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RE-USABLE POST OPERATIVE LOWER LEG SUPPORTS

Andrew Brule, MASc, MBA, PEng
Sunny Hill Health Centre for Children

ABSTRACT

Sunny Hill Health Centre for Children (SHHCC) is British Columbia's (BC) referral centre for children with disabilities. For decades SHHCC's Positioning and Mobility Team (PMT) have been called to BC's Children's Hospital (BCCH) for emergency post-operative positioning for children confined to mobility aids having just had lower leg surgeries (i.e. hip adductor release, de-rotational osteotomy, hamstring release, etc…). Post-operatively, physicians usually require the client's leg(s), often in casts, to be abducted and elevated in specific positions for them to leave bed and become mobile as soon as possible. This required expensive, labour intensive custom solutions for each client. SHHCC's PMT developed a low cost ($150 each), adjustable, reusable lower leg support that can be mounted on the client's own mobility aid. Using the client's mobility aid reduces client anxiety, eliminates the need to transfer life support equipment, and reduces the hospital's requirement to stock and maintain mobility aids.

The leg supports reduce the knowledge, skill, labour and costs required to implement a lower leg support and allows the client to be transferred to the community as soon as medically stable. Furthermore, the leg supports' position are easily adjustable which enables the community team to change their position as the client's recovery progresses. When the client has recuperated, the community team can remove the system and return it to the hospital for sterilization and re-use leaving the client's wheelchair untouched for easy adaptation to the client's new lower leg and hip position. This device has been in clinical use since 2008.

INTRODUCTION

Sunny Hill Health Centre for Children (SHHCC) is a tertiary referral centre for children aged 0 to 19 years with developmental disabilities in British Columbia (BC). SHHCC sees more than 5000 children yearly from over 300 different communities in the province.[i] The Positioning Mobility Team (PMT) is a service within the SHHCC's Therapy Department that provides custom positioning and mobility solutions. Annually, the PMT generates approximately 1000 custom work orders for work done for the children of BC.

For decades, the PMT have been called on short notice to BC's Children's Hospital (BCCH) to do emergency post-operative positioning for children confined to mobility aids having just had lower leg surgeries (i.e. hip adductor release, de-rotational osteotomy, hamstring release, etc…). Post operatively, physicians usually require the client's leg(s), often in casts, to be abducted and elevated in specific positions for them to leave bed and become mobile as soon as possible. Prior to 2008, this required the PMT to construct expensive, labour intensive, custom contoured foam seats for each client on short notice. The PMT's cost for producing a custom seat is $1080 ($540 materials and $540 Labour). This solution was labour intensive and well above the provincially mandated post operative seating modification limit of $300 per surgery.

SHHCC's PMT developed a low cost ($150 each), adjustable, reusable lower leg support that can be mounted on the client's own wheelchair.

Construction

The leg support assemblies have three main components (see Figure 1); the leg support pad, the support arm and the frame clamp.

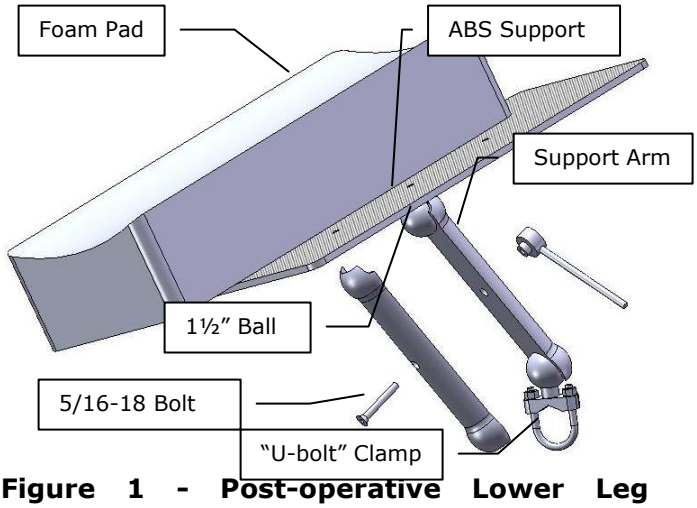

Figure 1 - Post-operative Lower Leg Support Assembly

Leg Support Pad

The leg support pad consists of a slightly contoured polyurethane foam pad upholstered in a sterilizable fabric with a loop fastener on the underside (see Figure 1). This pad is affixed to a ¼" thick rigid ABS support surface using the hook fastener. The hook and loop fastener gives the clinician flexibility in positioning the pad on the support surface. A 1½" ball is bolted to the underside of the ABS support surface. This 1½" ball fits into one of the sockets on the support arm.

Support Arm

The leg support pad is attached to a support arm using one of the sockets on the support arm. The support arm is a double ball and socket arm that provides 6 degrees of freedom of adjustment. The support arm comes in 3 different lengths; short (~4"); medium (~6"); and long (~9"). A 5/16-18 bolt protrudes through the centre of the arm joining the two halves together (see Figure 1). A crank handle is used to tighten the bolt and clamp the two balls in the two sockets at either end of the arm.

Frame Clamp

The support arm is connected to a second 1½" diameter ball which is attached to a "u-bolt" style clamp. The 1 ½" ball is inserted into the second socket of the support arm. The "U-bolt" clamp can clamp to tubing ranging in diameter from ¾" to 1⅛" diameter. This covers the diameters of most common mobility aid tubes. A larger "U-bolt" style clamp and ball assembly is available for larger tubing sizes.

Discussion

This device has been in clinical use since 2008. In the 2012-2013 fiscal year (April 1, 2012 – April 1, 2013), the PMT provided 7½ pairs (15 assemblies) of new lower leg support assemblies at $300 a pair. The PMT does not track the number of recycled Post-Operative Lower Leg Support Assemblies used.

The assembly is easily clamped to the footrest hangers or frame of the client's own mobility aid. Using the client's own wheelchair has many advantages; it reduces the client's anxiety by not having to introduce new equipment; it eliminates the need to transfer positioning equipment, life sustaining equipment and communication equipment to a temporary mobility aid; it eliminates the family having to transport and store a second mobility aid during convalescence; and it reduces the hospital's need to stock specialized mobility aids.

Clinically, it has been reported that the intuitive nature of the lower leg supports has enabled therapists to install and adjust these leg supports in less than ½ hour without the need of a technician. Furthermore, apart from functioning well in the community, the community teams have been able to independently adjust the position of the support as the client recuperates and when no longer necessary, the assemblies have been removed by the community team and returned to the health centre for sterilization and re-use. Finally because the client's original positioning system is untouched, this enables the community team to be able to easily adjust the existing system to accommodate the clients new leg and hip position.

Conclusion

These lower leg supports reduce the time, knowledge, skill, labour and costs required to implement a post operative lower leg support solution and allows the client to be transferred

to the community as soon as medically stable. Furthermore, the lower leg support's position is easily adjustable which enables the community team to change the leg support position as the client's recovery progresses. When the client has recuperated, the community team can remove the system and return it to the hospital for sterilization and re-use leaving the client's wheelchair untouched for easy adjustment for the client's new lower leg and hip position.

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[i] "Sunny Hill Health Centre for Children", Copyright © 2013 BC Children's Hospital. Accessed Jan 31, 2014. (URL: http://www.bcchildrens.ca/Services/SunnyHillHealthCtr/AboutUs/default.htm)