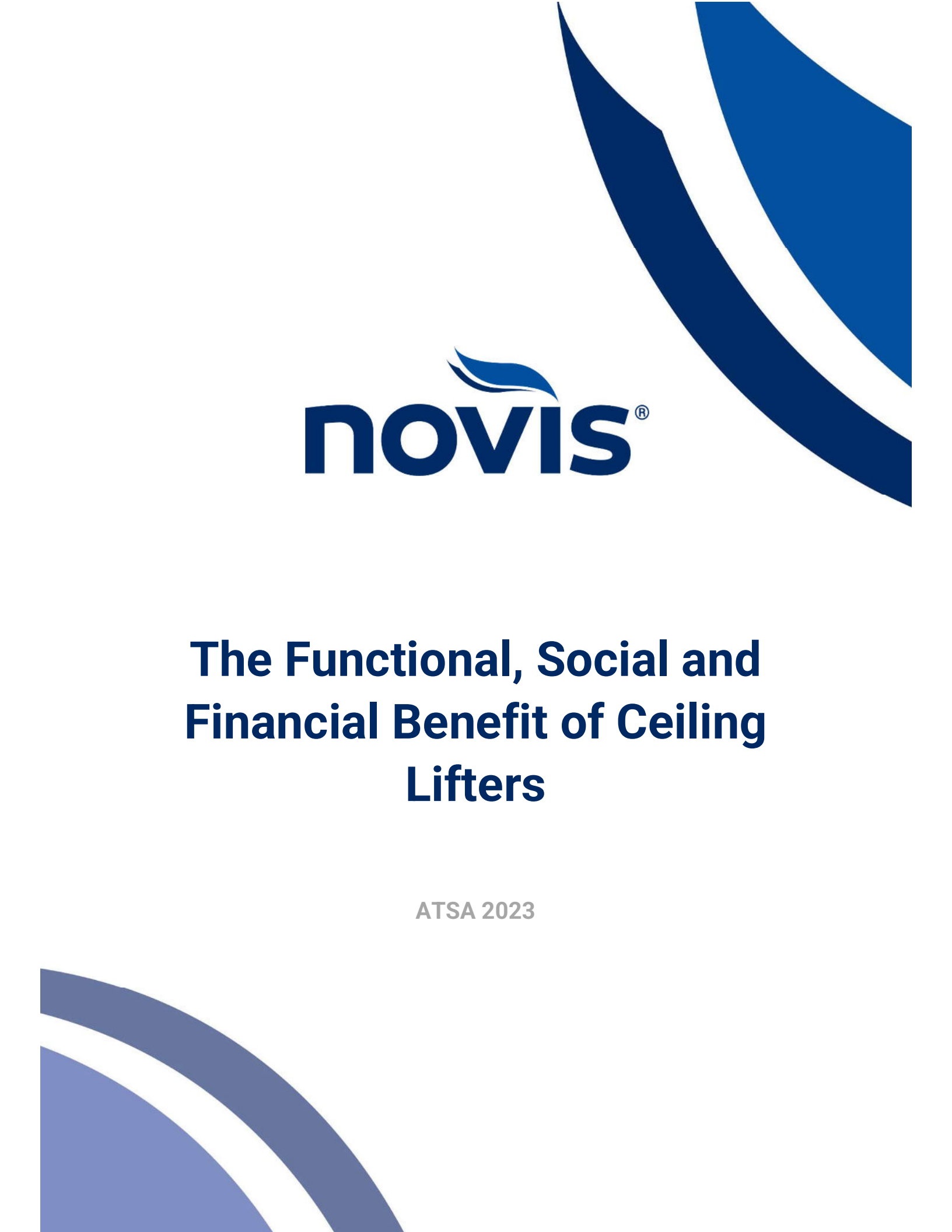


The Functional, Social and Financial Benefit of Ceiling Lifters

ATSA 2023

INTRODUCTION

With the implementation of the no manual lifting policies, the use of Assistive Technology has increased [1] in that this Technology is used to lift and transfer those who are unable, or partially able, to mobilise between bed, chair and toilets [1].

One such Assistive Technology is the increase in installation of Ceiling Lifters. Mobile hoists play the same role as ceiling hoists in assisting with transfers of people, with the outstanding difference being that caregivers have to push mobile hoists on their wheels to move them from one place to another [1].

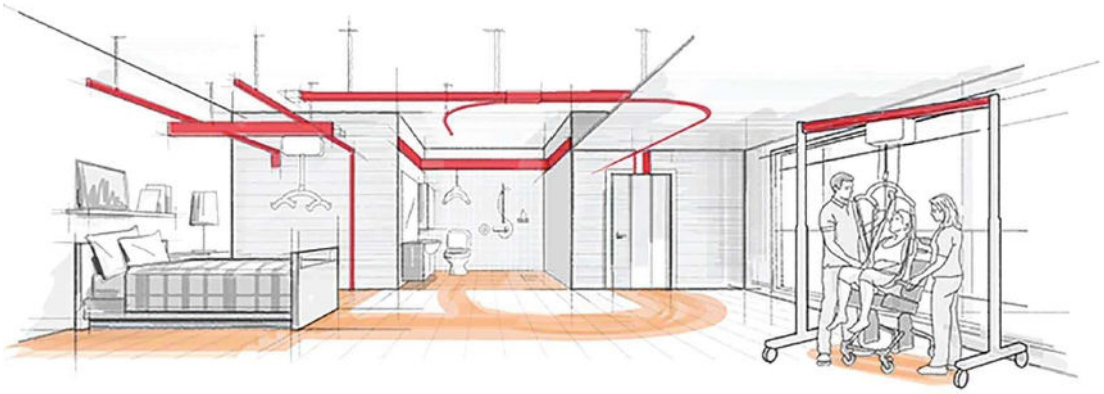
For transferring handling tasks, ceiling lifts area more acceptable mechanical lifting device than floor lifts [2].

Ceiling hoists are considered to have many advantages over traditional manual handling and mobile hoists in that they can accomplish transfers in limited spaces with fewer caregivers [3].

Ceiling hoists do not occupy floor space and caregivers can be free from physical exertions during the transfer. By installing ceiling hoists, it is expected that there would be a significant reduction in the amount of physical activity in handling of people [4] when performing lifting and transfer tasks.

Ceiling hoists offer great benefits such as an ease of use, enhanced safety, customisable options, they are space-saving, a positive investment, and they help to preserve the dignity of the Client [5].

When prescribing ceiling lifter solutions, it is important to not only to understand the system potential and options available. It is essential to analyse to evidence based functional, social and financial outcomes to ensure the Technology effectively assists in the achievement of Client outcomes and goals.



CEILING LIFTER OPTIONS

An advantage of selecting a ceiling lifter solution is the ability to customise the system to the requirements of the Client and/or the environment it is to be utilised in.

Lifter Motor Type

Selecting a ceiling lifter type will be based off multiple factors including financial needs, weight required, functions desired and transfers being conducted.

- Fixed Motor: A fixed motor is allocated to a room and remains on one rail system. The raising belt and suspension lower and raise from the motor attached directly to the rail via a trolley. This is the most ideal solution but requires a motor to be allocated to each rail system. Fixed Motors can be utilised for paediatric through to bariatric Clients

- Portable Motor: This motor is able to be moved between rooms from transfer to transfer. It is transported in a designated cart. The portable motor contains the suspension and the entire motor raises and lowers. An extension arm is uses to clip and unclip the lift strap from the trolley within the rail.

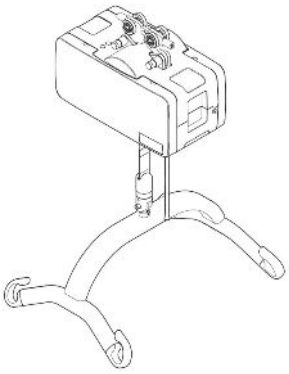


Figure 1: Molift Air Fixed Motor

Figure 2: Molift Nomad Portable Motor with Extension Arm

Track Design [6]

Track design options commonly used:

- Traverse track (XY system, H track or room covering): In most rooms, a traverse track gives staff more options for transfers and performance of Carer handling activities. The system covers a larger floor area of the room and as such facilitates a wider variety and method of transfer. This design also offers the Carer more opportunity for rehabilitation, more timely Carer handling assistance and allows lifting at any location under the H shaped track.

- Straight track: A straight track services the area under the installed track. When installed in the correct location it can facilitate a variety of transfers, though is limited in location and direction of movement.

- Curved track: Curved tracks are used in conjunction with straight track for turns or transitions from one room into another. The Curved component comes in a variety of angles to suit the intended path of movement.

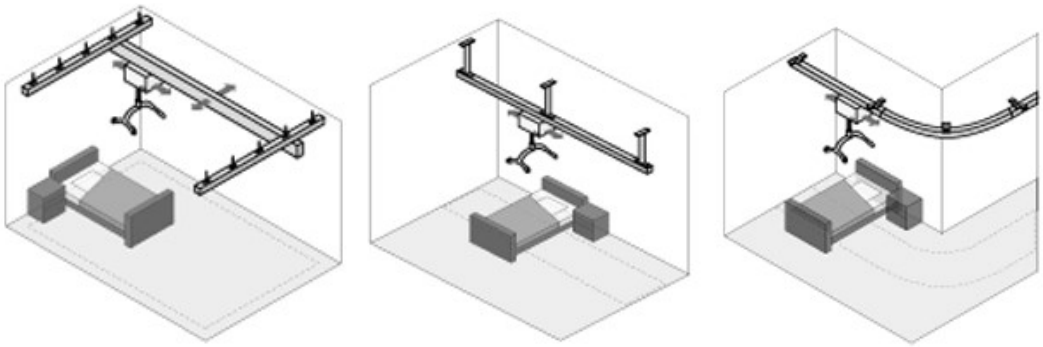


Figure 3: Traverse, Straight and Curved Rail Systems

- Portable Track: A freestanding gantry can be used when trialling the potential benefits of a system, where location is temporary, or where installation is unfeasible. These can be configured as a straight track with two upright supports, or with four upright supports that facilitate a traverse system.

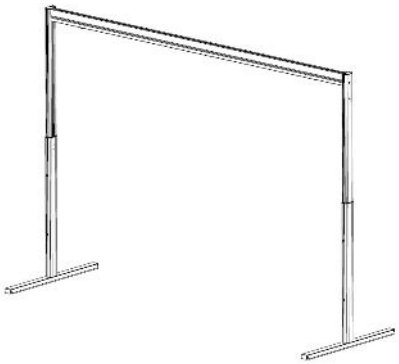


Figure 4: Straight Rail Molift Duo Gantry

Figure 5: Molift Quattro Traverse Gantry

- Additional components: Tracks can be added to utilising a transition, this attachment allows for a traverse rail to transition into a straight or another traverse system eg. Moving from a traverse system in a bedroom to a straight rail in a bathroom. Switches also allow for directional changes eg. Movement from a bedroom then selecting direction towards bathroom or direction towards another room.

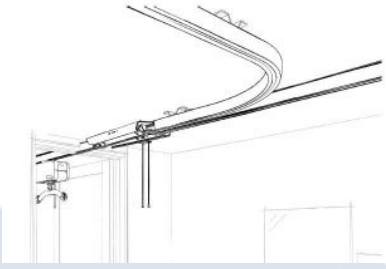


Figure 6: Straight Rail Switch

Figure 7: Transition between two Traverse systems

Charging [6]

- Stationary charging system: A charging/docking station is attached to the track, and for charging to take place, the lift must be brought to and docked at the charging station. Preferably a handset that can be docked onto a wall bracket, by which charging occurs. This promotes Carer return of the motor to a low traffic area, eliminates the need for complex electrical installation and minimises service and repairs.

- Continuous charging system: The track contains copper stripping that enables charging of the lift motor throughout the length of the track. Continuous charging occurs along the entire track not just in one specific location.

Ceiling Lift Movement [6]

All Ceiling lifters move up and down electronically and side to side, horizontal movement, either manually or electrically.

- Non-motorised track: Most caregivers prefer to pull the lift horizontally by hand rather than press a button and wait for the lift to move to the desired location. Movement is quite smooth and easy with this design. However, caregivers must pull the lift manually, although easily, to the recharging area if there is a charging/docking station.

- Motorised track: A motorisation component enables the caregiver to use the hand remote to move the lift horizontally along the track as well as to move the Client up and down vertically.

Fixation

The structural capacity of the building, to which the lift is anchored, must be capable of supporting the combined weight capacity of the lift, weight of the lifting equipment, and all other superimposed loads. Both static and dynamic loads must be considered. This capacity should be evaluated by a structural engineer [6].

- Ceiling Mounted: Multiple methods of fixation can be used dependent on the ceiling type. This may include batten screws, brackets, telescopic brackets, threaded rod and support arms. The rail can sit under the ceiling protruding into the room or can be flush mounted into the ceiling cavity

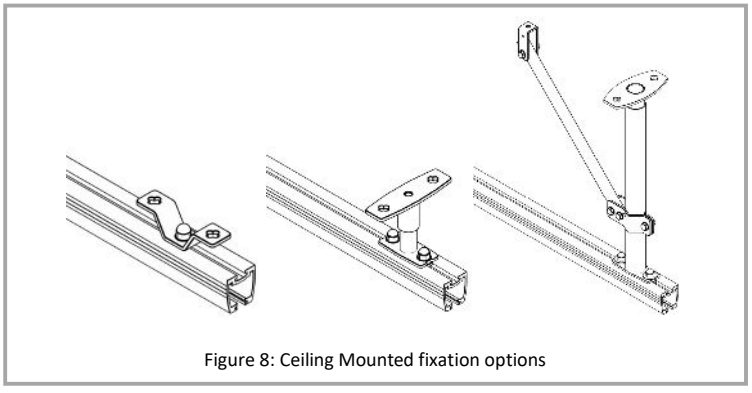


Figure 8: Ceiling Mounted fixation options

- Wall mounted: Attached to wall with a wall bracket and/or uses an upright support can facilitate a straight rail or a traverse track. This is an economical solution appropriate for renovations and when the ceiling is not an ideal choice for installation.

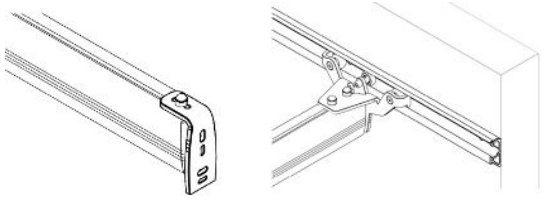


Figure 9: Straight and traverse system wall fixation.

Door Transition

For track to allow movement between rooms there are installation options available

- Continuous track: Built into the upper door and wall to allow motor to pass directly through the doorway

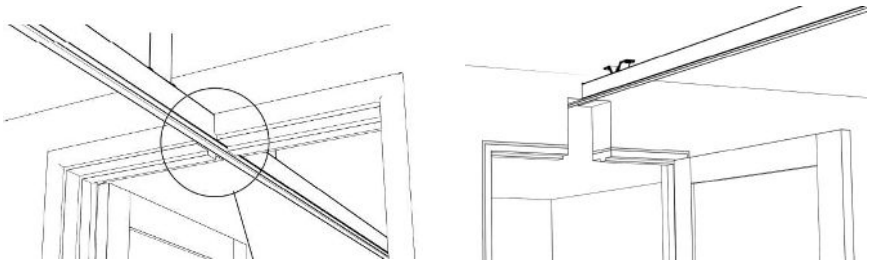


Figure 10: Options for Continuous rail doorway transition

- Motor Transition: A portable motor can be moved between one track system and a second. Alternatively, a sling and suspension can be moved between one fixed motor and another

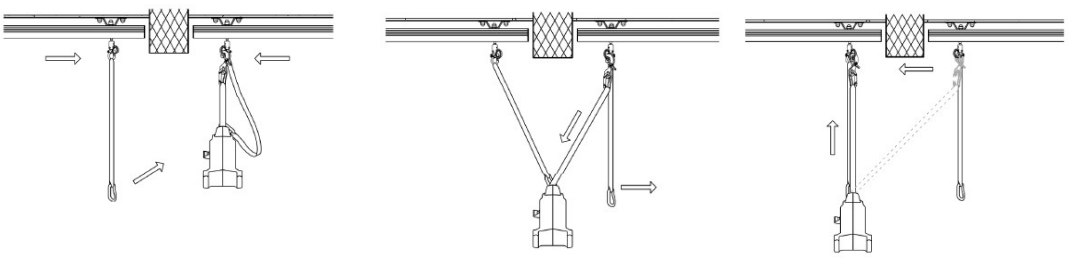


Figure 11: Portable Motor Transition between track systems

Suspension Bar Options

The Suspension is the connection between the lifter and the sling, the hanger bar. They come in varied sizes which is essential to accommodate Client width. This ensures the sling has a vertical connection and not crushing the Client inwards when suspended. Ideally made of aluminium to be light enough to facilitate control and minimise Carer loading when handling the bar.

- 2 point suspension: Attachment of sling points (shoulder and leg) to both left and right side connector points
- 4 point suspension: A 4 point suspension creates a more open sling experience, avoids pressure in the mid-body and allows for ideal sitting posture to be achieved for precision positioning.
- Stretcher suspension: For attachment of a stretcher, Jordan frame or soft stretcher

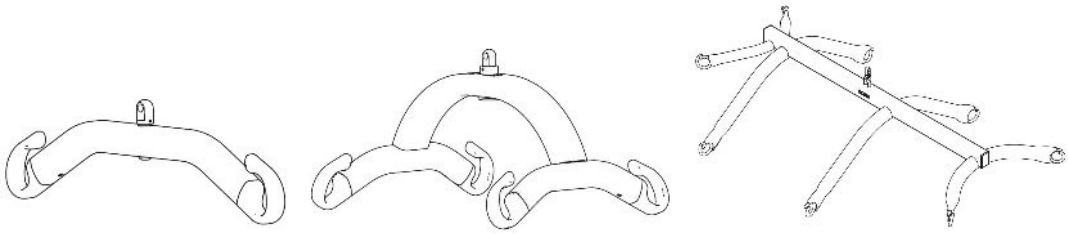


Figure 12: Molift Suspension options

Sling Options

Selecting a sling option will be dependant on the Client assessment and the task being undertaken

- High Back – providing full body support to the torso and head
- Medium back – For those with sufficient shoulder and neck control
- Amputee – Single or Bilateral above knee amputees
- Toileting – Requires thorough assessment but can be used to access lower body clothing
- Repositioning – Allows lifting of the Client supine, repositioning in bed or rolling
- Stretcher – Fabric stretcher supporting controlled supine lifting
- Firm Stretcher – Facilitates rescue and trauma lifting
- Ambulating – A belt style sling that provides support and safety whilst functioning in standing
- Bariatric – designed to accommodate users up to 500kg
- Limb Suspension – reduces caregiver static fatigue when holding a limb supported
- Mesh Sling – used when fast drying is required or when used in a bath or pool

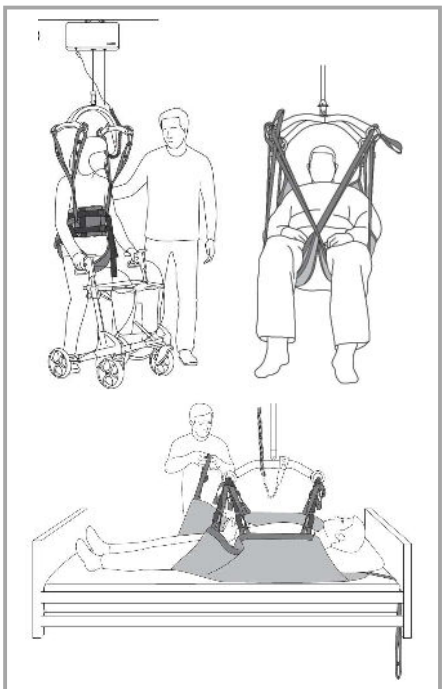


Figure 13: Molift Sling Options

Additional Considerations [6]

The following should be considered in determining track layout:

- Items in ceiling: Light fixtures, AC diffusers, fire sprinkler heads, televisions, X-ray equipment, OR lights, and other fixtures.
- Items above ceiling: Other ceiling-mounted equipment (e.g., radiology equipment), HVAC ducts, electrical conduits, plumbing, etc.
- Wall-mounted barriers: TVs, light fixtures, cabinets, and door swing radius.
- Structural materials in building frame: Building elements such as joists, beams, etc.
- Building system elements: Mechanical and electrical system features such as air ducts and electrical conduits.
- Unique architecture: Multi-level ceiling heights, vaulted ceilings, soffits, non-structural or radius walls.
- Fire/life safety code requirements
- Ceiling height: Ceiling height must allow the minimum lifting range required for use of lifting equipment.
- Motor maintenance: Allow enough space between the track-end and wall for removal of the motor.
- Motor charging: Provide a code-compliant recharging location for the lift motor.
- Storage space: Provide storage space that allows immediate accessibility for the motor and hanger bar when they are not in use but keeps the lift system away from areas of foot travel.
- Location/design of privacy curtains: The use of privacy curtains is affected by the installation of traverse track designs. Use of privacy screens, curtains attached to booms, and other unique designs may be a suitable alternative to curtains hung from the ceiling. In some situations, privacy curtains can be split and then fastened together with Velcro or buttons.

BENEFITS OF CEILING LIFTERS

Understanding the vast benefits if system installation to the Carer and Client is imperative to appreciating the positive outcomes of installation that will inevitably offset the initial costs of implementation and training.

Carer Physical Demand

Ceiling lifts are frequently advocated to mitigate risk of injury to healthcare workers when lifting, transferring, or repositioning Clients [7].

“All that is required of the handler is to operate a handset and guide the carry bar into place, without the need to support the weight of either the client or the carry bar. This reduces the pushing and pulling forces that can be involved in moving a mobile hoist into position.” [4]

Carers have indicated that manual handling tasks were the most physically demanding in their roles and that the same tasks performed with ceiling lifts were the least demanding [2].

Ceiling lifters significantly decrease physical force experienced by healthcare workers compared to floor hoists [2]. Staff perceive ceiling lifters to be safer, less physically demanding and prefer to use them for repositioning [2]. A significant reduction in the perceived risk of injury and discomfort to the neck, shoulders, back, hands, and arms of Carers occurs [8].

Ceiling lifters have been shown to lower spinal loads during the transport phases of a transfer [9] requiring 50-75% less force to push or pull than mobile hoists. During rotational hoist movement the torque required to move mobile hoists is 10 times greater than what is required to operate a ceiling lifter [10].

Ceiling lifter systems reduce anterior-posterior forces in the lumbar spine that would be considered safe, whereas mobile hoists had the potential to increase shear forces to unacceptable levels during handling manoeuvres of significant enough level to cause vertebral disc injury [11]. Us such, carers report reduced back pain [12].

Joint moment of shoulders reduced by 57% during bed-to-chair transfer [13] and require less muscle activation (Jung) Carers report reduced shoulder pain [12].

After the installation and training, the percentage of carers with musculoskeletal complaints decrease. This applies to back problems, knee problems and neck/shoulder/arm problems [14]. The rate of injury caused by lifting/transferring is significantly reduced by 58% after installation [15].

“Observed injury, non-injurious physical tiredness, pain and symptoms may result in absence from work. Absence of a caregiver is directly linked with the reduction of care and recruitment of replacements, resulting in extra cost. Research has indicated that decreased physical stress associated with ceiling hoists has led to a decrease in physical pain, doctor’s visits, medication use and painful manual lifting work for carers and, consequently, a reduction in the rate of employee absenteeism due to injury.” [1]

Transfer Time

Carers reported that they spend nearly 20% of their time on tasks associated with Client handling and transferring [16].

Transfer time has been cited as a concern for healthcare workers. Client transfers required a shorter amount of time to complete when performed with ceiling lifts compared to floor hoists [2]. This improved efficiency of has a subsequent benefit to quality of care [1].

The factors that contribute to an increased preparation time for mobile hoists include the availability and accessibility of the hoist, waiting for additional staff, rearranging and removing objects from the room to make space for the hoist and need for battery replacements [2].

Compared to mobile hoists, the number of lifting and transfer actions is reduced. Research have shown that this can be significantly and substantially reduced by up to 47% per 24 hours [17].

For dependant Clients there will be conservatively 7 to 8 transfers performed per day. Every 24 hours, in doing this there will be a shortening of each transfer time by 90 seconds. Calculated per Client, we come to approximately 11 minutes per client per day of time that is alleviated for other tasks. In a care facility with a group of 30 clients, of which 75% need a lifting system, we have of about 4 hours per day now free for other care activities [14].

This difference of 90 seconds for tasks compared between the two hoists is an important finding, as Carers currently have a heavy workload and any reductions on task time is an important factor in their job [18].

The reduction is primarily caused by the ability to combine multiple transfers into one transfer, both the transfer itself as for the provision of care, such as continence care, dressing and undressing, wound care [14].

When providing 30 hoist transfers a day, it can be suggested that a potential saving of 45.5 minutes using the traverse track and 8.5 minutes with straight track [18].

Therefore, with more time to complete other tasks this could potentially reduce the workload and stress levels for the Carers, resulting in fewer reported cases of illness due to injury [18].

Lifter Preference

The vast majority of healthcare workers choose ceiling lifters as their preferred method for Client transfer and repositioning [2], preferring these over floor lifts and manual methods [2].

The majority of Carers have positive perceptions of ceiling lift use. When they were asked to report their overall satisfaction with mechanical hoists, ceiling lifters have a higher average score than mobile hoists [2]. Carers perceived greater ease, safety and comfort [12].

Carers claimed to feel safe and unafraid during ceiling lift transfers and believed they were safer for and less strenuous on staff [2].

Job satisfaction also increased significantly after ceiling hoist intervention [1] and Carers report their jobs are easier to perform [1].

Carers with ceiling lifts were significantly more likely to use lifters and had more positive perceptions about transferring tasks, regarding worker safety, Client safety and comfort, ease of use, access, and storing [12].

Subjective responses have shown that Carers prefer the traverse rail system, rating it better than a fixed track design [18]. Less positive views of the fixed track included difficulty in positioning the lifter, extra manoeuvring of equipment and furniture was needed and more steps required.

In comparison the traverse system received mostly positive reviews; easy to position, minimal preparation, no restrictions on space around the bed. The subjective responses showed that experienced Carers preferred the traverse system, rating it best for time taken, ease of use, reduced steps taken and less cognitive effort [18].

Space Requirements

Ceiling lifters are considered to have many advantages over traditional manual handling and mobile hoists in that they can accomplish transfers in limited spaces with fewer Carers 3. It is agreed by experts that ceiling lifters can overcome spatial and environmental restrictions, such as storage problems [1].

Ceiling lifters occupy less storage space, but also require significantly less operational space than mobile hoists for both chair-to-bed and floor-to-bed transfers. This indicates that ceiling lifters have superior manoeuvrability within smaller environments not able to accommodate mobile hoists 1. With the improved manoeuvrability, ceiling lifters are an effective transfer tool, particularly in small-spaced environments and multi-level facilities.

If the lifting environment has limited space available and if the precise position is tight (such as above the toilet), the pushing, pulling and manoeuvring of a mobile hoist can be strenuous with a Client in the hoist. Manoeuvring in tight spaces leads to lots of start and stop movement with associated higher peak forces 19. A ceiling hoist system takes up less space and glides easily 14 lending itself to be an economical use of space in tight environments [2].

Ceiling lifters can be utilised amongst a furniture filled environment with less floor space, used with a non-medical bed, and operated on any floor type without excessive load, which are the primary barriers for mobile hoists [1].

Carer Compliance

Ceiling lifters have a positive impact on Carer compliance in use of the Assistive Technology versus other forms of hoists.

The use of ceiling lifters contributed to lower scores in fatigue, pain and frustration in addition to an improved positive workplace environment [20].

It is important to ensure that ceiling lifts are correctly and fully used by staff to achieve maximum benefits. A culture of Carer safety is necessary to achieve and to sustain a successful ceiling lifter intervention program [2].

Problems exist with compliance of use for mobile hoists. General Assistive Technology equipment reduces the biomechanical load and physical stress associated with Client lifting and transferring tasks. Despite wide availability of mobile lift and transfer equipment, Carers do not consistently use the equipment [21].

When time is scarce, the most convenient, but not necessarily the safest, method of Carer handling will most often prevail over team member safety. It appears that when Carers have a higher workload, competing demands from increased responsibilities result in more hasty, unsafe transfer methods instead of taking time to retrieve mobile hoists [16].

Factors associated with 50% or greater equipment compliance suggest that Carers will more likely use the equipment and use it consistently when convenient, when administration and other staff support the equipment use, and when clearly required by the Client and mobility status [21].

The availability and accessibility of the lift equipment is a strong and critical predictor of equipment use. Ceiling lifters are the most available and accessible patient handling option as they are in the room with the Carer [21].

Accessibility of equipment is particularly significant because the majority of Carers reported that equipment is too far away and too difficult to retrieve or remove from storage. This finding correlates with the infrequent and sporadic use of mobile assistive devices [16] that is mitigated utilising ceiling lifters.

Therapists view ceiling lifters favourably, preferring ceiling lifters based on ease of manoeuvrability, flexibility of use and time savings [22].

Client Comfort

Use of Ceiling lifters directly and indirectly improves Client quality of care [2].

Ceiling lifters were found to be more comfortable than floor lifts for Clients. The manoeuvring involved in mobile hoist transfers may have contributed to the Client comfort level as well to the increased time [2].

Ceiling lifter use facilitates dignity, comfort and safety [33, 1].

Client satisfaction increased from 80% to 95% after ceiling hoist installation and their comfort during movement also increased. This was particularly true for larger persons who require higher levels of assistance when transferring and are more likely to be of risk of falling [15].

Client's acceptance of transfer devices increases if they are satisfied and comfortable during a transfer, Client's acceptance thereby increases use [2].

Client Function

Every situation that involves the handling, or partial handling, of a person presents varying levels of risk to the Carer and the Client. Maintaining a good level of Client mobility and independence is an essential part of care delivery and can reduce the risk of long-term physical and psychological effects [24].

Delivery of care should focus on the individual's capacity, not their incapacity, to ensure that they are treated with dignity and respect [24]. The goal of any handling and transfers should be to maximise the Client's abilities in an effort to empower them, maintain or improve function and minimise risks of adverse effects of immobility.

Utilising normal movement from the Client, supported with appropriate equipment, rather than just 'using' equipment could encourage independence and user involvement [25].

By installing ceiling lifters, Clients can expect accompanying positive effects to their physical and functional opportunities. Ceiling lifters allow people who were bedridden or in the chair to broaden their sphere of action, which leads to improvement of physical function including muscle strength, digestive tract [1] and impacts on multiple systemic mechanisms.

Use of slings provides 'potential', a term referring to the possibilities and options available for rehabilitation. Therapist experience increased options for therapy, can accomplish more and mobilise Client's earlier in their recovery. Clients have increased participation and are more active in rehabilitation as a result [22].

Particular benefit for people who are bariatric, medically complex conditions or those who are completely dependent. Often achieving rehabilitation that was previously not available to them became possible [22].

Treatment is no longer limited by availability of Therapists or the Therapist's ability to support the weight of the Client. The sling provides external stability which allows the therapists to use their hands in other beneficial aspects of the therapy, such as cuing for posture and facilitating weight shifts [22].

Clients can be safer utilising devices, falls rates can decrease, and concern for falls doesn't limit training in ambulation, transfer rehearsal or functional activities [22]. They can take perceived risks to challenge themselves as they felt a greater sense of security, safety and comfort allowing them to maximise the benefits of rehabilitation [22].

Ceiling hoists are effective for clinical purposes, particularly for vestibular activities, as particular hoists can be used to assess standing tolerance, balance and orientation as well as working practice [4, 1].

Client Outcomes

Ceiling lifts are not detrimental to the quality of care received by Clients, and Clients prefer being transferred by ceiling lifts, with no negative effects on Client outcomes [2].

Clients experience lower levels of depression, improved urinary continence, higher engagement in activities, lower fall risk, and higher levels of alertness during the day. Additionally, a decline in pain, combativeness, locomotion, and cognition following introduction of appropriate equipment [26].

Incidence of Pressure Injury significantly reduced with higher ceiling lift coverage in the first year of intervention [2]. The use of ceiling lifts is assumed to lead to more frequent patient handling and transfers, thus decreasing the occurrence of pressure Injury [2].

Urinary incontinence is another outcome of interest, as more frequent visits to the bathroom, aided by ceiling lifts, may result in improvement [2].

Frequency of patient falls may decrease with the availability of ceiling lifts [2].

Anxiety levels of the Client are reduced following ceiling lifter transfer compared to mobile hoist methods [2]. Levels of depression are reduced, improved engagement and daytime alertness increased [2].

The close proximity between Carers and Clients during manual handling may enable patients to assault Carers. This risk can be decreased by using ceiling lifts, as Carers do not come into close contact with Clients during transferring or repositioning [2].

Skin tears are minimised when utilising ceiling lifters. Clients can be raised high enough by ceiling hoists to be safe from obstacles, which can prevent tissue damage caused by the body coming into contact with solid and rough obstacles [27].

The increased lift height of a ceiling lifter is beneficial for improving access to varied styles of bed and chairs, ensuring thorough clearance of the item and reduced risk of dragging of the Clients buttocks or feet. This will reduce impact of skin tears, shear and friction relating to decreased impact on risk of pressure injury.

Comprehensive planning, strategic implementation, continued monitoring, and modification of programs, as needed, will assure successful outcomes. The benefits of programs include improved quality of care related to improved Client mobility, fewer falls, pressure injuries, skin tears, and improved Client and Caregiver satisfaction [28].

REDUCTION OF CAREGIVERS

Optimised Handling Program

Commonly known as 'single handed care' refers to a means of safely moving or transferring an individual with the correct equipment solutions and appropriate number of caregivers. It promotes individual assessment to identify whether care involving more than one care worker can be safely reduced [29].

A more appropriate terminology may be reduced Carer handling [30], proportionate care, moving with dignity, smarter care, care for you, right size care or optimised handling [39] as these account for situations where Carers required to complete handling can be reduced, replaced with family member participation or eliminated completely.

In principle, in the right conditions, care provision with ceiling hoist systems can be performed with one carer [14]. Additionally, if people with reasonable levels of mobility can fit the sling themselves, independence in preparing for transfer is possible [1, 23].

The cost of providing care to Clients in the community is rising. Figures suggest that delivery of care is already lacking and that with our ageing population and the numbers of individuals now surviving catastrophic injury, appropriate provision will only decline further. Care planning and good risk assessment is therefore imperative [32].

Optimised handling might be achieved through more careful assessment of a person's needs and how to meet them, training and deployment of improved manual handling skills, use of different and more appropriate equipment and basing decisions on individual assessment rather than blanket policies about how many care workers will be needed to handle people and with what equipment [30].

This is a spend to save model [31] based on provision of appropriate Assistive Technology such ceiling lifters. It includes maximising skills, tools and technologies to deliver efficient care without over or under prescribing [33].

Outcomes of Optimised Handling

Improved empowering the Client, facilitates their independence, control, and involvement. Offering one to one care and conversation, and increased privacy and dignity, provides a more personalised care approach [33].

Reported benefits of an optimised handling program are overwhelmingly positive. They include good outcomes for those being handled, such as feelings of well-being, improved health, greater dignity, establishing a better relationship with less Carers and greater flexibility in the timing of visits [30].

This optimised handling or 'single handed care' approach is no longer just a vision, it is a reality being implemented internationally [30, 31, 32, 33].

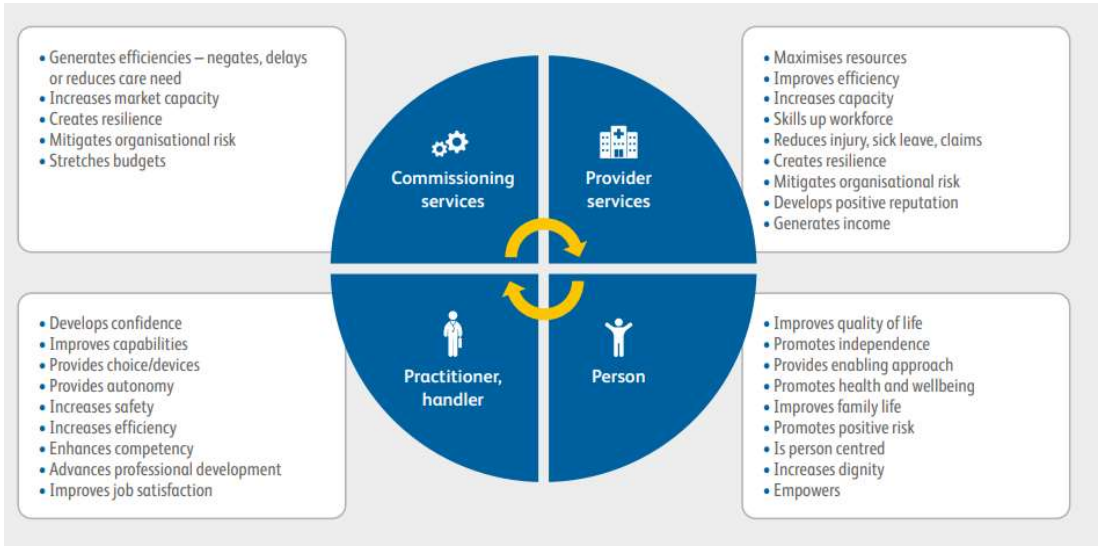


Figure 14: Outcomes of Optimised Handling Program [33]

PROGRAM VALUE

Holistic Program Outcomes

The value of a Safe Handling program is the cumulative monitory return of investing in the technology, training and ongoing maintenance of an evidence based solution.

Thorough reassessment and implementation of Assistive Technologies, such as ceiling lifters, have many documented positive outcomes: [34]

Occupational outcomes

- Promotion and maximisation of independence
- Reduced stress on family and informal Carers
- Provision of increased support for formal and informal Carers
- More flexibility of when care visits can take place, resulting in formal care service being more able to meet individual Client needs.

Health and wellbeing outcomes [34]

- Less time in hospital
- Reduced risk to Carers

- Reduced risk to individual
- Sustainability of care at home, reducing the need for 24 hour care
- Use of new equipment and improved techniques improves health and wellbeing of Carers and Clients

Quality of care outcomes [34]

- Equipment is based on the Client's individual needs and care is more person focused
- Benefits to individual's personal dignity, through having only one Carer carry out intimate personal care
- Having more personalised care with a smaller group of Carers involved improves consistency and quality of care and can help build better relationships with Clients
- Reduced frequency of care visits within the person's home, and reduced number of Carers makes the care process less intrusive
- Increased care time available builds capacity to address unmet need in the community
- Less use of equipment can lead to resources being available to meet the care needs of others
- Improved Client satisfaction

Organisational outcomes [34]

- Greater integration, communication and engagement between agencies
- Improved understanding of services
- Improved manual handling techniques
- Introduction to new equipment and new information gives increased confidence
- Increased training and upskilling of Care staff
- Staff are more risk aware and less risk averse
- Improved use of resources and capacity, as hours released are able to see more Clients
- Reduced waiting times for care provision

The miriad of benefits, or positive cahnges anticipated post installation can be documented in a decision chart. This representation clearly communicates the hollistic and broad impact of a ceiling lifter system and safe handling program. It also allows for direct and indirect impact to be clearly documents for translation into financial and social impact.

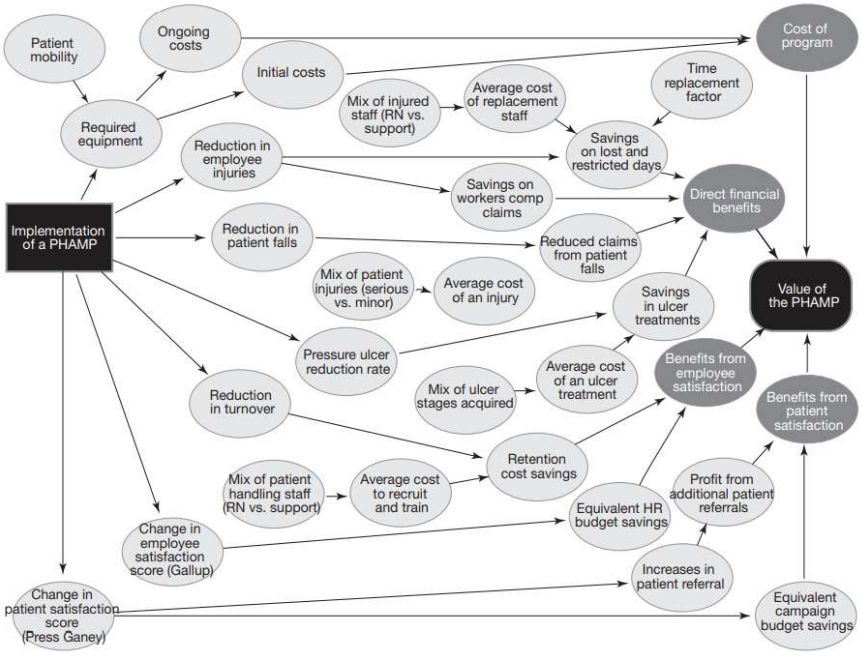


Figure 17: Implementation Decision Chart [6]

Social Return on Investment [34]

Social Return on Investment is a methodology which looks at the social value resulting from interventions. Social value is a quantification of the relative importance that people place on the changes they experience in their lives [34].

The aim of measuring Social Return on Investment is to reduce inequality and environmental degradation and improve wellbeing by incorporating social, environmental and economic costs and benefits [35].

Examples of social value might be the value we experience from increasing our confidence, feeling safer, or feeling more dignified. These things are important to us but are not commonly expressed or measured in the same way that financial value is [34].

It is important to measure this social value from the perspective of those affected by the project [35].

Social Return on Investment can help you improve services by: [35]

- Facilitating strategic discussions and helping understand and maximise the social value
- Helping target appropriate resources at managing unexpected outcomes, both positive and negative
- Demonstrating the importance of working with other organisations and people that have a contribution to make in creating change
- Identifying common ground between what an organisation wants to achieve and what its stakeholders want to achieve, helping to maximise social value
- Creating a formal dialogue with stakeholders that enables them to hold the service to account and involves them meaningfully in service design

The social impact of an optimised handling reassessment program resulted in 91% of Clients indicating that they felt an improvement in their health state. 44% of clients indicated that they had experienced an improvement in their feelings of anxiety and depression and 24% indicated that there had been an improvement in the levels of pain and discomfort that they were experiencing [34].

The use of new and up-to-date equipment, along with the upskilling of carers to use new equipment and techniques should contribute significantly to improvements in comfort for Clients and consequently, a reduction in the levels of pain that they experience [34].

FINANCIAL OUTCOMES

Financial Return on Investment

Determining the financial benefit from program implementation involves calculation of the Return on Investment (ROI) of the ceiling lifters.

ROI is an approximate measure of an investment's profitability. ROI is calculated by subtracting the initial costs of the investment from its final value, then dividing this new number by the cost of the investment, and finally, multiplying it by 100.

Regarding ceiling lifter purchase there are many factors that go into this equation [7] in addition to the traditional calculations which focus around cost of Carer injury and worker's compensation expenses.

The initial costs of the required equipment and training need to be compared against the reduction in employee injuries and turnover. This will also include other objective financial outcomes such as reduction in falls, reduction in pressure injury, increase in Carer mobility and change in Carer and employee satisfaction etc.

Each of these factors branches further into multifaceted benefits, factors that need to be considered in the ROI equation.

An example of this is in reduction of Musculoskeletal injury. A reduction in employee injuries saves on Workers' Comp claims, lost and restricted work days, costs of recruiting and training replacement staff, human resource budget savings, and benefits from increased employee satisfaction [7]. Staff Satisfaction then in turn increases productivity [7].

Item	Definition	Quantities/Measures
Benefits		
Staff Condition	The reduction in the numbers and severity of staff	Number of injuries, Days/time lost, Claims, Compensation costs, Insurance premiums, Replacement staff costs, Reduced turnover rate, Staff treatment costs, Reduced retirements, Staff working with restrictions
Patient Condition	The reduction of negative effects of poor SPH provision	Falls, Legal fees/claims, Number of injuries Medical/treatment costs, Patient deaths, Subluxations, Pressure ulcers, Infection, Reduced pneumonias, Skin tears/damage
Quality of care	The improvement in patient conditions and rehabilitation	Employee satisfaction survey, Patient satisfaction survey, Complaints, Improved patient mobility and function, Pressure ulcers, Improved pain scores, Decreased medication requests, Decreased patient referrals, Awareness of co-morbidities, Reduction of immobility conditions, Reduced therapy costs/time, Reduction of ventilator days, Decrease ICU days
Length of patient stay (LOS)	Reduction in care costs from improved care or reduced accidents	Improved mobility/function, Re-admission rates, Decrease injury rates, Decreased complications, Reduced days, Fees for delays
Efficiency in care delivery	Organisational benefits for throughput	Efficiency, More time to deliver care, Reduced carer numbers (single carer packages), Reduced visit numbers, Increased treatment numbers
Costs		
Equipment provision	The costs for equipment solutions	Equipment purchase, installation, training and support
Equipment maintenance	On-going costs for maintaining the SPH solution	Parts, engineer services, slings, planned preventative maintenance

Figure18: Holistic objective measurement parameters of Ceiling Lifter installation [36]

Cost of adverse events

- Falls: The average treatment cost for fall-related injuries, among older people in NSW, was $3,906 per fall injury treated. With the highest associated cost being $20,563 [37]. This does not account for falls resulting in death and the impact falls have on consequent quality of life.

- Pressure Injury: The overall daily cost of PI treatment was $27.77. The average cost of PI treatment (Stage 1 to 3) until healing was $98,490 [38]. This does not account for Stage 4, unstageable or Deep tissue injuries, which by severity would be assumed to have higher costs associated.

- Skin Tears: The average cost of treatment for each individual skin tear is $977.90 with traditional treatment methods [39]. It is noted that Clients often suffer from multiple skin tears and these individuals are at a further increased risk of recurrence, so an ongoing cost should be calculated.

Savings of Optimised Care

Cost savings will occur long term from a reduction in Carers and introduction of ceiling lifters versus continuation with current Carer numbers and mobile hoists. After breakeven point is achieved the future care will have reduced costs and result in financial benefit.

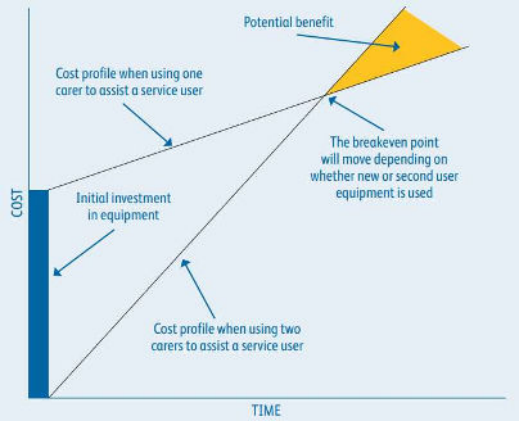


Figure 19: Return on Investment of an optimised handling program [25]

Cost vs Benefit

The most common and straightforward method for analysing cost vs benefit is associated with reduction in Caregiver Injury.

Implementation of ceiling lifter systems result in significant and sustained decrease in days lost, workers' compensation claims, and direct costs associated with Carer handling injuries [7].

The rapid economic gains and sustained reduction in the frequency and cost of Carer handling injuries beyond the first year of introduction strongly advocate for ceiling lift programs as an intervention strategy [7].

Compensation costs due to lifting and transferring tasks were reduced by up to 68% following the intervention when compared to utilisation of alternate devices [8, 15].

Implementing mechanical lifting equipment in an extended care facility produced a payback from direct savings alone within 4 years. Payback occurred more quickly when the effect of indirect savings or the trend to rising compensation costs was considered [40].

It is important to consider the longer-term effectiveness of ceiling lifters in reducing the risk of injury to Carers. The number of claims, compensation costs, and timeloss all decreased after the implementation of a ceiling lifter program and continued to decline for 3 years post-intervention [7].

The progressive decline in injuries and associated costs may have been related to the expected latency between exposure to physical demands and the onset of cumulative trauma disorders, or to the time required to fully realise changes in work culture and practice. The implementation of a ceiling lift program was found to generate economic benefits due to reduced compensation costs within 3 years of intervention [7].

These savings are particularly relevant given the ceiling lifter will have a working life of up to 12 years [7].

CONCLUSION

Providing ceiling lifts can result in superior outcomes to mobile hoists in multiple aspects of care, including better acceptance and use by Carers for transfers, as well as being associated with reduced work-related musculoskeletal symptoms in the low back and shoulders [12].

Requiring less physical activity, ceiling hoists appear to have obvious benefits in terms of injury prevention, efficiency of handling, and decreased dependence of people in care [1].

For the Client the benefits of utilising ceiling lifters are numerous including improved access to Assistive Technology during transfers, functional benefits, safety and protection from adverse incidents, and most importantly improved experience of comfort and dignity [12].

The benefits of ceiling lifter implementation are numerous and many can be equated as a social return on investment, being more difficult to objectify than direct and indirect financial returns.

When calculating financial return on investment, factors beyond Carer safety and minimised worker's compensation claims need to be considered. High cost negative outcomes such as Client falls, Pressure Injuries skin tears, and illness associated with immobility will all be positively impacted with implementation of ceiling lifters and must be considered equally in a holistic approach to costs versus benefit analysis.

A thorough understanding of the benefits for Caregivers, Therapists and Clients is hinged on the knowledge of the prescriber in ensuring an appropriately constructed system is requested and in a full understanding of the positive impact the Assistive Technology creates.

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