

## Focus on IFA's work

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# Physical loads during patient transport on staircases

## Problem

Emergency service personnel are frequently subjected to high physical stresses upon the back and joints during deployments. This is particularly the case when patients must be transported up and down narrow staircases. The constrained transportation paths results in unfavourable body postures. Adding to this problem is the rising number of heavyweight patients and the frequency with which they are transported. At the same time, the proportion of female emergency service personnel, who may be affected more severely by these stresses, has increased.

One solution to the problem could be the use of alternative transport equipment with the potential to reduce the stresses arising during the transport of patients. To date however, these alternatives have not been widely adopted, and their efficacy has barely been scientifically investigated.

## Activities

In a feasibility study conducted in cooperation with the German Social Accident Insurance Institution for the public sector in North Rhine-Westphalia (UK NRW), extensive laboratory studies were performed at the IFA in which the physical stresses arising during the use of four different items of equipment were quantified and compared. Conventional transport equipment in the form of an emergency carrying sheet and an escape chair as well as alternatives in the form of an evacuation



Test arrangement for transport of a patient by means of an evacuation slide sheet

slide sheet (see image) and a tracked stair chair were used in this study.

Several tests were performed in which six emergency service personnel working in pairs transported a patient dummy in the laboratory (on a staircase) using each item of transport equipment. The movements, resulting body postures

and the hand action forces of the two subjects were recorded and analysed by means of modified CUELA<sup>1</sup> measurement systems and force measurement apparatus. The subjects were also asked to rate their perceived exertion during each of the tests.

### **Results and Application**

The studies show the test arrangement to be suitable for recording the relevant stress parameters for two subjects simultaneously. The results deliver preliminary information on the stresses that may arise during use of the different forms of equipment for the transport of patients on staircases.

Besides the direction of transport (up or down stairs) and the equipment used, the carrying technique also influenced the level of physical stress experienced by the subjects. Based upon the measurement results and consultation of the subjects, it can be concluded that the stress can be reduced by use of the alternative transport equipment tested.

The findings of this pilot study are to be used to prepare a main study, the results of which in turn are to form the scientific basis for the formulation of recommendations for suitable preventive activity.

### **Area of Application**

Employees and superiors in the emergency services; prevention services of the German Social Accident Insurance Institutions

### **Expert Assistance**

IFA, Division 4: Ergonomics – Physical Environmental Factors

### **Literature Requests**

IFA, Central Division

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<sup>1</sup> Computer-assisted measurement and long-term analysis of musculoskeletal workloads