Importance of ergonomics in hospital care

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Low back pain in nurses - a serious and very frequent condition

Back complaints and other musculoskeletal disorders are common in health care. In certain departments (orthopaedics, neurology, intensive care) they are even very common: 70% of the nurses in physically demanding departments indicate that they suffer from back complaints each year. This is more than, for example, care providers in nursing homes or home care, where the average is 60%.(3)

The Belgian Federal Public Service (FOD) Employment, Labour and Social Dialogue states that **73% to 76% of the nursing staff suffer back problems every year**.(4) The occupational health service department of the University Hospital of Gent (UZ Gent) reports 72%, whereby 45% experience back complaints several times a year, 15% even more times a month and 3% daily.(5)

A survey by the General Union of Nurses of Belgium (AUVB) which was completed at the end of May 2021 shows that the profession of nurse is physically demanding. The results of the survey also show that 9 out of 10 nurses have physical complaints. These are mainly back pain (69%), overtiredness (36%) and shoulder pain (35%).(6)

Consequences and costs of low back pain in nurses

Presenteeism. Presenteeism is the fact that in some cases people work while they consider themselves ill. It is almost invisible but causes significant loss of productivity. These employees cannot work at full capacity, so colleagues have to step in. Most studies confirm that presenteeism is much more expensive than sick leave or disability. In America, the hidden costs of presenteeism are calculated as 63% of all medical costs and 2.6 times higher than absenteeism costs.(7)

Absenteeism. Back pain is a very frequent cause of long-term work absence. In the health and social care sector of Germany in 2019, 21% of sick days (absence) were due to back pain (much higher than the general 6.1%). 30% of employees had sick days due to musculoskeletal conditions and the **average sick leave was 20.2 days.**(8)

The percentage of healthcare workers with sick leave due to musculoskeletal disorders was 62.7% and the average number of days per episode was 18.2 days. For physicians, this was 10.0% and 13.1 days. **On average, a nurse was absent 4.5 days per year due to musculoskeletal conditions**.(8)

For Belgian employers, a day of sick leave in 2010 amounted about €300 in direct costs and about €600 in indirect costs - amounting to a total of **€900 per day of absence and per employee**.(9)

One **nurse who drops out** due to musculoskeletal injury thus **directly** costs **6.060€ to the hospital** and 18.180€ in total.

Calculation of absenteeism cost due to musculoskeletal disorders per hospital annually = [# nurses] * 4.5 *[days per year]* * 900€ *[per day of absence]*

Calculation of presenteeism costs due to musculoskeletal disorder = [absenteeism costs] * 2.6

Causes of lower back pain in nurses

The two biggest factors leading to complaints and absenteeism due to physical load among employees in care-related jobs: **lifting/carrying loads heavier than 10-12 kg and working in a position where the trunk** is **bent more than 30-45 degrees**. The state-of-the-art research, carried out in preparation for the Working Conditions Agreement, shows that both risk factors occur frequently and simultaneously among employees in hospitals.(10)

A nurse turning a patient from one side to the other experiences the following load on the low back:
Patient 50kg - load on low back of nurse 501 kg
Patient 75kg - load on nurse low back 657 kg
Patient 100kg - load on nurse low back 848 kg
Patient 150kg - load on low back of nurse 1,012 kg

Nurses often have to work in positions with very high loads on the lower back. Turning a patient from one side to the other quickly can result in a load on the lower back from 500 kg to over 1,000 kg.(10)

In the study by Dekker et al. (2007), 85% of health care personnel at University Medical Centers in the Netherlands indicated that large forces are exerted. Unfavourable postures were mentioned by 60% of personnel providing care, and almost half of them stated that they had to 'lift or carry more than 25 kg'.(11)

Excessive back strain is a recognised risk factor for lower back pain and nurses should lift no more than 23kg. This maximum lifting weight of 23kg is derived from the NIOSH method. As a measure of back strain this method measures the intradiscal pressure (pressure on the intervertebral discs). This pressure may not exceed 3400N (9). That corresponds to **lifting 23 kg**. That is an acceptable strain on the back for 99 % of **men**. However, 77% of nurses are women. If 99 % of **women** should be able to work in a back-saving way, **17 kg is a maximum lifting weight**.(12)

An additional problem is that overuse of the intervertebral disc often goes unnoticed until it is too late. Characteristics that support a relationship between work and low back pain include a specific work-related injury that accelerates the onset of symptoms, symptoms that are

temporally related to specific work activities (in duration and/or scope) and that have been epidemiologically linked to back disorders. As an example, an epidemiological review found an association between certain activities (e.g., manual handling of materials, frequent bending and twisting, heavy physical work) and back disorders[13].

Cost-effectiveness of means to reduce physical labour

As calculated in the second paragraph, a nurse who drops out of the workforce due to back pain generates 6.000€ in **direct costs** for the hospital for sick leave alone. So, **each investment in products or techniques that can prevent 1 drop-out due to lower back pain, is cost-effective when it costs 6.000€ or less.**

No single product or technique will solve all back problems, but an adequate source approach is cost-efficient. International research has shown that a **source-based approach (resources that reduce physical labour)** is the most effective approach for the work risk of physical load in care. After a somewhat longer period of time, the source approach also led to a decrease in the absenteeism that is associated with the complaints. A long-term follow-up showed that the decrease had also continued.

Jansen and Burdorf (2001) calculated that for stressful care situations, the number of employees absent due to back complaints would be **28%** lower when exposure to physical load decreases from regular lifting to very occasional lifting or carrying of loads heavier than 10 kg. In addition, the number of employees who are absent due to back complaints would be **34% lower** when only very limited bending of the posture is required.[3]

Calculation of savings from aids that reduce physical labour =
[absenteeism costs] * 28%
+
[presenteeism costs] * 28%

Relevant calculations have also come from the United Kingdom: a hospital would need to spend between 0.2% and 0.3% of its budget on implementing a 'no lifting' policy (or source-based approach), including resources, instructions, and reservations for maintenance. Documentation from various British hospitals, submitted to the Royal College of Nursing (the UK's main trade union for healthcare professionals), shows that **absenteeism and the number of people disabled halved in three years** and that savings of £400,000 per annum were not uncommon for the larger trusts.[3]

Finally, there are the costs of someone who becomes completely unable to work due to back pain. Each person who is not incapacitated for work or who returns to work in the Netherlands would save 133,000 € to 214,000 € (KPMG, 2001). Such amounts can be used to finance a physical load prevention programme based on source policy.[3]

Utility of means of reducing physical labour

In addition, there are non-financial reasons to invest in ergonomic devices. In Belgium, nursing is now the main bottleneck profession.[14] Offering an attractive job that is not physically overburdening in order to attract good care providers and not to see experience leave may be an important spearhead in the personnel policy.

In 2003, a Working Conditions Covenant for Hospitals was published in the Netherlands:

"Better Work Package". With this covenant, the government and the social partners in the hospital sector wanted to encourage institutions to tackle adverse working conditions[3] and drew up the following 10-point list of goals:

1. **Decline in back pain (prevalence)**
2. **Reduction of absenteeism**
3. **Reduction in disability**. This is said to be related to the confidence one has in returning to work in the knowledge that one is not immediately overburdened again.
4. **Preventing personal injury claims**. More and more employees are holding their employers responsible for musculoskeletal complaints resulting from inadequate protective equipment.
5. **Less fatigue at the end of the day**. This in itself is an important effect in a situation where the pressure of work is high, and the attractiveness of the profession needs attention. The increasing desire to work part time is also related to the physical strength of the profession. This 'fatigue aspect' is particularly relevant for nurses following pregnancy, during the period with small children and for older nurses (50+).
6. **Improvement of reintegration/work return possibilities**. Around 80% of people with long-term back pain can resume work or resume work much faster if the work itself is within safe health limits. Early intervention strategies reduced the costs of absence and duration of absence for nurses with back pain by 23% and 43% respectively. The key is to retain experienced nurses, even if they can be less physically strong.
7. **Greater chance of continuing to work with pleasure in old age.** The current rapid ageing of nursing staff means that these employees are more vulnerable when it comes to the physical load they can handle, but it is important that they also remain active 'at the bedside' in view of the increasing ageing population. It is known from Sweden that this is possible, as long as the load remains structurally within health-related limits. In Sweden, nurses work considerably longer in executive positions.
8. **Image of the profession.** Well trained and working optimally with professional and high-quality material can make a positive contribution to this.
9. **Fewer actions per nurse required: faster work.** Nurses with good aids are not only under less physical strain, but also have to carry out fewer actions, which saves time. Time-consuming and stressful actions are avoided.
10. **More time available per nurse.** ‘Lifting together' by two or more nurses was until recently considered one of the better ways of limiting physical load. However, this appears to be hardly the case based on research. The opposite may even apply, as the number of lifting actions mainly determines the risk of developing back complaints. If lifting activities are shared, so that in fact one lifting activity counts for both nurses, the risk of back complaints will increase for both. A source approach, in which the action is taken over by an aid, is advantageous for both. In addition, this makes the action more efficient, which is also relevant. After all, nurses often ask a colleague for assistance with 'lifting', which means that work routines have to be interrupted, which in turn wastes time. If one person can work properly with an aid (sling, hoist, lifting cushion), this will in principle save time.

Legislation, standards, and guidelines

In Belgium in 1993 the legislature imposed obligations on the employer, in the Royal Decree on the manual handling of loads, in order to prevent the risk of injuries caused by the manual handling of loads.[15] According to the welfare law, the employer is obliged to promote the

welfare of the employees in the execution of their work (Law of 4 August 1996 concerning the welfare of employees in the execution of their work, BS 18/9/1996). The employer must ensure that the work is adapted to the physical capabilities of the person and that **excessive professional physical and mental fatigue** is prevented.[16]

A parliamentary question was asked in the Chamber about the fact that Belgian legislation apparently does not stipulate a maximum weight that workers can lift manually. It is indeed the case that Belgian legislation does not lay down a maximum weight. The Royal Decree of 12 August 1993 on the manual handling of loads does state that it may not be too heavy. The employer must determine, after risk analysis and possibly with the help of the occupational health service or doctor, what is too heavy and what the maximum limit is. For the construction industry, there is a collective labour agreement of 4 October 2001 (made binding by the Royal Decree of 5 March 2006) which states that 25 kg is the limit for pre-packaged materials.[17]

The European standard EN 1005 and international standards ISO 11228 and ISO-TR 12296 also use 25kg as the maximum lifting weight, in ideal circumstances and at a limited frequency.

The risk screening per ISO 11228-1 includes the screening of five questions:

1) Are loads of 25 kg or more lifted by one person or loads of 42 kg or more lifted by two persons?

2) Are loads between 3 and 25kg lifted more than 10 times (per shift)?

3) Are loads lifted, that are laying at 175cm or higher, heavier than 3kg?

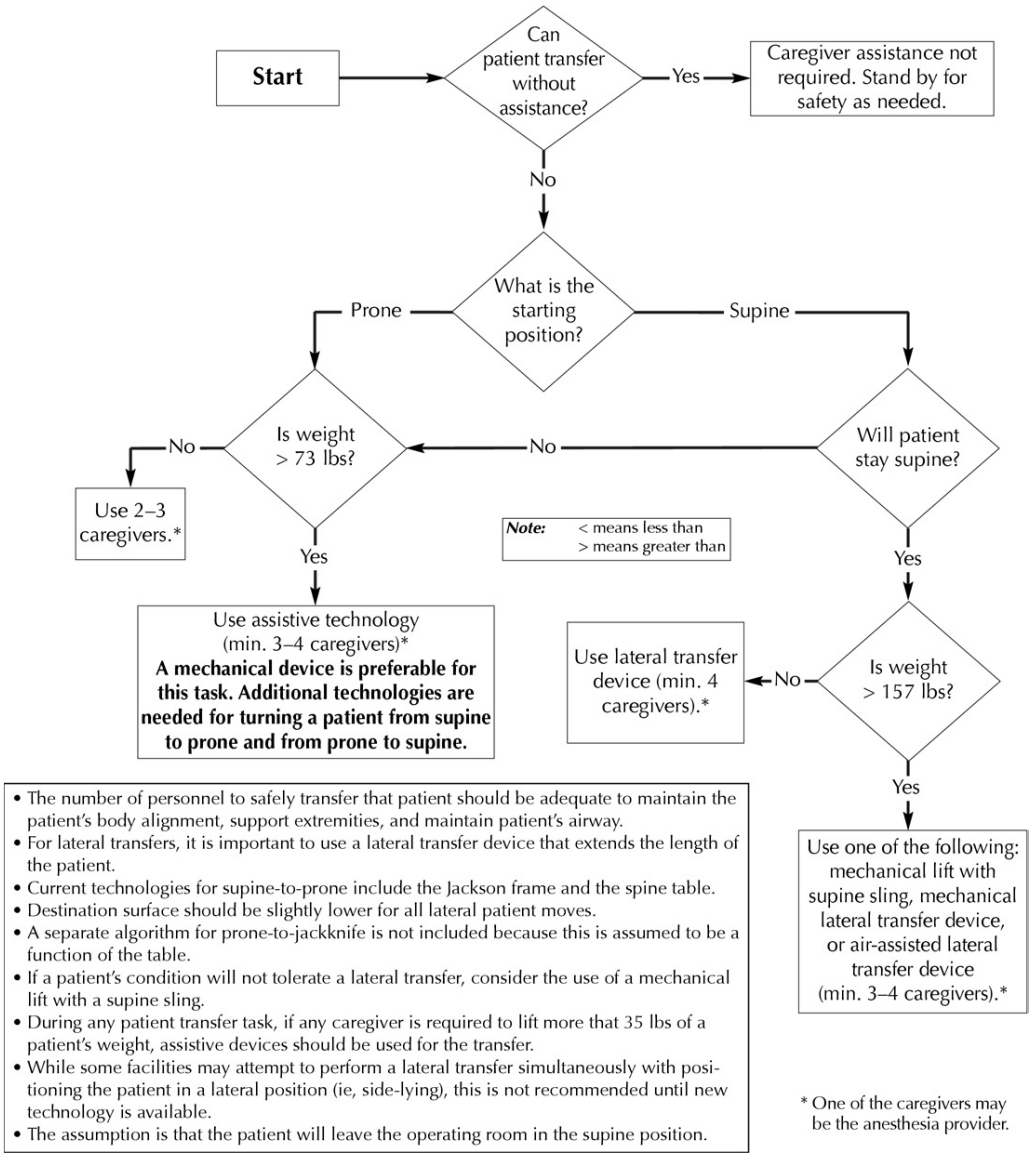
4) Are loads lifted, that are 63cm or further (forward distance) from the worker, heavier than 3kg?

5) Are there loads heavier than 3kg with a size larger than 60 x 40 x 35cm (B x W x H)?

If the answer to any of these questions is 'YES', then: 1) the risk of manual handling should be assigned; 2) the specific solution-oriented risk assessment should be carried out. Many nurses can answer 4 of the above questions positively for their daily activities.

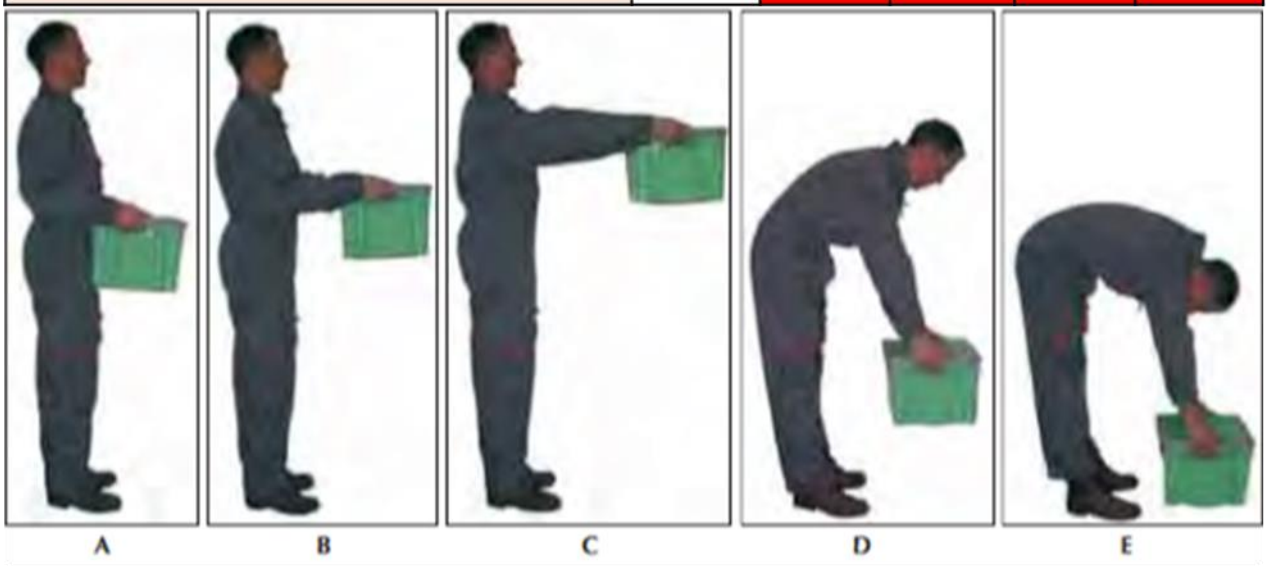
In the risk analysis, the employer cannot, of course, disregard international **reference standards and guidelines**:

The following decision tree was published by Waters and colleagues in 2011 and is recommended by AORN for transferring and lifting a patient[18]: patients under 73 lbs (33 kg) can be transferred with two or three nurses. With higher weights this should be at least 3 or 4 nurses and a mechanical transfer-assist device should be used.



In 2005, the Belgian Federal Public Service (FOD) Employment, Labour and Social Dialogue published a document entitled "The back: an expensive construction. Prevention of back pain in the construction industry".[19] The objective was to create an educational tool that complements the training of monitors in the prevention of back pain in the construction company. The initiative was subsidized by the European Social Fund (ESF) and the FOD. The illustration below gives an idea of the strain on the lower back when lifting in a stooped position. The most common posture and acts in healthcare lies somewhere between figure B and D (half stretched arms and slightly bent torso) and is **harmful from 15-25kg** according to this guideline.

Pressure (approximate) on the lower lumbar intervertebral disc for someone weighing 75kg	Weight of load (in kg)				
	0	10	15	25	50
Hull vertical and load against hull (Fig. A)	50	110	140	200	350
Hull vertical and load with arms half extended (Fig. B)	50	160	215	325	600
Hull vertical and load with arms extended (Fig. C)	50	210	290	375	850
45° torso bent forward (round back) (Fig. D)	250	335	375	460	675
90° torso bent forward (round back) (Fig. E)	300	435	502,5	635	975



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