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OCCUPATIONAL HEARING LOSS
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OCCUPATIONAL HEARING LOSS: SUMMARY OF INTRODUCTORY ADDRESS

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A survey of the development in the U.S.A. of rules and criteria for hearing impairment will illustrate a series of concepts and basic assumptions pertinent to occupational hearing loss and compensation for it.

The original "Fletcher point-eight rule" was intended for otologists, to provide an overall index of a patient's hearing capacity, the percentage hearing loss. In principle the rule divided the normal auditory area into cells with the dimensions of decibels and hertz and gave the percentage of cells that had been lost. The concept is atomistic, very much as if we were counting lost anatomical units, such as hair cells. The "point-eight" factor represents the translation of a normal dynamic range of 120 dB to a percentage scale. Fletcher's important simplification, however, was to restrict the frequency range of interest to three major speech frequencies, 500, 1000 and 2000 Hz. Thus some cells of the auditory area became much more important than others.

Next, the Fowler-Sabine scale, recommended by a subcommittee of the American Medical Association, put graded values on the decibel scale. It discounted minor losses within the range of normal hearing and also at very high intensities, and it increased the value of the central frequencies and added 4000 Hz. It introduced also an arbitrary weighting factor of five to one to obtain a binaural evaluation when the two ears were unequally impaired. Its chief weaknesses were the arbitrary assignments of unequal weights, and the complex table of weighting values and calculations; and it did not displace the simple Fletcher point-eight rule.

Social legislation related to noise-induced hearing loss began in U.S.A. with the principle of workmen's compensation insurance to repay an injured worker for loss of earning power. New York State and Wisconsin led the way. Through court decisions, which were influenced strongly by the analogy to silicosis, noise-induced hearing loss was recognized as an industrial disease, with a predetermined payment of x week's wages for total

loss of hearing. Here the analogy is to the loss of function of a hand or of vision. Actually, under the Fletcher point-eight rule, with its ceiling of 120 dB hearing loss as 100 percent, no noise-deafened worker could ever expect to receive more than perhaps 60 percent of the compensation scheduled for total deafness.

The Committee on Conservation of Hearing of the American Academy of Ophthalmology and Otolaryngology developed a rule which is a simplification of the Fowler-Sabine method. It is explicitly related to the sound levels of human speech that are actually encountered in everyday life (not under noisy working conditions). Like the previous rules it disregards any potential benefit from a hearing aid. Only the frequencies 500, 1000 and 2000 Hz are considered. The "high fence" of total impairment or handicap was placed at 93 dB (ISO), average for the three frequencies, because at this level the listener can rarely understand very loud speech at a social distance. Beginning handicap was placed at 27 dB HL (ISO), where difficulty is encountered with low levels of everyday speech. This "low fence" has become the benchmark for estimating the risk of noise-induced hearing handicap. The AAOO rule now enjoys considerable legal prestige by its incorporation into many rules or even state laws relating to compensation for hearing handicap, from whatever cause.

The high fence and the low fence were both adjusted deliberately by the committee to yield a simple rule, namely 1-1/2 percent handicap per decibel of hearing threshold level above 26 dB HL. The term "handicap" was substituted for "hearing loss" or "hearing impairment" in order to emphasize the relation of the scale to the physical characteristics of human speech instead of to the extent of anatomical injury to the ear. Handicap relates to social communication. In the interest of simplicity the AAOO rule introduced unreal abrupt transitions at zero and at 100 percent handicap. From the point of view of the victim, the rule is harsh at the low fence but lenient at the high fence. Perhaps this should be taken into account if we undertake to set arbitrary limits or criteria for habitual noise-exposure in order to reduce the risk of developing a hearing handicap.

A feature of the AAOO rule that surprises many audiologists is the omission of any allowance for presbycusis. In Wisconsin the rule for presbycusis is to reduce the final monetary award by an arbitrary percentage related to the age of the worker. I personally prefer no reduction at all because advancing presbycusis after retirement will inevitably and predictably increase the handicap. In Missouri a very unjust and illogical rule, intended to allow for "non-occupational causes" of impairment, subtracts a number of decibels before the average hearing level is translated into percentage handicap. This procedure ignores the difference in hearing level between "beginning presbycusis" at 0 dB HL and "beginning handicap" at 27 dB HL.

Causes other than noise and presbycusis can contribute to a hearing handicap, including otitis media, trauma, otosclerosis and Menière's disease. Rules must be devised for dealing with multiple causation, and presbycusis should be handled in this context. The general principle is to estimate first the overall percentage handicap. (See how big the pie is.) Then estimate separately the relative contribution of each of two or more causes to the final impairment. (Cut the pie on this basis.) Fortunately we now have good predictive data for presbycusis in non-noise-exposed populations, as we shall hear later today, and we can reasonably estimate its contribution to the total permanent threshold shift. (The remainder of the pie is charged to noise-exposure or other causes.) The problem of "second injury" in a different employment can be handled in the same way. Preemployment audiograms are very useful here.

Rules and criteria can be made fair and reasonable on the average but they cannot take into account all possible deviations or individual differences. It is important to keep the concepts clear and the rules simple.