Making the Most of Your Wound Care Dollars:

Effective Cost Management with the Joerns-Medela Negative Pressure Wound Therapy Solution

Joerns LLC
19748 Dearborn Street
Chatsworth, CA 91311

Correspondence:
Julia.Melendez@joerns.com

Contents

Abstract 2
Background 3
Methods 4
Results 5
Discussion 7
Conclusion 8
References 8

Abstract

Objective: To evaluate the clinical efficacy and cost effectiveness of a new negative pressure wound therapy (NPWT) program, utilizing the Medela Invia Liberty pump and dressing sets provided by Joerns Healthcare.

Setting: Six long term care facilities in the United States.

Participants: A convenience sample of nine residents at six long term care facilities during a 10-week intervention period.

Interventions: A 10-week intervention period during which the Joerns Healthcare NPWT solution, including the Medela Invia Liberty NPWT system, was introduced as the formulary product for negative pressure wound therapy. All other wound treatment interventions remained unchanged.

Main outcome measures: Rate of wound healing before and after treatment with the Medela NPWT system, cost-savings experienced over the prior NPWT system, pain with dressing changes, and ease of system use were reviewed.

Results: Wounds treated with the Medela Liberty NPWT system decreased significantly in size during the course of the study period. Cost savings ranged between 43 to 64% over the prior NPWT system, patients reported more comfortable therapy, and clinicians found the system easy to use.

Conclusion: Implementation of the Medela Invia NPWT solution as provided by Joerns Healthcare, led to wound healing, patient comfort during therapy, and ease of clinician use, while providing significant cost savings, over the study period.

Background

Long-term care providers operating within the Federal Medicare and various state Medicaid systems have long faced the challenges of balancing optimum clinical outcomes and quality care with the financial constraints inherent in those systems. With the advent of the Minimum Data Set 3.0 and the Resource Utilization Group IV, providers face new challenges in managing costs and maintaining quality.

The care of acute and chronic wounds is a clinical area that significantly burdens a facility's bottom line. Although difficult to quantify completely, costs related to care of patients with wounds consumes a large portion of a facility's reimbursement dollars beyond room and board.

Patients with wounds in long term care facilities are typically older frail adults, with multiple comorbidities, such as diabetes, that confound the healing process.[1] Wound treatment and outcomes management in these patients is a resource intensive endeavor, requiring collaboration among the interdisciplinary care team and a formulary of products that provides cost-effective and clinically appropriate care.

Various wound care technologies are available for treating complex chronic wounds. Ovington[2] reports that over 50 manufacturers produce more than 350 brands of moisture-retentive wound care dressings and therapies. Many of these modalities are grouped under one of the following categories: polyurethane films, hydrocolloids, hydrogels, foams, calcium alginates, collagen dressings, or negative pressure wound therapy (NPWT).

Out of this stockpile of wound treatments, NPWT is increasingly becoming the standard of care for complex wounds in the post-acute setting. NPWT involves the placement of a dressing interface within the wound bed which is then covered with a transparent dressing to maintain a moist wound environment. A specialized vacuum pump, connected to the dressing interface via a drain, applies intermittent or continuous sub-atmospheric pressure to the wound bed while drawing wound exudate away from the wound and into a sealed collection canister.[3]

Application of negative pressure facilitates the drainage of excessive fluid and debris, which leads to decreased bacterial counts, decreased interstitial edema, and increased capillary blood flow.[4, 5] The formation of granulation tissue, a hallmark indicator of wound healing, has been shown to increase during NPWT.[6]

Negative pressure wound therapy is appropriate for a variety of wounds seen in the post-acute environment, including Stage III and IV pressure ulcers, diabetic ulcers and venous ulcers.[7] Although its efficacy in wound healing has been established, facilities may not utilize NPWT as effectively as they otherwise would in their wound care program because it has traditionally been considered a high cost option.

Another factor worth considering is the patients' experience of pain during dressing changes when utilizing a NPWT system that incorporates open-cell polyurethane foam as the wound filler.[8-9] Studies have reported that newly formed granulation tissue grows into the open cells of the foam, requiring more force to remove the foam, and resulting in pain, bleeding and disruption to the wound bed.[10-11]

In 2009, the U.S. Food and Drug Administration issued a warning to healthcare professionals and consumers regarding reports of 6 deaths and 77 injuries over a 2 year period related to NPWT, including bleeding and infection related to retained foam dressing pieces that adhere to tissues or are embedded in the wound.[12]

In contrast, Hurd and colleagues evaluated 152 patients receiving NPWT utilizing an antimicrobial gauze wound filler versus a foam filler, for pain during therapy and with dressing changes, damage to the wound bed, and ease of dressing application. Minimal pain during therapy and during dressing changes was reported during treatment with gauze-based NPWT, and no damage to the granulating wound surface was observed in the majority of dressing changes. The median time to complete a dressing change and initiate therapy was 20 minutes.[13]

The present pilot study was undertaken to evaluate whether facilities can experience cost savings by implementing a wound care program that includes an alternative, full-featured NPWT system, available at a lower cost, without sacrificing clinical wound healing outcomes. The patients' experience of pain during therapy and during dressing changes, as well as clinician time to complete a dressing change, were also assessed.

Methods

Interventions

A retrospective chart review of wound care patients treated with the Medela Invia Liberty Negative Pressure Therapy (NPWT) system was conducted. In each case, the Liberty NPWT system was applied to the patient's wound until granulation tissue filled the wound bed to the extent that the wound could be effectively managed with an advanced moist wound care dressing or the patient was discharged from the facility.

Application of the Medela Liberty NPWT system consisted of applying a non-adherent contact layer into the base of the wound. Gauze was then moistened with normal saline, wrapped around an internal wound drain and fluffed to fill in the wound bed. A transparent film dressing was then placed over the gauze dressing and drain. The portable Liberty NPWT pump was prepared by installing the pump tubing and collection canister, and the wound drain was then connected to the Liberty pump tubing. Negative pressure was set between -60 and -80 mmHg as ordered by the physician.

Data Collection

A wound data collection tool, which includes information related to patient characteristics, treatment interventions and wound characteristics, was used to record wound information. Wound linear measurements (length X width X depth) were collected weekly by the responsible Wound Team in each of the facilities. Wound area and volume were obtained by multiplying length and width, and length, width and depth, respectively. Both area and volume measurements were used to determine the extent of wound healing for each individual wound.[14]

Wound progression data, which was recorded as the change in wound area and volume, was evaluated over the course of the study period. The last wound area and volume measured prior to the discontinuation of NPWT or the patient being discharged during the study period

were subtracted from the initial wound area and volume, respectively, to determine the changes in wound area and volume and percentage of wound area and volume reduction.

Data related to treatment costs associated with the Liberty NPWT system, the experience of patient pain reported during therapy and dressing changes, as well as data related to the ease of using the pump and completing dressing changes, were collected and analyzed for each patient.

Results

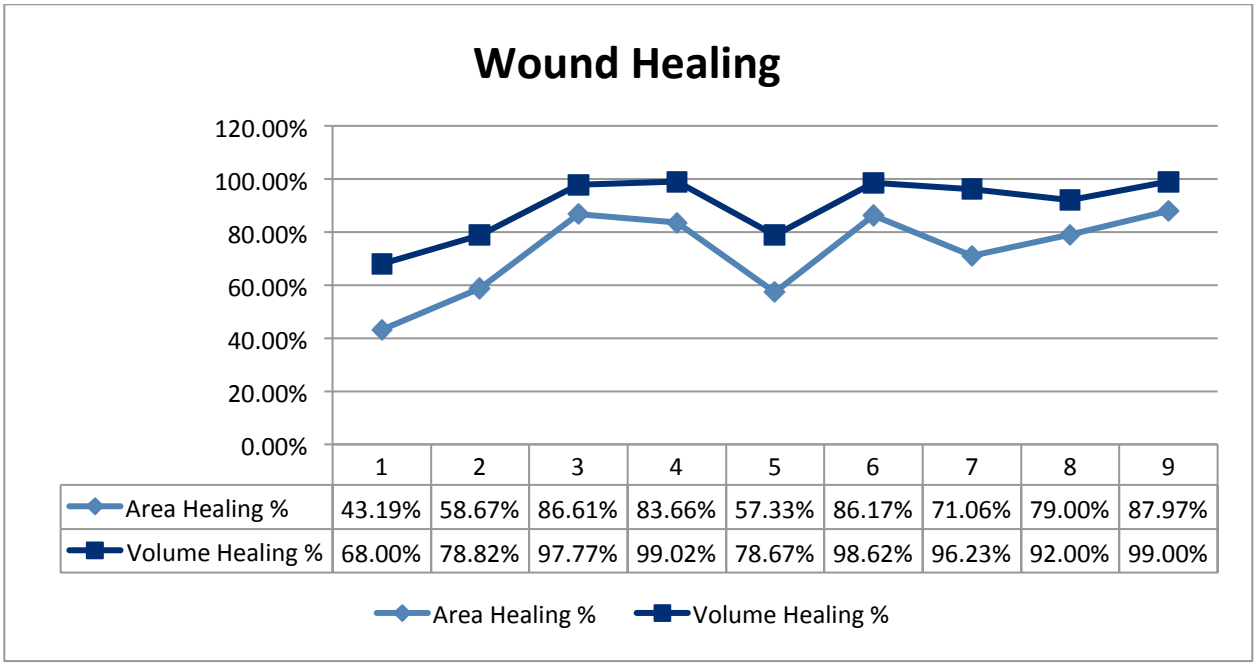
A total of nine patients, in six long-term care facilities, with wounds that were treated with the Liberty NPWT system participated in the study. The wound types within the study group consisted of surgical wounds (n=6) and pressure ulcers (n=3).

Wound Healing

As a rule of thumb, if a wound is not at least 30% smaller at week 4, despite optimal local wound care, it is unlikely to heal by week 12.[15] In the present review, healing of the wounds reviewed over the study period was significant. Within the first 4 weeks of NPWT with the Medela NPWT system, the average wound area was 57.10% smaller, and the wound volume decreased by 83.31%.

At the discontinuation of NPWT with the Medela system, the average wound area had decreased by 72.82%, and the wound volume had achieved an average of 89.79% healing, over an average of 40 days of therapy. These values equate to a weekly wound area healing rate of 13%, and a weekly volume healing rate of 16%.

The wounds decreased in area by an average of 1.34 cm^2 and in volume by an average of 6.29 cm^3 per day. This compares favorably with previously reported decreases in wound area of .23 cm^2 per day[16], and in wound area and volume of 1.08 cm^2 and 5.02 cm^3, per day[1] respectively, in wounds treated with a foam-based NPWT system.

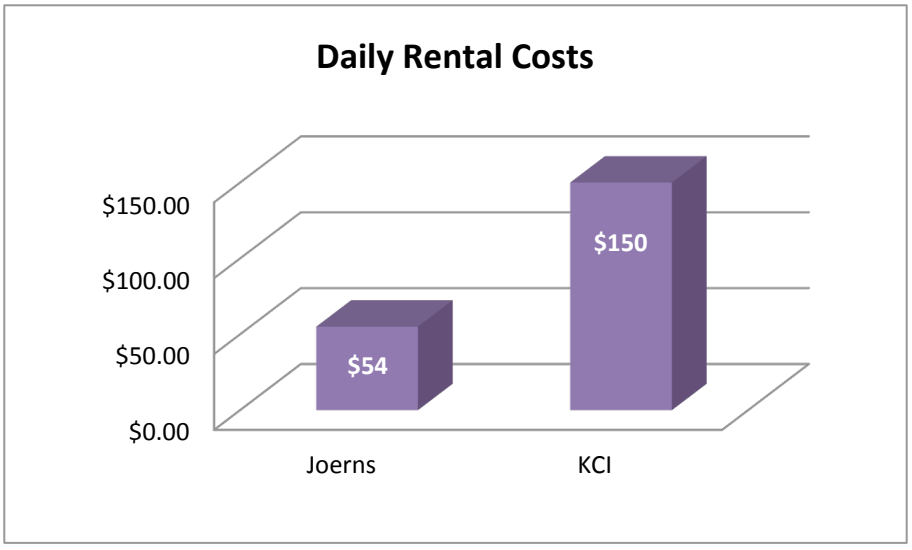


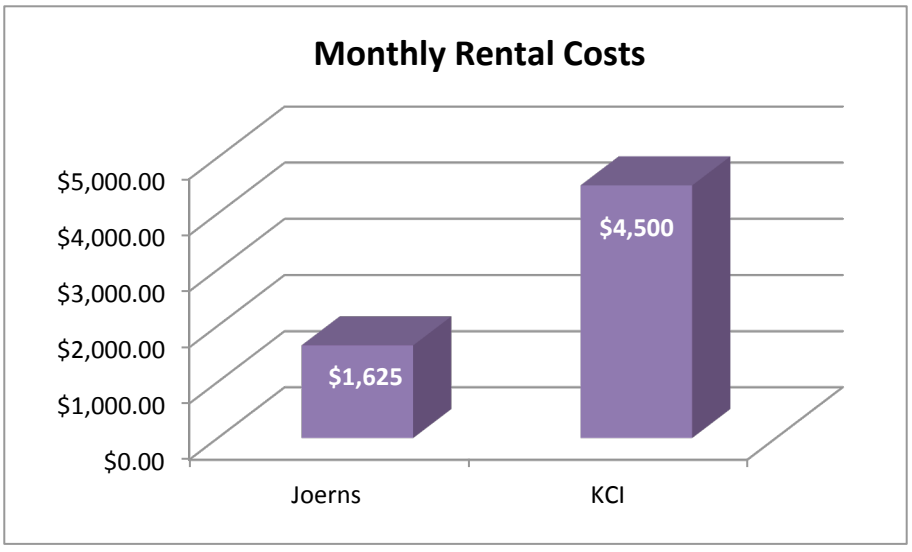
	1	2	3	4	5	6	7	8	9
Area Healing %	43.19%	58.67%	86.61%	83.66%	57.33%	86.17%	71.06%	79.00%	87.97%
Volume Healing %	68.00%	78.82%	97.77%	99.02%	78.67%	98.62%	96.23%	92.00%	99.00%

Cost of Therapy

The assessment of total costs associated with a particular wound care treatment modality is a complex undertaking[1], but it is possible to look at materials costs of providing the therapy. For example, various studies conducted utilizing V.A.C.® Therapy, the NPWT system marketed by Kinetic Concepts, Inc., have reported daily costs of $95 to $150 per day, or $2,850 to 4,500 per month.[16-19] In the post-acute environment, these costs can significantly impact the facility's finances.

In the present study, costs for rental of the pump and purchase of the dressing sets, canisters and pump tubing were based on contractual rates in effect at the time of the review. The average cost of therapy for all wounds was $2,179 over an average of 40 days of therapy, or $1,625 per month, which translates into a daily rate of about $54 per day, a 43 to 64% lower cost than V.A.C. therapy.





Facilities using the Joerns/Medela NPWT solution saved as much as 64% over their current NPWT vendor

Pain Associated with Therapy

Complex wounds and their treatment can often result in pain for patients[8], and clinicians should seek the least painful therapies that deliver optimum outcomes. NPWT is a therapy that can deliver significant wound healing, but has previously been associated with significant pain.[13] The main source of pain has been the NPWT dressing change, which is caused when the new granulation tissue, which has grown into and adhered to the foam dressing used with the prior NPWT system, is disrupted by pulling the foam out of the wound bed.[8, 10]

Gauze-based NPWT, such as that provided by the Medela Invia Liberty NPWT system, has been shown to decrease the pain associated with dressing changes, as there is no ingrowth of granulation tissue into the gauze.[10, 13] All patients in the present study who were cognitively able to report (n=7) reported no pain during dressing changes (n=7). The 2 patients unable to report did not exhibit signs of experiencing pain. There were no reports of tissue disruption with the Medela dressing changes, and two patients reported a significant improvement in the overall therapy and dressing change experience over the foam dressing used with a prior NPWT system.

Clinician Ease of Use

Facility clinicians are trained and certified in the Medela Invia Liberty NPWT system by Joerns Healthcare clinical specialists who provide intensive on-site support and are available to assist in implementation of the system in the facility's wound management program. The Joerns clinicians continue to monitor program implementation and provide support and training as necessary.

The facility clinicians using the Medela NPWT were asked to evaluate the system, and they rated their experiences highly. The results are shown in Table 1 below.

Table 1

Medela Liberty Evaluation Criteria	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Ease of Use: pump and dressing sets were easy to use and apply.	6	2	0	0	0
Clinical support services provided by Joerns Healthcare met our facility's needs.	7	1	0	0	0
Customer Service: Pump and products were delivered and removed in a timely and appropriate manner.	7	1	0	0	0
Overall Satisfaction: our facility would recommend the Medela NPWT products.	8	1	0	0	0

n = 8 (1 facility submitted evaluations from more than 1 clinician who used the Medela Liberty NPWT system)

Discussion

Given the expectation to deliver high quality care to patients with wounds in the cost-conscious environment of long term care, facilities are compelled to implement wound care therapies that economically deliver positive clinical outcomes. Cost-effectiveness of

therapies should be evaluated not only on dollars saved, but also on the clinical outcomes achieved. Low cost therapies that do not contribute to the realization of optimum results should be replaced by those that demonstrate positive therapeutic outcomes.

Negative pressure wound therapy has become a standard of care to treat difficult to heal and complex wounds in all health care settings. To manage the financial challenges previously associated with providing this therapy holistically, facilities have moved to NPWT solution providers, like Joerns Healthcare, that can deliver cost-effective alternatives which will not compromise clinical outcomes.

The goal for any facility wound care program is to offer wound treatment modalities that will effectively reduce wound size and severity in order to maximize the opportunity to heal wounds. This review quantifies the cost-savings that can be realized, as well as the significant wound healing that can be achieved, by implementing the Medela Invia Liberty NPWT system.

Conclusion

The results of this study support the conclusion that your facility and patients can benefit from introducing the Joerns NPWT solution, featuring the Medela NPWT system, as an integral part of your wound management program. Negative pressure wound therapy utilizing the Medela Invia NPWT system provided by Joerns Healthcare provides a cost-effective alternative to previous more costly NPWT options, without sacrificing the comfort and clinical outcomes your patients deserve.

References

1. deLeon, J.M., Barnes, S., Nagel, M., Fudge, M., Lucius, A., and Garcia, B. (2009). Cost-effectiveness of negative pressure wound therapy for postsurgical patients in long-term acute care. *Advances in Skin & Wound Care*. 22(3): 122-127.

2. Ovington, L. (2002). Hanging wet-to-dry dressings out to dry. *Advances in Skin & Wound Care*. 15(2):79-86.

3. Agency for Health Care Research and Quality, (May 2009). Negative Pressure Wound Therapy Devices. AHRQ Technology Assessment Report, Project ID: WNDT1108. *Available at http://www.ahrq.gov/clinic/ta/negpresswtd/negpresswtd.pdf*, Accessed April 6, 2011.

4. Morykwas, M.J., Argenta, L.C., Shelton-Brown, E.I., McGuirt, W. (1997). Vacuum-assisted closure: a new method for wound control and treatment: animal studies and basic foundation. *Annals of Plastic Surgery*. 38(6):553–62.

5. Argenta, L.C. and Morykwas, M.J. (1997). Vacuum-assisted closure. a new method for wound control and treatment: clinical experience. *Annals of Plastic Surgery*. 38(6):563–76; discussion 577.

6. Morykwas MJ, Faler BJ, Pearce DJ, Argenta LC. (2001). Effects of varying levels of subatmospheric pressure on the rate of granulation tissue formation in experimental wounds in swine. *Annals of Plastic Surgery*. 47(5):547–51.

7. Bollero, D., Driver, V., Glat, P., Gupta, S., Lázaro-Martínez, J.L., Lyder, C., Ottonello, M., Pelham, F., Vig, S., and Woo, K. (2010). The Role of Negative Pressure Wound Therapy in the Spectrum of Wound Healing: A Guidelines Document. *Ostomy Wound Management*. 56(5 Suppl):1–18.

8. Krasner, D.L. (2002). Managing Wound Pain in Patients with Vacuum-Assisted Closure Devices. *Ostomy Wound Management*. 48(5): 38–43.

9. Dorafshar, A.H., Franczyk, M., Lohman, R., and Gottlieb, L.J. (2009). Prospective Randomized Study Comparing Gauze Suction NPWT with Standard Vacuum Assisted Closure Device. *Study presented at the 88th Annual Meeting and Symposium of the American Association of Plastic Surgeons*, 2009.

10. Borgquist, O., Ingemansson, R., and Malmsjö, M. (2009). Tissue Ingrowth Into Foam but not Into Gauze During Negative Pressure Wound Therapy. *Wounds*. 21(11): 302-309.

11. Campbell, P.E., Smith, G.S., Smith, J.M. (2008). Retrospective Clinical Evaluation of Gauze-Based Negative Pressure Wound Therapy. *International Wound Journal.* 5(2): 280-286.

12. U.S. Food and Drug Administration, Center for Devices and Radiological Health. FDA Preliminary Public Health Notification: Serious Complications Associated with Negative Pressure Wound Therapy Systems. *Available at http://www.fda.gov/MedicalDevices/Safety/AlertsandNotices/PublicHealthNotifications/ucm190658.htm* , Accessed April 6, 2011.

13. Hurd, T., Chadwick, P., Cote, J., Cockwill, J., Mole, T.R., and Smith, J. (2010). Impact of Gauze-Based NPWT on the Patient Experience in the Treatment of Challenging Wounds. *International Wound Journal*. 7(6): 448-455.

14. Xakellis, G.C. and Frantz, R.A. (1997). Pressure Ulcer Healing: What is It? What Influences It? How is it Measured? *Advances in Skin & Wound Care*. 10(5): 20-26.

15. Woo, K.Y., Ayello, E.A., and Sibbald, R.G. (2007). The Edge Effect: Current Therapeutic Options to Advance the Wound Edge. *Advances in Skin & Wound Care*. 20(2): 99-117.

16. Philbeck, T.E., Whittington, K.T., Millsap, M.H., Briones, R.B., Wight, D.G., and Schroeder, W.J. (1999). The Clinical and Cost Effectiveness of Externally Applied Negative Pressure Wound Therapy in the Treatment of Wounds in Home Healthcare Medicare Patients. *Ostomy Wound Management*. 45(11): 41-50.

17. Verhaalen, A., Watkins, B., and Brasel, K. (2010). Techniques and Cost Effectiveness of Enteroatmospheric Fistula Isolation. *Wounds*. 22(8): 212-217.

18. Bui, T.D., Huerta, S., and Gordon, I.L. (2006). Negative Pressure Wound Therapy with Off-the-Shelf Components. *The American Journal of Surgery*. 192 (2006): 235-237.

19. Lavery, L.A., Boulton, A.J., Niezgoda, J.A., and Sheehan, P. (2007). A Comparison of Diabetic Foot Ulcer Outcomes Using Negative Pressure Wound Therapy Versus Historical Standard of Care. *International Wound Journal*. 4(2): 103-113.

Joerns LLC

Post Acute, Acute, HomeCare
5001 Joerns Drive
Stevens Point, WI 54481
(P) 800.826.0270
(F) 800.457.8827

VA/Government
19748 Dearborn Street
Chatsworth, CA 91311
(P) 800.966.6662
(F) 800.232.9796

Canadian Office
1000 Clarke Road, Suite 6
London, ON Canada N5V 3A9
(P) 866.546.1151
(F) 519.451.8662