no intercurrent infections or medical illnesses, and she continues to be on no medications.

Routine physical examination including screening neurological exam was unremarkable, laboratory studies were normal, and CT of her brain was unchanged from the previous study. Brief cognitive testing at admission showed a MoCA score of 24 out of 30, a decline compared to her previous score 6 months previously. After careful discussion with Ms. D. and her niece, informed consent is provided to start a trial of risperidone, which is gradually titrated to 2 mg at night with good response. After 2 weeks of treatment, you note a mild resting tremor in the hands and slowed gait with decreased arm swing. Risperidone is lowered to 1.5 mg at night with improvement in extrapyramidal symptoms, and Ms. D. is eventually discharged home to follow up with the outpatient team.

Case 1 Analysis Ms. D. initially presents with moderate non-bizarre persecutory delusions in the absence of cognitive and/or functional impairment and lacking prominent mood features. Her clinical picture is in keeping with delusional disorder, a common cause of paranoia in geriatric patients who otherwise lack family psychiatric history. She exhibits a classic constellation of risk factors for the development of delusional disorder, such as sensory impairment, social isolation, and premorbid personality structure. As is evident with her precipitous deterioration in the continuation of the case, late-onset psychosis is often a harbinger of major neurocognitive disorder, and individuals should be monitored closely for cognitive and/or functional decline suggestive of an evolving neurocognitive disorder.

Ms. D.'s case illustrates several general principles of treatment in late-life psychosis. Prior to initiating treatment, it is essential to conduct and to document an informed discussion of the risks and benefits of treatment with patients and their families. Treatment setting should be considered, and in this case, inpatient hospitalization allows for a closely monitored setting to initiate and titrate medication. The extrapyramidal side effects experienced by Ms. D. highlight the older adult's sensitivity to pharmacotherapy. In addition to the increased mortality risks due to sudden death and cerebrovascular events, individuals started on antipsychotics should be monitored closely for anticholinergic side effects, metabolic syndrome, oversedation, drug-drug interactions, and changes in cognitive and functional status [26]. Treatment should be time-limited, and target symptoms should be assessed using validated scales with frequent clinical reassessment [27].

Delusional disorder is typically considered resistant to treatment. There are currently no treatment studies focused on older adults with delusional disorder, and thus it is difficult to draw conclusions about the efficacy of antipsychotics in this population. However, a recent review of late-life schizophrenia reports that, although findings are mixed, there is some evidence supporting the efficacy of both risperidone and olanzapine in treating delusional disorder [25]. This same review found similar efficacy for pimozide, the typical antipsychotic previously considered first-line treatment for delusional disorder in the general population [25]. The one study looking at newer antipsychotics in delusional disorder found that, compared to oral antipsychotics, patients treated with long-acting injectable antipsychotics (e.g., paliperidone, risperidone) had significant improvement in both negative and positive symptoms [43].

15.2.2 Case 2

Case 2 History

You are a psychiatrist working on an inpatient geriatric psychiatry unit. Your new admission today is Mr. E., a 72-year-old single male resident from an assisted living facility. He was brought to the emergency department with "physical aggression and bizarre behaviors." Mr. E. has no known premorbid psychiatric history. Two years ago, he was diagnosed with mild neurocognitive disorder, major depressive disorder, and generalized anxiety disorder. He is unmarried with no children and had been living independently in an apartment until 6 months ago. His recent symptoms of depression and anxiety were attributed to his transition to retirement from teaching at age 65. He had worked as a high school mathematics teacher for 3 decades and was highly active in his local church. Following his retirement, his cognitive decline progressed, and, subsequently, he began to experience progressive parkinsonian symptoms, including mild intention tremor, cogwheeling rigidity, and bradykinesia. Recurrent falls and functional decline led to his eventual admission to the assisted living facility, as he required assistance with bathing, dressing, cooking, and medication management. He was seen by the facility's physician and referred to neurology service for evaluation of his parkinsonian symptoms.

Assisted living staff members report that he appears intermittently confused and disoriented and endorses visual hallucinations of insects and children in his room. He was initially insightful regarding these perceptual disturbances and easily reassured by staff. He was often seen in his room contentedly interacting with hallucinatory figures. Over the past month, he has expressed concerns that someone in the facility wants to harm him and that "nothing is real." He has become increasingly volatile and has been physically aggressive toward coresidents on several occasions, with no apparent trigger. At other times he appears entirely lucid and engages appropriately with staff and coresidents. His sleep is erratic and he has been observed to be thrashing his legs in his bed on nightly rounds. He is eating well, bowel and

bladder function are normal, and he denies any pain. There are no intercurrent medical illnesses and no infectious symptoms noted. There is no known family psychiatric history.

Past medical history is significant for dyslipidemia treated with a statin. He otherwise does not have any vascular risk factors. There is no history of traumatic brain injury. He is a non-smoker and nondrinker, and there is no illicit drug use. His current medications include atorvastatin 40 mg po daily and risperidone 0.5 mg po qhs, recently started by the facility's physician for psychosis. There are no known drug allergies.

On physical examination in emergency department, Mr. E. presented as afebrile with normal vital signs, and worsening parkinsonian symptoms were noted. The emergency physician noted that he appeared "perplexed" and endorsed visual hallucinations of small animals running around the ward. Mental status examination revealed a casually dressed and mildly disheveled older male, who appeared his stated age. He presented as confused, but was able to tolerate short interview. Speech was of normal rate, rhythm, and volume. Mood was described as "not bad" and affect was slightly blunted. Thoughts were disorganized, and perceptions revealed prominent visual hallucinations. He denied suicidality and homicidality. Insight and judgment were impaired due to level of confusion. Brief cognitive testing showed MoCA of 21 out of 30, with deficits in visuospatial and executive function. Laboratory investigations showed dehydration and mild leukocytosis, with urine culture positive for *E. coli* bacteriuria. He was started on intravenous fluids and an antibiotic.

Case 2 Questions and Answers

Case 2 Questions

Question 1. What is your working diagnosis?

Question 2. What are your options for pharmacological management in this case?

Question 3. The medical student on your team asks whether Mr. E. should be referred to the neurology service and started on medication for Parkinson disease. How do you respond?

Case 2 Answers

Case 2 Answer 1 (Question 1—What is your working diagnosis?)

Mr. E.'s clinical history demonstrates many of the core and supporting features of major neurocognitive disorder with Lewy bodies [1]. (See Table 15.6, which highlights the key DSM-5 diagnostic criteria.)

The main feature of major neurocognitive disorder with Lewy bodies is progressive cognitive impairment that tends to manifest as visuospatial and executive dysfunction rather than memory decline per se. Vivid and well-formed visual hallucinations are a hallmark of the disorder, as seen in Mr. E.'s hallucinations of insects and children, and may be accompanied by hallucinations in other modalities, as well as depressive symptoms. Clinical presentations of major neurocognitive disorder with Lewy bodies can fluctuate, and patients often require longitudinal follow-up to capture the diagnosis. As is a common occurrence in older adults, Mr. E.'s presentation was likely also complicated by delirium due to urinary tract infection, and his preexisting cognitive fluctuations worsened to the point of acute confusion and aggression.

Table 15.6 Highlights of the DSM-5 diagnostic criteria for major neurocognitive disorder with Lewy bodies [1]

Core features	Suggestive features
Cognitive fluctuation (attention and alertness) Recurrent visual hallucinations that tend to be well-formed Spontaneous parkinsonism developing subsequent to cognitive decline	Rapid eye movement (REM) sleep behavior disorder Severe antipsychotic sensitivity

Probable diagnosis: 2 core features *or* 1 suggestive feature and ≥ 1 core feature
Possible diagnosis: 1 core feature *or* ≥ 1 suggestive feature

Spontaneous parkinsonism is another core feature, which must begin after the development of cognitive impairment. Parkinsonism must be distinguished from antipsychotic-induced extrapyramidal symptoms, as 50% of individuals do have extreme antipsychotic sensitivity, a supporting feature of the disorder [44]. Mr. E. also demonstrated other supporting features of the disorder, including rapid eye movement (REM) sleep behaviors, as seen in his thrashing behaviors during sleep, as well as frequent falls. Although not present in this case, other supporting features include syncope, transient loss of consciousness, and autonomic dysfunction with orthostatic hypotension and urinary incontinence [45].

Case 2 Answer 2 (Question 2—What are your options for pharmacological management in this case?)

There is limited evidence guiding pharmacotherapy in major neurocognitive disorder with Lewy bodies. Compared to major neurocognitive disorder due to Alzheimer disease, Lewy body neurocognitive disorder is characterized by more severe dopaminergic and cholinergic deficits. As such, cholinesterase inhibitors are recommended as first-line treatment, with modest benefits for cognition and neuropsychiatric symptoms seen with standard doses of rivastigmine and donepezil [46]. Atypical antipsychotics are recommended when cholinesterase inhibitors are ineffective, but must be used very cautiously and with slow dose titration due to the risk of extreme antipsychotic sensitivity. Low doses of quetiapine and/or clozapine (12.5–50 mg) produce transient and lower levels of dopamine blockade and are therefore less likely to cause extrapyramidal symptoms. By extrapolation, a possible future treatment for psychosis is the novel agent pimavanserin, a selective serotonin $5HT_{2A}$ inverse agonist that has been shown to reduce psychosis in Parkinson disease and is well tolerated [46]. For further discussion related to other aspects of treatment for major neurocognitive disorder

Table 15.7 Evidence for pharmacotherapy of psychosis in major neurocognitive disorder with Lewy bodies [46]

Medication class	Drug	Level of evidence
Cognitive enhancers	Rivastigmine Donepezil Memantine	Level I evidence for cognitive symptoms, with both rivastigmine and donepezil. Overall moderate positive benefit. Mixed evidence for use in hallucinations. Memantine shows small significant cognitive improvement, but insufficient evidence
Atypical antipsychotics	Quetiapine Clozapine	Mixed evidence for quetiapine but clinically better tolerated than clozapine. Good evidence for clozapine in Parkinson disease-related neurocognitive disorder, but limited use due to risk of agranulocytosis and hematologic monitoring

with Lewy bodies, such as REM sleep behavior disorder and accompanying depression, please refer to ▶ Chaps. 20 and 24. All medications must be carefully monitored for increased risk of orthostatic hypotension, unsteady gait, and falls. Table 15.7 discusses the evidence regarding pharmacotherapy of psychosis in major neurocognitive disorder with Lewy bodies [46].

Case 2 Answer 3 (Question 3—The medical student on your team asks whether Mr. E. should be referred to the neurology service and started on medication for Parkinson disease. How do you respond?)

The complexity of managing major neurocognitive disorder with Lewy bodies lies in the high sensitivity to drug side effects and the likelihood that treatment with medication may improve one target symptom, yet worsen others. Recall that parkinsonian motor symptoms are due to a lack of dopamine function and are treated with dopaminergic agents. Psychosis is related to excess dopamine function and is treated with dopamine-blocking antipsychotics. Pharmacotherapeutic management of major neurocognitive disorder with Lewy bodies requires the delicate balancing of medications with opposing dopaminergic actions. Dopamine replacement therapy with carbidopa-levodopa, the established treatment for Parkinson disease, is generally less effective in Lewy body disease and increases the risk of worsening psychotic symptoms. The first step in treating this disease is rationalization of all dopaminergic agents to the lowest possible doses. In individuals with significant parkinsonism that is highly functionally impairing, low-dose dopamine replacement with carbidopa-levodopa may be considered with close monitoring for side effects [46]. Such cases require collaboration and regular communication between psychiatry and neurology services for optimal patient care.

Case 2 Analysis This case highlights the emergence of psychotic symptoms as one of the core features of major neurocognitive disorder with Lewy bodies, with well-formed visual hallucinations in the context of parkinsonism. Mr. E. also demonstrates supporting features of the illness, such as antipsychotic sensitivity, recurrent falls, and REM sleep behavior disorder. While it is often misdiagnosed, Lewy body neurocognitive disorder is the second most common form of major neurocognitive disorders after Alzheimer disease type [1]. Recognizing this as a distinct disease entity can be challenging due to the variable and fluctuating clinical presentation and common overlap with other clinical diagnoses that present with psychotic features. It is often not possible to make the diagnosis at a single consultation, and patients must be followed over time for the evolution of symptoms and diagnostic clarity.

Notably lacking from this case is the availability of collateral history, which can often be helpful in making the diagnosis. Mr. E. was initially given diagnoses of mild neurocognitive disorder, depressive disorder, and generalized anxiety disorder. Medical records from his previous consultations should be sought, to clarify the details surrounding his initial presentation and the natural history of his illness. As well, the case describes that Mr. E. is unmarried with no children. Efforts should be made to locate any knowledgeable informants, who may be able to provide information about the temporal sequence of his cognitive and motor symptoms and any known family history of neurocognitive disorders or movement disorders. Mr. E. was admitted from a long-term care facility. Staff members who know him well should be questioned regarding his response to his recent trial of risperidone, as to whether there was any improvement in his psychosis versus worsening with extreme antipsychotic sensitivity.

This case demonstrates the challenges in treating the psychotic symptoms in major neurocognitive disorder with Lewy bodies. The management requires cautious dosing of medication, close follow-up by the treating team, and vigilant monitoring for side effects. In Mr. E.'s case, the risperidone trialed by the primary care physician is not adequately treating his psychosis and, in fact, has worsened his symptoms. Initial steps in his management include stopping the risperidone and monitoring for clearing from potential delirium due to urinary tract infection. It would be reasonable to try a cholinesterase inhibitor as first-line treatment for Lewy body neurocognitive disorder. If the cholinesterase inhibitor is ineffective, or his psychosis continues to be distressing and/or a safety risk, he should be tried on a low dose of an atypical antipsychotic, such as quetiapine or clozapine.

15.3 Key Points: Late-Life Psychosis

- Psychosis can present in a variety of psychiatric and neurological conditions in late life. Symptoms may be part of a premorbid psychiatric illness in an aging individual or may reflect a new-onset disorder in late life, with or without an underlying medical etiology.

- Accurate diagnosis is essential as treatment depends on the context in which the psychosis presents.
- Delirium should always be ruled out first!
- Recall that new-onset psychosis in the geriatric patients is often a harbinger of major neurocognitive disorder, and patients should be followed over time for evolving neurocognitive disorders.
- Non-pharmacological treatment strategies should be tried before medications. If the psychosis is distressing and poses a safety risk, low-dose atypical antipsychotics may be used short term with close monitoring for side effects. Keep in mind the increased risks of morbidity and mortality associated with the use of antipsychotics in the geriatric patients with major neurocognitive disorders, and document informed consent prior to initiating pharmacotherapy.

15.4 Comprehension Multiple Choice Question (MCQ) Test and Answers

MCQ 1. Which of the following statements is true about psychosis in Alzheimer disease?

A. The prevalence of psychosis in Alzheimer disease is about 10%.
B. Psychosis in Alzheimer disease is strongly associated with the patient's sex.
C. Bizarre or complex delusions are common.
D. Misidentification of caregivers is a common feature.

Answer: D

The prevalence of psychosis in Alzheimer disease is approximately 40% (12–75%). Psychosis in Alzheimer disease is associated with age, age at onset of Alzheimer disease, and illness duration, but not with sex, education, or family history of major neurocognitive disorder or other psychiatric illnesses [47]. Paranoid delusions or misidentifications are common in Alzheimer disease, but bizarre or complex delusions (common in late-onset schizophrenia) are uncommon [3]. Therefore, the correct statement is D.

MCQ 2. Which of the following features is *not* preserved in late-life delusional disorder?

A. Basic personality features
B. Intellectual performance
C. Social functioning
D. Occupational functioning

Answer: C

Late-life delusional disorder is associated with significant social functional impairment in which individuals become more reclusive and avoidant, but intellectual performance, occupational functioning, and basic underlying personality features remain relatively well preserved [3]. Thus, the correct answer is C.

MCQ 3. Which of the following medications has been found to be superior in treating symptoms of psychosis in major neurocognitive disorder with Lewy bodies, without worsening motor symptoms, in a double-blind, placebo-controlled trial?

A. Galantamine
B. Rivastigmine
C. Donepezil
D. Memantine

Answer: B

The study by McKeith et al. demonstrated that rivastigmine is twice as likely to show at least 30% improvement in delusions and hallucinations in major neurocognitive disorder with Lewy bodies compared to placebo [48], and the correct answer is B.

References

1. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 5th ed. Arlington: American Psychiatric Publishing; 2013. p. 87–621.
2. Regier DA, Boyd JH, Burke JD, et al. One-month prevalence of mental disorders in the United States. Arch Gen Psychiatry. 1988;45:977–86.
3. Maglione JE, Ipsit VV, Jeste DV. Schizophrenia spectrum and other psychotic disorders. In: The American psychiatric publishing textbook of geriatric psychiatry. 5th ed. Arlington: American Psychiatric Publishing; 2015. p. 309–32.
4. Colijn MA, Bradley HN, Grossberg GT. Psychosis in later life: a review and update. Harv Rev Psychiatry. 2015;23(5):354–67.
5. First MB. DSM-5 handbook of differential diagnosis. Arlington: American Psychiatric Publishing; 2013.
6. Harris MJ, Jeste DV. Late-onset schizophrenia: an overview. Schizophr Bull. 1988;14:39–55.
7. Regier DA, Myers JK, Kramer M, et al. The NIMH epidemiologic catchment area program: historical context, major objectives and study population characteristics. Arch Gen Psychiatry. 1984;41:934–41.
8. Iglewicz A, Meeks TW, Jeste DV. New wine in old bottle: late-life psychosis. Psychiatr Clin N Am. 2011;34:295318.
9. Howard R, Rabins PV, Seeman MV, Jeste DV. Late-onset schizophrenia and very-late-onset schizophrenia-like psychosis: an international consensus. The International Late-Onset Schizophrenia Group. Am J Psychiatry. 2000;157:172178.
10. Mason O, Stott J, Sweeting R. Dimensions of positive symptoms in late versus early onset psychosis. Int Psychogeriatr. 2013;25:320–7.
11. Cagnin A, Gnoato F, Jelcic N, et al. Clinical and cognitive correlates of visual hallucinations in dementia with Lewy bodies. J Neurol Neurosurg Psychiatry. 2013;84:505–10.
12. Ballard CG, O'Brien JT, Swann AG. The natural history of psychosis and depression in dementia with Lewy bodies and Alzheimer's disease: persistence and new cases over 1 year of follow up. J Clin Psychiatry. 2001;62:46–9.
13. Johnson DK, Watts AS, Chapin BA. Neuropsychiatric profiles in dementia. Alzheimer Dis Assoc Disord. 2011;25:326–32.
14. Williams DR, Lees AJ. Visual hallucinations in the diagnosis of idiopathic Parkinson's disease: a retrospective autopsy study. Lancet Neurol. 2005;4:605–10.
15. Friedman JH. Parkinson disease psychosis: update. Behav Neurol. 2013;27:469–77.
16. Inouye SK, Westendorp RG, Saczynski JS. Delirium in elderly people. Lancet. 2014;383:911–22.

17. Abnormal Involuntary Movement Scale (AIMS). Available at http://www.cqaimh.org/pdf/tool_aims.pdf. Accessed 15 Jan 2017.
18. Patterson TL, Leeuwenkamp OR. Adjunctive psychosocial therapies for the treatment of schizophrenia. Schizophr Res. 2008;100:108119.
19. Shean GD. Evidence-based psychosocial practices and recovery from schizophrenia. Psychiatry. 2009;72:307–20.
20. Zimmermann G, Favrod J, Trieu VH. The effect of cognitive behavioural treatment on the positive symptoms of schizophrenia spectrum disorders: a meta-analysis. Schizophr Res. 2005;77:1–9.
21. Chien WT, Leung SF, Yeung FK. Current approaches to treatments for schizophrenia spectrum disorders, part II: psychosocial interventions and patient-focused perspectives in psychiatric care. Neuropsychiatr Dis Treat. 2013;9:1463–81.
22. Mueser KT, Deavers F, Penn DL. Psychosocial treatments for schizophrenia. Annu Rev Clin Psychol. 2013;9:465–97.
23. Dechamps A, Diolez P, Thiaudiere E. Effects of exercise programs to prevent decline in health-related quality of life in highly deconditioned institutionalized elderly persons: a randomized controlled trial. Arch Intern Med. 2010;170:162–9.
24. Suzuki T, Remington G, Uchida H. Management of schizophrenia in late life with antipsychotic medications: a qualitative review. Drugs Aging. 2011;28:961–80.
25. Mews MR, Quante A. Comparative efficacy and acceptability of existing pharmacotherapies for delusional disorder: a retrospective case series and review of the literature. J Clin Psychopharmacol. 2013;33:512–9.
26. Ray WA, Chung CP, Murray KT. Atypical antipsychotic drugs and the risk of sudden cardiac death. N Engl J Med. 2009;360:225–35.
27. Brodaty H, Ames D, Snowden J. A randomized placebo controlled trial of risperidone for the treatment of aggression, agitation, and psychosis in dementia. J Clin Psychiatry. 2003;64:134–43.
28. Jeste DV, Blazer D, Casey D. ACNP White Paper: update on use of antipsychotic drugs in elderly persons with dementia. Neuropsychopharmacology. 2008;33:957–70.
29. Risperdal Product Monograph. Available at https://www.janssen.com/canada/sites/www_janssen_com_canada/files/product/pdf/ris06112014cpm2_snds_0.pdf. Accessed 7 Mar 2017.
30. De Deyn PP, Drenth AF, Kremer BP. Aripiprazole in the treatment of Alzheimer's disease. Expert Opin Pharmacother. 2013;14:459–74.
31. Seitz DP, Adunuri N, Gill SS. Antidepressants for agitation and psychosis in dementia. Cochrane Database Syst Rev. 2011;(2):CD008191.
32. Pollock BG, Mulsant BH, Rosen J. A double-blind comparison of citalopram and risperidone for the treatment of behavioural and psychotic symptoms associated with dementia. Am J Geriatr Psychiatry. 2007;15:942–52.
33. Schneider LS, Frangakis C, Drye LT. Heterogeneity of treatment response to citalopram for patients with Alzheimer's disease with aggression or agitation: the CitAD randomized clinical trial. Am J Psychiatry. 2016;173(5):465–72.
34. Cummings J, Isaacson S, Mills R. Pimavanserin for patients with Parkinson's disease psychosis: a randomized, placebo-controlled phase 3 trial. Lancet. 2014;383:533–40.
35. Weintraub D, Hurtig HI. Presentation and management of psychosis in Parkinson's disease and dementia with Lewy bodies. Am J Psychiatry. 2007;164:1491–8.
36. Saperson K, Waserman JE, Hategan A. Neuropsychiatric symptoms in dementia. In: McMaster textbook of internal medicine. Kraków: Medycyna Praktyczna; 2016. http://empendium.com/mcmtextbook/chapter/B31.II.21.10. Accessed 4 Dec 2016.
37. Suzuki K, Awata S, Matsuoka H. Short-term effect of ECT in middle-aged and elderly patients with intractable catatonic schizophrenia. J ECT. 2003;19:73–80.
38. Suzuki K, Awata S, Takano T. Continuation electroconvulsive therapy for relapse prevention in middle-aged and elderly patients with intractable catatonic schizophrenia. Psychiatry Clin Neurosci. 2005;59:481–9.
39. Ueda S, Koyama K, Okubo Y. Marked improvement of psychotic symptoms after electroconvulsive therapy in Parkinson disease. J ECT. 2010;26:111–5.
40. Kenney C, Simpson R, Hunter C. Short-term and long-term safety of deep brain stimulation in the treatment of movement disorders. J Neurosurg. 2007;106:621–5.
41. Perala J, Suvisaari J, Saarni SI. Lifetime prevalence of psychotic and bipolar I disorders in a general population. Arch Gen Psychiatry. 2007;64:19–28.
42. Brunelle S, Cole MG, Elie M. Risk factors for late-onset psychoses: a systematic review of cohort studies. Int J Geriatr Psychiatry. 2012;27(3):240–52.
43. Gonzalez-Rodriguez A, Molina-Andreu O, Penades R. Effectiveness of long-acting injectable antipsychotics in delusional disorders with non-prominent hallucinations and without hallucinations. Int Clin Psychopharmacol. 2014;29:177–80.
44. McKeith I, Fairburn A, Perry R. Neuroleptic sensitivity in patients with senile dementia of Lewy body type. Br Med J. 1992;305(6855):673–8.
45. McKeith IG, Dickson DW, Lowe J. Diagnosis and management of dementia with Lewy bodies: third report of the DLB Consortium. Neurology. 2005;65(12):1863–72.
46. Walker Z, Possin KL, Boeve BF. Non-Alzheimer's dementia 2: Lewy body dementias. Lancet. 2015;386:1683–97.
47. Ropacki SA, Jeste DV. Epidemiology of and risk factors for psychosis of Alzheimer's disease: a review of 55 studies published from 1990 to 2003. Am J Psychiatry. 2005;162:2022–30.
48. McKeith I, Del Ser T, Spano P. Efficacy of rivastigmine in dementia with Lewy bodies: a randomized, double-blind, placebo-controlled international study. Lancet. 2000;356(9247):2031–6.