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Industrial Medicine: The Future for Vertigo and Tinnitus Patients

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The twenty-first century is posting a flag in front of the medical community that reads, "Keep your medical services affordable!" This means that despite all the improvements in the quality and quantity of diagnostic and therapeutic services, the costs for health care must remain at their current level or be reduced while yet maintaining the current good level of services. The field of diseases that must be treated by physicians extends over a very broad spectrum, including morphological disorders (e.g., fractures, tumors, and vascular accidents), metabolic disorders (e.g., diabetes, liver and kidney failure), functional diseases (e.g., hypertension, hypotension), neurosensory disorders (e.g., vertigo and tinnitus), and many other categories (e.g., infections, hormonal degenerative diseases, psychiatric diseases).

Having an awareness of the reasonable pricing structures for such complex modern goods as cars, televisions, audio sets, and kitchen equipment, and for such complex modern services as air transportation, call centers, restaurant chains, and supermarkets, we are challenged to consider the costs of our medical services before other, external powers begin to do so. In that eventuality, we could only expect that industrially managed companies or an external bureaucracy will overtake the field of regulation. At this point, we cannot propose what should be done, particularly with respect to all of the aforementioned disease groups, but we can posit some theories as regards our own field of vertigo and tinnitus, which afflict and disable millions of patients in Europe, the United States, and many other countries and regions at this time. Vertigo and tinnitus are the two most most frequently encountered neuro-otological disorders.

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Neurootology nowadays is not only a discipline of very special and sophisticated diagnostics but is just as much a medical specialty. It encompasses a differentiated spectrum of therapies for a broad variety of disorders afflicting human sensory performance in everyday life. As a consequence, demand for neurootological services is increasing in the field of modern medicine.

Traditionally, *diagnosis* has been defined as the art of identifying a disease on the basis of its signs and symptoms. Formerly, few diagnostic tests were available to assist physicians, who depended on medical history, observation, and examination. Only during the last decades—with its many technological advances in medicine—have tests become available (e.g., functional pathway analysis) to assist in making specific diagnoses.

Modern methods for measuring disorders in hearing are termed *audiometry*. Techniques for measuring diseases in the field of equilibrium, together with the symptoms of vertigo, nausea, giddiness, and instability, are called *equilibriometry*. For diagnosing taste disorders, we apply modern methods of *gustometry*. For those of smell disorders, we apply *olfactometry*. A large interconnected network analysis now specifically deals also with tinnitus; it is called *tinnitology*. Its diagnostic standards are related to major data-bank records about patients, diseases, and tests (e.g., Neurootological Data Evaluation–Claussen [NODEC I–IV]). Neurootology also has developed a very special system for treating disorders of the cranial senses. This branch can be parsed into a wide spectrum of different diseases necessitating different kinds of treatments.

Currently, the most important branch of applied therapy (e.g., for vertigo, unbalance, tinnitus, and the like owing to such conditions as infections, cardiovascular deficiencies, metabolic disorders, trauma, and aging processes) is pharmacotherapy with oral chemical medication (although such medication can be administered also by injection and infusion). We now can target therapy more precisely to correct the underlying deviation of function, owing to knowledge obtained from differential neurootometric diagnostics about the role of lesions within the central nervous system in various disorders (vertigo, nausea, tinnitus, hearing loss, and

taste and smell disorders). Included in this system for treating diseases of the cranial senses are psychotherapy and physiotherapy (e.g., Competitive Kinesthetic Interactive Therapy [CKIT]), especially in tinnitus and in selected cases of vertigo. However, this development has intensified diagnostically and therapeutically indicated medical activities, increasingly highlighting the question of how to finance more medical abilities and services.

Classifications of diseases become extremely important in compiling statistics regarding not only causes of illness (morbidity) but also causes of the total cost of national health care and costs per annum per case per disease. The newly arising, more highly differentiated neurootological classification of neurosensory diseases is based on the underlying functional derangement produced by functionally measurable disorders.

The epidemiological classification of diseases deals with the incidence, distribution, and control of disorders in a population. The statistical basis of disease classification employs analysis of disease incidence (the numbers of new cases of a specific disease occurring during a certain period) and disease prevalence rates (number of cases of a disease in existence at a certain time). Patients suffering from vertigo and tinnitus have been seen by physicians more and more frequently during recent decades, owing especially to increased life expectancy. During the latter half of an individual's life (starting at age 50 years), age-related hearing problems (called *presbyacusis* or *presbytinnitus*), vision problems (called *presbyopia*), equilibrium problems (called *presbyvertigo*, *presbynausea*, and *presbydystaxia*), and taste and smell problems (called *presbygeusia* and *presbyosmia*, respectively) are increasingly encountered.

In recent years, a combination of medicine and engineering has produced a vast array of new instruments, many of which require a modern neurootological laboratory setting for their use. Equipping and operating clinical neurootological offices thus is becoming more expensive. Over the last decade, health service administrators have been increasingly concerned with the question of cost-effectiveness with respect to the visible dynamics of this process.

Social insurance is a public insurance program that provides protection against various economic risks (e.g., loss of income due to accidents, trauma, sickness, old age, or unemployment) and entails compulsory participation. Social insurance is considered to be a type of social security and, in fact, the two terms are sometimes used interchangeably. The first compulsory social insurance programs on a national scale were established in Germany under Chancellor Otto von Bismarck in the nineteenth century: health insurance in 1883, workers' compensation in 1884, and old-age and invalidity pensions in 1889. Germany's example was soon followed by Austria and Hungary. The issue of social insurance elsewhere in Europe was dominated by a debate between those who preferred voluntary, subsidized insurance and those who advocated a compulsory system. Great Britain adopted national compulsory health insurance in 1911 and greatly expanded it in 1948. After 1920, social insurance on a compulsory basis was rapidly adopted throughout Europe and in the Western Hemisphere. The United States lagged behind Europe.

Social insurance programs differ from private insurance in several ways. Contributions are normally compulsory and may be made by the insured workers' employer and the state and by the insured themselves. Also, benefits are not as strictly tied to contributions as in private insurance. For example, to have the programs serve certain social purposes, some groups are included among beneficiaries even though they have not contributed for the required periods. Benefits may be raised in response to increases in the cost of living, again weakening the link between contributions and benefits. However, as the reimbursements of expenses for individual and public health costs are growing exponentially and as national resources are shrinking, the politicians responsible for national health care try to reduce their financial deficits under the pressure of the dramatically growing gap.

A health insurance system that is organized and administered by an insurance company or other private agency, with the provisions specified in a contract, is a private, or voluntary, health insurance. Private health insurance usually is financed on a group basis, but most plans also provide for individual policies. Private group plans usually are financed by groups of employees whose payments may be subsidized by their employer, with the money going into a special fund. Insurance of hospital costs is the most prevalent form of private health insurance coverage; another type is major medical expense protection, which provides protection against large medical costs but avoids the financial and administrative burdens involved in insuring small costs. However, this system also tries to meet an equal level between resources and expenses.

Confronted with the fact that our innovative and modern medicine is very expensive, we must consider what might be done to reduce present costs such that our diagnostic and therapeutic offerings still can meet the demands of the patients. A comparison can be made between our sophisticated medicine delivered by highly qualified and well-equipped medical staff who, outside of the hospital setting, usually work in small units run by a single or a few doctors, and the changes from manufacturing in small companies to industrial mass production. Only the latter truly allowed people worldwide

to participate in the production and share in the consumption of modern goods and services. Likewise, there exists in modern health care a dramatic demand for mass production of many kinds of medical services, which would entail, for instance, application of the principles of specialization, division of labor, and standardization of diagnostics and therapies. Such manufacturing processes can attain high rates of output at low unit cost, with lower costs expected as volume rises.

Mass-production methods are based on two general principles: (1) the division and specialization of human labor, and (2) the use of procedures, tools, laboratories, and other facilities, usually densely concentrated and automated as much as possible, to produce standard, interchangeable diagnostic data and related treatments.

Driven by the Industrial Revolution, modern methods of mass production have so improved the cost, quality, quantity, and variety of goods and services available that the largest global population in history now is sustained at the highest general standard of living. Following this example, industrial medicine might be the next field affected by a similar kind of a mass production. It can be foreseen that techniques of production management also will be employed in this industrial medical service. "Mass medicine" will create a responsibility similar in level and scope to other economically organized specialties, such as marketing or human resources and financial management. In industrial medicine, production management will include diagnosis and therapy design responsibility, planning and control issues involving capacity and quality, and work-force (including medical staff) organization and supervision. In modern industry, production management's responsibilities are summarized by the "five *M*s": men, machines, methods, materials, and money. These terms must be transferred and renamed for application in health care.

The manager's concern for money is explained by the importance of financing and asset utilization. In medicine, these same concerns exist. An industrial medicine manager (as, for instance, a person who has received a degree in medical economics) who allows excessive inventories to build up or who achieves level production and steady operation by sacrificing good patient service and timely delivery runs the risk that overinvestment or high current costs will wipe out any temporary competitive advantage that might have been obtained in his or her particular facility. The smoothness of resource movement and data flow is determined largely by the fundamental choices made in the design of the industrial medical center and in the process of treatment to be used.

As neurootologists, we have designed a special strategy and medical operations plan for up-to-date, high-level treatment of many vertigo and tinnitus patients. Over the last 30 years, we have developed our system of objective and quantitative functional neurosensory network analysis. We have built up a reference data bank, NODEC, involving approximately 30,000 patients ranging in age from 1 to 100 years and representing both genders and evaluated with respect to 1,000 parameters each, including such considerations as history, equilibriometry, audiometry, olfactometry, gustometry, and x-ray findings.

Because our objective and quantitative neurootological network analysis system produces numerous protocols from many different measurements, we end up with much paperwork for diagnostic evaluation and treatment planning. Therefore, by applying artificial intelligence, we designed the Claussen Medical Expert system (CLAMEDEX), which refashions the test data from history taking and curves and charts of experimental investigations into a description of each individual case, a differentiated individual diagnosis in which is described the site and functional deviation of the lesion(s) found. Then, a therapeutic plan is proposed with respect to the diagnostic findings. Both can be modified. A physician using this system retains a copy of the complete report for any given patient, to aid in making explanations to the patient.

Further questions concerning the characteristics of the symptoms vertigo, nausea, tinnitus, and so on, as well as about the neurootometric tests applied, can be passed along to the patient via the Internet before and after the patients meets with his or her physician—for instance, through the homepage http://www.vertigo-dizziness.com or by means of the more specific homepage http://tinnitusjournal.com. Specific literature is offered for physicians as well as patients in the Internet library *Archives of Sensology and Neurootology (ASN)*.

While research and development continues in universities and other centers, the practical application of good diagnostics and treatment are offered regularly to our patients in special neurootological centers. This is one model of cost-effective medical planning from one sector within the vast field of diseases. Appropriate models in other sectors must follow.

As regards financial concerns, this system could incite a sigh of relief on the part of both the public and health politicians. However, in future the medical profession will be confronted with many more changes: for instance, qualitative professional changes from independent and free physicians to doctors who are in employee positions and are subject to directives and instructions, or quantitative production changes from treating diseases individually to diagnosing and treating increasing numbers of patients monthly according to predefined rules and plans of disease management. Medical center space and staff will have to grow sufficiently

to effect low-cost industrial medical production (i.e., financial surplus value) per case.

Given the pressure of restricted finances behind this process, which is aimed at increased margins from return of invested capital based on mainstream and average medicine offered, we should already be building up to the point that our medical knowledge and experience are sufficiently taken into account in addressing a special system for the treatment of disorders of the cranial senses. These disorders would be differentiated into a wide spectrum of diseases requiring various kinds of treatments.

Modern medicine must aim not only at adding years to people's lives but also at adding life to people's years, at rates that are affordable. One might give that old chestnut an otological twist: We neurootologists should aim at putting life into people's *ears* . . . at a reasonable price!

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