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Article abstract

In the sociology of professions, working with machines is often seen as an obstacle to professional aspirations. This is especially true in healthcare, where a sharp distinction between professionals and technicians has prevailed since the early 20th century. However, only a few studies have documented the meaning of machines and technical skills for healthcare technicians. The purpose of this article is to show how and why two groups of such technicians, hearing prosthetists and respiratory technicians, actually tried to reconcile the use of machines with professionalization projects. It concludes with considerations about what these stories tell us about the history of technical work, about the transformations of the healthcare work environment in the second half of 20th century, and about the place of technical skills in the system of professions

# 'Professional Techs': Machines, Technical Skills and Professional Aspirations in Hearing Prosthetics and Respiratory Care in Quebec, 1950-1990[1]

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**Résumé :** La sociologie des professions décrit souvent l'emploi intensif de machines comme un obstacle à l'obtention d'un statut professionnel. Cela serait particulièrement vrai dans le secteur de la santé, où la dualité entre professionnel et technicien est fortement instituée depuis le début du 20ᵉ siècle. Peu d'études, cependant, ont réellement documenté l'usage des machines et ses implications pour les techniciens de la santé. Le présent article montre de quelles manières et pour quelles raisons deux groupes de techniciens, soit les inhalothérapeutes et les audioprothésistes, ont, en fait, cherché à concilier l'emploi de machines et leurs aspirations professionnelles. Cette histoire suggère certaines considérations utiles pour l'histoire du travail technique, l'étude du travail en santé depuis 1950, et le rôle concret des compétences techniques dans le système des professions.

**Abstract:** In the sociology of professions, working with machines is often seen as an obstacle to professional aspirations. This is especially true in healthcare, where a sharp distinction between professionals and technicians has prevailed since the early 20th century. However, only a few studies have documented the meaning of machines and technical skills for healthcare technicians. The purpose of this article is to show how and why two groups of such technicians, hearing prosthetists and respiratory technicians, actually tried to reconcile the use of machines with professionalization projects. It concludes with considerations about what these stories tell us about the history of technical work, about the transformations of the healthcare work environment in the second half of 20th century, and about the place of technical skills in the system of professions.

In 1988, Quebec's main association of respiratory technicians envisioned an idealized future in which its members would be "far more clinicians than technologists."[2] A few years later, in 1994, members of another technical occupation, the province's hearing prosthetists, held a congress entitled "Our profession, more than prostheses." These paralleled stands by respiratory technicians and hearing prosthetists for genuine clinical and professional roles in healthcare were nothing new. Nonetheless, they remained ambiguous. In preceding years, while presenting themselves as "real" professionals and "more" than machine-users, respiratory technicians and hearing prosthetists had continued to define themselves through the skilled but somewhat routine use of machines like audiometers and mechanical ventilators. In the healthcare work economy, such identification with machines seemed inconsistent with professional claims. Could a technician, a machine user, be a professional? The purpose of this article is to show how and why, from 1950 to 1990, Quebec's hearing prosthetists and respiratory technicians tried to reconcile the daily use of machines with aspirations to professional status, and to see what this may tell us about the history of technical work in healthcare.

The historical impact of technological change on work is a subject of debate. Historians of technology interested in mechanization processes have proposed contrasting views of machines and workers' skills in 19th and 20th centuries, the main topics of inquiry being the historical place of machines in the division of work and the nature of the skills associated with the daily use of machines.[3] However, most studies deal with industrial work. Only a few examine the impact of machines on work environments characterized by expertise and professionalism, which became more common in the late 20th century.

Technical work in healthcare during the 20th century offers historians of technology interesting case studies. In the 20th century, machines like dialyzers, monitoring devices, mechanical ventilators and prostheses

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2. *Inhalo-Scope* 6, 1 (1988): 10.
3. See : Larry Hirschhorn, *Beyond Mechanization: Work and Technology in a Postindustrial Age* (Cambridge: MIT Press, 1984); Laurence F. Gross, "Wool Carding: A Study of Skills and Technology," *Technology and Culture* 28, 4 (1987): 804-827; Michael Nuwer, "From Batch to Flow: Production Technology and Work-Force Skills in the Steel Industry, 1880-1920," *Technology and Culture* 29, 4 (1988): 808-838; Douglas Reynolds, "Engines of Struggle: Technology, Skill, and Unionization at General Motors, 1930-1940," *Michigan Historical Review* 15, 1 (1989) : 69-92; Logan Hovis and Jeremy Mouat, "Miners, Engineers, and the Transformation of Work in the Western Mining Industry, 1880-1930," *Technology and Culture* 37, 3 (1996): 429-456; Stephen R. Barley and Julien E. Orr, eds., *Between Craft and Science: Technical Work in US Settings* (Ithaca: Cornell University Press, 1997).

deeply reshaped the division of work in healthcare. In the process, healthcare developed a strong polarization between the figures of the "professional" who diagnoses and treats patients, and that of the "technician" who focuses on machines. In this hierarchical division of mental and manual work, the daily use of machines is often seen as an auxiliary position and an obstacle to professional aspirations.

In this context, "professional technician" may sound like an oxymoron. Indeed, the word "professional," in both sociological and popular language, often refers to a specific kind of non-manual, intellectual worker. In sociological literature, "real" professionals are people who, historically, earned special rights from their exclusive ability to control and define the content of their own work. According to A. Abbott's influential work, the key to such privilege is the mastery of exclusive abstract knowledge: "Only a knowledge system governed by abstractions can redefine its problems and tasks…, and seize new problems – as medicine has recently seized alcoholism, mental illness, hyperactivity in children, obesity, and numerous other things."[4] In healthcare, professionals define and seize problems through diagnosis, by assessing what problem the patient has and what should be done about it. Historians have shown how the changing and ever-enlarging use of diagnostic concepts by doctors, psychologists, speech therapists and others contributed to both their professional agendas and the medicalization of new conditions throughout the 20th and 21st centuries.[5]

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4.   Andrew D. Abbott, *The System of Professions: An Essay on the Division of Expert Labor* (Chicago: University of Chicago Press, 1988), 9. Other definitions of professions revolve more around the quest for legal and economical privileges, for example among authors influenced by Magali Sarfati-Larson, *The Rise of Professionalism: A Sociological Analysis* (Berkeley: University of California Press, 1977). In the present article, I rather study professionals at work, following Freidson's and Abbott's suggestions in order to consider professionalism as a window on the division of expert labour. By Freidson, see: *Professionnal Powers: A Study of the Institutionalization of Formal Knowledge* (Chicago: University of Chicago Press, 1986); *Profession of Medicine: A Study of the Sociology of Applied Knowledge* (Chicago: University of Chicago Press, 1970).

5.   Historians and sociologists of healthcare professions have done a lot to show the input of professional projects and aspirations in many medicalization processes. See: Sydney A. Halpern, "Medicalization as Professional Process: Postwar Trends in Pediatrics," *Journal of Health and Social Behavior* 31, 1 (1990): 28-42; Keith Wailoo, *Drawing Blood: Technology and Disease Identity in Twentieth-Century America* (Baltimore: Johns Hopkins University Press, 1997); Ad Prins, *Aging and Expertise: Alzheimer's Disease and the Medical Professions, 1930-1980* (Ph. D. dissertation, University of Amsterdam, 1998); Lorraine T. Midanik, "Biomedicalization and Alcohol Studies: Implications for Policy," *Journal of Public Health Policy* 25, 2 (2004): 211-228; Julien Prud'homme, "Local and Selective Appropriation: Circulation of New Diagnosis Categories in Speech Therapy in Quebec's Clinical Practice, 1985-2002," *Journal of Canadian Studies* 41, 3 (2007): 150-165; Peter Conrad, *The Medicalization of Society: On the Transformation of Human*

At the opposite of such self-sustained, professional autonomy would be the technician, bound to machines that perform a predefined set of tasks. For this reason, the spread of technology has traditionally been associated with proletarianization, and machines described as vehicles for the deskilling of workers and the general "degradation" of work.[6] In healthcare, technicians and other immediate operators of machines lack the opportunity to perform abstract, decisional operations like diagnosis and thus lack access to the privileged status of professional.

This polarization between professional and technical work has been perpetuated by the actors themselves.[7] Through writings like Donald Schön's best-seller, professionals (or at least professional leaders) have learned to despise "technical rationality" and to instead appreciate how "real" professionals use "reflexive," "intelligent" thinking to "frame [problems and] the practice role" themselves.[8] At the very opposite, machines, at least since the early 20th century, have come to impersonate non-reflexive immersion in the "methods and material equipment of the practical arts."[9]

Both scholars and workers, then, make a strong statement about the role of machines in the division of work – and, in the case of healthcare, of expert work as well. This statement has been documented by historians of healthcare work, especially for the early 20th century. As early as 1951, sociologist E. C. Hughes showed how "physicians relegate 'dirty work' to subordinate occupations" like nursing.[10] While Hughes did not directly address the case of machines, others did. D. Coburn documented a growing duality between professional knowledge and machine use by

*Conditions into Treatable Disorders* (Baltimore: Johns Hopkins University Press, 2007).

6. Harry Braverman, *Labour and Monopoly Capital: The Degradation of Work in the Twentieth Century* (New York: Monthly Review Press, 1974); Alfred D. Chandler, *The Visible Hand: The Managerial Revolution in American Business* (Cambridge: Harvard University Press, 1977); David Wagner, "The Proletarianization of Nursing in the United States, 1932-1946," *International Journal of Health Services* 10, 2 (1980): 271-290. See remarks from David E. Gray, "Militancy, Unionism, and Gender Ideology: A Study of Hospital Nurses," *Work and Occupations* 16, 2 (1989): 138-139.

7. Freidson, among others, has discussed the fact that the constructed duality between professional autonomy and servitude to machines is not only a sociological stand, but also a normative « folk-concept », spread among actors who endorse and substantiate the idea that social and economical promotion in the workplace depends upon the use of abstract knowledge, Freidson, *Profession of Medicine*, 13. See also: Freidson, *Professionalism Reborn: Theory, Prophecy and Policy* (Chicago: University of Chicago Press, 1994), 47-92.

8. Donald A. Schön, *The Reflective Practitioner: How Professionals Think in Action* (New York: Basic Books, 1983), especially Chapter 2.

9. Eric Schatzberg, "*Technik* Comes to America: Changing Meanings of *Technology* before 1930," *Technology and Culture* 47, 3 (2006): 490-494.

10. Halpern, 280.

showing how, historically, healthcare professionals precisely resisted deskilling by splitting mental and manual labour and delegating the latter to auxiliary groups created to assume the "pressure toward technical proletarianization" initiated by the generalization of machines.[11]

Historians of nursing and hospital technicians, in various tones, have generally confirmed the view that the daily use of machines in healthcare has most often been experienced, perceived and constructed as antithetic to professionalization. While showing how skilled, difficult and crucial to hospital development technical work has been in the 20th century, these historians also observed how daily routine use of technology generated an auxiliary status sustained by a hierarchical distinction between professional authority and technical execution. As an historian of nurses' technical work in the mid-20th century, J. Fairman showed how the specificity of nursing "was obscured by enthusiasm for machines as the intensive care unit became a technological repository… a realm where data from machines supplanted the intense observation of nurses and their expertise."[12] A. Witz, drawing on G. Larkin's study on the organization of x-ray work in the early 20th century, stressed how this technology "hinged upon the dual process of the emergence of the radiologist as a [medical] specialist… and the emergence of radiographers acting at the behest of radiologists in the capacity of technical aides close to but excluded from important diagnostic process."[13] In Canada, P. Twohig, analyzing the work of nurses in medical laboratories in the early 20th century, also showed how "nurses' engagement with technology…, rather than providing a fresh impetus to professional claims, served instead to blur

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11. David Coburn, "Professionalization and Proletarianization: Medicine, Nursing, and Chiropractic in Historical Perspective," *Labour/Le travail* 34 (1994): 153.

12. Julie Fairman, "Watchful Vigilance: Nursing Care, Technology, and the Development of Intensive Care Units," *Nursing Research* 41, 1 (1992): 58. See also: Fairman, "Alternative Visions: The Nurse-Technology Relationship in the Context of the History of Technology," *Nursing History Review* 6 (1998): 137-142. Nurses' ambiguous relationship with technology is also described by Cynthia Toman, « Blood Work: Canadian Nursing and Blood Transfusion, 1942-1990 », *Nursing History Review* 9 (2001): 71. See also studies by Margarete Sandelowski, "'Making the Best of Things': Technology in American Nursing, 1870-1940," *Nursing History Review* 5 (1997): 3-22; "Exploring the Gender-Technology Relation in Nursing," *Nursing Inquiry* 4, 4 (1997): 219-228; "(Ir)Reconcilable Differences? The Debate Concerning Nursing and Technology," *Image: Journal of Nursing Scholarship* 29, 2 (1997): 169-174; "The Physicians' Eyes: American Nursing and the Diagnostic Revolution in Medicine," *Nursing History Review* 8 (2000): 3-38.

13. Anne Witz, *Professions and Patriarchy* (New York: Routledge, 1992), 171; Gerald Larkin, "Medical Dominance and Control: Radiographers in the Division of Labour," *Sociological Review* 26, 4 (1978): 843-858. A similar analysis had been proposed by Cynthia Cockburn, *Machinery of Dominance: Women, Men and Technical Know-How* (Boston: Northeastern University Press, 1988), 112-140.

their role, while concurrently confirming their subordinate position to physicians."[14] That such a division of work was deeply rooted in the politics of gender has also been largely documented.[15]

   All this has not rendered technician positions odious: technician jobs have continued on the whole to be regarded as good and desirable positions.[16] The point here is not to belittle technicians or disparage the complexity of their work. But what remains true is that, for the healthcare workers who aspired to a professional position, i.e. who sought control over their own work by the use of abstract decisional thinking, the daily use of machines did not appear to be the best way to achieve this goal.[17] One, then, could expect groups aspiring to professional status to break from their more technical attributes and look for other kinds of resources to shift their position in the division of work. Indeed, this was the case among well-known groups like physiotherapists, chiropractors and, often, nurses from 1900 to 1970.[18]

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14. Peter L. Twohig, *Labour in the Laboratory: Medical Laboratory Workers in the Maritimes, 1900-1950* (Montréal/Kingston: McGill-Queen's University Press, 2005), 65. Still in Canada, Kathryn MacPherson also noted this hierarchical division of work in which, in the organization of science-related tasks, "conceptual authority… remained in the hands of doctors…, while nursing remained responsible for completing the prescribed tasks," "Science and Technique: Nurses' Work in a Canadian Hospital, 1920-1939," in *Caring and Curing: Historical Perspectives on Women and Healing in Canada*, eds. Dianne Dodd and Deborah Gorham (Ottawa: University of Ottawa Press, 1994), 80.
15. See: Margarete Sandelowski, *Devices and Desires: Gender, Technology, and American Nursing* (Chapel Hill: University of North Carolina Press, 2000). In Canada, crucial work on this matter has been made by Tracey L. Adams, *A Dentist and a Gentleman: Gender and the Rise of Dentistry in Ontario* (Toronto: University of Toronto Press, 2000).
16. In nursing, Barbara Melosh noted that "increasing emphasis on technical training" led to "a substantial increase in skilling during the twentieth century" for nurses, *'The Physician's Hand': Work Culture and Conflict in American Nursing* (Philadelphia: Temple University Press, 1982), paraphrased by Gray, 139.
17. Twohig has showed how, for decades, technical tasks only provided Canadian radiographers and medical laboratory technologists a relatively thin basis for the consolidation of a clearly defined professional group, "Education, Expertise, Experience and the Making of Hospital Workers in Canada, 1920-1960," *Scientia Canadensis* 29, 2 (2006) : 131-153.
18. Cynthia Toman showed how the appropriation of machines after 1940, even though it enhances job opportunities for nurses, is criticized by the "professionalizing" fringe of nursing leadership, "'Body Work', Medical Technology, and Hospital Nursing Practice," in *On All Frontiers: Four Centuries of Canadian Nursing*, eds. Dianne Dodd, Tina Bates, and Nicole Rousseau (Ottawa: University of Ottawa Press, 2005), 89-105. About chiropractors and physiotherapists: Steven C. Martin, "Chiropractic and the Social Context of Medical Technology, 1895-1925," *Technology and Culture* 34, 4 (1993): 808-834; Lucie Piché and Nadia Fahmy-Eid, "À la recherche d'un statut professionnel dans le champ paramédical: le cas de la diététique, de la physiothérapie et de la technologie médicale (1940-1973)," *Revue d'histoire de l'Amérique française* 45, 3 (1992): 375-401; Aline Charles and Nadia Fahmy-Eid, "La diététique et la physiothérapie face au problème

Quebec's respiratory technicians and hearing prosthetists, however, challenged these observations, especially after 1970. This apparent anomaly calls for investigation. What changed for healthcare technicians in the 1970s? What could this tell us about the evolving place of machines and machine-use in the division of expert labour in the second half of the 20th century? At stake is our assessment of the role of machines (and of the context in which it occurs) in the relative deskilling of work. Other scholars, after all, have suggested that machines may be more malleable than we think. For example, sociologists of work like S. Choi and *al*. have softened traditional positions on the deskilling potential of machines by arguing that this potential actually "depends on workers' power to use technology for their own purposes."[19] D. Couture has also suggested that medical technology could be subverted by its users for unforeseen ends.[20]

This being said, the point here is not to go back on what historians previously observed about the auxiliary place of technicians in healthcare – especially in the first half of the 20th century. Instead, the purpose of this paper is to show how, when and under which conditions technical workers looking for professional status chose not to run away from their machines but instead to stick with them, and even look in them for unsuspected potential for redefining work. In healthcare in particular, that would suggest that machines and technical work could be a unexpected source of professional aspirations (and their corollary, medicalization) by the very groups that had been created to assume the "pressure toward proletarianization."

In the following pages, I will analyze what machines meant to the evolving aspirations of Quebec's inhalation technicians and hearing prosthetists from 1950 to 1990.[21] This evolution occurred in two stages. In

des frontières interprofessionnelles (1950-1980)," *Revue d'histoire de l'Amérique française* 47, 3 (1994) : 377-408.

19. Seunghee Choi, Jeffrey Leiter and Donald Tomaskovic-Devey, "Contingent Autonomy: Technology, Bureaucracy, and the Relative Power in the Labor Process," *Work and Occupations* 35, 4 (2008): 426; Donald Tomaskovic-Devey and B.J. Risman, "Telecommuting Innovation and Organization: A Contingency Theory of Labor Process Change," *Social Science Quarterly* 74 (1993): 367-385.

20. Denise Couture, "Technologies médicales et statut des corps professionnels dans la division du travail socio-sanitaire," *Sociologie et sociétés* 20, 2 (1988): 81-84. Without writing specifically about the use of machines, recent work in nursing history also suggested how nurses have used attributes that were in principle antithetical to autonomy and power, like domesticity or altruism, "to step out of – or, perhaps more important, step up from – the traditional conventions," Patricia D'Antonio, "Revisiting and Rethinking the Rewriting of Nursing History," *Bulletin of the History of Medicine* 73, 2 (1999): 271. Why not from machines?

21. This work is part of a Ph.D. dissertation on the history of eight allied health professions; for more details about the history of respiratory technicians and hearing prosthetists in Quebec, see Julien Prud'homme, *Pratiques cliniques, aspirations*

the 1950s and 1960s, respiratory technicians and hearing prosthetists, as emerging groups, aimed to reinforce their position by conforming to a conventional view of technical work. At the time, it seemed that defining themselves in strict complementarity to doctors through the use of machines like audiometers or mechanical ventilators, in a clear division between mental and manual work, would be enough to secure desirable positions in the healthcare sector. After 1970, however, things changed in healthcare, and the position of respiratory technicians and hearing prosthetists became more ambiguous. Comprehensive reforms in healthcare eroded the advantages of medical sponsorship and stimulated competition from other, more aggressive professional projects of groups like nurses or audiologists. Increasingly vulnerable to inter-professional competition, respiratory technicians and hearing prosthetists tried both to act more like "professionals" by developing diagnostic and clinical abilities centered around the patient, and to do so without breaking from what remained their more reliable asset, the mastery of specific machines. Although these attempts had mixed results, the very process, from 1970 to the early 1990s, attests to the unsuspected malleability of machines and the potential of apparently common devices for the professionalization of practicians and the unexpected care of patients.

### "Inhalation Technicians": Oxygen Therapy, Aerosol Therapy and More

In early 20th century, new technologies were introduced in hospitals, in large part through their delegation to multitasking nurses. As P. Twohig has shown, more specialized staff was used only progressively after the 1920s, with staff assigned full-time to technical tasks like laboratory tests and x-ray exams; even then, "technical workers' professional identity remained malleable and highly dependent upon context."[22] It was during the Second World War that technicians' groups formally separated out from one another through distinct training and certification programs sponsored by medical associations. In the post-war era, this process was repeated with the introduction of a new generation of technical innovations, including mechanical ventilation and hearing prostheses.

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professionnelles et politiques de la santé. Histoire des professions paramédicales au Québec, 1940-2005 (Ph.D. dissertation (history), Université du Québec à Montréal, 2007).
22. Peter Twohig, "Education, Expertise…," 131. About the key role of multitasking nurses in the technological transformations of the hospital in the early-20th century, see: Sandelowski, Devices and Desires; Rosemary Stevens, In Sickness and in Wealth: American Hospitals in the Twentieth Century (New York: Basic Books, 1989); Susan M. Reverby, Ordered to Care: The Dilemma of American Nursing, 1850-1945 (Cambridge: Cambridge University Press, 1987).

Mechanical ventilation made its way into hospitals between 1945 and 1955. With antibiotics reducing the lethal consequences of pulmonary infections (often subsequent to tuberculosis or surgery) the number of surviving patients suffering from respiratory insufficiency increased. This justified the use of artificial oxygenation devices that became the responsibility of a specific group of workers. At Montreal's Notre-Dame Hospital, for example, the administration announced the reorganization of an "oxygen therapy" department in 1948, with brand new equipment and "staffed by three employees supervised by an experienced nurse."[23] Until the late 1950s, the staff assigned to this "inhalation therapy" essentially administered oxygen to patients and was responsible for managing the materials, most notably the delicate, and sometimes dangerous, handling and storage of the high-pressure oxygen cylinders. After 1960, however, the work became more diversified under the influence of medical specialists like pneumologists and anaesthetists.

On one hand, in the early 1960s, pneumologists working in respiratory physiology laboratories like the Institut Lavoisier of the Saint-Joseph de Rosemont Hospital in Montreal started using oxygen therapy technicians to test patients' respiratory functions, for example by measuring the volume of patients' expirations with a spirometer, or by making a chemical analysis of expired gases. In 1961, the Institute opened an intensive care unit for victims of respiratory failures and gave to some of its in-floor technicians the responsibility to use a bronchodilator in case of respiratory arrest. Soon enough, these new responsibilities became more common among inhalation technicians. In 1975, more than 70% of Quebec's inhalation therapy departments were under the supervision of pneumologists who were also responsible for respiratory physiology laboratories. On the other hand, many inhalation technicians began working for anaesthetists, who valued technicians used to handling and delivering of gas. The reorganization of the anaesthetics department at Notre-Dame Hospital in 1949 saw the creation of a "therapeutic gas" subsection staffed by "experienced nurses."[24] In the late 1950s, technical work in anaesthetics included inhalation technicians assigned to classic oxygen therapy but also to new tasks in "aerosol therapy," an expression describing a variety of ways to deliver medication that the patient would breathe in either through a mask or in a mist form.

As in the early 20th century, increased reliance on technicians drove the doctors involved to define and formalize the job of inhalation technician. After 1960, the Canadian Anaesthetists Society (CAS), eager to

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23. Annual report of Notre-Dame of Montreal Hospital, 1948, p. 40.
24. Annual report of Notre-Dame of Montreal Hospital, 1949, p. 114-120.

strengthen the position of its members, appealed for the creation of training programs under medical supervision. The call was heard by the technicians themselves, who, sponsored by the CAS, created the Canadian Association of Inhalation Therapists (CAIT) in 1964 to act as a certification agent to respond to the demands of medical employers.[25] Also, as early as 1961, the CAS and the Canadian Medical Association (CMA) planned to create inhalation therapy training schools across Canada. In Quebec, the Institut Lavoisier was mandated, and opened the School of Technology in Inhalation Therapy (STIT) in 1965, with a one-year training program. The first students were already experienced technicians, most often male nurses looking for formal recognition and complementary training. In subsequent years, however, only a few nurses and many more women entered the school, suggesting that the creation of a formal training program influenced the composition of the group. The number of students increased rapidly: having awarded 73 diplomas from 1964 to 1969, the school awarded 44 more in 1970 alone. As a result, while the Quebec chapter of CAIT numbered 64 members in 45 hospitals in 1966, the newly-created *Corporation des techniciens en inhalation du Québec* (CTIQ) had no fewer than 175 members in 104 hospitals in 1970.

Thus, by 1970, associations and formal training were beginning to delimit a larger and better defined group. Still, its limits remained fluid and somewhat porous. This was in part because of the first generation of uncertified technicians, closer to nurses or "in-house" technicians. Moreover, centered as it was on the machine rather than the patient, inhalation work was more logistical than therapeutic in nature. In 1963, Dr. Romeo Soucy, director at the Institut Lavoisier and prospective director of the STIT, described inhalation therapists as specialists of equipment and gas management, emphasizing their role in reducing the risk of explosion. In 1967, CAIT itself promoted the expertise of inhalation technicians by emphasizing the prevention of explosions and the time and money saved by optimal handling of the machines.[26] Technicians themselves felt comfortable in a role that could secure good positions: at the Saint-Vallier Hospital of Chicoutimi in 1969, a certified technician could supervise all by himself important teams staffed with

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25. Exams were written and admission certificates were delivered by anaesthetists from the CAS, a model similar to these of x-ray and laboratory technicians.

26. Archives of the Ordre professionnel des inhalothérapeutes du Québec (AOPIQ), File "Historique de l'OPIQ," letter from R. Soucy to J. Gelinas, 5 September 1963; letter from A. Conn to G. Fortin, 24 February 1964; Roméo Soucy, *Cours en thérapie inhalatoire*, 1965; File 1200-03-00/A, letter from R. Robinson to J. Gélinas, 19 May 1967; File 1200-04-00/A, "Allocution de F. Grégoire, 1968"; minutes of the Corporation des techniciens en inhalation du Québec (CTIQ), letter of R. Fontaine to the CIQ, 25 March 1977.

other techs or students, and such positions were deemed very desirable.[27] By the early 1970s, however, such occupational roots in machine management had started to look a little too thin for some leaders of the craft, to such a point that, in 1971, CTIQ president tried to softly reprimand its members: "… because you know, there is no shame for a chief technician in giving some treatment to the patients."[28]

Indeed, a purely logistical role could make the technicians more easily interchangeable. By rooting their expertise in the manipulation of machines whose therapeutic use remained at the doctors' discretion, inhalation technicians remained dependant on medical specialists for assignments that could easily be dispatched to someone else. Above all, certified inhalation technicians feared the competition of uncertified employees, especially for emerging tasks. In the area of administration of medication, for example, some hospital administrators convinced the CAS in 1972 to support the delegation of aerosol treatments to uncertified technicians. In respiratory physiology, it was also common to see pneumologists assign testing tasks to uncertified employees who, according to the doctor, were "handy" and had a sufficient "understanding of nursing work."[29] The edges of more classic tasks, such as oxygen therapy, also remained fluid. This time, the quarrel was between certified technicians and nurses. Expertise rooted solely in machines left the technicians open to competition from nurses, whose omnipresence at the bedside allowed them to keep close watch over the machines and the patients' reactions to treatment. It was not uncommon, especially when the technician was absent, to see the doctor assigning nurses to the use (surveillance, calibration, maintenance) of bedside machines, in order to avoid "exacting, time-consuming procedures."[30]

## Hearing Measurement and Care: A Disputed Practice

This relative blur between technical roles before 1970 is typical of another sector: the measurement of hearing impairment. At that time,

27. AOPIQ, Box 7, Cégep de Chicoutimi, *Implantation de l'option inhalothérapie*, 1969, annexes 2-3.
28. AOPIQ, minutes of the CTIQ, 28 April 1970; 5 May 1971.
29. AOPIQ, Box 7, File "Comité *ad hoc* en physiologie respiratoire," Anonymus, *Reconnaissance des techniciens en inhalothérapie, section physiologie respiratoire*, 1973, 4 p.
30. AOPIQ, File "Historique de l'OPIQ," STIT, *Fonctions et responsabilités conjointes du personnel de thérapie inhalatoire et du nursing*, september 1965; letter from R. Soucy to G. Fortin, 25 March 1968; File 1200-04-00/A, Roméo Soucy and Marcel Verschelden, *Mémoire concernant l'organisation de l'école française des techniciens en thérapie par inhalation* (Montreal: ETTI, 1964); Box 7, minutes of the Provincial Committee of inhalation techniques, 1st April 1968.

work in this field revolved around one particular instrument, the audiometer, used to produce an auditory image of the patient, called an audiogram. Practitioners connected patients to an audiometer that produced various frequencies of sound that a normal ear was expected to hear, in order to detect the presence of hearing impairment – a classic method known as "tonal audiometry." Audiometric measurements were introduced in hospitals by doctors specialized in otolaryngology, who, in the post-war era, saw hearing problems as a promising field for their speciality. At Montreal's Notre-Dame Hospital, chief otolaryngologist Fernand Montreuil extended his department's activities in 1952 to include the surgical treatment of deafness.[31] In part to help in the "etiological diagnosis of deafness" prior to surgery, he purchased audiometers and put "a staff of very well-trained technicians" in charge of them.[32]

As in the cases of vision problems and medication, clinical activity in hearing had an economic aspect, as the diagnosis of hearing impairment most often required that the patient purchase hearing prostheses on the private market. This market was full of prostheses salesmen who also used audiometers to select and adjust the prostheses when filling medical prescriptions. By using audiometers in this way, these salesmen, who called themselves "acousticians", came to play a role complementary to that of the doctors, from whom they got many of their clients.

Like the hospital's inhalation technicians, acousticians, who came to define themselves by the daily use of their machines, did not form a very well-defined group. In the 1960s and 1970s, the typical acoustician "office" was a small family business whose employees were trained through occasional seminars offered by prostheses manufacturers. In the absence of any formal training program during these years, the larger "offices," like those of association leader Pierre H. Bergeron in Quebec City, played an important role by providing the necessary practical training.

The complementarity between office-based acousticians and hospital-based otolaryngologists increased after 1960, when otolaryngologists faced competition from another player, the audiologist, a non-medical hospital-based specialist trained at graduate level at University of Montreal from 1956 on and at McGill University beginning in 1963. At first, competition from audiologists surprised otolaryngologists. Many of them had hired audiologists as an improved version of their early technicians, and assigned them technical work while keeping diagnosis for themselves. This classic division of work, however, failed to please the audiologists, who had greater professional aspirations and soon

31. Annual report of Notre-Dame of Montreal Hospital, 1952, p. 76, 99-102.
32. Annual report of Notre-Dame of Montreal Hospital, 1953, p. 87-98.

challenged the doctors' authority over the interpretation of audiograms and diagnosis. In the 1960s, otolaryngologists reacted by strengthening their relations with acousticians and referring most of their patients to them. Like inhalation technicians, acousticians presented themselves as strictly machine-users working collaboratively with medical specialists, and, in the context of the hearing impairment sector, otolaryngologists saw them as a good replacement for the professionally-minded audiologists. Some otolaryngologists pushed this collaboration one step further by inviting acousticians to work directly in the hospital, filling the technician role that audiologists had turned down.

Audiologists, eager to become essential players in the evaluation of hearing impairment and prostheses selection, reacted very quickly to this alliance between acousticians and otolaryngologists. In 1962, through their association, the Society of Speech Therapists and Audiologists of the Province of Quebec, audiologist representatives introduced a private bill in the legislative assembly to forbid the use of audiometers by acousticians for clinical evaluation. Although the bill was rejected because of opposition from otolaryngologists,[33] audiologists continued to attack acousticians in subsequent years. In 1972, audiologist leader Victor Baillargeon argued that "all responsibility for audiometric testing, referrals, evaluations of hearing prostheses and rehabilitation must be the audiologist's,"[34] and pleaded that acousticians lacked the abstract knowledge in physiology, psychology and acoustic physics that he deemed essential to the diagnosis of hearing impairment.[35]

In this context, acousticians created the *Association des acousticiens en prothèses auditives de la province de Québec* (AAPAPQ) in 1965, also known as the *Société des acousticiens*, which had one hundred members in 1975. In order to dissociate themselves from audiologists, who aimed to outflank the otolaryngologists, acousticians presented themselves as a strict complement to doctors, and defined themselves by knowledge centered on the machines, both in terms of their knowledge of the hearing prostheses complex market[36] and their use of the audiometer to inform the

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33. Julien Prud'homme, *Histoire des orthophonistes et des audiologistes au Québec, 1940-2005* (Québec: Presses de l'Université du Québec, 2005), 49-52.
34. Archives of the Ordre des audioprothésistes du Québec (AOAQ), letter from V. Baillargeon to P. Taffin, 12 December 1972; Guy Lescouflair, *Réflexions d'un audiologiste à propos des relations futures entre audiologistes et audioprothésistes*, open letter to the Société des orthophonistes et des audiologistes de la province de Québec, 1972.
35. AOAQ, Letter from V. Baillargeon to P. Taffin, 12 December 1972.
36. Acousticians presented themselves as experts in a complex market of "500 differents kinds" of prostheses, and thus as expert guides in a commercial maze, much like pharmacists in the medication market. Cf. Johanne Collin, *Changement d'ordonnance: Mutations professionnelles, identité sociale et féminisation de la profession*

choice and adjustment of the patient's prostheses. While audiologists were introducing new measures like "vocal audiometry" that required more abstract knowledge of phonetics, relied less on preset machines, and related more to the patient's capacity to identify words and sentences, acousticians stuck to tonal, machine-based audiometrics to strictly document an area of inquiry previously defined by otolaryngologists.

Although they differed in many respects, acousticians and inhalation technicians had much in common in the late 1960s and early 1970s. These groups defined themselves by the sole use of machines depending on medical prescription, in strict complementarity with the diagnostic work of doctor. This total reliance on the use of machines explicitly opposed any eventual extension to more therapeutic or autonomous work. Indeed, it was precisely on this direct complementarity with medical work that both inhalation technicians and acousticians relied to defend themselves against various competitors, either "real" professionals like audiologists or in-house technicians in respiratory physiology labs. This strategy, however, was thrown into question by the post-1970 transformations in the healthcare system and by increased competition from highly-qualified groups like nurses and audiologists.

## The 1970s: A New Professional Environment in Healthcare

After 1970, structural changes in Quebec's healthcare environment created a new context for inter-group competition, more favourable to the professional projects of non-technician groups like audiologists, physiotherapists and nurses. The continued growth of health institutions and a new wave of public reforms, with Quebec joining the federal health insurance program in 1971, supported the professional aspirations of such non-technician groups.[37] Many factors were at play. First, allied health professionals were growing in number much faster than doctors.[38] Second, while previous public reforms had favoured the medical profession, the reforms of the 1970s and 1980s aimed to be more neutral toward the various professions, thus creating greater opportunities for a variety of professional projects. Third, the increase and diversification of patient populations contributed to moving new clinical services away from medical authority.[39]

_pharmaceutique au Québec, 1940-1980_ (Montreal: Boréal, 1995).

37. About Quebec's public reforms in healthcare in the 1970s, see: Deena White, "The Rationalization of Health and Social-Service Delivery in Quebec," in _Health, Illness and Health Care in Canada_, eds. B. Singh Bolaria and Harley Dickinson (Toronto: Harcourt Brace, 1994); Benoît Gaumer, _Le système de santé et de services sociaux au Québec: Une histoire récente et mouvementée, 1921-2006_ (Quebec: Presses de l'Université Laval, 2008).

38. Gilles Dussault, "Les producteurs de services sociosanitaires," in _Le système de santé au Québec_, eds. Vincent Lemieux and al. (Sainte-Foy: Presses de l'Université Laval, 1994).

39. Julien Prud'homme, "Local and Selective…"

All these factors made professionalism a more promising way to achieve social and economic ascension in the healthcare sector, and pushed many groups to redefine their clinical aspirations more aggressively – including some who would threaten technicians' job security. Ill-prepared to face claims rooted in abstract knowledge, inhalation technicians and acousticians were confronted with the limits of their ties to machines, especially since their medical sponsorship was gradually fading. Now faced with a healthcare environment more favourable to professionalism, both inhalation technicians and acousticians looked for a way to be able to evaluate and take charge of patients themselves. It was into their machines that they looked first.

These changes were made while both groups were strengthening their organizational bases. There was much work to be done. In early 1970s Quebec, many healthcare groups had achieved some legal privileges through the adoption of private bills at the legislative assembly. In 1944, dental hygienists had obtained an exclusive right over their titles, although with no closure over their work, and, in the following years, nutritionists, social workers and psychologists had all asked for and gained similar rights; in 1946 and 1964, respectively, nurses and speech therapists had even achieved "real" professional closure through laws that forbade all competitors (except the doctors) to perform their trade.[40] Despite these precedents, however, neither respiratory therapists or hearing prosthetists enjoyed legal privileges around 1970, and their respective associations, the AAPAPQ and the CTIQ, were still very young. They nonetheless engaged in intense strategic lobbying. Under the guidance of their associations, both groups changed their names in order to adopt more clinical-sounding brands: in 1968 and 1971, respectively, inhalation technicians became "respiratory therapists", and acousticians became "hearing prosthetists." More important, both associations were very active in the political struggles that surrounded the writing and adoption of a new, audacious professional legislation submitted by the provincial government in 1971. This comprehensive bill, called the *Professional Code*, aimed to rationalize and standardize regulation over all professional bodies from accounting to occupational therapy, and it gave rise to intense lobbying and negotiations on all fronts before being finally adopted in 1973.[41] From the beginning, hearing prosthetists asked for a complete

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40. About legal professional closure, see: Magali Sarfati-Larson, *The Rise of Professionalism* (Berkeley: University of California Press, 1977); Catherine Paradeise, "Les professions comme marchés du travail fermés," *Sociologie et société* 20, 2 (1988): 9-21.
41. For accounts of the political context and significance of the Code, see: Nadia Fahmy-Eid et al., *Femmes, santé et professions. Histoire des diététistes et des physiothérapeutes au Québec et en Ontario. L'affirmation d'un statut professionnel, 1930-1980* (Montréal: Fides, 1997), 154-156, and Julien Prud'homme, *Pratiques cliniques*, 169-174.

monopoly over the use of hearing prosthetics.[42] In 1973, to the audiologists' indignation, the legislator indeed gave the prosthetists a legal monopoly over the sale, installation and adjustment of hearing prostheses, a North American premiere that guaranteed a solid position for the group; the AAPAPQ then became the *Ordre des audioprothésistes du Québec* (OAQ). This victory can probably be explained by the support of otolaryngologists, and was especially significant since hearing prosthetists would not rely on formal training programs until 1981, when a three-year college-level course opened at the Cégep de Rosemont (Montreal).

Respiratory therapists played a less essential role for medical specialists and their own quest for legal privileges proved to be much harder. After failing to get in the *Professional Code* in 1974, respiratory therapists had to wait until the mid-1980s to obtain some legal closure over some limited technical tasks. In the meantime, training in respiratory techniques spread into the new college system put in place in Quebec in 1967. What resulted was growth that contrasted with that of hearing prosthetists: indeed, while the OAQ, in which membership was mandatory, remained at only about one hundred members before reaching 140 in 1989, CTIQ's membership went from 627 members in 1977 to more than 2.000 in 1989.[43]

With new legal privileges for one and increased membership for the other, hearing prosthetists and respiratory technicians were then faced with a healthcare environment that was evolving quickly and perhaps becoming more threatening for technical workers ill prepared for the aggressive competition from other groups more willing to play according to the rules of professionalism. Nonetheless, both respiratory technicians and hearing prosthetists looked primarily to their machines for new, extended "professional" abilities.

## Hearing Prosthetists and Audiologists: Machine Wars

The harsh conflict opposing hearing prosthetists and audiologists over the right to specify the need for hearing prostheses did not ease in the 1970s. While prosthetists had won the monopoly over the sale and adjustment of prostheses, audiologists, working in hospital, were still in good position to evaluate many patients before their visit to the prosthetist, and then to make an assessment that might restrain the prosthetist's ability to counsel clients – and to make the desired sales. Despite legal privileges, evaluation therefore

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42. This claim was presented by hearing prosthetists as a life-and-death matter in their rivalry with audiologists, and the AAPAPQ raised the example of American prosthetists who, at the same time, were losing ground because of audiologists' access to the prosthesis market. AOAQ, minutes of the OAQ, 7 November and 2 December 1974, 3 March, 7 April and 15 June 1975, 28 June 1976.
43. Both groups evolved from fairly male to definitely female occupations during these years, Prud'homme, *Pratiques cliniques*, 199.

remained the key to control over one's work. To stop audiologists, who were getting more and more present and eminent in public hospitals, from regulating the prosthesis market through their evaluations, hearing prosthetists engaged in the development of new abilities to gain a true role of evaluation.

This became more urgent in the context of extensive public reforms of the hearing prosthesis market. In 1979, the *Régie de l'assurance maladie du Québec* (RAMQ), the third payer in charge of the public health insurance plan, launched a new public hearing prosthesis coverage plan that made the state the main regulator of the prostheses market. As in other parts of the healthcare system, this favoured professionals able to make autonomous evaluations and extend their scope of practice. Audiologists found numerous occasions to extend their activity to populations all upstream from referrals to the prosthetist, for example through screenings for occupational deafness. Hearing prosthetists, on the contrary, felt disadvantaged by the new public regime, especially in matters of control over work and referral of patients, and they feared that public coverage might incite the state to strengthen controls that could render obsolete their own expertise rooted in their understanding of the machines and their market.

The threat was indeed very real. First, as early as 1979, the RAMQ undertook to simplify the prostheses market by considerably reducing the number of admissible models, downplaying the commercial expertise of the prosthetists. Second, while doctors became less necessary than ever in the eye of public tiers, the prosthetists' apparent lack of autonomy in evaluation was making them more vulnerable to audiologists' claims over the control of work. For example, in 1977, the Workers' Compensation Board refused to recognize hearing prosthetists "as professionals in the proper meaning of the word" because prosthetists did not fill prescriptions by themselves; consequently, the Board announced that it might remove prosthetists from its referrals lists. The young OAQ had no choice but to try to minimize, for the first time, the relationship between prosthetists and doctors, by arguing that "hearing prosthetists… do their own tests and about 70% of prostheses are sold with the doctor only signing the certificate."[44] In other words, complementarity with doctors was ceasing to be an asset and the ability to diagnose independently was becoming an essential feature in the new politics of healthcare.

The matter became urgent for prosthetists when public tiers seemed favourable to giving audiologists access to evaluative grounds that could shortcut the prosthetists' usual referral channels. In 1975, the Department

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44. AOAQ, minutes of the OAQ, 29 August 1977, 8 November 1977; see 8 September 1975.

of Social Affairs (responsible for health matters) listened to audiologists' demands for the right to prescribe prostheses with great precision and to supervise the work of the prosthetists "before payment." In 1979, the new RAMQ program finally required that all sales of prostheses be preceded by a preliminary audiogram by an otolaryngologist or audiologist, a requirement that prosthetists deemed "unnecessary."[45] From 1970 to 1988, these rules fostered skirmishes between prosthetists, protective of their occupational autonomy and commercial freedom, and audiologists, who gave patients detailed prescriptions and even booked control follow-ups at the hospital to assess the prosthetists' work. In some facilities, like the Institut Raymond-Dewar (Montreal), audiologists used to schedule systematic follow-ups just before the warranty on a prosthesis ran out.

After 1985, the situation for hearing prosthetists worsened when audiologists from rehabilitation centers for the deaf like the Institut Raymond-Dewar and the Institut des sourds de Charlesbourg (near Quebec City), who mostly treated children, extended their activities to a new practice of adults suffering from hearing impairment caused by ageing (or "presbyacousia"). Audiologists justified this incursion through abstract concepts linked to a "global approach" that described loss of hearing as a "communication handicap" that went beyond the mere audiometrics and merited therapeutic assessment. By "paying more attention to the evaluation of the communication handicap experienced… than simply to the hearing loss,"[46] these audiologists valued therapeutic interventions that minimized or depreciated the use of a hearing pros-theses (and prosthetist), in favour of alternative tools such as the use of strategies (reading lips, etc.) or technical aids other than prostheses (modified phones, etc.).

This appropriation of a portion of the ageing population upset hearing prosthetists, 80% of whose practice was over the age of 60. A preliminary visit to the audiologist's office provided patients with prescriptions far too detailed for the prosthetists' taste, especially if such prescriptions minimized the usefulness of prostheses or made them part of a therapeutic program that governed their use to the point where the audiologist could claim responsibility for them. After 1990, this vision of hearing problems

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45. OAQ, *Mémoire à la Commission d'enquête sur les services de santé et les services sociaux connexes* (Québec: OAQ, [1985-1988]), 7-8; Regroupement des centres de réadaptation en déficience auditive, *Propositions des CRDA relativement au transfert du programme d'attribution des aides* (Montréal: RCRDA, 1987), 5-6.
46. Pauline Bélanger, *Programme de réadaptation auditive pour une clientèle âgée résidant en centre d'accueil et présentant des troubles d'audition* (Charlesbourg: Institut des sourds de Charlesbourg, 1987), 22.

fed a vigorous lobby by audiologists demanding that prosthetists cease to be independent salesmen and join rehabilitation teams as auxiliary staff.

Thus, organizational and professional developments in the post-1970 healthcare environment directly threatened the prosthetists' ability to recommend – and sell – the prostheses they wanted to their clients. Hearing prosthetists reacted by trying to develop diagnostic abilities more clearly centered on the patient than the machine. The young OAQ was at the forefront of this evolution, as is clearly visible in the transformation of its discourse. In 1974, the OAQ was still presenting its members simply as "people who sell hearing prostheses" and experts in machines and their market. By 1978, however, the OAQ had already modified its discourse to define the "art" of audiometrics as not only testing but also interpreting test results. In the 1980s, it was defining work in hearing prosthetics as "the evaluation of prosthetic needs"[47] through a broader range of tests, centered on the patient.

But to thus extend their practice to a more direct and comprehensive evaluation of the patient, hearing prosthetists relied mainly on their technical skills and use of machines. The OAQ played an important role in this transformation. In 1975, it led a move to update audiogram forms by adding the use of an important new device, the "master hearing aid," to standard procedures, and in subsequent years, of vocal audiometrics and the measure of the acoustic reflex through machines that tested the reaction of inner-ear muscles. This last measure was deemed especially important, as "those who don't do these tests must continue to depend on otolaryngologists and audiologists [to choose the prostheses];"[48] however uncommon before, it was added to routine protocols in 1984.

The OAQ also promoted other new machine-based practices in matters like post-prostheses follow-ups, prosthetist leaders deeming it "important that hearing prosthetists do their own quality control and equip themselves for this," instead of "abdicating" the responsibility of such evaluation to audiologists, "as is often the case."[49] These remarks concerned one specific machine, the "electroacoustic hearing aid analyzer," which could

47. Louise Landry-Boudreau and Louis Sauvé, *La pertinence de l'implantation d'un cours collégial en audioprothésie* (Montréal: Cégep de Rosemont, 1978), 29; AOAQ, minutes of the OAQ, 7 November 1974, 6 October 1975, 30 April 1977; OAQ, *Document d'orientation. Comité sur les normes et critères d'attribution du Conseil consultatif sur les aides technologiques. Rapport de commentaires préparé par le Comité scientifique* (Québec: OAQ, 1992), 5.
48. AOAQ, minutes of the OAQ, 3 February, 3 March, 7 April, 9 June, 15 June and 3 November 1975, 28 November and 18 December 1980, 27 February and 3 May 1981, 15 May 1982, 16 September 1983.
49. AOAQ, minutes of OAQ, 30 March and 26 May 1979.

be found in only 23% of hearing prosthetists offices in 1977 but was nonetheless added to the OAQ's minimal requirements in early 1980s.[50] In all this, the explicit aim of the OAQ was to add new machines to their members' arsenal so that prosthetists' evaluations could be so comprehensive that "in hearing prosthetics, the notion of prescription [by other professionals] could not apply."[51]

## Respiratory Therapy: Therapeutics and Autonomy in Hospitals

In inhalation techniques as in hearing prosthetics, dependence upon medical sponsorship and essentially technical tasks led to increased constraints and occupational threats after 1970. Soon enough, it became obvious that the future of respiratory technicians would necessarily extend beyond classical tasks like oxygen therapy and aerosol therapy. Indeed, in the mid 1980s, such modalities were becoming routine and were often assigned to young trainees. This relative devaluation was not without danger because, after 1970, nurses' representatives intensified their lobbying for the control of these very tasks. While hearing prosthetists were attacked over the very meaning of prosthetics by competitors with clear professional status, respiratory technicians were in competition with nurses who threatened their access to more basic technical tasks.

Most conflicts with nurses concerned the delivery of aerosol medication, as nurses often kept file management for themselves and claimed access to tasks like determining doses, monitoring patients and choosing the nebulizers used to deliver the drugs. The issue was an important one, because oxygen and aerosol therapy represented a large part of the available respiratory therapy workload. From 1975 to 1977 and from 1985 to 1987, system-wide negotiations saw nurses and respiratory therapists fight bitterly to determine who should be authorized to perform the various tasks of inhalation work. Locally, respiratory therapists were also in conflict with hospital administrations, who would often assign nurses to aerosol or oxygenation tasks.

Progressively, however, other technical innovations in medicine allowed the respiratory therapists to extend their action in a more clinical fashion. This was the case when anaesthetists extended their own activities to post-operative populations, and assigned respiratory therapists to new kinds of assisted respiration, distinct from classic oxygenation. These respiratory

50. AOAQ, minutes of OAQ, 28 November 1980, 27 February 1981, 15 May 1982; Landry-Boudreau and Sauvé, 12, 17-26; Syndicat professionnel des audioprothésistes du Québec, *Mémoire présenté à la Direction générale des relations de travail du MAS* (Montréal: SPAQ, [1977-1978]), 4-5.
51. OAQ, *Document d'orientation*, 2-3, 5, 7.

therapists learned a particular modality of positive pressure ventilation, called "positive end expiratory pressure" (PEEP), that had therapeutic applications. This very technical innovation bore the seeds of a genuinely clinical, curative role for respiratory therapists, who nevertheless remained attached to the machine.

In the early 1970s, the use of positive pressure ventilation on patients with respiratory insufficiency was still relatively new. Until then, assisted respiration had most often depended upon "negative pressure ventilation": a machine surrounded the space around the patient's chest and generated a barometric pressure inferior to that of the immediate surroundings, inciting the lungs to expand and, because of the inner void so created, to passively aspire air. Like oxygen therapy, this modality was used more to compensate for deficient respiration than to heal. After 1960, however, respiratory medicine changed the focus of its intervention, and doctors began worrying about the impact of this raw intake of oxygen on the condition of the lungs. Positive pressure ventilation addressed this issue: rather than drawing air in using suction, a mask or intubation was used to push, i.e. to positively pressure air from the outside and direct it into the lungs. Because this method gave more control over the circulation of air and its impacts, positive pressure ventilation changed assisted respiration into a positive intervention for the health of the organs. New curative uses were invented with the appearance of the PEEP positive pressure modality, first introduced in North America around 1967. This modality consisted of constantly changing the pressure of the air breathed in by the patient: automatic increases at the end of each expiration forced the lungs to permanently retain a given volume of air, preventing them from emptying and thus maintaining in the respiratory tracts a minimal pressure that invigorated the tissues and kept them active. This curative modality became widespread in Quebec between 1976 and 1984. Because it supposed a precise calibration of the pressure level specific to every patient, the monitoring and regulation of positive pressure was a modality that was both genuinely curative and directly rooted in the daily use of machines, most notably a new breed of mechanical ventilator.

By becoming the most immediate users of PEEP ventilators, respiratory therapists developed new curative roles, distinct from oxygen therapy, even though medical prescription remained central to ordering action and specifying the ventilation parameters. The novelty of the work with PEEP had two facets. First, for the very first time, the work had become unequivocally therapeutic and was more clearly than ever centered around the patient – particularly since PEEP could have dangerous outcomes for the patients' cardiovascular system. Second, medical prescription allowed some room for the respiratory therapist, especially after some years: by

the late 1980s, many prescriptions only gave minimal indications and had become less prescriptive, making the respiratory therapists, according to their representatives, "the key worker in the manipulations related to assisted respiration."[52] Together, these transformations gave respiratory therapists the beginnings of a therapeutic role. After 1990, some used the therapeutic potential of positive pressure ventilation to gain a curative role: for example, in 1996, respiratory therapists from the Cité de la Santé (near Montréal) used a brand new kind of PEEP whose therapeutic applications allowed them to play an eminent curative role and to "counsel treating doctors."[53]

   Other modalities, less known but also rooted in the use of machines, also contributed to transform the role of the respiratory therapist. One was the "respiratory re-education" program, a modality that first appeared as an extension of the work in pneumology departments. Born in Europe, this "educative therapy" combined muscular training of the diaphragm and expectoration muscles with the teaching of respiration techniques, in order to give autonomy to patients suffering from chronic pulmonary diseases. More important, this new practice was based on new, and sometimes unexpected, uses of old tests and machines of the respiratory physiology laboratory. First imported to Quebec by a pneumologist of Sacré-Coeur Hospital (Montreal) in 1968, respiratory re-education spread among respiratory therapists after 1976, leading in 1984 to a program created and taught by respiratory therapists that trained 45 therapists in its first year. This was described by the group's representatives as "an important moment in the history of our young profession,"[54] since respiratory re-education supposed for the respiratory therapists the autonomous elaboration, use and interpretation of classic tests like spirometry and arterial gazometry, and of new ones like the measurement, always through the use of machines, of overall lung capacity. Doctors began to oppose the use of such tests, an indication of the new autonomy gained by respiratory therapists through this production of new measurements with their old machines.[55] As for their colleagues using PEEP in the context of

52. Corporation professionnelle de inhalothérapeutes du Québec, *Guide de pratique de l'inhalothérapeute en ventilation artificielle* (Montreal: CPIQ, 1988), 2, 8-9.
53. *Inhalo-Scope* 13, 2 (1996): 18-20.
54. AOPIQ, Box 7, File « Congrès 1984 », *Concours Mérite au service de l'année Bulletin de la CIQ* (1981), 7; *Inhalo-Scope* 2, 1 (1984) : 6-7, 12-13, 28-30; 3, 1 (1985) : 29-31.
55. *Inhalo-Scope* 2, 1 (1984): 12-13; 2, 2 (1984): 20; 3, 1 (1985): 19-23; 3, 2 (1985): 5-6, 24-25; 6, 3 (1988): 11-13; Micheline Boisvert and Jacques Lareau, *Réflexions à être présentées dans le cadre du congrès des inhalothérapeutes* (Montreal: CPIQ, 1984), 7-10; AOPIQ, Box 7, "Inscription au concours de département de l'année"; File "Congrès," abstracts of 1975, Jean-Guy Demers, "L'inhalothérapie dans les soins à domicile"; abstracts of 1996, Anonymous, "Les nouveaux rôles de l'inhalothérapeute," Marie-Claude

anaesthetics, however, respiratory re-education seemed very promising in a pneumology setting allowing them to use machines to aspire to more clinical and evaluative tasks and thus secure better positions, not threatened by competitors like nurses.

## Conclusion

What changed for respiratory technicians and hearing prosthetists after 1970 is that identification with the exclusive use of machines under medical authority no longer seemed adequate in order to sustain a desirable place in the new healthcare system. In a work environment subject to increased inter-professional competition, machine users either had to be downgraded or to reinvent themselves and assume tasks more centered on patients and their evaluation. Threatened by other groups, respiratory technicians and hearing prosthetists looked to machines for these new skills, eager to foster genuinely professional aspirations without breaking from their roots in machines.

This does not mean that these atypical, machine-based professional projects were unequivocally successful. In fact, the projects of hearing prosthetists and respiratory therapists met at best with mixed results, not unlike more classic professional projects such as those of physiotherapists during the same years. Indeed, hearing prosthetists remained vulnerable to the claims of audiologists, who, in the 1990s, succeeded in embedding new generations of prostheses and other technical hearing aids in their own therapeutic perspectives, in spite of prosthetists' attempts to prevent it. Among respiratory therapists, modalities like positive pressure ventilation did not open a way for everyone. After 1990, in fact, the respiratory therapists' professional projects went in many new directions, sometimes including a real downplaying of the machines – some therapists, for example, started doing counselling for asthmatic patients. Post 1990, then, the history continues, not necessarily in directions studied here.

Even so, the attempts seen here to sublimate technique and the use of machines in the face of heightened inter-professional competition appear as responses to a broader trend of downgrading technical work and abilities in the latter 20th century.[56] These attempts by hearing prosthetists and respiratory technicians illustrate the temptation and the very real possibility for technicians to reinvent the use of machines when faced

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Pitre, "La rééducation respiratoire: une évaluation clinique"; Minutes of the Corporation des techniciens en inhalation du Québec, 26 March 1977, 2 February 1979.

56. A trend ably framed by Karla A. Erickson, "Historical Change, Technological Innovation, and Continuities of Gender in Three Occupations," *Work and Occupations* 35, 3 (2008): 358-368.

with a highly professionalized work environment. In healthcare, the possible emergence of genuinely curative roles among hearing prosthetists and respiratory technicians seeking more comprehensive evaluation and clinical roles also reveals how this temptation, and the malleability of machines, can turn technicians into unexpected agents of professionalization, and even of its side-effect, medicalization, by contributing to the extension of a diagnostic and clinical apparatus largely driven by various professional projects. By reuniting, to paraphrase R. Volti,[57] the history of technology and the sociology of professions, such case studies encourage us to remain cautious, or curious, when assessing the role of machines in the relative deskilling of work – especially in a post-1970 world that does not always fit the common analytical tools designed by historians of expert work and technology.

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57. According to whom "A historically based sociology of the professions could shed considerable light on what has been happening by taking into account the ways in which technology has strengthened or weakened the attempts of particular occupational groups to lay claims to professional status, while also paying attention to the social forces involved in the development and application of these technologies," Rudi Volti, "Reuniting History and Sociology Through Research on Technological Change," *Bulletin of Science, Technology & Society* 23, 6 (2003) : 459-464 (quote from p.462).