

EASYMAPO TOOL FOR SAFER RESIDENT HANDLING IN CARE HOMES

Introduction

The manual handling and transfer of residents are recognised as major sources of risk in residential care work, with substantial evidence of their association with a higher prevalence of musculoskeletal disorders (MSDs) among residential care workers compared with those in other health and social care settings (Menoni et al., 2022; Andersen et al., 2014). The MAPO method (Italian acronym for *Movimentazione e Assistenza di Pazienti Ospedalizzati*, i.e. Movement and Assistance of Hospital Patients) is a well-established, internationally validated standard for assessing the risks associated with the manual handling of patients. This case study highlights the value of the EasyMAPO tool, a simplified version of the MAPO method, for addressing the issue by promoting safer resident handling practices and improving preventive strategies in the residential care sector in Navarre, a region of Northern Spain.

This study is based on the guidelines for using the EasyMAPO tool issued by the Navarra Institute of Public and Occupational Health (Instituto de Salud Pública y Laboral de Navarra, ISPLN) and includes insights from an interview with two of the institute's occupational safety and health (OSH) technicians who helped develop the guidelines (Irisarri et al., 2024).

This case study is part of a broader research project aimed at providing an overview of research on occupational safety and health (OSH) in residential care work.¹

Description of the initiative

Aim

In the region of Navarre, the residential care sector employs nearly 11,000 people. Between 2019 and 2023, 1,600 workplace accidents resulting in sick leave and 1,300 without sick leave were reported. Of these, 58 % and 40 % were linked to overexertion caused by lifting and moving residents, respectively. In response, ISPLN developed an application called EasyMAPO² as part of the regional Occupational Risk Prevention Integration Programme within Navarre's Public Health Plan for 2022-2025. The residential care sector is one of the plan's priorities, and is also a target of the Programme for the Prevention of MSDs due to the high prevalence of such problems among direct care staff. Based on the MAPO method, EasyMAPO is designed to promote the integration of risk prevention strategies into company management, thereby fostering a preventive culture and reducing the prevalence and severity of work-related injuries associated with the transfer and mobilisation of residents (Gobierno de Navarra, 2025).

The MAPO method is a widely recognised tool for assessing the risks involved in patient handling that was developed through extensive research in Italian hospitals in the mid-1990s. It was included in the ISO/TR 12296:2012 Technical Report *Ergonomics — Manual handling of people in the healthcare sector*.³

A notable aspect of MAPO is that it provides a comprehensive risk assessment method that accounts for both organisational factors and other aspects related to physical demands and the work environment. The method is based on a multifactorial analysis of an organisational unit. Rather than

¹ 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>

² Direct link to the app (an updated version of the app can be accessed through a QR code in the report): <http://administracionelectronica.navarra.es/AccessoFicheros/DownloadFile.aspx?CodigoCompleto=Portal%40%40%40salud/EasyMAPO.zip> (accessed April 2026).

³ More information available at: <https://www.iso.org/standard/51310.html>

assessing the impact of mobilisation risks for individual tasks or workers, it considers multiple contributing factors. The first set of factors captures aspects that influence workers' physical workload or the frequency with which they manually lift patients, such as staffing levels for non-autonomous (NA) residents and workers' specific knowledge of and training in techniques that minimise biomechanical loads during patient handling. Other factors considered include the availability and suitability of assistive equipment and the characteristics of the physical environments in which patient handling tasks are performed, such as toilets and bedrooms, which are also assessed for their ergonomic suitability. The MAPO risk assessment method results in an overall risk exposure index that combines the contribution of the main risk factors involved in manual patient handling.

What has been done and how

In essence, EasyMAPO is a simplified version of the MAPO method for estimating the risks associated with manual handling residents in care homes for older people. This tool consists of an Excel macro file, which is downloaded onto the devices of individual users. It supports data entry and the visualisation of results from different estimates within a single interface, with simplified data input and integrated help and error messages. Below, we present the main data inputs for different components used subsequently to calculate the MAPO exposure index. Crucially, the application provides a basic estimate of risk exposure but does not relieve organisations of their obligation to conduct comprehensive risk assessments. The estimates performed with EasyMAPO allow managers to identify critical factors and prioritise interventions in organisational units where necessary. To support follow-up actions, ergonomic intervention sheets included in the guidelines serve as a starting point for internal reflection, thus helping organisations identify areas for improvement and establish plans to reduce the risks associated with resident mobilisation tasks.

The tool and guidelines were developed by internal ISPLN staff. Following initial training, a pilot test was conducted with seven care homes. Based on the data collected, a second version was developed to address operational errors and simplify or clarify the more challenging aspects.

Data input components

The tool includes various data entry sections:

- **Staff numbers and characteristics (OP)**

The first set of information concerns the number and main characteristics of staff involved in resident handling within a given unit. A key data input is the total number of workers available over a 24-hour period to perform resident mobilisation tasks, calculated as the sum of staff members across morning, afternoon and night shifts. This includes details of full-time and part-time staff, as well as those who work across multiple units. It also records the number of workers with recognised mobility limitations and whether staff typically work in pairs during resident handling tasks (see Figure 1).

Figure 1 below shows the data entry table. The right-hand side displays the partial results of the calculations performed by the EasyMAPO tool in relation to the personnel factor, based on the data entered on the left-hand side.

PERSONAL QUE REALIZA MOVILIZACIÓN DE RESIDENTES (OP)									
Hay alguna persona en plantilla en esta unidad que tenga limitaciones a la movilización (i)									
No									
Número total de personas que trabajan en la unidad y que REALIZAN movilizaciones									
Personal de enfermería			1						
Personal auxiliar y gerocultor			7	¿Se trabaja habitualmente por parejas?		Si			
Otro personal									
Personal que realiza movilizaciones presente en cada turno, a turno COMPLETO (i)									
Turno de Mañana	Nº de personas	5		Horas turno					
	Horario	De	8:00	A	15:00	7,00			
Turno de Tarde	Nº de personas	3		Horas turno					
	Horario	De	15:00	A	20:00	5,00			
Turno de Noche	Nº de personas	0		Horas turno					
	Horario	De	22:00	A		Complete horario			
Personal que realiza movilizaciones presente en cada turno, a turno PARCIAL (i)									
Turno	Nº de Personas	Horario		Fracción					
Mañana	1	De	9:00	A	13:00	0,57			
Tarde	1	De	15:00	A		Faltan datos			
		De		A					
		De		A					
		De		A					
Personal en turno completo que trabaja en varias unidades (i)									
Turno	Nº de Personas	Nº de Unidades	Pasa el mismo tiempo en cada unidad	Porcentaje que está presente en esta unidad	Fracción				
Noche	2	3	Si		0,67				
Mañana	1	2	No	60	0,60				

RESULTADOS PARCIALES	
Personal total en la unidad	8
Personal en 24 h. a turno completo	8
Este valor debe ser inferior al de la plantilla total. En los centros de día podría ser igual.	
Revise los turnos. Ha indicado algún turno de menos de 6 horas. Si es correcto ignore este aviso.	
Personal equivalente en 24 h. a turno parcial	0,57
(i)	
Personal equivalente en 24 h. compartido entre unidades	1,27
PERSONAL TOTAL DISPONIBLE EN 24 H (OP)	9,84
(i)	

- **Training factor (TF)**

Figure 2: Screenshot showing data input and estimates for the training factor (TF)

Note: the right-hand side of the figure displays the training factor (TF) value calculated based on the answers to the questions on the left-hand side of the table.

<http://osha.europa.eu>

▪ Residents requiring mobilisation (NC and PC)

In line with the MAPO method, residents are classified into two groups: non-collaborative (NC) residents, who require full lifting during mobilisation tasks, and partially collaborative (PC) residents, who require only partial lifting or support (see Figure 3). The total number of non-autonomous (NA) residents is calculated as the sum of NC and PC residents and serves as a key variable in risk calculations. When resident numbers fluctuate, as occurs in short-stay units or day centres, average values are used based on the minimum data collection period.

Figure 3: Screenshot showing data input for the number of non-collaborative (NC) and partially collaborative (PC) residents

RESIDENTES QUE PRECISAN DE MOVILIZACIÓN

Residentes **NO COLABORADORES** desde el punto de vista de la movilización (NC).
Número total de residentes que deben ser completamente levantados, aunque sea solo una vez al día

Residentes **PARCIALMENTE COLABORADORES** desde el punto de vista de la movilización (PC).
Número total de residentes que deben ser levantados parcialmente

Residentes **NO AUTÓNOMOS** desde el punto de vista de la movilización (NA).
Número total de residentes que precisan movilizaciones.

Source: Irisarri et al. (2024).

▪ Resident mobilisation tasks

The assessment documents all resident mobilisation tasks performed during routine shifts, with a distinction between those performed manually and those performed using assistive equipment. Tasks are categorised into two groups: total mobilisation (full lifting) and partial mobilisation (see Figure 4). Typical tasks include repositioning residents towards the head of the bed; transfers between beds and wheelchairs or armchairs; transfers involving stretchers; wheelchair repositioning; rotational movements in bed; standing transfers involving PC residents; and transfers between different seating surfaces. The app requires users to specify which resident handling tasks performed during a shift are done manually and which are carried out with assistive equipment.

Figure 4: Screenshot showing data input for resident mobilisation tasks

TAREAS DE MOVILIZACIÓN DE RESIDENTES HABITUALMENTE REALIZADAS EN UN TURNO (1)

Movilización o levantamiento **TOTAL** de residentes realizados habitualmente, de forma manual o auxiliada.

Marque con una X las movilizaciones que correspondan

	MANUAL	CON AYUDAS
Reposicionamiento hacia la cabecera de la cama		
Transferencia de cama a silla de ruedas o butaca y viceversa		
Transferencia de cama a camilla y viceversa		
Transferencia de silla de ruedas a WC y viceversa		
Reposicionamiento en la silla de ruedas o butaca		
Transferencia de silla de ruedas a butaca u otro tipo de silla y viceversa		
Otro:		

Note: by clicking on boxes marked with a '+' symbol, the tool displays additional information about each type of mobilisation task.

Source: Irisarri et al. (2024).

▪ Availability of assistive equipment (major and minor aids)

The EasyMAPO tool catalogues the availability of assistive equipment and evaluates whether it is suitable for the resident population. A device qualifies as an assistive device if it reduces or eliminates the biomechanical load associated with the mobilisation of care home residents (see Figure 5).

Major aids include mobile wheeled hoists, ceiling-mounted hoists, height-adjustable stretchers, and ergonomic beds with electric elevation and three-section articulation, while minor aids include slide sheets, transfer boards, standing hoists, ergonomic belts and turning discs. Users also indicate whether these devices are used routinely or only occasionally.

Figure 5: Screenshots showing the availability of major aids

EQUIPOS DE AYUDA DISPONIBLES. AYUDAS MAYORES			
Tipo de Equipo	Número de equipos	Se usa habitualmente	Se usa excepcionalmente
Grúa móvil sobre ruedas			
Grúa de techo			
Camilla regulable en altura			
Cama ergonómica con elevación y regulación eléctrica y con 3 nodos de articulación			

Note: by clicking on the boxes marked with a '+' symbol, the app displays additional information about each assistive device and its use.

Source: Irisarri et al. (2024).

▪ Sufficiency and suitability of major aids (lifting factor, LF)

The application calculates the lifting factor (LF), which is determined by the sufficiency and suitability of major aids for mobilising NC residents. The method considers major aids as sufficient when at least one of the following three criteria is met: having at least one transfer hoist for every eight NC residents; having at least one height-adjustable stretcher for every eight NC residents, accompanied by a slide sheet, sliding board or roll board for lateral transfers; and 100 % of the beds within the unit being ergonomic (i.e. height-adjustable with three articulated sections). The suitability criterion is met when major aids are used for at least 90 % of total mobilisation tasks.

▪ Sufficiency and suitability of minor aids (minor aids factor, AF)

Similarly, minor aids are considered sufficient when the unit has at least one slide sheet or transfer board and two other types of minor aid, or a slide sheet plus height-adjustable beds with three-section articulation. The suitability criterion is met when minor aids are used for at least 90 % of partial mobilisation tasks (see Figure 6). The numerical sufficiency of major aids is used to calculate the lifting factor (LF), which is a critical component of the overall risk assessment.

Figure 6: Screenshot showing the data input table for the percentage of mobilisation tasks involving total and partial assistance with major and minor aids

TAREAS DE MOVILIZACIÓN O LEVANTAMIENTOS AUXILIADOS (CON USO DE LAS AYUDAS DISPONIBLES)					
Indicar con una X el porcentaje (%) de movilizaciones TOTALES auxiliadas i					
0%	25%	50%	75%	≥ 90%	Indique el porcentaje
☐	☐	☐	☐	☐	
Indicar con una X el porcentaje (%) de movilizaciones PARCIALES auxiliadas					
0%	25%	50%	75%	≥ 90%	Indique el porcentaje
☐	☐	☐	☐	☐	
Indicar el % que más se aproxime a la realidad de las movilizaciones realizadas. Indicar 0% solo si ninguna movilización es efectuada con ayudas.					

Source: Issarri et al (2024).

EasyMAPO risk exposure index

Finally, the tool calculates the overall EasyMAPO risk exposure index based on the previously collected data. It should be noted that this index reflects a basic estimate of resident handling risks, which differs from the original MAPO index⁴ and is calculated as follows (where each factor corresponds to the above definitions):

$$\text{EasyMAPO index} = [(NC/OP \times LF) + (PC/OP \times AF)] \times WF \times EF \times TF$$

The EasyMAPO index values correspond to specific exposure levels: absent, low (green), medium (yellow) or high (red). A value of 0 indicates the absence of a hazard, with no identified risk associated with resident mobilisation. Values below 1.5 indicate low exposure and require no immediate intervention, although long-term evaluation is recommended. Values between 1.5 and 5 indicate a medium exposure level that requires evaluation and intervention within a medium- to long-term timeframe. Values above 5 represent a high exposure level that requires urgent evaluation and short-term intervention. The numerical magnitude directly correlates with the urgency of the risk, with higher values indicating a greater prevalence of acute lower back pain compared with the general population and, therefore, a greater need for timely intervention.

⁴ Compared to the core MAPO formula, EasyMAPO simplifies certain factors. Specifically, the application does not require data input to calculate the wheelchair factor (WF) or environmental factor (EF - original Famb), which are assigned constant values of 1. By contrast, the full analytical MAPO method involves performing a detailed evaluation of these environmental and equipment-related factors. The WF assigns a score to the availability of wheelchairs within the unit based on their ergonomic deficiencies (e.g. faulty brakes or non-removable armrests) and their numerical sufficiency (at least one wheelchair for every 50 % of non-ambulatory residents). Similarly, the original Famb assesses the ergonomic suitability of the areas where mobilisation takes place, specifically bathrooms and bedrooms. It considers factors such as the space available for using aids, door width, the presence of obstacles, toilet height, and the space around beds. Nevertheless, the tool includes a set of related questions that can be used to assess these relevant aspects, such as the number of wheelchairs available for NA residents and the minimum space required for the use of assistive equipment in bathrooms and bedrooms.

Figure 7: Screenshot showing estimated EasyMAPO values

VALOR EASYMAPO - NIVEL DE EXPOSICIÓN ESTIMADO						
NC/OP	FS	PC/OP	FA	FC	Famb	FF
1,65	2	1,10	1,00	1	1	0,75
VALOR EASYMAPO		3,30			NIVEL DE EXPOSICIÓN ESTIMADO	MEDIO
INTERPRETACIÓN / ACCIÓN		Evaluación e intervención a medio / largo plazo				

Note: the figure presents the results for each component and the resulting EasyMAPO value. The example shows an overall EasyMAPO risk exposure index that is moderate on the whole, highlighting variations across components, with higher risks associated with the use of minor aids and lower risk levels associated with training adequacy.

Source: Irisarri et al. (2024).

Success factors and challenges

EasyMAPO provides a practical tool for quickly assessing the risks associated with resident mobilisation tasks and planning preventive interventions. The basic estimates it performs support the identification of critical factors contributing to risk exposure and the prioritisation of interventions based on objective criteria. Furthermore, EasyMAPO evaluates the potential impact of changes within a facility, such as organisational adjustments, changes in resident dependency levels or the introduction of assistive equipment, both before and after implementation.

While the EasyMAPO tool is intended primarily for estimating risks, the information gathered through the tool provides a basis for developing safe resident handling and mobility policies in residential care homes. To support these policies, a set of ergonomic intervention factsheets were incorporated into the EasyMAPO user guide to help companies identify areas for improvement and develop plans to mitigate mobilisation risks. In this regard, the EasyMAPO guidelines advocate for a collective and participatory approach in the design and implementation of preventive actions at company level. The guide recommends establishing a steering group to ensure that workers and their representatives are actively involved in analysing problems, identifying possible solutions and monitoring impacts. It also highlights the importance of managerial commitment and support, as well as the allocation of sufficient time and resources to ensure the effective operation of these groups.

The EasyMAPO guidelines also emphasise the need to plan resident mobilisation and transfer tasks based on an individualised assessment of each resident's functional capacity, through an Individual Care and Safe Mobilisation Plan. This plan should document all required mobilisation tasks (e.g. bed-to-chair, bed-to-stretcher and chair-to-toilet transfers, repositioning and postural changes in bed), the specific mobilisation methods and techniques to be used, the number of professionals required, and the major and minor assistive equipment needed. Ideally, all mobilisation tasks should be performed with assistance, using either major or minor aids. The principle of 'minimal lifting' should be applied, with emphasis placed on sliding rather than lifting to minimise staff effort. Reducing the number of mobilisation tasks is also a key preventive measure. For instance, using an adjustable ergonomic bed can position residents in a way that avoids or reduces repositioning movements towards the head of the bed. When residents are seated, reclining wheelchairs or armchairs can reduce sliding and, consequently, the number of repositioning manoeuvres required. ISPLN is currently carrying out a project in several care homes to implement the Safe Patient Handling and Mobility programme based on these guidelines.

According to interviewees, one of the main advantages of the EasyMAPO tool is its accessibility and cost efficiency. Compared to the original MAPO methodology, the simplified version serves as a free digital resource that can be used by individual workers within a facility who lack specialised ergonomics or OSH training. This represents a significant benefit, especially given the small size of many care

homes in the region, which often lack dedicated OSH specialists and would otherwise need to engage external providers.

The EasyMAPO tool, in line with the MAPO methodology, extends beyond individual biomechanical risk assessment and requires organisations to conduct a thorough review of work organisation practices, including work shifts, resident characteristics, staff training, equipment availability and, crucially, whether such equipment is actually being used. The EasyMAPO tool also offers considerable flexibility in how organisations can use it, depending on their specific needs and circumstances, whether at the level of an individual section or unit or across the residential facility as a whole. The tool can also be used at different stages of resident mobilisation management. Organisations can use it as a diagnostic instrument before implementing interventions. Subsequently, they can perform periodic estimates to monitor progress as preventive measures are introduced, which allows them to track improvements and identify areas for improvement.

In contrast, the interviewees identified time and staffing constraints as one of the main barriers to the effective adoption of the tool. Completing certain data inputs, especially information on work shifts, is also considered challenging due to the wide range of situations within workplaces. More importantly, many facilities lack appropriate staff, such as physiotherapists, to properly assess residents' needs or evaluate how workers are performing mobilisation tasks, challenges that are exacerbated by the high turnover rates in the sector.

At the time of writing this case study, no data was available on the number of facilities using the EasyMAPO tool, which made it impossible to assess its effectiveness. The interviewees noted that, beyond staffing issues, one of the most critical factors is the failure to use minor aids for partial mobilisation tasks, despite their availability. In care homes, tasks involving repositioning residents towards the head of the bed are reported to be the main source of work-related injuries, exceeding those caused by transferring or lifting residents.

Transferability

The MAPO method gained significant international recognition through its inclusion in the ISO/TR 12296:2012 Technical Report *Ergonomics — Manual handling of people in the healthcare sector*, alongside other risk assessment tools. The validity of this method has been further strengthened by international research (Hignett et al., 2014). The EasyMAPO tool presents a simplified version of the original method, which aimed to promote the integration of risk management into work organisation processes. Therefore, this initiative can be readily adapted to residential care settings in other national contexts.

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