STORE AND FORWARD WOUND TELECONSULTATION IN RURAL HOME HEALTH: A PRACTICE IMPROVEMENT PROJECT

by

Rebecca Lynn Roche

A scholarly project submitted in partial fulfillment
of the requirements for the degree

of

Doctor of Nursing Practice

in

Family and Individual Health

MONTANA STATE UNIVERSITY
Bozeman, Montana

April 2019

DEDICATION

This DNP scholarly project is dedicated to my husband and three children who remind me every day that life is too short to live with regret. Without the love and support of many people, including my parents, this dream may have been out of reach. To those I love, thank you for always supporting my passions and believing that I could accomplish great things.

ACKNOWLEDGEMENTS

Thank you to the staff at the local home health organization for the encouragement during this journey. Your participation was critical to the success of this project. A special thank you to Wendy, Kathy, Crystal, and Carrie. To my fellow rural home health nurses, thank you for your dedication to improving the health of patients under some of the most challenging situations.

I am especially grateful for the gentle guidance and unending support of my committee chair Susan Raph DNP, RN, NEA-BC, as well as my committee members; Laurie Glover MN, APRN, FNP-C; Jeanne R. Conner MN, APRN, FNP-C and Beth Putnam MBA, RN.

This project was partially funded through the Dr. Helen Jacobson Lee Endowment for Rural Nursing Research through Montana State University. The grant was utilized to provide participation incentives and to cover the printing costs for educational materials, surveys, and fliers. In addition, the funding supported a free lunch-and-learn seminar to disseminate the results of the project to the local organization.

Montana State University Statistical Consulting and Research Services (SCRS) assisted with the survey data analysis and result schematics. Research reported in this publication was supported by Institutional Development Awards (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under Awards P20GM103474, 5U54GM104944, U54GM115371, and 5P20GM104417. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

TABLE OF CONTENTS

TABLE OF CONTENTS CONTINUED

TABLE OF CONTENTS CONTINUED

TABLE OF CONTENTS CONTINUED

LIST OF TABLES

Table Page

LIST OF FIGURES

Figure Page

ABSTRACT

Wound prevalence is increasing due to the aging demographics of the population and a rise in chronic diseases. Home health organizations face many challenges managing the rural home health patient with wounds as this population consumes a high number of resources and lacks access to wound experts. Store-and-forward (SAF) wound teleconsultation allows the home health patient to receive treatment recommendations from a wound expert using photographs taken by the home health nurse. The purpose of this practice improvement project was to explore patient, nurse, wound expert, and primary care provider satisfaction and perceived benefits of wound photography and SAF wound consultation in rural adult home health patients with wounds. Rozzano Locsin's Technological Competency as Caring in Nursing theory provided the guiding framework for this project. A standardized wound photography protocol utilizing the *NE1 Tool* was developed and implemented in a home health department as an adjunct to the weekly written assessment. One month later, three adult patients were recruited to a 12-week SAF wound consultation pilot using *AthenaText* application on mobile devices. Following the project period, a quantitative survey assessment of satisfaction and perceived benefits was conducted using three group-specific surveys.

Seventeen participants completed the survey: (1) wound expert, (2) patients, (5) providers and (9) nurses. All groups reported moderately high satisfaction with photography and 100% indicated agreement that photographs should be a standard component of care. Additional perceived benefits were noted in communication and identifying wound changes. All participant groups were highly satisfied with SAF wound consultation. Patients and the wound expert rated SAF wound consultation the highest citing benefits of reduced travel and promotion of rapid changes in treatment. Patients reported SAF consultation was equivalent to clinic care; however, comments suggest home-based wound care is superior to clinic-care in cases of severe immobility and difficult to reach wounds. This project demonstrated high satisfaction and multidisciplinary benefits related to wound photography and SAF wound consultation in the rural home health population. Standardized wound photography and SAF consultation is a cost-efficient, feasible, and essential component of wound management that improves access to wound expertise in the rural home health setting.

CHAPTER ONE – INTRODUCTION

Introduction

Over six million chronic wounds develop annually in the United States including pressure-related wounds, diabetic ulcers, and venous stasis ulcers (Murphy, 2012). The coexistence of an aging population and rise of chronic illnesses such as obesity, diabetes, and congestive heart failure increases patient risk for development of a chronic wound (Sen et al., 2009). In 2014, 4.9 million patients in the United States received care through home health agencies (Center for Disease Control and Prevention, 2016). On average, one-third of the patients who receive home health care require wound treatment and 42% of these patients have more than one wound (Ellenbecker, Samia, Cushman & Alster, 2008). Home health organizations are challenged to treat increasingly complex wounds in patients with limited resources who also have decreased access to wound experts. Store-and-forward (SAF) teleconsultation provides a modality to exchange patient's wound photographs for expert wound advice without the expense and delay of leaving home (Kobza & Scheurich, 2000; Zarchi, Haugaard, Dufour & Jemec, 2015).

Background

Definitions

Conceptual. Key terms which will be discussed include, telemedicine, teleconsultation, home health agency, primary care provider (PCP), wound expert, wound, chronic wound, and adverse wound events. According to the American

Association of Telemedicine (n.d.), “Telemedicine is the use of medical information exchanged from one site to another via electronic communications to improve patients' health status” (para. 23). Teleconsultation is a, “Consultation between a provider and specialist at distance using either store and forward telemedicine or real-time videoconferencing” (American Association of Telemedicine, n.d., para. 23). Telemedicine and teleconsultation are used interchangeably in this DNP project. Centers for Medicare and Medicaid Services ([CMS], 2017) define home health agency as an organization that provides professional health care services outside of the hospital setting. PCP refers to a physician, nurse practitioner, clinical nurse specialist, or physician assistant who provides a range of health services as allowed by state law (“Primary,” n.d.). Wound Expert is defined for this project as a licensed medical professional with advanced knowledge and experience in wound care, with or without advanced wound certification. A wound is any injury to the external surface of the skin resulting in tissue damage (Sen et al., 2009). Chronic wounds are wounds lasting greater than 3 months which fail to heal in a predictable and expected fashion (Sen et al., 2009). Adverse wound events are any abnormality in the expected healing process which includes infection, dehiscence, surgical debridement, or requires an in-office consultation.

Operational. Patient and provider (nurse, wound expert, PCP) satisfaction in this project relates to the patient’s opinion of whether SAF wound consultation fulfilled their needs and/or provided a positive experience. The perceived benefits of SAF wound consultation will be measured through assessment of the personal beliefs of the patient, nurse, wound expert, and primary care provider. Perceived benefits are not scientifically

determined to be actual benefits but are rather the insights of those surveyed regarding the advantages of SAF wound consultation. Organizational feasibility in this study relates to the ability of this organization to successfully implement a home health SAF wound teleconsultation program.

SAF Telemedicine

Telemedicine is not a treatment; it is mechanism used to exchange information and share expertise (Zarchi et al., 2015). SAF, also called asynchronous telemedicine, is practiced when a photograph is taken and then transmitted to an expert clinician for analysis and recommendations (Chittoria, 2012). SAF telemedicine is the most used form of telemedicine in dermatology (Tensen, van der Heijden, Jaspers & Witkamp, 2016). SAF teleconsultation does not require the expert clinician to be available at the time of the visit, which makes this intervention more flexible and cost effective than conventional telemedicine (Snoswell, Finnane, Janda, Soyere & Whitty, 2016). Tensen et al. (2016) reports that SAF teleconsultation shortens time to consultation when compared to traditional office consultation. Sugrue and Riggs (2005) reported similar findings with a decrease in consultation wait time from over three weeks to less than fourteen days.

Device. Tools for conducting wound SAF teleconsultation vary. Early studies in wound care report using digital cameras to take photographs which were then downloaded and sent to an expert by secure email (Wilkins, Lowery & Goldfarb, 2007). More recent studies use smart phones or portable tablet devices to upload wound

photographs to the electronic health record (EHR) or a secure data base for wound expert review (Tensen et al., 2016).

Delivery. SAF wound teleconsultation can be delivered a multitude of ways. Studies in home health patients have used standard SAF teleconsultation format where the visiting nurse obtained wound photographs which were later sent to an expert clinician (Binder et al., 2007; Terry et al., 2009; Zarchi et al., 2015). Other researchers have conducted synchronous electronic photo transmission with phone conversation while at the bedside during the home health visit (Sugrue & Riggs, 2005). Purported benefits to this system were the immediate integration of recommendations into the plan of care. Two additional identified studies provided a combination of traditional live video telemedicine followed by SAF wound teleconsultation (Buckley, Adelson & Agazio, 2009; Moore, Britton & Chetney, 2005).

HIPAA

The Health Information Portability and Accountability Act (HIPAA) was signed into law in 1996. According to the U.S. Department of Public Health and Human Services (DPHHS), HIPAA provides federal protection for personal health information and sets standards for sharing of information between providers, health plans, and clearinghouses (DPHHS HIPPA, 2017). Information that is individually identifiable and maintained by a covered provider is considered protected health information (PHI). Eighteen individual identifiers have been classified as PHI. A wound photograph that includes information such as name, date of birth, tattoos, date of service, facility name, or

portions of the face is considered PHI (Shindell, 2016). Wound photographs that contain no individual identifiers are not considered protected information under HIPAA. Under HIPAA, providers may exchange PHI, including wound photographs, with other providers without patient authorization if necessary for treatment (DPHHS HIPPA, 2017).

The Joint Commission (2017), a national health care safety accreditation organization, recommends informed consent be obtained before taking patient photographs or before photographs are incorporated permanently into the medical record. In comparison, The American Health Information Management Association ([AHIMA], 2010) suggests facilities that routinely take photographs for treatment include photography consent in the standard consent for treatment. Organizations can use wound photographs for educational purposes during internal training without additional patient authorization (Shindell, 2016). However, a separate consent should be obtained when photographs are used for purposes such as publication or conference presentation (AHIMA, 2010; Shindell, 2016).

Confidential photo storage and sharing is essential to assure HIPAA compliance. Photographs taken with non-secure devices or digital cameras must be transferred to a secure, encrypted location and deleted from the device as soon as possible (Shindell, 2016). As a rule, photographs in the medical record should minimize obvious identifying factors to reduce the risk for inadvertent PHI disclosure and to protect patient dignity (Hampton & Kilroy-Finley, 2016). Photographs with PHI should not be shared through standard phone, text, or email as these devices are prone to HIPAA security breaches,

left, and loss (Shindell, 2016). Separate systems for photo storage are no longer necessary as current technology allows photographs to be integrated into the EHR along with traditional health information. EHR applications produced by qualified vendors meet HIPAA regulations and maintain strict standards for data encryption, transfer, and storage (Shindell, 2016). Vendor applications require a secure login and directly upload photographs into the EHR without saving the photo to the electronic device.

Home Health Patients

Patients who receive home health care must be under the care of a provider who certifies they are appropriate for home health. Medicare, the largest payor of home health, also specifies the patient must be homebound (Sen et al., 2009). Homebound patients are defined as those requiring an assistive device, special transportation or another individual, and the activity of leaving the home takes considerable effort (CMS, 2017; Sen et al., 2009). Home health patients residing in private homes or assisted living facilities receive periodic scheduled home visits from licensed nurses and therapists.

Up to 80% of patients with wounds are cared for by community nurses working in home health or outpatient wound clinics (Lindholm & Searle, 2016). The National Center for Health Statistics reported in 2014 that 83% percent of home health patients were over the age of 65 (Harris-Kojetin, Sengupta & Park-Lee, 2016). Projections estimate that those older than 85 years will reach 27 million by 2050 and comprise 4.5% of the population. The percentage of those requiring home health care will proportionally rise as the population over the age of 65 years increases. The oldest population is more likely to be widowed, in poor health, and have limited family assistance to provide daily

personal care (Lindholm & Searle, 2016). This aging group is also more likely to have medical conditions that require assistive devices such as walkers, wheelchairs, or oxygen equipment which increases the assistance needed to travel outside of the home (Sen et al., 2009). In addition, patients with pressure related wounds may be bedbound or wheelchair bound which further complicates travel as well as the assessment of wounds in an office setting. Rural home health patients currently under the care of physician and licensed nurse require innovative wound management practices tailored to the setting in which they receive care, the home.

Home Health Nurses

Home health nurses provide wound care in challenging and unpredictable environments, which may lack proper sanitation, clean work surfaces, supplies, and caregivers to assist with wound care. Another obstacle to rural home health care is the need to travel long distances to visit patients. Nurses who provide wound care in the home may experience isolation from expert knowledge due to limited contact with other professionals (Zarchi et al., 2015; Winters & Lee, 2010). Home health nurses hold baccalaureate or associates degrees in nursing and are licensed as RNs and LPNs. Despite this, many nurses may not have had adequate training in evidence based wound care. Ayello and Baranoski (2014) reported that 68% of nurses ($N = 647$) surveyed indicated inadequate chronic wound training during formal nursing education. Only 32% of surveyed nurses reported access to a multidisciplinary wound care team (Ayello & Baranoski, 2014). Thus, many nurses lack exposure to the constantly changing guidelines for evidence based wound management (Gagnon et al., 2014). Some authors

have proposed the home health nurse may improve wound care knowledge and be provided professional development opportunity by having regular interaction with a wound expert (Buckley et al., 2009; Gagnon et al., 2014; Kolltveit et al., 2016, Sugrue & Rigs, 2005).

Wound Prevalence

Wounds are increasingly being recognized as a cause of rapidly rising health care costs (Sen et al., 2009). Wounds are caused by a variety of mechanisms and can be categorized by duration, origin, presence of infection, and whether they are open or closed. Acute wounds include surgical wounds, burns, and traumatic wounds. Pressure ulcers, diabetic ulcers, and venous stasis ulcers occur commonly, and are most likely to become chronic. Chronic wounds affect approximately 6.5 million people in the United States (Sen et al., 2009). Lindholm and Searle (2016) report 60% of all wounds cared for by home health nurses in European countries are chronic. Pressure ulcers remain a concern in the United States with a prevalence rate of 22% in the acute care settings (Sen et al., 2009). In addition, venous stasis ulcers affect 600,000 patients annually and comprise 70-90% of all lower extremity ulcers (Sen et al., 2009). Another factor in wound development is the rising rate of diabetes which demonstrates a 25% prevalence in those over the age of 65 (American Diabetes Association, 2017). The risk of wound development in a diabetic is estimated to be 25% with a 66% rate of reoccurrence (Sen et al., 2009). Twenty percent of the 3 million annual hospitalizations related to diabetes are due to lower extremity ulcers (Lindholm & Searle, 2016). Home health agencies must

establish strategies to deliver evidence based wound treatment in the home to speed healing and control costs.

Local Considerations

This DNP project is based around a home health agency located in the rural Midwest. According to DPHHS (2011), over 75% of this state is considered frontier which is defined as having less than 6 persons per square mile. The state has seven cities which sustain populations greater than 20,000 people. Due to a relative absence of public transportation, 96% of patients drive or require a ride from family members to see their medical providers (DPHHS, 2011). Of these patients, 13% drive over 30 miles to see a medical provider and 7% travel more than 50 miles (DPHHS, 2011). The Henry J. Kaiser Family Foundation ([KFF], 2015) reports the state has the lowest median income of the surrounding five states and 12% of the state's residents have annual income at or below federal poverty level. Sparse population, low income, and geography create isolating circumstances which make it difficult for rural patients to obtain timely specialty care.

Winters and Lee (2010) have highlighted the uniqueness of the rural setting through development of Rural Nursing Theory. Rural Nursing Theory asserts that care models designed for urban settings are often ineffective in the rural setting because they fail to consider the issues faced by rural persons (Long & Weinert, 2010). Effective delivery of rural health care requires focus on the unique rural person who may experience isolation and delayed care entry (Winters & Lee, 2010). Other considerations include the geography of the area, available family and community support systems who

historically have provided local health care, and the rural nurse who often fills multiple roles within the rural community (Winters & Lee, 2010).

Wound Expert Availability

Certified wound experts include nurses who hold a bachelor's degree or higher, physical therapists, physician assistants, and physicians. Several organizations provide wound certification under a variety of titles which may include Certified Wound, Ostomy, and Continence Nurse (CWOCN®), Wound Care Certified (WCC®), Diabetic Wound Certified® (DWC®), Certified Wound Specialist Physician (CWSP®), and board-certified plastics or reconstructive surgeons. In this midwestern state, there are currently 21 wound experts certified by the American Board of Wound Management and seven nurses certified by the WOCN society. An internet search failed to reveal the number of WCC certified providers. All listed certified wound experts practice in hospitals, specialty wound care clinics, or surgical practices located in the largest cities in the state. Due to a relative lack of wound experts, patients living in rural areas must endure long wait times and travel significant distances.

Primary Care Providers

DPHHS (2011) reports in 2005, a 50% reduction in the number of medical residents entering family practice in the United States. Over 83% of this mid-western state is designated as Primary Care Professional Shortage Area (DPHHS Health, 2017). In 2014, Skillman and Stover reported 15 counties were without a practicing physician and 17 counties were without a practicing primary care family physician. Currently, 762

physicians are practicing as primary care providers in the state (Skillman & Dahal, 2016). As more physicians choose specialty practice, rural states are likely to see a rise in nurse practitioners to fill the role of primary care provider. Currently, there are more than 500 active nurse practitioners in the state (KFF, 2017). Doctorally prepared Family Nurse Practitioners (DNP FNPs) licensed in this state practice independently as advanced practice registered nurses (APRNs) with full prescriptive authority. In rural areas, the DNP prepared FNP may be the sole provider of medical services for a community. DNP FNPs need resources to support the care of the home health patient with wounds who may lack access to a wound expert. FNPs practicing in rural areas will benefit from expert wound consultation to improve the provision of evidence based wound care. Gagnon et al. (2014) and Buckely et al. (2009) reported during teleconsultation knowledge may be transferred from the expert. Thus, SAF teleconsultation may support and develop the DNP prepared FNP's autonomy and confidence in the treatment of wounds.

Under federal law, FNPs can conduct the face-to-face patient visit in the clinic and order home health. However, a signature by a physician is required for order validation. FNPs maintain care coordination during the home health admission and resume full care of the patient following discharge. Current law hinders the care of rural patients and places unnecessary burden on the limited staff providing primary care in the rural setting. A new bill, The Home Health Planning Improvement Act (H.R. 1825), has been introduced for legislation which proposes FNPs can independently order and manage home health services (American Association of Nurse Practitioners, 2017).

Significance

Financial Impact of Wounds

The estimated annual cost to manage chronic wounds in the United States exceeds $25 billion (Sen et al., 2009). Nursing time and hospital costs are estimated to account for 80% of the total cost of wound care (Lindholm & Searle, 2016). Individual wound costs can be widely variable. Uncomplicated surgical wounds consume the least amount of resources; whereas chronic or infected wounds often require expensive interventions such as surgical debridement, hospitalization, and prolonged periods of care (Sen et al., 2009). Contrary to common belief, wound dressing supplies account for a very small proportion of the cost (Lindholm & Searle, 2016). Lindholm and Searle (2016) report the main contributors of wound care costs are time to wound closure, number of health professional visits, and wound complications. A reduction in any of the three drivers has the potential to significantly reduce the burden on the health system.

Chronic wounds also have global financial consequences beyond health care dollars, including decreased productivity, missed work days, and disability (Murphy, 2012). Patients are often forced to choose between work commitments and compliance with wound care (Sen et al., 2009). Chronic wounds cause financial strain on personal and community resources. Venous ulcers alone account for 2 million lost work days each year and may be a cause for early retirement in up to 12% (Sen et al., 2009).

Chronic wounds present challenges to home health agencies as they traditionally require services for an extended period and consume large amounts of resources. Harris-Kojetin et al. (2016) reported the population over the age of 65 is projected to reach 88

million by 2050 and approximately two-thirds of this population will require long term care services including home health care. Home health agencies will be taxed to care for the expanding older population under Medicare's current prospective payment system which reimburses agencies an established dollar amount for every 60-day episode of care. Home health agencies must establish evidence-based wound management programs to heal wounds faster with fewer nurse visits and lower costs to assure future sustainability in health care (Lindholm & Searle, 2016; Terry et al., 2009).

Wound Expert Consultation

Certified wound experts use current evidence in wound healing and advanced wound care products to heal wounds faster often while decreasing frequency of dressing changes, and nurse visits (Kobza & Scheurich, 2000; Moore et al., 2005; Zarchi et al., 2015). Lindholm and Searle (2016) report that the average outpatient wound dressing is changed every three days; however, a survey in Denmark found that up to 23% of home health patients received daily wound care. The selection of an appropriate wound dressing is based on location, drainage, and the correct identification of the wound type. Excessive dressing changes increase the number of nurse visits, supply costs, and may also increase the risk for wound infection (Lindholm & Searle, 2016). Wound experts accurately identify the wound condition and prescribe the appropriate wound dressing and frequency. Arnold and Weir (1996) conducted a retrospective analysis of home care patients over 18 months which demonstrated wound healing rates of 78.5% in those patients cared for by certified wound nurse specialist ($N = 344$) compared to 36.6% healing rate in those who received standard nursing care ($N = 464$). Home health

agencies can use SAF telemedicine with a certified wound expert to increase timely access to expert clinician knowledge which maximizes healing through evidence-based wound care (Sugrue & Riggs, 2005).

Wound Photography

Current practices at the home health organization in this project do not include the use of routine wound photography. Early studies related to wound photography cited the process to upload, manage, and store photos was time consuming and counterproductive (Baer, Williams, Vickers & Kvedar, 2004). However, current technology allows high quality digital photographs to be taken with portable electronic devices and uploaded effortlessly into the EHR (Kim, Evans, Steinberg, Pollard, & Attinger, 2013).

Professional Organizations. The National Pressure Ulcer Advisory Panel (NPUAP) and the WOCN Society support wound photography as an adjunct to the written wound assessment. However, neither organization has published or endorsed a photography protocol. The NPUAP and WOCN society recommend organizations develop standardized processes for wound photography to assure consistency between providers which maximizes the practice value (NPUAP, 2014; WOCN, 2012). The American Professional Wound Care Association has supported photography since 2008 when they published a White Paper stating digital cameras for taking wound photographs were essential to maintain a successful wound care program.

Clinical Practice Guidelines. The NPUAP (2014) published a Clinical Practice Guideline (CPG) which summarizes best practice for the assessment, monitoring, and

treatment of pressure ulcers. The Pressure Ulcer CPG addresses the usefulness in standardized, serial wound photographs as an adjunctive component to the written assessment to monitor and document wound healing. The NPUAP was rigorously designed and thoroughly conducted by 12 team members and included a total of 104 experts and 356 literature sources during the development. The NPUAP CPG was analyzed using the AGREE II criteria and given an overall rating of 6/7 for the absence of patient's preferences (Brouwers et al., 2010). The recommendation and level of evidence for wound photography is reported as Level C. The guideline does not address SAF wound consultation or specify a standardized procedure for wound photography.

Bradshaw, Gergar and Holko (2011) developed an organizational competency-based CPG for taking wound photographs after a literature search failed to identify a previously documented process. Strengths of the Wound Photography CPG include the use of a multidisciplinary team and a review of the literature which identified 11 peer reviewed sources. Bradshaw et al. (2011) reported that use of the Wound Photography CPG enhanced staff confidence and skill which led to greater efficiency and an increase in the value of the wound photographs.

Expert Recommendations. Independent wound experts agree that wound photographs provide valuable objective information that supports the written assessment when they are taken at regular intervals and follow established photography protocols (Bradshaw et al., 2011; Stotts & Sparacino, 2005; Woo, 2011). Written documentation and manual wound measurement remain essential as wound photographs cannot capture details such as tunneling, depth, undermining, induration, warmth, or odor. However,

wound photographs can objectively capture wound details that are subject to opinion such as color, quality of drainage, percentage of granulation tissue, necrotic tissue, and circumferential skin integrity (O'Connell-Gifford, n.d.). Wound photographs enable the provider to identify changes in the wound which helps determine if the current therapy is effective or requires a change (Florczak et al., 2012; Jorgensen, Sorensen, Jemec & Yderstraede, 2015, Kim et al., 2013). Some wound experts argue that wound photography helps to substantiate the nursing care given and may prevent litigation (Swezey, 2012; O'Connell-Gifford, n.d.). In addition to including a written assessment with the wound photograph, clinicians should always document details concerning any oral and written communication about the wound to the patient, family, and ordering provider (Mager, 2004).

Problem

Home health patients with wounds place a significant financial burden on home health agencies as they require high staff utilization over prolonged periods. In addition, home health patients in the rural setting lack direct and timely access to wound experts and may not be receiving evidence based wound management, including the use of serial wound photographs.

Purpose

The purpose of this DNP scholarly project is to implement a practice improvement project to explore patient and provider (nurse, wound expert, primary care

provider) satisfaction and perceived benefits of SAF wound consultation in the care of rural adult home health patients with wounds. The objectives of this project include development and implementation of a standardized photography protocol for weekly home health wound assessments and SAF wound consultation using 3 patients. The goal of this project is to determine individual organizational value and feasibility of SAF consultation and wound photography. The culmination of the project will be a presentation of results to the local organization and rural health care community including recommendations for wound photography and SAF use in future home health wound care.

CHAPTER TWO – REVIEW OF LITERATURE

Introduction

Providing evidence based wound treatment to home health patients through SAF wound teleconsultation has the potential to reduce organizational costs, nurse visits, and improve wound healing. A literature review was conducted to identify the current state of knowledge related SAF telemedicine in wound care in the outpatient setting. This review addresses SAF telemedicine with a wound expert in the adult outpatient with a variety of wound types. This review will not address pediatrics or SAF in the inpatient setting. Topics covered include: reliability of remote photographic analysis, patient perspectives, nurse perspectives, the effect on wound healing, and other potential benefits of SAF wound consultation.

Methods

A search for literature published in the last 16 years was conducted through medical and nursing databases including CINAHL, MEDLINE (PubMed), Joanna Briggs Institute, and Cochrane Library. Google and Google scholar searches expanded the search to yield additional grey literature not commercially published. Expert recommendations were sought from key organizations including WOCN Society, the NPUAP and the American Professional Wound Care Association. Search terms were extracted from the research question and further expanded based on relevant studies. The keywords *wound*, home care, home health, telemed*, pressure ulcer, chronic wound,*

outpatient, photo, assessment, assessment method, documentation, nursing,* and *smart phone* were used in various combinations within each database. Additionally, sources were extracted from the bibliographies of retrieved primary sources.

Findings

Reliability of Remote Photographic Analysis

A variety of studies have established the reliability and validity of remote (off-site) wound photograph analysis compared to in-person analysis (Baer et al., 2004; Rennekampff, Fimmers, Metelmann, Schumann & Tenenhaus, 2015). Chittoria (2012) conducted a narrative summary which reported 90% diagnostic agreement between in-person and remote diagnosis of wound photographs using mobile phones. Localio et al. (2006) and Baer et al. (2004) both demonstrated good overall sensitivity and agreement on pressure ulcer classification from wound photographs. Systematic reviews of SAF in wound care have reported high inter-rater reliability; however, there is some variation in reliability between wound types (Canadian Agency for Drugs and Technologies in Health, 2014).

An off-site wound expert can reliably evaluate a single wound photograph; however, the true value of wound photography emerges when multiple photographs are assembled. Wound photographs allow objective comparison over time to identify therapy effectiveness. Mohafez, Ahmad, Roohi and Hadizadeh (2016) reported that images of wounds taken at regular intervals carries the highest index for healing. Other studies demonstrated similar findings, reporting regular wound photo documentation aids

in monitoring the effectiveness of therapy (Florczak et al., 2012; Jorgensen et al., 2015; Kolltveit et al., 2016).

Patient Perspectives

Home health patients are already supported by a provider overseeing care and a home health agency delivering care through routine nursing visits. SAF wound teleconsultation has the potential to bolster effectiveness of wound therapy within the context of an established relationship between the patient and the home health nurse. Home health patients may live an hour's drive or more from the nearest hospital or clinic. Thus, a 15 to 30-minute office wound consult is unlikely to provide benefit to the rural home health patient when compared to the effort, planning, and cost to arrange such a trip (Winters & Lee, 2010). Multiple studies have attempted to measure the impact of SAF wound consultation from the perspective of the patient. Two case-series pilot studies demonstrated high patient satisfaction scores (75-98.2%) related to SAF wound consultation with only 3.6% reporting preference for live consultation (Binder et al., 2007; Wilkins et al., 2007). Patients with wounds in areas that are difficult to see have reported peace of mind knowing how their wound looks (Wang, Anderson, Jones & Evans; 2014). Wang et al. (2014) used a structured questionnaire to identify 81% of patients believed wound photography helped monitor their recovery. Of those, 58% believed that photographing wounds increased their involvement in care. Wang et al. (2014) reported that patients who could see their wound were four times more likely to remember how their wound appeared and monitor wound progression. Wound

photographs can be used in mutual goal setting and patient teaching to reinforce the effect of following treatment recommendations (Wang et al., 2014).

Nurse Perspectives

Researchers have published nurses' perceived benefits to SAF wound teleconsultation, which includes improved communication, nurse mentorship, identification of wound changes, and timely access to expert consultation (Chanussot-Deprez & Contreras-Ruiz, 2008; Florczak et al., 2012). SAF wound teleconsultation provides nurses and wound experts a secure process to exchange assessment information and expert recommendations which can be documented in the medical record. Through serial wound photographs, SAF helps to standardize the monitoring process and terminology which improves interdisciplinary communication. Kolltveit et al. (2016) found that the combination of wound photographs and written description made wounds issue more visible, increased the knowledge of providers, and improved the quality of the documentation. SAF may also provide an opportunity for nurses to increase personal wound knowledge through routine access to a wound care expert (Buckley et al., 2009).

Multiple nurses often provide care for a single wound patient. Wound photographs support the nurse in identifying changes between visits, thereby reducing the variability between nurses (O'Connell-Gifford, 2011; Stotts & Sparicino, 2005). Florczak et al. (2012) conducted a pre/posttest evaluation of nurse perceptions in using a smartphone photo wound documentation system. While the study was small ($N = 38$), paired *t*-tests demonstrated significant increase in perceived improvement in wound care through the ability to review wound progress ($p = 0.000$) and the early recognition of

wound changes ($p = 0.001$). Other descriptive and case-studies have similarly supported increased nurse satisfaction with SAF and wound photography related to the ability to rapidly detect wound changes (Chanussot-Deprez & Contreras-Ruiz, 2008; Kolltveit et al., 2016, Gagnon et al., 2014; Sugrue & Riggs; 2012).

Wound Healing

The review of literature identified multiple SAF wound teleconsultation studies where researchers observed the impact on wound healing in the outpatient setting (See Appendix A for Synthesis Table), but few have looked specifically at the home health population. Patients receiving wound care outside of a tightly controlled hospital environment are similar in that they lack clear access to expert consultation and they are exposed to many influential environmental factors.

The highest quality evidence presents from two randomly controlled trials (RCTs), however both consisted of small sample sizes and design flaws in one study resulted in decreased dependability and reliability of results (Terry et al. 2009; Rasmussen et al., 2015). Terry et al. (2009) randomized home health patients with various wounds ($N = 103$) into three groups. However, an *increase* in healing time for the SAF group was reported due to a disproportional number of severe wounds being assigned to the group. The SAF group did however demonstrate the most significant reduction in wound size, which provides evidence of SAF impact on wound healing. In comparison, Rasmussen et al. (2015) conducted the largest RCT ($N = 401$) with strongest design using SAF wound consultation, along with a telephone call, in outpatient diabetic patients with wounds. Rasmussen (2015) reported equivocal healing and amputation

outcomes in the SAF intervention group compared to standard face-to-face visits in the clinic. However, an unexpected increase in mortality was reported in the intervention group, which was not explained by adjustment of known variables. Authors recommend caution when employing SAF wound consultation in high risk diabetic patients as they may be at higher risk of mortality and may require closer monitoring (Rasmussen et al., 2015).

Two quasi-experiments in home health patients used non-random assignment and demonstrated decreased wound healing time in the SAF telemedicine group compared to baseline data used as a control group (Kobza & Scheurich, 2000; Zarchi et al., 2015). Kobza and Scheurich (2000) reported all 191 chronic wounds demonstrated shorter healing times, with 58% of SAF patients ($N = 76$) discharged with healed wounds compared to 37% at baseline. Zarchi et al. (2015) reported the SAF wound consultation group ($N = 55$) was more than twice as likely (AHR 2.19, 95%CI) to heal compared to the control group ($N = 40$), who received standard home health nursing treatment.

Other researchers have quantified healing outcomes associated with SAF wound consultation using days to wound healing, which has been used to establish wound healing benchmarks. Moore et al. (2005) conducted an observational study using SAF in hard to heal, chronic home health wounds ($N = 18$) and demonstrated all wounds healed in 61 days. Moore et al. (2005) did not use a control group; however, the findings are consistent with healing benchmarks proposed by other researchers. Similar wound healing benchmarks replicated in the clinic setting, demonstrated reduced wound duration from 105 days to 70 days (Summerhayes, McGee, Cooper, Ghauri & Ranaboldo, 2012).

Terry et al. (2009) presented new home health wound healing benchmarks: 51 days for pressure ulcers and 34 days for surgical wounds. Wound healing benchmarks published in the literature may provide home health agencies a comparison to assess effectiveness of wound care delivery. SAF wound consultation has also been successfully utilized in the long-term care population. Vowden and Vowden (2013) conducted a quasi-experimental study in long term patients with chronic wounds ($N = 26$) and reported healing times were less in the SAF wound group (10 months) compared to the control group (15 months).

Although all outpatient studies involving SAF were included in this literature review, it is important to note that differences exist between home health, long-term care, and clinic populations. Home health patients live independently in unpredictable environments and receive routine nursing visits in addition to SAF expert wound consultation. Long-term care patients also receive routine nursing care, live in a more controlled environment but are often in poor health and have higher rates of chronic wounds. The outpatient clinic population receives the SAF intervention from a medical assistant or nurse in the clinic but generally no nursing visits to the home. Routine home nursing visits likely impact wound healing; however, this factor is not generally controlled or accounted for in research. Zarchi et al. (2015) emphasized the difficulty in isolating the effects of SAF wound consultation from confounding variables which also improve wound healing such as improved nurse wound care knowledge, increased organizational focus on wound care, and timely treatment changes. Little research is available addressing factors that may impact the effectiveness of the nursing home visit

in wound care. The DNP student speculates that the experience of the attending nurse, wound care knowledge, patient's involvement, number of visits, and the quality of the nurse-patient relationship may all impact wound healing.

Other Proposed Benefits

The literature review also identified other outcomes associated with SAF wound teleconsultation which includes a reduction in adverse wound events, wound-related hospitalizations, nurse visits, and wound supply costs (Kobza & Scheurich, 2000; Moore et al., 2005). Moore et al. (2005) reported a 55% reduction in number of home visits and a 35% reduction in wound supplies with SAF wound telemedicine in home health patients. Although the study was small ($N = 18$), the findings are significant because 100% of the chronic, hard to heal wounds demonstrated healing at 61 days. Sugrue & Riggs (2005) conducted an organizational pilot study that included a phone call at the time of the visit and reported a reduction in adverse wound events and decreased visits per patient episode with implementation of a SAF wound consultation program. Kobza and Scheurich (2000) also reported a reduction in wound-related hospitalization from 18% to 6% in the SAF telemedicine group ($N = 76$) which was comprised of home health patients with chronic wounds. Vowden and Vowden (2013) report reduction in hospitalization in one case and identification of the need for early hospital admission in another case.

Gaps in the Literature

Quality evidence to support SAF telemedicine in the home health patient with wounds is lacking. The current evidence is comprised of two RCTs, small quasi-experimental and observational studies with less than 95 participants, and expert recommendations. Design flaws in one RCT and a finding of increased mortality in another weaken the strength of the evidence. Conducting high quality RCTs in wound care is challenging due to multiple causative factors which can impact wound healing and are difficult to control for in study design. The small studies which currently support SAF wound consultation all lack generalizability to other settings. Additional well-designed research is needed to assess the validity of SAF wound teleconsultation in the home health patient and its effect on costs, nurse visits, hospitalization, wound healing, and satisfaction.

Conclusion

A review of the literature indicates an overall lack of high-quality evidence to promote the superiority of SAF wound telemedicine in home health patients. However, separate studies of various designs have reported similar findings cumulatively supporting the use of SAF wound consultation. The available literature proposes there is relatively low risk associated with this intervention, and potential for substantial clinical and cost-saving benefits. An SAF wound consultation improvement project will be undertaken to assess the perceived value of this technology at an individual rural organization and the effect on patient and provider satisfaction.

Theoretical Framework

Theorist

Rozzano Locsin's (2005) Technological Competency as Caring in Nursing (TCCN) theory provided the guiding framework for this study. TCCN, a middle-range theory, was introduced in 2001 to addresses the complex relationship and intersection of nursing, technology and caring (DeJonge, Vankampen, Cambier & Kelly, n.d.). Locsin explored the challenges of nursing maintaining the focus on caring within an environment where an increasing number of complex and technological tools are used. Locsin defined caring as a conscious collected effort by the entire profession to demonstrate "…intentional, deliberate, and authentic encounters" (Locsin & Purnell, 2015, p. 51). This professional concept is distinguished from caring as a personal feeling or attribute. TCCN theory proposes the caring nature of the nurse can translate through competent use of technology (Locsin & Purnell, 2015). Locsin's TCCN theory (2005) will provide unique nursing knowledge and rationale to promote nurses' mastery of the SAF technology to assure the coexistence of technology and intentional expression of caring.

Conceptual Model

The concepts of "technological knowing" and "participative engaging" from Rozzano Locsin's (2001) TCCN theory will provide the guiding construct for this DNP project.

Technological Knowing. The technological knowing concept was selected to address the project's intent to introduce another technological component, wound

photographs within the context of the patient-nurse-relationship. Technological knowing encompasses technological competency, appreciation for caring, and intent to comprehensive knowing of persons (Parcells & Locsin, 2001). Technology requires a significant demand for nursing attention which can interfere with the fundamental concept of nursing to care for the patient. According to Locsin, through technological knowing the nurse can more fully engage and interact with patients in meaningful ways (Locsin & Purnell, 2015). Locsin (2013) acknowledged that as technological tasks increase within nursing practice the patient can be similarly viewed as an object that requires fixing. TCCN theory (2001) asserts the nursing profession can avoid reduction to a robotic nurse who completes tasks through use of unique nursing knowledge focused on theory-based actions which are grounded in the concept of caring. The technological knowing concept was used to design the intervention so the act of taking photographs did not present a barrier for the nurse in the development of deliberate patient engagement. The concept guided the creation of a wound photography competency training to allow nurses to become experts over the technology prior to project implementation. The technologically knowing nurse comfortably and confidently carries out the necessary technological skill to achieve comprehensive patient knowing while maintaining the focus on caring (Locsin, 2005).

Participative Engaging. Locsin's theory is grounded in maintaining the humanness of the patient and preserving the natural relationship between the nurse and patient (Locsin & Purnell, 2015). Participative engaging encompasses the shared activities that occur through the dynamic process of knowing persons, implementing

interventions, and observing outcomes (Locsin, 2013). The rationale for choosing this concept was to increase patient engagement and understanding in the role that technology plays (DeJonge et al., n.d.). Nurses used the concept of participative engaging to demonstrate how obtaining wound photographs fulfills the comprehensive knowing and understanding a person which further demonstrates nursing's commitment to caring. The participative engaging concept was used to develop shared goal setting with patients during care plan development. This concept provides a framework for evaluation where wound photographs are shared and mutually discussed at regular intervals allowing the patient to observe changes, reflect on personal role, and fully integrate into the plan of care. The patient was invited to engage as a participant in the care using technology rather than be an object of the care (Locsin, 2013). This process of evaluating wound photographs informed both the nurse and the patient.

CHAPTER THREE – METHODS

Methods

Home health patients with wounds living in rural communities require innovative care delivery to assure access to high-quality, evidence based wound interventions. Many home health patients in the rural Midwest lack accessibility to wound experts due to scarcity of wound specialist and the inability to travel. The purpose of this DNP scholarly project was to establish and implement a pilot SAF wound consultation protocol which included interdisciplinary staff education regarding use of wound photography. The DNP project evaluated patient and provider satisfaction, identified perceived value and benefits of SAF wound consultation, and informed recommendations regarding the feasibility of full organizational implementation.

Design

The DNP project used a non-experimental quantitative design to translate best practice in wound care into the rural home health setting. Data collection occurred through structured patient, nurse, PCP, and wound expert surveys with responses rated on a five-point Likert scale. Demographic information was extracted from each patient's electronic medical record. Rozzano Locsin's (2005) TCCN theory was used as the guiding framework for nurse engagement in technology to demonstrate the technologically competent nurse can seamlessly blend invasive technology into deliberate and caring nursing actions.

Setting

The home health agency at the center of this DNP scholarly project is a not-for-profit, hospital based, home health organization in the rural Midwest. The home health agency and attached 25-bed critical access hospital are in a community of less than 7,000 people. The agency's service area encompasses two counties covering 6,221 square miles and 13,300 people. Nurses travel as far as 60 miles from the agency to see patients. Annually, the agency provides services to approximately 200 home health patients through 2,400 nursing visits (B. Putnam, personal communication, January 31, 2017). The agency employs 11 registered nurses, two licensed practical nurses, five personal care aides, a social worker and a physical therapist. The nearest advanced wound care clinic is located 106 miles from the study location and is in the third largest urban city in the state.

The DNP student has a 13-year history working in rural nursing and has spent the last six years in home health. The home health agency routinely provides wound care services to patients with a variety of wound types. Visit frequency depends on the wound type, amount of drainage, location, and the patient's circumstances such as how far they live from the facility and whether they live alone. Nurses complete wound documentation during each visit within the EHR using a laptop or tablet. Detailed wound measurements are taken once weekly; wound photographs are not currently a part of the documentation process. Nurses make every effort to document their assessment during the visit. However, circumstances such as time or the condition of the home may require the nurse to chart afterwards in the car or at the office. A variety of nurses may care for

the same wound patient over the course of the care episode, emphasizing the importance of accurate wound documentation between nurse visits.

In cases of new wounds or difficult to heal wounds, home health nurses traditionally obtain expert wound treatment recommendations by phone from a local wound expert after giving a verbal report. Documenting and substantiating this type of informal wound consultation in the medical record is challenging. The patient can be scheduled in the wound clinic, but this takes considerable time and is taxing for the home bound patient. Optimizing nursing staff efficiency through routine access to expert wound consultation will assure the provision of evidence-based wound care and reduce unnecessary treatment costs. In addition, the use of serial wound photographs will provide objective measurement of healing and help nurses determine the effectiveness of current wound therapy.

Sample

The population focus of this project was the rural home health patient, visiting home health nurse, off-site wound expert, and primary care provider. The target population was a convenience sample of three adult home health patients receiving wound care at a specified home health agency during the project period. Any nurse employed by the home health department who provided care for a patient in the study was included in the nursing survey process. A pre-selected Wound Care Certified RN functioned as the off-site wound expert. The wound expert was employed by the same

organization and practiced in an outpatient clinic. Additionally, the primary care provider of each patient was included in the survey process.

Inclusion Criteria

Adult home health patients aged 21 years and older who received wound care during January 8, 2018 through April 1st, 2018 and had a signing provider with *AthenaHealth* access were eligible to participate. No criteria were specified for wound type or condition. Patients presenting for admission during the project period as well as those who began receiving wound care services prior to the start of the study were both eligible to participate.

Exclusion Criteria

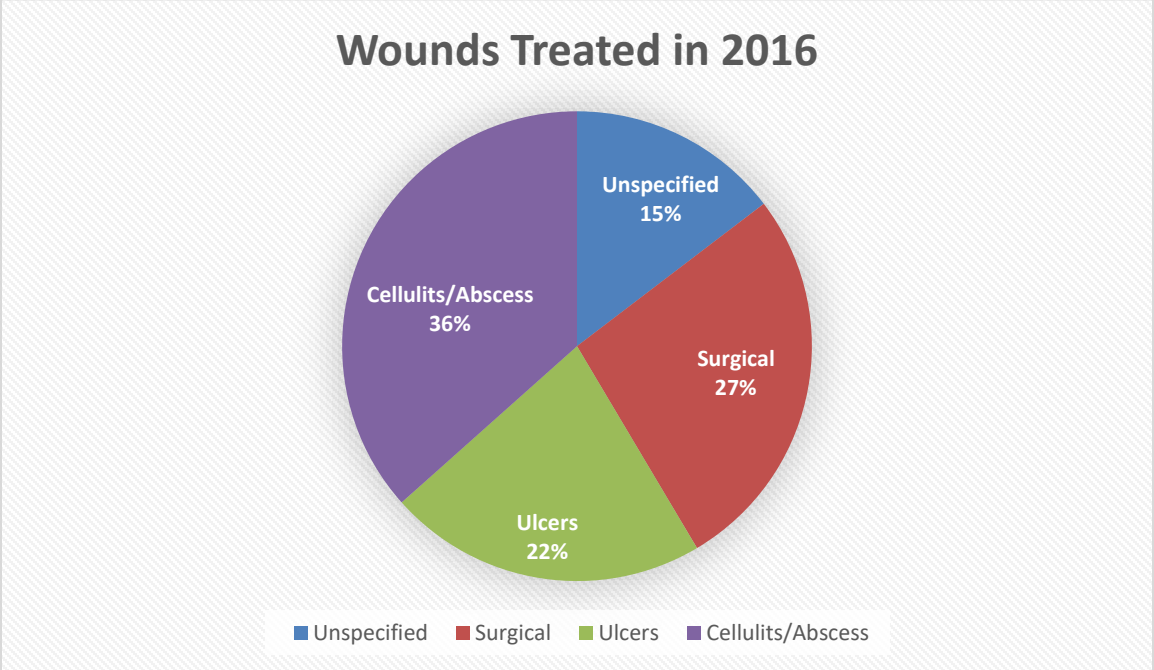
Pediatric patients and hospice patients were not included in the project sample.

Implementation

As part of the scholarly project, the DNP student developed an organizational multidisciplinary committee to guide the implementation of the project. Team members include the home health department manager, hospital clinic manager, clinic informatics leader, wound expert, and home health staff nurse. A fishbone analysis diagram was constructed to examine and identify barriers to the provision of evidence based wound care in rural home health (See Appendix B for Fishbone Analysis). Historical evidence from the agency's 2016 census was also collected to assess wound prevalence and type. The organization provided wound care to 41 patients in 2016 representing 20.5% of all

patients serviced. The high prevalence of wounds in this population provided supportive rational for this project as an opportunity to improve care and reduce organizational costs.

Figure 1. Home Health Wound Prevalence by Wound Type



Phase 1

The DNP project was implemented in two phases. Phase one began in the fall of 2017 with development of a wound photography protocol (See Appendix C for Wound Photography Protocol). The photography protocol was developed in conjunction with the local wound expert and was based on evidence found in the literature. The DNP student conducted a wound photography in-service for all home health nurses using an adaptation of Bradshaw et al.'s (2011) Wound Photography Competency, the NE1 Wound Assessment Tool (NE1), and online NE1 resources (MEDLINE, 2017). Locsin's TCCN theory (2005) provided project guidance to assure nurses were given thorough training to

support competency with the technological act of taking wound photographs. Nurses who demonstrate competency with the technology used for wound photography can maintain their focus on caring for the patient. Following the hands-on training, each home health nurse demonstrated competency in wound photography by conducting wound photography of three simulated mannequin wounds. The DNP student and the home health nurse reviewed photographs to assure consistency and adherence to the protocol. The home health department implemented the wound photography protocol following the in-service and began taking photographs of wounds as a standard component to comprehensive weekly wound assessment.

Phase 2

The DNP student conducted a second educational in-service in January of 2018, one week prior to project implementation. The in-service introduced SAF wound teleconsultation and the DNP project details (See Appendix D for SAF Wound Teleconsultation Flow Chart). Nurses demonstrated competency by completing three simulated SAF wound teleconsultations following the established protocol (See Appendix E for SAF Wound Teleconsultation Protocol).

Patients eligible for inclusion in the project were asked on admission or during their care episode for consent to participate in the SAF pilot project. The project consent and photography consent were signed by the patient with the home health nurse. Each patient in the project received a folder that included a project information flier, copy of the IRB approval, copies of consent forms and the DNP student's contact information (See Appendix F for DNP Project Information Flier). Wound photographs were taken

weekly by the home health nurse during the home visit using *AthenaText* on a mobile electronic device. AthenaText is a HIPPA certified, secure, and confidential program that directly uploads the wound photograph into the EHR. The wound expert reviewed the wound photographs and made treatment recommendations within 72 hours. The PCP was notified in Athena of the wound assessment, photograph, and proposed treatment recommendations. The PCP had an opportunity to accept or make additions to the wound management orders.

Data Collection

Process

The DNP student collected patient demographic data from the medical record; data was de-identified and transferred to an excel spreadsheet. The spreadsheet was developed under the guidance of the Montana State University Statistical Analysis office. Each patient was identified by an assigned number. The spreadsheet was kept on a secure, password protected computer. Patient's name, date of birth, and other potentially identifying information was kept confidential throughout the project. Information collected included: age, gender, Braden score, wound characteristics, and chronic disease diagnosis (diabetes, peripheral vascular disease, chronic obstructive pulmonary disease, malnutrition, obesity, wheelchair, or bed bound), total length of stay on home health services, time to wound closure, total number of nurse visits made, and adverse wound events.

Upon project completion, a paper Likert survey was administered to all home health nurses, wound specialists, and primary care providers involved in the SAF process. The surveys were kept confidential and only identified by survey type (patient, nurse, provider). The patient was asked to complete the survey upon discharge or at the completion of the study period, whichever came first. Nurses were given the survey during a mandatory staff meeting. PCPs were hand delivered the survey during normal business hours. Paper surveys were returned via the organizational mail system using a secure envelope or by a pre-addressed envelope through United States Postal Service. The provider participants each received a $5 coffee card upon survey completion.

Tools

Survey. Separate 5-point Likert scale surveys were developed for patients, nurses, and providers to address satisfaction and perceived benefits of wound photography and SAF wound consultation. The surveys included 15 structured questions and one open ended question asking for any additional feedback related to the experiences with SAF or wound photography (See Appendix G for Patient, Nurse and Provider Surveys). The surveys were developed from concepts identified in the review of literature and further guided by the unique needs of the organization. All surveys were pilot tested prior to use with three staff nurses, three lay persons, and two APRNs to assure readability. The purpose of the survey was to answer eight main questions divided into two categories. The survey results would be used to determine the feasibility of full

organizational implementation of wound photography and an SAF wound consultation program.

SAF Wound Consultation:

1. What is the provider's (nurse, primary care provider and wound expert) level of satisfaction with SAF wound consultation?
2. What do providers perceive as benefits of SAF wound consultation?
3. What is the patient's level of satisfaction with the SAF wound consultation?
4. What do patients perceive as benefits of SAF wound consultation?

Wound photography:

5. What is the provider's level of satisfaction with wound photography?
6. What do providers perceive as benefits of wound photography?
7. What is the patient's level of satisfaction with wound photography?
8. What do patients perceive as benefits of wound photography?

NE1 Assessment Tool. The Medline (2017) NE1 Wound Assessment Tool was used as part of the standardized wound photography protocol. The NE1 is a single use product available for purchase through MEDLINE medical supply (See Appendix H for NE1 Tool). The NE1 consists of an L-shaped paper measurement device which adheres to intact skin around a wound. The NE1 has demonstrated validity in improving wound assessment and documentation and helps to standardize wound assessment improving the consistency of wound photography (MEDLINE, 2017). The tool provides color pictures and descriptions to assist the clinician with accurate wound assessment, as well as vertical and horizonal rulers which give scale to the photo. The NE1 includes

documentation fields to record essential information including the wound location, type, date, time, and photographer's initials. A box of 100 NE1 tools costs $539.57; however, the tools used in this project were donated by a local wound care supply representative.

Protection of Human Rights

The DNP project received expedited approval from Montana State University Institutional Review in December of 2017 (See Appendix I for IRB Approval). All participants signed a consent form specifying voluntary participation in this practice improvement project which includes the use of weekly wound photographs. The consent form specified that patients may withdraw from the project at any time. Photography and patient concents were scanned into the Athena EHR according to the organization's policies and procedures. Completed surveys, which contained no personal health information, were kept in a locked file separate from the consents. An excel spreadsheet stored on a password protected computer was used to record de-identified patient information extracted from the EHR. Surveys and spreadsheets will be securely maintained until three years after project completion at which time they will be destroyed.

There were minimal foreseen risks or harms to participating in this project. A small increase in the length of the weekly nurse visit was possible and maybe considered inconvenient by both patient and nurse. Also, the 5-10 minutes required to complete the post project survey may also be viewed unfavorably. Benefits include assisting a local healthcare organization assess a new form of evidence-based care delivery which may

change how wound care is delivered in the future. In addition, wound photography and SAF consultation may lead to early implementation of evidence-based wound care, a reduction in nurse visits, limit required travel, and improve satisfaction.

Statistical Analysis

Montana State University's Statistical Consulting and Research Services (SCRS) was consulted throughout the data collection and analysis portion of the DNP project (Montana, 2018). Each of the three surveys and corresponding questions were mapped to each of the eight project questions. The surveys used a Likert scale which included five choices; strongly agree, agree, neutral, disagree, and strongly disagree. For analysis purposes, scores were given to each category of the Likert scale: strongly agree (5), agree (4), neutral (3), disagree (2), and strongly disagree (1). Each survey was individually analyzed followed by an overall analysis of all surveys. Likert scale data for each question (in each group) was reported in aggregate as percentages. Qualitative data from open-ended questions was analyzed through validation and thematic refinement (Polit & Beck, 2012). Objective data collected from chart review was reported as summary descriptive statistics. Montana SCRS (2018) is credited with all of the results figures (see Appendix J for a complete copy of the SCRS report).

Assumptions

The following assumptions were made regarding the results of the project. It was assumed that that the home health patient with wounds would perceive wound

photography as positive and valuable for their education as well as documenting wound progression. Patients were anticipated to perceive SAF consultation as beneficial as it limits travel, time, and inconvenience. Another assumption is that nurses would perceive wound photography as valuable as photographs provide objective wound monitoring and improve a nurse's ability to identify changes between visits.

CHAPTER FOUR – RESULTS

Results

During the project period, two patients, five PCPs, nine home health nurses, and one wound expert participated in the survey process ($N = 17$). Response rate was 100% with 100% completion of survey questions across all groups. Participants were asked to share additional thoughts, suggestions, or feedback at the end of the survey in a free-text area. Additionally, due to overwhelmingly high satisfaction levels with SAF consultation, the agency permitted patients who did not meet inclusion criteria to trial SAF wound consultation. A total of 20 patients had wound photographs taken and eight patients participated in SAF wound consultation. Patients who were not eligible for the project included hospice patients, home health patients with a provider who did not have access to the Athena EHR, or those cognitively unable to complete the survey process.

Patient's Survey of Satisfaction and Perceived Value

Two patients, both females over the age of 65, met criteria for inclusion in the project. Patient 1 was a longstanding home health patient with multiple sclerosis who had received home health services for greater than two years. She also had a history of malnutrition and neurogenic bladder. Patient 1 was bed bound requiring lift transfers into a specialty wheelchair. She lived alone in a private residence 25 miles from the agency. She required extensive assistance from family and private caregivers. Patient 1's Braden Score (11) indicated she was at high risk for pressure ulcers. Home health nurses made

visits twice weekly. Patient 1 had multiple chronic pressure related wounds to her buttocks, back, groin, and lower extremities. During the project period she experienced a wound infection which was successfully treated at home with oral antibiotics.

Table 1. Patient Participant Characteristics

Patient Participant	Days on Service	# Wounds	Wound Types	Nurse Visits	Frequency of Dressing Change	SAF Consults	Adverse Wound Outcomes
1	84+	5	Pressure ulcers Diaper dermatitis	23	2 x week	9	Infection L Hip
2	59+	3	Stasis dermatitis Candida intertrigo	21	2-3 x week	4	None

Patient 2 was admitted during the project period for cellulitis, lymphedema, and stasis dermatitis. She had history of diabetes, morbid obesity, and oxygen-dependent COPD. Her Braden Score of 14 indicated she was at risk for pressure related skin injury. Patient 2 was predominately wheelchair bound but was able to stand with assistance to transfer. She lived alone with daily support of family members less than two miles from the agency. Patient 2 had multiple small wounds on her lower extremities; additional wounds were later noted in her groin and mouth. Both patients continued to receive home health services following the project period; neither patient was discharged.

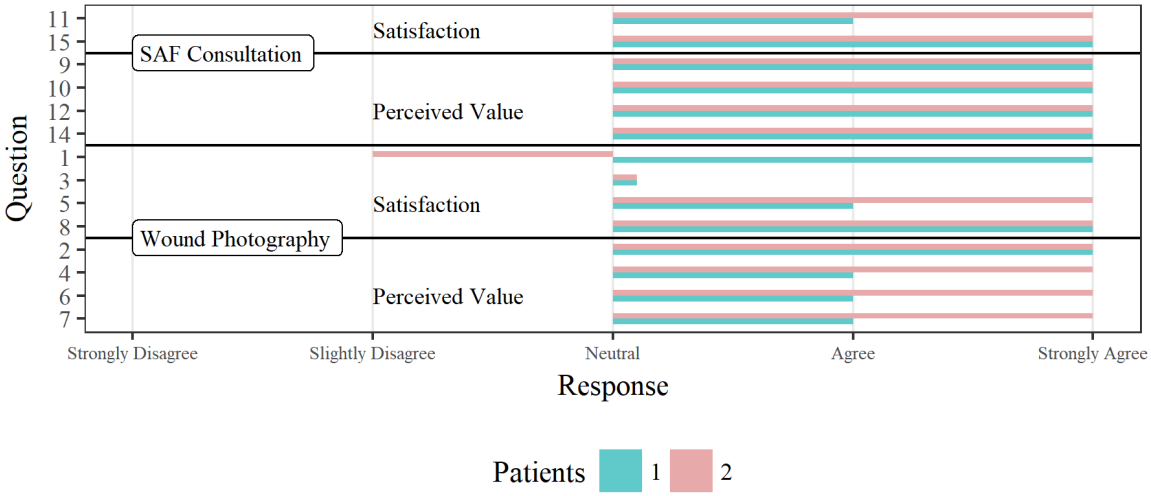
Wound Photography

Satisfaction. Patients indicated satisfaction with the use of wound photography in home health; however, a wider variation in responses was noted in this category

compared to SAF consultation. Both patients responded neutrally (with a score of 3) when asked, 'I liked seeing photographs of my wound.' Patient 2 'slightly disagreed' with the statement, 'I am comfortable having my wound photographed.' Comments explained, "I was a bit embarrassed when the nurse took photographs of my groin, but I valued being able to see the wounds. They were far worse than imagined." Despite patients' neutral responses regarding viewing their own wound photographs, both participants 'strongly agreed' that 'Wound photographs should be a standard component of wound management.

Perceived Value. Patients 'strongly agreed' with question 2: 'Wound photographs helped me to learn about my wounds'. Patients also responded positively (scores of 4 and 5) to other benefits of photography including increased patient participation in care (question 4), identification of wound changes over time (question 6), and benefit to the providers who care for me when photographs are stored in the medical record (question 7).

Figure 2. Patients' Results by Survey Question



SAF Wound Consultation

Satisfaction. SAF consultation with a wound expert was viewed positively by both participants. Patients were moderately satisfied with SAF consultation as indicated by survey responses of 4 and 5. Both patients 'strongly agreed' with question 15: 'If needed, I would use SAF wound consultation in the future.

Perceived Value. Both patients placed high value ($M = 5$) on the SAF wound consultation service (question 12). Patient 1, who was located 25 miles from the agency, 'strongly agreed' with question 9: 'SAF consultation reduced my travel to the doctor's office.' Patients also strongly agreed with question 14: 'SAF consultation allowed changes in wound care to occur more quickly than waiting for an appointment.'

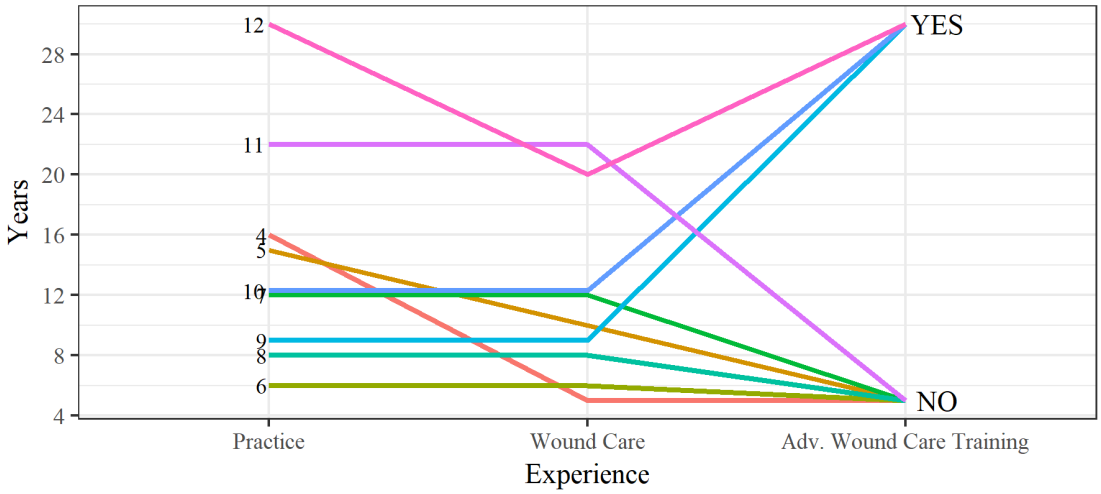
Both patients indicated 'strong agreement' with question 10: 'SAF wound consultation provided care that was equal to visiting a doctor or wound expert in the clinic.' However, comments in the free-text area suggested an important distinction

between the clinic visit and wound care provided in the home under the guidance of SAF wound consultation. Participant 1 responded, “Way too difficult to leave home; can’t even examine my wounds in the clinic.” Participant 2 had a similar statement, “This service was not the same as going to the office; it was far better. I cannot even get onto the examination table in the clinic; they can’t even look at all my wounds.”

Nurse’s Survey of Satisfaction and Perceived Value

Nine home health nurses ($n = 9$) participated in the survey process. Home health nurses’ clinical experience ranged from six to 30 years. Most nurses had practiced wound care throughout their career with 67% having greater than 10 years of practice experience. Only three nurses reported advanced wound training through online education or conferences. No home health nurses were certified in wound care.

Figure 3. Nurse Participant Experience



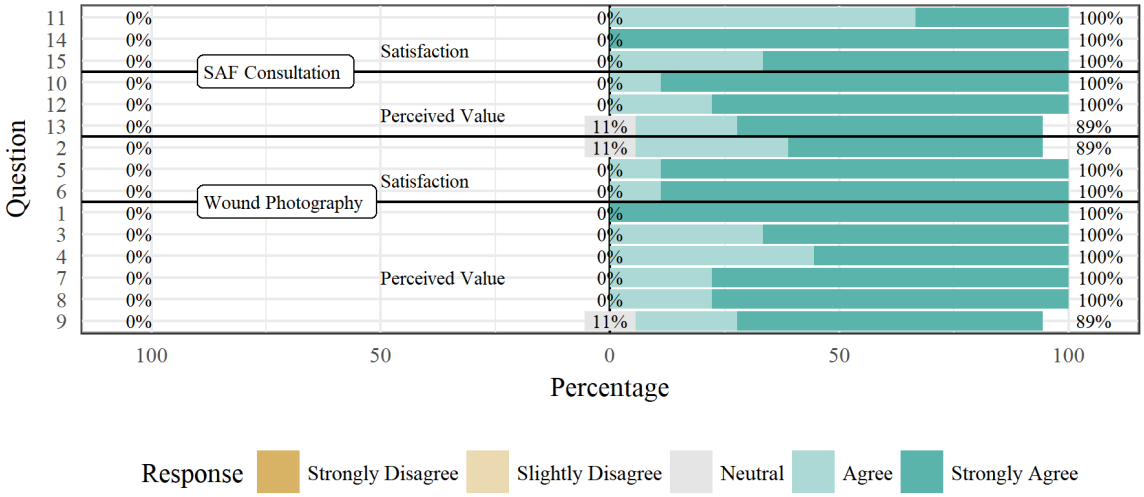
SAF Wound Consultation

Satisfaction. All nurses (n = 9) reported satisfaction with the SAF wound consultation process. Of nurses surveyed, 100% 'strongly agreed' with question 14: 'SAF wound consultation was a valuable service for home health patients.' One nurse commented, "To me, the utilization of SAF is a no-brainer. Visualization is critical for wound management and assists with optimal collaboration between colleagues." In response to question 11, 'Nothing important was missed or left out during the SAF wound consultation process,' 66% of nurses agreed and 33% strongly agreed (M = 4.3). One nurse who scored lowest commented, "The interaction with the wound expert only happened when I was assigned to the patient."

Perceived Value. Nurses' scores for perceived value of SAF wound consultation were 89% positive with only one neutral response to question 13: 'My knowledge of wound care was increased through regular interaction with the wound expert.' All nurses

(n = 9) agreed, with 89% indicating strong agreement, that SAF consultation allowed changes in wound care to occur more quickly than waiting for office appointment (question 10). In addition, 100% of nurses agreed (M = 4.8) with question 12: SAF consultation promoted multidisciplinary wound management.

Figure 4. Distribution of Nurse Results by Survey Question



Wound Photography

Satisfaction. Six of the nine nurse participants (67%) indicated strong agreement (M = 4.5) with question 2: 'I am satisfied with the quality of the digital wound photographs.' Two nurses indicated agreement (22%) and one nurse respondent noted a neutral response. No free-text comments were given. Eighty-nine percent of nurses surveyed indicated 'strong agreement' (M = 4.9) with question 6: 'The use of consistent photography techniques makes wound photographs more valuable.' Of nurses surveyed, 100% agreed (M = 4.9) with question 5: 'Wound photographs should be a standard component of wound management.'

Perceived Value. Nurses (n = 9) responded positively to five of the six questions used to identify benefits of wound photography. Of surveyed nurses, 100% 'strongly agreed' (M= 5.0) with question 1: 'Wound photographs improved my communication with the wound expert and provider.' Nurses also responded positively to other perceived benefits of wound photography including: more accurate documentation than written description alone (question 3, M = 4.7), identification of wound changes (question 4, M = 4.6), value in patient teaching (question 8, M = 4.8) and improved continuity of wound care between nurses (question 7, M = 4.8).

> One nurse commented, "Wound photography allowed myself to visit a patient (that I had never seen before) with confidence on how to proceed with that specific wound and to know if it was resolving or headed the other direction. Great service for home health nurses."

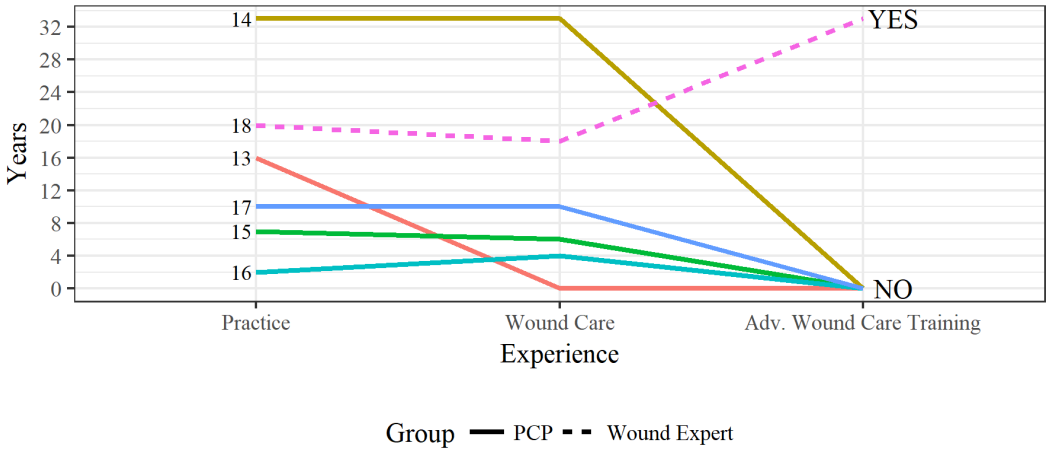
The greatest variation in nurse responses (M = 4.6) were observed with question 9: 'Wound photographs in the electronic medical record are beneficial to my practice.' One nurse responded neutrally and the remaining 89% reported agreement. Comments from one nurse may help clarify the challenges nurses experience when integrating wound photographs into the EHRs, "Only downside that I can see is it is very time consuming if there are a lot of wounds."

PCP and Wound Expert Survey of Satisfaction and Perceived Value

Five PCPs and one wound expert completed the survey. One nurse practitioner and two physicians were listed as the PCPs for the two patient participants. The remaining PCPs had patients who used SAF consultation during the project period but did not meet criteria for project inclusion. All PCPs (n = 5) worked in a family practice

clinic environment with some seeing a higher proportion of specialty populations such as obstetrics, pediatrics, and internal medicine. PCP's clinical experience ranged from two to 33 years. Most PCPs except participant 13 indicated wound experience which paralleled career experience. Participant 16 had two years of PCP practice experience and four years of nursing wound care experience. No PCP had received advanced wound training. Only the wound expert was certified in wound care.

Figure 5. PCP and Wound Expert Experience



Note: Numbers (13-18) within the figure represent participant identification.

SAF Wound Consultation

Satisfaction. SAF wound consultation satisfaction was rated highly by the wound expert ($M = 4.7$). Of PCPs surveyed, 100% agreed ($M = 4.8$) with question 15: 'SAF wound consultation is a valuable service for home health patients.' Eighty percent of PCPs reported strong satisfaction ($M = 4.8$) with the SAF consultation process (question 14). One PCP commented, "The wound SAF was very valuable and improved patient care. I would like to see all patients with chronic wounds have this service available."

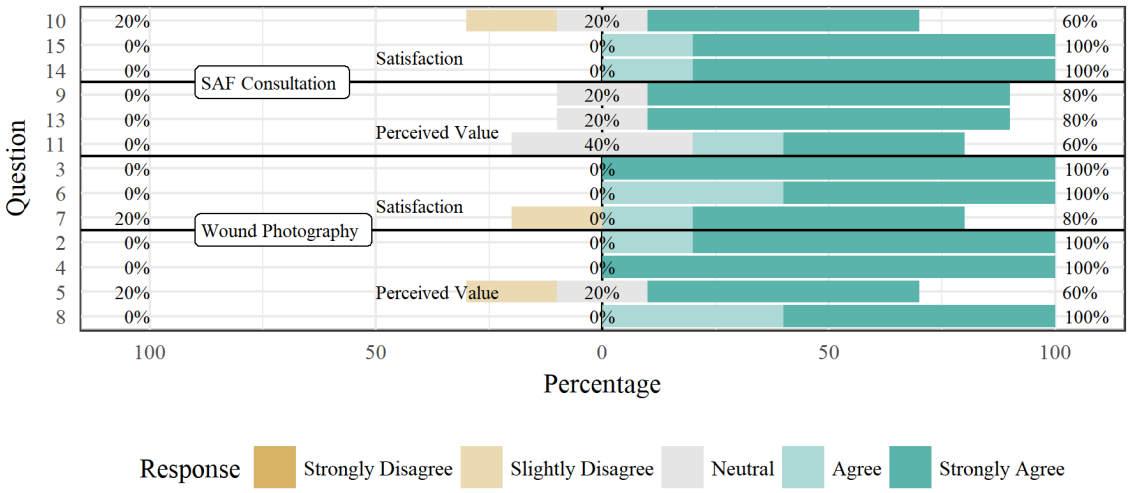
Eighty percent of PCPs indicated strong agreement (*M* = 4.4) with question 10, 'Nothing important was missed or left out during SAF wound consultation.' The wound expert also 'agreed' with this statement (4.0). One PCP 'slightly disagreed' and comments indicated dissatisfaction with receiving a wound photograph without nursing assessment.

Perceived Value. The wound expert rated all questions of perceived benefits and value of SAF wound consultation highly (*M* = 5). Questions in this category included promotion of multidisciplinary wound management, SAF care was equivalent to an office visit, and SAF allowed more rapid changes in wound care than waiting for an appointment. The wound expert commented, "Not only will this make my life easier, patient care will be enhanced, costs can be controlled, and I can utilize my time efficiently."

PCP scores indicated moderately high agreement (*M* = 4.5) regarding perceived value of SAF wound consultation. Of PCPs, 80% reported strong agreement with question 9, 'SAF wound consultation allowed changes in wound care to occur more quickly than waiting for an office appointment with the wound expert.' No negative responses were noted; however, one PCP did report neutrally. Similar responses were seen in question 13 with 80% of PCPs reporting strong agreement (*M* = 4.6) and one reporting neutrally to 'SAF wound consultation promoted multidisciplinary wound care management.' Question 11, 'SAF wound consultation provided care that was equal to going into the office,' achieved the most varied responses (*M* = 4.4) with 60% of PCPs indicating strong agreement, one indicating agreement, and one responding neutrally.

> I will always believe that a hands-on physical exam can never be fully replaced by digital evaluations, perhaps because I strongly believe in the value of laying hands on a patient and the healing importance of human interaction. But this project with pictures was incredibly useful as additional information over time when a hands-on approach cannot be completed as frequently (Participant 15).

Figure 6. Distribution of PCP Results by Survey Question



Wound Photography

Satisfaction. The wound expert's survey results demonstrated moderately high ($M = 4.7$) wound photography satisfaction. Of providers surveyed ($n = 5$), 100% reported that they were strongly satisfied with the quality of digital wound photographs (question 3). In addition, all PCPs 'agreed' ($M = 4.6$) that consistent photography techniques made wound photographs more valuable. The wound expert and 80% percent of PCPs 'agreed' or 'strongly agreed' with question 7: 'I am satisfied with the use of wound photographs to monitor wound status.' One PCP 'slightly disagreed' with the statement and substantiated the response with a comment, "Wound like commentary from the nurse with all photographs." Other PCP comments included, "A picture is worth a thousand

words. It is hard to see what someone is trying to describe but a picture with a ruler eliminates the guess. All wounds should be documented with photographs."

Perceived Value. The wound expert rated all categories of perceived value of wound photography highly with categories of improved communication, accuracy of documentation, identification of wound changes, and benefit of EHR use all scoring 5. Regarding communication, 100% of PCPs agreed ($M = 4.8$) that wound photography improved communication with the home health nurse. All PCPs ($n = 5$) also strongly agreed with question 4: 'Wound photographs provide more accurate documentation than written description alone.' In addition, PCPs agreed ($M = 4.6$) that wound photographs in the EHR were beneficial to their practice with 60% reporting strong agreement.

> The pictures were incredibly useful, especially given the limitations of available office visits and the ability of some patients to come into the clinic….her wounds worsened abruptly. It was much easier to discuss her case with our local surgeon with the pictures provided (Participant 15).

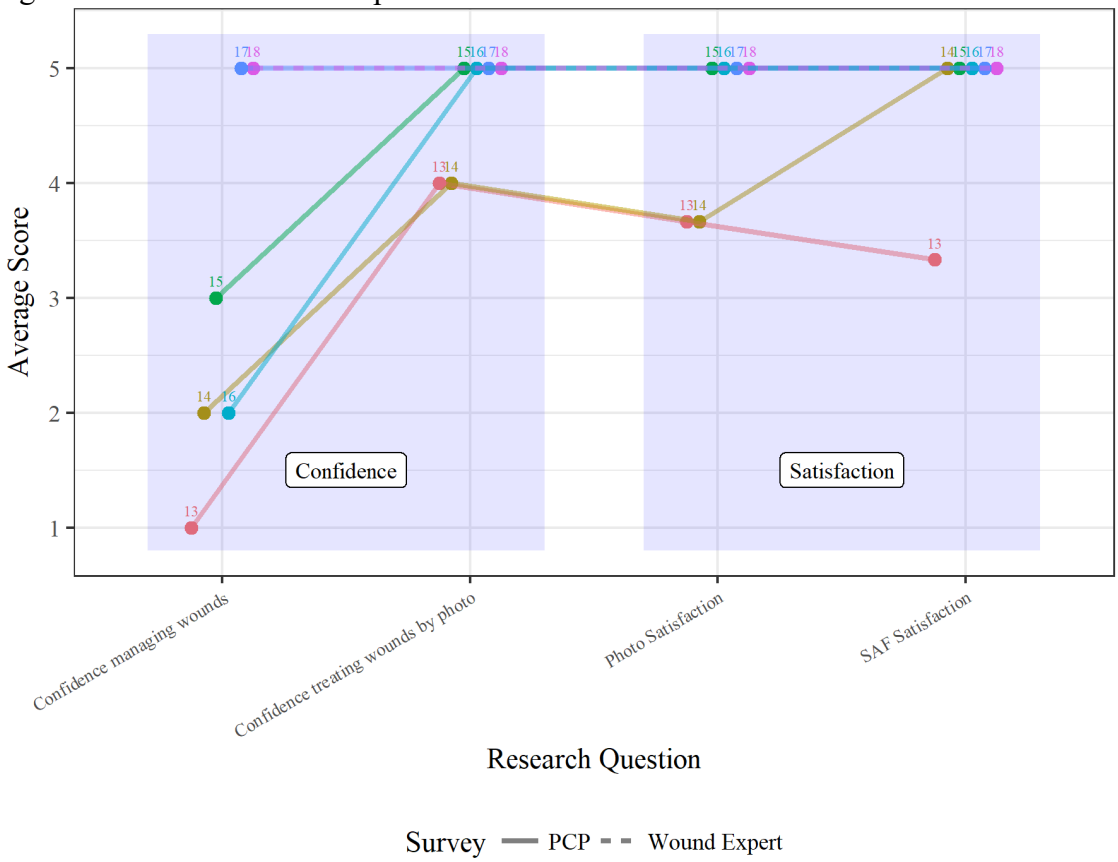
Of PCPs, 60% reported ($M = 4.0$) strong agreement with question 5: 'I could identify the changes in the wound by reviewing wound photographs.' PCPs with lower confidence scores were less certain of detecting wound changes; one PCP indicated a neutral response, and another indicated slight disagreement. Regarding wound photographs, one PCP commented, "I could also see the dramatic changes beyond what nurses were communicating."

Special Questions

Two survey questions did not directly address the research questions but related to the PCP's confidence in managing wounds independently and treating wounds based on a

photograph and nurse assessment. The wound expert indicated the highest level of confidence in wound management and treating wounds based on photographs.

Figure 7. PCP and Wound Expert Confidence and Satisfaction



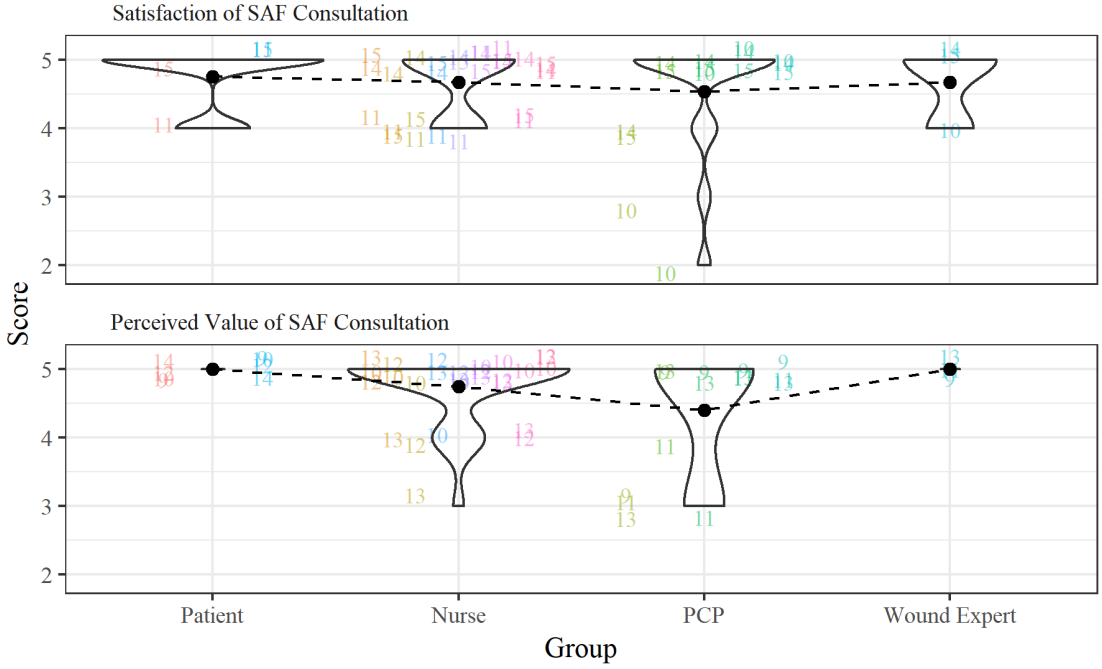
In comparison to the high level of confidence reported by the wound expert, 60% of PCPs ($M = 2.6$) reported low confidence (score below 3) in managing wounds independently. Only one PCP indicated a high level of confidence. PCPs with the lowest confidence also scored lowest in satisfaction of wound photography and SAF consultation. Despite low confidence in managing wounds independently, all PCPs indicated moderately high confidence ($M = 4.6$) in treating wounds based on a

photograph and nurse's assessment. In addition, four of the five PCPs (80%) indicated a high level of satisfaction ($M = 4.8$) with SAF wound consultation with a wound expert.

Survey Results Across Groups

Overall, survey results indicated moderately high levels of satisfaction and perceived value for wound photography and SAF consultation across all groups. A violin scatter plot (Figure 8) demonstrates the distribution of individual scores for each participant group. Response distribution is indicated by black wavy lines with the widest triangular areas representing the highest frequency responses. Solid black dots signify the average or mean group score. Colored numbers represent survey questions.

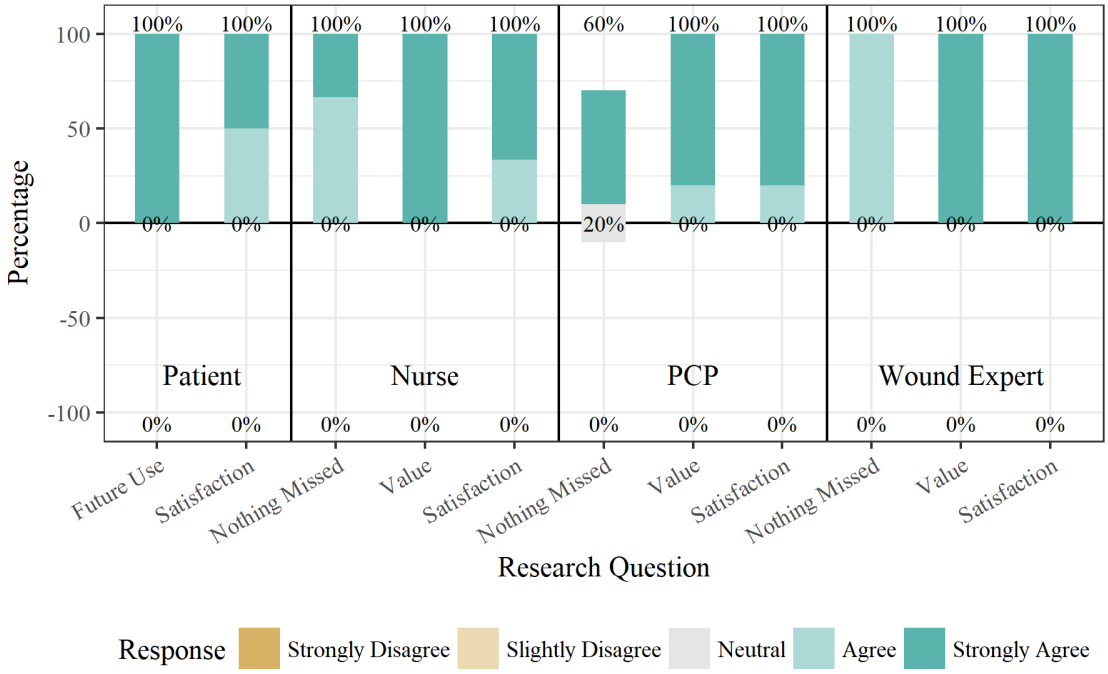
Figure 8. Distribution of Survey Responses for SAF Consultation



Satisfaction of SAF Wound Consultation

Satisfaction of SAF wound consultation was rated highly by all participant groups with means of 4.5 or higher. A wider distribution of responses for SAF satisfaction among all groups prompted closer, side-by-side evaluation of survey questions included in this category looking for similarities. Lower nurse ($M = 4.3$), PCP ($M = 4.4$), and wound expert (4.0) response scores were similarly associated with the statement, 'Nothing important was missed or left out during the SAF wound consultation process.'

Figure 9. Satisfaction of SAF Wound Consultation Across Groups



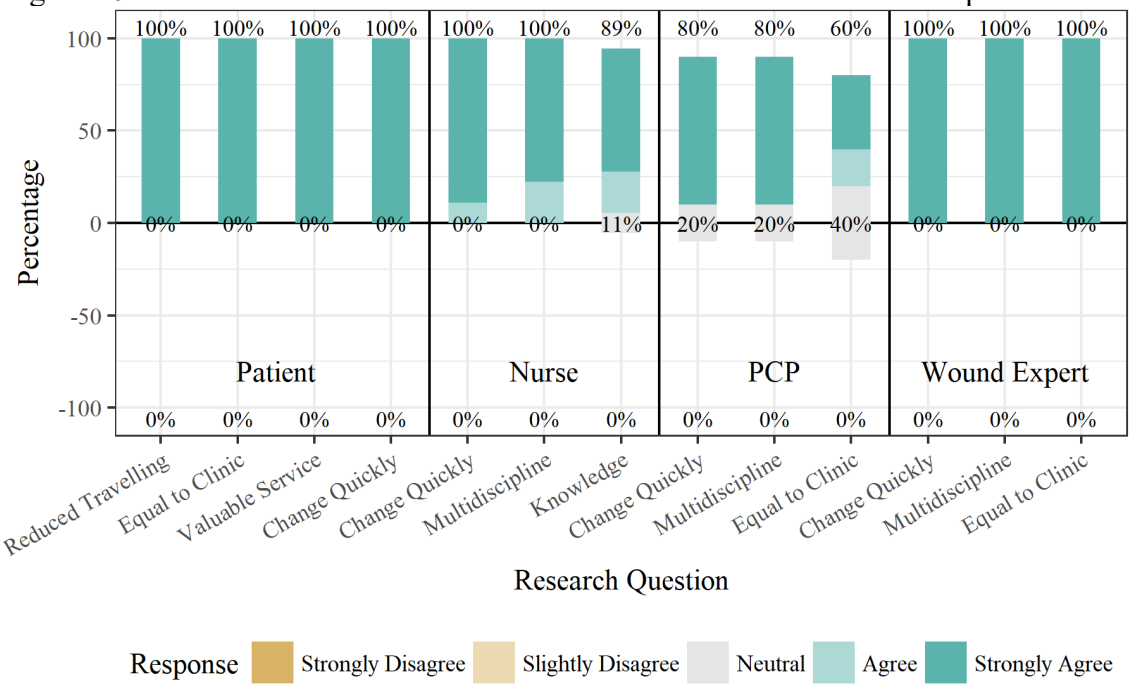
Perceived Value of SAF Wound Consultation

Patients and the wound expert rated the value of SAF wound consultation the highest at 5. Nurse ($M = 4.7$) and PCP ($M = 4.3$) responses also indicated moderate agreement but demonstrated a wider distribution and lower mean scores. Patient and

wound expert responses indicated ‘strong agreement’ that SAF promoted more rapid changes in wound therapy than waiting for an office appointment. When compared to nurses ($M = 4.8$) , PCP responses ($M = 4.6$) indicate lower overall agreement with one neutral response. Regarding promotion of multidisciplinary communication, the wound expert (5.0) and nurses ($M = 4.8$) rated this item highly while PCP results were slightly lower ($M = 4.6$).

The statement, ‘SAF wound consultation provided care that was equal to going into the office’ received the widest distribution in responses across groups with 63% of all participants strongly agreeing and two PCP participants reporting neutrally. The wound expert and patients both responded strongly to this item ($M = 5$). PCP responses were not negative but demonstrated lower certainty ($M = 4.0$) with two neutral responses.

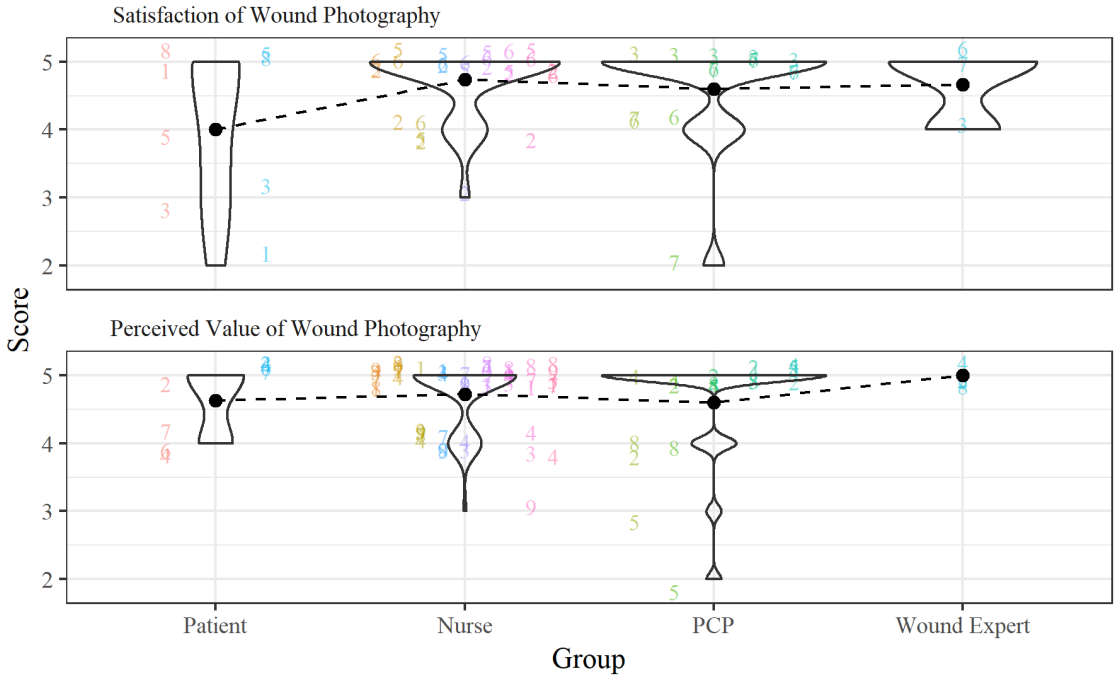
Figure 10. Perceived Value and Benefits of SAF Consultation Across Groups



Satisfaction of Wound Photography

The widest variability across all participant groups was noted in the category of satisfaction of wound photography. All groups except patients posted mean scores greater than 4.5 indicating moderate satisfaction. As discussed earlier, patient's scores were lower due to neutral personal preferences regarding viewing wound photographs and emotional discomfort with having photographs taken.

Figure 11. Distribution of Survey Responses for Wound Photography

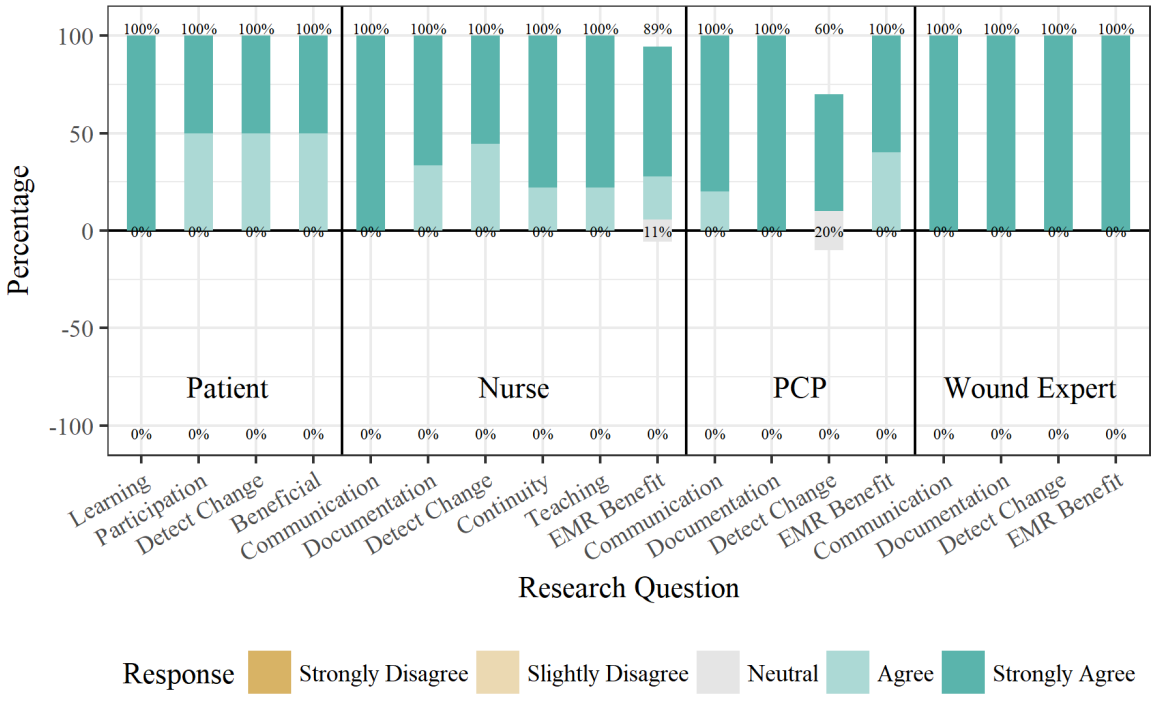


Nurses ($M = 4.9$) and PCPs ($M = 4.6$) agreed with the wound expert (5.0) that consistent photography techniques make wound photographs more valuable. In addition, 100% of PCPs reported high satisfaction ($M = 5.0$) with the 'quality of the digital wound photographs.' The wound expert (4.0) and the nurses ($M = 4.6$) were also satisfied with the quality of the digital images but reported lower mean scores than PCPs.

Perceived Value of Wound Photography

Across groups, mean scores above 4.5 indicated all participants placed moderately high value on wound photography. Strongest agreement among participant groups was seen in categories of communication and documentation. PCPs (M = 4.8), nurses (M = 5.0) and the wound expert (5.0) reported wound photographs improved communication with care team members. In response to the statement, 'Wound photographs provide more accurate documentation than written description alone,' 100% of PCPs and the wound expert 'strongly agreed' (M = 5.0). Nurses had slightly lower scores (M = 4.7) with three nurse participants 'agreeing.' In addition, PCPs (M = 4.6), nurses (M = 4.6) and the wound expert (5.0) felt strongly that wound photographs in the electronic medical record were beneficial to their practice.

Figure 12. Perceived Value and Benefits of Wound Photography Across Groups



PCP's overall had the lowest mean scores ($M = 4.0$) related to the ability to 'identify wound changes by reviewing the wound photograph.' In comparison to nurses ($M = 4.6$) and the wound expert (5.0) who both responded strongly to this item. Patients also 'agreed' ($M = 4.5$) to a similar question, 'Wound photographs helped me to see changes in my wound.'

CHAPTER FIVE – DISCUSSION

General Findings

This DNP project achieved its goal to conduct a multidisciplinary assessment of satisfaction and perceived value of wound photography and SAF consultation in the home health population. General findings indicate high levels of satisfaction for wound photography and SAF consultation across all participant groups. Participants indicated many highly rated benefits of photography and SAF consultation cumulatively supporting the value and use in home health wound management.

Wound Characteristics

No wounds demonstrated complete closure during the project. Reasons for lack of complete healing are multifactorial; both patients had chronic wounds which traditionally fluctuate in severity over time. In addition, both patients had comorbidities known to affect wound healing including obesity, COPD, immobility, and diabetes. Patient 1 demonstrated a downhill trajectory during the project experiencing worsening weakness, impaired nutrition, and weight loss. This was not a consequence of her care but rather advancing disease processes and a personal desire to remain living at home.

Nurse and PCP Experience

The results of the survey indicate the organization has a diversified staff with experienced providers and nurses. Nurses report more education directed towards wound care than providers. However, an overall lack of education regarding wound care is

apparent among both nurses and PCPs. These findings are in alignment with those reported by Ayello and Baranoski (2014). Continuing education in wound care through classes, conferences, and lunch-and-learn seminars, should be directed toward both nurses and PCPs in rural settings.

While most PCPs have managed wounds throughout their career, PCPs reported very low confidence in independently managing wounds. However, PCP confidence soared when treating wounds based on a wound photograph and the on-site nurse's assessment. These results suggest that PCPs rely heavily on the home health nurse's assessment and the local wound expert's knowledge. Thus, wounds may represent an ideal problem which is best managed through a multidisciplinary framework. SAF wound consultation is the modality which can bring these disciplines together.

NE1 Tool

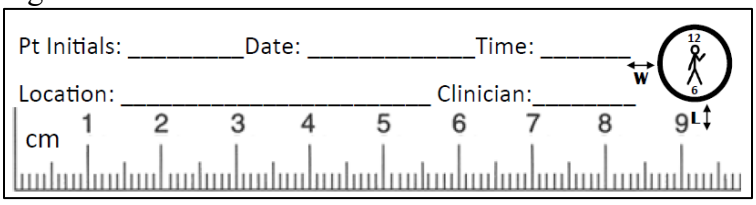
The NE1 tool was used to standardize the photography process and assist nurses with wound assessment and staging. In patient 1, the NE1 tool was used to photograph pressure related wounds; however, this was done inconsistently depending on the nurse. The tool was not appropriate for use in patient 2 as her wounds diffusely covered both lower extremities.

Informal feedback from staff indicated the NE1 tool was helpful when assessing and staging a wound with clearly defined margins. The tool, when used consistently, does help standardize photographs making side-by-side comparison more valuable. However, at $5 for a single use tool, organizations wishing to control supply costs may find the tool an unnecessary and extravagant expense. Nurses suggested the tool be

charged weekly to the patient's wound supply costs to recoup the expense. This strategy would likely be effective with private insurance; however, Medicare's prospective payment system pays home health organizations a lump sum per episode of care. The wound expert found the tool to be a great resource for nurses or providers who are less comfortable assessing and staging wounds. Ultimately, the organization must decide if the cost of such a tool translates to improved wound assessment, documentation, and improved healing metrics.

The DNP student developed a single use wound label for cases where the NE1 was not appropriate. The label (Figure 12) included essential documentation: patient initials, time, date, location, and an orientation diagram. The label was developed in a word document and printed on commercial pre-made Avery label sheets. The label was revised multiple times integrating real-time feedback from staff nurses. The labels were a cost-effective way to accurately document skin and wound photographs.

Figure 13. Wound Identification Label



Cost Savings

The project was not intended to collect detailed data regarding cost savings. However, significant savings were likely experienced by the patient and organization. In terms of patient savings, both patients relied on working family members (children) to transport them to the clinic. Avoiding unnecessary weekly work absences reduced family

costs as well as greater costs to society. Weekly SAF consultation with the wound expert also saved Patient 1 from 50-mile roundtrip visits to the clinic for a total savings of 450 miles over nine consultations.

Patient 1, while overall demonstrated a decline in physical health, benefited from SAF wound consultation in a number of ways. Nursing staff identified deterioration in the left hip wound and sent a photograph to the PCP and wound expert. Based on the photograph and nurse's assessment, the wound expert ordered a wound culture and the PCP ordered antibiotics. SAF consultation supported a rapid change in the wound treatment which may have prevented the need for hospitalization. These findings agree with Vowden and Vowden (2013) who reported SAF consultation prevented the need for hospitalization and in some cases identified those who would benefit from early hospitalization. SAF consultation also provided a mechanism to digitally consult a local surgeon. The surgeon, wound expert, and PCP proposed a treatment plan with surgery debridement, negative pressure wound vac therapy, and short-term nursing home placement. Acknowledging the risks, Patient 1 declined aggressive treatment and opted to remain at home.

Without SAF consultation, the patient's condition would have likely deteriorated at home leading to an expensive ER visit and hospitalization. The average medical hospitalization stay for the local hospital is 2.75 days and costs approximately $9,000 but does not include surgery costs (American Hospital Directory, 2018). SAF consultation allowed the patient to receive rapid treatment at home and to make an informed decision

concerning her care which was in accordance with her desires. This resulted in high patient satisfaction and saved thousands of health care dollars.

Project Questions

Satisfaction of SAF Wound Consultation

All participants reported moderately high satisfaction and indicated that SAF consultation with a wound expert was a valuable service for home health patients. The process itself was determined to be acceptable despite the challenges faced by the organization integrating three separate EHRs between the clinic, wound expert, and the home health department. The SAF consultation process is expected to improve significantly in terms of the number of steps, timeliness, and completeness as the organization moves toward a single EHR.

Perceived Value of SAF Wound Consultation

Participants reported moderately high perceived benefits with SAF wound consultation across all groups. The most notable finding related to alternative viewpoints expressed by patients and PCPs regarding the equivalence of the SAF wound consultation with the clinic visit. Home health patients and the wound expert both strongly agreed that SAF wound consultation provided wound care which was equal to the clinic wound visit. Patients' comments further suggested that SAF wound consultation is more effective in cases where the wound cannot be examined in the office due to the wound location or patient's level of immobility. PCPs were less certain of this perceived benefit, with two participants indicating neutral responses. Neutral responses should not be

interpreted as negative responses. Instead, a neutral response may indicate uncertainty or lack of experience. One PCP expressed a commonly held belief that technology cannot replace the hands-on physical examination. However, in later discussions with PCPs, some conceded that they may be viewing the office visit in idealistic terms which are not applicable to a subset of patients who cannot be fully examined in the clinic. These findings suggest that in a particular group of patients wound care provided in the home setting may be preferable and more effective than the clinic.

While still positive, lower nurse, PCP, and wound expert responses were similarly associated with the statement, 'Nothing important was missed or left out during the SAF wound consultation process.' Lower scores may indicate inconsistencies in the SAF consultation process such as variations in the level of interaction with the wound expert. In other cases, components of the consultation may not have been consistently deployed such as one consultation where the nursing assessment was omitted. Based on participant comments, missing components may also be related to time constraints or challenges associated with using multiple EHRs. These factors are expected to improve as the organization reduces the number of EHRs currently in use.

Satisfaction of Wound Photography

Across groups, participants reported high levels of satisfaction with wound photography. Similar to Wang et al. (2014) results, patients in this project were not enthusiastic about having wounds photographed and yet reported wound photography was a valuable component of wound management. Nurses should drape sensitive areas which are not necessary to include in the photograph and provide reassurance of the

usefulness of routine wound photographs for communication and identification of changes. Based on patients' feedback, those who cannot visualize their wounds should be encouraged to view wound photographs as wound status may differ considerably from what the individual has imagined. As suggested in the literature, patients reported wound photographs were helpful in teaching them about their wounds and wound therapy (Wang et al., 2014).

High satisfaction with the 'quality of digital images' was evident among PCPs, nurses and the wound expert. Recall, no expensive equipment was purchased to take wound photographs and the digital images were deemed appropriate to base wound treatment recommendations. The best quality images came from personal smart phones. Nursing staff reported the organization's larger Samsung tablets were more difficult to maneuver when photographing wounds in difficult to reach locations.

PCPs rated the satisfaction of the 'use of wound photographs to monitor wounds' lower when they did not include a nurse assessment. The omission of the nursing assessment indicated a failure to follow the protocol as designed. However, this presented an opportunity to assess the significance of the bedside assessment from the provider's perspective. The PCP placed high value on the nurse's written wound assessment which agrees with findings in the literature recommending the wound photograph should never standalone (NPUAP, 2014; Stotts & Sparacino, 2005).

Perceived Value of Wound Photography

High agreement with the value of photography was seen across all groups, particularly in the categories of communication and documentation. While still positive,

the lowest scores were observed with PCP and nurse responses regarding the benefit of wound photographs in the medical record. Based on feedback from nurses and providers, this may be related to the EHR's capabilities. Specifically, side by side comparison of a previous and current wound photographs was difficult to complete. The project also required the home health RN to use an additional EHR application (*AthenaText*) in addition to the department EHR. Nurses reported that weekly documentation of Patient 1's five wounds took a considerable amount of time due to duplicate charting of the wound assessment. While this patient was more complex than the traditional home health patient, this represents a barrier to implementation. As previously discussed, the complexity of the SAF process is expected to improve as the Athena EHR is expanded.

Feasibility of Implementation

The Joanna Briggs Institute (JBI) model of evidence-based practice identifies evidence which professionals use to inform everyday practice in addition to that found in the literature (Pearson, Jordan & Munn, 2012). The JBI model was used as a framework to evaluate the results of the pilot project and determine the feasibility of implementation. The JBI model breaks down broader evidence into FAME: Feasibility, Appropriateness, Meaningfulness, and Effectiveness. Feasibility relates to, "the extent to which an activity is practical and practicable" (Person et al., 2012, p. 2). This DNP project demonstrated multidisciplinary satisfaction with the processes used for wound photography and SAF consultation. Thus, demonstrating the practicability of both. In addition, the project was practical as it did not require additional expensive equipment or staff and could be easily

integrated into the existing structure of the home health department. The 'appropriateness' of the intervention was clear given the inability of the home health patient to be easily seen in the clinic and the nurses' need to accurately document and communicate the status of wounds. All participants felt this was a highly beneficial service to the home health population. The JBI model emphasizes the 'meaningfulness' of an intervention as measured by the patient experience (Pearson et al., 2012). Patients unanimously agreed that they would use SAF consultation in the future, that it reduced travel, provided care which was equal (or better) than the clinic, and allowed changes in wound care to occur more quickly. Finally, the 'effectiveness' of the pilot project was achieved as the multidisciplinary results indicated high levels of satisfaction and perceived benefits. The results of the project cumulatively support full implementation of wound photography and SAF wound consultation in the home health department.

Cost Implications

Implementation of SAF consultation on a permanent basis would incur minimal agency costs. The project would require a department leader, most likely an RN, working 1-5 hours per week to track SAF consults, upload documents into the EHR, and modify the consultation process as necessary. The role of the leader is anticipated to become less involved as Athena EHR expands within the organization and all nurses develop a high level of competency with the process.

Medicare will not reimburse the outpatient wound expert nor the home health agency for providing the SAF consultation service to home health patients. Medicare pays the agency a set dollar amount to treat the home health patient with wounds; wounds

which heal faster result in more revenue to the department. Medicare does reimburse for traditional telemedicine visits with two-way video communication. Agreements should be developed between the wound expert, hospital, and home health department to assure the organizational benefits of the service outweigh the costs. Organizations with high acute care costs may find that offering an SAF consultation service line (even when non-reimbursable) may be helpful in reducing unnecessary ER and hospitalization costs.

Expanding Access

The wound expert is a limited resource both in this state and local community. The literature suggests that 2-6 SAF consultations can be provided per hour compared to the wound expert seeing 1-3 patients in the clinic. SAF consultation represents a modality which can be used to extend the reach of the wound expert so that more patients can benefit from the wound service and knowledge. The service line may lead to spin-off services in other departments such as laboratory, radiology, and the primary care clinic.

Relation of Project to Theoretical Constructs

Rozzano Locsin's (2005) Technological Competency as Caring in Nursing (TCCN) theory provided the guiding framework for this DNP project. The concepts of technological knowing and participative engaging informed development of the project's timeline and nurse in-service training. In addition, these concepts provided structure for understanding the response to the use of an additional technology in home health.

Technological Knowing

Home health patients, while elderly and somewhat isolated from rapidly changing technology, were accepting of the use of wound photography as a tool to document wounds. Patient's comments indicated some embarrassment with having wound photographs taken of private areas. However, they also indicated a comfort with the home health nurse and even a preference for wound care in the home over that of the clinic. These findings indicate the home health nurses were able to competently use the digital device to obtain wound photographs without negatively influencing their ability to develop a caring relationship with the patient.

All survey groups indicated multiple perceived benefits to the use of wound photographs and SAF consultation. The results suggest that the technology assisted the participants to more fully know and understand the patient. This technological knowing, which was only accessible through the use of technology, informed the design of an appropriate and patient-specific plan of care.

Participative Engaging

The concept of participative engaging was used as a model for nurses to base their caring interactions so that the patient became a participant in the care rather than the object of care. Nurses who were competent with the technology engaged patients in learning, teaching, and shared goal setting using wound photographs. Nurses with the highest levels of proficiency over the technology demonstrated more frequent use of wound photographs in patient interaction which supports Locsin's theory. Patient's self-directed involvement (asking questions, wanting to see comparison photographs) also

appeared to increase as the use of the technology became routine practice. This may suggest that patients' comfort with the technology plays a role in participative engaging.

While all nursing staff demonstrated competency with wound photography and SAF consultation following the in-services, nurses were at varying levels of comfort and proficiency. Project leaders should consider having nurses' self-rate their comfort level following training to identify those who need or want additional training support. As Locsin's theory contends, those who are not technologically competent are unable to blend invasive technology into caring nursing actions.

Dissemination

Organizational

The DNP student conducted a presentation of project findings at the agency on August 30th, 2018 over the lunch hour. All local PCPs, nurses (including those from home health), managers, and the wound expert were invited by email and poster advertisement. The 40-minute power point presentation included a brief review of the literature, participant demographics, survey findings, and implications for future practice. The presentation was followed by an open floor discussion regarding how to integrate and improve the use of wound photography and SAF wound consultation in the home health population. Nursing staff discussed the challenges of duplicate charting of the wound assessment and integration of three EHRs. The home health manager reported an upcoming EHR expansion that would improve the documentation issue. One provider reported the largest concern was assuring the photograph was always accompanied by a

complete written wound assessment. Those in attendance were generally enthusiastic about the technology and the use of wound photographs in wound management.

A total of twenty individuals attended the presentation which demonstrates the stakeholder support of using this technology to increase patient access to high quality wound care. Attendees were given a pocket card to take back to their departments specifying the steps to upload photographs into the Athena EHR. In addition, free single use labels with printed rulers were distributed to all attendees to encourage the use in wound photographs in their practices.

Community

Following project completion, the DNP student was interviewed by the local newspaper in effort to disseminate the project's findings to the greater community. The article was published on September 5th, 2018 (see Appendix K). The article has prompted further discussions with those in the organization and within the community. The Rotary Club also requested the DNP student speak at the local chapter meeting regarding the project and its impact.

Relation of Project to the Eight DNP Essentials

This DNP Project provided an opportunity for the DNP student to demonstrate the eight essentials of Doctoral Education for Advanced Nursing Practice. The project began with a thorough review of the literature (I – Scientific underpinnings of practice) and evaluation of the evidence (III – Clinical scholarship and analytical methods for evidence-based practice). After identifying the focus population, the DNP student

explored the characteristics of home health patients identifying the vulnerabilities of the population. The information was used to design the SAF wound consultation process to serve an unmet need in the home health population through increasing access (VII – Clinical Prevention and Population Health). While exploring the project, the DNP student identified a policy issue which negatively affected the rural APRN's autonomous practice: Medicare's requirement that a physician sign the home health plan of care. The DNP student wrote a letter to a state legislator urging support of H.R. Bill 1825 which would eliminate the requirement (V. - Health care policy for advocacy in health care). See Appendix L for a copy of the Letter to State Representative.

The DNP student assumed the role of project leader and established a multidisciplinary team of stakeholders (VI – Interprofessional collaboration for improving patient and population health outcomes). The team explored the issues, identified supportive and opposing factors, and developed an implementation process and plan (II – Organizational and systems leadership for quality improvement). The pilot project involved a novel use of informational technology which had never been used at the facility but had the potential to improve the care of the home health patient and transform wound management (IV – Information systems/technology and patient care technology for the improvement and transformation of health care). The DNP student served as both educator and mentor during the DNP project. Using specialized knowledge, skills and effective communication, the DNP student conducted educational in-services to promote the practice change and prepare staff for the pilot project. In

addition, the DNP student served as mentor to other nurses fostering confidence, involvement, and ownership over the project (VIII – Advanced nursing practice).

Recommendations for Practice

Wound Photography

As well as being supported in the literature, all participants indicated wound photographs should be a standard component of wound management. The DNP student recommends the use of a standardized wound photography protocol to maximize the clinical usefulness when comparing wound photographs over time. Nurses should complete a clinical wound photography competency annually to assure protocol adherence. The DNP student also recommends the organization use a single treatment consent which incorporates separate consent for photography. In other words, all patients will be asked about the use of photography when presenting for care. This is in agreement with the American Health Information Management Association's (2010) recommendations for organizations which routinely use photography in practice. Use of a separate consent at the time of photography, which is current practice, may be a barrier to the routine use of photography.

This project demonstrated wound photography improved communication with members of the care team and added value to the written assessment. Unlike the SAF results, these findings are not isolated to the home health population and can be generalized to wound documentation in other departments. The DNP student recommends that standardized wound photography be implemented throughout the

organization following the expansion of the Athena EHR. Thus, allowing for continuous wound care documentation through all levels of care at the organization.

SAF Wound Consultation

SAF consultation was highly rated by all participants who indicated the modality conferred significant benefit to the home health patient. The DNP student, in agreement with the home health director, recommends SAF wound consultation be implemented in the department. The SAF process is expected to evolve and improve as the EHR features change and the organization moves to expand Athena.

Wound Healing Metrics

Lindholm and Searle (2016) reported the three main contributors of wound care costs are time to wound closure, number of health professional visits, and wound complications. However, the number of nurse visits, length of stay on service, and days until wound healing were less useful than predicted for this project. These wound healing metrics are much more applicable to acute wounds which heal in less than 90 days in an expected fashion rather than the chronic recurrent wounds included in this project. The DNP student recommends the agency continue to monitor wound healing metrics to assure its wound management program is meeting wound healing benchmarks in the literature. This recommendation is based on the 'effectiveness' component of the JBI model assuring that the modality is having the intended effect (Pearson et al., 2012). Understanding the nature of the most commonly treated wounds in the department should inform development of the wound management program.

Strengths

Strengths of this project include the length of the pilot period (12 weeks) which allowed SAF and wound photography to be utilized by all nurses under a variety of conditions. The period was also sufficient for wounds to demonstrate measurable healing and change. Data regarding satisfaction and perceived benefits was collected spherically from many perspectives for a more complete representation of results. Important to consider, this pilot may be one of the first multidisciplinary surveys of wound photography and SAF consultation in the home health population.

Limitations

The limitations of this project include the small sample size. The reader should consider the sample size when reviewing percentages discussed in this project as one value can significantly alter the results which may distort the findings. Like other sources identified in the review of literature, this organizational specific project is not applicable to other organizations. As such, the findings cannot be generalized across home health agencies. Results may have also been subject to the Hawthorn effect where participants change their behavior simply because they are under observation.

While not addressed in this project, the DNP student acknowledges the significant role that nutrition plays in wound healing. Multidisciplinary wound care should always consider dietician referral especially in cases of malnutrition or low albumin. Diabetes presents additional challenges when treating wounds; providers should consider referral to a diabetes educator when hemoglobin A1c values are not at goal.

Future Considerations

The home health patients in this project proposed a novel concept not previously identified in the literature suggesting that for some individuals wound care provided in the home may be superior to traditional clinic visits. Both patients indicated their wounds could not be examined in the clinic. Participants had similar characteristics including chronic-recurrent type wounds, severe immobility, and wounds located in difficult to reach areas. PCP survey results indicated less certainty. However, upon further discussion with provider participants, there was consensus that select patients, particularly those with chronic wounds may be best managed in the home setting. A local occupational therapist suggested the home was a more appropriate place to provide intimate care because of the adaptive equipment and accommodations which assure patient comfort and safety. Additional research is needed to define the characteristics of this home health subpopulation which may benefit greatest from SAF wound consultation. There may be a future opportunity for a separate service line for wound management in this population.

While only two patients met criteria for project inclusion, several other patients and families trialed SAF consultation and benefit from it including those on hospice. Hospice patients are unlikely to heal most wounds and have different wound goals including to control drainage, reduce odor, treat wound pain, and prevent progression. Based on experience, the DNP student believes that SAF consultation in this population has the potential to reduce unnecessary travel, control pain, and improve patient and family satisfaction. However, more research is needed.

Conclusion

Comprehensive multidisciplinary wound care based on best evidence is essential to optimize wound healing and reduce the cost of care. Demographic results indicate primary care providers are often responsible for wound care in their clinical practice but lack professional wound care training and confidence to complete this independently. This multidisciplinary survey demonstrated high levels of satisfaction and perceived benefits of wound photography and SAF wound consultation in the home health population. The results of this DNP project suggest that increased use of technology in home health wound care is both well received and confers value to the patient, PCP, and the home health nurse.

REFERENCES CITED

American Association of Nurse Practitioners. (2017). *HR2267 ordering home health care*. Retrieved from https://www.aanp.org/legislation-regulation/news/federal-news/68-articles/332-good-news-hr2267

American Association of Telemedicine. (n.d.). *Telemedicine Glossary*. Retrieved September 2017 from http://thesource.americantelemed.org/resources/telemedicine-glossary

American Diabetes Association. (2017, July). *Statistics about diabetes*. Retrieved from http://www.diabetes.org/diabetes-basics/statistics/

American Health Information Management Association. (2010). Sample consent for clinical photography, videotaping, audiotaping, and other multimedia imaging of patients. *Journal of American Health Information Management Association*, *81*(4). Retrieved September 9, 2017 from http://library.ahima.org/doc?oid=99416#.Wamik8iGNPY

American Hospital Directory. (2018). *Central Montana Medical Center.* Retrieved from https://www.ahd.com/free_profile/271345/Central_Montana_Medical_Center/Lewistown/Montana/

American Professional Wound Care Association. (2008). *Principles to initiate and maintain a successful wound care center: A white paper by the AWCA*. Retrieved from http://www.apwca.org/Resources/Documents/APWCA-Wound-Cntr-Priniciples-061508%5B1%5D.pdf

Arnold, N. & Weir, D. (1994). Retrospective Analysis of healing in wounds cared for by ET nurses' verses staff nurses in the home setting. *Journal of Wound Ostomy Continence Nursing*, *21*(4), 156-160.

Ayello, E. A. & Baranoski, S. (2014). 2014 survey results: Wound care and prevention. *Advances in Skin and Wound Care, 27*(8), 371-380. doi:10.1097/01.ASW.0000451511.43830.a7

Baer, C. A., Williams, C. M., Vickers, L. & Kvedar, J. C. (2004). A pilot study of specialized nursing care for home health patients. *Journal of Telemedicine and Telecare*, *10*(6), 342-345.

Binder, B., Hofmann-Wellenhof, R., Salmhofer, W., Okcu, A., Kerl, H. & Soyer, P. (2007). Teledermatological monitoring of leg ulcers in cooperation with home care nurses. *Archive of Dermatology, 143*(12), 1511-1514.

Bradshaw, L, Gergar, M. & Holko, G. (2011). Collaboration in wound photography competency development: A unique approach. *Advances in Skin and Wound Care*, *24*(2), 85-92. doi:10.1097/01.ASW.0000393762.24398.e3

Brouwers, M. Kho, M., Browman, G., Cluzeau, F., Feder, G., Fervers, B., . . . Makarski J. (2010). AGREE II: Advancing guideline development, reporting and evaluation in health care. *Canadian Medical Association Journal. 182,* 839-842. 10.1503/cmaj.090449

Buckley, K. M., Adelson, L. K. & Agazio, J. G. (2009). Reducing the risks of wound consultation: Adding digital images to verbal reports. *Journal of Wound Ostomy Continence Nurses*, *36*(2), 163-170. doi:10.1097/01.WON.0000347657.02594.36

Canadian Agency for Drugs and Technologies in Health. (2014, May). *Personal wireless device use for wound care consultation: A review of safety, clinical benefits and guidelines.* Retrieved from https://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0071147/

Center for Disease Control and Prevention, National Center for Health Statistics. (2016). *Home Health Care*. Retrieved from https://www.cdc.gov/nchs/fastats/home-health-care.htm

Centers for Medicare and Medicaid Services. (2017, March). *Medicare & home health care* (Product No. 10969). Retrieved from https://www.medicare.gov/Pubs/pdf/10969-Medicare-and-Home-Health-Care.pdf

Chanussot-Deprez, C. & Contreras-Ruiz, J. (2008). Telemedicine in wound care. *International Wound Journal, 5*(5), 651-654.

Chittoria, R. K. (2012). Telemedicine for wound management. *Indian Journal of Plastic Surgery, 45*(2), 412-417. doi**:**10.4103/0970-0358.101330

DeJonge, K., Vankampen, N., Cambier, E. & Kelly, N. R. (n.d.). *Locsin: Technological competency as an expression of caring theory critique.* Ferris State University. Retrieved from http://kristindejonge.weebly.com/uploads/5/0/2/2/50228145/locsin_group_theory_critique_.pdf

Ellenbecker, C. H., Samia, L., Cushman, M. J. & Alster, K. (2008). Patient safety and quality in home health care. In R. G. Hughes (Ed.), *Patient safety and quality: An evidence-based handbook for nurses* (pp. 301-350). Rockville, MD: AHRQ. Retrieved from https://www.ncbi.nlm.nih.gov/books/NBK2631/pdf/Bookshelf_NBK2631.pdf

Florczak, B., Scheurich, A., Croghan, J., Sheridan, P., Kurtz, D., McGill, W. & McClain, B. (2012). An observational study to assess an Electronic Point-of-care wound documentation system regarding user satisfaction and potential for improved care. *Ostomy Wound Management*, *58*(3), 46-51.

Gagnon, M. P., Breton, E., Courcy, F., Auirion, S., Cote, J. & Pare, G. (2014). The influence of a wound care teleassistance service on nursing practice: A case study in Quebec. *Telemedicine and e-Health*, *20*(6), 593-600. doi:10.1089/tmj.2013.0287

Hampton, S. & Kilroy-Findley, A. (2016). Taking and photographing wounds and data protection. *Wounds UK*, *12*(1), 40-44.

Harris-Kojetin L, Sengupta M & Park-Lee E. (2016). *Long-term care providers and services users in the United States: Data from the National Study of Long-Term Care Providers, 2013–2014.* National Center for Health Statistics. Vital Health Statistics, *3*(38). Retrieved from https://www.cdc.gov/nchs/data/series/sr_03/sr03_038.pdf

Henry J. Kaiser Family Foundation. (2017). *State health facts: Total number of nurse practitioners.* Retrieved from https://www.kff.org/statedata/?state=MT

Jorgensen, L. B., Sorensen, J. A., Jemec, G. B. and Yderstraede, K. B. (2015). Methods to assess area and volume of wounds: A systematic review. *International Wound Journal*, *13*(4), 540-553. doi:10.111/iwj.12472

Kim, P., Evans, K., Steinberg, J., Pollard, M. & Attinger, C. (2013). Critical elements to building an effective wound care center. *Journal of Vascular Surgery*, *57*(6), 1703-1709. doi:10.1016/j.jvs.2012.11.112

Kobza, L. & Scheurich, A. (2000). The impact of telemedicine on outcomes of chronic wounds in the home care setting. *Ostomy Wound Management*, *46*(10), 48-53.

Kolltveit, B. H., Gjengedal, E., Graue, M., Iverson, M. M., Thorne, S. & Kirkevold, M. (2016). Telemedicine in diabetes foot care delivery: Health care professionals' experience. *BMC Services Research*, *16*, 134. doi:10.1186/s12913-016-1377-7

Lindholm, C & Searle, R. (2016). Wound management for the 21st century: Combining effectiveness and efficiency. *International Wound Journal*, *13*(2), 5-15. doi: 10.1111/iwj.12623

Localio, A. R., Margolis, D. J., Kagan, S. H., Lowe, R. A., Kinosian, B., Abbuhl, S., . . . Baumgarten, M. (2006). Use of photographs for the identification of pressure ulcers in elderly hospitalized patients: Validity and reliability. *Wound Repair and Regeneration*, *14*, 506-513. doi:10.111/j.1743-6109.2006.00146.x

Locsin, R. (2001). The culture of technology: Defining transformation in nursing, from the lady with a lamp to robonurse. *Holistic Nursing Practice, 16*(1), 1-4.

Locsin, R. (2005). *Technological competency as caring in nursing: A model for practice.* Indianapolis, IN: Sigma Theta Tau International.

Locsin, R. (2013). Technological competency as caring in nursing: Maintaining human dignity in a high-tech world of nursing. *Journal of Nursing and Health Sciences*, *7*(10), 1-6. Retrieved from http://www.nurse.nu.ac.th/Journal/data/Vol.7%20No.1/001.pdf

Locsin, R. C. & Purnell, M. (2015). Advancing the theory of technological competency as caring in nursing: The universal technological domain. *International Journal for Human Caring*, *19*(2), 50-54.

Long, K. A. & Weinart, C. (2010). Rural nursing: Developing the theory base. In C. Winters & H. Lee (Eds.), *Rural Nursing: Concepts, theory, and practice* (3rd ed.). New York, NY: Springer.

Mager, S. (2004). *Photographic wound documentation: Consistent and accurate methods can help reduce liability*. Retrieved from http://www.leadingageinsurance.com/sites/lai/Documents/pdf/CNA_ABulletin_04_07.pdf

MEDLINE. (2017). NE1 Wound Assessment Tool. Retrieved from https://www.medline.com/product/NE1-Wound-Assessment-Tool/Wound-Measurement/Z05-PF00315

Mohafez, H. Ahmad, S. A., Roohi, S. A. & Hadizadeh, M. (2016). Wound healing assessment using digital photography. *Journal of Biomedical Engineering and Medical Imaging, 3*(5). doi:10.14738/jbemi.35.2203

Montana State University Statistical Consulting and Research Services. (2018). *Statistical consulting and research services*. Retrieved from http://www.montana.edu/statisticalconsulting/

Moore, R. S., Britton, B. & Chetney, R. (2005). Wound care using interactive telehealth. *Home Health Care Management & Practice, 17*(3), 303-312. doi:10.1177/1084822304217807

Murphy, C. J. (2012). *Beyond biomaterials: Engineering the wound bed* (Report 5RC2AR058971-02). National Institute of Arthritis and Musculoskeletal and Skin Diseases Retrieved from https://projectreporter.nih.gov/pr_Prj_info_desc_dtls.cfm?projectnumber=5RC2AR058971-02&icde=0&print=yes

National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance. (2014). *Prevention and treatment of pressure ulcers: Clinical practice guideline.* Washington, DC: Author. Retrieved from https://www.guideline.gov/summaries/summary/48866

O'Connell-Gifford, E. (2011, October). A picture can be worth a thousand words: The use of photo documentation in wound care. *Healthy Skin*, *8*(2), 25-30.

Parcells, D. & Locsin, R. (2001). Development and psychometric testing of the technological competency as caring in nursing instrument. *International Journal for Human Caring*, *15*(4), 6-14.

Pearson, A., Jordan, Z. & Munn, Z. (2012). Translational science and evidence-based healthcare: A clarification and reconceptualization of how knowledge is generated and used in healthcare. *Nursing Research and Practice*, *2012*, 1-6. doi:10.1155/2012/792519

Polit, D. F. & Beck, C. T. (2017). *Nursing research: Generating and assessing evidence for nursing practice* (10th ed.). Philadelphia, PA: Wolters Kluwer.

Primary care provider. (n.d.). In *Center for Medicare and Medicaid Services Glossary*. Retrieved from https://www.healthcare.gov/glossary/primary-care-provider/

Rasmussen, B. S., Froekjaer, J., Bjerregaard, M. R., Lauritsen, J., Hangaard, J., Henriksen, C. W., …, Yderstraede, K. B. (2015). A randomized controlled trial comparing telemedical and standard outpatient monitoring of diabetic foot ulcers. *Diabetes Care, 38*, 723-1729. doi:10.2337/dc15-0332

Rennekampff, H., Fimmers, R., Metelmann, H., Schumann, H. and Tenenhaus, M. (2015). Reliability of photographic analysis of wound epithelialization assessed in human skin graft donor sites and epidermolysis bullosa wounds. *Trials, 16*(32). doi:10.1186/s13063-015-0742-x

Sen, C. K., Gordillo, G. M., Roy, S., Kirsner, Lambert, R., Hunt, T. K., . . . Longaker, M. (2009). Human skin wounds: A major and snowballing threat to public health and the economy. *Wound Repair Regeneration, 17*(6), 763-771. doi:10.111/j.1524-475X.2009.00543.x.

Shindell, R. (2016, July). HIPAA privacy and security compliance: Managing the use of photographs and videos in the wound clinic. *Today's Wound Clinic, 10*(7). Retrieved from http://www.todayswoundclinic.com/articles/hipaa-privacy-security-compliance-managing-use-photographs-and-videos-wound-clinic

Skillman, S. M. & Dahal, A. (2016). *Montana's physician workforce in 2016.* University of Washington Center for Health Workforce Studies. Retrieved from http://depts.washington.edu/fammed/chws/wp-content/uploads/sites/5/2017/04/montana-physician-workforce-in-2016.pdf

Skillman, S. M. & Stover, B. (2014). *Montana's physician workforce in 2014.* University of Washington Center for Health Workforce Studies. Retrieved from http://healthinfo.montana.edu/workforce-development/MT_Phys_Workforce_11_7_14_rev.pdf

Snoswell, C., Finnane, A., Janda, M., Soyere, P. & Whitty, J. A. (2016). Cost effectiveness of store-and forward teledermatology: A systematic review. *Journal of American Medical Association Dermatology, 152*(6), 702-708. doi:10.1001/jamadermatol.2016.0525

Stotts, N. A. & Sparacino, P. S. (2005). Assessing the patient with a wound: As the basis for home care wound management. *Home Healthcare Nurse*, *23*(2), 82-92.

Sugrue, M & Riggs, V. (2005). Can you see and hear me now: The implementation of camera phones in the home setting. *Home Health Care Management and Practice, 17*(3), 192-195.

Summerhayes, C., McGee, J., Cooper, R., Ghauri, A. S. & Ranaboldo, C. (2012). Introducing leg ulcer telemedicine into rural general practice. *Wounds UK*, *8*(2): 28-36.

Swezey, L. (2012, December). *Wound photography in assessing wound healing.* Retrieved September 17, 2017 from Wound Educators website: http://woundeducators.com/wound-photography-in-assessing-wound-healing/

Tensen, E., van der Heijden, J., Jaspers, M. & Witkamp, L. (2016). Two decades of Teledermatology: Current status and integration in national healthcare systems. *Current Dermatology Report*, *5*, 96-104. doi:10.1007/s13671-016-0136-7

Terry, M., Halstead, L. S., O'Hare, P., Gaskill, C., Ho, P.S., Obecny, J., …Lauderdale, M. E. (2009). Feasibility study of home care wound management using telemedicine. *Advances in Skin and Wound Care*, *22*(8), 358-364. doi:10.1097/01.ASW.0000358638.38161.6b

The Henry J. Kaiser Family Foundation. (2015). *State health facts.* Retrieved on September 16, 2017 from http://www.kff.org/statedata/

The Henry J. Kaiser Family Foundation. (2017, April). *Providers and service use*. Retrieved on September 16, 2017 from http://www.kff.org/state-category/providers-service-use/

The Joint Commission. (2017). *Rights and responsibilities of the individual. Patient rights and informed consent when videotaping or filming*. Retrieved September 15, 2017 from https://www.jointcommission.org/standards_information/jcfaqdetails.aspx?StandardsFAQId=834&StandardsFAQChapterId=14&ProgramId=0&ChapterId=0&IsFeatured=False&IsNew=False&Keyword=

U.S. Department of Public Health and Human Services. (2011). *Montana's rural health plan*, 1-81. Retrieved from https://dphhs.mt.gov/Portals/85/qad/documents/LicensureBureau/montanaruralhealthplan.pdf

U.S. Department of Public Health and Human Services. (2017). *Health professional shortage area designations.* Retrieved on September 16, 2017 from http://dphhs.mt.gov/publichealth/primarycare/-Shortage-Area-Designations

U.S. Department of Public Health and Human Services. (2017, June). *HIPPA for professionals*. Retrieved from https://www.hhs.gov/hipaa/for-professionals/index.html

Vowden, K. & Vowden, P. (2013). A pilot study on the potential of remote support to enhance wound care for nursing-home patients. *Journal of Wound Care*, *22*(9), 481-488.

Wang, S. C., Anderson, J. E., Jones, D. & Evans, R. (2014). Patient perceptions of wound photography. *International Wound Journal*, *13*(3), 326-330. doi:10.1111/iwj.12293

Wilkins, E. G., Lowery, J. C. & Goldfarb, S. (2007). Feasibility of virtual wound care: A pilot study. *Advances in Skin & Wound Care*, *20*, 275-280.

Winters, C. A. & Lee, H. J. (Eds.). (2010). *Rural Nursing: Concepts, theory, and practice* (3rd ed.). New York, NY: Springer.

Woo, K. Y. (2011, March 18). *Photography Is an Essential Tool in Wound Documentation* [Web log post]. Retrieved from http://journals.lww.com/aswcjournal/blog/wordsonwounds/pages/post.aspx?PostID=1

Wound Ostomy and Continence Nurses Society. (2012, January). *Photography in wound documentation: Fact sheet.* Retrieved from http://c.ymcdn.com/sites/www.wocn.org/resource/resmgr/Publications/Photography_in_Wound_Documen.pdf

Zarchi, K., Haugaard, V. B., Dufour, D. N. & Jemec, B. E. (2015). Expert advice provided through telemedicine improves healing of chronic wounds: Prospective cluster controlled study. *Journal of Investigative Dermatology, 135*, 895-900. doi:10.1038/jid.2014.441

APPENDICES

APPENDIX A

SYNTHESIS TABLE OF SAF EFFECT ON WOUND HEALING

	Design	SAF Delivery	Adult Participants	Population	Wound / Type	Outcomes / Findings	Decrease days to wound closure
Baer	Case-series	SAF	34 (M = 71)	HH	15% LE	*71-85% assessment agreement: ulcer type/stage (K=0.41-0.71) good *13-90 % agree on treatment (13% agree on dressing) K= -0.75-0.81 poor to excellent	N/A
Buckley	Descriptive Correlational	SAF	43 (Mdn = 73)	HH	89, various	*WCON making wound recommendations based only on verbal reports risk over or under treatment (58%)	N/A
Sugrue	Case-report	SAF during visit + call	not specified	HH	PU, LE, surgical	*Decreased visits per episode *Well accepted	N/A
Wilkins	Case-series Observational	SAF	56 (M=66)	OP	88, chronic, various, 66% DW	*58% of SAF resulted in intervention changes *98.2% patients satisfied *3.6 preferred personal visits	N/A
Chanussot-Deprez	Case-series	SAF	51-73	OP	Chronic wounds	*demonstrated use and healing in 3 cases, no statistical data	N/A
Florczak	Observational	SAF	38	LTC	> Stage I PU	*statistically significant changes seen in 'reviewing wound progress' and 'recognizing changes in wound status'	N/A
Binder	Case-series	SAF	16 (Mdn = 73)	HH	46, LE ulcers	*CWE made changes in 23% of cases *46% reduction in travel *75% believed WP could replace expert visit	N/A
Terry	RCT	SAF + call	103 (M<51)	HH	160, 66% non-healing surgical	*SAF TM increased healing time but demonstrated greatest changes in wound size *Benchmark data: 90% all wounds healed/improved, PU – 51 days to heal, Surgical – 34 days	-NO
Rasmussen	RCT	SAF	401	OP	DW, PU	*No difference in healing or amputation between groups *TM had 42% less ER visits *Increased mortality in TM (HR = 8.68 [95% CI, 6.93, 10.88] p = 0.0001)	= NO DIFF
Kobza	Quasi-experiment	LIVE Video phone + SAF	76 (M=70)	HH	191, PU III-IV, VU, DU,	*83% healing in LTM group vs. 34% baseline *58% healed wounds in LTM vs. 37% baseline	+ YES
Moore	Case-series Observational	LIVE TM x 1 then SAF	18	HH	chronic	*Reduced healing to 61 days (all wounds) *55% reduction home visits	+ YES
Zarchi	Quasi-experiment	SAF	95 (M=74-78)	HH	chronic excluded: surgical, cancer, PU	*70% healing of SAF wounds (45% in control) *AHR of healing was significantly higher in the SAFWP group than control group (AHR 2.19; 95% CI).	+ YES

Summerhayes	Prospective cohort study	SAF-wound system	25	Primary Care	LE ulcers	*Median healing time fell from 105 to 70 days *Patient costs decreased *Slight increase in per patient costs with more staff involvement	+ YES
Vowden	Quasi-experiment	SAF	26	LTC	various	*Median wound duration lower in SAF TM (10 mo.) vs. control (15 mo.) *SAF wound have changed treatment in 7/9 control pts. *SAF prevented 1 hospital admission and identified 1 need for early hospitalization	+ YES

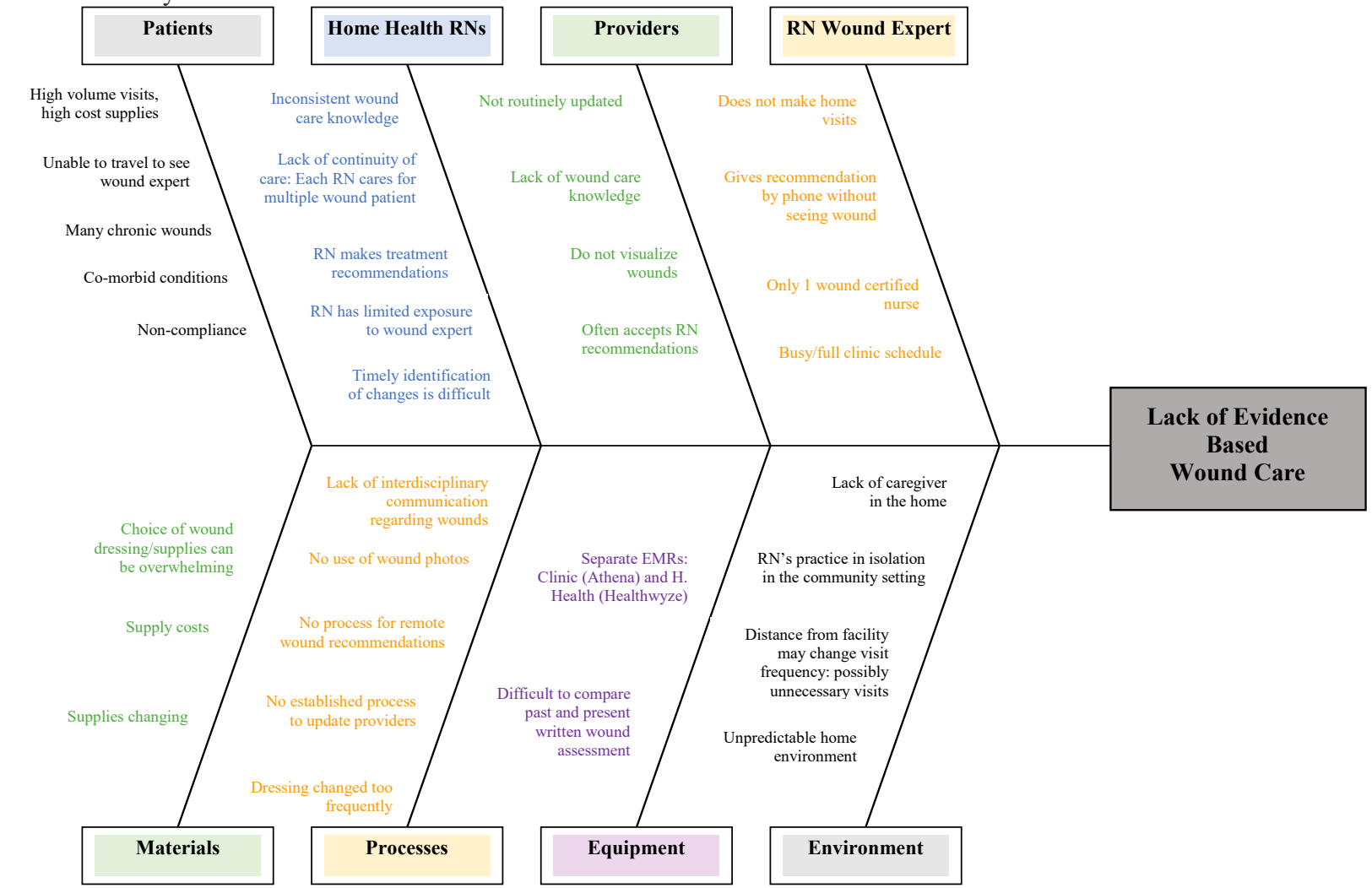
KEY

AHR: adjusted hazard ratio	OP: outpatient
DU: diabetic ulcers	PU: pressure ulcer
DW: diabetic wounds	SA: surface area
Ind.: Independent	SAF: store-and-forward telemedicine
LE: lower extremity	TM: telemedicine
LTC: long term care	VU: venous ulcers
LTM: live telemedicine	WCON/CWE: certified wound expert
Mo: months	

APPENDIX B

FISHBONE ANALYSIS OF LACK OF EVIDENCE BASED WOUND CARE

Fishbone Analysis of Lack of Evidence Based Wound Care in Home Health



APPENDIX C

WOUND PHOTOGRAPHY PROTOCOL

Wound Photography Protocol

OBJECTIVE: To provide established guidelines for obtaining photographic images of wounds or other skin impairments for documentation in the patient's electronic medical record.

PROTOCOL: Any skin impairment including wounds will be photographed on admission and then weekly thereafter. Photography guidelines ensure consistency between photographers which increases clinical value during comparison. Wound photographs are not a replacement for weekly comprehensive written wound assessments.

PROCEDURE:

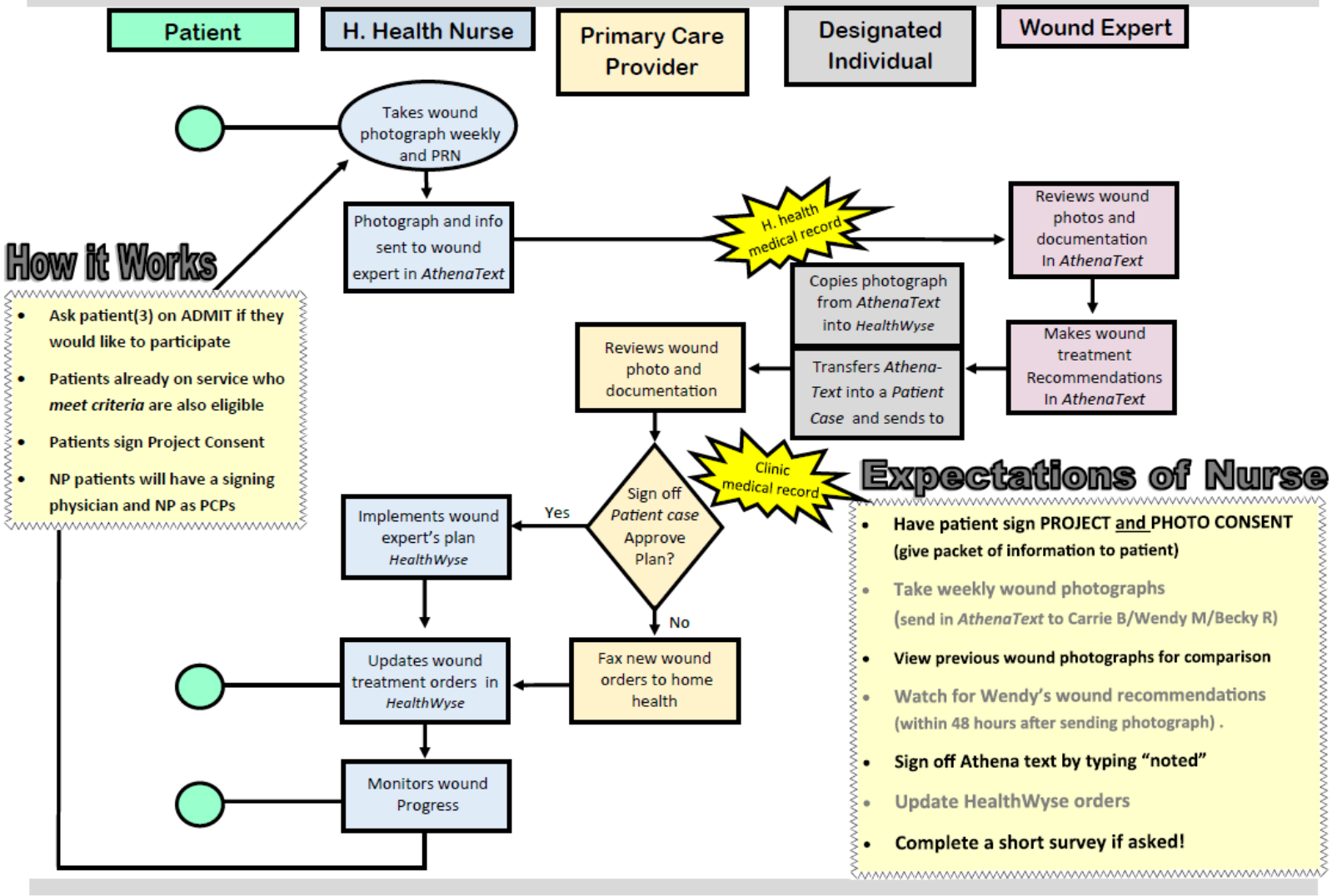
1. The patient will sign a general consent for treatment and photography consent.
2. Inform patient of the photography protocol. Serial wound photographs (1-3) will be taken weekly by the nurse and uploaded in the electronic medical record.
3. On admission, the admitting RN will identify and photograph any existing wounds or skin impairments.
4. Wounds or skin impairments which develop after admission will be photographed on the day they are first identified.
5. Subsequent wound photographs will occur weekly on the first nurse visit of the week (generally Monday or Tuesday) or whenever a significant change occurs.
6. The nurse will provide comprehensive wound assessments with wound measurements on the first visit of the week (generally Monday or Tuesday) or whenever a significant change occurs.
7. On discharge, a photograph of the wound area should be taken on the day of discharge.
8. All photographs should adhere to the following photography procedure guidelines:
    a. Follow organizational guidelines for hand hygiene.
    b. Lighting should be adequate to illuminate the wound area.
    c. Position the patient for wound photographs
    d. Fill out the NE1 Wound Assessment Tool:
        i. Patient initials and date of birth
        ii. Date and time photograph was taken
        iii. Location of wound
        iv. Clinician/photographer signature
    e. Cut or tear the NE1 tool as needed for smaller wounds or tight locations.
    f. Remove the adhesive backing of the NE1 tool starting at the corner.
    g. Position the NE1 tool (with date) at the 12 o'clock position (towards the patient's head). Place the tool outside of any erythematous or otherwise affected intact skin. Keep the NE1 right angle flat; do not bend or wrap the NE1 tool around a body part. The inside corner of the NE1 should frame the wound.
    h. The photo orientation and NE1 placement should be consistent for all photos.

i. Using the Athena Text or camera feature (on the portable electronic device) take the photograph with the camera perpendicular to the wound and NE1 tool.
    i. Take one photograph (approximately 4-6 inches from the wound) of the wound filling most of the camera screen. Be sure to include the portions of the NE1 tool with the required documentation.
    ii. Take a second wound photograph from 1-2 feet away to help establish the wound's location and size in relation to the patient.
    iii. Multiple wound located close together can all be included in one wound photograph with one NE1 tool. Complex wounds may require individual photographs.
j. Upload wound photographs into the electronic medical record.
k. Photographs saved to an electronic device should be uploaded to the electronic medical record within 24 hours and deleted from the device.

APPENDIX D

SAF WOUND TELECONSULTATION FLOW CHART

Flow Chart of Store-And-Forward (SAF) Wound Teleconsultation in Home Health



APPENDIX E

SAF WOUND TELECONSULTATION PROTOCOL

STORE-AND-FORWARD WOUND TELECONSULTATION PROTOCOL

OBJECTIVE: To provide established guidelines for conducting store and forward wound consultation using wound photographs in the home health patient.
PROTOCOL: Wound photographs are taken by the home health nurse on admission or upon the identification of any wound or skin impairment and then weekly thereafter. Photographs are sent electronically in Athena to the designated wound expert for treatment recommendations. Recommendations are then sent to the primary care provider for review. Wound photographs and SAF teleconsultation are not a replacement for weekly comprehensive written wound assessments by the home health nurse.
PROCEDURE:

1. The patient must sign wound photography consent.
2. The nurse informs the patient of the SAF teleconsultation protocol.
3. The signing physician will send an order allowing wound expert to make treatment plans.
4. The home health nurse takes serial wound photographs following the Wound Photography Protocol. Additional photographs may be taken at any time a significant change is detected by the home health nurse.
5. Wound photographs will be sent weekly to the designated wound expert using Athena Text. In addition to the wound photographs, documentation for consultation will include:
    l. Wound origination date
    m. Type of wound: traumatic, pressure ulcer, venous stasis ulcer, diabetic
    n. Maximum depth (linear measurements can be determined by NE1 tool)
    o. Presence of tunneling
    p. Presence of induration
    q. Drainage: amount, consistency
    r. Odor: mild, moderate, strong
    s. Vital signs if abnormal
    t. Nurse Impression: ex. healing, improving, worsening, deteriorating, unchanged. The nurse may also place a focused question for the wound expert here.
6. The **wound expert** will review the photographs and make treatment recommendations in *Athena Text within 72 hours* of receiving the consultation.
7. The **Home health nurse** notes new orders and updates the *HealthWyse* care plan.
8. A designated home health staff member will copy photographs and wound expert recommendations from *AthenaText* into *HealthWyse*. Label: Wound Care_Date
9. A designated individual with copy the *AthenaText* consultation into an Athena *Clinical Document (CD)* to send to the primary care provider (and nurse practitioner if applicable) for review. Label: Wound Care
10. The **primary care provider** (PCP) closes the *CD* (SAF wound teleconsultation) and accepts treatment recommendations as written.

    *If the PCP elects an alternative treatment plan, all new orders must be faxed to the home health department as per standard practice.

APPENDIX F

DNP PROJECT INFORMATION FLIER

Store-and Forward (SAF) Wound Teleconsultation in Home Health

Three home health patients will be recruited to participate in the 12-week SAF pilot project. The home health nurse will take weekly wound photographs which will be sent to a wound expert. The wound expert will make wound treatment recommendations and send to the PCP for approval.

Purpose

Integrate evidence based practices in wound care and conduct a multidisciplinary assessment of satisfaction and perceived benefits to inform feasibility of organizational implementation.
***In partial fulfillment of the Doctor of Nursing Practice (DNP) Degree.**

Project Period: January 8th - April 1st, 2018

Inclusion Criteria: adults, age 21 years or older, with any type of wound receiving care during the project period under the care of a PCP who has routine Athena access

Exclusion Criteria: pediatric patients, hospice patients

Post-Project Survey: April 2018

Patients(3), home health nurses(10) and PCPs(3-6) will be asked to complete a survey regarding **satisfaction** and **perceived benefits** of wound photography and SAF teleconsultation

Goals

- **Coordinate wound management**
- **Improve communication**
- **Identify wound changes**
- **Reduce visits**
- **Control costs**
- **Maximize healing**

Presentation of Results: August 2018

For comments or suggestions please contact:
- Rebecca Roche
  406-459-0396
  rebecca.roche@student.montana.edu

APPENDIX G

PATIENT, NURSE, AND PROVIDER SURVEYS

Patient Survey of Satisfaction and Perceived Value of *Wound Photography* and Store-and-forward Wound Consultation

Store-and-forward (SAF) wound consultation is the process of sending wound photographs (taken by the home health nurse) to a wound expert who then makes treatment recommendations.

Place a √ in the column to indicate the extent you agree with each statement. *Leave the question blank if the question does not apply to you.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. I am comfortable having my wound photographed.					
2. Wound photographs helped me to learn about my wound(s).					
3. I liked seeing photographs of my wound(s).					
4. Wound photographs helped me to participate in my care.					
5. I am satisfied with the use of wound photographs in home health.					
6. Wound photographs helped me to see the changes in my wound over time.					
7. Having wound photographs in my medical record is beneficial to the nurses and doctors who care for me.					
8. Wound photographs should be a standard component of wound management.					
9. SAF wound consultation reduced my travel to the doctor's office.					

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
10. SAF wound consultation provided care that was equal to visiting a wound expert in the clinic.					
11. I am satisfied with the wound care provided by the home health department using SAF wound consultation.					
12. SAF wound consultation is a valuable service for home health patients.					
13. I am satisfied with how often I was seen by my primary (admission) nurse.					
14. SAF wound consultation allowed changes in my wound care to occur more quickly than waiting for an office appointment with the wound expert.					
15. If needed, I would use SAF wound consultation in the future.					

Your feedback regarding this 12-week pilot project is extremely valuable. Please share any other thoughts, suggestions, or feedback regarding your experience with *wound photography* and SAF wound consultation.

Nurse Survey of Satisfaction and Perceived Value
of *Wound Photography* and Store-and-forward Wound Consultation

How many years have you worked as a nurse?	**Store-and-forward (SAF) wound consultation** is the process of sending wound photographs (taken by the home health nurse) to a wound expert who then makes treatment recommendations.
How many years of wound care experience do you have?	
Have you had any advanced wound care training, please explain? N / Y	

Place a √ in the column to indicate the extent you agree with each statement. *Leave the question blank if the question does not apply to you.	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
1. Wound photographs improved my communication with the wound expert and provider.					
2. I am satisfied with the quality of the digital wound photographs.					
3. Wound photographs provide more accurate documentation than written description alone.					
4. I could identify changes in the wound by reviewing wound photographs.					
5. Wound photographs should be a standard component of wound management.					
6. The use of consistent photography techniques makes wound photographs more valuable.					
7. Wound photographs improved continuity of wound care between different nurses.					
8. I used wound photographs to improve patient teaching.					
9. Wound photographs in the electronic medical record are beneficial to my practice.					

	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
10. SAF wound consultation allowed changes in wound care to occur more quickly than waiting for an office appointment with the wound expert.					
11. Nothing important was missed or left out during the SAF wound consultation process.					
12. SAF wound consultation promoted multidisciplinary wound care management.					
13. My knowledge of wound care was increased through regular interaction with the wound expert.					
14. SAF wound consultation is a valuable service for home health patients.					
15. I am satisfied with the SAF wound consultation process.					

Your feedback regarding this 12-week pilot project is extremely valuable. Please share any other thoughts, suggestions, or feedback regarding your experience with *wound photography* and/or SAF wound consultation.

Provider and Wound Expert Survey of Satisfaction and Perceived Value
of *Wound Photography* and Store-and-forward Wound Consultation

How many years of primary care experience do you have? **How many years of wound care experience do you have?** **Have you had any advanced wound care training, please explain? N / Y**	**Store-and-forward (SAF) wound consultation** is the process of sending wound photographs (taken by the home health nurse) to a wound expert who then makes treatment recommendations.

Place a √ in the column to indicate the extent you agree with each statement. *Leave the question blank if the question does not apply to you.	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
1. I am confident managing wound care independently.					
2. Wound photographs improved my communication with the home health nurse.					
3. I am satisfied with the quality of the digital wound photographs.					
4. Wound photographs provide more accurate documentation than written description alone.					
5. I could identify changes in the wound by reviewing wound photographs.					
6. The use of consistent photography techniques makes wound photographs more valuable.					
7. I am satisfied with the use of wound photographs to monitor wound status.					
8. Wound photographs in the electronic medical record are beneficial to my practice.					
9. **SAF wound consultation** allowed changes in wound care to occur more quickly than waiting for an office appointment with the provider or wound expert.					
10. Nothing important was missed or left out during the **SAF wound consultation** process.					

	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
11. **SAF wound consultation** provided care that was equal to going into the office.					
12. I felt confident giving treatment orders based on wound photographs and the nurse's assessment.					
13. **SAF wound consultation** promoted multidisciplinary wound care management.					
14. I am satisfied with the **SAF wound consultation** process.					
15. **SAF wound consultation** is a valuable service for home health patients.					

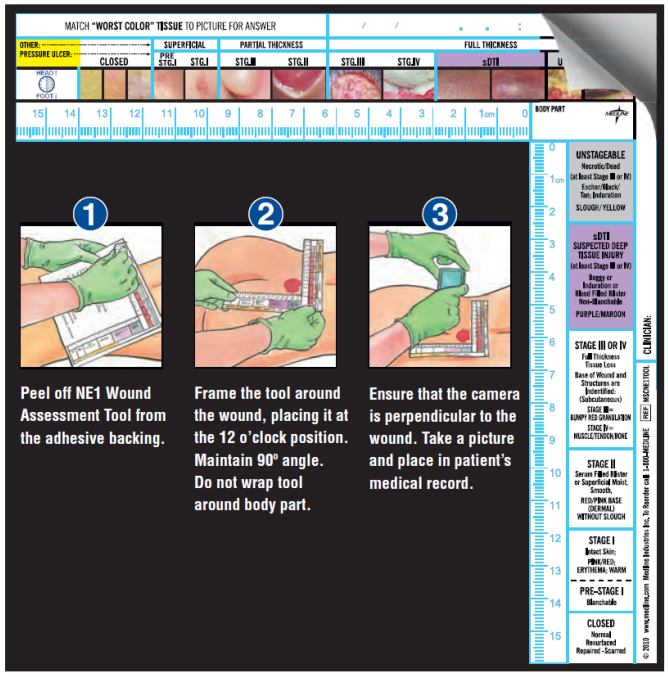
You feedback regarding this 12-week pilot is extremely valuable. Please share any other thoughts, suggestions, or feedback regarding your experience with *wound photography* and/or SAF wound consultation.

APPENDIX H

NE1 WOUND ASSESSMENT TOOL

NE1™ – The New Standard for Wound Assessment

- Reduces errors, increases accurate wound assessment[1]
- Standardizes wound documentation for review and to assist with protection against litigation[1]
- Drives appropriate reimbursement due to more accurate wound assessments[1]



PRECISION
Horizontal and vertical rulers for consistent, precise wound measurements in cm and mm.

CONSISTENCY
Clear point-of-care instructions and use tips.

ACCURACY
Full color wound guide increases assessment validity.

ACCOUNTABILITY
Captures clinician's signature, date and patient data.

FUNCTIONALITY
Adhesive back gently holds the disposable, single-use tool in place.

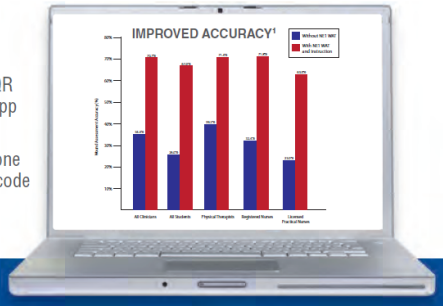
ORDERING INFORMATION

Item Number	Pkg.
MSCNE1TOOL	100/bx

Recognition: HCA Innovators Award, Quality & Patient Safety category; WOCN conference accepted abstract on wound identification; NPUAP Research Committee: accepted abstract on wound identification; *Advances in Skin & Wound Care:* manuscript accepted for publication

See MedlineNE1.com for:
- Interactive training through Medline University
- Wound documentation form
- Peer-reviewed research articles
- Competency assessment, webinars and more

❶ Download a QR code reader app
❷ Launch app
❸ Hover the phone over this QR code



Medline Industries, Inc.
One Medline Place
Mundelein, IL 60060

Medline United States
1-800-MEDLINE (633-5463)
www.medline.com | info@medline.com

Medline Canada
1-800-396-6996
www.medline.ca | canada@medline.com

Medline México
01-800-831-0898
www.medlinemexico.com | mexico@medline.com

1. Young DL, Estocado N, Landers MR, Black J. A pilot study providing evidence for the validity of a new tool to improve assignment of NPUAP stage to pressure ulcers. *Advances in Skin & Wound Care.* In print 2011.

MKT211202/LIT419R/10M/SG/22

APPENDIX I

IRB APPROVAL

MONTANA STATE UNIVERSITY

INSTITUTIONAL REVIEW BOARD

For the Protection of Human Subjects
FWA 00000165

960 Technology Blvd. Room 127
c/o Microbiology & Immunology
Montana State University
Bozeman, MT 59718
Telephone: 406-994-6783
FAX: 406-994-4303
E-mail: cherylj@montana.edu

Chair: Mark Quinn
406-994-4707
mquinn@montana.edu
Administrator:
Cheryl Johnson
406-994-4706
cherylj@montana.edu

MEMORANDUM

TO: Rebecca Roche and Susan Raph

FROM: Mark Quinn Mark Quinn CJ
Chair, Institutional Review Board for the Protection of Human Subjects

DATE: December 6, 2017

SUBJECT: *"Store-and-Forward Telemedicine Wound Consultation in Home Health: A Practice Improvement Project"* [RR120617]

The above proposal was reviewed by expedited review by the Institutional Review Board. This proposal is now approved for a period of one-year.

Please keep track of the number of subjects who participate in the study and of any unexpected or adverse consequences of the research. If there are any adverse consequences, please report them to the committee as soon as possible. If there are serious adverse consequences, please suspend the research until the situation has been reviewed by the Institutional Review Board.

Any changes in the human subjects' aspects of the research should be approved by the committee before they are implemented.

It is the investigator's responsibility to inform subjects about the risks and benefits of the research. Although the subject's signing of the consent form, documents this process, you, as the investigator should be sure that the subject understands it. Please remember that subjects should receive a copy of the consent form and that you should keep a signed copy for your records.

In one year, you will be sent a questionnaire asking for information about the progress of the research. The information that you provide will be used to determine whether the committee will give continuing approval for another year. If the research is still in progress in 5 years, a complete new application will be required.

APPENDIX J

MONTANA STATE UNIVERSITY SCRS REPORT

Montana State University

Statistical Consulting and Research Services

Store-and-Forward Wound Consultation Pilot Study

Lead Statistician:
Tan Tran, M.S.

Director:
Lillian Lin, Ph.D.
Megan Higgs, Ph.D.

Contributions from:
Kenneth Flagg, M.S.

When you make use of our work for publications or presentations, please be sure to acknowledge the funding we receive from NIGMS using the following: "Research reported in this publication was supported by Institutional Development Awards (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under Awards P20GM103474, 5U54GM104944, U54GM115371, and 5P20GM104417. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health."

prepared for Rebecca Roche

June 27, 2018

1 Background

Rebecca Roche is a DNP student at Montana State University. For her dissertation, she is implementing a store-and-forward (SAF) wound consultation pilot program at a rural home health agency where she works (CMMC). The goal of her study is to explore patient and provider satisfaction and perceived benefits of the pilot program. Rebecca will present the study proposal to her committee in October 2017, with plans to defend her dissertation in Fall 2018.

Her primary research questions are divided into two main categories

- Regarding the SAF wound consultation
  1. What is the provider's level of satisfaction with SAF wound consultation?
  2. What do providers perceive as benefits of SAF wound consultation?
  3. What is the patient's level of satisfaction with SAF wound consultation?
  4. Do patients perceive SAF wound consultation as valuable?
- Regarding the Wound photography
  5. What is the provider's level of satisfaction with wound photography?
  6. What do providers perceive as benefits to wound photography?
  7. What is the patient's level of satisfaction with photography?
  8. Do patients perceive wound photography as valuable?

In answering these questions, Rebecca would like assess the feasibility of a full organizational implementation of a SAF wound consultation program at this home health agency.

SCRS will assist by providing a descriptive data analysis.

2 Pilot Study

2.1 Survey

There are three groups of participants in the study: patients, nurses, and primary care providers (PCPs)/wound experts. In order to be included in the study, the participants have to meet several criteria. Adult home health patients aged 21 years and older who received wound care during January 8, 2018 through April 1, 2018 and had a signing provider with AthenaHealth access were eligible to participate. There were no criteria specified for wound type or condition. Patients presenting for admission during the project period as well as those who began receiving wound care services prior to the start of the study were both eligible to participate. All nurses and PCPs working with

the study participants at the organization were surveyed. The distribution of participant types is in Fig. 1.

There are three surveys designed for each type of participant. Besides demographic questions, each survey has 15 Likert-scale questions and one open-ended question. The survey items are tied to the research questions (Tables 1 and 2) and some questions were reused in surveys targeting different type of health providers.

Table 1: Mapping of the survey items to the SAF wound consultation research questions.

Research Question	Survey	Item No.	Survey Item Wordings
1	Nurse	11	Nothing important was missed or left out during the SAF wound consultation process.
		14	SAF wound consultation is a valuable service for home health patients.
		15	I am satisfied with the SAF wound consultation process.
	PCP/Expert	10	Nothing important was missed or left out during the SAF wound consultation process.
		15	SAF wound consultation is a valuable service for home health patients.
		14	I am satisfied with the SAF wound consultation process.
2	Nurse	10	SAF wound consultation allowed changes in wound care to occur more quickly than waiting for an office appointment with the wound expert.
		12	SAF wound consultation promoted multidisciplinary wound care management.
		13	My knowledge of wound care was increased through regular interaction with the wound expert.
	PCP/Expert	9	SAF wound consultation allowed changes in wound care to occur more quickly than waiting for an office appointment with the wound expert.
		13	SAF wound consultation promoted multidisciplinary wound care management.
		11	SAF wound consultation provided care that was equal to going into the office.
3	Patient	11	I am satisfied with the wound care provided by the home health department using SAF wound consultation.
		15	If needed, I would use SAF wound consultation in the future.
4	Patient	9	SAF wound consultation reduced my travel to the doctor's office
		10	SAF wound consultation provided care that was equal to visiting a doctor or wound expert in the clinic.
		12	SAF wound consultation is a valuable service for home health patients.
		14	SAF wound consultation allowed changes in my wound care to occur more quickly than waiting for an appointment in the office.

Table 2: Mapping of the survey items to the wound photography research questions.

Research Question	Survey	Item No.	Survey Item Wordings
5	Nurse	2	I am satisfied with the quality of the digital wound photographs.
		5	Wound photographs should be a standard component of wound management.
		6	The use of consistent photography techniques makes wound photographs more valuable.
	PCP/Expert	3	I am satisfied with the quality of the digital wound photographs.
		6	The use of consistent photography techniques makes wound photographs more valuable.
		7	I am satisfied with the use of wound photographs to monitor wound status.
6	Nurse	1	Wound photographs improved my communication with the wound expert and provider.
		3	Wound photographs provide more accurate documentation than written description alone.
		4	I could identify changes in the wound by reviewing wound photographs.
		7	Wound photographs improved the continuity of wound care between different nurses.
		8	I used wound photographs to improve patient teaching.
		9	Wound photographs in the electronic medical record are beneficial to my practice.
	PCP/Expert	2	Wound photographs improved my communication with the home health nurse.
		4	Wound photographs provide more accurate documentation than written description alone.
		5	I could identify changes in the wound by reviewing wound photographs.
		8	Wound photographs in the electronic medical record are beneficial to my practice.
7	Patient	1	I am comfortable having my wound photographed.
		3	I liked seeing photographs of my wound(s).
		5	I am satisfied with the use of wound photographs in home health.
		8	Wound photographs should be a standard component of wound management.
8	Patient	2	Wound photographs helped me to learn about my wound(s).
		4	Wound photographs helped me to participate in my care.
		6	Wound photographs helped me to see the changes in my wound over time.
		7	Having wound photographs in my medical record is beneficial to the nurses and doctors who care for me.
NA	PCP/Expert	1*	I am confident managing wound care independently.
		12*	I felt confident giving treatment orders based on wound photographs and nurse assessment.
	Patient	13**	I am satisfied with how often I was seen by my primary (admission) nurse.

* Provider's confidence in managing wounds, not a direct research question.
** Added at the request of the department manager as continuity of care is an issue in home health.

2.2 Participants' Characteristics

The patients' wound characteristics and the project outcomes are summarized in Tables 3 and 4.

	Ind.	Diagnosis	Days on Service (LOS)	Wound Type	# Wounds	Wound Origination
1	1	MS, Neurogenic Bladder	84+	Pressure	5	chronic
2	2	DM, Morbid Obesity, venous insufficiency, lymphadema, cellulitis, COPD (oxygen dependent)	59+	stasis dermatitis LE, groin	2	2018-01-18

Table 3: Demographics of patients.

	Ind.	# Nurse Visits	Dressing Freq.	# SAF consultations	Adverse Wound Outcomes
1	1	23 (in 12 weeks)	2 x week	9	Infection / Left Hip (oral antibiotics)
2	2	21 (in 8 weeks)	2-3 x week	4	None

Table 4: Project outcomes of the patients participated in the study.

The experience levels of the nurses in the study are summarized in Fig. 2. The nurses had at least 5 years experience in wound care, with 6 out of 9 having more than 10 years of practice experience. Most of the nurses had practiced wound care throughout their practice career. Out of 9 nurses in the study, only three had some form of advanced wound care training in the form of online education or attendance at wound care conferences. Only the wound expert was certified in wound care. One nurse (ID 11) had been practicing wound care for 22 years without formal wound care training.

The experience levels of the primary care providers and the wound expert are in Fig. 3. One notable case is PCP 16 who only has practiced for 2 years as a PCP (nurse practitioner) but had 4 years of wound care experience as a registered nurse.

3 Data Analysis

Based on the research questions of interest, we summarized the survey results into two categories: the survey results separated by the research question groups (Section 1), and the average scores of each research question. To facilitate the comparisons among respondent groups, we divided the report into patients and nurses/PCP/wound expert.

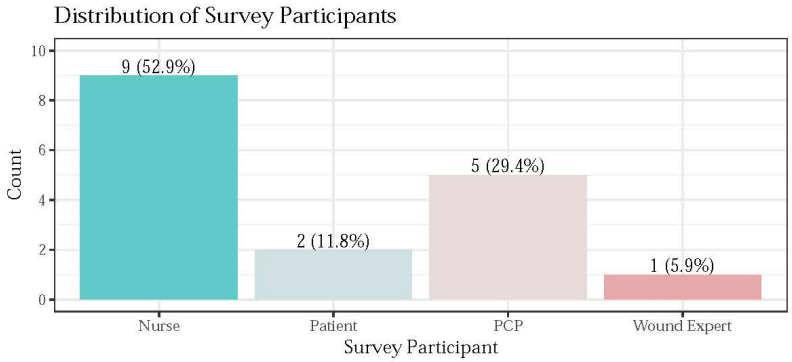


Figure 1: Distribution of Survey Participants.

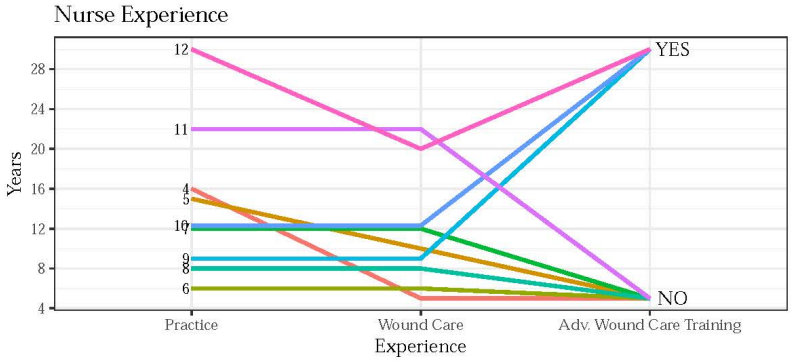


Figure 2: The experience of the nurses participating in the study. The numbers shown are the Nurse IDs.

3.1 Patients

Figure 4 shows the survey answers of the patients. There are two patients in the study and they are color-coded in the plot. The questions are grouped into the research questions of interest. Question 13 was dropped from the plot because the client does not categorize it into any research question.

If we summarize the response of each research question by averaging the scores of individual answers, we have the plot in Fig. 5. The client can use this plot to compare the patients' perceptions of the satisfaction and benefits of SAF wound consultation and photography.

3.2 Providers

For 9 nurses in the study, we suggest two types of plots that can help interpret their responses. Figure 6 summarizes the scores by questions and displays what percentage of nurses out of those surveyed responded 1 to 5 for each survey question. The percentage numbers on the plot are the percentage of low score responses (1 and 2), neutral response (3), and high score responses (4 and 5). The answers of the PCPs are also similarly summarized in Fig. 7. Because there is only one wound expert in the study, his/her answer is given in Fig. 8 without the percentage. Notice that in the plots for PCP and Wound expert (Fig. 6 and 7), questions 1 and 12 are dropped from the data because they serve different purposes and do not belong to a research question. The analysis of these questions is done in Section 3.3.

To help visualize the mean score of the research questions of interest for each respondent, plots for nurses and PCP/wound expert are displayed in Figures 9 and 10, respectively. For each participant, the values on the plot are created by averaging the scores of the survey that map to each research question, as described in Section 2.1. The ranges of the average scores are the same between Figures 9 and 10 to help in comparing the responses in the two groups.

3.3 Special Questions in the Surveys

There are several questions in the surveys for PCP/Expert and Patient that were not designed to directly answer the research questions of interest. They are questions 1 and 12 in the PCP/Expert survey and question 13 in the Patient survey (question details are in Table 2). The client suspects a relationship between these questions and the PCP/Expert's satisfaction of SAF wound consultation and wound photography. Therefore, Fig. 11 is created for this purpose.

4 Other Plots

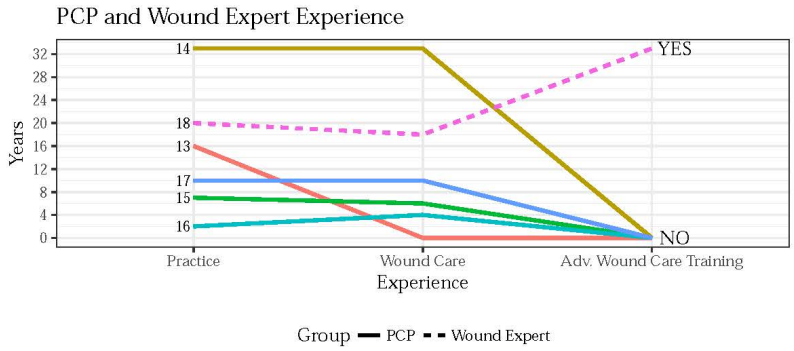


Figure 3: Experience of the Primary care providers and Wound expert. The numbers shown are the participant IDs.

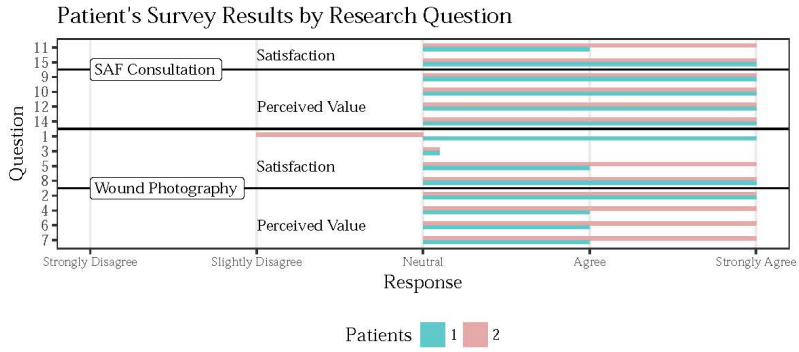


Figure 4: The individual responses by the patients.

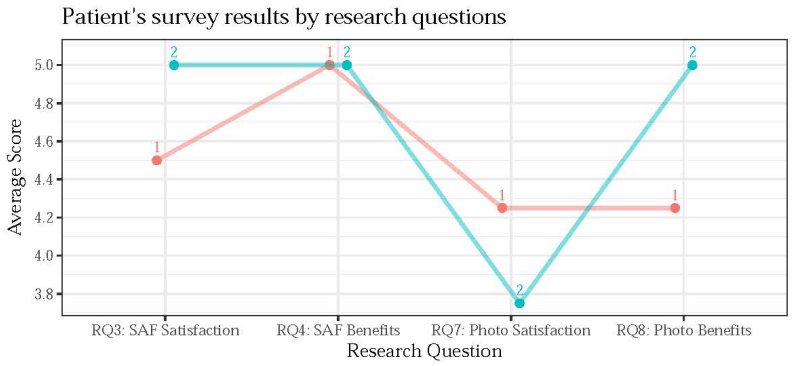


Figure 5: Patient's average score of all survey questions aggregated by research question. Each patient is indicated by color and numbers.

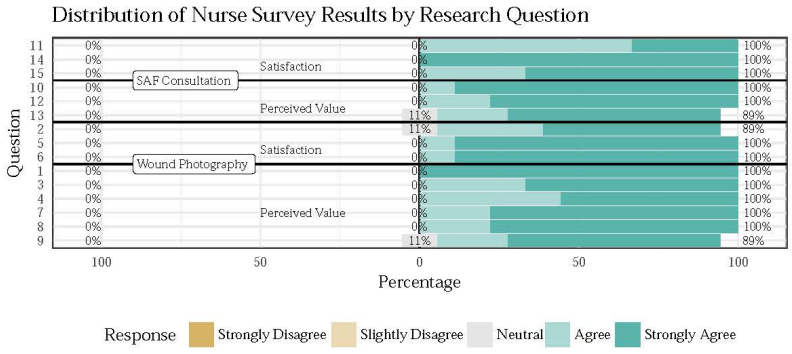


Figure 6: The percentage of answers given by the nurses for each survey question.

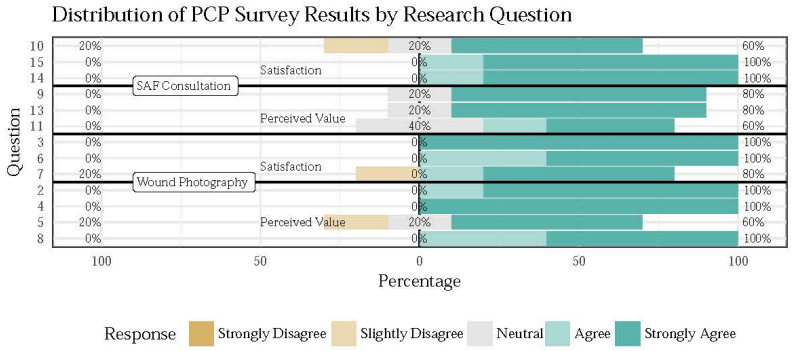


Figure 7: The percentage of answers given by the PCP for each survey question.

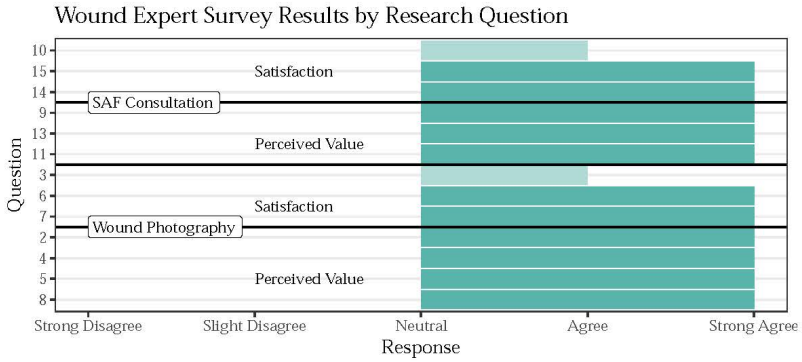


Figure 8: The answers given by the wound expert for each survey question.

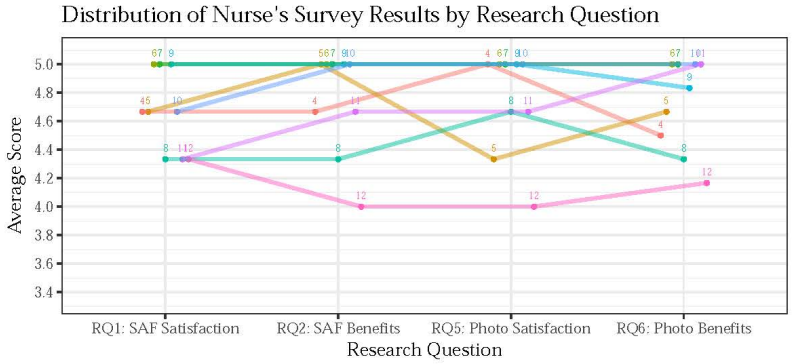


Figure 9: The nurse's average response score of all survey questions belonging to each research question. Each nurse is indicated by color and numbers.

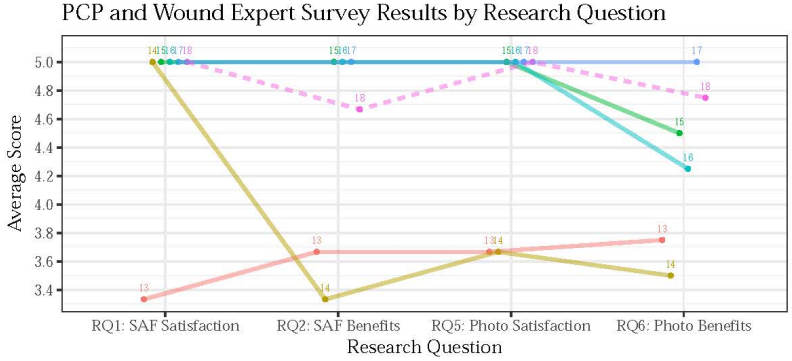


Figure 10: The PCP/Wound expert average response score of all survey questions belonging to each research question. Each person is indicated by color and numbers. Solid lines indicate PCPs whereas the dashed line indicates the wound expert.

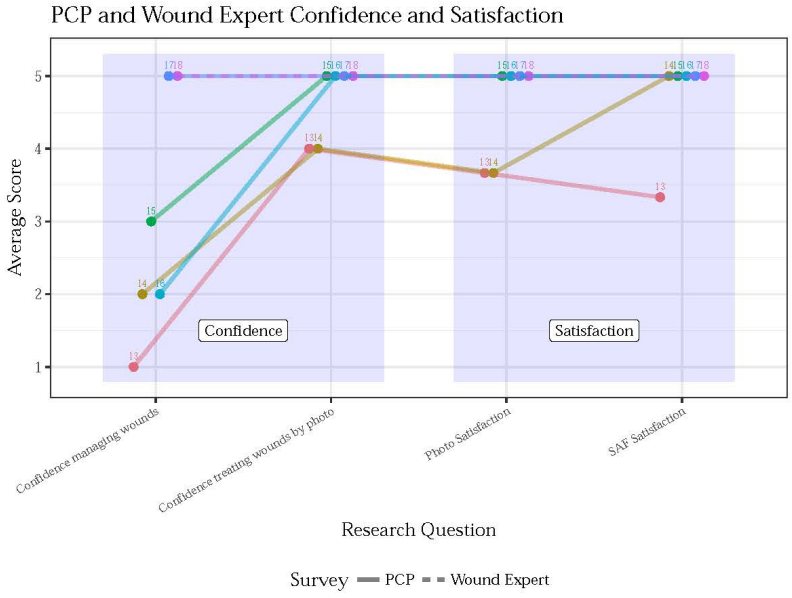


Figure 11: Relationship between Questions 1 and 12 in PCP/Expert survey (two columns on the left) and the research questions 1 and 5 (Satisfaction of SAF wound consultation and Satisfaction of wound photos; two columns on the right).

4.1 Detailed Plot

Figure 12 includes many layers of information. Each box in the plot displays results for a particular research question. The black dots are the mean score of the questions for that research question and group of participants. Another feature is the mirrored density curves showing the distribution of the raw scores in that group. There are some cases where the density curves do not exist which means that all of the questions have the same scores. The question numbers in the corresponding survey of the group are also shown in the plot. Their y-coordinates are the answers and are jittered to avoid overplotting. The questions are also arranged such that the answers from one individual are in one vertical line.

For example, in the top left plot, there are three answers with 5 and one answer with 4, thus making the density curve wider at the score of 5 and narrower at the score of 4. We can also see that the answers are arranged in two columns, indicating two patients participated in the study. One patient gave 5 for question 15 and 4 for question 11 (to the left of the dot) whereas the other patient gave a score of 5 for both questions. The average score of the patients for the group of questions related to the satisfaction of SAF wound (RQ3) is $(5 + 5 + 5 + 4)/4 = 4.75$, which is the position of the black dot in that group.

From this figure, one can see how the mean scores are different among groups in each research question. The client can also examine the distribution of the answers and also how each respondent answers each question.

4.2 Plots for Research Questions

For Research Question 1, nurses and PCP/Wound experts answered the same set of questions, so we put their answers side-by-side in Fig. 13 to compare their perceptions on SAF Wound Teleconsultation. Note that the percentages on the bar charts are calculated out of different sample sizes (shown as "(n = #)" on the x-axis label).

Although having a different set of questions with a different target participant, Research Question 3 is interested in the same perception as Research Question 1. To facilitate comparison between how different the patients, nurses, and PCP/expert are in the level of satisfaction with SAF wound consultation, we put all the answers on the same plot, divided by participant groups in Fig. 14. The percentage of the answers for the patients are calculated out of 2 participated patients.

Similar figures are also created for the pair of Research Question 6 (provider benefits of photography) and Research Question 8 (patients perceived value of photography) (Fig. 15) and the pair of Research Question 2 (providers' perceived value and benefits of SAF consultation) and Research Question 4 (patients' perceived value and benefits of SAF consultation) (Fig. 16).

Figure 17 compares the answers of patients and providers with regards to the research question on the benefits of SAF wound consultation. The providers are comprised of

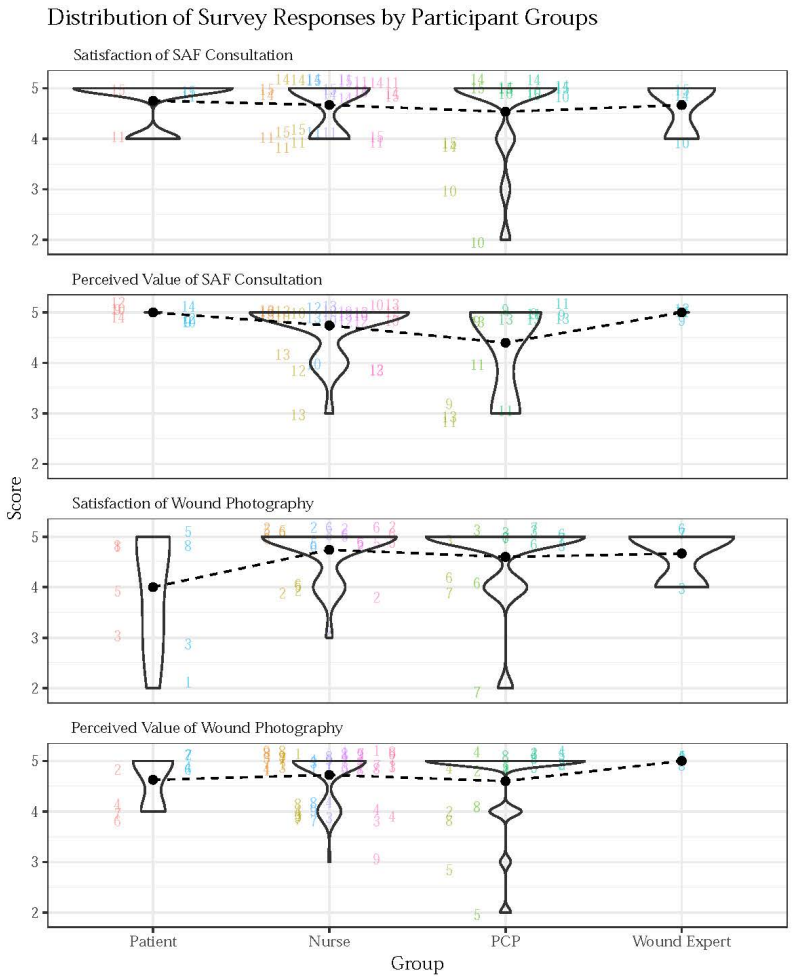


Figure 12: Average scores of the research questions between the four groups of participants. The numbers are the question number in the corresponding survey. Each individual is displayed vertically. The curves are the distribution of the score, and the black dots are the average score for a group of participants in each research question.

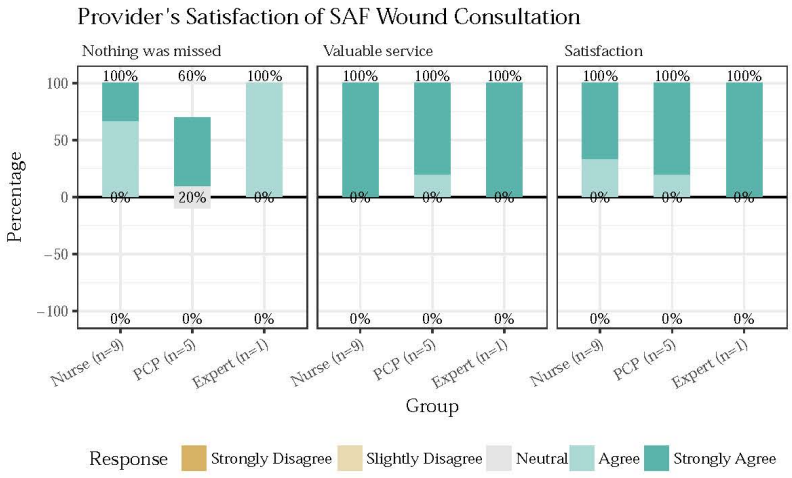


Figure 13: Comparison of the answers for Research Question 1: Satisfaction of SAF Wound Teleconsiltation between Nurses and PCP/Expert.

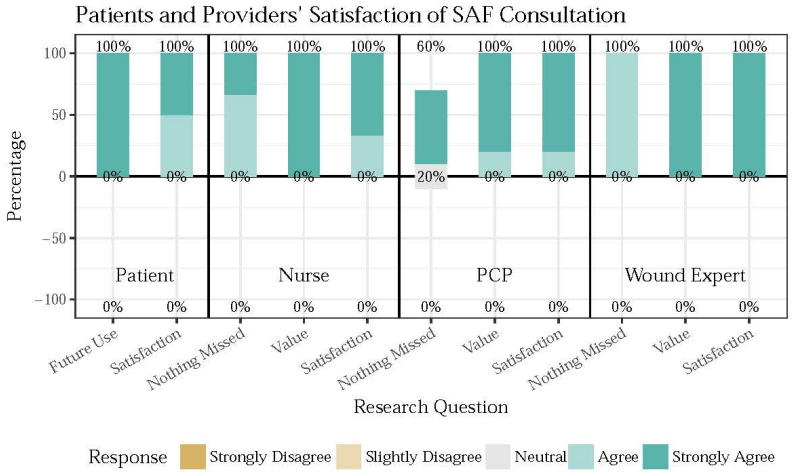


Figure 14: Comparison of how each group of participants answered the questions in Research Question 1 and Research Question 3 (Level of Satisfaction with SAF).

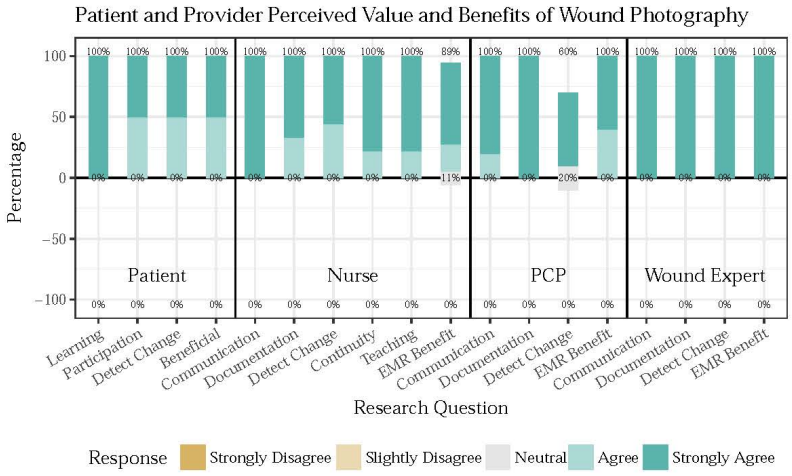


Figure 15: Comparison of how each group of participants answered the questions in Research Question 6 and Research Question 8 (Perceived Value and Benefits of Wound Photography).

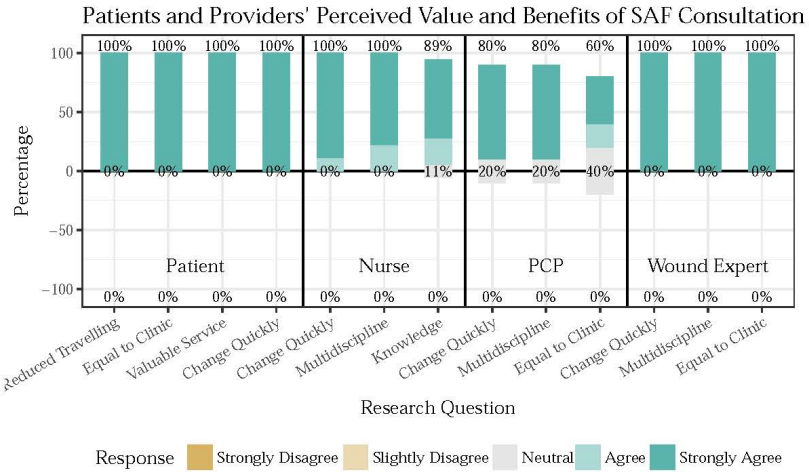


Figure 16: Comparison of how each group of participants answered the questions in Research Question 2 and Research Question 4 (Perceived Value and Benefits of SAF Consultation).

nurses, PCPs, and one wound expert. From this plot, the client can see that all the clients responded 5 (Strongly Agree) for questions related to benefits of consultation whereas some providers gave Neutral scores, making the mean score lower than 5.

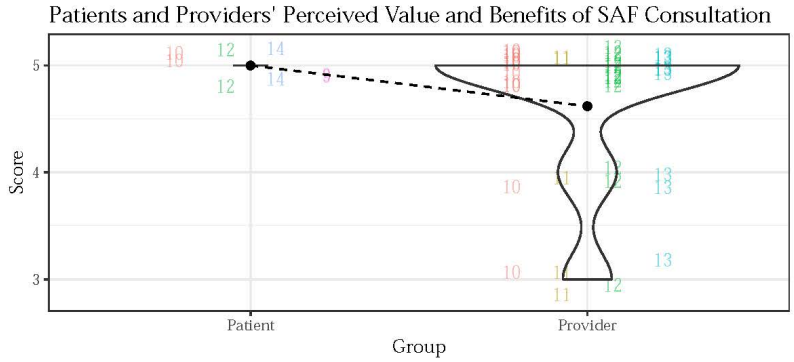


Figure 17: The difference in the results between patients and providers w.r.t. Benefits of SAF Wound Teleconsultation. Question details:
Patient/9: Reduced travelling
Patient/10: Equal care as clinic visit
Patient/12: Valuable service
Patient/14: Changes occur more quickly than office
Provider/10: Changes occur more quickly than office
Provider/11: Equal care as clinic visit
Provider/12: Promote multidisciplinary
Provider/13: Increase knowledge

Appendix: Responses for the open survey question

Individual	Type	Answer
1	Patient	"way too difficult to leave home, can't even examine my wounds in the clinic, extremely valuable service for people like me"
2	Patient	"I am very comfortable with the home health nurses. I was a bit embarrassed when the nurse took photographs of my groin but I valued being able to see the wounds. They were far worse than imagined. This service was not the same as going to the office, it was far better. I cannot get onto the examination table in the clinic; they can't even look at all my wounds. I also found the measurment ruler helpful to gauge healing over time."
4	Nurse	"To me, the utilazation of SAF is a no-brainer. Visualization is critical for wound management and assists with optimal collaboration between colleagues."
5	Nurse	N/A
6	Nurse	"This project has been very helpful to get wound photography implemented into our regular practice."
7	Nurse	"This is a great tool. Only downside I can see is it is very time consuming if there are a lot of wounds."
8	Nurse	N/A
9	Nurse	N/A
10	Nurse	"Wound photography allowed myself to visit a patient (that I have never seen before) with confidence on how to proceed with that specific wound and to know if it was resolving or headed the other direction. Great service for home health nurses."
11	Nurse	N/A
12	Nurse	"The interaction with the wound expert only happened when I was assigned to the patient. It might be a little more effective to have a week to week follow up with all staff present."
13	PCP	N/A
14	PCP	"would like commentary from the nurse with all photograhs" Star/comment next to question 7 & 10 (indicating some photographs did not have nurse assessment, indicating the nurse assessment and impression was highly valued by the provider"

15	PCP	"The pictures were incredibly useful, especially given the limitations of available office visits and ability of some patients to come into clinic. One patient in particularly was completely bed-bound, lived about 30 minutes outside of town. I could not make home visits due to being the only obstetrician in town and the call requirements to be within 15 minutes of town. And her wounds worsened abruptly. It was much easier to discuss her case with our local surgeon with the pictures provided. I also could easily see the dramatic changes beyond what nurses were communicating. I still will always believe that a hands on physical exam can never be fully replaced by digital evaluations, perhaps because I strongly believe in the value of laying hands on a patient and the healing importance of human interaction. But this project with pictures was incredibly useful as additional information over time when a hands on approach cannot be completed as frequently."
16	PCP	"A picture is worth a thousand words. It is hard to see what someone is trying to describe but a picture with a ruler measurer eliminates the guess. All wounds should be documented with photographs."
17	PCP	"The wound SAF pictures were very valuable and improved patient care. I would like to see all patients with chronic wounds have this service available."
18	Wound Expert	"This project will help support my goal of implementing photographs into the wound care policy. Not only will this make my life easier, patient care will be enhanced, costs can be controlled, and I can utilize my time effeciently. "

Table 5: Table of open responses, labeled by participant type.

APPENDIX K

LOCAL NEWSPAPER ARTICLE DISSEMINATION

A new approach to healing wounds

Home health pilot project part of MSU doctoral thesis

By CHARLIE DENISON | Reporter

Central Montana Medical Center Home Health Nurse Rebecca Roche delivered a presentation Thursday on a three-month pilot project utilizing digital wound photographs to guide wound therapy. Photo courtesy of Rebecca Roche

Wound photography.

It sounds so simple, however, this technology is very underutilized in the medical field.

According to Rebecca Roche, a nurse who has specialized in acute care, home health and hospice, this service needs to be used regularly and effectively.

Currently pursuing her doctoral degree through Montana State University, Roche is taking on this matter head-on.

"I have always been passionate about skin and wounds," Roche said, "and I saw a need for this in the department. More than 20 percent of home health patients have wounds."

In her experience, Roche said she's seen wounds consume a large amount of resources. It is her belief that healing wounds faster "can reduce costs of the home health department to care for their patients."

Central Montana Medical Center's home health department took her up on the concept and started using photos to document patient wounds.

It's not a difficult process, Roche added, and it just makes sense.

"You know how digital we all are, yet we haven't been using a lot of it to document medical records," she said, "so we did a pilot project called 'Store and Forward,' which is a form of telemedicine except it uses a still photograph instead of a two-way video."

During this three-month period, Roche and other home health nurses took photographs of patient wounds and send them to CMMC wound certified nurse Wendy Maddux for an assessment. She'd then send the information over to a provider.

"The information was then uploaded permanently to the patient's electronic medical record," Roche said. "This means if the patient were later seen in the clinic for an issue with their wound the provider could look back at previous photographs to help them determine if the wound was healing or worsening."

Following the pilot project, Roche surveyed patients, nurses and providers and was very pleased with the results.

"This pilot project was received really well," she said. "There were very high satisfaction rates. This helped reduce travel for patients and also helped make changes more quickly with patient wound care. We could take a picture, send it off and make necessary changes right away."

Such technology is tremendously beneficial, Roche said, as it helps those who are homebound and can't travel to get the care they need when they need it.

"SAF is all about decreased travel and increased satisfaction," Roche said.

It's also secure, which Roche said is very important for patients to understand.

See Wounds | Page 5

Wounds

« From Front Page

Rebecca Roche

"Photographs are taken with cell phones, but the photos go straight into an Athena app and right into a chart," Roche said.

Nurses also appreciate this new approach.

"Nurses said SAF has made it easier for them to go in, know what they are seeing, know what they are going to do and be able to look at the visit behind and say, 'oh, this is better, this is worse or this is the same.'"

What impressed Roche the most about the pilot project was its ability to improve communication and the quality of documentation.

"We are going to continue to do this SAF consultation with wound experts and hope to see it implemented in the hospital setting," Roche said. "Right now it's only used in the clinic."

Roche said she's really enjoyed working on this pilot project and believes in the difference it is making.

"People have done studies indicating that recommendations for wound care based on verbal reports are accurate only 50 percent of the time," Roche said. "Think about trying to describe color or the percent of granulation or dead necrotic tissue. It's subjective. But when you include a photograph, agreeing on an appropriate therapy is much easier."

Roche adds the photo is not meant to stand alone.

"An assessment is included and necessary, as a photo can't tell you what the drainage was before the nurse cleaned the wound, it can't tell you the patient's vital signs and can't tell you how the wound feels or smells," Roche said.

SAF has been on the rise for some time now, Roche said, and it's an honor for her to bring it to light here in Central Montana.

"This is really starting to pick up in rural settings where there isn't as much access to experts," she said. "Those most affected by wounds are generally older, so home health covers the SAF bill in the set amount of dollars Medicare gives us to take care of the patient. However, it is still to be determined how we would cover this service for outpatients."

Last week, Roche presented the findings of the home health pilot project to CMMC representatives. She was pleased with the response.

"It was really exciting," she said. "I had providers from the clinic, nurses and outpatient therapy there. It meant a lot to me that they came and listened. I really believe this is something we can get behind to see about and think about how we can use photography to improve the areas in which we are working. It's practical and practicable. We can do this."

Roche said home health plans to move SAF forward and implement it officially. As for Roche, she has now officially completed her dissemination and is one chapter away from finishing her doctorate thesis. She graduates in May of 2019.

APPENDIX L

LETTER TO STATE REPRESENTATIVE

Rebecca Roche
[redacted]
April 11, 2018

[redacted]
State Representative
[redacted]

Dear Mr. Gianforte:

As a RN of 13 years and a soon-to-be nurse practitioner, I urge you to cosponsor S. 445/H.R. 1825 which grants nurse practitioners the right to independently certify patients for home health services.

Nurse practitioners (NP's) have a long history of demonstrating safe and cost-effective care. Under federal law, NPs can order physical therapy, hospice, bill for telemedicine, interpret diagnostic imaging, and certify patients eligible for skilled nursing services. NPs provide patient care across the lifespan and coordinate care before and after hospitalizations and home health services. Yet, current law prevents them from independently certifying Medicare patients for home health services.

Under federal law, the NP can document the face-to-face visit and order home health. However, a physician's signature is required to validate the order before admission. This unnecessary restriction results in delayed care entry and drives up costs due to duplicate provider visits and unnecessary hospitalizations. Current law promotes fragmentation of care by requiring a physician often unfamiliar and not directly involved with the patient's care to certify the home health order.

The availability of physicians in primary care is also declining making the current law impractical. Over 83% of Montana is designated as a Primary Care Professional Shortage Area. In many areas, NPs are the sole provider of health care services. The law limits Medicare beneficiary access to home health services and places an unnecessary documentation burden on providers working in rural primary care.

Montana's Medicare patients deserve timely, coordinated, and patient-centered care. Please co-sponsor S. 445/H.R. 1825 and expand Medicare beneficiary access to home health services.

Sincerely,

Your Constituent
Rebecca Roche BAN, RN
Doctor of Nursing Practice - Student