

Client: John Doe
D.O.B.: 10/26/1965

Diagnosis:
Spinal Cord Injury

Letter of Medical Necessity to replace existing equipment

Dear Medical Reviewer,

John Doe is a 43y/o male with Spinal Cord Injury. His condition is characterized by

I am writing this letter to provide documentation to show medical necessity for the following items.

Marvel M1 Standard Wheelchair

John Doe is unable to ambulate to accomplish his mobility related Activities of Daily Living (ADL's). He does not have the ability to stand to accomplish these activities. He is unable to use any ambulatory assistive device to accomplish these activities safely. He is able to use a manual wheelchair sufficiently to accomplish these types of tasks while in a seated position. A Marvel wheelchair can be used for these activities.

Ultra-Light Weight Wheelchair

The Marvel Wheelchair is an ultra-light weight chair comparable in weight to the lightest frames on the market, but with the added benefits of independent front and rear suspension, adjustability, modularity, and a true lifetime warranty on the frame. The ultra-light weight frame is easier to self-propel which is a function of the lower weight and suspension technology employed. The ability to remove the front end of the Marvel Wheelchair (Front Castor Wing) as well as the rear wheels also makes it much easier for John Doe to lift into and out of his vehicle when transferring to and from his vehicle.



(As the photo above shows, the Marvel Wheelchair with the front castor wing in the storage position is lightweight and allows for easy storage. For more information on weight, I have attached an interview with Marvel Wheelchair founders Christian Bagg and Jeff Adams)

Adjustability: Adjustable Width

Fitting John Doe to the appropriate width in his chair is critical to his long term abilities to accomplish mobility related ADLs in an injury free manner. “Seat width that is too wide can create a pelvic obliquity (one side of the pelvic higher than the other) and limit accessibility as the overall chair width increases with seat width. Seat width that is too narrow can create rotational deformities, cause discomfort, and increase pressure on the lateral thighs (trochanters) or lower legs.” The challenge with conventional chairs is that once we fit John Doe to his ideal wheelchair width, he must maintain his weight for the next five years; that is challenging for anyone. It would be reasonable to assume that most people will experience weight fluctuations over a five-year period. It is both reasonable and predictable to expect that someone with a spinal cord injury to experience muscle atrophy, which also has a profound effect on the size of a wheelchair that will allow for healthy use of the device. Having a Marvel Wheelchair with its unique width adjustment capability (infinite adjustability from 12-16 or 14-18 inches is required for John Doe’s long term health.

Chris Mauer, MPT, ATP, “Proper fit of a wheelchair”, Assistivetech.net, Jan 2007

Adjustability: Adjustable Center of Gravity

The wheelchair setup will influence the propulsion technique and ultimately the amount of resistance or reactive force/stress that is translated back to the John

Doe's shoulder joint. "The more rearward the seat position is in relation to the wheel (center of gravity), the less rolling resistance and the more efficiency with propulsion the wheelchair will have. A more rearward seat positioning (center of gravity) will promote a long and smooth stroke that limits high forces and the rate of loading on the pushrim that you will see with a short and abrupt "pumping"-style stroke. This is, of course, true only if the wheelchair user has adequate range of motion in his or her shoulder joint. A rearward seat position basically has less drag because you are not loading the front casters as much, therefore not allowing a "plowing" effect. The tradeoff is stability. The more rearward the seat position is, the less stable the wheelchair will be and the more likely it will tip backward. For experienced users with a very low level of injury, this is not typically a problem; however, more inexperienced users or those with a higher level of injury may not have the seat set back as much or may need to use antitippers. " Only with the Marvel Wheelchair do I have the ability to make minute changes on a continual basis to adjust John Doe's chair to account for his improving balance, strength, and experience. I would like to continue repositioning his seat rearward, to minimize the wear and tear on his shoulders and upper body.

Kevin, Lockette, PT, "Injury Prevention for Wheelchair Users", Physical Therapy Products, April-May 2005.

Manual Reclining Backrest

This feature allows the back support of the wheelchair to be adjusted by John Doe while he is in the wheelchair. This gives John Doe control to create more comfortable positions throughout the day reducing muscle aches and spasticity, and greatly improving his quality of life. Consider driving all day in your car without the ability to change the recline position on your car seat. Small changes have big benefits on comfort, muscle aches, and spasticity.

Carbon Fiber Backrest

This carbon fiber backrest replaces industry standard fabric upholstery and is required to provide sufficient posterior back support to promote erect posture while propelling his Marvel Wheelchair. Standard upholstery tends to sag particularly over time, and does not provide adequate support. Standard upholstery causes him to sit in a rounded posture, reduces upper extremity efficiency and increases strain on his upper quadrant. "Most rotator cuff injuries are due to muscle imbalances of the shoulder; Wheelchair users are even more susceptible to muscle. Shoulder strength and muscle length/range-of-motion imbalance can cause impingement of the soft-tissue structures of the acromiohumeral space. Nearly every motion and all repetitive motions are anterior, working such areas as the pectorals, shoulder internal rotators, and anterior deltoid. These anterior muscles become tight and shortened, while the upper back muscles become weak and elongated. You can see these

imbalances in the postures long term wheelchair users. A typical posture is rounded shoulders with mild thoracic kyphosis and forward head. This posture is even more accentuated by a non-supportive wheelchair back that is stretched out, accommodating this poor posture.” John Doe is already at high risk for rotator cuff injuries and TO minimize this risk he requires a solid backrest.

Kevin Lockette, PT, “Injury Prevention for Wheelchair Users”, Physical Therapy Products, April-May 2005.

Quick Release Axles for Rear Wheels

Quick release axles allow the wheel to be removed after transfers and for transport. The chair will not be manageable for John Doe to accomplish his mobility related ADL's because of the weight of the chair with the wheels in place. This important component to the wheelchair ensures that the chair can be used in a variety of environments as John Doe requires to remain independent.

Tempest Everyday Wheels

Due to the patient's size, 25" Tempest Everyday wheels are necessary for proper positioning of the upper extremities during self propulsion. John Doe requires these light weight wheels for efficiency with propulsion and decreased energy expenditure during self propulsion. The reduced rolling resistance is needed: (a) because of decreased strength, range of motion, chronic pain or overuse of the upper extremity; (b) to allow the client to use the wheelchair everyday, all day long; (c) to increase the maneuverability of the wheelchair over carpeted areas within the home; (d) to maintain the lightest system possible--these wheels are the lightest available. In addition, these wheels do not employ energy sapping SPOX spoke technology that has been rejected by the bicycle industry many years ago.

Pneumatic Tires

These tires are required equipment on this wheelchair. The chair cannot be used without these tires.

Rear Anti-tippers

The anti-tippers are necessary to keep the wheelchair from tipping over backwards during transfers and when ascending ramps and inclines.

Solid Seat Pan

A seat pan is required to provide a surface for the seat cushion to rest on. “Sling seats eventually lead to asymmetrical seating invites and/or aggravates spinal cord and pelvic deformities.”

J.G. Webster, Prevention of Pressure Sores: Engineering and Clinical Aspects. Pg 78.

Scissor Locks for Manual Wheelchair

These wheel locks are required to prevent the chair from moving during transfers or when on an uneven surface. They are a basic safety item for the wheelchair and are medically necessary to prevent falls from the wheelchair and prevent injury.

Independent Rear & Front Suspension System

The rear shock absorber is required to reduce the vibration, bouncing and stress associated with John Doe's daily use of his wheelchair. This reduction will result in improved activity tolerance and ability to perform mobility related ADL's. He will experience lower pain, spasticity and fatigue levels which normally would interrupt his daily activities. The provision of this optional feature is required so that he can achieve the greatest level of independence possible without developing chronic pain and stress related to active daily use of a wheelchair.

Setsuo Maeda , Makoto Futatsuka, Jiro Yonesaki and Maki Ikeda, “Relationship between questionnaire survey results of vibration complaints of wheelchair users and vibration transmissibility of manual wheelchair” , Environmental Health and Preventive Medicine, July 2003.

www.springerlink.com/content/b073141180t7v521/

Gerald Weisman, M.S. and Dryver R. Huston, Ph.D., Low back pain and whole body vibration exposure for wheelchair users, Vermont Rehabilitation Engineering Research Center, University of Vermont Burlington, Vermont RESNA Study, June 1995.

Other manufacturer's have tried to make suspension work, with varying degrees of success. Marvel Wheelchairs has achieved a new level, using bicycle technology, and applying it to the wheelchair in a unique way. Marvel incorporated a sophisticated and proven mountain bike air shock technology, and added some of its own specifications so that it fits the wheelchair geometry just right – it has adjustable damp and rebound, as well as being adjustable for the exact rider weight (e.g. 127lbs is set to 127 psi of pressure). No other wheelchair manufacturer or after-market company offers a suspension system that is specifically adjustable to rider weight.

In addition, Marvel suspends the seat, not the wheels and frame – a big problem with suspension in the past has been that as the suspension engages, the front castors are pulled out of alignment. As soon as the user sits in the chair, the geometry of the front wheels is no longer 90 degrees to the ground, which affects both rake and trail of the castor wheels- which can cause the chair to steer

incorrectly, and can cause erratic and dangerous steering, particularly in downhill situations.

Marvel overcomes this challenge by having a pivot point under the front of the seat (using the same technology as a bottom bracket from a bicycle), resulting in the seating platform being suspended independently of the drive train. This is a big advantage for John Doe. What this means for John Doe is that when the Marvel shock engages, nothing happens to the relationship of the castor wheels to the ground, in fact, nothing happens to either set of wheels, because, as mentioned above, the "drive train" (front and back wheels and frame) is independent from the seating platform.

Marvel also added a torsion bushing to provide independent front suspension. This dampens vibrations, keeping all four wheels grounded over most terrain, and dramatically increases the durability of the wheelchair. This technology effectively provides suspension to the front of the wheelchair without the negative effect of causing it to pitch forward, a common complaint of users of wheelchairs equipped with conventional hinged castor fork suspension systems.

Removable Quick Release Front Castor Wing

The front castor wing is completely removable with a quick release axle. This allows John Doe to easily load and unload his chair into his car with minimal strain on his upper body and back. The heaviest single component weighs under 10lbs. This makes the load far less than any other chair on the market regarding weight for loading. To view standard loading technique, refer to the online YouTube video below:

www.youtube.com/watch?v=wmqhZzASuAU

Modularity & Warranty

The Marvel wheelchair is designed for easy upgrades and is fully modular. If John Doe desires a different backrest or different seatpan or upgraded front castor wing or new shock, they are easy to acquire and retrofit without having to purchase a new chair. This allows John Doe to access a chair that will fit his needs and allow him to take advantage of the latest technology breakthroughs as they happen, without purchasing another chair. The warranty on the frame is lifetime, and unlike other wheelchair manufacturer warranties, lifetime does not mean five years.

The above items have been determined to be medically necessary for John Doe and are in no way for his convenience. Thank you in advance for your anticipated approval of this much needed item for John Doe. Please feel free to call me if you have any questions.

Sincerely,

Jane Doe, PT/OT
416-535-7376

I have read and agree with the justification of medical necessity for the above described durable medical equipment.

Physician Name (print)

Physician Signature

Date

Excerpt from interview with co-founders of Marvel Wheelchairs Jeff Adams and Christian Bagg, May 2009

Q. What do you guys think about the weight game that everyone seems to be playing?

Christian: Well, first of all, if it's a "game", then we should all play by the same rules, right?

The thing that bugs me the most about it is the lack of consistency – some of the weights are with wheels, some without, some with accessories, some not, so it's really almost impossible to compare different products on the market. And at the end of the day, every industry where weight is an issue is the same – everyone exaggerates to try to make their product look lighter.

Look at the bike industry, where 10 grams makes a difference in people's minds – they actually have web sites like weightweenies and slowtwitch that debunk the advertised weights of bike frames and components.

Jeff: When we went through the initial concept design phase, we identified three areas that we wanted to attack with a mind to be the best in the business – adjustability, modularity, and suspension. Weight wasn't even on the radar in any real way. We knew that by using custom extrusions and an overarching minimalist concept that we would get to where we needed to be comparable to the other chairs on the market, simply because the tubing that they use isn't butted or optimized for weight – this proved to be true, because a completely MARVEL M1 without wheels or side-guards comes in at just under 13 pounds.



Christian: Going back to my point about comparing weights in a consistent way, remember that a Marvel MARVEL M1 comes stock with a solid seat and a solid back AND suspension. I double dog dare you to find another chair on the market with those three things that weighs in at anywhere close to that.

Jeff: We're really trying to not play the "weight game", but we did go through a bit of a gut-check exercise. We weighed the last chair I bought before we started manufacturing, around a year and a half ago – it was a TiLite ZR, which I ordered with a solid seat from their factory, and outfitted it with a solid Jay back. I modified the back to reduce weight by taking out the angle adjustability.

Christian: Sorry to interrupt, but this is a great example of what we accomplished with the MARVEL M1 – in the past, you would have to choose between adjustability or light weight – that's why Jeff modified the back – the benefit of the adjustability just couldn't be justified at the cost of two or three pounds of brackets and clamps. With the MARVEL M1, you can have your cake and eat it too – we're hitting weights that are comparable to the lightest chairs on the market, but we're fully adjustable over a dozen key measurements. You don't have to choose between either a light chair or an adjustable one – the MARVEL M1 is both.

Jeff: That's exactly right, and that ties in to our philosophy of letting the rider choose, and giving them the luxury of changing their mind about measurements at any point, and for any reason – going back to the weight comparison that we did, I also ordered carbon side-guards, again installed at the TiLite factory – the only other component that I installed was that I added a pair of Rogue fenders. So the TiLite ZR was totally factory spec, but for a Jay back and the Rogue fenders.

We put my TiLite on the scale, and it weighed in at 14.35 pounds.

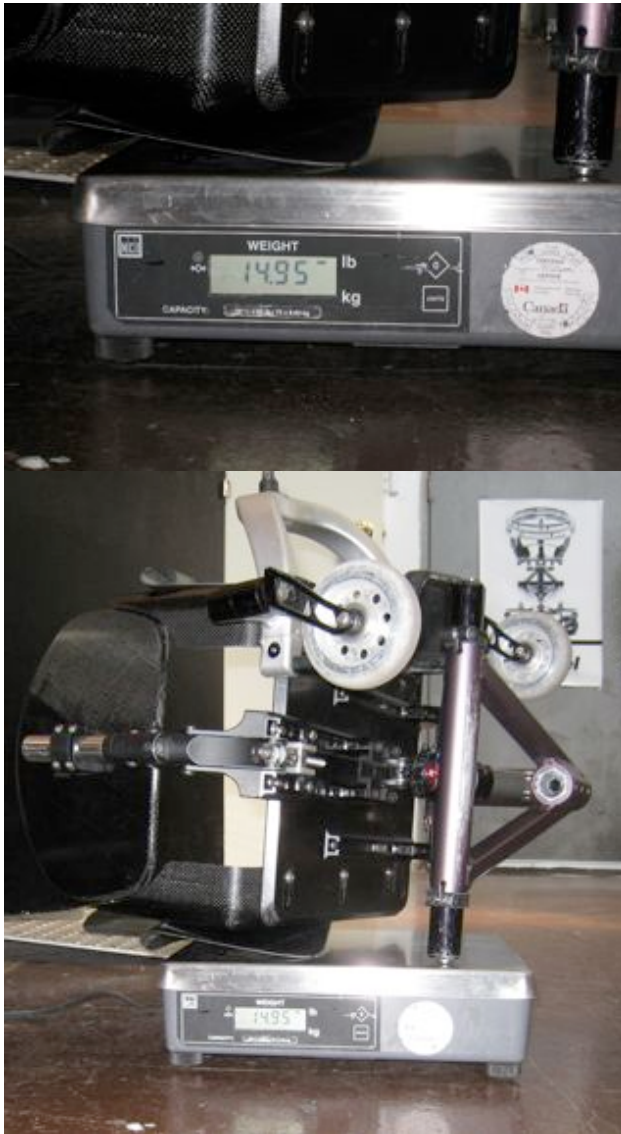
I now ride a totally stock MARVEL M1, which comes with a solid seat, back, and side-guards. I added Rogue fenders, and my MARVEL M1 tips the scales at 14.95 pounds. So apples to apples, we're a little over half a pound heavier than what is seen to be one of the lightest chairs on the market, and one that is sold heavily on the benefits of it being light-weight.

Christian: Except that the ZR is their least adjustable model, and your MARVEL M1 is fully adjustable, has suspension, and when you take your chair apart for loading into a car, the component parts weigh less than the total – so the wing weighs just under four pounds, leaving you with just over ten pounds for the frame and seat.

Jeff: Right, except for that. Why do we always have to end these things in an argument?

Christian: I mostly blame you. You're very difficult to get along with.

“Jeff’s Marvel Wheelchair weighs 14.95 lbs ... about a half a pound heavier than his TiLite ZR... but also has front suspension, rear suspension, and full adjustability of center of gravity, width, length, backrest height, backrest angle, caster to caster width, seat angle, and more....”



“Jeff ‘s TiLite ZR in a comparable configuration weighs 14.35lbs”

