Reduction of Complications and Associated Costs with Flexitouch® Therapy for Lymphedema

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Abstract: Lymphedema is a chronic condition requiring multiple clinic visits over several weeks for costly treatment and education by a trained therapist, followed by lifelong in-home self-care. The self-care regimen can be physically and psychologically demanding and inadequate treatment can lead to progression of the lymphedema and serious complications. The patient described in this report was diligent with a home care program yet experienced difficulty controlling her lymphedema independently, necessitating a return to skilled therapy for repeated treatments. This case study describes the impact that an advanced pneumatic device, the Flexitouch® system, had on the costs of treatment and quality of life for a patient with lymphedema. Substantial long- and short-term cost reductions and quality-of-life gains may have been realized as the patient achieved successful maintenance of a home care program without any lymphedema-related complications or infections requiring hospitalization, antibiotic therapy, or in-clinic lymphedema therapy.

BACKGROUND

Patients may develop secondary lymphedema as a result of damage to the lymphatic system following trauma or surgical intervention, such as lymph node dissection during mastectomy for breast cancer [1-4]. Lymphedema is a chronic condition that requires potentially costly and time-consuming treatment. After diagnosis and evaluation, initial treatment may consist of intensive complete decongestive therapy (CDT) [5] requiring multiple visits over several weeks in the clinic setting by a therapist (physical therapist, physical therapy assistant, occupational therapist, certified occupational therapist assistant, certified massage therapist, or registered nurse) trained to treat lymphedema [6-8]. CDT includes manual lymphatic drainage (MLD), meticulous skin care, gradient compression bandaging, medically prescribed compression garments, and instruction in a therapeutic exercise program and self-care to be administered at home following discharge [5, 6].

Training the patient in the skills necessary to maintain the reduced size of the limb(s) is an essential component of the successful implementation of a lifelong home maintenance therapy program [6]. However, the ability to successfully perform necessary aspects of home care such as self-MLD and application of compression garments may be too difficult for patients with limited arm mobility resulting from cancer treatment, lymphedema itself or comorbid conditions such as obesity or arthritis [8]. Further, in more than 13 years in clinical practice treating lymphedema, many patients experience repetitive stress syndromes which may also hamper the patient's ability to successfully perform their home program. Left untreated, or inadequately maintained, lymphedema can progress in size [9] and severity [4], potentially leading to complications such as fibrosis, chronic inflammation [9], repeated infections (e.g. cellulitis) [10, 11], increased pain, reduced range of motion, and difficulty using the limb [3, 8, 10]. Complications requiring hospitalization, repeated intensive therapy, antibiotics, or decreased performance of the affected limb for daily function (e.g., work, home, and self-care functions), as well as significant quality of life and psycho-social issues (e.g. depression, altered body image, isolation) fatigue and decreased stamina are potential outcomes of inadequate lymphedema care [8, 12].

Reducing the significant and costly problems associated with lymphedema requires both identification of the barriers to successful home therapy and implementation of a home therapy program that can cost-effectively address those barriers, eliminate return trips to the clinic or hospital, and achieve clinical success.

This case review was compiled to illustrate the effect of an advanced pneumatic device on the costs of treatment and quality of life for a patient with lymphedema. The Flexitouch® system (FT) (Tactile Systems Technology, Inc, Minneapolis, MN) [13] was added to the patient's in home therapy program. The design of the FT system (Fig. **1**) is based on well-established principles of lymphatic drainage, including initial treatment of truncal lymphatics followed by specific gentle, dynamic pressure sequences to direct fluid drainage away from the affected quadrant and limb into healthy functioning lymphatic territories.

PATIENT HISTORY

The patient is a 52-year-old woman who underwent a lumpectomy followed by radiation and chemotherapy for cancer in her right breast in April 2000. She was diagnosed with lymphedema of the right upper extremity in 2004, was evaluated by a lymphedema therapist, and received intensive CDT in the clinic daily for four weeks. Her home therapy program consisted of daily self-MLD and the wearing of a

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1874-9437/09

Fig. (1). Flexitouch system.

compression garment (JOBST® Elvarex®, BSN Medical, Charlotte, NC). Despite her diligence her lymphedema continued to worsen and her limb volume increased. Her ability to perform self-MLD was hampered by the development of tendonitis in her right thumb. By August 2005 her right arm limb volume was 46% greater than that of her left arm. In addition she had developed fibrosis of her right forearm. She was treated with a second 4-week course of intensive CDT at Washington Hospital Lymphedema Services. After 1 week of CDT, an in-clinic trial of the FT system was added to her therapy. After only 2 sessions incorporating treatment with the FT system, her fibrosis had softened considerably. At the end of the intensive 4-week program, the patient's condition plateaued at an 18% limb volume differential. She was re-instructed in a home therapy program consisting of self-MLD, gradient compression bandaging, therapeutic exercise, and diet, and was fitted with a second custom compression garment (JOBST® Elvarex®, BSN Medical, Charlotte, NC).

Based on the success of adding the FT system to her in-clinic treatment, the FT system was prescribed as an addition to her home maintenance program in September 2005. However, insurance initially denied coverage, and she did not receive the system at that time. By mid-October her right arm limb volume was 23% greater than that of her left arm; there was visible lymphedema over the right posterior upper quadrant and palpable lymphedema over the right anterior upper quadrant. The patient returned again to the clinic for a third 4-week course of intensive CDT. Following this, she resumed her home maintenance program in November. In Dec, 2005, she was admitted to the hospital for cellulitis requiring intravenous antibiotics; furthermore, after discharge she continued to require outpatient care for this infection.

Upon appeal, the patient received insurance approval for the FT system, and she obtained the system for home use in February 2006. During the six months it took to obtain insurance approval, the patient had undergone a third 4-week course of CDT, and required hospitalization and outpatient follow up care to treat complications. At the time of this publication, nearly 3 years since first receiving the Flexitouch, the patient continues to use the FT system as part of her home maintenance program, which includes self-massage of the neck and inguinal areas, compression bandages, and daytime and nighttime compression garments; she has required no in-clinic treatment or hospitalization related to her lymphedema.

METHODS

Costs of lymphedema-related treatment prior to implementation of the FT system at home were compared with costs for lymphedema-related treatment after FT system use. Costs of care were obtained from financial records provided with written consent by the patient and were included in the review without regard to the payer (i.e., insurance or patient). The initial CDT costs from 2004 were not included in this comparison in order to target the evaluation of costs associated only with failed home maintenance and related medical complications. Therefore, lymphedema-related costs were reviewed for August 2005 through January 2006 (prior to FT system usage) and February 2006 through February 2009. After initiation of the FT system therapy.

RESULTS

Lymphedema-related treatment costs incurred from August 2005 through December 2005 for this patient were

Lymphedema Cost Detail

DATE	ITEM	CHARGE
Aug 2005	PT	$ 382.74
Sept 2005	PT	$ 7,172.86
Sept 2005	PT	$ 5,172.23
Oct 2005	PT	$ 5,219.34
Nov 2005	PT	$ 3,625.70
Dec 2005	MD care	$ 38.83
Dec 2005	X-ray	$ 10.98
Dec 2005	Lab	$ 27.58
Dec 2005	Hospital	$ 178.84
Dec 2005	Hospital	$ 63.50
Dec 2005	Hospital	$ 81.49
Dec 2005	Medical care	$ 90.18
Dec 2005	Medical care	$ 330.65
Dec 2005	Inpatient	$ 7,370.71
	Total 8/05–1/06	$ 29,765.66
Feb 2006	Flexitouch	$ 6,200.00
Thru Dec 2006		$ 0.00
Thru Dec 2007		$ 0.00
Thru Mar 2008		$ 0.00
Thru Feb 2009		$ 0.00

Fig. (2). Lymphedema cost detail.

initiating use of the FT system at home, she has been able to successfully manage her lymphedema on a long-term basis without any lymphedema-related complications or infections requiring hospitalization, antibiotic therapy, or in-clinic lymphedema therapy (Fig. **3**).

In addition, the patient reported that she experienced improved quality of life since she began using the FT system at home. She stated that she is able to maintain her reduced limb volume, appreciates being able to set her own schedule for therapy, and feels she has regained control over her own lymphedema therapy and personal time.

CONCLUSIONS

The patient described in this report is an example of a patient who was diligent with a comprehensive home care program yet experienced difficulty controlling her lymphedema independently [8], necessitating a return to skilled therapy for treatment when the home program failed. This single patient evaluation demonstrated substantial long- and short-term cost reductions and quality-of-life gains as the patient achieved successful lymphedema maintenance through a home care program. Incorporation of the FT system into a home program may have assisted this patient in achieving a cost-effective and clinically efficacious transition from outpatient care to home management, while minimizing the physical and emotional burden placed on the patient.

Complications associated with lymphedema care can be costly. An example from this case was an episode of cellulitis that occurred in December 2005. This infection, its progression and the ultimate need for hospital care were attributable to the patient's lymphedema. Reducing the incidence and severity of complications such as this one will lead to decreased costs to third-party payers and patients. In addition, the patients' quality of life may be improved if they receive helpful tools that allow them to independently manage lymphedema at home. Additional cost evaluations will be important to fully appreciate the role this device may have in advancing patient care.

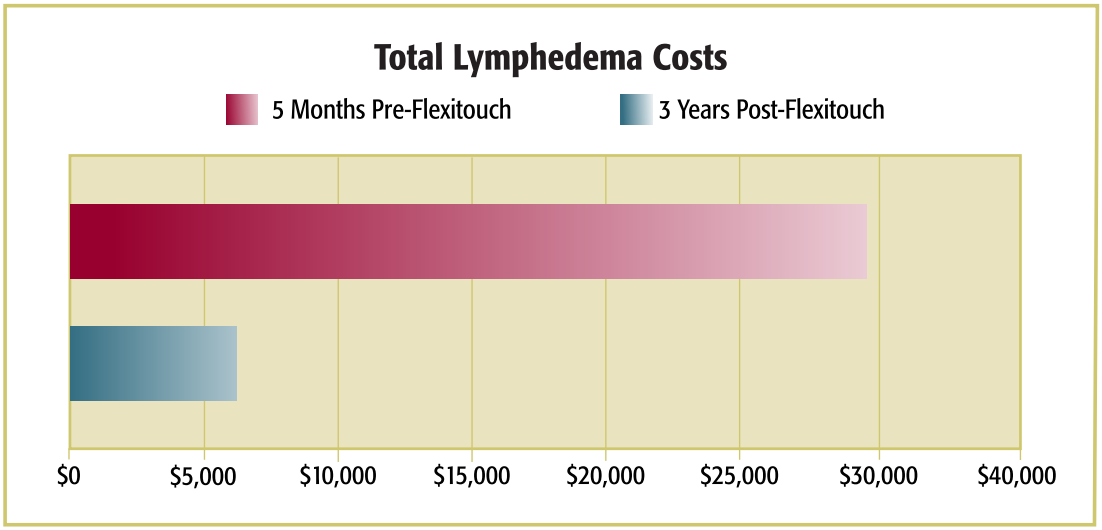

Fig. (3). Total lymphedema costs.

more than 4 times greater than the cost of the FT system (Fig. **2**). The patient was followed for more than 3 years after she incorporated the FT system into her home program, and she incurred no additional lymphedema-related costs[1]. Since

[1] As compression garments are part of standard lymphedema care, these costs were not included pre or post Flexitouch treatment.

CONFLICT OF INTEREST

The author declares no conflict of interest.

ACKNOWLEDGEMENTS

Tactile Systems, Inc. provided assistance with preparation of the manuscript.

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Received: January 19, 2009 Revised: February 19, 2009 Accepted: February 26, 2009