Work-related risk factors for lumbar herniated disc disease: 
a systematic review of clinical studies

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1. Introduction
Lifting, whole body vibration and bending of the trunk are established work-related risk factors for non-specific low back pain. Knowledge of threshold limit values for these risk factors enables effective prevention for instance by implementing ergonomic measures. However, for a specific cause of low back pain, lumbosacral radicular syndrome, often referred to as lumbar herniated disc disease (LHDD), no review of work-related risk factors is present.

2. Method
A systematic review was performed in PubMed and Embase until January 2015. Inclusion criteria were that LHDD was diagnosed by a clinician and a risk estimate was reported for work-related risk factors. A quality assessment of evidence was performed.

3. Results
The search resulted in 5015 studies and 22 fulfilled the inclusion criteria. The studies were from ten countries. Four studies had a cross-sectional design, 14 studies a case-control design and four described a cohort. The median number of participants was 1057 (range 116-15,688). The studies reported about the following (combinations of) work-related risk factors: job description, physically demanding work, lifting and carrying, bending and twisting of the trunk, sitting, driving a vehicle and kneeling. Nurses, construction workers, professional drivers, and manual laborers have an increased risk of LHDD. Lifting and carrying, including bending of the trunk increase the risk of LHDD. Driving a vehicle, without lifting and carrying or bending of the trunk, does not increase the risk of LHDD. For the other risk factors, no conclusive evidence was available.

4. Discussion
Work-related risk factors for LHDD have been established. The exposure is characterized by more than 10 years performing physically demanding work, like daily lifting and carrying of loads of at least 5 kg on average 2 hours or 25 times per day, including bending of the trunk more than 20 degrees for at least one hour a day. The assumption that driving a vehicle by itself is a risk factor for LHDD was not supported by this review.

References
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