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Approximately 8 months after his transradial amputation, Than Lam was fitted with an activity-specific prosthesis to use for gym workouts. Lam's upper limb prosthetic therapist, Chris Bollinger, is shown helping Lam achieve proper body alignment using one of several weight machines. (Photos courtesy of Advanced Arm Dynamics.)

## Moving Forward After Upper Limb Loss

Successfully transitioning amputees back to the community after amputation requires an approach that considers the whole person

Occupational and physical therapists practice in a variety of clinical settings and treat a range of people who have suffered life-altering diagnoses, including amputations. Transitioning to daily life after discharge can be challenging for these patients. Some return to their previous functional level, while others may require more intensive caregiver assistance and outpatient therapy services. Therapists work to maximize their patients' functional abilities through environmental adaptation and ADL/IADL retraining, while focusing on each person's goals. However, are the psychosocial aspects of their altered health status and function always addressed? Is there a heavy focus on treating the physical issues while

sometimes overlooking the patients' mental and social health? Addressing the psychological burden that some patients—specifically, upper limb amputees—face is a critical component of achieving positive and long-lasting rehabilitation outcomes.

### STATISTICAL CONTEXT

A review of statistical data indicates that in comparison to the general population, some patient populations have a significantly higher incidence of mental health concerns. It is estimated that 18.1% and 3.8% of the general population screen positive for anxiety disorders and substance abuse, respectively.<sup>1</sup> According to the National Institute of Mental Health, in 2012, 6.9% of all adults in the United

States had at least one major depressive episode within the last year.<sup>2</sup> The addition of a severe impairment increases the chance of suffering from depressive symptoms. For example, the Depression and the Bipolar Support Alliance recognize that 25% of cancer patients, 10% to 27% of stroke patients, 33% of heart attack survivors, and 50% of Parkinson's disease patients may experience depression.<sup>3</sup>

The most recent statistics (2011) from the Amputee Coalition indicate that in the United States, there are approximately 1.9 million people living with limb loss.<sup>4</sup> Dillingham et al cites that in an 8-year period (1988-96), the average number of limb loss discharges per year was 133,235. The article also notes that for every one upper limb amputation there were 35 lower limb amputations,

and that the primary cause of upper limb amputation is trauma.<sup>5</sup> In a more recent study (2005), researchers Desmond and Maclachlan noted that short- and long-term studies documenting significant emotional distress after an amputation are limited.<sup>6</sup> Their cross-sectional survey examined responses of 582 British ex-service amputees with a long-standing amputation of 10 years or longer. Results include a higher incidence of positive screens for depressive symptoms and anxiety with 32% and 34%, respectively, and 24.6% of respondents reporting post-traumatic stress symptoms. Another survey report of 954 amputees who have suffered either an upper or lower limb amputation reveals that 30% have a depressed mood.<sup>7</sup>

Collectively, these statistics allow for a reasonable conclusion to be drawn: The upper limb loss patient population faces an increased risk of experiencing psychosocial challenges. Awareness of these challenges needs to be considered by all healthcare providers to help achieve successful outcomes.

**TAKING A HOLISTIC APPROACH**

I am a member of a specialized clinical team that provides comprehensive upper limb prosthetic rehabilitation, with a commitment to treating each person as a whole. Numerous studies offer evidence that prosthetic training paired with early fitting, patient education, and functional training can increase the likelihood of prosthetic acceptance.<sup>8,9,10</sup> Our model of care includes a prosthetist who specializes exclusively in upper limb and an occupational



**Bollinger includes real life tasks in ongoing prosthetic training with Mark Dowling, whose arm was amputated at the shoulder. After being fitted with a myoelectric prosthesis, Dowling participated in multiple treatment sessions learning how to reposition the prosthesis to avoid compensatory movements.**

therapist who provides functional training with an upper limb prosthesis. Ongoing therapeutic support services help the patient learn to incorporate the use of one or more prostheses into daily life. This support, from initial contact through all subsequent clinical interactions with

the patient, includes assisting people with the psychosocial impact of upper limb loss.

During the initial evaluation before prosthetic care begins, the therapist presents a written wellness inventory to each patient. This tool screens for issues that are com-

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mon to upper limb amputees, including post-traumatic stress disorder (PTSD), pain management, resilience, quality of life, depression, anxiety, and drug or alcohol abuse. Preliminary results of 192 prospective patients who have completed the wellness inventory reveal that 53.7% of patients have screened positive for depression and 21.4% for PTSD, showing results similar to other literature findings.<sup>11</sup> Concurrent challenges that can occur include fear of the unknown, loss of self-esteem, loss of self-confidence, fear of rejection, and loss of job or occupational role.<sup>12</sup>

Upper limb amputees may experience day-to-day struggles with self-image issues. Resiliency is an important quality that varies significantly between individual patients. According to the American Psychological Association, resiliency is, "The process of adapting well in the face of adversity, trauma, tragedy, threats or significant sources of stress. It does not mean that a person doesn't experience difficulty or distress, in fact, the road to resilience is likely to involve considerable emotional distress."<sup>13</sup> Some patients demonstrate a high level of resilience, adjusting well to their new normal and being ready to progress with their prosthetic rehabilitation. Others may be in the early stages of the grief cycle and have a hard time coping. The written wellness inventory provides an opportunity to identify obstacles that may impact a person's rehabilitation, and provide resources that can help to improve their outcomes. In response to wellness inventory results and subsequent conversations

between the patient and therapist, patients are offered collaborative support with counselors, local support groups, a peer support network, and other educational resources.

The five stages of grief model developed by Elizabeth Kubler-Ross, MD, can be applied to patients who have experienced upper limb loss and other traumas. Denial is typically the initial stage, followed by anger, bargaining, depression, and acceptance.<sup>14,15</sup> Coping is different for everyone. Some people accept their new self-image and move forward, while others may never reach the acceptance stage. Early psychosocial intervention has been proven successful, with an improvement of symptoms in up to 80% of those treated for depression within 4 weeks to 6 weeks of beginning medication, psychotherapy, attending support groups or a combination of these treatments. (National Institute of Health, 1998)<sup>3</sup>

### PROFILES IN SUCCESSFUL REHABILITATION

Two people we have worked with offer real-life examples of high resilience and positive results in medical recovery and prosthetic rehabilitation. Throughout their ongoing process of care, these two individuals have modeled strength, courage, and tenacity. Than Lam and Mark Dowling were each diagnosed with cancer that resulted in upper limb amputation. Despite an increased risk of psychosocial challenges secondary to their diagnosis, both individuals screened high in the resilience category and demonstrated this throughout their medical recovery. Ultimately, their resilience helped them to achieve suc-

cessful outcomes in their rehabilitation. Like anyone else, these two patients admit that they occasionally have bad days, but generally, they report that their lives are fulfilling and not hampered by their limb loss.

### CASE STUDY 1

Than was first diagnosed with osteosarcoma in June 2013, and experienced thoughts of uncertainty and fear of the future. An elective unilateral transradial amputation was performed in July 2013. During his initial prosthetic evaluation in July, Than stressed the importance of returning to his prior level of function before his amputation. In clinical discussions subsequent to the completion of his wellness inventory, Than described a range of factors that motivated him to intensely pursue prosthetic rehabilitation. These included his personal faith, strong family support, will for survival, professional responsibilities, and collaboration with his medical and rehabilitation team. He has embraced his outcome and reports that he has a stronger appreciation of the challenges that people with disabilities face, along with a newfound gratitude for life-saving medical care.

Two months after his amputation, Than was fitted with a myoelectric prosthesis designed to assist with his activities of daily living, as well as his career as a lead electrical engineer and adjunct college professor. Some of his daily bimanual tasks included using a computer and cell phone, carrying two things at once, lifting heavy objects (laptop, boxes, groceries), and gesturing during

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presentations and lectures. Wearing a prosthesis helped him feel more confident in social situations and less hesitant to be around new people. His concern with his appearance diminished over time as he felt more natural and symmetric. As Than explored different activities with his myoelectric prosthesis, he learned that he would require a second prosthesis to be able to return to physical activities such as riding his bicycle and exercising at the gym. A myoelectric prosthesis helps with everyday tasks in home, community, and work settings. However, it may not be the best option for sports and recreation.

In March of 2014, Than was fitted with an activity-specific prosthesis with terminal devices designed specifically for bicycling and for completing exercises, including pull-ups, rowing, and using free weights and weighted machines. An average day for Than included a 10-mile bicycle ride in the morning, a full day at work where his myoelectric prosthesis was essential, and a 2-hour exercise routine at the local gym.

In February of 2015, Than underwent a shoulder disarticulation procedure secondary to a reoccurrence of cancer. Despite this challenge, Than returned to his career as an engineer and adjunct professor the week after his amputation, and he remains physically active. He is currently being fitted with a shoulder disarticulation myoelectric prosthesis for everyday use.

The higher-level amputation of his arm means he will wear a more complex prosthesis with a mechanical elbow, a rotating wrist, and a multiarticulating hand. Than demonstrates a calm demeanor during clinical appointments, and frequently talks about his gratitude for being alive and having another opportunity to use a prosthesis to help accomplish his daily tasks at work and home. Than has stated that his positive experience with wearing a transradial prosthesis has given him a solid foundation for believing he will be successful with a shoulder disarticulation prosthesis.

## CASE STUDY 2

Mark was diagnosed with myxofibrosarcoma and agreed to a right shoulder disarticulation to stop the spread of cancer. Early in his rehabilitation, Mark determined that a prosthesis would be essential to help with daily activities such as basic self care tasks, IADL meal prep tasks, and work responsibilities. He was fitted with his myoelectric prosthesis in May 2013 and has had complications requiring a second procedure to remove lymph nodes from his axilla area, in addition to ongoing lymphedema treatment. From his initial evaluation forward, Mark talked about the importance of his support network of family and friends in facing his medical challenges. Mark indicated that staying focused on his personal faith and his career in information technology were daily motivators that helped him remain positive. This mind-set is a critical aspect of prosthetic rehabilitation, as noted in the *Atlas of Limb Prosthetics*, chapter "Adult Upper Limb Prosthetic Training." "Motivation and the desire of the patient to be independent are perhaps the most important ingredients to cultivate and reinforce."<sup>9</sup> He continues to adjust to changes in his life and his body, and describes himself as "more patient and focused" as a result of his amputation and prosthetic rehabilitation.

After being fitted with a myoelectric prosthesis, multiple treatment sessions were conducted in the clinic focusing on prosthetic control skills, learning to preposition the prosthesis to avoid compensatory movements, and learning



**As Lam explored different activities with his myoelectric prosthesis, he learned he would require a second prosthesis to return to certain physical activities. Lam says he believes that having a unique prosthesis for the gym is vital to his sense of well-being and happiness.**

how to incorporate the prosthesis in all tasks. The next phase of therapy involved a site evaluation at Mark's workplace to determine the most effective ways to incorporate the prosthesis into his job duties. Reasonable accommodations and environmental adaptations were made to help him successfully transition back to work in his full capacity. Mark has also learned to incorporate his prosthesis in tasks such as meal prep, lawn care, and gardening work. He and his family have started a foundation to help survivors and caregivers affected by sarcoma and other rare cancers.

## TUNED IN TO THE PATIENT

Than and Mark came to us well-adjusted, highly motivated individuals who were knowledgeable of resources and ready for the next steps in their care. Every patient and their circumstances are unique. Some demonstrate high resilience, while others experience greater challenges accepting their new self-image. As therapists, it is our job to identify challenges with each patient during the evaluation and throughout treatment. Some ways to accomplish this include the use of abbreviated standardized assessments similar to the wellness inventory, and being cognizant of the different psychosocial factors based on the diagnosis. It is also critical to give each patient appropriate recommendations for psychosocial support, and information about local and national resources. Therapists who are proactive in the early stages of patient care, and address clinical, social, and psychological concerns, will increase the chances of successful outcomes for their patients. RM

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## REFERENCES

1. Kessler RC, Chiu WT, Demler O, Walters EE. Prevalence, severity, and comorbidity of twelve-month DSM-IV disorders in the National Comorbidity Survey Replication (NCS-R). *Archives of General Psychiatry*. 2005 Jun;62(6):617-27. doi:10.1001/archpsyc.62.6.617
2. National Institute of Mental Health. Major Depression Among Adults (2012). Available at: <http://www.nimh.nih.gov/health/statistics/prevalence/major-depression-among-adults.shtml>. Accessed March 10, 2016.
3. Depression and Bipolar Support Alliance. Depression Statistics (2012). Available at: [http://www.dbsalliance.org/site/PageServer?pagename=education\\_statistics\\_depression](http://www.dbsalliance.org/site/PageServer?pagename=education_statistics_depression). Accessed March 10, 2016.
4. Limb Loss Task Force/Amputee Coalition, Roadmap for limb loss prevention & amputee care improvement. Knoxville, Tennessee: Amputee Coalition; 2011. Available at <http://www.amputee-coalition.org>.
5. Dillingham T, Pezzin LE, Mackenzie EJ. Limb amputation and limb deficiency: epidemiology and recent trends in the United States. *South Med J*. 2002;95:875-883.
6. Desmond DM, MacLachlan M. Affective distress and amputation-related pain among older men with long-term, traumatic limb amputations. *J Pain Symptom Manage*. 2006;31(4):362-68. DOI: 10.1016/j.jpainsymman.2005.08.014
7. Amputee Coalition of America Limb Loss and Research and Statistics Program. People with Amputation Speak Out. Available at: [http://www.amputee-coalition.org/wp-content/uploads/2014/11/lsp\\_people-speak-out\\_120115-113243.pdf](http://www.amputee-coalition.org/wp-content/uploads/2014/11/lsp_people-speak-out_120115-113243.pdf). Accessed March 10, 2016.
8. Resnik L, Meucci M, Lieberman-Klinger S, et al. Advanced upper limb prosthetic devices: implications for upper-limb prosthetic rehabilitation. *Arch Phys Med Rehabil*. 2012;93:710-717. Available at: doi: 10.1016/j.apmr.2011.11.010.
9. Atkins D. Adult upper limb prosthetic training. In: Bowker HK, Michael JW, Eds. *Atlas of Limb Prosthetics: Surgical, Prosthetic, and Rehabilitation Principles*. 2nd ed. Rosemont: American Academy of Orthopedic Surgeons; 2002. Available at: <http://www.oandplibrary.org/alp/chap11-01.asp>. Accessed March 10, 2016.
10. Gaine WJ, Smart C, Bransby-Zachary M. Upper limb traumatic amputees. Review of prosthetic use. *J Hand Surg [Br]*. 1997;22:73-76.
11. Elliot T, Jackson W, Ryan T. Resilience and Psychological Adjustment Following Upper Extremity Limb Loss. APA Annual Convention Proposal, 2015.
12. Smurr LM, Gulick K, Yancosek K, Ganz O. Managing the upper extremity amputee: a protocol for success. *J Hand Ther*. 2008;21:160-75; quiz 176. Available at: doi: 10.1197/j.jht.2007.09.006.
13. American Psychological Association. The Road to Resilience. Available at: <http://www.apa.org/helpcenter/road-resilience.aspx>. Accessed March 10, 2016
14. Bhuvaneshwar CG, Epstein LA, Stern TA. Reactions to amputation: Recognition and treatment. *J Clin Psychiatry*. 2007;9:303-308. Available at: <http://www.ncbi.nlm.nih.gov/pubmed/17934555>. Accessed March 10, 2016.
15. Kubler-Ross E. *On Death and Dying*. New York, NY: Simon & Schuster; 1969. Available at: <http://grief.com/the-five-stages-of-grief/>. Accessed May 13, 2016.