

A Team Approach to Improve Wound Care Quality in Long-Term Care

by

Jillian E. Haney

Under Supervision of

Dr. Karen Clark, PhD, RN

Second Reader

Dr. Linda Costa, PhD, RN, NEA-BC

A DNP Project Manuscript
Submitted in Partial Fulfillment of the Requirements for the
Doctor of Nursing Practice Degree

University of Maryland, School of Nursing
May 2020

Abstract

Problem and Purpose: Elderly long-term care residents are vulnerable to developing chronic wounds as a result of multiple factors related to aging, immobility, nutritional deficits, and medical comorbidities. Chronic wounds may result in uncontrolled pain, infection, hospitalization, amputation, and increased mortality. On one long-term care unit, lack of adequate wound surveillance and treatment has resulted in delayed healing rates. The purpose of this quality improvement project was to implement a wound care team, consisting of a nurse practitioner and licensed practical nurse to provide direct wound care surveillance and treatment for all residents of one long-term care unit, and collaborate with the inter-professional team to improve outcomes.

Methods: On a weekly basis, the team assessed all active wounds, collecting measurements (length, width, depth in centimeters), and data on wound quality (tissue type, drainage, and etiology); and reviewed current treatment modalities. This data was recorded by the licensed practical nurse in the unit wound book, and presented weekly during inter-professional safety meetings, including physical therapy, social work, nutrition, and unit management, with the goal of developing a collaborative, resident-centered plan of care.

Results: An average of 5 residents weekly were seen by the wound team. Over the 13-week implementation period, weekly data analysis revealed no overall change in wound incidence or prevalence. The accuracy and completion of nursing documentation improved from nearly 50% at the start of the project, to nearly 90% in the final weeks of data collection. Improved data accuracy allowed better inter-professional team decision-making. Changes facilitated by the inter-professional team process included enhancing the use of offloading devices, nutritional interventions, increasing access to high-quality wound supplies, and clarifying resident and family goals of care.

Conclusion: A team approach is a feasible way to improve wound care quality in the long-term care setting. This process allows increased inter-professional communication and collaboration through enhanced data sharing, and enables needed changes made with group decision-making. Longer term studies could provide more insight into the effect of this process on wound incidence, prevalence, and healing rates.

A Team Approach to Improve Wound Care Quality in Long-Term Care

Introduction

The incidence and prevalence of a chronic, non-healing wound increases with age, and is associated with numerous risk factors; such as immobility, malnutrition, diabetes, cardiovascular disease, and cognitive decline; among others (Nussbaum et al., 2018). Elderly long-term care (LTC) residents are particularly vulnerable to both delayed healing and the development of new, non-healing ulcerations. In 2014, an estimated 8.2% of Medicare beneficiaries (8.2 million individuals) received wound care treatment, with anticipated future increase in prevalence given a growing elderly population (Nussbaum et. al, 2018). Chronic wounds have a significant impact on an individual's quality of life, with resultant complications such as uncontrolled pain, infection, hospitalization, amputation, and increased mortality (Sullivan & Schoelles, 2013). Successful wound care interventions in LTC settings require a multi-component approach, consisting of strong leadership involvement, the establishment of a wound care team, continual auditing and feedback, and the adoption of formal pressure ulcer programs including simplified assessment tools (Edwards et al., 2017; Hartmann, Solomon, Palmer, VanDeusen, & Lukas, 2016; Moore et al., 2014, Sullivan & Schoelles, 2013).

Fragmented wound surveillance at one LTC facility resulted in a missed opportunity to establish primary preventive measures and secondary treatment to improve resident outcomes, ensure regulatory compliance, and reduce cost. The purpose of the project was to increase wound surveillance through the implementation of weekly unit wound team rounds (one dyad consisting of a nurse practitioner [NP] and a licensed practical nurse [LPN] wound “champion”) to identify, document, treat, and monitor active wounds. The data collected during rounds was communicated among management and the inter-professional team (physical therapy, nutrition,

social work) during weekly unit safety meetings to improve care coordination and address needed systems changes.

Literature Review

A literature review was conducted to establish the evidence base for developing a wound care quality improvement (QI) program in a LTC setting, revealing three major themes associated with successful interventions: implementing an inter-professional team, supporting key leadership and contextual factors, and developing strategies to improve and simplify staff care and documentation processes. The level and quality of the evidence was fair, mainly limited by inherent challenges in implementing a randomized multi-component trial in the LTC setting. The synthesis of this evidence helped to guide the planning, implementation, and evaluation of this QI project.

A team-based, inter-professional approach has been implicated as a strategy in a wide variety of efforts to improve coordination of care and health-care outcomes. Interpretation of study results is somewhat difficult given diverse research practice settings and multi-component study interventions, and lack of randomized-control trials (Moore et al., 2014; Moore, Webster, & Samuriwo, 2015; Reeves, Pelone, Harrison, Goldman, & Zwarenstein, 2017). However, several QI studies located in which researchers implemented a wound care team in a LTC have shown positive results, such as significant reductions in wound incidence and prevalence, costs, pain, and falls; and improved accuracy of documentation and use of evidence-based protocols (Edwards et al., 2017; Milne, Trigilia, Houle, DeLong, & Rosenblum, 2009; Tippet, 2009; Vu, Harris, Duncan, & Sussman, 2007). While difficult to isolate as a causative factor, wound care teams across a wide variety of practice settings and wound etiologies have been associated with

improved wound healing, amputation rates, patient satisfaction, pressure ulcer rates, and cost (Niederhauser et al., 2012; Moore et al., 2014).

This review highlighted a second common theme: the importance of contextual factors in wound care program success; especially, active involvement and participation of institution leaders. LTC facilities with highly-rated pressure ulcer performance had strong leadership support, goal agreement between leadership and front-line staff, and formal pressure ulcer programs in place (Hartmann et al., 2016; Sullivan & Schoelles, 2013); as well as leadership support for staff education, and shared data monitoring and audit processes (Niederhauser et al., 2012; Sullivan & Schoelles, 2013). Researcher's results from multiple QI studies in LTC settings also found that developing context for translation supported by facility and unit leadership was key for project success (Milne et al., 2009; Tippet, 2009).

A final theme isolated from a review of the literature was the importance of considering specific staff-level care and process interventions associated with positive outcomes. Several researchers mentioned the importance of developing facility policies, education, and tools based upon evidence-based best practices (Edwards et al., 2017; Milne, et al., 2009; Niederhauser et al., 2012; Sullivan & Schoelles, 2013; Tippet, 2009; Vu et al., 2007). Process changes including simplification of nursing documentation and simplified assessment tools resulted in both improved outcomes and accuracy of documentation (Edwards et al., 2017; Milne, et al., 2009; Niederhauser, et al., 2012; Sullivan & Schoelles, 2013; Tippet, 2009). Other factors associated with improved pressure ulcer performance in hospital and LTC settings include pre-program planning, data monitoring and feedback, staff engagement in program development and education, and simplifying processes and avoiding making too many changes at one time (Niederhauser et al., 2012). These findings highlight the need to consider streamlining nursing

education, process, documentation, and the use of evidence-based, but simplified interventions to enhance knowledge and engagement and improve outcomes.

Theoretical Framework

In “Leading Change: Why Transformation Efforts Fail,” Kotter (1995) presents an 8-step approach in organizational transformation to enable the process of quality improvement interventions and promote sustained change. The first step in this process was to create a sense of urgency to stimulation and motivate action, which included review of current wound prevalence and implications for regulatory penalty related to non-compliance. The next step, “forming a powerful guiding coalition,” involved convening stakeholders to support the project, consisting of the wound team, and other members of the inter-professional team (management, physical therapy, social work, nutrition, et cetera) (Kotter, 1995, p. 4). In the third step, the development of a shared vision, the team collaborated to create shared goals, enabling the fourth step: communicating the vision, which involved disseminating the plan among all involved staff members and modeling new behaviors. Then, in the fifth step, barriers to practice change were analyzed to improve practice change uptake. The sixth step involved creating “short-term wins,” that is, measurable outcomes to share among team members to support continued enthusiasm (Kotter, 1995, p. 7). In this project, data was shared in inter-professional meetings and one-on-one staff discussions to demonstrate the outcome of their efforts. The seventh step consisted of “reinvigorating” and “consolidating improvements and producing still more change,” that is, continual process evaluation and systems adaptations to improve the ongoing implementation and overall outcomes (Kotter, 1995, p. 4). In this project, ongoing findings enabled reevaluation of the wound care program and identified new changes needed at various levels. Finally, the last step, Kotter (1995) proposes that the changes need to be “anchored” as part of the organization’s

overall culture (p. 8); which required ongoing wound care quality championing by all team members to create sustainability.

Methods

This wound care quality improvement project was undertaken at a LTC unit of elderly residents within a continuing care retirement community. All unit residents were included for initial and ongoing wound surveillance by the wound care team, which included a unit census range of 18-24 individuals during the 13-week project period. Written permission to proceed with the project was obtained from the LTC facility's Director of Nursing, and a formal Non-Human Subjects Research designation was granted by the University's Institutional Review Board.

Changes in structure included convening a wound care team, and providing nurse wound champion staff education. The wound care team, consisting of an NP and an LPN wound care champion facilitated both initial and sustained efforts for change. Staff were educated during face-to-face and group discussion on wound care knowledge gaps and correct use of wound assessment tools. Weekly bedside wound rounds were initiated with the wound team, including assessment and discussion, in which the nurse practitioner measured wounds, and the team briefly discussed staging classification, wound quality, drainage, comorbid factors, and treatment plan. The wound team presented findings with other members of the inter-professional team (management, physical therapy, social work, nutrition) during weekly safety meetings on Tuesdays. Improved wound assessment and care plan development by the wound team facilitated collection of more accurate surveillance data to present with the inter-professional team to identify further individual needs (such as nutrition, assistive devices, physical therapy), or systems-level changes needed to be addressed by unit and facility management. Senior

leadership was engaged at the start of the project, and data shared created short-term wins to reduce barriers to success and help sustain long-term momentum.

Wound data (incidence, prevalence, healing rate) was collected and calculated on a weekly basis during unit wound rounds and verified with the unit's wound care binder which contained written wound assessments to present during weekly safety meetings. The healing rate is defined as number of residents with wound healing during target period (weeks 0-2, 2-4, 4-8, and 8-12) divided by the number of residents with a currently active wound. The wound team performed bedside wound assessments and nursing staff updated the wound binder data with the information collected, which was assessed weekly for accuracy and completion in terms of wound etiology, quality, staging, and measurement. Overall wound-specific data was collected and presented during safety meetings at weeks 2, 4, 8, and 12.

Data was analyzed on a weekly basis, as an aggregate from weeks 0-2, 2-4, 4-8, 8-12, and upon completion as a comparison to baseline pre-intervention data (Appendix A). Accuracy and completion of nursing documentation was analyzed weekly, and results shared with the wound team. Weekly wound prevalence, incidence, and healing rate was calculated as a percentage, per audit tool instructions, and discussed with the wound team and inter-professional team. Percentage change was calculated at pre-determined intervals per the audit tools to assess interval outcomes and address any needed changes.

Results

The main practice changes of this project included convening a wound care team and beginning weekly wound team rounds to facilitate data sharing with the inter-professional team during weekly safety meetings. Weekly data analysis revealed no overall change in wound incidence (Figure 4) and prevalence (Figure 1), however, the accuracy and completion of nursing

documentation improved from around 50% at the start of the project, to around 90% in the final weeks of data collection (Figure 2). The improved quality of this documentation helped guide the inter-professional team in creating individualized care plans for residents with active wounds, and stimulated discussions surrounding treatment options, family considerations, and overall prognosis and goals of care. While wound incidence and prevalence were not affected by this intervention, the project was associated with a healing rate (as defined previously) of 16% from weeks 2-4, 50% in weeks 4-8, and 28% from weeks 8-12 (Figure 3). While no previous data on specific prior healing rates for this unit is available, this result is encouraging for sustained implementation of project changes. One problem encountered was gaining participation of nursing staff, who often had numerous daily responsibilities that conflicted occasionally with participation in rounds, and more often with participation in safety meetings.

An original intent of this project was to introduce a new bedside pressure ulcer assessment tool, but this proved too challenging of a goal given current circumstances of low staffing and increased work-load. As such, wound assessments continued on the unit's designated skin flow-sheets. Also, another barrier encountered was ineffective communication and between unit management and nursing staff, as well as ongoing changes in key leadership positions and lack of support for continued education and staff development. Facilitators included enthusiasm by nursing staff and the nurse practitioner, and having a low census helped to complete wound rounds in an efficient and timely fashion, which served to reduce nurse workload. Overall, this project improved inter-professional communication and collaboration through enhanced data sharing, as evidenced by specific changes made as a result of group discussion. This included monitoring the use of offloading devices (such as wheelchair cushions

and low-air loss mattresses), discussions regarding nutritional interventions, improving nursing access to high-quality wound supplies, and clarifying resident and family goals of care.

Discussion

As mentioned, the implementation of this project was associated with an increase in accuracy of nursing wound care documentation. This occurred likely as a result of team assessment and discussion during bedside wound rounds, including expert verification by the nurse practitioner. Several instances of incorrectly documented staging were discovered and corrected during bedside rounds, such as the documentation of a wound as partial-thickness, stage II, when the wound was found to be a full-thickness, or stage III pressure ulcer. These corrections in documentation were vital during safety meetings, as the inter-professional team typically relied on nursing documentation for discussion as nurses often had other obligations during safety meeting times. Data regarding the specific incidence and prevalence of each stage of ulcer was not collected, as the length of this project was unlikely to affect appreciable changes in ulcer staging.

Researchers have highlighted the importance of contextual factors in the development of a successful LTC wound program, to include leadership, staff participation, staff development and education and goal agreement between leaders and front-line staff (Hartmann et al., 2016; Niederhauser et al., 2012; Sullivan & Schoelles, 2013). This project highlighted existing contextual problems in this unit, including deficiencies in leadership, communication, staff education and leader-staff goal agreement, and the need for nursing to be more directly involved in unit-level quality improvement and decision-making. Strengths of the project were research-supported strategies including pre-program planning, nurse champions, a team model, avoiding too many changes at once (such as adding new tools), and data monitoring and feedback, which

all proved to aide in this project's implementation (Niederhauser et al., 2012; Sullivan & Schoelles, 2013). The commitment of the nurse practitioner to continue weekly rounds and communicate with staff helped promote sustainability, as unit leadership thus far has been ineffective in supporting a strong wound care program. Additionally, the wound care encounters were billable visits for the nurse practitioner. Nursing staff were able to complete wound measurements and develop care plans in an efficient manner which also helped promote sustainability.

Some limitations of this project included a short implementation and data tracking period for monitoring wound incidence and prevalence, as chronic wounds may take months to heal (Nussbaum et al., 2018). Also, this was a small project; among an average census of 20 residents, the average wound prevalence was around 20%; or 5-7 active wounds monitored on a weekly basis. This project was also small in terms of nursing staff outreach, as only two wound care champion nurses participated. Nurses had difficulty participating in inter-professional safety meetings due to conflicting duties. Bias and imprecision may have been introduced by only having one individual assessing completion of nursing documentation. The initial scope of the project, including implementation of a new assessment tool, had to be reduced to accommodate limitations in unit context.

Conclusion

While this project fell short of a comprehensive wound care program, and limitations were encountered in unit context, this was a useful project in developing individual and systems-based plans to monitor and improve resident healing outcomes. In order to maintain sustainability, the nurse practitioner and LPN team need to commit to completing weekly wound rounds, and work more closely with the inter-professional team during safety meetings. Unit

leadership should provide support for nursing staff to complete these duties in terms of time, resources, and training. Leadership should also follow wound documentation and outcomes more closely, hold staff accountable, and create a shared vision by including staff input on decision-making and quality improvement. As mirrored in research findings, this project demonstrated that examining and maximizing contextual factors is important in developing a wound-care program. In future wound care QI projects in the long-term care setting, efforts should include high levels of leadership engagement, commitment to ongoing staff participation and education, wound care champions and teams, continual data monitoring and feedback, and the use of simplified interventions and tools. Implementing a wound care team process on a LTC unit is a feasible, cost-effective strategy to improve nursing assessment and documentation and facilitate inter-professional team decision-making, to ultimately improve healing outcomes in this population.

References

- Edwards, H. E., Chang, A. M., Gibb, M., Finlayson, K. J., Parker, C., O'Reilly, M., ... Shuter, P. (2017). Reduced prevalence and severity of wounds following implementation of the Champions for Skin Integrity model to facilitate uptake of evidence-based practice in aged care. *Journal of Clinical Nursing, 26*(23/24), 4276–4285.
- Hartmann, C. W., Solomon, J., Palmer, J. A., VanDeusen, & Lukas, C. (2016). Contextual facilitators of and barriers to nursing home pressure ulcer prevention. *Advances in Skin & Wound Care, 29*(5), 226–238.
- Kotter, J. P. (1995). Leading change: Why transformation efforts fail. *Harvard Business Review, 73*(2), 59–67.
- Milne, C. T., Trigilia, D., Houle, T. L., DeLong S., & Rosenblum, D. (2009). Reducing pressure ulcer prevalence rates in the long-term acute care setting. *Ostomy Wound Management, 55*(4), 50–56. Retrieved from <https://www.o-wm.com/content/reducing-pressure-ulcer-prevalence-rates-long-term-acute-care-setting>
- Moore, Z. E. H., Webster, J., & Samuriwo, R. (2015). Wound-care teams for preventing and treating pressure ulcers. *The Cochrane Database of Systematic Reviews, (9)*, CD011011.
- Moore, Z., Butcher, G., Corbett, L. Q., McGuinness, W., Snyder, R. J., & van Acker, K. (2014). Exploring the concept of a team approach to wound care: Managing wounds as a team. *Journal of Wound Care, 23 Suppl 5b*, S1–S38. Retrieved from [http://ewma.org/fileadmin/user_upload/EWMA.org/Project_Portfolio/EWMA_Document s/AAWC_AWMA_EWMA_ManagingWoundAsATeam_FINALdoc.pdf](http://ewma.org/fileadmin/user_upload/EWMA.org/Project_Portfolio/EWMA_Document_s/AAWC_AWMA_EWMA_ManagingWoundAsATeam_FINALdoc.pdf)
- Niederhauser, A., Lukas, C. V., Parker, V., Ayello, E. A., Zulkowski, K., & Berlowitz, D.

- (2012). Comprehensive programs for preventing pressure ulcers: A review of the literature. *Advances in Skin & Wound Care*, 25(4), 167–190.
- Nussbaum, S. R., Carter, M. J., Fife, C. E., DaVanzo, J., Haught, R., Nusgart, M., & Cartwright, D. (2018). An economic evaluation of the impact, cost and Medicare policy implications of chronic non-healing wounds. *Value in Health*, 21, 27–32. Retrieved from <https://www.sciencedirect.com/science/article/pii/S1098301517303297/pdf?md5=0d72d5ecb79415b95d943c3d26dad062&pid=1-s2.0-S1098301517303297-main.pdf>
- Reeves, S., Pelone, F., Harrison, R., Goldman, J., & Zwarenstein, M. (2017). Interprofessional collaboration to improve professional practice and healthcare outcomes. *Cochrane Database of Systematic Reviews*, (8). Retrieved from <https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD000072.pub3/epdf/full>
- Sullivan, N., & Schoelles, K. M. (2013). Preventing in-facility pressure ulcers as a patient safety strategy: A systematic review. *Annals of Internal Medicine*, 158, 410–416. Retrieved from <https://annals.org/aim/fullarticle/1657885/preventing-facility-pressure-ulcers-patient-safety-strategy-systematic-review>
- Tippet, A. W. (2009). Reducing the incidence of pressure ulcers in nursing home residents: A prospective 6-year evaluation. *Ostomy Wound Management*, 55(11), 52–58.
- Vu, T., Harris, A., Duncan, G., & Sussman, G. (2007). Cost-effectiveness of multidisciplinary wound care in nursing homes: A pseudo-randomized pragmatic cluster trial. *Family Practice*, 24(4), 372–379. Retrieved from <https://academic.oup.com/fampra/article-pdf/24/4/372/1389950/cmm024.pdf>

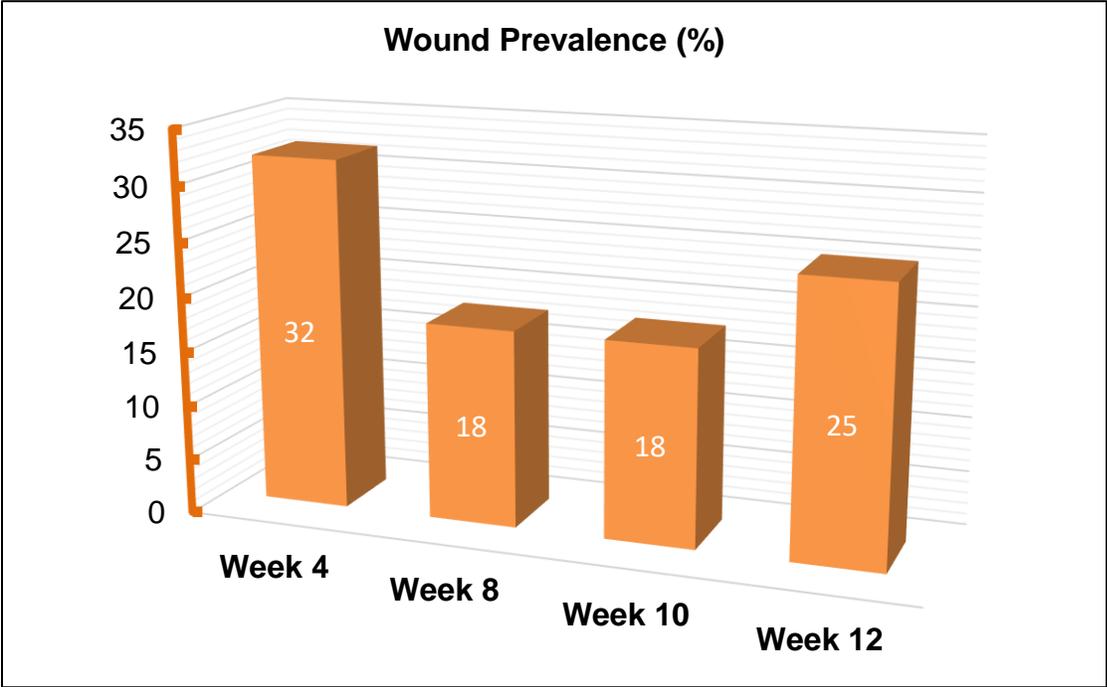


Figure 1. Wound prevalence, as percentage. Average total weekly unit census $N=20$

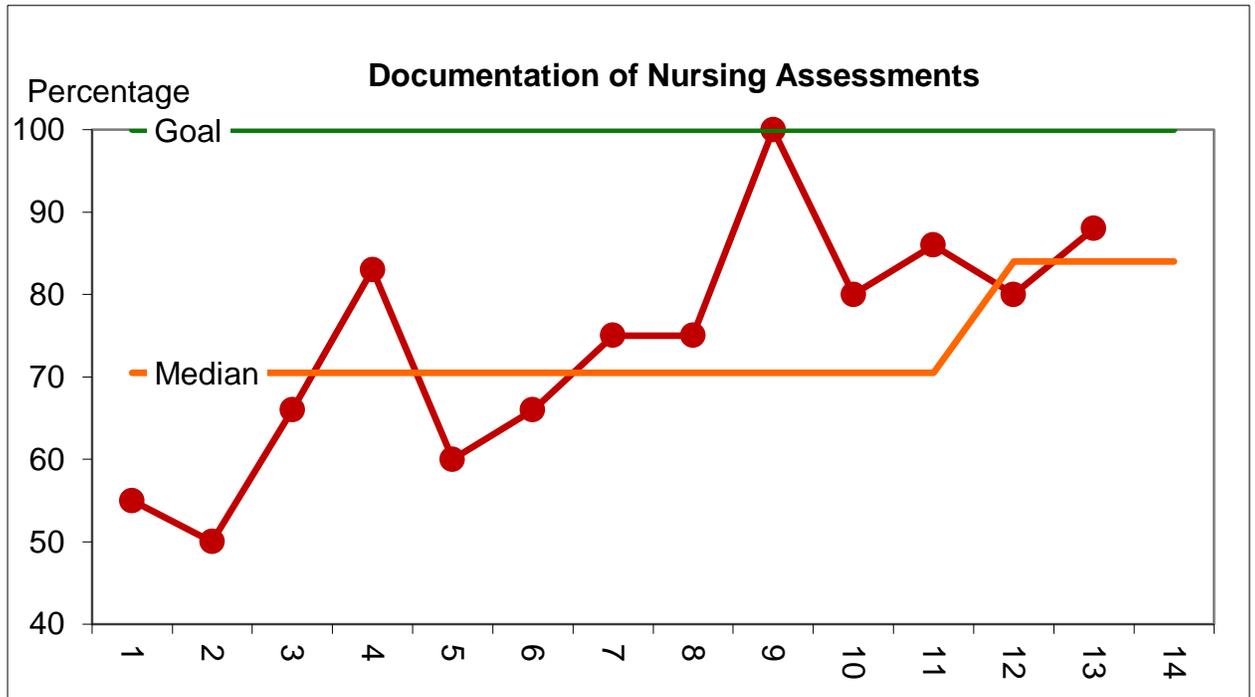


Figure 2. Percentage of complete nursing assessments in unit wound book on a weekly basis.

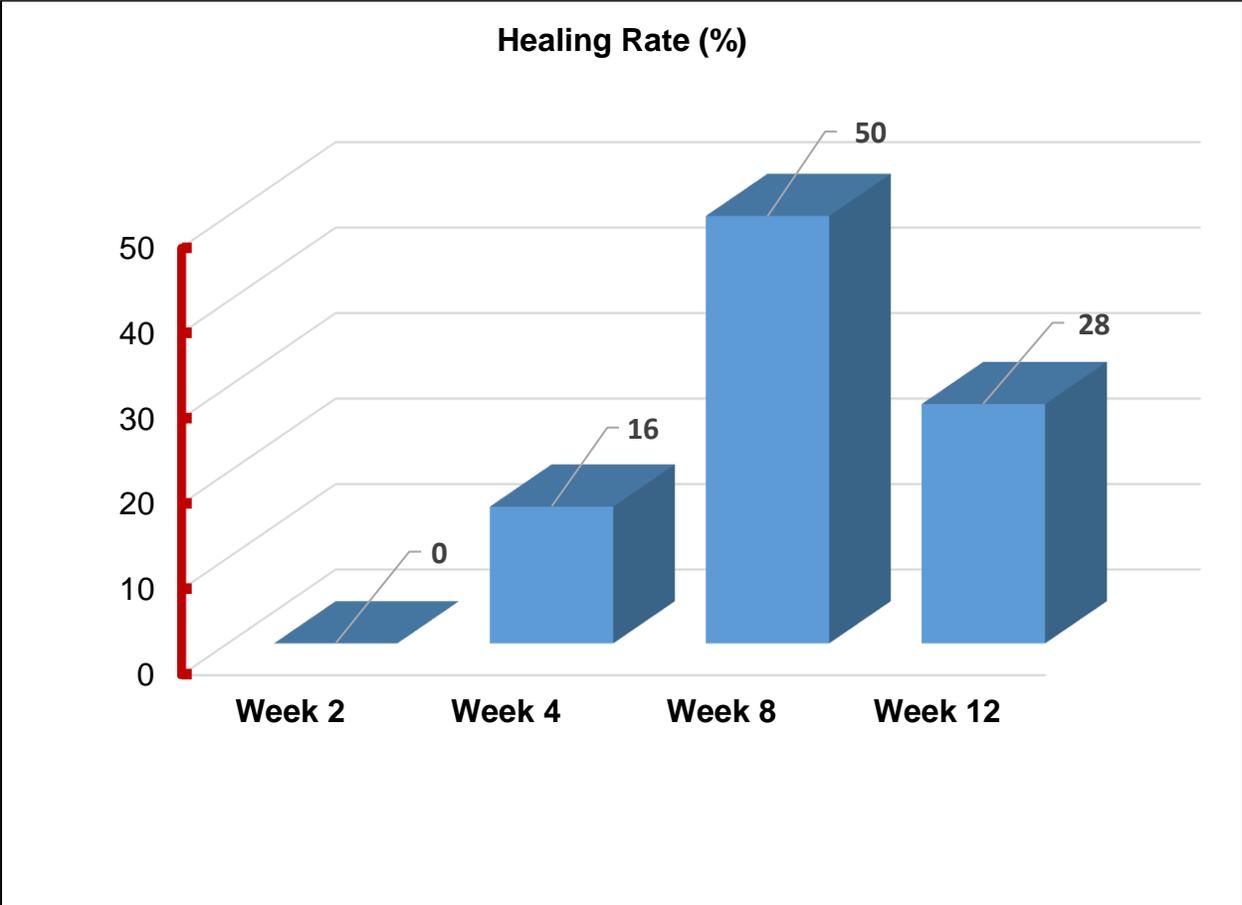


Figure 3. Healing rate percentage from weeks 0-2 (week 2), weeks 2-4 (week 4), weeks 4-8 (week 8), and weeks 8-12 (week 12).

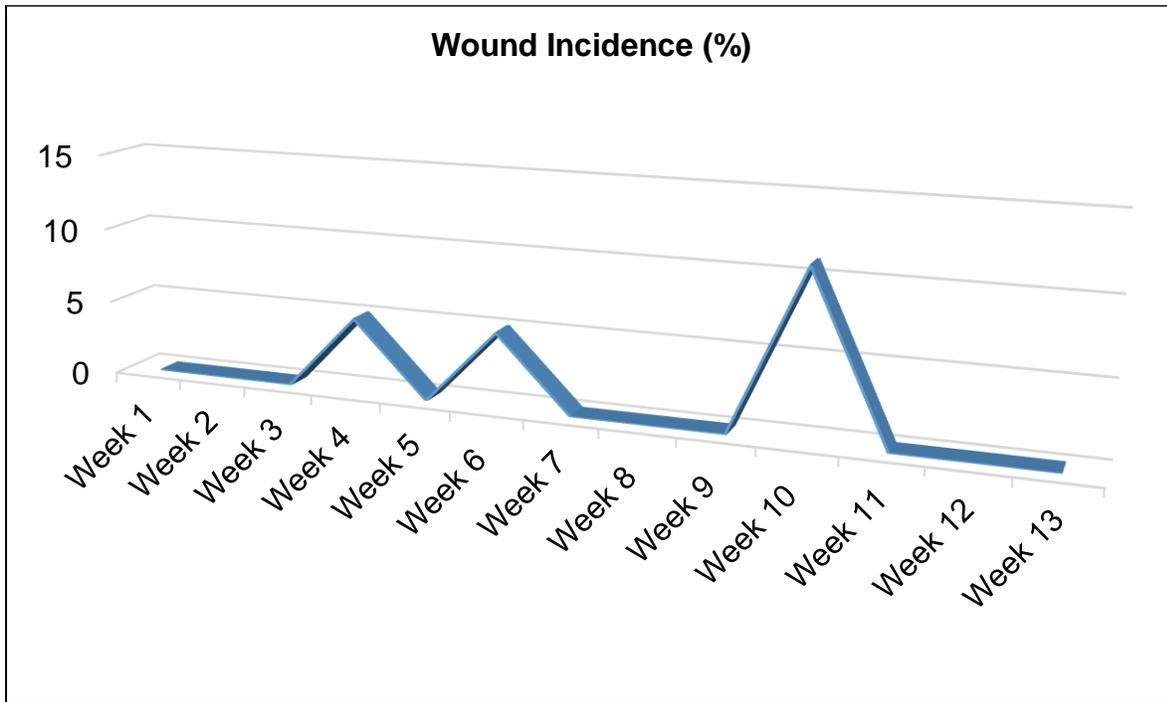


Figure 4. Weekly wound incidence percentage.

Appendix A

Audit Tools for Weekly and Overall Outcome Monitoring

The following two audit tools were used on a weekly basis to monitor project progress in terms of wound outcomes and accuracy and completion of documentation.

Weekly Wound Surveillance Tool

De-Identified Patient ID	Code for RN/LPN	Diagnosis and Plan verified by NP	Unit Wound Book Assessment Complete	Inter-professional Team Review in Safety Meeting
(e.g.: 1001)	(e.g.: 12)			

Unit Weekly Census Number = _____

Weekly Wound Prevalence (number of residents with at least one wound / total number of residents x 100%) = _____

Weekly Wound Incidence (number of residents with new wound identified / total number of residents x 100%) = _____

Weekly Healing Rate (number of residents with newly healed wound / total number of residents with active wound x 100%) = _____

Appendix B

Evidence Review Table

							Evidence Rating
Study #	Authors, Year	Study Objective/ Intervention or Exposures Compared	Design	Sample (N)	Outcomes (How Measured)	Results	Level & Quality
1	Centers for Medicare & Medicaid Services (CMS) 2014	Nursing home data compendium prepared by CMS (11 th edition) using data from the CMS CASPER database, the U.S. Census Bureau, and Minimum Data Set (MDS) information for each CMS certified nursing home for the period of 2005-2014	Nationwide nursing home data compilation with various demographic and health outcome measures to identify key nursing home deficiencies and citations. No analysis or recommendation provided	N=15,638 CMS-certified nursing homes in the U.S.	Report presents numerous data outcomes relating to number of nursing homes and provider characteristics, average number of deficiencies, percentage of surveys with citations for substandard quality of care, and many others. Particular data of interest includes: 1) Percentage of surveys with citation for pressure ulcers 2) Most frequently cited health deficiencies	1) Nationwide nursing home overall pressure ulcer prevalence decreased from 5.9% to 5.1% from 2011-2014 (-13.0% decrease) 2) Failure to prevent and treat pressure ulcers in nursing homes was a top-10 deficiency resulting in citation for the years 2005-2014 Data highlight ongoing need to improve nursing home pressure ulcer care and reduce rate of CMS deficiency related to pressure ulcers nationwide	3A
2	Edwards, Change, Gibb, Finlayson, Parker, O'Reilly, Shuter, 2017	To assess the effectiveness of a multifaceted wound program in LTC setting: skin integrity team, staff education & skills training, multidisciplinary network, awareness campaign, ongoing audit and feedback	Quasi-experimental; Pre/post-test of differing random group of LTC residents	Random selection of n=200 pre, n=201 residents Staff survey (n=126 before, and n=143 after completed survey)	1) Pre- and post- resident skin assessment at 6 months 2) Staff survey collected pre- and 6 mo. post intervention	1) Sig. reduction in wound of any type (54% pre vs 43% post, p=0.04); Pressure injuries reduced from 24% to 10% (p<0.001) 2) Staff reported reduced barriers to EBP, increase in guideline based preventive strategy usage, improvements in documentation and information sharing	2A

3	Hartmann, Solomon, Palmer, VanDeusen, & Lukas, 2016	To examine the enabling factors/context between leadership and staff in LTC that had high quality pressure ulcer outcomes	Mixed method: Qualitative and Quantitative Non-experimental	Pressure ulcer data analysis from N=109 Veterans Affairs LTCs; N=23 staff interviews from 6 LTC facilities	1) Analysis of pressure ulcer performance using data analysis across 109 LTC sites 2) Varying contextual factors of pressure ulcer program evaluated with staff interviews at multiple LTC sites (6)	LTC sites with strong pressure ulcer performance: 1) had strong leadership support for program, frontline staff and leadership goal agreement, 2) formal pressure ulcer prevention program/structures in place	3A
4	Kotter 1995	To present the key components of a quality improvement theoretical framework designed to achieve sustained success in transformation efforts	Expert Opinion	Non-experimental	Non-experimental without data analysis	Presents 8-stage cumulative approach to facilitating transformation efforts of a group; readily adaptable to quality improvement efforts: 1) Create a sense of urgency 2) Form a powerful guiding coalition 3) Create a vision 4) Communicate the vision 5) Empower others to act on the vision 6) Plan for and create short-term wins 7) Consolidate improvements and produce more change 8) Institutionalize new approaches	5B
5	Milne, Trigilia, Houle, DeLong, & Rosenblum, 2009	To assess the impact of a wound care quality improvement project in a long-term care acute hospital (LTACH)	Quality improvement: established team, audit system, policy revision based on CPG, EHR changes, staff education	Project performed at multi-unit 108-bed LTACH	Intervention: Failure Mode and Effects Analysis used for gap analysis, collected initial prevalence data and braden scores on all patients, then weekly and monthly data: pressure ulcer incidence, prevalence; chart audit after project to assess documentation	At 12 mo. after intervention, facility acquired pressure ulcer rate decreased by 37% with 71% reduction in pressure ulcer prevalence; increased accuracy in documentation with 92% agreement between bedside and wound team staff	5A

6	Moore, Webster, & Samuriwo, 2015	To evaluate the evidence supporting the use of wound-care teams for preventing and treating pressure ulcers	Systematic review	No studies met inclusion criteria for the review	There is a lack of studies of sufficient evidence to determine if wound-care teams alone make a difference in healing pressure ulcers or developing new ulcers	More RCT needed to establish specific effect of wound-care teams on pressure ulcer outcomes	1A
7	Moore, Butcher, Corbett, McGuiness, Snyder, & Van Acker, 2014	To review the evidence in applying a team approach to improving wound-care outcomes across the spectrum of practice settings and wound etiologies	Literature review	84 articles were reviewed; did not quantify types of studies included	Wound healing, amputation rates, patient satisfaction and QOL, pressure ulcer rates, cost	Lack of clarity surrounding this problem due to heterogeneity of team wound care projects, lack of term “team” definition in research (multidisciplinary, interdisciplinary or trans-disciplinary) and need for more description of the model used to translate the team approach. Difficulty in drawing conclusions RE team alone when multicomponent strategies are the norm; however the overall team approach has shown positive results over all types of wound etiologies and practice settings; authors provide framework for team approach	5A
8	Niederhauser, Lukas, Parker, Ayello, Zulkowski, & Berlowitz 2012	To review the evidence to support a multi-component interventions including multidisciplinary teams to prevent pressure ulcers in inpatient facilities (hospitals and LTC settings)	Literature review	24 studies were reviewed, no RCT; all longitudinal pre-test post-test	<ol style="list-style-type: none"> 1) Pressure ulcer prevalence 2) Pressure ulcer incidence 3) Care processes 4) Recurring components 	<ol style="list-style-type: none"> 1) Of 10 studies reporting prevalence, 9 reduced pressure ulcer prevalence 2) Of 6 studies reporting incidence, 5 reduced pressure ulcer incidence 3) Of 4 studies reporting care processes: 1 improved all; 2 improved some, not all; 1 had no change 4) Recurring components associated with success were pre-program planning, establishing best practices (tools, education), continual data monitoring and feedback, skin care champions & teams (no one best team) 	5A

						model identified), and processes – staff engagement and involvement in development, simplifying intervention	
9	Nussbaum, Carter, Fife, DaVanzo, Haught, Nusgart, & Cartwright, 2018	To review the incidence, prevalence, and costs associated with wound care treatment for Medicare recipients	Retrospective data analysis	Analyzed data from the Medicare 5% limited data set for calendar year 2014 for individuals that received care for arterial ulcers, chronic ulcers, diabetic foot ulcers, diabetic skin infections, pressure ulcers, surgical wounds, venous ulcers, etc.	1) Prevalence of each type of wound 2) Cost for each type of wound and aggregate cost 3) Cost by location of service (hospital inpatient, outpatient – clinic, skilled nursing facility)	In 2014: 1) 15% Medicare beneficiaries (8.2 million) received wound care treatment 2) Surgical infection wound most expensive followed by diabetic foot ulcer; aggregate costs 28.1-96.8 billion 3) Hospital outpatients comprised the greatest costs (9.9-35 billion), inpatient costs second greatest (5-24.3 billion) Suggests that focused quality improvement efforts (quality measures, reimbursement models) especially in outpatient settings are indicated given greater than expected costs and increase in aging population	5A
10	Reeves, Pelone, Harrison, Goldman, Zwarenstein, 2017	To assess outcomes of studies designed to improve interprofessional practice (in a practice setting) as compared to usual or alternative care; analyzed all available practice settings (inpatient and outpatient)	Systematic review	9 studies that included six cluster-randomized trials and three individual randomized trials	1) Patient functional status 2) Patient assessed quality 3) Patient outcomes 4) Adherence to clinical practices 5) Continuity of care 6) Use of healthcare resources 7) Team communication/ collaboration	Low certainty evidence was found to support inter-professional activities in: 1) Improved stroke patient functional status 4) Improvement to adherence to correct clinical practices and prescriptions 6) Use of checklists, rounds, and external team meetings may decrease resources, cost, and LOS	1A
11	Sullivan, & Schoelles, 2013	To assess components and contexts of successful pressure ulcer intervention	Systematic review	26 pressure ulcer intervention studies – mostly time series, one RCT (9 were high-	1) Reduction pressure ulcer rates	Identified moderate strength evidence to support multi-component programs in this practice setting	2A

		programs in inpatient and LTC facilities		quality, 14 moderate, 3 were low), studies were completed in long-term and acute care settings (18 acute care, 8 long-term care)	2) Improvement in processes of care	1) 11 (42%) of 26 studies had improvement in pressure ulcer rates; 2) Successful programs that reduced pressure ulcer rates and improved processes of care had: simplified assessment and intervention, support from leadership, multidisciplinary teams, use of skin champions, continual staff teaching, and continual data monitoring and audit processes	
12	Tippet, 2009	To assess the effects of a wound care quality improvement project in a long-term care setting over the course of 6 years	Quality improvement: Interdisciplinary team, staff training, use of evidence-based protocols, simplification of process	Project performed at 151-bed skilled nursing facility	Data collected monthly over 6 years: 1) Incidence and prevalence of pressure ulcers 2) Cost 3) Falls	1) Initial prevalence 12-25% incidence 5.19%, reduced incidence to “0” nosocomial ulcers at 6 mo., 0.73% at two years with continued sustained level (<1%) after 6 years post implementation 2) Reduced cost \$124,000/yr 3) 37% reduction in falls (incidental finding) Found that multidisciplinary team approach with strong leadership & simplifying processes facilitated needed practice changes	5A
13	Vu, Harris, Duncan, & Sussman, 2007	To assess the effects of a multidisciplinary wound team treatment including staff education and application of protocol as compared to standard nursing care in a long-term care setting	Quasi-experimental study	N=176 pts, 44 LTC facilities Intervention group: n=94 pts, 21 facilities Control group: n=82 pts, 23 facilities	Outcomes collected after 20 weeks as compared to pre-intervention data: 1) Healing rates 2) Cost 3) Pain	1) Healing rate higher in intervention group (61.7% vs. 52.5%, p=0.07) 2) Cost \$277.90 ASD less on average for wound in intervention group 3) Percent of pts with total pain relief greater in intervention group (38.6% vs. 24.4%, p=0.017)	2A