Walk Safe®

by NRS Healthcare

Clinical Briefing

The Revolutionary
New Walking Frame

Developed in partnership with

University of Salford MANCHESTER

University of Exeter

UK Patent GB2613198 | Chinese Utility Patent ZL202122982123.8 | International Patent Publication WO/2023/094832
Australia Patent Pending AU2022395923 | Canadian Patent Pending CA3239048 | US Patent Pending US18712590

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What is Walk Safe®?

The traditional front wheeled walking frame has existed since 1950 with very little innovation.

The NRS Walk Safe® is a revolutionary new walking frame, developed by NRS Healthcare in partnership with the University of Salford, and University of Exeter.

We developed Walk Safe® to provide a much safer indoor walking aid for people who would use a traditional front wheeled walking frame.

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Why did we develop Walk Safe®?

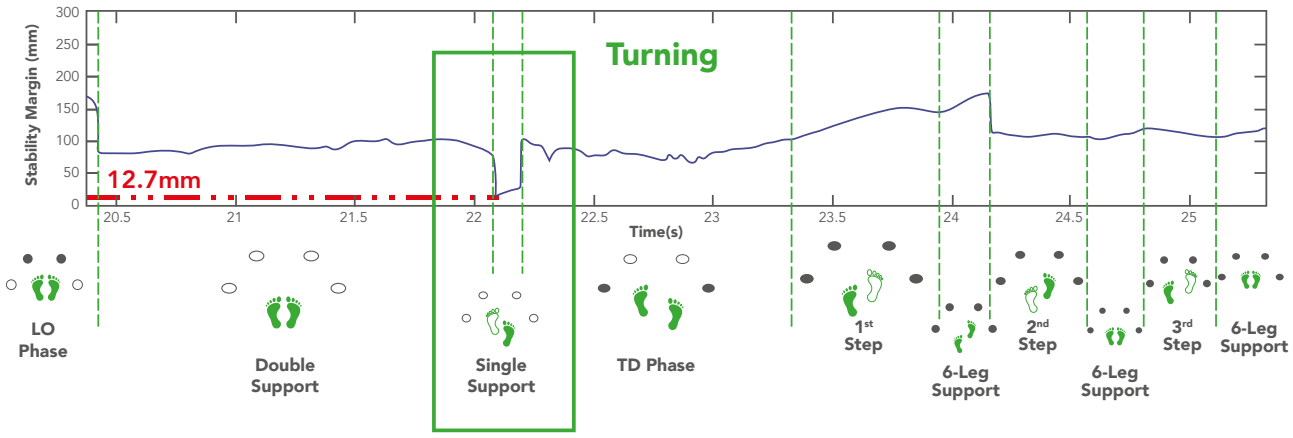
Falls amongst walking aid users are usually serious, with many people ending up in hospital, often with fractures. Some people with complex hip fractures are unable to walk again. Many of these people then experience a loss of mobility, with loss of independence and greater care needs. This can lead to a rapid decline in health. 40% of older adults living at home experience a fall once a year[1]. This has a significant cost: in the UK falls are estimated to cost the National Health Service about approximately £2.3 billion per year[2].

NRS Healthcare was approached by the University of Salford (UoS) in 2020. UoS were researching the stability of people using walking frames[3].

UoS established that guidance provided for the safe use of existing walking frames fails to address complex tasks such as turning or crossing thresholds. Many users are given insufficient guidance, or fail to adhere to available guidance.

The UoS research monitored participants in a simulated home environment using load cells to monitor the force through the base of the walking frame and insoles to measure pressure of the user's feet. This indicated that participants frequently lifted the frame.

The UoS research then monitored the participants in a gait laboratory. In addition to the monitoring of force, they were able to monitor the relative position of the user with the frame, and calculate the stability margin (a relative measure of stability) using a biomechanics algorithm[4].



Adapted figure from Costamagna et al. Med Eng Phys. 2017

The UoS research[3] showed that many users were unable to adopt safe strategies as recommended by the available guidance, especially when turning the walking frame in restricted environments typical of a user's home.

When guidance for safe use of walking frames was unable to be followed, the average stability margin of the participants was much lower than when correct guidance was followed.

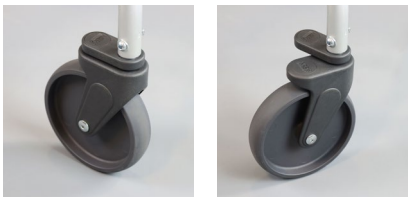
Because the design of existing walking frames fails to address how to safely turn and cross thresholds, and users were unable to adhere to available guidance, users stability was compromised and users were being put at risk of falls.

What is the key innovation in Walk Safe®?

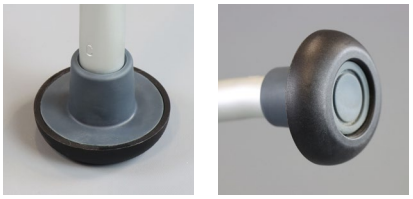
Walk Safe® features innovative swivel front wheels, and a rear glide with a retractable brake, both of **which enable the user to turn without having to lift the frame**. When the frame stays in contact with the floor, it offers continuous support to the user. We believe this significantly enhances user safety, and potentially reduces falls risk.

The wheels incorporate a patented magnetic bias mechanism[6] which keeps the wheels aligned in a forward direction when the user walks forwards, preventing the walking frame from veering left or right. By applying a modest steering through the handles the magnets will release, allowing the frame to turn. Once the frame returns to the straight-ahead position, the magnets re-engage, ensuring the user goes forwards.

The wheels are 25% larger (diameter) than standard frames, which combined with the rear glide make it easier to cross carpet edges without having to pick up the frame.



Swivel front wheels with magnetic bias



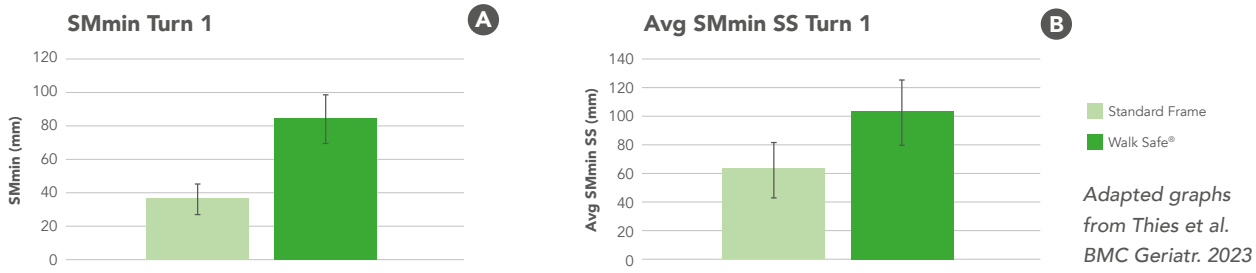
Rear glide with retractable brake

Walk Safe® Testing

We developed the Walk Safe® through a two year Knowledge Transfer Partnership with the University of Salford (UoS). We tested prototypes in a gait laboratory and in care homes, using the same methodology as previous UoS research.

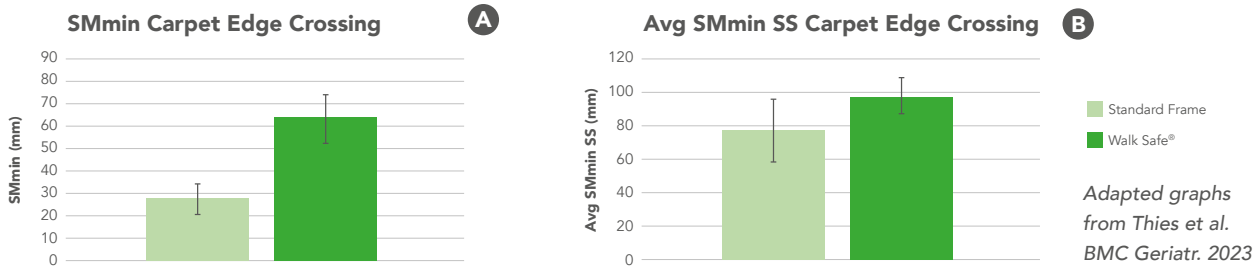
We measured the stability margin of users during a range of activities including straight line walking, turning and crossing thresholds, comparing the results of an existing front wheeled walking frame with the Walk Safe® prototypes[5].

We measured a 40% increase in average stability margin with the Walk Safe® when turning, and the minimum stability margin (the point of highest risk) more than doubled.



Adapted graphs from Thies et al. BMC Geriatr. 2023

We measured the stability margin of users when crossing carpet thresholds, and saw a similar increase in average and minimum stability margin when using the Walk Safe® compared to an existing front wheeled walking frame.



Adapted graphs from Thies et al. BMC Geriatr. 2023

These improvements in stability can be directly attributed to the design features of the Walk Safe®, which enable the user to adopt safe strategies for complex walking activity such as turning and crossing thresholds, by eliminating the need to pick up the frame.

Ease of use

Because the user should not have to pick up the frame, users can adopt a much more natural gait pattern, which requires less effort. The user can also turn in much smaller spaces, which is important if the user has a small bedroom or bathroom. This was commented on by the healthcare professionals who were interviewed during the research:

> *I think, the turning circle has been reduced in comparison to the standard frame and I think that it improves safety because you can turn in a smaller space. You don't have to manoeuvre the patient into unsafe positions, and because of the turning circle you don't have to lift, reducing risks for falls and it increases stability.*

> *I would say the definite advantage are the wheels. The ability to not have to ask someone to statically or incrementally turn around could have major benefits for example the ease of getting over the threshold from one surface to another… I think it makes it easier because you've got the larger wheels.*

When we tested Walk Safe® in care homes, users all commented how easy it was to use, and that they got less tired. They also said they felt safer. Users did not receive any formal training, they simply got up and walked, and intuitively learned how to turn. Reducing walking effort gives the user more energy to walk which helps with overall fitness and helps the user stay mobile.

> *Yes, they (the swivel wheels) were very good. I liked it.*

> *It (turning) is very easy. Normally you have to pick it up & plonk it down. This (prototype frame) is superior. I think this is far superior for getting around.*

> *I didn't feel like I was going to fall over, I just went nice and steady.*

Edited quotes published in Thies. et al. BMC Geriatr. 2023

Having a walking frame that is intuitive to use will save physiotherapists time, reduce the risk of incorrect use, and will be especially useful when working with users with cognitive impairments.

What are the lower handles for?

When we observed users with a traditional front wheeled walking frame getting up from a chair or sitting down, we noticed this could be difficult if they had limited leg strength. If the chair is a traditional armchair, a user can use the armrests to push up or to support when sitting down. However, if the chair does not have armrests, for example: a sofa, then the user can only push up from the seat cushion, which means it is very difficult to get enough support to stand.

We designed a pair of lower handles, positioned a comfortable reach from the seated position, so the user can push up when seated, and then move their hands to the upper handles once they are in a standing position. The user can also use the lower handles to give support whilst sitting down.

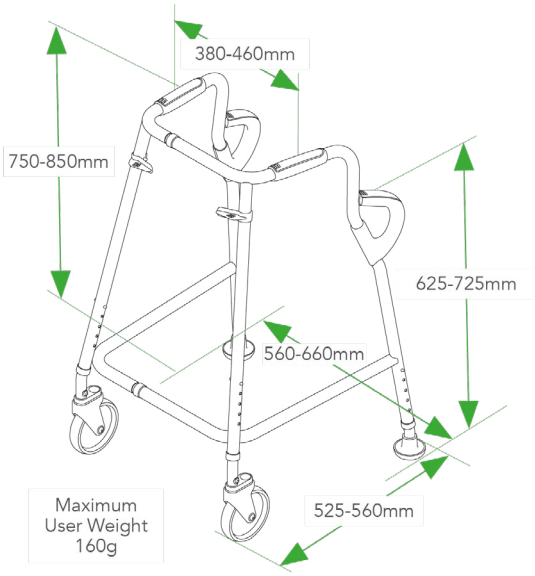
Sizing

Conventional walking frames are usually supplied in three heights, small, medium, and large, with 75mm of height adjustment. The most commonly prescribed sizes are medium and large. Some small frames are also prescribed but are mostly used on the highest setting. They are typically available in three fixed widths, narrow, standard, and wide.

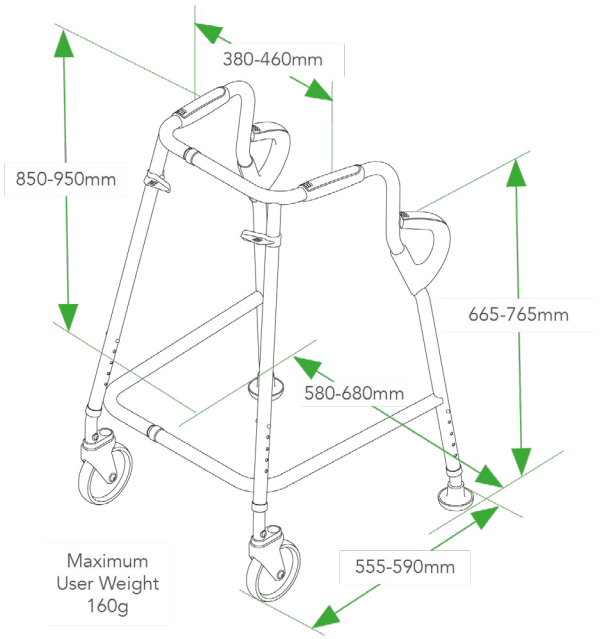
Walk Safe® has been designed in just two sizes, medium and large, each version having 100mm height adjustment. This means that the most common adult users, typically 4'10" (150cm) to 6'2" (190cm) can be supported with just two sizes.

Walk Safe® also has with 80mm of width adjustment. This means it can be adjusted to suit both smaller and larger sized users and also fit into narrow environments.

This means that instead of carrying 6 or even 9 sizes of walking frame in stock to meet all the height and width needs of the users, Walk Safe® can fit most users with just two sizes. This simplifies ordering and reduces stock holding.



Medium *S58115*



Large *S58139*

Quality & durability

Walk Safe® has been designed with a robust frame with high-quality components. The frame is made from large diameter aluminium tube and unlike traditional walking frames is fully welded. All the plastic parts are made from durable glass filled nylon. Walk Safe® has been tested to simulate using the frame with maximum user weight for up to 10 years of use. This means that the product should withstand the rigours of use in the community.

We believe that by developing a more durable product, with good spare parts availability, the walking frame will last a long time and will be able to be re-issued to multiple service users. This should generate good life costings, comparable to buying several traditional walking frames. It will reduce the amount of product that is scrapped, helping reduce carbon footprint.

How will Walk Safe® make a difference?

The University of Salford research[3,4] showed that existing walking frames show significantly reduced stability when lifted to turn or cross thresholds, which may present a risk of falls.

The Walk Safe® has been designed to make it much easier and safer for walking frame users to walk indoors. They can be used with minimal training as they are intuitive to use.

Because Walk Safe® should not require lifting when turning or crossing thresholds it has been proven to double user stability during these activities when compared to existing front wheeled walking frames[5].

We believe this will significantly reduce the number of falls amongst this group of people, reducing hospital visits and care costs. Falls cost the NHS approx. £2.3 billion per annum. If falls amongst the elderly population of the UK could be reduced by just 5%, this could save £115 million. We cannot evidence this as yet, but it is a reasonable hypothesis.

Using Walk Safe® will help keep older people mobile. Users who tried Walk Safe® felt less fearful of falling, which should encourage them to walk more. As Walk Safe® does not need to be picked up, it requires less effort to use, which should increase the stamina of walking frame users. This should help keep users more mobile and stay independent for longer. We know that keeping mobile is essential to maintain health for as long as possible.

[1] Rubenstein LZ. Falls in older people: epidemiology, risk factors and strategies for prevention. Age Ageing. 2006;35(Suppl 2):ii37–41.

[2] NICE . Falls: assessment and prevention of falls in older people. 2013. https://www.nice.org.uk/guidance/cg161

[3] Thies, S.B., Bates, A., Costamagna, E. et al. Are older people putting themselves at risk when using their walking frames?. BMC Geriatr 20, 90 (2020). https://doi.org/10.1186/s12877-020-1450-2

[4] Costamagna E, Thies SB, Kenney LPJ, Howard D, Liu A, Ogden D. A generalisable methodology for stability assessment of walking aid users. Med Eng Phys. 2017 Sep;47:167-175. doi: 10.1016/j.medengphy.2017.06.013. Epub 2017 Jul 3. PMID: 28684213.

[5] Thies SB, Bevan S, Wassall M, Shajan BK, Chowalloor L, Kenney L, Howard D. Evaluation of a novel biomechanics-informed walking frame, developed through a Knowledge Transfer Partnership between biomechanists and design engineers. BMC Geriatr. 2023 Nov 13;23(1):734. doi: 10.1186/s12877-023-04443-7. PMID: 37957568; PMCID: PMC10642022.

[6] Patent References:
UK Patent GB2613198
Chinese Utility Patent ZL202122982123.8
International Patent Publication WO/2023/094832
Australia Patent Pending AU2022395923
Canadian Patent Pending CA3239048
US Patent Pending US18712590

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