Vibration Injury Network

Research Network on Detection and Prevention of Injuries due to Occupational Vibration Exposures

Development of a Questionnaire for Epidemiological Studies of Whole-Body Vibration

Appendix W2B to Final Report

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1. Objective

The objective was to develop a questionnaire for use in a multicentre epidemiological study to identify and quantify the relationship between exposure to whole-body vibration (WBV) and the most important health effects, taking into account various contributing and confounding factors.

2. Methods

At the start of VINET, the University of Patras, in close collaboration with the other members of the group, elaborated a first draft of a questionnaire (Magnusson et al. 1998). This draft was further developed and refined. It was agreed that the emphasis of the health section of the questionnaire was on low back pain (LBP) and that it should meet the criteria outlined in a critical review of epidemiological studies in this field (Bovenzi & Hulshof 1998). The major components of the questionnaire (assessment of exposure, assessment of health effects, and assessment of contributing and confounding factors) were identified. They were included in four different sections: a section on personal and general information; a section on health effects; a section on historical and current WBV exposure and further work environment information; and a section on psycho-social factors. The first draft was based on validated questionnaires and on questionnaires from epidemiological studies conducted by the group members (Boshuizen et al. 1992, Bovenzi & Betta 1994, Magnusson et al. 1996). In an iterative process of group consultation, redrafting and field testing, consensus was reached on a final version. This version was meant to be used for studies of ground vehicle drivers/operators.

3. Results

The section on *personal and general information* includes background factors like anthropometry, socio-economic status, annual amount of personal car driving and lifestyle factors. As smoking has been linked to the risk of musculoskeletal complaints (Boshuizen et al. 1993), questions about smoking behaviour were also included.

As there is no validated questionnaire for assessing exposure to WBV, most of the questions in the section on *work environment information* were selected from the

aforementioned previous epidemiological studies. These questions ask detailed information about the type of vehicle, amount of driving, ground surface, driving environment and conditions, seat suspension, and back support. This information enables the calculation of cumulative measures of exposure severity and duration. Potential confounding and contributing factors like manual handling, lifting tasks and postural load were also included. In a pilot study, an adapted version of the exposure section (VINET Questionnaire Section 2 Work environment information) of the questionnaire was thereafter developed for including relevant questions for helicopter pilots (Magnusson et al. 2000). This specific version of the questionnaire was reviewed by captain helicopter pilots for comments on the relevance of the questions and thereafter again modified accordingly.
A version of the information of exposure section (VINET Questionnaire Section C Work environment information) was designed for control groups not driving operating vehicles as a profession (Magnusson 2000). Before using the questionnaire in any new occupational group it is advisable to have a few representative persons out of this group reviewing the questions for their relevance for the particular group to be studied.

For the section on *health effects*, lay-out and a number of questions were selected from the Nordic questionnaire, a validated and widely used questionnaire to assess musculoskeletal complaints (Kuorinka et al. 1983). For grading the severity of pain intensity and disability of LBP, we used the scales suggested by von Korff et al (1992). To assess functional disability because of LBP in daily life, the validated Roland and Morris disability questionnaire (1983) was included. The first draft of the VINET questionnaire also contained the Quebec back pain disability scale (Kopec et al. 1995). However, regarding the overlap with the Roland and Morris disability questionnaire, it was decided to delete it.
Furthermore, the general health parts of the questionnaire were harmonized with the corresponding HAV questionnaire (Bovenzi 1999).

Psychological characteristics of workers (like coping behaviour) and psychosocial aspects of work (e.g. high workload, lack of control and social support) are believed to play a role in the development or recurrence of LBP. To assess these *potential contributing and confounding factors*, we included respectively the Fear-Avoidance Beliefs Questionnaire (FABQ) (Waddell et al. 1993) and a questionnaire for the assessment of psychosocial aspects of work (PAW). The FABQ is a validated instrument that concentrates on the individual's beliefs about physical activity or work activity being a cause of his or her trouble, and on fears about the danger of such activities when having an episode of pain (Waddell et al. 1993). The PAW is an instrument, validated for internal consistency and reliability, that consists of 15 statements divided over three subscales: job satisfaction, social support and mental stress (Symonds et al. 1996). A further discussion took place about the inclusion of parts of a specific and validated Dutch questionnaire on work stress (VBBA) (Van Veldhoven et al. 1996). However, due to the length of the most suitable clusters of this questionnaire, it was decided not to use it.

The questionnaire has been tested in pilot studies on helicopter pilots (Magnusson et al. 2000) and forklift drivers (Hoy et al. 2000) and substantial parts of it in a study on port machinery operators (Bovenzi et al. 2001). Some questions with ambigue elements or unclear formulations were rephrased. Because of some complaints about the length of the questionnaire, a further modification was done in the lay-out of the health effect section. If an introducing question was answered with a "no" the respondent was told to ignore the remaining questions on that particular section.

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