Project Title: Using Telehealth Technology to Implement Evidence-Based Wound Care in Underserved Practice Settings

Organization Name: Mission Health System

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Summary of Project Aims
The purpose of this evidence-based practice (EBP) project was to test the fidelity and feasibility of using telehealth technology for comprehensive wound, ostomy, and continence (WOC) nursing service delivery to underserved rural practice settings.

Specific PICO components were as follows:
- **Patient:** Adult residents of a rural skilled nursing facility (SNF)
- **Intervention:** Remote WOC assessment and management delivered via telehealth technology
- **Comparison:** Standard care (care management delivered by non-WOC nurses)
- **Outcomes:**
  - New pressure/lower extremity ulcer development
  - Progression of wound size and status
  - Time to heal
  - Treatment cost
  - Number of wound related physician and/or WOC nurse referrals
  - Number of wound related complications (localized infections, cellulitis, osteomyelitis, amputation, sepsis, etc.)
Number of wound related ED visits
Number of wound related hospitalizations
Wound related mortality

The PICO question guiding this project was: In adult residents in a rural SNF (P), what is the effect of the use of telehealth technology to provide WOC nurse assessment and management (I) as compared to standard treatment (C) on pressure/lower extremity ulcer development, progression, time to heal, treatment cost, number of wound related physician and/or WOC nurse referrals, number of wound related complications, number of wound related ED visits, number of wound related hospitalizations, and wound related mortality (O)?

The project was conducted in two phases. Phase I incorporated an inter-rater reliability design with a specific focus on treatment integrity. Phase II incorporated an iterative, descriptive, exploratory design with a focus on treatment impact on patient outcome. A return on investment (ROI) analysis was also conducted.

Theoretical/Conceptual Framework
The translation of evidence to practice in the healthcare setting is a complex process riddled with ever-changing nuances and barriers. To account for the variation in factors impacting knowledge translation within a large, diverse healthcare system, this project used an iterative methods design using action research methodology guided by the Knowledge-to-Action (KTA) framework. The KTA framework, created from a concept analysis of 31 planned action theories, was developed in an effort to define and conceptualize the process of knowledge translation/implementation. It is considered a planned action model integrating the concepts of knowledge creation and action.

Methods, Procedures, & Sampling

Subjects and Setting: Phase I was conducted on 7 units of a tertiary acute care facility (hub facility) as well as the SNF (spoke facility). Subjects included adult patients with a WOC consult order. Phase II was conducted at a remote, rural SNF (spoke facility). Subjects included any adult patient with a WOC consult order.

Apparatus and/or Instruments: Intra- and interrater reliability was assessed using a documentation-based wound assessment tool consisting of 6 discrete assessment points based on the Bates-Jensen Wound Assessment Tool. Phase II patient outcome evaluations were assessed as outlined in the proposal outcomes.

Procedure:

Phase I: Consult requests were received by a centrally located WOC nurse. With the patient’s consent, the assessment was first conducted by the WOC nurse remotely in collaboration with a bedside nurse wearing the telehealth technology. The same WOC nurse then conducted an assessment at the bedside. Initial assessment points and treatment plans were compared. A different WOC nurse, blinded to the first assessment, also conducted a bedside assessment with treatment recommendations, which were then compared to the telehealth generated treatment plan. After each patient consult, barriers and supports to
implementation were discussed and themes analyzed in an effort to guide Phase II implementation.

**Phase II:** Hub WOC nurses traveled to the spoke SNF site and conducted on-site wound assessment and telehealth apparatus use training. Training included real-time bedside assessment using the remote technology and implementation of treatment recommendations. Once training was completed, remote telewound assessment and management was initiated. Consult requests were received by a centrally located WOC nurse at the hub site. The staff RN at the rural SNF (spoke site) conducted the remote bedside assessment using the telehealth apparatus. The hub WOC nurse, patient/family, and spoke primary nurse collaboratively developed and implemented a treatment plan. Hub WOC nurses were in ongoing contact with the spoke staff RN and visited the spoke site regularly to assess education/knowledge uptake and assessment/treatment consistency. Implementation strategies were adjusted as indicated by ongoing project evaluation. Patient outcomes were monitored longitudinally across Phase II implementation and maintenance. Data were compared with like-matched patients undergoing standard treatment prior to project implementation.

**Summary of Findings**

**Phase I:** Twenty-one wounds on 16 patients were assessed via telehealth technology and bedside observation (the gold standard comparator) using the Wound Assessment Tool. Six wound assessment components were included for each wound; however, missing documentation was noted on all but one assessment component (drainage amount), with the “wound edges” data point having the highest percentage (76%) of omitted documentation (Figure). When comparing tele-observations versus bedside intra-rater reliability for the Wound Assessment Tool, there was excellent agreement on observations with an overall percent agreement on all items of 98%. Perfect agreement (i.e., 100%) was achieved for observations on the wound bed, wound edges, periwound tissue, drainage amount, and odor. Minimal discrepancy was demonstrated on the presence or absence of drainage (i.e., tele-observation score = 14, bedside observation score = 15), yielding a 93% agreement. Agreement on “drainage amount” was calculated only on observations in which there was agreement on the presence or absence of drainage and the drainage amount was documented for both the remote and bedside assessment, yielding only one assessment. Inter-rater reliability of treatment plan as established by the WOC nurse conducting the remote tele-assessment and an independent WOC nurse conducting a bedside assessment was 100%.
Phase II: Wound progression was compared pre- and post-implementation of the telehealth technology. Chart review pre-implementation showed that there was a limited number of patients with chronic wounds prior to implementation, and that trend continued post-implementation. Given the compromised state of the patient population, and that many were hospitalized for other comorbidities, being moved into hospice, and/or expiring during the course of the project, an accurate comparison of patient outcomes was not attainable.

Extraneous Findings: Despite the lack of improvement in wound outcomes, other unexpected positive findings were noted. The telehealth technology device was well received by patients and families, nursing staff, and physicians. Patients and families were very pleased to have access to expert care from wound care nursing experts at the supporting tertiary care (hub) facility. Patients with confusion/dementia also responded well to the use of the device. The nursing staff were very happy to have real-time support from the WOC nurses, and expressed that they felt that their knowledge and competency in providing more complicated wound assessments and treatments had improved over the study period. Additionally, we were able to better standardize treatment modalities through the use of the device. The primary care physicians supporting the SNF were also very receptive to the technology and asked that similar technology be added in their office practice setting in an effort to better manage outpatient wounds and avoid sending patients to wound care centers that are more than an hour away, requiring transportation down a long, treacherous mountain road.

Return on Investment Analysis: Return on investment analysis also yielded positive findings. Remote staff training on the use of the device was less than one hour from box to bedside, with technology uptake being essentially intuitive in nature. The overall cost of implementation of the telehealth device, to include training of the bedside nurse at the SNF site, was less than $5200.00. The average cost of an in-person WOCN consult at this remote facility, inclusive of WOCN salary and travel time, is $300.00. The average cost to transport the patient via EMS to an outpatient wound care center is $630.00. Given that a complex chronic wound should be seen by a WOCN at least weekly, the cost of the tele-technology purchase, inclusive of staff training, was recouped in less than 4.5 months of telewound consults.

Recommendations
Results support further evaluation of telehealth technology as a tool to enhance the delivery of wound care services in remote underserved settings. Implementation and evaluation of this technology on clinical and financial outcomes in multiple wound care delivery environments should be determined moving forward. Successful implementation should serve as a template to expand evidence-based WOC nursing care across the globe.