

Negative Pressure Therapy in the Community: Analysis of Outcomes



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Negative pressure therapy is an adjunctive therapy used to improve the rate of wound healing. Negative pressure therapy consists of inserting an open cell foam dressing into a wound bed and covering the foam with an occlusive drape. Non-collapsible tubing is embedded into the foam and connected to a small pump that contains a disposable canister to collect wound exudate. The pump applies controlled sub-atmospheric pressure that can be continuous or intermittent within a range of -50 mmHg to

-125 mmHg.¹ The sub-atmospheric pressure is postulated to increase blood flow, decrease edema and bacterial count, and promote the formation of granulation tissue.² The exact mechanisms by which negative pressure therapy influences wound healing are unknown.

Negative pressure therapy has been used in the Capital Health Region since October 2000. Criteria for the use of negative pressure therapy were incorporated into the *Regional Wound Care Guidelines* in 2001. These criteria

indicate that negative pressure therapy can be applied to the following wounds: pressure ulcers and other chronic wounds, including venous stasis ulcers, acute and traumatic wounds, dehisced wounds and over meshed grafts.³ Selection criteria in the Capital Health Home Care Program are consistent with the *Regional Wound Care Guidelines*.

This study was a retrospective audit examining the outcomes of all clients treated with negative pressure therapy in the Capital Health Home Care Program over a 15-month period (January 1, 2002, to March 31, 2003). Data collected included wound type, length of treatment, outcome and cost. Descriptive statistics were used to analyze the data. A positive outcome was defined as "granulated to skin level, ready for skin graft, or complete closure."

Results

Eighty-one clients were treated with negative pressure therapy during the 15-month period. The average length of treatment was 30 days (range: 1–217 days). Positive outcomes were achieved in 50.6 per cent (n=41) of the cases. Complications included

TABLE 1

Summary of Findings

Wound Type	Number of Clients	Average Length of Treatment	Percentage of Positive Outcomes
All Wounds	81	30	50.6
Other Wounds	7	25	86.0
Diabetic Ulcers	9	47	77.7
Pilonidal Sinus	12	26	66.6
Abdominal Wounds	26	29	53.8
Vascular Surgery	2	28	50.0
Breast Wounds	6	26	40.0
Muscle flap/Graft	3	80	13.3
Pressure Ulcers	6	25	16.6
Non-Diabetic leg Ulcers	8	16	12.5
Irradiated Tissue	3	48	0



Figure 1: Before and after negative pressure therapy.

wound deterioration (12.3 per cent, n=10), and infection (3.7 per cent, n=3). The cost of negative pressure therapy during this period was \$248,200, which includes equipment rental, dressings, canisters and nursing time.

The wounds were subdivided into groups (see Table 1) and analyzed by wound type. The results clearly demonstrate that the benefits of negative pressure therapy vary depending on the wound type. Only four of the groups resulted in a higher-than-average proportion of positive outcomes when compared with all wounds included in the study. As illustrated in Table 1, wounds included in the 'other' group appeared to benefit most.

Discussion

Delayed wound healing is a challenge in the community setting, and often requires daily or more frequent nursing visits. With conventional wound-healing methods, it may take several

months to heal the wound. The use of negative pressure therapy has been proposed as a novel method of manipulating the chronic wound environment to assist and accelerate wound healing.⁴ Although initial clinical results are promising, the gap between available scientific evidence and everyday clinical practice does not give a balanced view of the appropriate use of negative pressure therapy.¹ Negative pressure therapy is an expensive treatment modality, and, because the costs are high, a recent consensus report suggests that use as a first-line therapy is inappropriate.¹ However, others suggest that negative pressure therapy has the potential for saving money if it is used on the "right patient, the right wound, at the right time."⁵

In this study, valuable information was gained in determining how negative pressure therapy may best be used. For example, management of a pilonidal sinus can often be problematic, and if managed with conventional

About Capital Health and the Home Care Program
 Capital Health is one of the largest integrated health regions in Canada, providing health services to 980,000 residents in the region, and specialty services to Northern Alberta. The Home Care Program provides health and support services to people with health needs who wish to remain in their homes.

methods, can take from three to six months or more to heal. In the community, saline soaked gauze dressings are labour intensive. As shown in Table 2, normal saline-soaked gauze dressings may be less costly, but negative pressure therapy is more cost-effective because labour costs are reduced and the average healing time is less when compared with conventional methods. One case, shown in Figure 1, clearly illustrates the benefits for both the client and the program. The client had been plagued with recurrent pilonidal sinus for three years. After the third excision, negative pressure therapy was initiated. With three weeks of therapy, the wound had 100 per cent granular base, and epithelial tissue was begin-

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TABLE 2

Cost-effectiveness Example: Pilonidal Sinus Negative Pressure Therapy vs. Standard b.i.d. Dressings

Weekly costs	NS Gauze	Negative Pressure
Labour	\$560*	\$135*
Supplies	\$135	\$206
Equip. Rental	–	\$413
Total	\$695	\$754

*excluding travel



Figure 2: Before and after negative pressure therapy.

ning to migrate across the wound edges. Complete closure was achieved in 42 days.

Diabetic leg ulcers are known to be a high risk for lower extremity amputation. Consequently, healing these wounds quickly may result in a substantial reduction in the number of amputations. Preliminary studies have shown that negative pressure therapy may be beneficial.⁶ This

study also supports the use of negative pressure therapy in the treatment of indolent diabetic leg ulcers. One case, shown in Figure 2, clearly illustrates the benefits. The client's medical status was poor, and the physician thought that there was little potential for healing. The wound was large and deep. There was a 10 cm sinus tract on the left side. Negative pressure therapy

was discontinued after 29 days. The wound had 100 per cent granular base, with a few areas of hypergranulation. Conventional wound dressings were used to bring the wound to complete closure four weeks later.

Pressure ulcers present a significant challenge in the community setting. At a time of increasingly scarce resources, these ulcers continue to consume an excessive amount of resources in terms of nursing time and advanced wound products.⁷ Although negative pressure therapy has shown some potential in the facility sector, the outcomes are generally poor when the client is

discharged to the community. One of the main reasons is that the availability of specialty support surfaces is severely limited in the community. When clients were discharged home without a specialty support surface, in most cases the wound deteriorated rapidly, and negative pressure therapy was discontinued.

Some researchers have suggested that negative pressure therapy may be more beneficial in treating acute wounds than chronic wounds.⁶ However, our study did not support that notion. Acute wounds were included in six of the groups. Three of the groups had a higher

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