Multidisciplinary analysis of risk factors of MSD in meat cutting: the issue of organising knife maintenance

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1. Introduction

The scientific literature has shown that several risk factors of musculoskeletal disorders (MSD) can be found in the meat cutting sector (InVS 2007) in which there has been a constant increase of these occupational diseases. One of the determinants of MSD risk factors is the cutting capacity of the knife used (McGorry, Dowd et al. 2003) which is affected by knife maintenance and its organisation (Vézina, Prevost et al. 1999). Consequently, multidisciplinary research-action was performed in which the activity of different operators was analysed, with monitoring of the evolution of blade sharpness during a workday. This communication is focused on the relations between knife maintenance organisation and blade sharpness, which is a risk factor in the occurrence of MSD. Knife maintenance includes several operations, in particular sharpening (done outside the cutting workstation) and steeling (done at the cutting post).

2. Material and methods

Observations in real work situations emphasised two main modes of organising sharpening: individual, i.e. done by the meat cutter; and centralised, done by an operator who sharpens the knives of a group of meat cutters. The analyses were performed in a company practicing individual sharpening (10 meat cutters) and in a company practicing centralised sharpening (6 meat cutters and 1 knife sharpener). The aim was to perform a quantitative, objective evaluation (the force necessary to cut a reference material), and a qualitative, subjective evaluation (on a visual analogic scale from 0 (no cutting) to 10 (optimal cutting), by the meat cutter and/or the sharpener, of the cutting capacity of the knife. Individual self-confrontation interviews focusing in particular on the organisation of sharpening were also carried out.

3. Results

The results showed that the organisation of sharpening appeared to have an impact on the cutting capacity of the knife from both the objective viewpoint and the subjective viewpoint. Seen from the objective viewpoint, the knives of the company practicing individual knife sharpening cut less efficiently (n=24, average force =33.65 N, SD=3.39N) than those of the company practicing centralised sharpening (n=16, average force =22.55 N, SD=4.83N). The evolution of the cutting capacity of the knives (difference between the force before and after sharpening) was 5.6N for individual sharpening and 7.1N for centralised sharpening. The results of the qualitative evaluation showed that the meat cutters who sharpened their knives themselves evaluated the cutting capacity of their knives with an average score of 8.2. For centralised sharpening, the sharpener estimated the cutting capacity of the knives at 10 and the meat cutters at 7.2.

The individual self-confrontation interviews showed that 50% of the meat cutters who sharpened their own knives and 50% of the meat cutters whose sharpening was centralised preferred to sharpen their knives themselves (individual sharpening). The other meat cutters did not express a clear preference on the mode of organisation of knife sharpening: a single meat cutter who sharpened his knives himself appeared to find centralised sharpening advantageous due to the time saving made possible by this mode of organisation, while for 50% of the meat cutters for whom sharpening was centralised, this mode of organisation appeared to match their quality expectations. Indeed, although imposed, it was done at the request of the meat cutters.

4. Discussions

The results underline that the issue of organising knife maintenance can be complex, requiring the combination of quantitative and qualitative approaches. The analysis of the interviews showed that the divergence between the objective and subjective evaluation of knife cutting capacity can result from the fact
that the meat cutters took more variables into account than the objective evaluation: relations between the meat cutters and the sharpeners, the need for training, experience, time available to perform sharpening, etc. In addition, the subjective evaluation took into account the evolution through time of all the conditions in which the working tools were used.

As far as the mechanism of occurrence of MSD is multifactorial (Bongers, Kremer et al., 2002), the decisions relating to the organisation of sharpening should take into account both the objective and subjective criteria considered from the assessment of meat cutters and knife sharpeners. Therefore this study provides elements of response for companies seeking an answer to the question of organising knife sharpening.

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References