

PREVENTING RISKS IN NURSING HOMES THROUGH SAFER DESIGN AND RENOVATION

Introduction

The residential care sector in France faces significant challenges relating to workers' safety and sickness absence. The sector is characterised by a high prevalence of work-related accidents and sickness absence primarily associated with musculoskeletal disorders (MSDs). Specifically, in the nursing home sector (*Établissement d'hébergement pour personnes âgées dépendantes*, known as EHPAD) MSDs account for 94 % of recognised occupational diseases, and 25 % of workplace accidents are related to back pain. The estimated annual cost of MSDs for companies is around EUR 46 million, with over 60 % of this attributed to back pain. More than 660,000 workdays are lost, equivalent to over 3,100 full-time positions, with back pain again representing more than 60 % of these lost days.

Against this background, several preventive strategies have been developing from the collaboration of national and regional public authorities. The French national research and safety institute for the prevention of occupational accidents and diseases (INRS) has issued a comprehensive guide based on good prevention practices in the design and renovation of nursing homes. The guide is addressed to all stakeholders involved in the construction and renovation of nursing homes, from project owners, architects and engineers to occupational safety and health (OSH) specialists and workers. These guidelines emphasise a structured approach to integrating OSH risk prevention from the initial stages of the projects onwards. The guide promotes a participatory approach that involves all stakeholders in the definition of appropriate design solutions.

This case study draws on different solutions that have been implemented in French nursing homes, as presented in L'Effet Prévention, a website developed by the regional pension and occupational health insurance fund (Caisse d'Assurance Retraite et de la Santé au Travail, CARSAT) in Aquitaine.¹ Crucially, these examples illustrate real-world solutions that may not always qualify as 'best practices'. Instead, some examples present situations that could be improved by following suggestions that are accessed by clicking on the examples. This highlights the importance of organisations integrating OSH strategies from the outset, during the initial planning of establishments, rather than making suboptimal design choices that create operational risks and require additional investments afterwards.

The selection and elaboration of the examples below received feedback from two representatives of the technical team responsible for the website. This case study is part of a broader research project aimed at providing an overview of research on OSH in residential care work.²

Description of the initiative

Aim

Nursing homes face substantial OSH challenges that impact both residential care workers' well-being and the quality of care delivered to residents. Designing and refurbishing residential care establishments provides a critical opportunity to integrate risk-prevention strategies from the initial planning stages, transforming these facilities into safer and healthier environments for both workers and residents.

¹ CARSAT Aquitaine manages L'Effet Prévention, a website that allows companies to access examples of projects implemented by other organisations. The platform features photos and factsheets to illustrate risk-prevention strategies, enabling users to filter solutions by sector and activity types. All content presented in this case study has been authorised for reproduction to ensure compliance with intellectual property and privacy standards. More information is available from: <https://leffetprevention.carsat-aquitaine.fr/>

² The full report — *Residential care workers: a comprehensive overview of occupational safety and health* — is available at <https://osha.europa.eu/en/publications/residential-care-workers-comprehensive-overview-occupational-safety-and-health>

Nursing homes experience persistently high numbers and long-term impacts of work-related accidents and injuries, creating high costs for organisations. MSDs represent the leading cause of sickness absence and incapacity among residential care workers. These arise primarily from the manual handling and mobilisation of dependent residents, poor ergonomic conditions, and facilities designed without consideration for worker safety. The guidelines for the design and renovation of residential care spaces not only cover prevention of MSDs and the risks of slips and falls, but also a broader range of risk exposures (including chemical and physical) in all areas of residential work (including, for example, the kitchen and laundry).

What has been done?

Creating safe and effective nursing home environments requires careful attention to multiple design factors. The INRS guidelines provide design interventions concerned with movement and circulation within establishments, where residents' mobilisations mostly take place, including bedrooms and bathrooms, as well as other facilities within establishments (laundry, kitchen, care units). It also covers other environmental factors that directly affect workers' well-being (such as air quality and thermal regulation). By attending to these design elements, these interventions aim to effectively address different risk factors. This section draws on different examples of interventions in nursing homes that have implemented proactive OSH risk-prevention strategies under the guidance of CARSAT Aquitaine. It presents specific accomplishments in establishments that have benefited from the intervention in critical areas of the physical work environment of residential care workers, with a focus on the integration of technical aids and assistive equipment.

Movement and circulation within establishments

Movement and circulation within nursing homes represents OSH challenges that directly impact the physical demands on workers. Many facilities have inadequately sized corridors that restrict the passage of wheelchairs and equipment, forcing staff and residents to navigate congested spaces. Poor coordination of logistics (such as for meal delivery, linen transports and care activities) involves frequent back-and-forth movements within establishments, requiring workers to undertake additional push/pull efforts, increasing fatigue, along with risking slips, trips and falls. Bedroom and bathroom design frequently fails to accommodate the passage of mobility aids and lifting equipment, forcing caregivers to relocate furniture or adopt unsafe handling practices when assisting residents with transfers and personal hygiene.

General guidelines for nursing home design emphasise the importance of well-planned movement within establishments. During the planning phase of the projects, an analysis of logistical flows across different facilities should be conducted, incorporating staff inputs, to minimise distances to be covered and ensure the agile transfer of residents. Effective circulation design within establishments requires specific dimensional and operational standards. Corridors must have a minimum width of 2.10 m to allow easy passage of wheelchairs and walkers. Small storage spaces should be located near doors to rooms so that trolleys carrying linen, meals or care supplies can be temporarily left there without blocking hallways or common areas. Each activity area, like care stations or kitchens, should have a storage space nearby to prevent overcrowding in circulation areas.

Box 1: Internal circulation designs in STELISA - Sainte Elisabeth nursing home (Saint-Palais)

Corridors have a minimum width of 1.80 m, facilitating the passage and crossing of wheelchairs and walkers.

Recessed spaces at room entrances allow for the temporary storage of trolleys (containing linen, meals or medical supplies) without obstructing circulation.

Each unit has technical and storage rooms for storing equipment and linens (clean and soiled), thus preventing congestion in circulation areas and reducing movement between storage areas and points of use. These rooms are equipped with time-delay door closers, allowing trolleys to pass easily without restricting movement or requiring manual support.

A smooth, seamless floor covering reduces trolley noise and facilitates their movement (by minimising rolling resistance).



Source: L'Effet Prévention - Reconstruction d'un EHPAD à Saint-Palais

<https://leffetprevention.carsat-aquitaine.fr/fiche/reconstruction-dun-ehpad-a-saint-palais/circulation-interieure/>

Facilities design to prevent workers' injuries

The design of appropriate bedrooms and bathrooms should contribute to reducing physical strain and awkward postures during care activities, hygiene tasks, bed making, room cleaning and mobilising dependent residents, while ensuring compliance with regulations and standards for accessibility for people with disabilities.

A main issue for bedroom design in nursing homes is that traditional layouts often do not take into account that these spaces also serve as workspaces for residential care workers. Bedroom design must accommodate multiple simultaneous activities, such as the provision of care and hygiene services, making beds, cleaning premises and facilitating the mobilisation of residents experiencing loss of autonomy. Yet many existing designs lack the spatial requirements needed for caregiving tasks, contributing to postural constraints and MSD among staff.

Specific design requirements include ensuring accessibility and circulation for all handling aids and rolling equipment, such as patient lifts and wheelchairs, without having to move furniture. Bedroom spaces must allow a patient lift to be used at any point in the room, and a designated area should be available for performing transfers between the bed and a chair or other equipment. For instance, the turning diameter of a wheelchair with its attendant should be increased to 1.90 m rather than the 1.50 m allowed for wheelchair alone. Circulation spaces must be configured to allow the use of handling aids and rolling equipment, such as patient lifts and wheelchairs, with a minimum clear passage width of 0.9 m.

Box 2: Bedroom design accommodation at EHPAD Résidence du Clos Lafitte nursing home (Gironde)

A 1.20 m-wide bedroom door allows easy passage for a bed to be moved without having to dismantle it or remove its side rails.

A sliding door to the bathroom does not obstruct the circulation space at the bedroom entrance, and its 1.00 m opening width facilitates wheelchair access without awkward manoeuvres.

A remote control located at the bedroom entrance operates the roller shutters, eliminating manual opening and closing, reducing unnecessary movement within the room and preserving the resident's privacy.



Source: L'Effet Prévention – Reconstruction d'un EHPAD en Gironde

<https://leffetprevention.carsat-aquitaine.fr/reconstruction-dun-ehpad-en-gironde/la-chambre-et-son-cabinet-de-toilette-3.html>

Mobilising dependent residents for personal hygiene without appropriate space and equipment is a highly physically demanding task that substantially contributes to MSDs and the risk of injuries. Bedrooms and bathrooms may not always be well positioned, sized or equipped to accommodate the mobilisation of patients with high levels of physical dependence.

To address these issues, the design of bathrooms must consider specific spatial and equipment specifications that prioritise both accessibility and patients' and workers' safety. Proper design requirements for bathrooms in nursing homes require minimum space to accommodate lifting equipment and facilitate workers' operations. The design must ensure a clear area with a minimum 1.90 m diameter to allow wheelchair movement and for two workers to move around, and for the use of hygiene and shower chairs. Circulation spaces must accommodate the use of specialised equipment such as shower trolleys with a minimum length of 2 m. Access to the bathroom should include surface-mounted sliding doors to save space.

Ergonomic specifications are also of key importance. Bathrooms should include wall-hung toilets with grab bars positioned to allow accessibility for people with reduced mobility. Retractable grab bars should be on either side of the toilet at an appropriate height (not exceeding 0.70-0.75 m), with enough space to allow the use of assistive devices or the positioning of staff. Showers should be designed without a tray with a slope of less than 2 % and equipped with both horizontal flat and vertical grab bars. Access to showers requires a minimum width of 1.10 m. In cases where this requirement is not met, establishments need to make additional investments to acquire electric shower chairs to enable access and reduce workers' postural strain while mobilising residents. Additionally, the INRS guidelines recommend reviewing the feasibility of providing access to the toilet via ceiling rails, so it can be integrated seamlessly into the bathroom environment. This would enable dependent residents to receive appropriate care while minimising postural constraints and other musculoskeletal risks for workers.

Integration of assistive devices: ceiling patient lifts

The most effective method for safe patient handling is installing mobilisation and lifting-aid equipment, especially ceiling patient-lift systems. There are substantial benefits of integrating ceiling-mounted, rail-mounted patient lifts for residents who cannot support their body weight. These systems eliminate staff effort and postural constraints during transfers, allow better contact between staff and residents through face-to-face positioning, ensure greater safety and comfort for the resident, and require less floor space than rolling patient lifts. Beyond individual bedrooms, ceiling lifts should be planned other facilities such as bathrooms or hydrotherapy rooms to facilitate transfers from wheelchairs to the treatment. Also recommended is the provision of at least one mobile patient-lift device on wheels and one electric lifting

chair per floor, to help residents with their movements or to allow them to get up if they fall outside their rooms. Other recommended technical aids include 'standers', which allow residents to stand up using their upper limbs with the assistance of workers. These can be used for transfers or for performing care (such as dressing, changing, or caregiving tasks at the sink).

Ceiling hoists should be integrated into the facility design to encourage workers to use them in their daily routines. An H-shaped rail configuration is recommended as the optimal design choice because it provides complete coverage of the room, ensuring that lifting capability extends to the bedroom and bathroom. The H-shaped design also assists in case of a fall in the entrance area. Alternatively, an L-shaped rail configuration also assists patient transfers out of bed. In contrast, straight rails at one side of the bed, or oblique rail configurations, are not advisable as they limit transfer options and reduce the room for manoeuvre.

The effectiveness of ceiling lifts is also determined by the choice of motor and the management of the equipment. Selecting a particular type of ceiling-lift motor should be based on the assessment of the number of residents who require assistance for daily mobilisations. For highly dependent residents, fixed or detachable motors are preferable to portable ones, as they can remain permanently in the room and would be always available for staff, avoiding the handling of mobile motors or trolleys that require setup and removal at each transfer for each resident. For rooms not yet equipped with plug-in motors, or in the case of temporary equipment failure, portable motors should be provided with automatic motor-lifting capabilities, appropriate transport and storage areas, and designated charging locations.

Limitations arising from straight rail configurations and the use of mobile motors can create risky situations, forcing workers to adopt awkward postures and over-exert themselves when assisting residents with mobilisation. For instance, during an emergency intervention, they may need to lift their arms to place the motor or to lift a patient who has fallen in the room outside the scope of the rail.

Box 3: Integration of assistive equipment in the Résidence Bossège nursing home (Médoc)

Rooms are equipped with height-adjustable beds, H-type ceiling rails, and a combination of fixed and mobile motors with harnesses tailored to residents' dependency levels. These tools facilitate various transfer phases (from bed to wheelchair, shower trolley, etc.) and help ensure safe mobilisation of dependent residents, while also limiting space congestion by using wheeled patient lifts. Mobile motors allow adaptation to residents' temporary assistance needs.



Source: L'Effet Prévention – Reconstruction d'un EHPAD dans le Médoc
<https://leffetprevention.carsat-aquitaine.fr/fiche/reconstruction-dun-ehpad-dans-le-medoc/la-mobilisation-des-residents/>

Box 4: Integration of assistive equipment in Résidence du Clos Lafitte

The facility's rooms are equipped with ceiling tracks and fixed motors to facilitate patient transfers and reduce corridor congestion caused by mobile patient lifts. These motors remain in the rooms of residents who require daily assistance, thus eliminating the need for mobile motorised trolleys that must be set up and removed for each transfer.

The beds are height adjustable, and the room entrances are wide enough to allow for the temporary storage of cleaning and care trolleys, preventing clutter in the rooms and corridors.



Source: L'Effet Prévention – Reconstruction d'un EHPAD en Gironde

<https://leffetprevention.carsat-aquitaine.fr/reconstruction-dun-ehpad-en-gironde/mobilisation-des-residents.html>

Note: Picture can be accessed by clicking on the items highlighted in the photos on the main website.

Box 5: Integration of assistive equipment in La Chêneraie nursing home (Bordeaux)

The rooms of the high-dependency unit of this facility have all been equipped with ceiling tracks, but there is only one portable motor for the whole unit.

This requires plugging in and unplugging the motor each time, which creates postural strain for the care workers and increases intervention time. To avoid stressful work situations and the risk of accidents, it is advisable to acquire as many detachable motors as there are dependent residents who require assistance with mobility, and to leave the motors in their rooms as long as the patient's level of dependency requires.



Source: L'Effet Prévention – Reconstruction d'un EHPAD à Bordeaux Caudéran

<https://leffetprevention.carsat-aquitaine.fr/reconstruction-dun-ehpad-a-bordeaux-cauderan/manutention-et-levage-1.html>

Note: Picture can be accessed by clicking on the items highlighted in the photos on the main website.

Box 6: Integration of assistive equipment in a nursing home in Bourdeaux Cauderan

Choosing a straight rail in a resident's room presents several constraints:

- Transfer area is available only to the left or right of the bed along the rail's axis.
- The limitation of transfer types (e.g., from bed to shower bed) requires additional handling.
- Movement within the resident's comfort zone is limited to the upper body.
- Reduced flexibility for resident care (due to the fixed furniture configuration).

Among all existing ceiling-mounted rail-lift solutions, the H-shaped rail provides complete coverage of the room and facilitates resident mobilisation in various configurations, including lifting them following a fall in the entry area.



Source: L'Effet Prévention – Reconstruction d'un EHPAD à Bordeaux Cauderan

<https://leffetprevention.carsat-aquitaine.fr/reconstruction-dun-ehpad-a-bordeaux-cauderan/manutention-et-levage-1.html>

Box 7: Integration of assistive equipment in STELISA - Accueil Sainte Elisabeth nursing home (Saint-Palais)

The facility installed 50 fixed and removable motors, matching the number of residents requiring daily mobility assistance. These motors can be disassembled for storage or installed in another room if a resident's level of independence changes.

In addition, six mobile motors (on trolleys) are available to address specific situations (e.g. a resident's temporary loss of independence or a motor malfunction).



Source: L'Effet Prévention – Reconstruction d'un EHPAD à Saint-Palais

<https://leffetprevention.carsat-aquitaine.fr/reconstruction-dun-ehpad-a-saint-palais/la-mobilisation-des-residents.html>

Success factors and challenges

The rationale of the examples presented above builds on the principle that OSH risk-prevention strategies should be integrated into the overall development of construction and renovation projects,

alongside functional and architectural aspects. The INRS guidelines emphasise a participatory approach for the successful design and implementation of preventive strategies. The methodology for the project development envisages the establishment of a steering committee as the coordinating and main decision-making body. It is composed of company and worker representatives, as well as external stakeholders, such as CARSAT OSH prevention specialists. This ensures that both organisational knowledge and external expertise inform the design options. Working groups should also be created, with representatives from different groups of workers providing inputs on design choices based on their experience of daily work and direct knowledge of residents' needs. Key issues addressed within these working groups include the design and integration of assistive devices within bedrooms and bathrooms, as well as other accessibility requirements (location, flooring, etc.).

Projects development should be iterative and each phase of completion should be formally validated through project reviews that bring together all stakeholders to discuss architectural, technical and organisational options. This ensures that design decisions meet expectations and that compromises between competing needs are explicitly examined and approved before advancing to the next stage, when modifications will be increasingly costly and difficult to implement. A practical strategy used in some of the interventions presented above is the creation of prototypes to optimise and validate design proposals.

On the other hand, the effective implementation of interventions faces certain challenges. Nursing homes differ in their funding and governance (for example, public, private for-profit and non-profit) and, significantly, in the level of commitment of management and workers. Financial constraints may limit the adoption of adequate lifting equipment, requiring complementary funding from regional funds (CARSAT). More importantly, technical aids alone are not enough: work organisation and training are also critical factors for achieving desired risk-prevention outcomes. In this regard, CARSAT Aquitaine has made substantial efforts to install ceiling lifts in the nursing home establishments and to training managers and risk-prevention specialists to promote the effective use of ceiling lifts among residential care workers. This approach has revealed significant positive impacts by reducing work-related accidents and compensated sick leaves associated with residents' handling and mobilisation. Crucially, the assessment of the programme revealed significant savings of EUR 6 million in work-related accidents and occupational illnesses among the establishments that benefited from the intervention, confirming the financial return of investments in equipment and training.

Transferability

While the interventions on the design and renovation of nursing homes presented in this case study are developed within the context of the French OSH system, some principles embedded in this approach can be transferred to other contexts. A key element emphasised by these interventions is the need to ensure staff involvement in the design and implementation of effective prevention strategies. However, the transferability or adaptation of practical solutions is also influenced by resource availability and architectural requirements, which vary across countries.

CARSAT Aquitaine has made a substantial investment in the installation of ceiling lifts in nursing home establishments and the training of managers and risk-prevention specialists to promote their effective use among residential care workers.

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