

 *Being Outside of the Box: Audiology in Northern Québec*

 *Être hors des sentiers battus : l'audiologie dans le Nord du Québec*

KEY WORDS

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Abstract

The Inuit of today have a very high prevalence of hearing loss due mainly to otitis media and noise exposure. In Nunavik, (Northern Quebec, Canada) for more than twenty-five years, there has been a specialised audiology program which incorporates Inuit hearing specialists. We describe the extent of the hearing problems, some solutions adapted to the north, and the training and role of the Inuit hearing specialists.

Abrégé

Les Inuit ont aujourd'hui un taux élevé de prévalence de perte auditive due principalement à l'otite et à l'exposition aux médias et au bruit. Au Nunavik, (Nord du Québec, Canada), pendant plus de vingt-cinq ans, il y a eu un programme spécialisé en audiologie qui fait place à des spécialistes de l'ouïe qui sont Inuit eux-mêmes. Nous décrivons la portée des problèmes auditifs, quelques solutions adaptées au nord et la formation et le rôle des spécialistes audiologistes Inuit.

The Inuit are an Aboriginal group living in the Arctic regions of Russia, Alaska, Canada, and Greenland. Because of the remoteness, Inuit in Canada maintained a nomadic traditional existence with little contact with modern civilisation until the early 20th century.

The 55,000 Inuit in Canada do not live in reserves. They live in Nunatsiavut (Labrador), Nunavik (northern Quebec), Nunavut, and the Inuvialuit (NWT). Their medical and educational services are governed by four provincial/territorial jurisdictions. In addition, one in five Inuit now live in cities in the south.

During the past 50 years, living habits have changed extensively and rapidly. Inuit villages have services including a school, clinic, internet and satellite TV, in addition to stores selling food and other goods from the south. The villages are accessible by airplane year round and by sea during the summer months.

NUNAVIK

In 2006, the total population of Nunavik as reported by Statistics Canada was close to 11,000, with 90% of the residents being Inuit. Nunavik Inuit pay both federal and provincial sales and income taxes. Jurisdiction was transferred from the federal to the provincial government at the signing of the James Bay and Northern Quebec Agreement in 1974. While 60% of Inuit in Nunavik have part-time or full-time salaried employment, traditional activities such as hunting, fishing, and berry picking are still widely practiced (Makivik Corporation, 2007).

Thirty-four percent of the Nunavik population is less than 15 years old, as compared to only sixteen percent in the rest of Quebec. Inuttitut is the dominant language spoken and many elders and younger children speak neither English nor French. The first three years of school are taught in Inuttitut, with about equal numbers of students choosing to study in English and French beginning in grade 3.

The two hospitals, Innulitsivik and Tulattavik, provide medical care to villages on the Hudson and Ungava coasts, respectively. The population of Nunavik has doubled in the last 30 years (Régie régionale de la santé et des services sociaux Nunavik en collaboration avec l'Institut national de santé publique du Québec, 2011).

Review of causes and extent of hearing problems in Inuit

The Inuit have a high prevalence of hearing impairment, which began following contact with European civilizations. The main causes of hearing loss are otitis media and noise exposure (Baxter, 1990).

In 1984, the prevalence of hearing loss in Cree and Inuit students living in the same community, Kuujjuarapik on Hudson Bay, was compared. Normal hearing in both ears was found in 96% of Cree as compared to 77% of the Inuit school children. Only 13% of Inuit children showed no evidence of past or present middle ear disease, as compared to 70% of Cree children (Julien, Baxter, Crago, Ilecki & Therien, 1987). Otitis media is therefore a critical and ongoing health challenge for Inuit children in particular.

In Inuit babies, acute otitis media often causes the tympanic membrane to rupture rapidly. Repeated infections can lead to a chronic eardrum perforation and conductive hearing loss. In a study of children aged 2 to 6 years old in Inukjuak, Nunavik, prevalence of chronic perforation was found to be 10.8%. Risk factors for developing chronic otitis media included having siblings with otitis media, the number of persons in the home, and the age at first consultation for otitis media (Bruneau, Ayukawa, Proulx, Baxter, & Kost, 2001).

Since the adoption of the Haemophilus influenza vaccine in 1988, sensorineural hearing loss due to meningitis has been very rare.

In Nunavik, kindergarten students have been tested for the past 20 years. When time allows, we also do screening in daycares, and grade 2 students. While the prevalence of hearing loss varies considerably between communities, overall approximately 20% of all students in Nunavik have hearing loss in one or both ears (Ayukawa, Lejeune, & Proulx, 2004).

Qanuippitaa study

In 2004, the Canadian Coast Guard Ship Amundsen visited the 14 villages of Nunavik to carry out an extensive health survey called "Qanuippitaa? How are we?" (Rochette, St. Laurent & Plaziac, 2008). The survey included a hearing test of 821 adults (Ayukawa, Belanger & Rochette, 2008). The evaluations were performed on board the ship in a small soundproof booth. Only 56% of adults were found to have normal hearing, which was defined as a pure tone average (PTA) at 1000, 2000, and 4000 Hz of less than 26dB in both ears. The prevalence of a hearing disability of a moderate loss or greater for adults (age 18 years and up) in Nunavik was 7.6%. This represents among the highest prevalence rates of hearing loss in the world, with only 3 of 31 countries that have participated in the WHO survey of epidemiological studies reporting similar or higher prevalence rates (Pascolini, & Smith, 2009).

Men were found to have a prevalence rate of hearing loss that was three times greater than that reported for

women. Inuit men are exposed to high levels of noise in both traditional and occupational activities, including rifles, shotguns, snowmobiles, power tools, motorized ice augers, and heavy equipment. Seventy-five percent of the men aged 45 and over were found to have a mild or worse bilateral hearing impairment. Twelve percent of men were found to have a moderate bilateral hearing loss or worse (Ayukawa, Belanger & Rochette, 2008).

Hearing and Otitis Program

The Hearing and Otitis Program began in 1985 and was initially based at McGill University. Funding was obtained from the Quebec Ministry of Health in 1986 for the two northern hospitals which included salaries for two Inuit workers per coast. By 1987, services were being delivered in the north by traveling teams which included an audiologist, a hearing aid dispenser, and the Inuit hearing technicians known as "siutilirijit". However, the work of the siutilirijit was not as an interpreter but followed these guiding principles originally outlined in 1985: (Crago, Hurteau, & Ayukawa, 1990)

1. Trained Inuit personnel must be involved in all aspects of the service delivery.
2. The cooperation, advice, and participation of the Inuit must be sought.
3. Inuit language, culture, life-style, and attitudes must be considered in the project design.
4. The project should provide adequate counselling to the patients and their families at the time of treatment.
5. Follow-up and long-term contact is needed to insure the success of the program.
6. Services should be provided in the native language by a trained specialist rather than through the use of an interpreter.

For the first ten years, the Hearing and Otitis Program provided audiological services to both the Hudson and Ungava coasts. Since 1994, when each hospital hired their own audiologist, their service models have evolved separately due to differing management priorities. This article describes the situation on the Ungava coast where the author (HA) has been audiologist since 1995.

TRAINING OF INUIT SUPPORT PERSONNEL

Siutilirijit have been trained using various methods which depend on the trainer, the student, their level of education, as well as many other factors. In the beginning,

much time and effort was put into developing a curriculum. However the use of written materials and oral lecture format for training has not been very effective. A better method has been to begin with direct experience and to gradually incorporate theoretical explanations in the context of case-based scenarios. For example, a trainee will observe and then do pure tone testing on the first day, and when confident will start tympanometry, otoscopy, etc. with supervision and guidance from the audiologist.

Week long training sessions have also been carried out. The advantages are that this develops a sense of collaboration, can give the opportunity for more experienced Inuit workers to teach the beginners, or trainers can be invited for special topics. Some specialty topics have included: calibration, cerumen management, hearing aid trouble shooting, noise induced hearing loss, speech and language problems. The disadvantages include the significant cost (travel, accommodation), and effort needed to organise.

For example, one of the co-authors (AMR) who is a recently trained siutilirijit, in one year learned basic ear and hearing screening as well as counselling on ear care and the prevention of hearing loss by working together with the audiologist. In addition, two weeks at our team's hearing aid dispenser's office in the south improved her skills in hearing aid care and trouble shooting. During the ENT visit, she had the opportunity to observe PE tube and tympanoplasty surgeries which has allowed her to give better explanations to potential surgery candidates.

In each village there is also a local Hearing and Otitis person who helps during the tours and is the contact person between visits. They can be regular workers at the clinic in which case they are usually stable. If not, they may be workers who are on-call for replacement or for specialist visits and turn-over can sometimes be high. Some Hearing and Otitis workers have later become siutilirijit, if their home situation allows for travel.

The main disadvantage of this informal training method has been the lack of recognition of the skills of the siutilirijit by the hospital management as well as by professional organizations such as SAC.

DESCRIPTION OF TOURS

Every year, each community is usually visited three times. There is a school visit as early as possible during the academic year. Depending on staffing, this tour can be done by the audiologist or siutilirijit or both together with the local worker. The priority is to check the students' hearing aids,

the sound field amplification systems in the classrooms, and inform teachers of the needs of students with hearing loss. The visit can include the kindergarten and grade 2 screening (both done annually), and classroom visits to do hearing awareness and hearing conservation activities.

During the team tour, both the audiologist and siutilirijit travel and work primarily at the health clinic together with the local Hearing and Otitis worker. At this time the focus is to see those with known problems and the new referrals, make recommendations for new hearing aids, and do hearing aid checks. A daycare screening and other public health type activities may be done, such as promotion of hunter's earmuffs and FM radio programs.

The hearing aid dispenser visits about 2-3 months after the team tour. He will fit new hearing aids, return repaired hearing aids, and do checkups and adjustments. He usually works with the Hearing and Otitis worker in the village, and sometimes the siutilirijit. Depending on the needs of the village, extra visits or combined visits may be made.

Rehabilitation options

Because of intermittent draining of the middle ear due to chronic eardrum perforation use of conventional hearing aids is often problematic. Children with bilateral hearing loss often start with a bone-conduction hearing aid. When they are older, a behind-the-ear hearing aid may be fitted with two ear molds, or an in-the-ear hearing aid or a receiver-in-canal hearing aid. Individual hearing aids and other assistive devices are covered by the Québec health care program.

Since 1997, more and more classrooms have been equipped with sound field amplification systems in which teachers use a wireless microphone to broadcast their voice through loudspeakers. Currently there are about 120 sound systems amplifying almost every primary classroom and most secondary classrooms. Sound field amplification was shown to significantly improve speech intelligibility and listening behaviours for both hearing impaired and normal hearing Inuit students (Eriks-Brophy & Ayukawa, 2000). Consulting with teachers and providing in-service on the use of the sound field systems is an important and ongoing role of the team. As it has proven difficult to find ongoing funding, maintenance and replacement of old equipment is now the main challenge.

Up to present, there are only two BAHA (bone-anchored-hearing-aid) clients. The successful candidate had bilateral atresia, while another individual with chronic otitis chooses not to use the device. Both were provided with equipment through a charitable foundation and were

less than 18 years of age at the time of implantation. Due to difficulties in funding for adults and the time required for adapting fitting and follow up protocol, this option has been deferred for the time being.

Mothers-to-be who are at high risk are sent to Montreal for delivery at the McGill University Health Centre and the newborns receive hearing screening before returning to Nunavik. Follow up of babies needing to be re-tested is done during the team tour, and one baby with a unilateral sensorineural hearing loss has been identified.

Great challenges remain with providing adequate rehabilitation for speech and language in Inuttitut for pre-school children. Since 2009, the school board and health board have jointly funded a training program for Inuit special education teachers provided by a speech/language pathologist, who has similar experience in training Inuit professionals in Nunavut. This training is ongoing, and the goal is that pre-school children will ultimately receive services from these teachers. However, at present, services are inadequate in this age group.

ENT collaboration

An ENT specialist visits the hospital in Kuujuaq twice a year to provide consultations and perform surgery which consists primarily of pressure equalisation tubes and tympanoplasties. Tympanoplasties are not recommended for children because the success rate is better in adults (Duval, MacDonald, Lugtig Mollins & Tate, 1994). Consultations are also done using video otoscopy. Photos of eardrums are stored and later emailed directly to the specialist, or video-conferencing technology can be used for reviewing the consultations together.

Prevention of hearing loss

Due to the high prevalence of hearing loss in Inuit men, preventative efforts have been made that focus on encouraging individuals to protect and preserve their hearing. After demonstrating and testing different devices, it was found that hunters are willing to use "high-tech" hunters' earmuffs, which amplify soft sounds and automatically dampen noise at dangerous levels. These are now available at subsidized prices in many communities.

Other prevention methods have included visiting classrooms or alternatively providing teachers with activities to make the students appreciate their hearing and showing what the effects of a hearing loss would be. Means of raising community awareness include visits to classrooms and musical events with a sound-level meter to measure the

sound of I-pods and concerts, provision of information on noise-induced hearing loss, free earplugs, and demonstrations and raffles of hunters' earmuffs and noise-cancelling headphones. The community FM radio stations and local newspapers and magazines have all helped publicize hearing loss issues and hearing loss prevention to the general population.

One village example

During the past year, the audiologist and siutilirijit visited Kangiqsujuaq (population 600) for a week in October for the school visit, ten days in February for the team tour, followed by the hearing aid specialist visit in April. During the school visit, all the teachers were met, and the kindergarten and grade 2 students were screened. Five of ten kindergarten students tested failed the screening (hearing worse than 20dB at 500, 1k, 2k, or 4k, or abnormal (Type B) tympanogram or non-intact eardrum), and two of twelve grade 2 students failed. There are nine students with hearing aids at that school, and none were consistently using their hearing aids, some having "lost" them, some being unwilling to use them, and some having a dead battery, or an ear needing treatment. At the October visit, there were seven functioning sound field systems, and the new parts and three new sound field systems which had been ordered in March had not yet arrived. A young technically savvy Inuit teacher's aide was asked to help the special education teacher install and take care of the equipment. In February, a visit to the school revealed that there were thirteen systems working, and two needing repair. The school had received new funding from the municipality for upgrading the gym amplification, which is used for assemblies, and as well they were planning to buy spare parts and amplify the one remaining classroom. During the team tour, a new Hearing and Otitis worker worked with us. In total 53 clients were seen at the clinic, and eight new hearing aids recommended. A partial daycare screening was carried out; only testing those preschoolers referred by the clinic or daycare educators. Of the 23 preschoolers assessed during the tour, half will be followed up for ear problems. These include five children with tympanic membrane perforations and two with PE tubes. There was also one baby who had failed newborn hearing screening (both OAE and AABR) in one ear, and now at seven months old failed OAE testing in both ears and had flat tympanograms. Four video consults were recorded for later evaluation by the ENT specialist. These were reviewed with him after the tour using video-conferencing.

CONCLUSION

Working in a remote area, in a culture different than one's own involves special challenges that have been met by the inclusion of Inuit support personnel for decades in Nunavik. There is a known problem of professional turnover in remote regions that can seriously affect services. Experience has shown that generally local workers stay longer than those brought in from south. The job of siutilirijit started as a full time position, and involved many weeks of travel. In between tours, their duties include secretarial tasks such as sending and receiving hearing aids for repair, filing, updating databases, placing orders, making preparations for travel, translation, plus time spent on training, development of materials, and other projects. When a siutilirijit is not based in the same locale as the audiologist, there can be problems in providing structure and supervision. The job of siutilirijit has now evolved to become two or three part-time positions, allowing for more flexibility, and fewer weeks away from home. Some Inuit may work a few years, take time off and come back when family commitments change.

The presumed disadvantages for the audiologist in having a non-Inuit assistant or having no assistant are that they could be unaware of mistakes being made, such as inappropriate counselling, and could suffer increased risk of burn out, frustration, or judgemental behaviours.

Visits to classrooms, daycares, hunter support programs, and all public health interventions are much more effective when they include an Inuit partner. Teachers, students, and the public appreciate having trained Inuit health workers who are able to provide services.

Hearing loss and hearing conservation efforts are an enormous priority for the Inuit communities of Nunavik. The Hearing and Otitis Program, which has been developed and refined over many years, demonstrates how partnerships between the audiologist and siutilirijit result in improved communication and better services for the population, as well as increased job satisfaction for the team as a whole.

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