

The Mask Dilemma:

**A discussion on acoustic problems and
solutions**

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 - Has a sensorineural hearing loss and wears hearing aids.
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 - Works closely with the TDHHs in her region.
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Agenda for today's presentation:

- What is the “Mask Dilemma?”
- What are the different types of masks being used and what does the research say about the acoustic properties of each mask?
- What does SNR or “signal to noise ratio” mean again?
- What is the best position for a remote microphone system when a mask is worn?
- What does the research say about children vs. adults when listening in noisy environments?
- What does the research say about children's use of visual cues?
- Ways to encourage self-advocacy for deaf/hard of hearing students.
- How can we encourage teens and teachers to use their remote microphone systems?

BC Ministry of Education's Back to School Plan

Health guidelines

Wearing a mask

Every student and staff member will be given two masks when they return to school in September.

Under the updated health and safety guidelines, masks are required for all staff and all students in middle and secondary school when they are in high traffic areas like school buses and hallways, and anytime they are outside of their classroom or learning group and they cannot safely distance from others.

- Students will have the choice to wear a mask in the classroom
- Staff will have the choice to wear a mask when interacting within their learning group

→ Everyone must treat each other and those wearing masks with respect ←

Exceptions will be made for students and staff who cannot wear masks for medical or disability related reasons.

Elementary school students **are not** required to wear masks.

Even when wearing a mask, staff and students will still be required to maintain physical distance from people outside of their learning group where possible.

If a student or staff member develops symptoms while at school, they must wear a mask while they are preparing to go home. [Review COVID-19 mask use information](#) from the British Columbia Centre for Disease Control (BCCDC).

What is the Mask Dilemma?

- Communication barriers: auditory and visual barrier, especially for those with hearing loss and when they are worn in noisy environments.
- Degrades speech signal: so what is the best mask to use and best position for remote microphone systems?
- Increases strain on teacher's voice: encourages use of sound field systems.



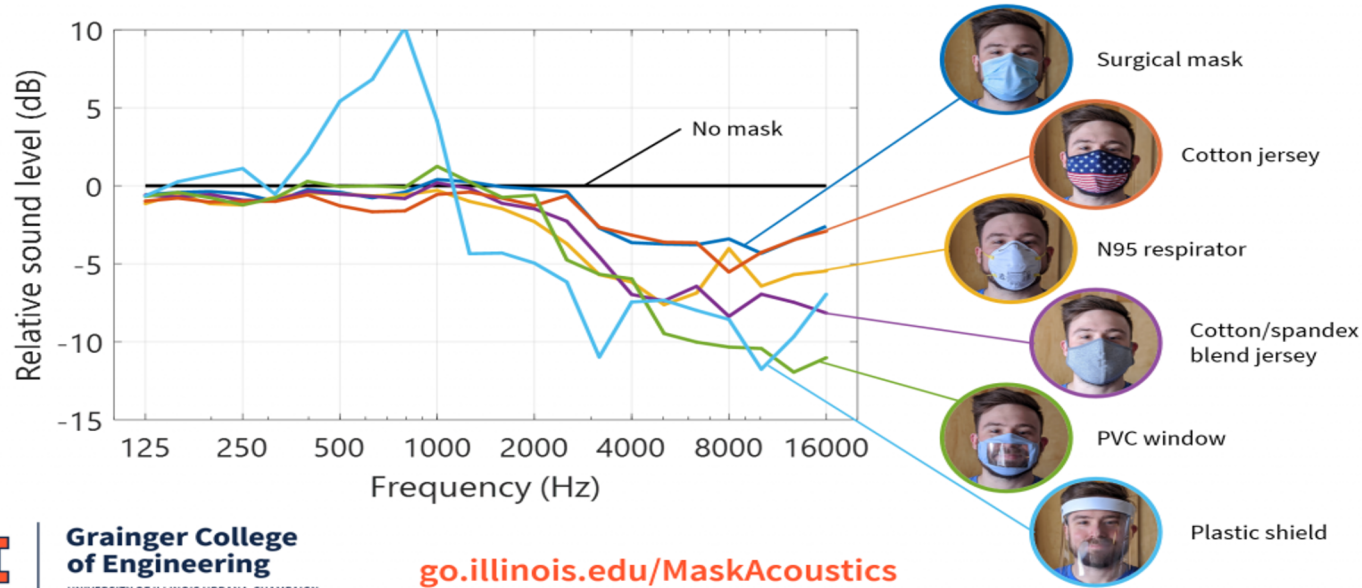


Examples of different masks and face shields used



What the research says: Acoustic effects of masks

Face masks degrade high-frequency speech sounds

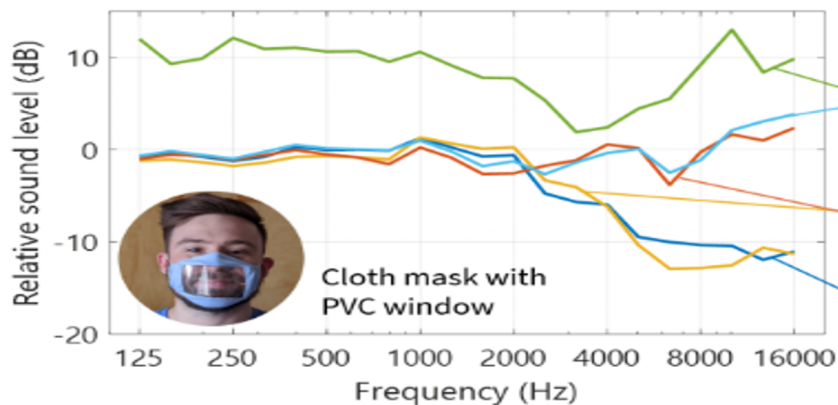


Corey, R. M., Jones, U., & Singer, A. C. (2020). Acoustic effects of medical, cloth, and transparent face masks on speech signals.

What the research says: Acoustic effects of masks

Face masks block sound in front of the talker

Microphones on the body are not strongly affected



6 ft



**Grainger College
of Engineering**
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go.illinois.edu/MaskAcoustics

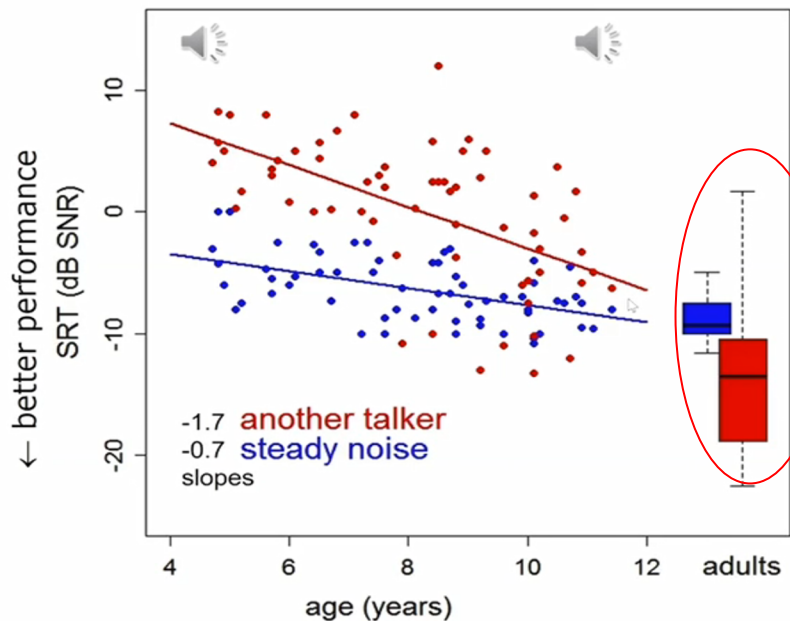
- Acoustic effect of the PVC window mask on microphones in different locations on and near the body

What does SNR mean again?

- SNR= Signal to noise ratio
- Defined as “the difference in decibels between the level (volume) of the signal (usually the person talking) and the level (volume) of the background noise. The calculation is not really a “ratio” but rather just a subtraction of the smaller value from the larger value.
- Example 1: If the level of the signal (teacher’s voice) is 60 dB and the level of the noise is 50 dB, then the SNR= +10 dB.
- Example 2: If the level of the signal (teacher’s voice) is 50 dB and the level of the noise is 60 dB, then the SNR=-10 dB.
- Ideally, we always want the SNR to be a positive + number as this means that the teacher’s voice is louder than the background noise.

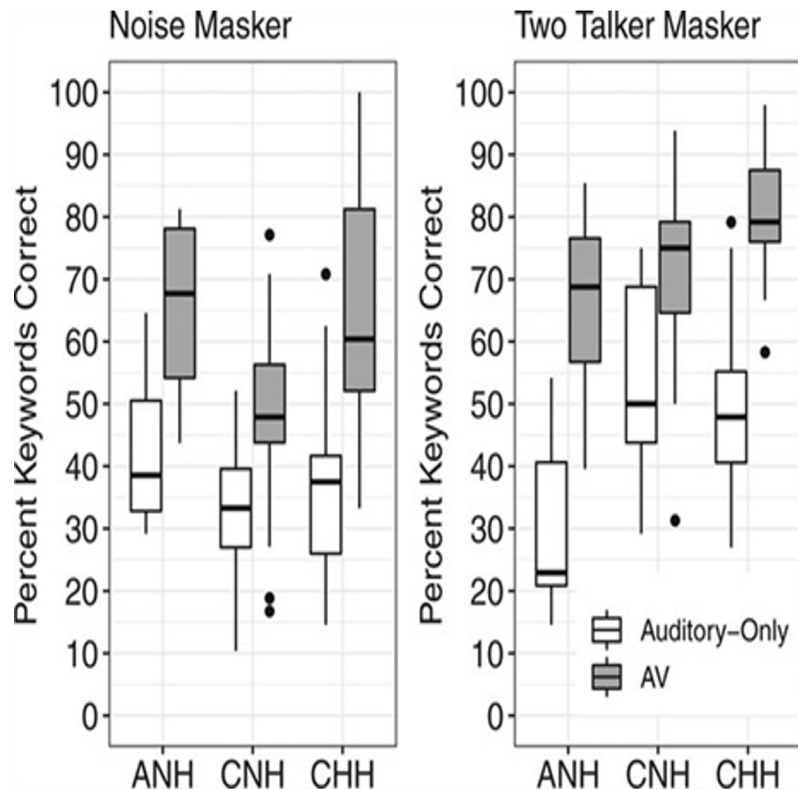
What the research says: Children vs. adults in noise

Children can't ignore another talker



Rosen, S. (2020). Understanding speech in noise. British Society of Audiology E-Conference.

What the research says: Auditory only vs. Audio-visual cues



- ANH= Adult normal hearing; CNH= Child normal hearing; CHH= Child with hearing loss (mild to severe).
- Task= to repeat sentences in steady state noise and then in two talker babble noise. Sentences were presented with auditory information only, and then with audio-visual information.
- Results: All groups benefited from audio-visual information when listening in noise. Children with hearing loss utilize audiovisual information the most compared to their normal hearing peers and adults.

Lalonde, K., & McCreery, R. W. (2020). Audiovisual enhancement of speech perception in noise by school-age children who are hard of hearing. *Ear and hearing*, 41(4), 705-719.

**In an ideal world: all
classrooms would have a
remote microphone system.**

Jessica's demo of microphone position with Roger Touchscreen



Student Self-Advocacy

What to do in a hallway full of masks and noise?



- Create awareness with your students: Let them know early that these areas may be the most difficult areas to communicate.
 - Reiterate importance of good communication strategies and role play scenarios.
 - Consider speech to text apps.
 - For students that report great difficulty: consult audiologist to apply a “mask program” in their hearing device to increase gain of high frequencies.
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How do you know which mask to use?



Quote from Hands and Voices: “There is no one right answer. The right facial covering to wear to communicate with a deaf child or adult is the one that works best for THEM.”

Always consider the following:

- Student's preferred language
 - Student's preferred communication mode
 - Visual access for the student
 - Auditory access for a student
 - Student and family health risks
 - Protection level and cleanliness of each style
 - Teacher and staff health risks
 - Size and fit
 - Reusable vs. disposable
 - Cost
 - Breathability
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Encouraging teens to use their remote microphone system

Factors that impact acceptance or rejection of equipment:

- Acceptance or rejection of their hearing loss and personal self-esteem.
- Degree of motivation to do well in school.
- Priority to be similar to their peers.
- Age at which the RM system was initiated.
- School staff motivation to use the device.
- Teen not wanting to place burden on teacher.
- How well the technology is working.
- Knowledge of the benefits and limitations of the RM system.
- The information provided to the parent to engage their support.

What can be done to help:

- Create opportunities for peer-to-peer support and mentorship with young adults.
- For some students, grades are a motivating factor to wear system.
- Let teens be teens: give them a voice and a choice.
- Advocate for early use of RM system, starting in elementary school.
- Educating staff about hearing loss awareness is a must. Will touch on this on next slide.
- Aggressive troubleshooting of RM system is a must.
- TDHH and audiologist both play pivotal roles in ensuring that the student knows the benefits and limitations of their technology. Knowledge is power!

Encouraging teachers to wear remote microphone systems

Factors that impact use or disuse of equipment:

- Orientation and training of equipment.
- Hearing loss awareness: audibility vs. intelligibility; need for increased SNR for deaf/hard of hearing students.
- Attitude towards equipment. What does the teacher gain from using equipment?
- Classroom support for equipment implementation.
- Teacher: student contract for equipment use.

What can be done to help:

- Ensure that teachers/school staff receive adequate training on equipment. Ensure student and parents receive orientation by audiologist as well—the more people who know how to use the system, the better.
- Ensure the teacher knows *why* the system is needed. Do not brush over this information—prepare concrete reasons.
- Encourage a positive attitude towards the equipment as it sets the stage for the student. Also reduces vocal strain!
- Advocate for an EA for younger children or those with multiple needs; get parents on board.
- When RM system use is part of an IEP it is not really “optional”.

Today's take-away's

- Use of masks in the school setting can cause a “dilemma” for students with hearing loss due to auditory and visual barriers to communication.
- All types of masks attenuate speech sounds especially in the mid to high frequencies; clear masks attenuate these sounds the **most**.
- The best position of the remote microphone system when wearing a **clear mask** is on the **lapel**.
- Children need the signal to be significantly more louder than the background noise compared to adults, especially when the background noise is speech noise (not just steady state noise). **This supports the use of remote microphone systems in general.**
- Normal hearing children, adults, and children with hearing loss all perform better at listening tasks in noise when there are audio-visual cues, compared to just having auditory cues. Children with hearing loss were found to utilize the audio-visual cues the most. **This supports the use of clear masks and a remote microphone system together for children with hearing loss.**
- Students may benefit from a self-advocacy refresher now that masks are in the picture.
- The best mask to use when communicating with a student with hearing loss, is the one that works best for **them**.
- It can be challenging to get teens and teachers to “buy in” to using a remote microphone system; try the different strategies provided to tackle these challenging cases.

What PPE are you using and how can you check in with your students to monitor access?

Contact Jessica for any questions!
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