La Medicina del Lavoro

Editorial

Med. Lav. 2023; 114 (5): e2023045
DOI: 10.23749/mdl.v114i5.15260

The Evolving Work Landscape and the Intersection of Technics, Technology, and Occupational Health*

Work is historically and clearly inscribed in the DNA of Occupational Medicine. It has been so since its founder Bernardino Ramazzini wrote at the beginning of the 18th century, "*...nor did I disdain visiting the basest workshops and workshops to observe all the means used in the mechanical arts carefully...*", and later talking about workplaces and the observation of people at work "*they are in this sense the only school in which one can be educated and describe what is most interesting and above all provide means of healing and prevention of diseases that attack the creators…*" [1].

It has been so since the beginning of the 20th century, when Luigi Devoto, father of modern Italian Occupational Medicine, fought for the structure to study and treat occupational diseases called the "*Clinica del Lavoro*". He had a dialectical confrontation with another illustrious clinician, Gaetano Pini, who argued that the "Workers' Clinic" denomination would be more appropriate to unequivocally identify the purposes of a structure finalized to benefit the working class. Devoto's famous argument to support his position was "*...because it is work that is sick, and it is this that must be treated so that workers' diseases can be prevented*". He had an opportunity to further clarify his thoughts in a conference held in Brescia in 1906, where he stated, "*It is necessary to purify work from its thorns and stains. The enlightening help of work physiology and pathology is indispensable, so we must have faith in science*". [2]

Therefore, working technical and human contents and knowledge and pathophysiological knowledge of medical discipline based on scientific evidence (today, scientific evidence-based medicine) became indispensable supports for reducing and eliminating work-related risks. However, Devoto had already demonstrated constant awareness that we had to start from work in 1901 by heading the first Occupational Medicine journal in the world that he was about to found, *'Il Lavoro'* (in English, "The Work") [3] which then became *'La Medicina del Lavoro'* (in English, "Work's Medicine") [4] after about twenty years. This concept also led to the English subheading 'Work, Environment & Health' chosen a few years ago for the journal's current edition. [5]

Certainly, in Ramazzini's time, the work's technical components were based on notions and norms empirically acquired or handed down by tradition and, to a lesser extent, on the application of scientific knowledge transmitted from father to son, family members, or in a broader context or among members of their workshop. On the contrary, the technics that Devoto dealt with were born during the 1st and 2nd industrial revolutions, configured as a wealth of knowledge, increasingly specialized, subject to continuous innovation, and requiring specific studies and the associated training provided in various professional polytechnic schools and universities.

It is with the technics, and particularly those of the 3rd and 4th industrial revolutions that have gradually characterized work from the 19th century to today, that Occupational Medicine has been called to deal with, has grown and evolved, having to keep up with the evolution of raw and secondary materials, the manufacturing technics of their instruments, the working environments (from lighting

*This editorial is based on the introductory lecture delivered at the first session of the 85 th National Congress on Occupational Medicine (Turin, 20-22 September 2023)

technology to the microclimate) the physical and mental workload, the availability of individual and collective means of prevention and protection.

The traditional risks to the health and safety of workers have been greatly reduced, some even disappeared, at least in the most advanced production realities, by the radical technical innovations introduced; we must be aware of this, above all, to guarantee, increase, and often revolutionize, productivity and profitability of manual and intellectual work. However, we must remember that also Occupational Medicine contributed to reducing occupational risks and improving working conditions by demonstrating historical pathologies of work, from silicosis to intoxications caused by metallic elements or volatile chemical compounds, and through the increasingly in-depth understanding of the pathogenetic mechanisms of work-related diseases.

The objective was, therefore, to shift to the problems relating to new production methods and work organization. The osmosis between polytechnic and medical-biological disciplines became the condition for being able to foster research to achieve the compatibility between work and man on one side and between man and work on the other, mainly in the prevention of risks associated with the introduction of new materials, with multiple and low exposures to toxic substances (sometimes comparable with those brought by polluted general environments) or to musculoskeletal and psychosocial risk factors. The focus is shifting to a more demanding objective: achieving an increasingly widespread psychophysical well-being of men at work.

To realize or at least get close to objectives of this nature, further developments are necessary in the relationships between our two worlds, with interaction and integration at a higher level, shifting our reflections to scientific and theoretical insights into technology applications. And this seems to me to be the most suitable place to do it, given that, among other things, the diffusion of term technology is credited to a doctor, scientist, and professor at Harvard, Jacob Bighelow, author of the treatise "Elements of Technology" in 1829 [6], in which he broadened his horizons to mechanics and the non-biological sciences.

According to Bighelow, technology meant synthetically "systematic treatment of an art", but the technology most appropriate and comprehensive of the problems that we are called to face at the beginning of the 21st century is that based on theoretical formulations, derived by deduction from previous knowledge, verified and validated through experiments. However, we cannot deny that there is still room for further discoveries based on observation. It is at this level that, in my opinion, the interaction between our disciplines is already taking shape in the design, decision, and implementation of the production processes so that the results desired by technologists are obtained first and foremost, but at the same time, ensuring that prevention is considered from the design phase, so that unwanted effects are reduced to a minimum, in our case the negative effects on the psychophysical health of workers and in a broader sense on environmental and living conditions.

An example, on the technological side, of these concepts was that of William Vanderburg [7], known as "preventive engineering" and well exemplified by the metaphor of driving a car by focusing on its performance as indicated by the instruments on the dashboard, and only occasionally looking outside to see where it is going. That represents a reality where engineers, managers, and regulators make decisions without or with little regard for the consequences that are mostly outside their domains of competence, from where they cannot "see" them.

This has meant that conventional approaches have been fundamentally non-preventive and

non-precautionary in structure, characterized by the production of gross wealth without considering social and environmental costs from the outset and without verifying the correlation between wealth creation and human and environmental well-being.

A collaboration and disciplinary integration between technologists and occupational physicians in the methodological approaches of the design phases and the decision-making process would create the ideal conditions for obtaining the desired net results, also allowing us not to have to intervene *post hoc* in attempting to remedy conditions of risk created in the application of the new technics, with higher costs for remedial interventions and above all with the addition of certainly predictable human costs.

Furthermore the current technology must face and respond to challenges posed by the 4th Industrial Revolution, which is questioning those that, from Fordism onwards, were considered cornerstones of work, such as its times and places, hierarchies, and organizational methods. Technology which, therefore, tends to move away from its merely mechanistic sphere to place itself in an increasingly open and engaging position with other and new knowledge, approaching contents such as those underlying the definition that gives the Encyclopedia Britannica: "*the application of scientific knowledge to the practical aims of human life or to the change and manipulation of the human environment*" [8].

Finally, I would like to recall a crucial point for me: that of the training curricula of future technologists and doctors, whose shortcomings, as Vanderburgh himself noted, are then laboriously attempted to be remedied, with higher costs and sometimes unsatisfactory results, in the following phase of professional practice [7]. It is a matter of guaranteeing in degree courses and specialization schools reciprocal, possibly integrated teaching paths of the main contents that join our disciplinary areas.

Pietro Apostoli
Honorary Professor of Occupational Medicine
at the University of Brescia

References

1. Ramazzini B, De Morbis Artificum Diatriba. 1700, Capponi Publ, Modena.
2. Busacchi V, D'Antuono G, *La Medicina del Lavoro nei suoi sviluppi storici*, Arti grafiche - Linotypia E. Cossidente, Roma 1967, p. 105.
3. Il Lavoro. 1901 https://collezioni.unimi.it/dcb/rivlavoro/index.php
4. La Medicina del Lavoro. 1925 https://collezioni.unimi.it/dcb/rivlavoro/index.php
5. Mutti A. Cultural background and methods of Occupational Medicine are increasingly used to characterize environmental pollution and its health effects. *Med Lav*. 2020;111(1):6-9. https://mattioli1885journals.com/index.php/lamedicinadellavoro/article/view/9190
6. Bigelow, Jacob, 1786-1879. Elements of technology, taken chiefly from a course of lectures delivered at Cambridge, on the application of the sciences to the useful arts. Retrieved from the Digital Public Library of America, http://catalog.hathitrust.org/Record/001510374. (Last Accessed September 27, 2023.)
7. Vanderburg W. Preventive Engineering: Strategy for Dealing with Negative Social and Environmental Implications of Technology. *J Prof Iss Eng Ed Pr*. Vol. 121, No. 3, July 1995.
8. Encyclopedia Britannica, Technology, last updated August 2023 https://www.britannica.com