

WHITE PAPER

Continuum® NPWT:

8 month pilot study at Level 1 Trauma Center



CONTINUUM®



PRO-II®
gps enabled npwt pump



Jane Smith access granted.

Category	Item	Quantity	Location	Status
Medical	Band-Aids	100	Room 101	Available
Medical	Gloves	50	Room 101	Available
Medical	Stethoscopes	5	Room 101	Available

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Cardboard box

Background

Negative Pressure Wound Therapy (NPWT) is typically managed by a paper based systems that involve at least one vendor for inpatient care and a separate Durable Medical Equipment provider (DME) for outpatient care. In many cases, multiple DMEs are involved in delivering inpatient and outpatient care for one hospital. The standard system requires close coordination between the hospital and DME because the hospital must swap from the inpatient NPWT device to one provided by the DME at discharge. This system limits a hospital's ability to timely discharge patients. It also places a significant time burden on staff to perform sometimes unnecessary dressing changes and document inpatient usage for charge capture. The standard model for supply chain management of NPWT leads to lost charges and increased hospitalization durations. DeRoyal has developed an alternative model, the Continuum® NPWT system, that automates the management of NPWT, virtually eliminating the need for multiple devices and thus optimizing patient care.

Objective

The purpose of this study was to demonstrate the benefits of the Continuum® NPWT system through an 8-month pilot study conducted at a Level 1 Trauma Center located in Tennessee.

Methods

The Continuum® NPWT system was evaluated between February 2017 and September 2017. The system automatically managed GPS & RFID enabled NPWT pumps, dressing supplies, and discharge kits. All inventory was secured in Continuum® Vaults. The system automatically sent required patient information to the DME and insurance company to facilitate and expedite the discharge process for outpatient care and the system helps ensure accurate charge capture for both inpatient and outpatient care. At discharge, electronic transfer to the DME for responsibility of care occurs automatically as the NPWT device crosses the Geofence (a virtual fence) placed around the hospital. The NPWT device is returned to the Vault at conclusion of outpatient treatment by the DME.

The following outcome metrics were assessed monthly:

- *Number of patients managed*
- *Number of Part A (inpatient) rental days*
- *Discharges with pump and kit*
- *Number of Medicaid patients discharged*
- *and Patients discharged on non-dressing days or after hours*

The first four months were compared to the final four months to characterize the benefits and cost savings of the Continuum® NPWT system.

Results

The Continuum® NPWT system managed 529 patients that received NPWT treatment with a total of 3716 rental days. The system decreased discharge time by 28 minutes due to elimination of paperwork and eliminating 90% of discharge dressing changes resulting in 45 minutes of recovered clinician time per incidence. The hospital discharged 94 patients with the NPWT device used while in the hospital and the ability to discharge on non-dressing change days saved 89 hospitalization days. Patient utilization of NPWT increased by 25.1% while average days of inpatient NPWT decreased by 2.9%. The Continuum® NPWT system allowed for discharge of 14 Medicaid patients that would have required hospitalization until completion of treatment under standard NPWT systems. Annualized cost and time savings are estimated to be \$503,320 and 210 hours, respectively.

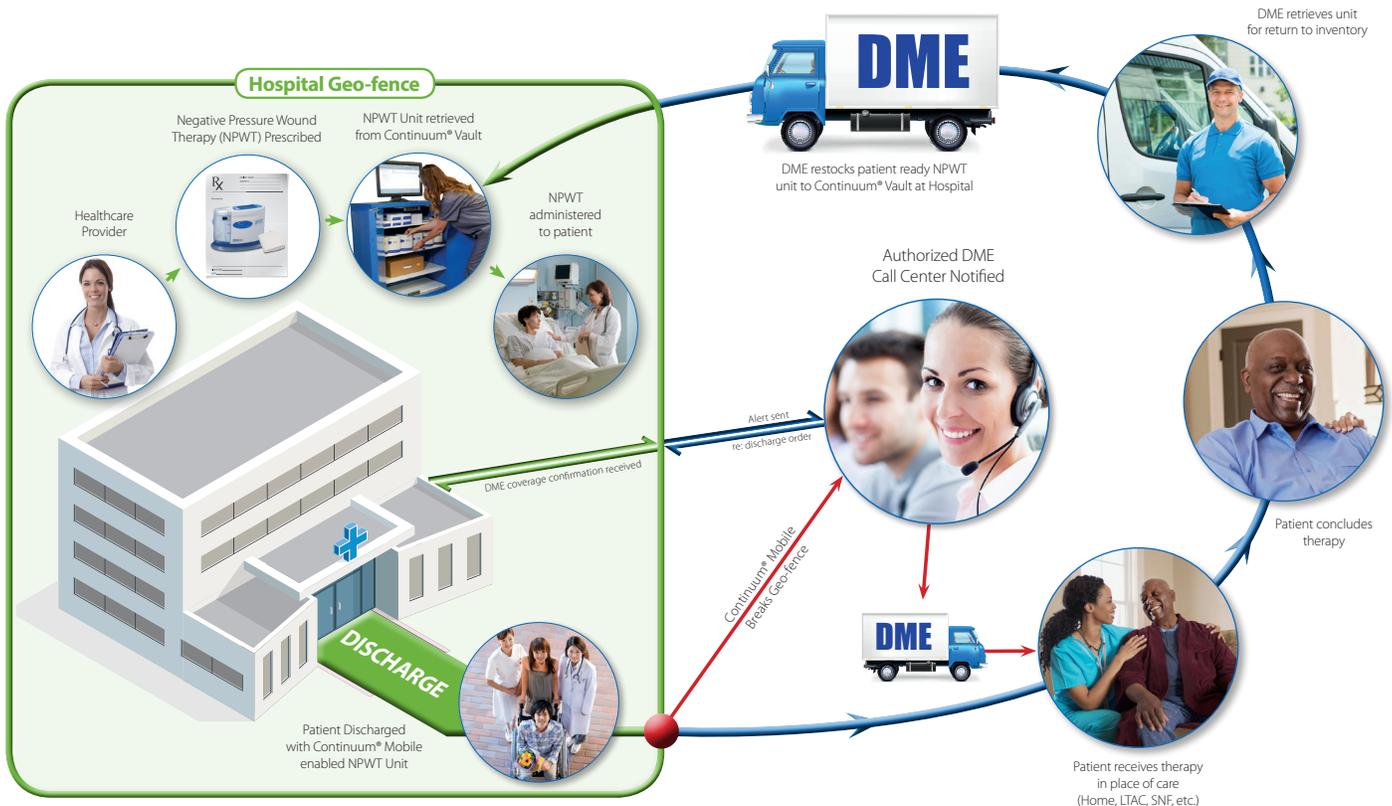
Discussion

The results from this pilot study demonstrate the benefits of an automated, secured, and electronically monitored system for NPWT, such as the Continuum® NPWT system, through the reduction of hospitalization duration, increased ability to discharge patients, improved quality of care, and significant cost savings.

Background

The standard NPWT model employed in healthcare facilities across the United States requires at least two inventories of NPWT devices that involve hospital devices for inpatient care and devices supplied by a durable medical equipment company for outpatient care. Hospital personnel are responsible for documenting care and usage duration during the inpatient period. Hospitals typically rent the NPWT device from a manufacturer and pay daily rental rates even if pump usage is only for a few hours. If errors occur in the documentation of NPWT usage, then the hospital incurs significant costs for unused pumps. Since a DME company manages outpatient care, discharges require participation of both hospital personnel and a DME representative. Prior to discharge, the DME must obtain insurance approval and ensure a device is available for the patient to leave the hospital. If insurance is denied or a device is not available, then hospitalization is prolonged and medical costs increase¹. In some instances, a patient receives a transitional NPWT device, but the transitional device also represents an increase in unnecessary healthcare costs and does not eliminate unnecessary dressing changes. The discharge process requires hospital personnel to document the wound and change the dressing to switch the patient to the outpatient NPWT device. The process to document the wound and perform the dressing change requires significant clinician time and in some instances, the dressing change is not necessary. Coordination between the hospital and DME is key often limiting patient discharges to set days and can sometimes lead to prolonged hospitalization. It is important to note that multiple DMEs often provide NPWT pumps to a hospital's patients for outpatient care further complicating the discharge of NPWT patients.

DeRoyal has developed a novel solution to manage the coordination of care between the hospital and a DME through a system called Continuum[®] NPWT. The system utilizes secured inventory cabinets called Vaults that leverage radio frequency identification (RFID) technology, GPS enabled NPWT devices, and cloud based software to automate the management of NPWT devices, dressing supplies, billing and the transition to outpatient care. At device removal and digital assignment to the patient, the Continuum[®] inventory control system begins tracking rental days and automatically notifies an in-network DME of a potential discharge. Notification of the DME at the beginning of care allows the hospital discharge coordinator and the DME to obtain the insurance approval at the start of care to eliminate delays in discharge. Once a patient is ready for discharge, the patient goes home with the same device placed at admission with dressing supplies for the first week of outpatient care. When the patient



leaves the hospital premises, the Continuum® system automatically transitions the patient to outpatient care managed by the DME. Overall, the system's design eliminates paper work, reduces time to discharge, and maximizes accuracy of charge capture for the hospital and DME. The purpose of this paper is to describe the results of a pilot study completed at a level one trauma center located in Tennessee.

Methods

Prior to implementation of the Continuum® inventory control system, the hospital utilized hand documented logs for the NPWT device vendor to determine daily billing per unit. Discharges were limited to predetermined days due to dressing change requirements when switching to the outpatient device. The hospital also had a limited ability to find DME companies to accept Medicaid patients due to difficulties associated with obtaining NPWT outpatient treatment approval.

The pilot study was completed between February 2017 and September 2017. At the hospital, two vaults were installed with one Vault managing NPWT devices with dressing supplies and a second Vault that managing discharge kits. The system automatically reordered dressing supplies and dressing kits as the hospital used inventory located in the vaults. As utilization increased, the number of pumps and dressing supplies managed by the system increased automatically. By the end of the evaluation period, the Continuum® system actively managed 50 NPWT units. Removal of a NPWT device or dressing supplies from the Vault prompts clinical personnel to assign the inventory to the patient. E-signature on a tablet captures delivery of the supplies to the patient. At the start of therapy, the Continuum® system transmits information required for pre-authorizations and discharge to the local DME and insurance providers. This process ensures patient discharge occurs from the hospital when hospitalization is no longer medically necessary. At discharge, the responsibility for outpatient care transfers automatically to the DME when the pump crosses the geofence placed around the hospital. At completion of outpatient treatment, the DME returns the pump to the Vault in the hospital. Outcomes for the pilot study were assessed monthly and included:

- *Number of patients managed*
- *Number of Part A (inpatient) rental days*
- *Discharges with pump and kit*
- *Number of Medicaid patients discharged*
- *Patients discharged on non-dressing days or after hours.*

Time eliminated due to automation of paperwork for discharging the patient and time to perform a dressing change was estimated by hospital clinicians participating in the pilot study. Data from the first four months of the pilot study was compared to the average values for the final four months to demonstrate the impact the Continuum® NPWT system had on the management of NPWT patients. The data from the final four months was utilized to estimate annual cost savings for the hospital.

Results

Overall the system successfully managed care for 529 patients with a total of 3716 rental days. The hospital discharged 94 patients with the NPWT device used in the hospital. The number of NPWT patients managed with the Continuum® system increased from 49 patients in February to a maximum of 82 patients in August. A 25.1% increase in patient utilization of NPWT occurred over the final 4 months of the evaluated period. While utilization increased, average days on rent decreased from 7.15 in February to 6.92 days in September. Comparing the first 4 months of the evaluation to the final 4 months demonstrated a 2.9% decrease in average days of rent representing an estimated \$7,800 (\$50/day rent) savings for the hospital when annualized over 12 months. Patients discharged to their home with the pump increased by 69% and a 171% increase in hospitalization days saved in the final 4 months of the pilot. Overall, the Continuum® system eliminated 89 hospitalization days representing a significant improvement in patient quality of care and cost savings. The system allowed 14 Medicaid patient discharges to home where previously these patients required hospitalization until NPWT treatment concluded. During the pilot study, the GPS capability of the NPWT pumps recovered two devices that would have otherwise been lost, representing a \$20,000 capital savings for the hospital. Table 1 describes hospital cost savings and table 2 describes hospital staff time saved annualized based on the final 3 months of data from the evaluation. Estimated annual cost savings for this pilot study was \$503,320 and estimated time savings were 210 hours of clinician time.

Table 1: Annualized Cost Savings of Pilot Study

	Single Time Cost	Reduction in Monthly Occurrences	Annual Savings in Dollars
Average cost per day for Non-Profit Hospital ²	\$2,289	16	\$439,488
Capital Equipment Loss ³	\$10,000	0.3	\$36,000
Reduction in Rental Days	\$50/day	13	\$7,800
Dressing Changes ⁴	\$119.24	14	\$20,032

Table 2: Annualized Time Savings of Pilot Study

	Time Reduction in Minutes	Monthly Occurrences	Monthly Minutes Saved	Annual Savings in Time
Discharge Time	28	15	420 minutes	84 hours
Dressing Change Time	45	14	630 minutes	126 hours
Total Annual Time Savings				210 hours



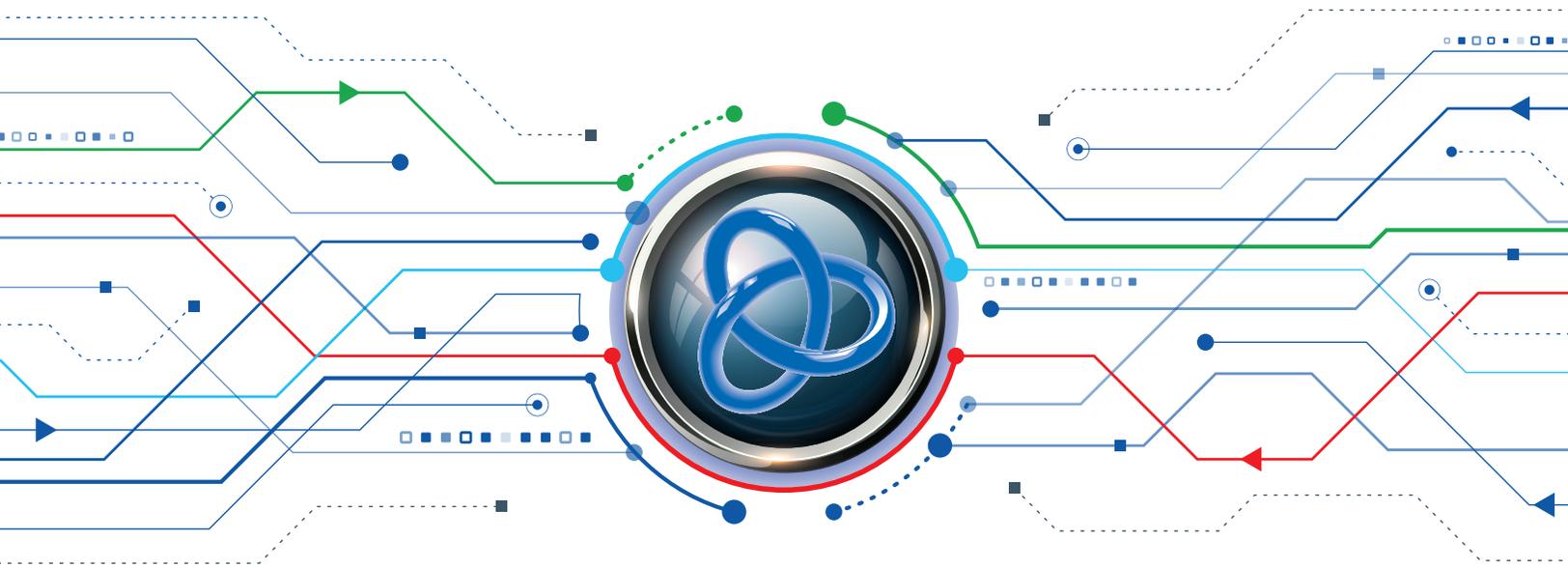
CONTINUUM[®]
NPWT

Discussion

The Continuum® inventory control system allowed the hospital to increase patient utilization of NPWT treatment while decreasing average duration of device use. The system ensured NPWT devices and dressing components were available through automatic reordering allowing patient utilization to increase. Use of a single NPWT device in treating a patient in both the inpatient and outpatient environment streamlined continuity of care. This benefit allowed patients discharges to occur at any time. As a result, 40% of discharges occurring after hours or on non-dressing change days, directly equating to 89 hospitalization days saved during the 8-month evaluation period. It is important to note that the system likely saved additional hospitalization days due to eliminating discharge delays associated with outpatient device availability and DME device delivery. The use of a single pump eliminated 90% of dressing changes at discharge, saving clinician time and reducing the anxiety and pain often experienced by patients during dressing changes. Elimination of discharge paperwork through automation recovered additional clinician time. The recovered clinician time not only represents a cost savings for the hospital but also improves patient quality of care as clinicians can spend more time focused on the patient's needs and care. With the Continuum® NPWT system, device training for patients and caregivers occurs for one device and the inpatient period allows for familiarization with the device prior to discharge. This benefit helps to eliminate uncertainty in using the device at home and eliminates anxiety that can occur with a different outpatient device. The Continuum® system maintains chain of custody throughout treatment and the GPS feature of the system ensures recovery of NPWT devices after treatment completion. The findings from this pilot study of the Continuum® NPWT system clearly demonstrate improved continuity of care and directly addresses the weaknesses of the standard NPWT supply chain model utilized in most healthcare facilities. Overall, the hospital is expected to save over \$500,000 annually, in addition to the clinician time saved and improved quality of care for patients treated within the Continuum® NPWT system.

Works Cited

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Reprint # LIT0-2422 | Rev. 9/17

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