Medical Examination of Hearing Required by Quebec Regulations: A Relevance Analysis

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ABSTRACT

The relevance of Quebec regulations imposing medical hearing evaluations on certain workers or job applicants has been evaluated. In pursuing the sole legitimate public health objective of regulation (ensuring the safety of others), it is essential to identify valid evaluation tools that can be used to establish criteria regarding when a hearing deficiency leads to disabilities that impede the safe performance of all the requirements of a given job, despite all possible work and workplace adaptations. Current regulations are heterogeneous in establishing such criteria and do not ensure the implementation of preventive measures. Furthermore, they emphasize individual hearing abilities and often fail to consider the nature of the work environment. A conceptual framework that emphasizes the interaction between the person and the work environment is discussed.

RÉSUMÉ

La pertinence des règlements imposant des examens médicaux de l'audition à certaines catégories de travailleurs ou de postulants à un emploi a été évaluée. Dans le contexte de la poursuite du seul objectif légitime qui est d'assurer la protection d'autrui, il est essentiel d'identifier des outils d'évaluation valides qui peuvent être utilisés pour établir au préalable quand exactement une déficience auditive conduit à des incapacités qui entravent la performance sécuritaire de toutes les exigences d'un travail donné, malgré toutes les adaptations possibles de la tâche et de l'environnement de travail. Les règlements actuels sont très hétérogènes à cet égard et n'assurent pas la mise en place de mesures préventives. Par ailleurs, l'approche réglementaire met l'emphase sur les capacités auditives individuelles et ne prend souvent pas en considération l'état du milieu de travail. Un cadre d'analyse qui met l'accent sur l'interaction entre la personne et l'environnement de travail est discuté.

1. INTRODUCTION

In 1995, the Quebec Provincial Medical Committee on Occupational Health set up a task force commissioned to study the relevance of regulations imposing medical examinations on certain categories of workers or job applicants in order to make appropriate recommendations, if need be, to the Quebec National Public Health Director.

The analysis approach arose out of Strategy #6 of the Health and Well-Being Policy, which is to "guide the health and social services system towards the most effective and least costly solutions" and allows to reach one of the ministerial objectives to "systematically, and on an ongoing basis, evaluate the quality and effectiveness of interventions, technologies and, more broadly, health and social services." [1]

To eliminate the regulatory constraints maintaining inappropriate medical practices, the Quebec Medical Council recommended in 1997 that "each act and regulation prescribing medical examinations be periodically evaluated" and that "a sunset clause provide for terminating the application of those that have not been reviewed within a reasonable schedule to take into consideration the evolution of knowledge."[2]

Finally, in 1999, the Task Force on the Complementarity of the Private Sector in Pursuing the Fundamental Objectives of Quebec's Health System (Arpin Report) echoed these

recommendations by suggesting the necessity of "ceasing to guarantee services that are medically or socially not required."[3]

To date, relevance evaluations for sections of the *Regulation respecting the application of the Public Health Protection Act* that require medical examinations for diagnostic radiology workers and food handlers in certain forestry camps [4,5] have led the Quebec Council of Public Health Directors to recommend the abolition of these regulatory examinations to the Ministry of Health and Social Services who shared their opinion in this matter. More recently, the evaluation conducted by the Provincial Medical Committee on Occupational Health regarding the By-law respecting standards of the Sûreté du Québec and municipal police forces for the hiring of constables and cadets (c. P-13, r.14), was adopted by the Council of Public Health Directors [6].

The present paper will deal more specifically with the relevance of medical hearing evaluations required by regulation before hiring and/or during the course of employment. Four Quebec regulations that impose such requirements have been identified [7]:

- The By-law respecting standards of the Sûreté du Québec and municipal police forces for the hiring of constables and cadets (P-13, r.14) states that "an audiometric evaluation of the candidate must be carried out in standardized conditions and that a candidate will be considered unemployable when there is evidence of: (i) an average hearing loss at 1 000, 2 000 and 3 000 Hertz greater than 25 decibels; (ii) a hearing loss at 500, 1 000, 2 000 and 3 000 Hertz greater than 35 decibels; (iii) a hearing loss at 4 000 Hertz greater than 45 decibels."[8]

- Section 215 of the Regulation respecting occupational health and safety in mines (S-2.1, r.19.1), states that "The operator of a hoist used for the transportation of persons shall have a medical certificate issued by a physician within the 12 months preceding his entry in duty, and renewed annually, certifying that he has been examined and that he does not present any physical or mental handicaps or deficiencies in sight or hearing which, in the exercise of his duties, could endanger the safety of the persons being transported."[9]

- Section 136 of the *Regulation respecting occupational health and safety* (S-2.1, r.19.01) provides that "the employer shall, in conjunction with an audiometric program, make hearing protectors available to workers or shall limit their noise exposure time."[10]

- The *Regulation respecting access to driving a road vehicle in connection with the health of drivers* (C-24.2, r.0.1.0001) under the Highway Safety Code states that "A corrected or uncorrected average hearing loss greater than 40 decibels for the better ear at frequencies of 500, 1 000 and 2 000 hertz is essentially incompatible with driving a bus, an emergency vehicle, a minibus and a taxi."[11]

Similar regulations are in place in many industrial countries. Plausibly promulgated for the purpose of protecting the public, they do not necessarily meet recognized objectives, such as the objectives of hearing tests, as well as public health and occupational health objectives.

1.1 Objectives of hearing tests

Upon hiring and throughout employment, although not explicitly stated in the regulations identified, the objectives pursued by the medical hearing evaluation or audiometric program are most likely to permit the early identification of hearing loss or to judge an employee's fitness for work. Protecting the public or fellow workers are also possible objectives, especially in the case of the *Regulation respecting conditions of access to driving a road vehicle relative to the health of drivers* (C-24.2, r.0.1.0001), since workplace noise [12,13,14] and hearing loss [15] are recognized as factors associated with occupational accidents [16].

1.2 Public health objectives

According to the principles underlying public health practice, the administration of medical examinations for prevention purposes is justified only when solid scientific evidence exists that such examinations genuinely ensure improved quality of life or a reduction in avoidable or premature morbidity and mortality. The ethics and principles of public health in fact require that only those medical practices for which preventive effectiveness is demonstrated at the population level should be offered, and only for problems which have real importance both to the individual concerned and the general population.

1.3 Occupational health objectives

In the context of occupational health, other objectives may also be legitimately pursued. For example, the administration of medical examinations may be justified, from an employer's point of view, by the need to judge a person's ability to perform a job, thus the absence of disabilities that could represent an unacceptable risk for the company. The World Health Organization has proposed criteria for recognizing when these activities are legitimate [17,18].

1.4 Regulatory objectives

Imposing screening tests by legislation and regulation however involves conflicts between the individual right to privacy and the collective right to safety. In this regard, the Quebec College of Physicians concluded in 1997 that "treatment of the sick imposes on the physician a duty of diligence" whereas "a work-related medical examination

imposes a duty of reserve" (seeking only the information necessary for judging fitness to perform a job) [19]. When the government imposes a burden on its citizens, it should also be bound to a duty of reserve at the individual level and to an obligation of results at the population level.

From a public health standpoint, the only objective that can legitimately justify imposing medical examinations on a worker or applicant is to ensure the safety of others. And because the consequences of such examinations may be to deprive an individual of his right to work under the Canadian Charter of Rights and Freedoms, it is necessary to give reasonable proof of their validity in identifying disabilities that may significantly imperil the health or safety of others. Furthermore, the obligation of results implies that the benefits obtained from the proposed examinations [20] and their efficiency [21] should have been clearly established in advance [22]. In addition to the direct costs of carrying out the various examinations imposed by legislation or regulation, the medical acts required are defined as insured services and are thus reimbursed by the Quebec Health Insurance Board. As thousands of citizens must submit to these requirements, the resources required represent considerable sums for our society [23, 24]. It is therefore essential to verify whether the scientific bases, which alone can justify imposing these burdens on categories of Quebec citizens, are all present. In addition, and in a general way, preference should be given to other means that do not undermine individual rights and freedoms.

Given the existence of other mechanisms to address disease prevention among workers (i.e: an organization specific health program under section 113 of the *Occupational Health and Safety Act* (R.S.Q., S-2.1)), it is not legitimate for the government to impose medical examinations for the purpose of protecting the "individual himself" or preventing the emergence or progression of work-related diseases. The government must rather favor a legal and regulatory approach that creates an obligation to provide safe and healthy working environments based on existing medical knowledge as well as technological and organizational possibilities. A legal approach limiting individual rights requires evidence of its absolute necessity and the absence of less constraining alternatives. To this end, the rationale and context for the use of hearing tests in the early identification of hearing loss to prevent its progression is presented in the Appendix.

2. ANALYSIS FRAMEWORK

In pursuing the sole legitimate objective (protection of others) regulatory examinations must be analyzed to answer the following questions:

- Are there specific tasks or jobs where particular hearing abilities are essential, and where hearing disabilities that have been compensated for by individual rehabilitation or environmental adaptations would endanger fellow workers or the public? If the answer is negative, a medical assessment is not appropriate. The fact nevertheless remains that hearing tests in a non-regulatory clinical context may be useful to appreciate the nature of the required rehabilitation or environmental adaptations in some cases.

- If the answer to the previous question is positive, for each particular situation, do valid tests exist to identify all individuals, and only those individuals, who suffer from such disabilities? If such tests do not exist, the administration of standard tests is obviously impossible and clinical assessment on a case-by-case basis might be the only alternative.

- If such valid tests are available, are they the ones required by the acts and regulations? If not, are the medical examinations currently imposed effective in this respect? If not, the act or regulation in question should be abolished or amended.

In summary, can we correctly identify the persons who suffer from a hearing deficiency for which they have however been "optimally" rehabilitated, but who suffer from disabilities such that they cannot perform in a manner safe for others all the requirements of a given job, despite all possible work and workplace adaptations? It is therefore appropriate to establish in advance when a hearing deficiency leads to such disabilities.

3. ANALYSIS OF REGULATORY EXAMINATIONS

3.1 Examinations to be analyzed

The requirements contained in the four regulations identified are very heterogeneous and very unspecific: sometimes a "hearing test", "an audiometric testing program" or "a medical hearing examination" is demanded, other times the regulation demands that the absence of a hearing disability be established, without however saying how. Similarly, the auditory thresholds used to establish a "passing mark" for the test, if stated, differ from one regulation to the next, while several regulations give the assessing physician the authority to determine who will pass or fail the test. The heterogeneity of the legislative and regulatory requirements at least highlights the lack of consistency of the acts and regulations, although in principle they all aim the same objectives. The question is to determine under such conditions whether one or the other, or all these very different regulatory requirements really make it possible to ensure that fellow workers or the public are protected.

3.2 Analysis

Are there specific tasks or jobs where particular hearing abilities are essential, and where hearing disabilities would

endanger fellow workers or the public? Intuitively, one can suppose that for certain tasks or jobs, a worker must possess minimum hearing abilities in order to avoid endangering the safety of others (i.e: the operator of a hoist in a mine who has to perceive auditory signals on which the miners' safety depends).

Supposing that some of these conditions are identified, can these disabilities be compensated for by individual rehabilitation or environmental adaptations? Before administering any examination whatsoever to an individual, this question must first be answered. Many forms of adaptation or rehabilitation (visual rather than auditory signals, hearing aids, assistive listening devices, etc) exist. However, if for a given situation they are not applicable or do not sufficiently compensate for the hearing disabilities, do valid tests exist to identify all individuals having disabilities that cannot be compensated for through rehabilitation?

For lack of a more explicit definition of the examinations required by the regulations studied, the discussion will focus on the standard hearing tests carried out by the Screening Expertise Center of the Quebec National Public Health Institute. These examinations, administered to identify the various stages of noise-induced hearing loss among workers, include the auditory history questionnaire, the tympanometric examination and the tonal audiometric examination in air conduction and are carried out in accordance with the standards of the Quebec Standards Bureau [25].

Since the hearing function is a complex psycho-acoustic experience reaching far beyond the simple perception of a sound, these examinations can identify a loss of auditory sensitivity, but in no way allow the evaluation of disabilities to which it may lead. The auditory history questionnaire gathers information on the identity of the worker and his exposure to noise but no question deals, in detail, with hearing disabilities. The external auditory canal and tympanometric examinations are complements to the screening audiogram, whose only function is to determine the auditory thresholds for pure tones of different frequencies. It does not measure, for example, a worker's sound discrimination or frequency selectivity abilities. Frequency selectivity is defined as the ability to perceive a sound stimulus in the presence of one or more other sound stimuli. Such abilities, which are often altered in persons with acquired noise-induced hearing loss, are those that may be the greatest source of significant functional limitations. The tools available to assess these hearing abilities outside the clinical setting are currently incomplete and are still at the experimental stage.

Even the simplest auditory task (detecting the presence of a sound) is influenced by the properties of the sound wave and the environment in which it propagates. For example, detecting a back-up alarm against a background noise in a reverberant space, while wearing hearing protectors, is not the same as detecting a pure sound emitted through earphones in an audiometric room. Another more complex auditory task consists of discriminating between several acoustic signals. This task draws on frequency selectivity and temporal resolution abilities [26], as well as memorization of the signal's characteristics so it can be faithfully perceived.

The localization of sound sources is also an auditory task of great importance for several types of job. Being able to identify the origin or distance of a sound source may be crucial for ensuring the safety of a worker or other persons nearby (i.e: a worker being crushed to death by failing to localize the back-up signal emitted by a heavy vehicle [16]).

Finally, understanding speech requires much more complex processing than any other auditory activity and is strongly influenced by several factors external to the person (distortions introduced by the use of an electronic device, ambient noise levels, use of hearing protection, etc.) In addition, all auditory tasks listed previously are likely to be disturbed when hearing protectors are worn, whatever the individual's auditory thresholds may be.

Once the listening, communication or localization requirements are identified, how can the disabilities responsible for creating situations of handicap that represent a danger for fellow workers or the public be assessed? Although some attempts have been made, hearing tests allowing the valid identification of the ability to perform job assignments have not yet been developed [27] for all workplace situations, and under all circumstances. New tests have been or are being developed, but at best are at the beginning of implementation in the community (i.e: the "Hearing In Noise Test" (HINT) [28], the Guide for Clinical Measurement of Auditory Localization Ability [29] and the "Source Azimuth Identification In Noise Test (SAINT)."[30])

Despite the existence of certain tests, the regulatory approach emphasizes individual hearing abilities and usually does not take into consideration the fact that the work environment itself is unhealthy, even dangerous, from an auditory standpoint because of the presence of other determinants that influence the perception of acoustic signals (i.e: ambient noise levels, the quality of communication systems, the design of warning signals relative to the ambient noise and the hearing abilities of the worker population).

In summary, neither the medical assessment nor the audiogram enables us to appreciate hearing disabilities [31], which are themselves at the source of situations of handicap. Because they are inappropriate in answering the questions raised previously, it cannot be reasonably argued that these examinations really ensure the protection of others. Moreover, these examinations do not enable us to adequately guide workers towards appropriate habilitation and rehabilitation services when such resources exist.

3.3 Broader perspective

To complement this relevance analysis, particularly for those who believe that a regulatory examination may be justified for the sole purpose of protecting the individual concerned, and in order to make a judgment supported by an even broader perspective, it is also useful to consider the results of critical analysis of the scientific literature carried out by expert committees. These committees seek to determine who, in the generally asymptomatic population, will benefit

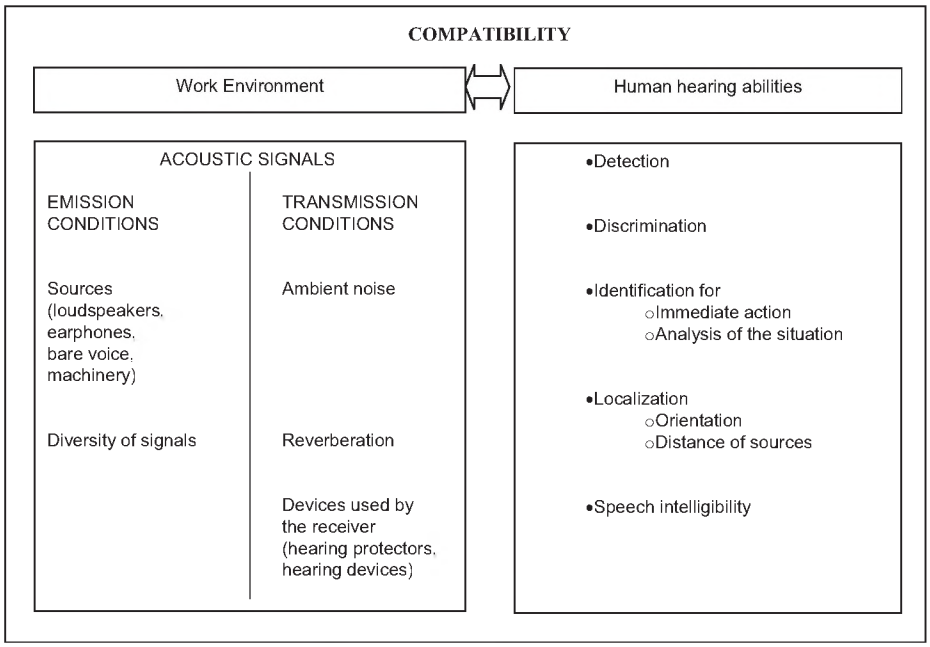

Figure 1. Conceptual model for analyzing compatibility between work requirements and hearing abilities.
The conditions involved in the transmission of acoustic signals are taken into consideration in the definition of occupational requirements. Emphasis is placed on the interaction between the individual and the work environment, rather than solely on the individual (Hétu R[31]).

from certain medical examinations likely to allow the early identification of certain diseases. Any medical examination that is not appropriate, based on the risk factors present in the work environment, especially when its use is not recognized as *relevant for the general population* for the purpose of *case finding*, must therefore be regarded as unnecessary and abusive, and is therefore to be avoided. It could not be legitimate to use such an examination in a context other than one of evaluation and treatment of persons who are ill or who seek a consultation (the diagnostic and therapeutic approach).

So, for the benefit of the general population, the Canadian Task Force on Preventive Health Care recommends to family physicians that they look for hearing impairment among senior citizens. The high prevalence of this impairment in the senior population and the possibility of offering means to minimize the situations of listening and communication handicap justify this recommendation. However, the Task Force does not make the same recommendation for the adult population, although it has sufficient data to "support noise reduction and hearing protection programs" for this population [32]. The U.S. Preventive Services Task Force, for its part states even more explicitly that there is insufficient evidence to recommend for or against routinely screening asymptomatic adolescents and working-age adults for hearing impairment [33]. Consequently, since the scientific literature is silent as to the usefulness of hearing tests among asymptomatic adults, they should not be imposed by regulation, even for the sole purpose of protecting the person concerned.

If intuitively we feel that certain functional limitations can endanger fellow workers or the public, we must recognize, that to our knowledge, there is currently no tool available that enables a matching of specific auditory requirements by type of task or work and individual hearing abilities. This lack of tools in no way justifies subjecting groups of individuals to irrelevant examinations. The duty of reserve and the obligation of results that the government must impose on itself do not allow to limit itself to an obligation of means and doing its best under the circumstances, not even in the meanwhile. Consequently, we must conclude that the medical examinations required by the various regulations are inappropriate for achieving the desired goals, whatever they may be.

4. ANALYSIS FRAMEWORK FOR ASSESSING THE CONTRIBUTION OF HEARING TESTS TO THE PROTECTION OF OTHERS

Hétu proposed the adoption of a renewed conceptual framework based on an ecological perspective of activities involving hearing. This new model, illustrated in figure 1, emphasizes the interaction between the person and the work environment [31]. Laroche established its relevance in four cases of complaints filed with the Canadian and Quebec Human Rights Commissions in recent years [34]. These two authors point out that the different hearing abilities required by a task will vary depending on the type of acoustic signals to be processed and the conditions involved in the transmission and reception of such signals [35,36]. As Hétu points out, an examination of the interaction between the environmental demands and the individual's hearing abilities may reveal inconsistencies, either because the environment is inadequate or because the person presents limited abilities to respond

to environmental constraints. To remedy these limitations, we must design environments that are better adapted to normal human hearing abilities or resort to hearing devices (hearing aids and assistive listening devices) that allow the deficient function to be corrected or supplemented. Hétu strongly insists on the necessity of exploring all possible accommodations (i.e: use of hearing devices, adaptation of sound warning systems in industrial settings [36,37], spontaneous adaptations adopted by workers themselves and work-related experience [31]) in order to maximize compatibility between the environment and human skills.

5. CONCLUSION

Sections of the regulations examined, like other acts and regulations that require medical examinations, have the effect of "freezing" professional practices by making them insensitive to the evolution of scientific knowledge. The Canadian Task Force on Preventive Health Care has determined that effective action to prevent occupational hearing loss in the adult population resides in "noise reduction programs" [32] at the source or along its propagation paths.

With regards to the sole legitimate goal of third party protection, the examinations imposed by these four regulations do not ensure the safety of others when they are simply not left to the evaluator's discretion. Also, because the criteria for hearing impairment used to establish the presence of a danger for the public or fellow workers have not been defined, and because workplace monitoring of hearing is not recognized as a scientifically valid intervention by recognized groups of experts, the government cannot claim to meet the obligation of results to which it must bind itself when imposing burdens on citizens and thereby unnecessarily limiting their individual rights. As well, the functional abilities of detection, discrimination, recognition, localization and speech understanding which ensure an adequate match with the work requirements are not assessed by the audiogram, but remain in the field of scientific research [28] or at the stage of assessment for implementation in the community. These functional abilities are currently usually assessed in an interview carried out by specialized personnel and, more rarely, through analysis and field observation of work assignments.

Furthermore, the scientific literature and consulted documents demonstrate that the current context of administration of regulatory examinations does not ensure the implementation, although mandatory in work environments, of preventive measures that could help control the emergence or progression of occupational hearing loss. Finally, if the departments or agencies that have the authority to promulgate such regulatory requirements wish to maintain them, they should first ensure that the recommendations of the Public Health Concertation and Coordination Committee, aimed at assuming the obligation of results set forth in the Health and Well-Being Policy [38], are adequately implemented.

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7. ACKNOWLEDGMENTS

We would like to acknowledge Véronique Vaillancourt, research assistant for the Audiology and Speech-Language Pathology Program at the University of Ottawa, for helping with the translation and formatting of this document.

8. APPENDIX

Regarding the objectives of prevention or early identification of hearing loss to prevent its progression, certain findings concerning workplace hearing tests were identified by members of the Advisory Committee to the Public Health General Directorate of the Department of Health and Social Services at the beginning of its mandate. Although these objectives are not related to the sole legitimate objective of regulation described before, they seemed to be pursued in the *Regulation respecting industrial and commercial establishments* and the *Workplace Quality Regulation* (These two regulations have been repealed and replaced by the *Regulation respecting occupational health and safety).* The following findings are noted because they are related to the requirements of these regulations and allow a better understanding of all that must guide the use of hearing tests in the workplace, even outside a regulatory context:

- "Occupational hearing loss is a frequent and debilitating problem for workers... [Even if activities aimed at sensitizing the work community to the harmful effects of noise are conducted], in many cases they are not successful in inciting the implementation of noise reduction measures, even when the technological resources are available. Constraints such as motivation and employer resources are also strong determinants [39].
- Hearing tests must be supported by firm action aiming the elimination of noise sources and the adoption of effective protective measures to prevent occupational hearing loss.
- Any hearing evaluation program must provide for follow-up of workers with hearing problems. Support must also be provided for rehabilitation and compensation efforts.
- A screening program consisting of a series of tests repeated with a certain regularity..., may have perverse effects: targeting the worker instead of the stressor, a feeling of false security, metrological difficulties, the insufficiency of resources to provide proper follow-up, etc. Furthermore, the screening process is sometimes directed away from its underlying purposes, for example when used to provide experimental proof that, in a given factory, noise exposure is great enough to produce occupational hearing loss or just the opposite. It is improper to use hearing tests to demonstrate over and again such a claim [40].
- Nor is it proper to use hearing tests to search out hypersensitive workers. Early identification efforts of so-called vulnerable individuals are useless because, among other reasons, the hearing tests are incapable of validly identifying them" [41].

Let's mention by the way why the use of hearing tests is greatly limited by the measuring qualities of audiometry:

- The hearing test is influenced by several sources of random or systematic errors that can alter the precision of the auditory threshold measurement. Under optimum screening conditions, the measurement error can be limited to ± 5 dB for the 0.5-4 kHz frequency range and to ± 8 dB at 6 kHz. It is thus difficult to talk of a significant deterioration in hearing between two screening tests unless the variation in thresholds exceeds 10 dB for the 0.5-4 kHz range and 15 dB for 6 kHz. The conditions for carrying out the tests must be such that their validity and reliability can be guaranteed and that the measurement error is kept to a minimum [42].
- Even assuming a minimum error of measurement, the testing schedule must take into consideration the acquisition time course of occupational hearing loss. This makes it possible to optimize the relative validity (sensitivity, specificity) of the procedure [43].

For the most sensitive individuals (5% of the population) confirmed to be otologically normal, the hearing deterioration rate associated with occupational noise rarely exceeds one (1) decibel per year after 5 to 10 years of noise exposure, even at the frequency most sensitive to the effects of noise (4 kHz), for the most harmful levels of exposure ($LAeq_3$ (8h), 90-100 dB_A), and in the absence of hearing protection [44].

Given the seniority-related context of noise exposure commonly encountered in the work environment, one would often have to wait ten years or more to detect a significant deterioration and this, under optimal conditions of validity. Can we then claim that a given testing program is effective in the early identification of any hearing deterioration when the work environment continues to be knowingly harmful throughout this period?

The Advisory Committee also recognized the irreversibility of traumatic hearing loss and the necessity of combining the concept of handicap with that of natural history. Hearing alterations are at first temporary, but become permanent in the long run. It is when the symptoms generate permanent listening and communication difficulties at work, at home and in leisure activities that it is appropriate to speak of a severe situation of handicap, with the consequences it entails for the victim. Indeed, hearing loss is rated the same as a below-the-knee amputation in terms of disability adjusted life-years (DALYs) [45].

"To make legitimate the use of a hearing test with noise-exposed workers, it is important that the test be valid and intervene in the development of the disease at a stage where it

is possible to improve the prognosis, and that, for a significant proportion of workers... In this context, ... hearing tests must be part of an overall intervention process and cannot alone guarantee the initiation of preventive measures... If the natural history of occupational hearing loss includes a sufficiently long latency period to allow interventions to influence the prognosis for this disease,... the tests are part of a very precise stage in a process of behavior modification leading to the adoption of appropriate preventive measures. In the absence of evaluation studies specifically addressing the advantages and limitations of the hearing test in this behavior modification process... it's use may be justified at some very precise stages:

> To complete the work environment analysis through knowledge of the health status of workers identified as being at risk for developing a hearing loss (AROHS, section 113.1);
>
> To contribute to the first step in a process of behavior modification leading to the adoption of effective preventive measures (AROHS, section 113.2), namely "recognition of the situation of risk" through an awareness campaign [46,41].

The scientific literature however shows that "despite our knowledge of the consequences of excessive noise exposure and occupational hearing loss, as well as the availability of technologies allowing control over the exposure in many circumstances, the situation is improving very little," [47] and that, despite the application of the two above-mentioned regulations. Moreover, the Advisory Committee has recommended that hearing tests, if necessary, normally be conducted at intervals of at least five years in certain very restricted and well-identified contexts for certain categories of workers. It is also recognized that the only preventive method that has demonstrated effectiveness is noise reduction at the source or along its propagation paths, which should no doubt be regulated in light of contemporary scientific knowledge.

Also, the Advisory Committee states that "we cannot support the merit of a systematized workplace hearing testing operation if efforts made to ensure follow-up remain in vain" [41]. The regional disparities in terms of resources to ensure the diagnosis and rehabilitation of affected workers are a major and inescapable difficulty within the framework of a regulatory obligation applicable throughout the Quebec territory [48].

In response to the Advisory Committee's report, the Quebec Provincial Medical Committee on Occupational Health (QPMCOH) concluded that "firm action aimed at eliminating noise sources and the adoption of effective protective measures in order to prevent occupational hearing loss may, under certain conditions, be supported by hearing tests" [48]. It's members unanimously recognized that it is crucial "to ensure that professional services are available both for rehabilitation and compensation" and that "this requirement is currently not being met everywhere" [48] in Quebec.

In addition, the QPMCOH states that "although there is no doubt in anyone's mind that conducting hearing tests is useful for determining the hearing status of workers who have been exposed to noise for many years, opinions are more divided as to their usefulness for pursuing the objectives of health programs" [48] (i.e: preventing the progression of occupational hearing loss).

It is preferable that the relevance assessment of conducting such tests instead be done on a case-by-case basis, according to the principles of public health. The recommendations made by the Quebec Provincial Medical Committee on Occupational Health in response to the report of the Advisory Committee of the Department of Health and Social Services Public Health General Directorate should be repeated here. Its members unanimously agreed that:

1. Hearing tests can provide information about the workplace that is likely to satisfy the needs of the knowledge function; but as such information has not been demonstrated to be indispensable for carrying out an approach aimed at modifying the environment, it is up to the responsible physician to judge the relevance of such tests according to the characteristics of the environment.
2. Current scientific knowledge does not allow us to draw conclusions as to the usefulness, effectiveness or efficiency of hearing tests as a tool for raising the awareness of workers and employers, favoring modification of the work environment or of individual behaviors.
3. Hearing tests should only be conducted if one can provide follow-up [...] in rehabilitation and adequate support in view of compensation. It is agreed upon that the use of hearing tests for knowledge purposes must respect this general principle, taking into account the accessibility to such minimal follow-up [48].

Furthermore, the Medical Committee considers "unavoidable the necessity that actions, aimed first at reducing noise at the source or implementing effective protective measures other than the mere recommendation to use means of individual protection, be initiated. Failing to do so renders monitoring actions meaningless" [48]. The current regulatory obligations to this effect should be reinforced so as to compel employers to concentrate their energies and resources on reducing noise and on adapting work positions to the residual hearing abilities of workers, rather than to the endless search for cases.

These recommendations are consistent with those proposed by recognized learned societies and are much more in keeping with an approach aimed at respecting the duty of reserve enacted by the Quebec College of Physicians, an ethical obligation to which the government itself should not evade.