

HEARING HEALTH IN REMOTE QUEBEC: A CASE STUDY FROM A NATIVE SCHOOL

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1 Introduction

In remote regions of Quebec, audiology services remain critical yet challenging to access due to geographic distance. Many rural and indigenous communities are located several hours away from urban areas, where most audiology clinics and hearing health professionals are concentrated. Thus, for individuals residing in these distant regions, accessing audiology services can be difficult, often requiring significant time, resources, and logistical coordination. These barriers are also exacerbated by the nature of audiological intervention. Indeed, hearing tests and hearing aid fittings may require a significant number of visits to the practitioner's clinic or hospital. More specifically for the Abitibi-Témiscamingue region, audiology services are mainly offered through the "Centre intégré de santé et de services sociaux de l'Abitibi-Témiscamingue" with service points in the cities of Rouyn-Noranda and Val-d'Or, and several privately owned audiology clinics which may still require significant travelling.

Currently, in Quebec, there are no major hearing health-specific awareness or screening programs that are established targeting school-age children. The only government-established program is the "The Universal Newborn Hearing Screening Program" which aims to identify infants at risk of hearing loss as early as possible, often within the first few days of their lives, ensuring prompt intervention. This program currently reaches 53% of all newborns in the province, with growing numbers of centers joining the program [1].

Indigenous communities experience higher rates of hearing health problems than the general population. Several studies suggest that Indigenous people, especially children, are more susceptible to persisting otitis media, a leading cause of hearing loss [2]. For children, this early-onset hearing loss can lead to significant developmental challenges, impacting their communication, education, and overall quality of life [3]. While the exact prevalence varies across different communities in Quebec, some studies suggest that it could reach up to 46% of children in some populations, notably northern Inuit communities [4] but it is still high in southern communities (~25% of children surveyed in a Nova Scotia First Nations elementary [2]).

Here we present the results of a visit to an indigenous

community from the Abitibi-Témiscamingue region that was accomplished through a collaboration between the University of Montreal's School of Speech-Language Pathology and Audiology, the First Nations Education Council, and an Algonquin community school and community health center.

2 Method

The collaboration between the university and the community took place over a period of 4 years (2019-2023) which included both virtual and in-person visits to the community. Referral reasons for a hearing screening included parental concern, school's staff concern, speech-language pathologists concern or as an update following previous interventions or screenings. During the in-person visits, both audiologists and audiology students performed hearing screenings using otoscopy, tympanometry (*SENTIERO DESKTOP Tympanometer*), transient evoked Otoacoustic emissions (*Otodynamics Echoport IL O292 USB-I*), and air conduction audiometry (*MAICO MA-40 audiometer and TDH-39 earphones*) based on the children's age and profile.

The hearing screenings were performed in an office assigned by the school administration with noise levels slightly exceeding the ANSI/ASA S3.1. standards for the use of supra-aural earphones (mean value = 41.0 dB SPL) when testing up to the 0 dB HL threshold. To account for the ambient noise, the passing criteria for air conduction audiometry was set to 30 dB HL.

3 Results

A total of 29 children were screened at the school during the 2023 visit, with their ages ranging from 4 to 13 years old. The children assessed from pre-kindergarten and kindergarten represented the majority of the participants (6/7 and 8/11). The main findings included hearing loss, middle ear pathology, and significant earwax buildup.

Before any screening was performed, written consent was obtained from the parent or legal guardian. All the results and referral reasons were communicated both to the school administration, the community health and wellness center, and the legal guardians. Probable hearing loss was detected in only 3 children, all with signs of otitis media and in some cases significant wax buildup. All references were made to the region's hospital with pediatric audiology services available, and a follow-up was offered through the community center and medical transportation services available on-site.

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Table 1: Number of hearing screenings performed for each grade.

Grade	Number of Screenings
Daycare	1
Pre-Kindergarten	6
Kindergarten	8
1 st Grade	3
2 nd Grade	4
3 rd Grade	2
4 th – 8 th Grade	5

Table 2: Hearing screening Results and Referral Reasons (2023).

Result	Treatment or Referral reason	Number of children	Total
Normal	No Treatment	10	23
	Cerumen removal	6	
	Mineral Oil	7	
Need for Referral	Otitis Media	4	6
	Known HL	1	
	Cerumen occlusion	1	

Discussion

Children with hearing loss can face difficulties with speech and language acquisition, academic achievement, and social interaction. Speech and language are central to the learning process, enabling children to follow the teacher’s instructions, participate in class discussions, and interact with their peers [5]. Early identification of hearing problems through hearing screenings is thus essential in preventing these adverse outcomes [5], but the long travel distance to specialized health services remains a significant barrier for access to these.

Considering the challenges faced, it appears that a community-based approach [6-8] is the most realistic and accessible option for the promotion of hearing health. Indeed, we show that there is a need for hearing screenings in school-aged children, and that most of the findings are treatable in a timely manner with medical referral required only for a small number of the children tested. It must also be noted that in cases where only otitis media is found, interventions would be possible directly within the community, depending on the availability of medical services and professionals.

Recent advances in tele-audiology appear to be another option for these communities [9]. With little training, members of the community would be able to assist the children in the use of mobile screening applications or devices. This type of intervention would still not account for middle-ear pathologies and ear wax accumulation but would act as a first line of testing prior to more specific interventions. Indeed, we found that there is interest in offering these services by the school nurse and the health center, which would reduce challenges in navigating the health system.

4 Conclusion

We emphasize the pressing need for accessible audiology services in remote Quebec regions, particularly for indigenous communities. Findings from the collaborative initiative between the University of Montreal’s School of Speech-Language Pathology and Audiology, the First Nations Education Council, and an Algonquin First-Nations community highlights a high prevalence of treatable hearing conditions in the tested children. We advocate for a community-based approach and the adoption of tele-audiology as viable solutions to overcome accessibility barriers. The strategies identified can serve as a model for other remote communities.

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