

vi: 1 April 2024

## Review Article

# Pharmacologically Altering the Minds of the Old, Sick, and Dying

Peer-approved: 1 April 2024

© The Author(s) 2024. This is an Open Access article under the CC BY 4.0 license.

Qeios, Vol. 6 (2024)  
ISSN: 2632-3834

Preethi Morris<sup>1</sup>

1. University of Minnesota, Minneapolis, United States

The percentage of the world's population that falls into the category of "elderly" has increased and is expected to greatly increase in the upcoming decades. The burden for the physical and mental well-being of the elderly has largely fallen upon health professionals and caregivers in various living environments. This article reviews and discusses the common use of psychotropic drugs among elderly populations worldwide despite the increased sensitivity of the aged central nervous system to the effects of these drugs, and the greatly increased risk of falls, fractures, fainting, and hospital admission for adverse events due to the usage of psychotropic drugs in this age sector. *Psychotropic Polypharmacy, Potentially Inappropriate Medication*, and the mind-altering effects of psychotropic drugs in the elderly population are also explained. Finally, we discuss the near-universal usage of psychotropic drugs in *end-of-life protocols* used in palliative care, hospice, and end-of-life treatment centers.

**Correspondence:** [papers@team.qeios.com](mailto:papers@team.qeios.com) — Qeios will forward to the authors

## Introduction

The percentage of the world's population above age 60 is increasingly high because we are aging at an extraordinary rate. By 2030, the WHO estimates that 1.4 billion, or 1 in 6 of the world's population, will fall into this category. This elderly population is expected to triple from 2020 to 2050 (WHO, 2023). The use of psychotropic drugs has been increasing significantly over the past two decades in the general population, and especially among older adults worldwide. Mental health diseases such as dementia, depression, and anxiety, as well as chronic pain, are especially prevalent among the elderly population. According to the WHO, the key risk factors for mental health illness among the elderly are social isolation and loneliness (WHO, 2023). The reality of age-related morbidity and mental illness has led to widespread and often dangerous or inappropriate use of psychotropic drugs among the elderly. Whether in community homes, home dwellings, or hospital scenarios, a large proportion of the elderly are taking one or more psychotropic drugs. Among community-dwelling older adults, the rate of psychotropic drug use is reported to be 18 times higher than in the middle-aged adult population (OACNS, 2018). Among nursing homes and psychiatric care units, about 87% of elderly patients are reported to be taking at least one psychotropic drug, and 11% were taking 4 or more (OACNS).

The U.S. Department of Health and Human Services examined long-term nursing home elderly residents and found that from 2011 to 2019, about 80% of Medicare's long-stay nursing home residents were prescribed at least one psychotropic drug. Higher psychotropic drug use was associated with a lower nurse-to-resident ratio, while the rate of unsupported schizophrenia reporting increased (Grimm, 2022). Similarly, the vast majority of the elderly population in Western Europe, whether living in residential homes or in the community, is taking one or more psychotropic drugs (Bednarczyk, 2022).

## Psychotropic Drugs are Mind-altering

Psychotropic drugs alter the mind through their effects on neurotransmitter signaling in the brain and fall into these categories: antidepressants, anti-anxiety medication, stimulants, antipsychotics, and mood stabilizers. Additionally, though often used for pain management, opiates also slow down the mind and thoughts and thus are medically considered "psychoactive." These drugs often have multiple effects on neurotransmitter signaling that correlate with their mind-altering effects. For example, *quetiapine*, a drug taken for schizophrenia and major depressive disorder, is a dopamine, serotonin, as well as an alpha-2 noradrenergic receptor antagonist. The drug *clozapine* also has multiple targets of action. (Sathyanarayana, 2016). Furthermore, with all psychotropic drugs, there are 1 or more of 10 modes of action by which the brain, and thus the mind, is altered: 1) *receptor agonist*, 2)

receptor partial agonist, 3) receptor antagonist, 4) reuptake inhibitor, 5) reuptake inhibitor and releaser, 6) reuptake inhibitor and receptor antagonist, 7) enzyme inhibitor, 8) ion channel blocker, 9) positive allosteric modulator, 10) enzyme modulator (Sathyanarayana, 2016).

### *A Brief Note on the Dangers of Psychotropic Drug Use Among the Elderly*

This prevalence of the use of psychotropic drugs is a reality despite the well-known observations that this age population is especially susceptible to the adverse effects of these drugs. Older individuals are shown to have a decreased beta-adrenergic response and baroreflex response, while they have an increased sensitivity to drug-induced sedation and parasympathetic stimulation of the central nervous system (Jain, 2019). Practices of “*Geriatric Psychopharmacology*” worldwide persist in spite of the fact that older adults show a greater sensitivity to the effects and side effects of psychotropic drugs and are more likely to experience related falls, skeletal fractures, stroke, hypotension, and mortality as a result (Bednarczyk, 2022). One study that examined the risk of severe adverse drug reactions found that the risk of falls and syncope was three times greater in elderly adults taking psychotropic drugs than in those that do not (Stingl, 2020). Furthermore, studies show that elderly patients taking anticholinergics are at an increased risk for cognitive decline, Alzheimer’s disease, and dementia, and this risk is reduced with stopping medication (Carrière, 2009; Gray, 2015).

### *Psychotropic Polypharmacy among the Elderly*

*Psychotropic polypharmacy* is the prescription of two or more psychotropic drugs at one time. As of 2020, the number of older aged individuals in the United States taking multiple psychotropic drugs had doubled relative to a decade prior. A study of community-dwelling older adults (over 55 years) showed that the use of multiple psychotropic drugs, also known as **psychotropic polypharmacy**, has become common among the elderly and impairs global cognition, executive function, and mobility (Loggia, 2020).

### *Is it because of Age-related Morbidity?*

With increasing age, there is an increasing incidence of all forms of adverse health conditions such as pain and mental illnesses. It stands to reason from the perspective of health professionals that age-associated morbidity warrants the use of psychotropic drugs. For example, opioids are commonly prescribed to the elderly due to the high rates of **chronic pain**. About 50% of older adults in the United States are reported to suffer from chronic pain, and this fraction increases with age (Khan, 2020). A study done on a large sample of elderly individuals in Pennsylvania found that 20.7% of them had filled opioid prescriptions, and of those taking large doses of opioids, there was a significant

association with the use of sedatives, hypnotics, anxiolytics, and antidepressants (Khan, 2020). Mental health diseases such as dementia, depression, and anxiety are especially prevalent among the elderly population. According to the WHO, the key risk factors for mental health illness among the elderly are social isolation and loneliness (WHO, 2023). According to the Global Health Estimate in 2019, over a quarter of deaths from suicide occur in the elderly population (WHO, 2023). The proportion of elderly psychiatric inpatients and outpatients among the common elderly population is large, and the use of one or more psychiatric drugs is commonplace. A cross-sectional study of outpatient psychiatric patients 65 years and older revealed that the mean number of psychotropic drugs taken was nearly 2 per day (Sahin, 2021). The study researchers estimated that the percentage of potentially inappropriate drug use was 35.7%, and drug-drug interactions were found in 20.9% of patients (Sahin, 2021). Another study of elderly subjects living in nursing homes in Norway showed that 71% of 431 participants were taking one or more psychotropic drugs, and the study also showed a decrease in the quality of life in all stages of dementia for most psychotropic drugs tested (Ito, 2020).

### *Potentially Inappropriate Medicating of the Elderly*

The risk of being prescribed and using **potentially inappropriate medication (PIM)** is also significantly greater among the elderly population. For example, according to *Beers Criteria for psychiatric drugs*, anticholinergics, antipsychotics, antiepileptics, benzodiazepines, opioids, lithium, and duloxetine drug combinations should be avoided due to the increased risk of falls and fractures. A cross-sectional study of psychiatric outpatients in India showed that of 832 elderly patients, 70.7% of them were using drug agents with interactions that were capable of producing *torsades de pointes*, a type of sometimes deadly polymorphic ventricular tachycardia (Das, 2021). A large study in 10 psychiatric hospitals in Germany revealed that 33.9% of 4760 elderly patients were prescribed a potentially inappropriate medication—often anticholinergics, benzodiazepines, and antipsychotics (Hefner, 2020). Similar results were found in studies conducted in Natal and Lebanon (Moreira, 2020; Yaghi, 2023). In fact, a meta-analysis of 94 studies encompassing 17 countries and 371.2 thousand older patients showed that the use of potentially inappropriate medications was on average 36.7% worldwide (Tian, 2023).

## **Discussion**

### *The Mind-Altering Effects of Psychotropic Drugs*

Psychotropic drugs are often administered under the premise that mental illnesses are caused by neurochemical imbalance, yet despite all the association and correlation studies performed on humans and animals, we cannot

conclude that neurochemical imbalance or dysfunction of neurotransmission is the cause of mental health illness. Rather, psychotropic drugs contribute to neurochemical imbalances and dysfunction of neurotransmission, as reported by numerous neurophysiological studies of withdrawal, tolerance, and addiction (Morris, 2024). We can expect this perturbation of neurochemical signaling through the administration of psychotropic drugs to be accentuated in the older population due to their heightened response to the effects of psychotropic drugs. Older adults are reported to be 3.5 times more likely to be admitted to the hospital for serious adverse responses to psychotropic drugs (Lindsey, 2009). As we have discussed, psychotropic drugs among the elderly (with or without dementia) are very common in all living situations (community, assisted living, acute care medical and psychiatric units, and nursing homes) (Lindsey, 2009). Due to the discovery of inappropriate prescribing and usage of psychotropic drugs among the elderly, federal legislation mandated a limitation on psychotropic drugs to be placed upon the elderly through the *Omnibus Budget Reconciliation Act of 1987* (Lindsey, 2009). Yet, though there was a decrease in typical antipsychotic medication due to this Act, the use of atypical antipsychotic drugs has increased since then, and SSRIs have significantly replaced tricyclics due to a perception of greater safety. Nevertheless, the reported alarming effects of all types of psychotropic drugs have persisted, and nurses are often untrained in the usage and side effects of psychotropic drugs (Lindsey, 2009). The question stands to be proposed: what causes this staggering rate of falls, syncope, and skeletal fractures in the older population with concurrent psychotropic drug use? Drug-induced hypotension (a common side effect of psychotropic drugs in the elderly due to the heightened central nervous system response) is a plausible cause. Additionally or alternatively, consider these mind-altering side effects of common psychotropic drugs:

## Mental Effects of Common Psychotropic Drugs

**Alprazolam:** drowsiness, change in sex drive, mental or mood changes (hallucinations, thoughts of suicide), slurred speech, difficulty talking, loss of coordination, trouble walking, memory problems, seizures

**Amantadine:** drowsiness, change in sex drive

**Aripiprazole:** insomnia, mood changes, depression, compulsive behaviors and visual disturbances, suicidal thoughts or actions, seizures

**Asenapine:** blurred vision, drowsiness, mental or mood changes (e.g., increased anxiety, depression, suicidal thoughts), mask-like facial expression, seizures, tardive dyskinesia (unusual uncontrolled movements of face, mouth, tongue, arms, or legs)

**Artane:** drowsiness, severe confusion

**Atomoxetine:** drowsiness, nervousness, mood changes (e.g., confusion, hallucinations, memory problems)

**Benzotropine:** mood changes, decrease of sexual desire

**Bupropion:** restlessness, and inability to keep still may occur, unusual strong urges, unusual or uncontrolled movements, severe confusion

**Buspiron:** blurred vision, mental or mood changes (e.g., agitation, anxiety, confusion, hallucinations), uncontrolled movements, seizures

**Carbamazepine:** drowsiness, unsteadiness,

**Chlordiazepoxide:** drowsiness, blurred vision, mental or mood changes, slurred speech, clumsiness, trouble walking, decreased or increased interest in sex, tremor, uncontrollable movements, sleep disturbances

**Chlormazine:** drowsiness, blurred vision, trouble sleeping,

**Citalopram:** drowsiness, decreased interest in sex, seizures, hallucinations, unusual restlessness, loss of coordination, severe dizziness

**Clomipramine:** changes to psychiatric illness, tiredness

**Clonazepam:** drowsiness, unusual or sudden changes in mood, thoughts, or behavior including confusion, memory problems, signs of depression, suicidal thoughts or attempts, thoughts of harming self

**Clonidine:** drowsiness, mental or mood changes (such as irritability, depression),

**Clozapine:** drowsiness, blurred vision, seizures, uncontrollable movements, mental or mood changes

**Desvenlafaxine:** drowsiness, blurred vision, nervousness, trouble sleeping, decreased interest in sex, seizures, hallucinations, restlessness, loss of coordination

**Dexmethylphenidate:** trouble sleeping, nervousness, drowsiness, mood or behavior changes (such as agitation, aggression, mood swings, depression, abnormal thoughts), uncontrolled muscle movements (such as twitching, shaking), sudden outbursts of words or sounds, seizures, strokes

**Dextroamphetamine:** drowsiness, blurred vision, nervousness, trouble sleeping, decreased interest in sex, seizures, hallucinations, restlessness, loss of coordination

**Diphenhydramine:** trouble sleeping, mental, mood, or behavior changes (agitation, aggression, mood swings, depression, abnormal thoughts), uncontrolled movements, continuous chewing movements or teeth grinding, outbursts of words or sounds, change in sexual ability or desire, extreme tiredness, slurred speech, confusion

**Divalproex:** drowsiness, blurred/double vision, uncontrolled eye movements, depression, suicidal thoughts or other mental or mood problems, unsteadiness, seizures

**Duloxetine:** drowsiness, shaking, sudden mental changes

**Escitalopram:** drowsiness, tiredness, difficulty sleeping, unusual or severe mental or mood changes (such as confusion, difficulty

concentrating, nervousness, unusual high energy or excitement, rare thoughts of suicide), seizures, hallucinations, unusual restlessness, loss of coordination

**Eszopiclone:** daytime drowsiness, memory loss, mental, mood, or behavior changes (new or worsening depression, abnormal thoughts,

thoughts of suicide, hallucinations, confusion, agitation, aggressive behavior, anxiety)

**Fluoxetine:** drowsiness, anxiety, trouble sleeping, unusual or severe mental or mood changes (such as agitation, unusual high energy excitement, thoughts of suicide), seizures, hallucinations, unusual restlessness, loss of coordination

**Fluphenazine:** Drowsiness, lethargy, feelings of restlessness, mask-like facial expression, unusual mental or mood changes (e.g., depression, worsening of psychosis), confusion, seizures

**Fluvoxamine:** drowsiness, trouble sleeping, shaking, decrease in sexual interest, seizures, hallucinations, unusual restlessness, loss of coordination

**Gabapentin:** Drowsiness, loss of coordination, tiredness, blurred or double vision, unusual or sudden changes in your mood, thoughts, or behavior including signs of depression, suicidal thoughts or attempts,

**Guanfacine:** drowsiness, tiredness, fainting, mental or mood changes (such as depression, confusion)

**Haloperidol:** drowsiness, sleep disturbances, shaking, restlessness, mask-like facial expression, drooling, seizures, facial or muscle twitching (tongue thrusting, chewing movements, puffing or puckering of mouth), uncontrollable shaking, seizures, fainting

**Haloperidol Decanoate:** drowsiness, troubled sleeping, facial or muscle twitching (tongue thrusting, chewing movements, puffing or puckering of mouth), uncontrollable shaking, seizures, fainting

**Hydroxyzine:** drowsiness, blurred vision, mental or mood changes (e.g., worsening anxiety, confusion, hallucinations), shaking, seizures

**Iloperidone:** drowsiness, uncontrollable movements such as lip smacking, mouth puckering, tongue thrusting, chewing, or unusual arm or leg movements, seizures

**Imipramine:** blurred vision, drowsiness, mental or mood changes, restlessness, ringing in the ears, sexual problems, shakiness

**Lamotrigine:** drowsiness, blurred/double vision, unusual or sudden changes in mood, thoughts, or behavior including signs of depression, suicidal thoughts or attempts, thoughts of harming self

**Lisdexamfetamine:** nervousness, trouble sleeping, irritability or restlessness, mood or behavior changes (agitation, aggression, mood swings, depression, hallucinations, abnormal thoughts or behavior), involuntary movements, muscle twitching or

shaking, outbursts of words, blurred vision, slurred speech, confusion, sudden vision changes

**Lithium:** drowsiness, unsteady walk, confusion, slurred speech, blurred vision, seizures

**Lorazepam:** drowsiness, blurred vision, changes in sexual desire, mental or mood changes (such as hallucinations, depression, thoughts of suicide), slurred speech or difficulty talking, vision changes, unusual weakness, trouble walking, memory problems, seizures

**Loxapine:** drowsiness, blurred vision, severe muscle spasms or cramping (such as twisting neck, arching back, eyes rolling up), restlessness or constant need to move, shaking, slow or shuffling walk, depression or suicidal thoughts, involuntary or repetitive muscle movements such as lip smacking or puckering, tongue thrusting, chewing, or finger or toe movements, seizures, sudden mental or mood changes (such as confusion, loss of consciousness)

**Lurasidone:** drowsiness, mask-like facial expression, inability to keep still, and agitation may occur, face or muscle twitching and uncontrollable movements (tardive dyskinesia), sudden mental or mood changes

**Melatonin:** mental or mood changes (e.g., depression, confusion)

**Methylphenidate:** Tourette's syndrome, toxic psychosis

**Metoprolol:** blurred vision, tiredness

**Mirtazapine:** drowsiness, hallucinations, unusual restlessness, loss of coordination, muscle twitching or stiffness, loss of consciousness

**Modafinil:** nervousness, difficulty sleeping, mental mood changes (such as agitation, confusion, depression, hallucinations, rare thoughts of suicide),

**Naltrexone:** anxiety, tiredness, difficulty sleeping,

**Nicotine** (gum, lozenge, patch): mental or mood changes (e.g., irritability, trouble sleeping, vivid dreams), confusion, slurred speech

**Nuedexta:** Muscle twitching, confusion, restlessness

**Olanzapine:** drowsiness, agitation, confusion, restlessness, difficulty speaking, unusual or uncontrolled movements of face or tongue, seizures

**Oxcarbazepine:** drowsiness, trouble sleeping, Unusual or sudden changes in mood, thoughts, or behavior including signs of depression, suicidal thoughts or attempts, thoughts about harming self, double vision, change in vision, involuntary eye movements, difficulty speaking,

**Paliperidone:** restlessness, difficulty sitting still, slow movement, restlessness, seizures, unusual or uncontrolled movements (especially of the face, lips, mouth, tongue, arms or legs), mental or mood changes

**Paroxetine:** drowsiness, trouble sleeping, Shaking, restlessness, inability to keep still, decreased interest in sex, hallucinations, unusual restlessness, loss of coordination

**Pimozide:** severe muscle spasms or cramping (such as twisting neck, arching back, eyes rolling up), restlessness or constant need to move, shaking, slow or shuffling walk, drowsiness, Involuntary or repetitive muscle movements such as lip smacking or puckering, tongue thrusting, chewing, finger or toe movements, sudden mental or mood changes (such as confusion, loss of consciousness)

**Prazosin:** drowsiness, tiredness, blurred vision, mental or mood changes (such as depression),

**Propranolol:** tiredness, hallucinations (hearing, seeing, tasting, smelling, or feeling something that doesn't exist), uncontrolled mood swings, confusion, mental depression,

**Quetiapine:** tiredness, drowsiness, Restlessness or constant need to move, shakiness, signs of infection (fever, persistent sore throat), mental or mood changes (increased anxiety, depression, thoughts of suicide), seizures, unusual or uncontrolled movements of face, lips, mouth or tongue

**Rameolton:** drowsiness, tiredness, decreased sexual desire, Mental or mood changes (e.g., depression, strange thoughts, thoughts of suicide)

**Risperidone:** drowsiness, difficulty sleeping, nervousness, decreased sexual desire, mental or mood changes, uncontrolled muscle movements, drooling, difficulty swallowing, seizures, frequent falls

**Thioridazine:** lethargy, drowsiness, restlessness, seizures, blurred vision, confusion

**Topiramate:** Tiredness, drowsiness, tingling of hands or feet, confusion, slowed thinking, trouble concentrating, nervousness, memory problems, language problems, depression, suicidal thoughts or attempts, other mental or mood problems, loss of consciousness

**Sertraline:** drowsiness, trouble sleeping, decreased interest in sex, hallucinations, unusual restlessness, loss of coordination

**Trazodone:** tiredness, drowsiness, blurred vision, change in sexual interest, Shaking, nightmares

**Trilafon:** drowsiness, blurred vision, tiredness, involuntary or repetitive muscle movements such as lip smacking or puckering, tongue thrusting, chewing, or finger or toe movements (tardive dyskinesia), seizures

**Valproic Acid:** drowsiness, shakiness, double-blurred vision, sudden mental changes

**Venlafaxine:** drowsiness, nervousness, difficulty sleeping, decreased interest in sex, hallucinations, unusual restlessness, loss of coordination, seizures, hallucinations, unusual restlessness, loss of coordination

**Vilazodone:** trouble sleeping, restlessness, inability to keep still, difficulty concentrating, confusion, memory problems, hallucinations, loss of coordination, twitching muscles, unusual agitation or restlessness

**Vortioxetine:** shaking (tremor), restlessness, inability to keep still, difficulty concentrating, memory changes, confusion,

seizures, loss of coordination

**Vraylar:** insomnia, drowsiness, restlessness, anxiety, agitation, seizures, blurred vision, suicidal thoughts or actions, destruction of muscle cells, abnormal movements of face or jaw

**Ziprasidone:** drowsiness, mental or mood changes (e.g., agitation, anxiety, depression, suicidal thoughts), feelings of restlessness, mask-like facial expression, shakiness, seizures, unusual uncontrolled movements of face, mouth, tongue, arms, or legs

**Zolpidem:** memory loss, mental mood or behavior changes (new or worsening depression, abnormal thoughts, thoughts of suicide, hallucinations, confusion, agitation, aggressive behavior, anxiety), sleep-driving (driving vehicles while not fully awake)

(all above reported by THHS)

If indeed the greater part of the elderly population is on psychotropic drugs, and this percentage levels off not far below 100% when considering **end-of-life protocol**, and this age sector is remarkably susceptible especially to the CNS effects of these drugs, then the administration of these drugs is effectively altering the minds of the elderly of our generation, and increasingly and overwhelmingly so as they approach the end of their lives and death. While drowsiness, anxiety, difficulty sleeping, nervousness, and blurred vision are not rare but *common* effects experienced by the vast majority of individuals taking psychotropic drugs in the general population of middle-aged adults, the relatively rare mental effects with regard to younger age sectors are much more *commonly* seen among the elderly. These include “*mental and mood changes*”, depression, suicidal thoughts, hallucinations, confusion, aggressive behavior, tardive dyskinesia, agitation, restlessness, sleep-driving, involuntary or repetitive movements, language and speech problems, memory loss, suicidal thoughts and behaviors, seizures, and various other forms of paranormal bodily and facial movements and vocalizations (see list above). The drugs are altering the minds of the elderly.

## End of Life Protocol

As elderly individuals or severely sick and dying patients approach death, hospitals worldwide are apt to employ standard *end-of-life treatment*. Standard end-of-life protocol prioritizes physical and mental comfort. As individuals approach death, fear, anxiety, depression, and panic are common experiences. The National Institute on Aging states:

“End-of-life care can also include helping the dying person manage mental and emotional distress. Someone who is alert near the end of life might understandably feel depressed or anxious... The dying person may also have some specific fears and concerns. He or she may fear the unknown, or worry about those left behind. Some people are afraid of being alone at the very

end. These feelings can be made worse by the reactions of family, friends, and even the medical team. For example, family and friends may not know how to help or what to say, so they stop visiting, or they may withdraw because they are already grieving. Doctors may feel helpless and avoid dying patients because they cannot help them further. And some people may experience mental confusion and may have strange or unusual behavior, making it harder to connect with their loved ones. This can add to a dying person's sense of isolation.” (NIA)

End-of-life treatment almost invariably involves the use of one or more psychotropic drugs to treat both the mental challenges faced and other physical symptoms, including pain, breathlessness, and nausea. These drugs are often narcotics, antipsychotics, and sedatives such as atropine, haloperidol, lorazepam, morphine, and prochlorperazine. Pharmacy Times states, “Adequate pain management is considered a universal requirement in health care.<sup>5</sup> Pain control is also recognized as a central component of providing optimal hospice care (Farinde, 2020).” The same article explains the common protocol for pain management, beginning with initial steps employing short-term pain medications: Vicodin, Percocet, or Lortab, which are all combinations of codeine and either aspirin or acetaminophen, and more extensive treatment through strong narcotics for patients exhibiting a greater degree of pain (Farinde, 2020). Of note, though effective for pain management, opiates also slow down the mind and thoughts, and thus are medically considered “psychoactive” and lead to tolerance and abuse in many cases among all age sectors. Opiate use also clearly increases the risk of falls, fall injuries, and fall fractures in elderly individuals (Yoshikawa, 2020). Midazolam, a sedative, or opiates are prescribed for breathlessness. Antipsychotics such as metoclopramide, haloperidol, or levomepromazine are often prescribed for nausea. The vast majority of dying patients face at least one of these symptoms, and for palliative care, hospice, and end-of-life treatment centers, addressing these symptoms with drugs is obligatory.

### Unanimous Findings

As one might expect, the rate of *Potentially Inappropriate Medications* in palliative care is very high (Pyte, 2019; Sevilla-Sánchez, 2017; Lindsay, 2014). An observational multicenter study conducted in 7 palliative care centers in the USA discovered that patients were taking close to 5 drugs on the day of their death, with the vast majority taking pain medication and psycholeptics (van Norden, 2016). A study in South Australia at a palliative care center found that patients were taking a mean number of 4.9 drugs upon admission, and that this increased about 2.5 times as death approached (Currow, 2007). A retrospective cohort study with deceased patients in a palliative care

center in the Netherlands reported that morphine, midazolam, and haloperidol were the most common drugs used upon admission (21%, 11%, 23% respectively), and that the use of these drugs increased to 87%, 58%, and 50% respectively (Masman, 2015). Furthermore, as patients reached the end of their lives, the drugs were given mainly through the subcutaneous route as opposed to orally (94% subcutaneous on the day of death). Similarly, a palliative care center in Portugal showed that on the day of death, close to all patients were taking opioid analgesics, a significant percentage were also taking hypnotics, antidepressants, and antipsychotics, and a minority were also taking antiepileptics and anxiolytics (Peralta, 2022). A cross-sectional descriptive study in 23 geriatric wards in Belgium found that the majority of patients were given anticipatory prescriptions of psychotropic drugs (morphine, benzodiazepines, scopolamine) (Van Den Noortgate, 2016). In a university hospital in Vienna, 90% of palliative care patients were being prescribed drugs for pain and anxiety, with most patients taking over 4 drugs on the day of their death (Kierna, 2016). Similar findings were observed in an MD Anderson Cancer Center in Texas, 30 cancer centers located in 12 European countries, three different regions of the Netherlands, a hospice care center in Italy, and a study of hospice care units in Northern Ireland (Hui, 2005; Paque, 2018; Pasina, 2019; Arevalo, 2018; Lundy, 2013). Many more studies could be cited, and the findings are unanimous. The minds of the elderly population are being altered with drugs as they approach death in care centers. Whether psychotropic drugs are given for pain, breathlessness, nausea, or mental challenges, they are being administered and taken by the elderly as they approach death, and especially on the day of death.

## Conclusion

We have observed that the use of psychotropic drugs is prevalent in the elderly population, even relative to middle-aged adults. This is due to the increase in age-associated physical morbidity and mental challenges faced with aging. This reality exists despite the increased sensitivity of the brains of the elderly to the effects and side effects of psychotropic drugs, the risk for falls, fall injuries, fainting, skeletal fractures, and admissions to the hospital for adverse events related to the use of commonly prescribed psychotropic drugs. The incidence of *Potentially Inappropriate Medication* use, especially concurrent with *psychotropic polypharmacy*, is also higher in elderly populations. We have also discussed the mind-altering side effects of a lengthy list of commonly prescribed psychotropic drugs. Furthermore, as individuals reach the end of their lives in palliative care, hospice, and other end-of-life care centers, the majority of them are administered multiple drugs, usually psychotropic drugs, for the treatment of physical and mental discomfort. It can be

reasonably concluded that our world is giving a large percentage of elderly individuals psychotropic drugs, which alter the state of the mind, through the administration of health care, and this is overwhelmingly the case as they approach the end of their lives.

## Statements and Declarations

**Statement of Significance:** This article reviews and discusses the broad and universal use of psychotropic drugs, which alter the mind through pharmacological mechanisms in the brain, among elderly individuals of our generation as they approach death.

## References

- Arevalo, Jimmy J., et al. "Medication use in the last days of life in hospital, hospice, and home settings in the Netherlands." *Journal of Palliative Medicine* 21.2 (2018): 149-155.
- Bednarczyk, Eliza, et al. "Stakeholders' views on the use of psychotropic medication in older people: a systematic review." *Age and Ageing* 51.3 (2022): afac060.
- Carrière, Isabelle, et al. "Drugs with anticholinergic properties, cognitive decline, and dementia in an elderly general population: the 3-city study." *Archives of internal medicine* 169.14 (2009): 1317-1324.
- Currow, David C., et al. "Prescribing in palliative care as death approaches." *Journal of the American Geriatrics Society* 55.4 (2007): 590-595.
- Das, Biswadeep, et al. "Leading 20 drug-drug interactions, polypharmacy, and analysis of the nature of risk factors due to QT interval prolonging drug use and potentially inappropriate psychotropic use in elderly psychiatry outpatients." *Therapeutic Advances in Cardiovascular Disease* 15 (2021): 17539447211058892.
- Farinde, Abimbola "What Drugs Are Used in End-of-Life Care?" *Pharmacy Times* (2020) <https://www.pharmacytimes.com/view/what-drugs-are-used-in-end-of-life-care>
- Gray, Shelly L., et al. "Cumulative use of strong anticholinergics and incident dementia: a prospective cohort study." *JAMA internal medicine* 175.3 (2015): 401-407.
- Grimm, Christi A. "Long-term trends of psychotropic drug use in nursing homes." (2022).
- Hefner, Gudrun, et al. "Potentially inappropriate medication in older psychiatric patients." *European Journal of Clinical Pharmacology* 77 (2021): 331-339.
- Hui, David, et al. "Changes in medication profile among patients with advanced cancer admitted to an acute palliative care unit." *Supportive Care in Cancer* 23 (2015): 427-432.
- Ito, Erika, et al. "The negative impact of psychotropic drug use on quality of life in nursing home patients at different stages of dementia: cross-sectional analyses from the COSMOS trial." *Journal of the American Medical Directors Association* 21.11 (2020): 1623-1628.
- Jain Neha, et al. "Geriatric Polypharmacy: Prescribing Medications in the Elderly" <https://portal.ct.gov/-/media/DMHAS/SWS/olderadults/con> (2019)
- Kierner, Katharina A., et al. "Polypharmacy in the terminal stage of cancer." *Supportive Care in Cancer* 24 (2016): 2067-2074.
- Khan, Shivani R., et al. "Association between psychotropic drug use and prescription opioid use among older adults." *Geriatric Nursing* 41.6 (2020): 776-781.
- Lindsay, Julian, et al. "Reducing potentially inappropriate medications in palliative cancer patients: evidence to support deprescribing approaches." *Supportive Care in Cancer* 22 (2014): 1113-1119.
- Lindsey, Pamela L. "Psychotropic medication use among older adults: what all nurses need to know." *Journal of gerontological nursing* vol. 35,9 (2009): 28-38. doi:10.3928/00989134-20090731-01
- Loggia, Gilles, et al. "Psychotropic polypharmacy in adults 55 years or older: a risk for impaired global cognition, executive function, and mobility." *Frontiers in Pharmacology* 10 (2020): 1659.
- Lundy, Emma, et al. "Polypharmacy and drug omissions across hospices in Northern Ireland." *Journal of Palliative Medicine* 16.11 (2013): 1446-1449.
- Masman, Anniek D., et al. "Medication use during end-of-life care in a palliative care centre." *International journal of clinical pharmacy* 37 (2015): 767-775.
- Moreira, Francisca Sueli Monte, et al. "Use of potentially inappropriate medications in institutionalized elderly: prevalence and associated factors." *Ciência & Saúde Coletiva* 25 (2020): 2073-2082.
- Morris, Preethi. "'Correlation does not imply Causation', while Psychotropic Drugs do cause Neurochemical Imbalances and Dysfunction of Neurotransmission." *Qeios* (2024).
- Paque, Kristel, et al. "Changes in medication use in a cohort of patients with advanced cancer: The international multicentre prospective European Palliative Care Cancer Symptom study." *Palliative medicine* 32.4 (2018): 775-785.
- Pasina, Luca, et al. "Prevalence of preventive and symptomatic drug treatments in hospice care: An Italian observational study." *American Journal of Hospice and Palliative Medicine®* 36.3 (2019): 216-221.
- Peralta, Tatiana, et al. "Prescription trends at the end of life in a palliative care unit: observational study." *BMC Palliative Care* 21.1 (2022): 65.
- Pype, Peter, et al. "Potentially inappropriate medication in primary care at the end of life: a mixed-method study." *Acta Clinica Belgica* 73.3 (2018): 213-219.
- ŞAHİN, Esra Kabadayı, et al. "EVALUATION OF POTENTIALLY INAPPROPRIATE PSYCHOTROPIC USE IN

ELDERLY PSYCHIATRIC PATIENTS." *Turkish Journal of Geriatrics/Türk Geriatri Dergisi* 24.4 (2021).

- Sevilla-Sánchez, Daniel, et al. "Potentially inappropriate medication at hospital admission in patients with palliative care needs." *International Journal of Clinical Pharmacy* 39 (2017): 1018-1030.
- Stingl, Julia C., et al. "Prevalence of psychotropic drugs in cases of severe adverse drug reactions leading to unplanned emergency visits in general hospitals." *Pharmacopsychiatry* 53.03 (2020): 133-137.
- Tian, Fangyuan, et al. "Prevalence of use of potentially inappropriate medications among older adults worldwide: a systematic review and meta-analysis." *JAMA Network Open* 6.8 (2023): e2326910-e2326910.
- Van Den Noortgate, Nele J., et al. "Prescription and deprescription of medication during the last 48 hours of life: multicenter study in 23 acute geriatric wards in Flanders, Belgium." *Journal of pain and symptom management* 51.6 (2016): 1020-1026.
- Yaghi, Gracia, and Bahia Chahine. "Potentially inappropriate medications use in a psychiatric elderly care hospital: A cross-sectional study using Beers criteria." *Health Science Reports* 6.5 (2023): e1247.
- Yoshikawa, Aya, et al. "Opioid use and the risk of falls, fall injuries and fractures among older adults: a systematic review and meta-analysis." *The Journals of Gerontology: Series A* 75.10 (2020): 1989-1995.
- The 411 on Seniors and Psychotropic Medications <https://training.mmlearn.org/blog/the-411-on-seniors-and-psychotropic-medications> (2018)
- Mental health of older adults <https://www.who.int/news-room/fact-sheets/detail/mental-health-of-older-adults#:~:text=While%20most%20have%20good%20health,form%20of%20long%2Dterm%20care> (2023)
- *Providing Care and Comfort at the End of Life* National Institute on Aging <https://www.nia.nih.gov/health/end-life/providing-care-and-comfort-end-life#emotional>
- List of Psychotropic Medications and Side Effects Texas Health and Human Services <https://www.hhs.texas.gov/sites/default/files/documents/LOP-Psychotropic-Medications-and-Side-Effects.pdf>

## Declarations

**Funding:** No specific funding was received for this work.

**Potential competing interests:** No potential competing interests to declare.