All work conditions and occupational exposures are inevitably multifactorial

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1973. At the time, electric welding machines by point and, a fortiori, robots do not exist. The bodies of the cars are assembled by manual welding. On the assembly line of the "beetles", 4 workers are responsible for grinding and sandpapering the visible welds, in particular the sills and ledges. The work is painful: grinding wheels and sanding machines are heavy and working postures are awkward. In addition, to avoid incandescent projections from the colleagues, the workers have to wear a leather hood recovering head, chest, back and arms. When they remove them between two bodies, they are soaked. Finally the noise is deafening.

The occupational physician, cardiologist in addition, is concerned about the physical load. He asks my assistance regarding noise and thermal stress. In keeping with the training we received, we first measure: peaks of 170 beats per minute of heart rate recorded by Holter, 95 dB (A) at the integrating sound level meter. We are not going as far as measuring the core (rectal!) temperature of the workers, but record water compensation (sometimes in Belgian beer!) over 2 liters per day and hoods dripping with sweat. A 40-page report is prepared with many graphs of heart rate and sound recordings.

Thanks to the power of persuasion of the occupational doctor, the report does not remain this time unheeded and the company decides to extend the assembly line. During the summer, the "grill band" is installed: 4 successive stations on the assembly line where the car body is mounted on a spit and can rotate so as to present the sills and ledges to 65 cm in height.

The company is proud of this ergonomic improvement and we are also: to date, the company history available on the Web, speaks about an "investment of work humanization". The work of grinding and sandpapering is done now at good height and the physical load is greatly reduced. The workers, at 4 meters from each other, are no longer exposed to the projections of the grinding machines of the colleagues, so that the hoods can be replaced by a much lighter frontal protection and the thermal stress is decreased. Finally the sound exposure level is lowered to 91 dB(A), each one remaining exposed primarily only to the noise of its own work and a wall with acoustic absorbing materials separating him from the neighboring assembly line.

The results are considered to be very positive. Splendid example of "multinuisances"!

We did not look at vibration, however obvious: it was not (yet) "fashionable". Neithet did we pay attention to the vision problems, the smoke released by the operations reducing the sight behind the hood in absence of an appropriate auxiliary lighting system: this aspect was however improved by the "grill band", just as the pollution of the breathing zone due to the smoke.

Three months later, the company notes a high absentee rate at these 4 stations and constant demands for transfer to other workplaces! What's going on?

We then took generously the trouble to meet the workers who informed us of their group organization at the former station. According to the methods and times office of the company, the group of 4 had 2.5 minutes to process a body and then 30 seconds of "rest". This time being completely insufficient to store the machines, remove the hoods, cool off, get dressed and pick up the machines, the group managed so that three of them deal successively with three successive bodies, taking the first slightly late, the second in time and the third in advance. They had then over one minute off. During these 9 minutes, the fourth worker was able to cool off, smoke a cigarette (times changed!), discuss with others, go to the toilets…., before taking again his turn in the next group of three to, at the choice of the group, either grind, or sandpaper. The group got along perfectly, the absenteeism was occasional and justified to the colleagues.

In the new work organization, the group no longer exists, each one has to grind or sandpaper the same sills or ledges during 8 hours, with virtually no autonomy: no more social contact, nearly complete insulation (thanks to the acoustic wall!), 30 seconds maximum between two bodies, cigarette which gets "wasted" in the ashtray between two breaks, necessary recourse to a counselor for any break of more than 30 seconds…

What is the objective? The absence of trauma (accidents) and occupational diseases or the Health according to the definition of the World Health Organization, namely "a state of complete physical, mental and social wellbeing"? ([1])

Our approach of this work station of grinding and sandpapering had already been "multinuisance": physical load, noise, thermal stress. However it was completely off the pursuit of this complete physical, mental and social wellbeing.

It is quite surprising and disappointing that this definition, dating from 1946 and often repeated, has so little been concretized by us, hygienists, ergonomists, doctors, safety officers, psychologists who work in this area of Health at the workplaces. In recent years, the emergence of multidisciplinarity seems in many cases to exacerbate the gap between these "specialists": chemical agents for the hygienist, accidents for the safety officer while the ergonomist is "in charge" of the repetitive movements and the psychologist of the stress; fragmentation of the concerns which will get worse in the absence of a in-depth reflection on the meaning and implications of the INTERdisciplinarity and reappraisal of the training programs.

In 1959, probably in the same movement as the WHO definition, Hertzberg ([2]) proposed the theory of the two factors which suggests that two types of factors influence the behavior of an employee:

- The first ones, called hygiene factors, relate to the context in which the employee works: wage policy, working conditions, system of supervision, occupational safety…
- The second ones, called motivation factors, relate to the personal development of the employee: possibilities for self-fulfillment, career evolution, autonomy, responsibilities, personal recognition, work interest.

When the first ones are satisfied, sources of dissatisfaction are eliminated and only the latter ones can be sources of satisfaction and motivation.

Reducing the noise, heat and physical load constraints contributed to reduce physical causes of dissatisfaction. The new organization of the "grill band" led to a reduction of the autonomy of these employees, of their social and mental satisfaction and of their motivation. Their overall assessment led them to want to leave this workstation: it is thus on the whole negative.

What can we conclude?

1. All exposures are multifactorial and, just as it would be absurd to treat the eczema of somebody without taking care of his diabetes and his hypertension, it is absurd to worry about the noise to which a worker is exposed, without taking care at the same time of his chemical environment, his physical load and his psychosocial environment.
2. Whatever the problem considered (noise, physical load…), it is essential to replace it in the general context of the work situation, instead of treating the problems sequentially as they appear or according to external circumstances (skill and interest of the observer) and then to deepen it if necessary, if the problem cannot be solved immediately and if the risk is very high (chemical risks, accidents….).
3. The objective is to maintain or improve the wellbeing of the work collective (employees and local management). No coherent action can then be carried out without the knowledge of the work situation that only this work collective holds. This group must then be the main "actor" of the prevention and not merely its "object".

4. Any approach must be participative and not only consultative, that is, to be based on a direct, active and equitable cooperation (dialog) within the work collective on THEIR living conditions together in the company.
5. This approach is particularly critical in SME employing more than 60% of the workers and simple tools, easy to use and inexpensive must be developed for them, by taking account their limited resources in health and safety. The Sirtes ([3]) LEST ([4]), AET ([5]), FIOH ([6])… methods developed in the '70 and '80 and then withdrawn, went in this direction and there exist really at present only the WISE ([7]) and SOBANE - Déparis ([8]) guides.
6. The current conventional approach of evaluation of the risks must be questioned in order to achieve more economically, faster and easier coherent action plans. The approach must be direct targeted towards prevention and the risk assessment is only one step not always essential. It is certainly interesting to study the increased risk of hearing loss due to vibration, or of musculoskeletal disorders due to deleterious psychosocial factors and vice versa. However the methods of noise abatement will not differ because there is concomitant exposure to vibration and the psychosocial climate must be improved for itself, and not because it leads to a worsening of the MSD.

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