Standardization in Wound Care Delivery to Reduce Systemic Variation

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Executive Summary

The executive summary will provide and discuss a comprehensive, concise, and accurate project overview, problem statement, scope of the problem, mission and vision of the project, purpose of the project, objectives and statements, and the plan and scope of the project.

Overview

Wounds impact nearly 15% of Medicare beneficiaries (8.2 million patients) with an estimated wound care cost of $28 billion annually. In addition, if wounds were included as a secondary diagnosis, the cost for Medicare may range from $31.7 billion to $96.8 billion, while with non-Medicare patients, the wound care cost range from $9.9 - $35.8 billion for outpatient services, and $5.0 - $24.3 billion for inpatient (Nussbaum et al., 2018). With the presented wound care costs, the utilization of many variations of wound care delivery at all levels of health care settings, from the hospital to the home, may likely result in suboptimal outcomes for the clients, substandard community health, decreased affordability for hospital continuum, and decreased satisfaction for the providers. With the existence of wound care nurse specialists, advanced wound care products, and the increased volume of patients who require wound care, there is a need for standardization of safe, high quality, and affordable wound care delivery. Therefore, this project aims to introduce a scaling standardization system to reduce the systemic variations of the current wound care delivery practices to be used by the healthcare system in various settings.

The following sections briefly discuss the statement of the project's problem, mission and vision statement, scope of the problem, and objectives and outcomes of the project.

Statement of the Problem

The current utilization of different variations of wound care delivery at all levels of healthcare settings, from acute to home health services, will not meet the challenges of wound care delivery. The lack of standardization to deliver safe, high-quality, and affordable wound care services in all levels of healthcare settings will no longer meet the needs of today's complex wound care services. The increased cost of wound care delivery services, increased volume of patients with wounds, and decreased satisfaction of the wound care providers and patients call for standardization of wound care delivery in all healthcare settings. Therefore, the DNP project proposes a standardized workflow linking people to processes that can be virtually accessed by all health care providers, including nurses led by the Wound, Ostomy, and Continence Nurse (WOCN).

Scope of the Problem

The project scope addresses the systemic variation in wound care delivery across healthcare settings. Historically, within the healthcare organization that the DNP project was completed (for the purposes of the DNP project, the healthcare organization will be referred to as K org), WOCNs were introduced into the care delivery pathway when wounds were not healing or determined to be complex. Nurses and WOCNs may or may not take pictures to document wounds, potentially delaying healing because a baseline was not established. To address the inconsistent practices of variably involving the WOCN in the plan of care and variably documenting wounds through pictures, the new standardization of wound care delivery, using both the WOCN and the Tissue Analytics Application (TAA), will be introduced to the entire healthcare staff in collaboration with the nursing education department. Educational emphasis will be on how: 1) to access and use the new standardization of wound care delivery; 2) to

optimize the WOCN, and 3) to access and utilize the wound care products and supplies more uniformly. The systemic variation in wound care delivery practices across healthcare K org in all care delivery settings leads to suboptimal wound care healing and patient outcomes, increases in nursing overtime and nursing burnout, decreased patient access, and waste in wound care supplies.

Mission and Vision Statement

The mission of the DNP project is to redesign the wound care delivery services of K org by standardization of wound care orders which will be utilized from inpatient to clinic, and up to the patients' homes. The vision is to have a working standardized wound care delivery system where all healthcare providers, including WOCNs and other nurses, can access the wound care orders virtually, delivering safe, highly affordable, and efficient wound care services to all patients of K org. The virtual technology to be utilized in the standardization of wound care delivery is through the Tissue Analytics Application (TAA), which will be explained more in detail in the latter part of the paper.

Objectives and Outcomes

The primary objective of the project is to provide a high-quality wound care service to patients of K org in all patient care settings leading to safe, high-quality, easily accessible and affordable wound care services, decreased organizational cost expenses, and increased satisfaction for nurses and other health care providers. The DNP project will be conducted in phases. Phase 1 will focus on the development of the standardized process and subsequent access created, phase 2 will focus on the adoption of the standardized process, and phase 3 will focus on the adoption of the standardized process starting from K org in Orange County to the rest of Southern California K org. The project's outcome is a standardized wound care delivery system

through TAA, which can be virtually accessed by all healthcare providers to deliver a high-quality wound care service to patients.

The next section will discuss the problem statement and the significance of the project to improve wound care delivery for K org and its patients. In addition, supporting data will be provided for the need for change in wound care delivery.

Problem Statement and Significance

The systemic variation in wound care delivery practices across the Healthcare K org in acute settings, in clinics, and in home care settings led to suboptimal outcomes for the patients, substandard community health, decreased affordability for the hospital continuum, and decreased satisfaction for the providers. The challenges are widely evident internally within K org and externally throughout United States hospitals and in developed countries with a healthy medical infrastructure.

Historical attempts to achieve common standards for specialist nursing have largely been unsuccessful due to the diversity of approaches to nurse specialization (Ranchal et al., 2015). To augment this point, a study conducted in Spain by Avruscio, Tocco-Tussardi, Bordignon, and Vindigni (2017) illustrated the incidence of variability and the need for a systems approach through nurse staffing, wound care nurse specialization, and process standardization. In the study, the medical group retrospectively identified their gaps through an internal audit of how wound care was being rendered by the nurse. Evidence from their observations indicated that physicians and nurses provided care not always consistent with the recommendations, and assessment and decision-making processes were poorly documented (Avruscio et al., 2017). Furthermore, their clinical oversight and management revealed significant inconsistencies, particularly highlighting fragmented performance instead of a preferred, structured, patient-

centered unified methodology for wound care delivery. The consequences of those imperfect inconsistencies hurt both providers, as identified above, and patients. Services for those not receiving best practice care are fragmented, with care delivered by a range of healthcare professionals across primary and secondary settings. Such a disconnected system leads to increased healing times, high recurrence rates, complications requiring hospitalization, and reduced quality of life for the thousands of patients affected by chronic wounds in Australia (Brain et al., 2019).

Guest et al. (2017) conducted a large-scale study in the United Kingdom, detailing the utilization and outcomes of over 2,000 patients from 2012 to 2013. After adjustment for comorbidities, in the United Kingdom, the annual cost to the National Health System (NHS) of managing 2.2 million wounds was estimated to be £4.5–5.1 billion (equivalent to $4.6 – $5.7 billion). Of these wounds, it was estimated that 1.3 million wounds healed (61%,) and 0.9 million remained unhealed (39%). Moreover, resource use associated with managing the unhealed wounds was substantially greater than that of managing the healed wounds (20% more practice nurse visits, 104% more community nurse visits, 13% more GP visits, 18% more hospital outpatient visits, 40% more drug prescriptions). Consequently, the annual cost of managing wounds that healed was estimated to be £2.1 billion ($2.5 billion) as compared with £3.2 billion ($4.4 billion) for the 39% of wounds that did not heal within the study year (Guest et al., 2017).

Guest et al. (2017) identified most wound care being a nurse-led discipline. Despite this, there would appear to be minimal clinical involvement of tissue viability nurses and other specialist nurses. This study demonstrated a lack of evidence-based wound care, treatment at times deviated from approved guidelines, lack of senior engagement in wound care delivery, and

lack of continuity and consistency of wound care and treatment planning (Guest et al., 2017). All-in-all, this landmark study and subsequent smaller-scale studies detail what wound care delivery without accountability can lead to.

The following section discusses the environmental context of the project, which includes the description of the type of setting where the project will take place and the size and location of the setting. In addition, market/risk analysis will be presented, including the economic, social, and political environment in which the project will be implemented and analyzed and discussed relative to the implementation strategies (Strengths, Weaknesses, Opportunities, Threats).

Environmental Context

The magnitude of Wound Care Delivery variability across the K org healthcare continuum of hospital, clinic, and home, is not a new problem. It was initially addressed with the hiring of Wound Ostomy Certified Nurses and the designation of wound care champions. With that said, with the growing complexities of wound care delivery, the increasing membership, and the lack of evidence-based nursing practice guiding this care delivery, K org is attempting to address the issues.

Setting

The project will be implemented in the home care setting of K org in Orange County and then scaled regionally to all home care settings for K org Southern California Home Care. In Orange County Home Care, there are 50 licensed nurses in home care services who have a fundamental understanding of basic wound care. Wound care represents approximately 30% of the referral volume for all home care, which has also experienced a 5% rate increase in the number of home care referrals yearly. The increase in aggregate volume has resulted in increased

overtime and decreased time spent with patients, leading to inadequate wound assessment and inefficient wound care delivery.

The magnitude of variability of wound care delivery across healthcare K org in all levels of care is not a new problem. K org addressed the variability by hiring a WOCN and designating wound care champions who are licensed nurses. However, due to the growing complexities of wound care, increasing patient membership, and the lack of standardization of wound care practice, the variability remained an issue. Therefore, K org is readdressing the variability issue once again by attempting to redesign the organization's wound care delivery services by the standardization of wound care orders which will be utilized from inpatient to clinic, and up to the patients' homes, at both a regional and local level.

The next section will discuss the strengths, opportunities, vulnerabilities, and threats in implementing a standardized approach to wound care delivery.

Market/Risk Analysis

Strengths, Opportunities, Vulnerabilities, and Threats

Strengths

A Southern California Regional Wound Care Steering Committee was formed in 2019 to recognize the reality of variability in wound care delivery. K org Orange County Senior Nursing Leaders and the Executive Team have sponsored new Wound Care Core Teams for all settings, as well as a combined Core Team Committee sponsored by the Chief Operating Officer and Chief Nurse Executives. The team has started a pilot program exploring the viability of standardizing wound care delivery. At the service line level, there are existing, solid partnerships amongst the Orange County Home Care Continuum, the Health Innovation Studio, and Regional Home Care Services. The partnerships also extend to both the hospital and ambulatory settings.

Opportunities

K org San Diego ran a test of change regarding around wound care delivery in the home setting and showcased optimistic results, primarily through a reduced re-hospitalization rate for the population they provided care for and satisfaction for the provider, with nurses collectively supporting the ease-of-use of the Tissue Analytics application (TAA). The reduced patient recidivism provided the opportunity to test the TAA platform in another service area, which K org Orange County took advantage of. The other opportunity which highlighted the need to engage in this work was the $400,000 spent on medical equipment expenditures by Orange County. With the tremendous amount of momentum and willingness to do right and the significant qualitative and financial value-add to the organization come vulnerabilities and threats to accomplishing the objectives of the standardizing wound care delivery.

Vulnerabilities

Vulnerabilities and threats to the implementation of standardized wound care delivery are specific to culture, organizational environment, and external, unforeseen factors that can minimize the priority of strategizing, implementing, and executing this work. The existing vulnerabilities within the culture K org Orange County include clinician oversight of the supervisors, clinician burnout (attributed to the 17% overtime in 2019), the lack of adherence to following the process of consulting the Wound Care Nurse, Tissue Analytics not being incorporated into the Electronic Medical record, and the pre-existing state of the Hospital, Ambulatory Care, and Home Care settings working in silos rather than more collaboratively.

Threats

The primary threat to the redesign work moving forward is the myriad of activities in response to Covid-19, with the entire organizational shift currently focused on mitigating risk,

ensuring hospital capacity, and securing appropriate personal protective equipment to render care appropriately. Although these vulnerabilities and threats exist, the Wound Care optimization initiative has been allowed to continue because the work is being viewed as a response to Covid-19, with increasing hospital throughput and keeping both patients and providers safe through virtual Wound Care visit consultation.

The next section will discuss the integration of faith and the theoretical framework of implementing a standardized wound care practice.

Faith Integration and Theoretical Framework

Faith Integration

The DNP project, whose goal is the standardization of wound care delivery in all levels of settings, needs a strong leadership team. For this project, the servant-leadership style seems to fit. As a believer, Jesus Christ is the best example of a strong leader who taught his disciples how to be good leaders. Mark 10: 43 says, “If you want to be a leader, you must first be a servant.” The verse fits the project’s challenging scope because of the complexities of creating wound care standardization where there is such variation.

Another scripture fitting the project is John 13: 3-5 when Jesus washed the disciples’ feet. “Jesus, knowing that the Father had given all things into His hands, and that He had come forth from God and was going back to God, got up from supper, and laid aside His garments; and taking a towel, He girded Himself. Then He poured water into the basin and began to wash the disciples’ feet and to wipe them with the towel with which He was girded.”

Engagement and partnership, collaboration and accountability, service, and support are all contributing to healthcare success. Just as Jesus sought to understand His disciples and helped them disciple others through His example, the author attempted to do the same. The practical

parallel of how servant leadership is demonstrated in this DNP project is through an approach with the nurses and supervisors. Rather than the DNP project being a directive from administration stating that the process is going to change, the author met with clinicians in patients' homes, observing the care being delivered. The author then inquired with the clinicians and supervisors of what worked well for them during care delivery and what areas in the process needed improvement. With the input received from the nurses, the author then invited the nurses to be a part of the development process, allowing them to construct the new standardized workflow, test it, and then modify it as needed. The nurses became an integral part of the development, with the process becoming their own. Collaboratively approaching the DNP project created ownership and accountability to the process the nurses built. The nurses were provided the time and space to engage and contribute, serving as a parallel to the servant leadership that Jesus demonstrated.

Theoretical Framework

The theoretical framework chosen for the project aligns with the servant-leadership style discussed in the Faith Integration section. Servant leadership is a recent theory by Robert Greenleaf. According to Greenleaf, servant leaders get results for their organization through whole-hearted attention to their followers and their actions. Servant leadership places its emphasis on collaboration, trust, empathy, and ethics. Greenleaf portrays the servant-leader as someone who naturally serves first and then makes a conscious choice to aspire to lead. Such an individual is different from the person who first has the desire to lead, establishes his or her leadership, then chooses to serve because of a moral sense or because that service is expected (Flaniken, 2006).

In an Ontario, Canada hospital study conducted by Heerschap, Nicholas, and Whitehead (2018), participants commented on the importance of interprofessional perspectives when assessing and treating a wound, how the lack of an interprofessional team approach is detrimental to patient outcomes, and that assistance from team members is vital to patient outcomes and safety. In addition, participants frequently discussed the benefits of a wound care specialist on the wound management team to assist in the decision-making process. The wound specialist was suggested as a beneficial resource for whenever wound complications arise or when staff are uncertain how to proceed with care (Heerschap, et al., 2018). The presumed interdependence of working in a hospital setting was overshadowed by operation in silos, so to speak, with nursing care delivery operating independently without multidisciplinary collaboration or specific nursing expertise. The same illustration can describe the home care setting, where providing care in a wide array of home settings matches the isolation experienced by home care nurses. Nurses in the home care setting operate based on experience, utilizing or not utilizing best practices, and inconsistently leveraging the expertise of a Wound Ostomy Certified Nurse, which actually does exist in the home care space.

In both hospital and home scenarios, Practice Theory comes into play. Practice Theory is applied to unpacking the methodical, well-intentioned, and, at times, disjointed processes of nursing wound care delivery from the perspectives of the home care nurse. A prominent theme in literature reviews of wound care delivery and assessing this operationally in the DNP project is the voice of the nurses, particularly in how vocal and how specific they are in identifying opportunities. Concurrently, as preliminary work has been completed for the DNP project, the Wound Care Core Team, including this author, has been especially intentional in seeking to

understand the environmental reality of the frontline nursing team through interviews with case management clinicians, Wound Ostomy Certified Nurses, and frontline management.

The accountability of the nurses started when they expressed their desire to be part of the solution and not of the continuing problem. The nurses and WOCNs were receptive to revising the current workflow process. Incorporating the WOCN from the initial visit of all new patients and agreeing to test a new phone-based application standardizing wound care practice created ownership and accountability for the nurses, leading to their receptiveness to the DNP project.

The next section will review the literature and evidence related to the successful implementation of a standardized wound care process.

Literature Review and Evidence Synthesis

Literature Review

The search of databases to identify peer-reviewed literature related to the DNP project included Cumulative Index to Nursing and Allied Health Literature (CINAHL), Academic Search Premier, Science Direct, Scopus, Medical Literature Analysis, and Retrieval Online (MEDLINE), APA PSYCINFO, and the OneSearch at CBU). Using the following key terms of wound care, nursing, and standardization, relevant quantitative, qualitative, and mixed-method studies published in English between 2007 to 2020 were reviewed.

When using the term wound care, CINAHL (scholarly journals, conference papers, dissertations, or theses) yielded 43,637 papers. Adding nursing as a search term decreased the number of possible papers to 8,683, while adding standardization resulted in 29 papers. Aggregately, two papers were retained from CINAHL for inclusion in the review of the literature.

When using the term wound care, Academic Search Premier (scholarly journals, conference papers dissertations, or theses) yielded 69,407 papers. Adding nursing as a search term decreased the number of possible papers to 8,376, while adding standardization resulted in 25 papers. Aggregately, one paper was retained from Academic Search Premier for inclusion in the review of the literature.

APA PyscInfo (scholarly journals, conference papers, dissertations, or theses) yielded 2,465 papers using the term wound care. Adding nursing as a search term decreased the number of possible papers to 619, while adding standardization resulted in four papers. Aggregately, one paper was retained from APA PyscInfo for inclusion in the review of the literature.

Medline (scholarly journals, conference papers dissertations or theses) yielded 64,053 papers using wound care. The number decreased to 8,533, adding nursing as a search term. Lastly, adding standardization resulted in 34 papers. Aggregately, three papers were retained from Medline for inclusion in the review of the literature.

OneSearch at CBU (scholarly journals, conference papers dissertations, or theses) yielded 170,552 papers with wound care as a starting search term. Adding nursing decreased the number of possible papers to 28,497, and the number decreased to 96 when the term standardization was added to the search term. Two papers were retained from OneSearch at CBU for inclusion in the review of the literature.

When using the term wound care, Scopus (scholarly journals, conference papers, dissertations, or theses) yielded 95,020 papers. Adding nursing as a search term decreased the number of possible papers to 18,730, while adding standardization resulted in 295 papers. Five papers were retained from Scopus for inclusion in the review of the literature.

Lastly, Science Direct (scholarly journals, conference papers dissertations, or theses) yielded 263,752 papers using the search term wound care. Adding nursing decreased the number of possible papers to 38,949, while adding standardization resulted in 9,355 papers. There are a total of two papers retained from Science Direct for inclusion in the review of the literature.

Thus, a total of 16 articles were included in the literature review.

Synthesis of the Literature

In a study conducted by Wang et al. (2019), nurses confirmed that the system functions would work in wound care practice without major problems. Through cognitive walkthrough with nurses and iterative design, the human–computer interface in the system workflow was found to meet nurses' expectations and to improve the efficiency and effectiveness of current clinical practice. After the prototype trial, the efficiency and convenience of all major task operations in the wound care process were compared between the new work experience with the prototype and the past work experience. It was clear that the efficiency of the task operation and the performance were significantly improved by cutting the time of each task in the normal workflow. The survey result showed that the new smart mobile system achieved a high-level user satisfaction and proved its effectiveness in clinical practice (Wang et al., 2019).

In another study emphasizing process mapping, referencing the previously cited article from Avruscio et al. (2017), nurses completed a current versus ideal state regarding their practices. The nurses identified variances across each medical and administrative specialty with their analysis and subsequent process mapping led to a decrease in annual expenditures related to wound care management by approximately 56%, treating nearly the same amount of patients year over year (319 versus 316, respectively) (Avruscio et al., 2017).

Coleman et al. (2017) looked at standardized minimum data sets (MDS), which were utilized to simplify nurse assessments to their core work, and furthermore allow the opportunity to collate data to analyze and build decision support through trends, thereby increasing the opportunity to improve patient outcomes. Using structured consensus methods that incorporated a literature review and expert opinions, an MDS was developed to underpin wound assessment documentation and practice. It is anticipated that the MDS will facilitate a more consistent approach to generic wound assessment practice and support providers and commissioners of care to develop and refocus services that promote improvements in wound care with the potential for improved patient outcomes (Coleman et al., 2017).

Clinicians' understanding of the roles and responsibilities of a wound care specialist can serve in augmenting wound care delivery and streamline resources. Referencing the Heershap study (Heerschap et al., 2018), participants believed that due to the availability of a wound care specialist for consultation, there was a lack of accountability in gaining knowledge and education to later manage future similar wounds. Participants noted in some instances, if they believed they had adequate education to manage a wound, they put off management and did not always apply the most appropriate dressing. It was believed that for clinicians to be truly independent in their decision-making process, they required the appropriate level of knowledge and education. The need for clarity of the wound care specialist's responsibilities was discussed to manage time and resources more appropriately and develop competency in wound management (Heerschap et al., 2018). Consultant advanced practice nurses contribute to the efficiency of care for people with chronic complex wounds and to the training, which optimizes the resources and improves professional knowledge, which in turn leads to better care of patients with chronic wounds (Jiménez-Garcia et al., 2019).

Collectively, the 16 articles reviewed discussed variations in the delivery of wound care, nurse involvement in the standardization process, and the importance of wound experts such as WOCNs in the delivery of care.

The next section will discuss the SMART objectives of the DNP Project.

SMART Objectives

Phase 1

- Wound Care Ostomy Nurse (WOCN) Touches through Virtual Consultation via Telephone and/or the Tissue Analytics App (TAA) will increase by 25%. A baseline of 4 visits/touches per day
- Via Survey, Nurses who participated in the TAA/WOCN pilot will voice high satisfaction (9 or 10 score) on 80% of the surveys received back.
- Timeliness of Care Aggregate will increase to 96% (Baseline Timeliness of Care January – October 2019 93.5%)

Phase 2

- All of Phase 1 will be achieved, + clinician adherence to workflow leveraging both WOCN and TAA Application will be 50%.

Phase 3

- Completion of Phase 1 and Phase 2 conclusion will further result in the authorization of a Test of Change to another K org Southern California Home Care Agency by Q2 2021.
- Tests of Change in another Home Care Agency will result in: scale across K org SCAL Home Care and a Test of Change by Q4 2021.

The next section will discuss methods, implementation, and outcomes of the SMART objectives of each phase of the DNP project.

Methods, Implementation, and Outcomes of the DNP Project

Methods

Led by the DNP author, K org Orange County Home Care Leadership began collaborating with its partner San Diego Home Care agency to gather information on their wound care practices. An Orange County Wound Care Committee was formed, consisting of Home Care Administrative and Physician Leadership, along with a partnership with the Health Innovation Studio (the technological design center of K org) and sponsorship by both local and regional K org executive leadership. A subsequent planning committee was created to develop the new standardized wound care workflow process, introduce and train nurses on the Tissue Analytics Application (TAA), and draft a communication strategy informing nurses about the importance of standardization and WOCN involvement in wound care delivery. Home visits with the nurses providing wound care to patients were also conducted to understand the current workflow and identify gaps in wound care delivery. Education sessions were conducted with the 30 Clinicians who would be utilizing the TAA and testing the new workflow incorporating the WOCN at the start of care.

The next section will discuss the phases of implementation and outcomes of creating a standardized approach to wound care delivery.

Phase 1 Implementation

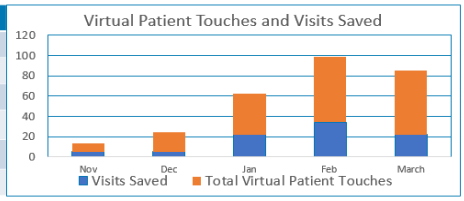
The initial test of change utilizing people, process, and technology to scale a standardized, systematic approach to Wound Care Delivery through one single subject matter expert (Wound Ostomy Certified Nurse, WOCN) has been completed. The following will be a review of the objectives, measurement tools utilized to obtain the data, and how the data was been analyzed to demonstrate outcomes.

K org granted IRB approval for Tissue Analytics utilization in 2018. CBU granted IRB approval for the DNP project to move forward in August 2020. From November 2019 through March 2020, K org Orange County Home Health and the K org Health Innovation Center met strategized, planned, and developed to integrate the Standard Operating Practice combining the WOCN and TAA into the home care nursing workflow. The workflow was tested by 30 K org Registered Nurses and Licensed Vocational Nurses. The first SMART goal identified through these first five months was that once phase 1 was completed, the WOCN Touches through Virtual Consultation via Telephone and/or the Tissue Analytics App would increase by 20%. The table below demonstrates the data over Phase 1:

OC Wound Care TA Pilot: Visits Saved, Access Created

- From Nov 2019 to March 2020, there were 195 Virtual Patient Touches (VPTs)** on the OC Wound Care Patient Tracking Log
- 88 out of 195 visits (45%) account for visits saved

	Visits Saved	Total VPTs
Nov	5	8
Dec	5	19
Jan	22	40
Feb	34	65
March	22	63
TOTAL	**88**	**195**



- For a VTP to qualify as a "Visit Saved" the following standardized criteria was applied:
  - What Kristi would normally go out to see PRE Test of Change, Stage III/Stage IV, complicated wound/unhealing wound (no sign of healing in 2 weeks, non-healing), daily visits
  - Is this a wound that I would have had to go out for?
  - Who is the Frontline Clinician – Aptitude determination for quality of wound care provided?
  - All things considered to determine delegation
  - Delegation = saved visit

- The pilot resulted in a 73% increase in patient encounters for WOCN
- (16 visits/week) * 12 weeks + (January + February + March virtual patient touches) = 192 in-person + 168 VPTs = 360 total visits
- 360/12 weeks = 30 in-person visits and VPTs per week
- 30 visits and VPTs/16 visits = 87.5% increase in WOCN utilization
- 30 visits and VPTs – 16 visits = 14 additional patient touches per week
- 14 additional patient touches per week / 4 patient touches per day (1 clinician) = 3.5 clinicians per week access to members

	Pre-Pilot	During Pilot	Impact of Pilot (Visits)	Impact of Pilot (WOCN Days)
Patient Visits per week	16 Visits	30 Visits *= +87.5% increase in visits*	+ 14 Visits *(on average, based on January - March data)*	+3.5 Clinician Days per week

- Visits saved Jan + Feb + March = 78/12 weeks = 6.5 visits saved per week
- Transformation from an in-person care delivery model to a virtual case management model

*** "Virtual Patient Touch" refers to a single instance in which a wound photo is virtually reviewed by the WOCN. Comments or treatment recommendations are made and documented at this time. Patients may have multiple virtual touches.*

The data reflected in the study's initial results encapsulates three months where adoption of the Tissue Analytics Standard of Practice was more robust. The baseline "n" for the WOCN was the regionally accepted productivity standards of 4 visits/per day, with a weekly aggregate of 16 visits per week. The team then scaled this over three months (12 weeks), resulting in a baseline of 192 in-person visits per week.

To demonstrate how the Tissue Analytics Standard of Practice augmented the work of the WOCN, total virtual patient touches (VPTs) and visits saved would be the primary metrics moving forward. What is also important is the definition of visits saved (identified above). The WOCN kept an Excel Database of all the patients encountered through Phase 1 of the pilot, capturing demographics, the date when each patient was seen, the initial treatment recommendations and frequency of the wound treatment, whether or not the WOCN was consulted, comments pertaining to communication between the frontline RN/WOCN, and wound status. Additionally, of considerable importance within this database was determining whether or not the intervention of the WOCN coupled with the utilization of TAA resulted in a visit saved.

Through collaboration with the Core Study group, it was determined that a visit saved constituted the work of the WOCN being delegated, where otherwise, the WOCN needed to see the patient in person to render wound care. If the work of the WOCN through consultation and delegation could be appropriately executed, the net result was equivalent to a visit saved.

Phase 1 of the DNP project was conducted from November 5, 2019 - March 31, 2020. Through the three months of increased activity of the pilot, there was an 87.5% increase in total patient touches (168 VPTs in addition to the achieved baseline in-person visits of 192 in-person visits). Of those 168 VPTs, 78 resulted in visits saved, representing 46% of the virtual touches. Considering this from an aggregate three month-view to a weekly view, the 87.5% increase in WOCN touches is equivalent to 14 additional weekly touches. Furthermore, this reflects having an extra 3.5 clinicians per week.

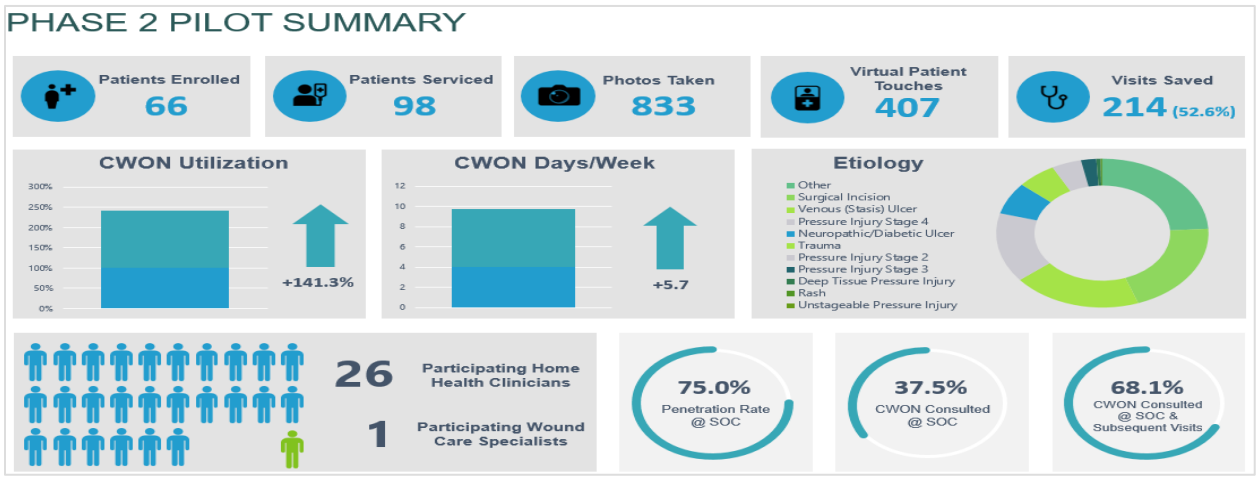
Regarding the reliability of the data, the baselines are the regional averages of nursing visits across K org Southern California. The definition of visits saved was validated by K org San Diego and the Core study team. Overall timeliness of care also increased to 95% (from a baseline

of 93.5% in 2019). As a balancing measure, the actual Home Health Census has remained flat during this time (approximately 500 patients), validating that increase in timeliness of care is not solely due to the presumed reduction in volume due to the Coronavirus pandemic. Both Timeliness of Care and the Census are validated metrics through the National Strategic Healthcare partners database repository and K org Regional Home Care analytics, respectively.

Provider input is also essential to determine the clinical experience of using Tissue Analytics. The first provider electronic survey was conducted in January 2020. The "n" was ten nurses, enough to get some preliminary thoughts; however, not enough to speak to the validity of both the application and the process. The questions addressed provider ease of use, challenges with adaptability, communication with the WOCN, desire to continue to use TAA, and an open forum feedback question. Regarding application ease of use, 62.5% of nurse providers viewed the application as difficult to use, with the other 37.5% identified the application as easy to use. Regarding the most challenging aspect of utilizing the TAA/WOCN process with the option to select all options that apply, 75% of nurse providers noted that double documentation was the most challenging part of using the application, with another 62.5% identifying the time required for program enrollment was a significant barrier in application usage. Regarding communication with the WOCN, 87.5% of nurse providers acknowledged better two-way communication with the WOCN, while 12.5% of clinicians stated communication remained the same. Nurse perceptions specific to more efficient wound care practices being streamlined brought a result of 50% true, and the other 50% somewhat true. Continued usage of the application reflected 75% of nurses to be supportive and 12.5% somewhat supportive.

Phase 2 Implementation

Phase 2 of the pilot kept all of the goals of phase 1 with the addition of the new target of clinician adherence to the workflow leveraging both WOCN and Tissue Analytics Application will at the start of care and subsequent visits being 50%. Here are the results of the 5-month study:



Phase 2 of the pilot was conducted from July 15 – October 15, 2020, when 407 VPTs took place. Of those 407 VPTs, 214 resulted in visits saved, representing approximately 52.6% of the virtual touches. Conversely, the in-person WOCN visits went from 4 per day/16 per week in phase 1 to 1.8 per day/7.2 per week. Total in-person touches were 93.6, with 500.6 aggregate touches including VPTs, representing a total of 38.5 visits per week over phase 2, a 141% increase in WOCN touches (when compared to the normal regional average of 16 in-person visits by the WOCN weekly). The new net visit total of 22.5 additional visits per week would be equivalent to having an additional 5.6 clinicians per week. The new phase 2 goal of adherence of the clinical nurse leveraging the WOCN and TAA standardized process workflow at the start of care and subsequent visits resulted in a 68.1% adherence rate. Overall, timeliness of care also increased to 97.2% (from a phase 1 baseline of 95.9%). As a balancing measure, the actual Home Health Census increased in phase 2 to approximately 550 patients.

The second provider electronic survey was conducted in November 2020. The “n” was 15 nurses, larger than the initial ten nurses who returned the survey in phase 1. The same questions from phase 1 were applied to phase 2. The questions addressed provider ease of use, challenges with adaptability, communication with the WOCN, desire to continue to use TAA, and an open forum feedback question. Regarding application ease of use, 13.3% of nurse providers viewed the application as difficult to use, 73.3% identified the application as easy to use, and 13% were neutral. Regarding the most challenging aspect of utilizing the TAA/WOCN process with the option to select all options that apply, 46.7% of nurse providers noted that double documentation was the most challenging part of using the application, with another 13.3% identifying the time requirement for program enrollment as a significant barrier in application usage. Regarding communication with the WOCN, 73.3% of nurse providers acknowledged better two-way communication with the WOCN, while 26.7% of clinicians stated communication remained the same. Nurse perceptions specific to more efficient wound care practices being streamlined brought a result of 53% true, and the other 26.7% somewhat true. Continued usage of the application reflected 53.3% of nurses as supportive and 20% as somewhat supportive.

Aggregately, the operational efficiency and nurse provider satisfaction metrics demonstrated directional correctness when comparing phase 1 with phase 2 data. The improvement from phase 1 to phase 2 was evidenced by significant improvements in WOCN Nurse access (3.5 versus 5.6 extra clinicians/week, respectively), timeliness of care (93% versus 95%, respectively), provider ease of use (62.5% versus 73.3% favorability, respectively). The additional phase 2 goal of clinical adherence of the nurse leveraging the WOCN and TAA standardized process workflow at the start of care and subsequent visits resulted in a 68.1% adherence rate.

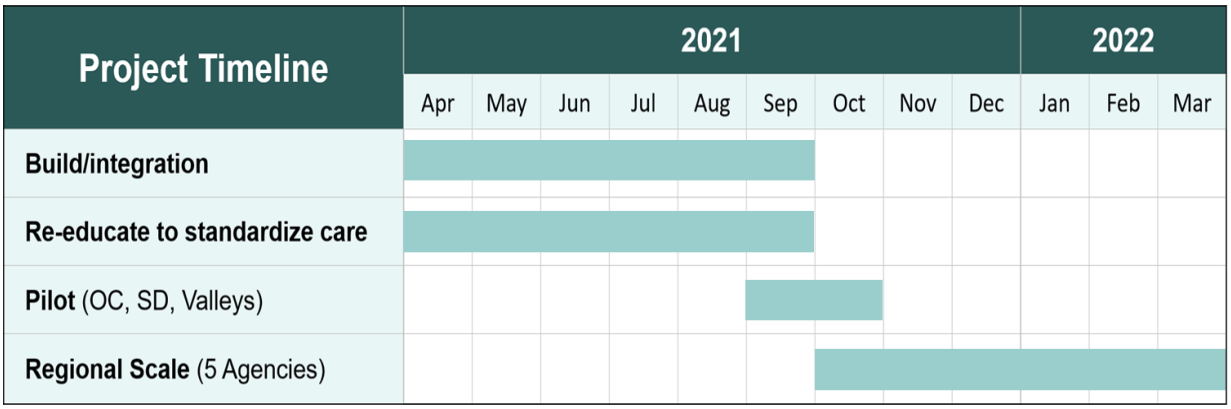
Phase 3 Implementation

The data from phases 1 and 2 were incorporated into the phase 3 build-out. Phase 3 encompassed strategy and implementation plans regarding key stakeholders. The key stakeholders included Net Health Leadership (the parent company of Tissue Analytics), the K org Orange County San Diego and Orange County Home Care Agencies, K org Southern California (SCAL) Regional Home Care, the K org Systems, Solutions, and Deployment (SSD) Regional Leadership Team, and the Health Innovation Studio Service Line. Specific to Net Health and K org SCAL, technical requirements, particularly the integration of TAA into Epic Healthconnect and its respective costs were detailed (see finances and resources section). The author led or co-led strategy sessions, proposed and developed the crosswalk of alternative pathways, developed the implementation timeline, and modified the nurse implementation and education platform rollout with the Health Innovation Studio Service Line and K org SCAL Regional Home Care.

Numerous meetings were held to determine the strategy for each audience the DNP project was presented to, assigning speakers for respective slides, and having prepared counter-arguments for possible questions received from the audience. Presentations to K org SCAL Regional Finance were designed to showcase the fiscal returns on the investment if the TAA/WOCN process was scaled across multiple K org SCAL Home Care Agencies. Presentations to K org SCAL Regional Quality were created to reflect an increase in patient access and adherence to the new standardized TAA/WOCN process. Included in the presentations was the extension of the TAA/WOCN process into the hospital and ambulatory settings, with Net Health providing cost information if executive leadership was interested in exploring this option. Also included was a crosswalk detailing the benefits of the TAA/WOCN platform versus the existing Epic Healthconnect wound platform. The crosswalk highlighted the

TAA/WOCN platform process and its increased accuracy of wound measurement, its ability to chronologically document wound progression, and the reduced time spent in providing wound care versus the use of the Epic Healthconnect wound platform. Lastly, project timelines were discussed, specific to the Epic Healthconnect wound care platform roadmap, which includes accurate wound measurement not being available in Epic Healthconnect until 2023 at the earliest as compared with TAA/WOCN, which is already active in 2 separate K org Home Care Agencies. Consequently, the TAA/WOCN process platform was advertised as a bridge program for the next two years and ready for integration into Healthconnect within the next six months, while the Epic Healthconnect wound platform was being developed and optimized for a projected late 2023 or early 2024 roll-out.

From an operational standpoint for Phase 3, several planning meetings that the author co-led or contributed to were conducted to prepare nurses for the regional rollout and ensure coverage for all agencies. The team's first determination was to re-establish fundamental evidence-based wound care practices and training for all nurses at each of the home health agencies at the local level. Secondly, training of the TAA/WOCN process and the TAA application for the nurses would follow. At the regional level, an additional WOCN position was requested to provide additional access for the existing 3 WOCNs in the region and expanded coverage to meet the wound care needs of each of the agencies. A subsequent training program to develop wound care nurse champions for each agency was instituted to provide a secondary layer of expertise and coverage for each of the home care agencies. The aggregate local nurse training timeline and the establishment of regional support, respectively, took place from April 2021 to August 2021, with K org Orange County, San Diego, and Valleys officially launching in Quarter 3 2021 and the rest of K org Southern California Home Health agencies by Quarter 4 2021.



Project Outcomes

Phase 1 Outcomes

- Wound Care Ostomy Nurse (WOCN) Touches Through Virtual Consultation via Telephone and/or the Tissue Analytics App increased by 87.5%.
- Nurses who participated in the Tissue Analytics App/WOCN pilot voiced high satisfaction via survey (9 or 10 score) on 62.5% of the surveys received back.
- Timeliness of Care Aggregate increased to 95% (Baseline Timeliness of Care January – October 2019 93.5%)

Phase 2 Outcomes

- Wound Care Ostomy Nurse (WOCN) Touches Through Virtual Consultation via Telephone and/or the Tissue Analytics App increased by 141%.
- Nurses who participated in the Tissue Analytics App/WOCN pilot voiced high satisfaction via survey (9 or 10 score) on 73.3% of the surveys received back.
- Timeliness of Care Aggregate increased to 97.2%
- Clinician adherence to workflow leveraging both WOCN and Tissue Analytics Application is 68.1%.

Phase 3 Outcomes

- Phase 1 and Phase 2 outcome data resulted in the authorization of process scale to K org Southern California Home Care by Q4 2021.

Finances and Resources

Nurse training for this work is already embedded into the annual budget, as education and onboarding time for the Tissue Analytics Application is required. The application uses the iPhone interface, with all the clinicians having K org-issued iPhones. The integration requires a one-time onboarding fee of $45,000 paid to Net Health and K org SSD labor costs of $403,430. The annualized subscription for all 8 K org SCAL Home Care Agencies is $307,200. A WOCN, with an annual cost of $273,312, including benefits, will also be added to the Regional Team to help manage the patient volume. Combined with the one-time integration internal K org SSD costs, annual TAA subscription, and additional 1.2 WOCN Full-time equivalents, the total investment cost of scaling the TAA/WOCN process across K org SCAL Home Care is $1,028,942.

The financial analysis and return on investment are determined based on the presumption that the TAA/WOCN process will reduce the average clinical visits per patient case by 20% (20 visits per case pre-TAA/WOCN process, 16 visits per case with TAA/WOCN process). Based on the additional capacity to conduct an additional 28,316 visits, that provides K org SCAL Home Care an opportunity to insource 28,316 visits that would have been outsourced to another outside contracted home health agency. With each external visit costing $107, the opportunity repatriation cost savings of the 28,316 patient visits would be $3,029,788. Moreover, subtracting the subsequent aggregate costs of the 1st year of the TAA/WOCN pilot ($1,028,942) gives a proposed net return of investment of $2,000,846. For the second year, subtracting the K org SSD

integration costs and one-time onboarding fee ($448,430) and keeping the same business case assumptions, the projected repatriation cost savings would be equivalent to $2,449,276.

Financial Analysis

Avg Visits per Wound Care Case (w/o TAA)	20.0
Decrease in Avg Visits per Wound Care Case (w/ TAA)	(4.0)
Avg Visits per Wound Care Case (w/ TAA)	**16.0**
Annual Wound Care Referral Volume (2020)	46,572
% Taken Under Care	38.0%
% Referrals Meeting TAA Criteria	40.0%
Annual TAA Eligible Internal Wound Care Referrals	7,079
Estimated Volume In-person Wound Care Visits (w/o TAA)	141,579
Estimated Volume In-person Wound Care Visits (w/ TAA)	113,263
Variance in Visits (Additional Capacity)	**28,316**
Volume of Visits w/ Opportunity to Insource	28,316
External Cost per Case	$107
Total Repatriation Cost Savings	**$3,029,788**

*TAA = Tissue Analytics Application

1st Year ROI 194.5%

Total Repatriation Cost Savings	$3,029,788
(Less Subscription Fees + Integration Costs)	($755,630)
(Less 1.2 FTEs WOC Nurse)	($273,312)
1st Year Net Return on Investment	**$2,000,846**

The next section will aggregate the final results of the phases of implementation, analyze the outcomes of the DNP project, review implications for practice and limitations, discuss if objectives were met, and provide recommendations for further study and scale.

Final Results/Outcomes Analysis

	Nurse Provider Ease of Use	Increase in WOCN Patient Access (4 Visits baseline/day)	Timeliness of Care	Nurse Adherence rate to TAA/WOCN process
Phase 1	62.5% favorable	+3.5 extra WOCN visits	95%	N/A
Phase 2	73.3% favorable	+5.6 extra WOCN visits	97%	68.1%
Phase 3	Formal business case approved by organizational regional executive quality, technical, and home care leadership. Proposed Return on Investment (ROI) of $2,000,846 after year 1 with program scaled across Southern California organization			

The TAA/WOCN process workflow received approval for scale from K org San Diego and K org Orange County to the entirety of K org SCAL Home Care. Uniform, increased patient access to the unique WOCN skill set, resulting in improved treatment plan continuity, and overall

higher general patient access to home health services were foundational in establishing the quality return on investment of the DNP project. Achieving scale only came through nurse acceptance and adherence to the TAA/WOCN process. Garnering nurse buy-in to the work was essential, and having the nurses involved in the build-out of the actual process by providing feedback to the work they would ultimately be held accountable to was critical. Nurses also played a significant role in the TAA application itself, giving recommendations to minimize clicks and simplify platform view settings. Aggregately, nurse-centered design, coupled with the development of a robust business case showcasing the fiscal return on investment, led to the approval of the TAA/WOCN process to move forward across K org SCAL Home Care.

Implications for Practice/Limitations to Study

Studies detailing wound care nursing advances in practice are increasingly available, as nursing has become more specialized. While other nursing studies focus on the incidence of pressure ulcers and healing times, the specific DNP project had a major emphasis on nurse adherence to process and the subsequent access it would create for a medical system. The aggregate increase in specialized WOCN access for patients and overall general access to home care for those patients suggest that adopting a standardized approach to performing accurate wound care by leveraging appropriate processes and technology may have a positive impact on patient health and organizational medical system fiscal outcomes. Further studies are needed to gauge the level of improved access in all healthcare delivery settings, including the hospital, clinic, and home. Moreover, from a utilization perspective, it may be helpful to get a better understanding of what the increase in access means for patients in the long-term, specifically to how timely follow-ups occur and how many total visits they receive impact patient outcomes. Hospital and emergency room recidivism data could also be studied. From a quality perspective,

assessing how the streamlined wound care delivery process creates a baseline number of visits for a particular type of wound would be helpful. From a supply cost perspective, attempting to develop a wound care formulary that matches products to use for different types of wounds could also be beneficial to measuring fiscal benefits.

Limitations to the DNP project include not measuring patient pain and psychosocial well-being (levels of anxiety, depression, stress). Literature highlights the importance of a holistic assessment in wound care. Patients with chronic wounds frequently suffer from multiple major symptoms such as pain, anxiety, depression, and stress. Since these variables can be proxy measures of quality of life, the studies on wound care should also examine these psychological outcomes to gain a deeper understanding of their impact (Monaco et al., 2021). Another limitation was not included into the workflow the ability of the patient to take their own picture, which would result in the WOCN being activated and notified for review of the wound. Lastly, the DNP project did not include population data, including race, age, healthcare coverage, and other chronic conditions that could impact the development of the process map and wound healing.

Recommendations

With scale achieved throughout K org SCAL Home Care, there remains a significant opportunity to build on the success of implementing a standardized wound care system. With wound care remaining a strategic priority for K org, further analysis is needed to gauge the achievement of process scale across the home care continuum, from nurse adoption and patient access. Moreover, incorporating wound supply costs before and after process implementation should be considered. Providing efficient, timely, high-quality care affordably is in alignment with the mission and vision of K org, which is to provide high-quality, affordable health care

services to improve the health of their members and the communities they serve. In order to maintain a sustainable competitive advantage in the home care space, there should be considerations of centralizing the WOCN virtually and investing in additional WOCN specialists to the K org SCAL Home Care team to increase capacity, particularly with the anticipated significant growth in the Medicare population. The existing WOCN/TAA workflow should be modified and optimized while the regional roll-out is occurring, garnering new feedback from nurses in K org SCAL Home Care Agencies. Furthermore, future studies conducting a thorough review of how the WOCN/TAA workflow can be incorporated into the hospital and clinic settings would be ideal, by attempting to forecast how many more potential patients can be serviced and what the return on investment would be for the entire organization.

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