

Auditory hallucinations in a patient who is hearing impaired

Amy Gallop, MD, Samuel Shikora, MS-3, Brittani Lubeck, MS-3, and Lingjin Zheng, MD

Ms. L, age 78, recently developed hearing loss. She presents with worsening anxiety due to recurrent musical hallucinations. She has no other psychotic symptoms. How would you treat her?



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CASE New-onset auditory hallucinations

Ms. L, age 78, presents to our hospital with worsening anxiety due to auditory hallucinations. She has been hearing music, which she reports is worse at night and consists of songs, usually the song Jingle Bells, sometimes just melodies and other times with lyrics. Ms. L denies paranoia, visual hallucinations, or worsening mood.

Two weeks ago, Ms. L had visited another hospital, describing 5 days of right-side hearing loss accompanied by pain and burning in her ear and face, along with vesicular lesions in a dermatomal pattern extending into her auditory canal. During this visit, Ms. L's complete blood count, urine culture, urine drug screen, electrolytes, liver panel, thyroid studies, and vitamin levels were unremarkable. A CT scan of her head showed no abnormalities.

Ms. L was diagnosed with Ramsay Hunt syndrome (herpes zoster oticus), which affects cranial nerves, because of physical examination findings with a dermatomal pattern of lesion distribution and associated pain. Ramsay Hunt syndrome can cause facial paralysis and hearing loss in the affected ear. She was discharged with prescriptions for prednisone 60 mg/d for 7 days and valacyclovir 1 g/d for 7 days and told to follow up with her primary care physician. During the present visit to our hospital, Ms. L's home health

nurse reports that she still has her entire bottles of valacyclovir and prednisone left.

Ms. L also has left-side hearing loss that began 5 years ago and a history of recurrent major depressive disorder (MDD) and generalized anxiety disorder. Due to the recent onset of right-side hearing loss, her hearing impairment requires her to communicate via writing or via a voice-to-text app.

HISTORY Depressed and living alone

Ms. L was diagnosed with MDD more than 4 decades ago and has been receiving medication since then. She reports no prior psychiatric hospitalizations, suicide attempts, manic symptoms, or psychotic symptoms. For more than 20 years, she has seen a nurse practitioner, who had prescribed mirtazapine 30 mg/d for MDD, poor appetite, and sleep. Within the last 5 years, her nurse practitioner added risperidone 0.5 mg/d at night to

Dr. Gallop is PGY-4 Psychiatry Resident, Department of Psychiatry, Saint Louis University, St. Louis, Missouri. Samuel Shikora and Brittani Lubeck are MD candidates, Saint Louis University School of Medicine, St. Louis, Missouri. Dr. Zheng is Assistant Professor, Department of Psychiatry, Saint Louis University, St. Louis, Missouri.

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Table 1

Musical hallucinations: Treatment options

Treatment	Benefit(s)	Disadvantage(s)
Hearing aids	Auditory stimulation helps reorient connection between sound and internal brain activity	Some patients may not be able to afford hearing aids
Antidepressants	May result in improvement in auditory hallucinations secondary to hearing loss. Can treat comorbid depressive symptoms	Use is off-label and research is limited. Patients may experience adverse effects
Acetylcholinesterase inhibitors	May improve auditory processing	Use is off-label and research is limited. Patients may experience adverse effects
Antiepileptic medications	May be beneficial in people with musical hallucinations due to brain injuries or stroke	Limited data exist. These medications carry an adverse effects burden and can interact with other agents
Repetitive transcranial magnetic stimulation	May help integrate various sensory inputs	Can be expensive, requires a large time commitment, and has limited data

Source: References 7-9

Clinical Point

Musical hallucinations are a 'release phenomenon' believed to be caused by deprivation of stimulation of the auditory cortex

augment the mirtazapine for tearfulness, irritability, and mood swings.

Ms. L's medical history also includes hypertension and chronic obstructive pulmonary disease. She is a retired teacher and lives alone. She has a chore worker who visits her home for 1 hour 5 days a week to help with cleaning and lifting, and support from her son. Ms. L no longer drives and relies on others for transportation, but is able to manage her finances, activities of daily living, cooking, and walking without any assistance.

What is the likely cause of Ms. L's auditory hallucinations?

- a) Steroid-induced psychotic disorder
- b) Delirium secondary to general medical condition
- c) Musical hallucinations secondary to hearing loss
- d) MDD with psychotic features

EVALUATION Identifying the cause of the music

Ms. L is alert and oriented to time and situation, her concentration is appropriate,

and her recent and remote memories are preserved. A full cognitive screen is not performed, but she is able to spell WORLD forwards and backwards and adequately perform a serial 7s test. An examination of her ear does not reveal any open vesicular lesions or swelling, but she continues to report pain and tingling in the C7 dermatomal pattern. Her urine drug screen and infectious and autoimmune laboratory testing are unremarkable. She does not have electrolyte, renal function, or blood count abnormalities. An MRI of her brain that is performed to rule out intracranial pathology due to acute hearing loss shows no acute intracranial abnormalities, with some artifact effect due to motion. Because temporal lobe epilepsy can present with hallucinations,¹ an EEG is performed to rule out seizure activity; it shows a normal wake pattern.

Psychiatry is consulted for management of the auditory hallucinations because Ms. L is distressed by hearing music. Ms. L is evaluated by Neurology and Otolaryngology. Neurology recommends a repeat brain MRI in the outpatient setting after seeing an artifact in the inpatient imaging, as well as



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follow-up with her primary care physician. Otolaryngology believes her symptoms are secondary to Ramsay Hunt syndrome with incomplete treatment, which is consistent with the initial diagnosis from her previous hospital visit, and recommends another course of oral corticosteroids, along with Audiology and Otolaryngology follow-up.

The authors' observations

This is the first case we have seen detailing musical hallucinations (MH) secondary to Ramsay Hunt syndrome, although musical hallucinations have been associated with other etiologies of hearing loss. MH is a “release phenomenon” believed to be caused by deprivation of stimulation of the auditory cortex.² They are categorized as complex auditory hallucinations made up of melodies and rhythms and may be present in up to 2.5% of patients with hearing impairment.¹ The condition is mostly seen in older adults because this population is more likely to experience hearing loss. MH is more common among women (70% to 80% of cases) and is highly comorbid with psychiatric disorders such as schizophrenia, obsessive-compulsive disorder, or (as was the case for Ms. L) MDD.³ Hallucinations secondary to hearing loss may be more common in left-side hearing loss.⁴ In a 2005 study, Warner et al⁵ found religious music such as hymns or Christmas carols was most commonly heard, possibly due to repetitive past exposure.

There is no consensus on treatment for MH. Current treatment guidance comes from case reports and case series. Treatment is generally most successful when the etiology of the hallucination is both apparent and treatable, such as an infectious etiology.³ In the case of MH due to hearing loss, hallucinations may improve following treatment with hearing aids or cochlear implants,^{1,3,6,7} which is what was advised for Ms. L. *Table 1⁷⁻⁹* (page 42) outlines other possible measures for addressing musical hallucinations.

Table 2

Mental health considerations for patients who are hearing impaired

Risk factors for hearing loss

Screen for the following:

- smoking
- metabolic syndrome
- brain lesions (strokes, tumors)
- exposure to ototoxic medications such as chemotherapeutic agents or diuretics
- older age
- exposure to loud noises.

Mental health outcomes

Patients with hearing loss are at risk for:

- neurocognitive decline
- depressive disorders
- anxiety disorders
- psychotic symptoms
- delirium
- increased social isolation.

Psychiatric treatment in patients with comorbid hearing loss

- Assess if efforts to improve hearing loss through assistive devices and communications have been pursued
- Psychiatrists should refer patients to:
 - audiologists to discuss hearing aids and cochlear implants, and address barriers to use
 - otolaryngologists for further evaluation of hearing loss (warning signs that should prompt early evaluation: abrupt onset, unilateral hearing loss, other symptoms)
 - auditory rehabilitation.
- Antidepressant medication may improve auditory processing
- Acetylcholinesterase inhibitors may result in symptom improvement due to cholinergic input needed for auditory processing

Source: References 8,10,11

Anticholinesterases, antidepressants, and antiepileptics may provide some benefit.⁸ However, pharmacotherapy is generally less efficacious and can cause adverse effects, so environmental support and hearing aids may be a safer approach. No medications have been shown to completely cure MH.

Clinical Point

Treatment with hearing aids or cochlear implants may improve auditory hallucinations

continued

Clinical Point

People with hearing loss are more likely to develop feelings of social isolation, depression, and delirium

Table 3

Communicating with a patient who is hearing impaired

Method	Benefit	Disadvantage
Sign language interpreter	Most effective form of communication	Patients may not know sign language if hearing loss is acute or if they are visually impaired; finding an interpreter may not be feasible
Sound amplification products such as hearing aids and frequency modulation systems with a microphone lanyard	For people with some hearing intact, this would be beneficial. Hearing aids may slow cognitive decline in patients who are hearing impaired	Institutions may not have access to these assistive devices
Written messages, either pen and paper or technology-assisted	Allows for clear communication and interpretation	Time-intensive and not an option for people who are visually impaired or illiterate
Clear-paneled face masks	Patients who are hearing impaired may rely on lip reading to assist in understanding; masks with clear panels allow patients to continue to do this	Can be 5 times more costly than traditional surgical masks
Utilizing a family member or friend	A patient's support system is likely to have found different ways to communicate with their loved one	Patients may not have a support system

Source: References 8-11

TREATMENT Hearing loss management and follow-up

When speaking with the consulting psychiatry team, Ms. L reports her outpatient psychotropic regimen has been helpful. The team decides to continue mirtazapine 30 mg/d and risperidone 0.5 mg/d at night. We recommend that Ms. L discuss tapering off risperidone with her outpatient clinician if they feel it may be indicated to reduce the risk of adverse effects. The treatment team decides not to start corticosteroids due to the risk of steroid-induced psychotic symptoms. The team discusses hallucinations related to hearing loss with Ms. L and advise her to follow up with Audiology and Otolaryngology in the outpatient setting.

The authors' observations

Approximately 40% of people age >60 struggle with hearing impairment^{4,9}; this impacts their general quality of life and how clinicians communicate with such patients.¹⁰ People

with hearing loss are more likely to develop feelings of social isolation, depression, and delirium (*Table 2*,^{8,10,11} *page 43*).¹¹

Risk factors for hearing loss include tobacco use, metabolic syndrome, exposure to loud noises, and exposure to certain ototoxic medications such as chemotherapeutic agents.¹¹ As psychiatrists, it is important to identify patients who may be at risk for hearing loss and refer them to the appropriate medical professional. If hearing loss is new onset, refer the patient to an otolaryngologist for a full evaluation. Unilateral hearing loss should warrant further workup because this could be due to an acoustic neuroma.¹¹

When providing care for a patient who uses a hearing aid, discuss adherence, barriers to adherence, and difficulties with adjusting the hearing aid. A referral to an audiologist may help patients address these barriers. Patients with hearing impairment or loss may benefit from auditory rehabilitation programs that provide communication strategies, ways

to adapt to hearing loss, and information about different assistive options.¹¹ Such programs are often run by audiologists or speech language pathologists and contain both counseling and group components.

It is critical for psychiatrists to ensure appropriate communication with patients who are hearing impaired (*Table 3*,⁸⁻¹¹ *page 44*). The use of assistive devices such as sound amplifiers, written messages, or family members to assist in communication is needed to prevent miscommunication.⁹⁻¹¹

OUTCOME Lack of follow-up

A home health worker visits Ms. L, communicating with her using voice-to-text. Ms. L has not yet gone to her primary care physician, audiologist, or outpatient psychiatrist for follow-up because she needs to arrange transportation. Ms. L remains distressed by the music she is hearing, which is worse at night, along with her acute hearing loss.

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Related Resources

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Drug Brand Names

Mirtazapine • Remeron	Risperidone • Risperdal
Prednisone • Rayos	Valacyclovir • Valtrex

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Clinical Point

Use assistive devices or other strategies to ensure appropriate communication with patients who are hearing impaired

Bottom Line

Hearing loss can predispose a person to psychiatric disorders and symptoms, including depression, delirium, and auditory hallucinations. Psychiatrists should strive to ensure clear communication with patients who are hearing impaired and should refer such patients to appropriate resources to improve outcomes.