PROGRAM DEVELOPMENT AND EXPANSION OF A CLINICIAN-DRIVEN WOUND CARE PROGRAM AT AN OUTPATIENT WOUND CARE CENTER

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Presented to the Faculty of the University of the Incarnate Word
In partial fulfillment of the requirements
for the degree of

DOCTOR OF NURSING PRACTICE

UNIVERSITY OF THE INCARNATE WORD

December 2023

ACKNOWLEDGEMENTS

Ten years ago, I moved to America from China with my family. I was a surgeon at a Burn Center in China for 12 years. I only began speaking English once I came to the United States. The language barrier made it difficult for me to practice again as a doctor; however, I knew I wanted to remain in medicine, which is still my dream. I decided to become a nurse practitioner to use my medical training and experience to serve needy people and give back to our communities. At 37, the decision to start from scratch to become a nurse practitioner did not come easy. It has meant making sacrifices to be able to focus entirely on making my career change successful. Hence, I want first to thank my family, my loving and supportive wife, Diyi, and my two cute and intelligent daughters, Ava and Brianna. I cannot thank them enough for their support during the 10 years of study.

I want to take this opportunity to extend my gratitude to each nursing faculty member at the Ila Faye Miller School of Nursing and Health Professions. I would especially like to thank Dr. Jennifer A. Browne. As my project advisor, the excellent orientation she gave kept me on the right track and saved me from unnecessary twists and turns. I could have only finished this project with her help.

I also want to thank Dr. Kirsten Smith, former director of Methodist Wound Care Center, for the much-valued help and suggestions for the project design and implementation. Additionally, I appreciate the assistance for the implementation processes of the project from Dr. Ricardo Aguilar and the nursing staff at the wound care center.

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Abstract

Problem. Patients with chronic wounds often present with additional physical and emotional problems because healing of chronic wounds may require months to resolve. Practitioners develop treatment plans based on their own training and clinical expertise, but unfortunately, there are no universal guidelines to inform the management of chronic wounds. Expanding multi-factorial assessments and interventions could improve patient outcomes. The purpose of this project was to implement a wound care protocol for outpatient wound care clients based on a nutritional and psychological self-assessment. **Methods.** A patient-completed checklist, done on arrival to the clinic, triggered clinician-driven protocol interventions addressing mental health and nutritional needs. Data comparisons of the before-and-after intervention included the scores of the Wound-QoL-14 subscale ' Psyche', the scores of Mini Nutritional assessments (MNA), and wound sizes. For evaluating the outcomes of before-and-after intervention, the Wilcoxon signed-rank test was used to analyze the scores of subscale 'Psyche' and the scores of MNA. Wound sizes were analyzed using the paired-sample *t*-test. **Results.** Forty-one patients were involved in this project. Approximately 50.5% and 46.3% of patients were identified at high psychological and nutritional risk, respectively. After 4 weeks, comparisons of before and after intervention scores demonstrated statistically significant improvement in both the psychological and nutritional subscales. Additionally, there was a significant decrease in wound sizes. **Conclusion.** With an increasing volume of patients seen in this facility, clinician tools can help streamline the assessment of factors that caused poor wound healing. Assessment tools that trigger clinician-driven interventions support the standardized application of evidence-based care recommendations.

*Keywords***:** chronic wounds, wound healing, wound management, nutritional status, psychological assessment, psychological intervention

Program Development and Expansion of a Clinician-Driven Wound Care Program at an Outpatient Wound Care Center

An estimated 2% of the total population in the United States is affected by chronic wounds (Järbrink et al., 2017). A subset of these wounds, characterized as difficult-to-heal, may require from 1 month to more than 3 months to resolve (Yao et al., 2020). There are many causes that contribute to delayed wound healing including wound infection, malnutrition, inadequate tissue perfusion, incompetent immune system, and compromised mental status (Jones et al., 2018; Yan et al., 2021). Thus, when it comes to management of chronic wounds, a more holistic approach to wound healing would be beneficial.

Studies have demonstrated that patients with chronic wounds may experience stress, anxiety, and depression, resulting in an adverse effect on the wound healing process due to compromised immune system and neuroendocrine pathways (Yan et al., 2021). Multiple trials have also suggested that wound healing improved when affected individuals received psychological interventions (Robinson et al., 2017). Meanwhile, the nutritional statuses of patients play an important role in the prevention and management of wounds. Poor nutritional statuses can increase the risk for impaired wound healing and exacerbate further complications (Bishop et al., 2018).

Statement of the Problem

There are no universal guidelines for the management of chronic wounds, as wounds vary. For example, different wounds require different therapies and dressings. Some wounds require no dressings at all. Wound treatment can also vary based on the stages of healing. As a result, standardized wound protocols to guide therapeutic strategies differ (Mahmoudi & Gould, 2020).

There are four clinicians, including one surgeon, two nurse practitioners, and one physician assistant working at this Wound Care Center. The surgeon makes a relatively comprehensive wound care plan. The other three clinicians usually develop treatment plans without either nutritional therapy

or psychological interventions. The practitioners base their intervention plan on their own training and assessments, without a formalized approach to the evaluation of factors that can delay wound healing. The primary problem identified in the assessment of practitioner practices at this wound care center was the variation or absence of the assessment of psychological and nutritional needs and any associated recommended interventions. Additionally, it was noted that the ancillary staff and medical assistants did not participate in any data collection.

Current Practice Assessment

The Primary System Assessment

The project placement is an outpatient wound care center at the largest hospital in San Antonio, Texas. It is located at sub-level two within Methodist Hospital's campus in the Methodist Plaza building. Due to the complex structural layout of the building, the wound care center is not easy to find. But the hospital provides an electronic map to guide users. Meanwhile, there are enough parking spaces for patients. And patients can also access public transport. The clinic offers outpatient services to adult patients from San Antonio and the surrounding communities in the South Texas region. It was initially founded by Dr. Jefferson C. Davis in 1988. The mission of this wound care center is to provide the highest quality wound care for patients with complex and chronic wounds and help them recover quickly. The clinic is headed by a director, supported by an attending general surgeon, two family nurse practitioners, a physician assistant, a nurse leader, seven registered nurses, two licensed vocational nurses, two hyperbaric technologists, a case manager, an office secretary, and a medical scribe. The clinic is open Monday through Friday from 7:00 a.m. to 3:30 p.m. The clinic has five treatment rooms and two hyperbaric chambers. There are an average of 30 patient visits daily, usually including 25 outpatients and five hyperbaric treatments. If workloads increase, two registered nurses as a pool of personnel will come in to help.

The wound care center provides wound treatment for approximately 150 adult patients weekly. All patients need to set up an appointment by phone. It may take approximately 7 days for patients to get an appointment. No walk-in patients are accommodated without an appointment. Most patients (about 80%) can arrive early to check in to finish the paperwork in the waiting room (the office secretary offered information). The clinic accepts Medicare, Medicaid, commercial health insurance plans, and private pay. The most common reasons for seeking medical attention include pressure ulcers, venous ulcers, ischemic ulcers, diabetic foot ulcers, and non-healing or infected traumatic or surgical wounds. As an adjuvant therapy, all patients receiving hyperbaric treatment must come in Daily during the course. The clinic collaborates with podiatrists, plastic surgeons and vascular specialists and provides a referral service program. The feedback from surveyed patients indicated 100% satisfaction with the services they received and the length of time at the clinic.

The lead physician provides wound care services to new admissions with complex wounds, patients with worsened wounds, and patients with hyperbaric treatments. The services include assessment, diagnosis, and treatment plan development. Referring patients and prescribing medications may be completed at the same visits if necessary. Meanwhile, the surgeon furnishes direct supervision, assistance, and direction throughout the performance of the hyperbaric treatments. The lead physician also makes the daily work schedule for the clinicians and supervises the nurse practitioners and physician assistants, who also offer wound care services to new admissions and patients with stable conditions. However, they must consult and report to the lead physician regarding management issues. The medical team meets daily to discuss wound treatment issues. Additionally, the medical team and the case manager are hired by the Burn and Reconstructive Centers of America, while the nursing group belongs to the Methodist Healthcare System.

The nurse leader makes nurse and hyperbaric technologist work schedules weekly and oversees their patient services. Coordinating work operations within the clinic is also her responsibility. She

reports to the director, who plans and coordinates, and supervises various elements of the clinic. There are usually two nurses in each treatment room. One nurse is responsible for recording, updating, and managing clinical data and patients' information; another one focuses on implementing orders of wound management and sometimes assisting with the debridement procedures. One of the nurses can complete the provider's orders, including prescriptions, lab orders, faxing wound care orders to home healthcare companies, wound care instructions, and discharge education. This clinic does not use the hospital's labs, so that all lab orders will be faxed to external lab companies. Discharge instructions will be offered to patients when all the wounds are resolved.

One hyperbaric technologist and one registered nurse work daily at the hyperbaric treatment zone. The technologist administers hyperbaric oxygen therapy (HBOT) to patients as the lead physician prescribes under the supervision of the registered nurse and the provider. The technologist and nurse are responsible for the safe and effective operation of the hyperbaric chambers and related support systems. The registered nurse reinforces safety education of HBOT to the patients and keeps complete and accurate patient records during the HBOT. After the treatment, the nurse will carry out the wound care orders, and the technologist will perform hyperbaric chamber system maintenance. In addition, the technologist also provides call reminders to patients with next-day appointments.

The office secretary registers new patients and obtains their referral information as necessary. She is responsible for managing patient accounts, updating existing patient information, and activating patient insurance plans. The secretary reports directly to the providers, the nurse leader, and the case manager. Two licensed vocational nurses perform multiple roles. One licensed vocational nurse will pick up the duties in the absence of the office secretary. At ordinary times, they assist with non-invasive and direct patient care procedures and can also administer HBOT because they are certified hyperbaric technologists as well.

During the assessment of practice patterns, the organization's strengths and weaknesses were identified. Clinic staff were interviewed and asked whether their values were consistent with the mission and purpose of the clinic. They all reported that the mission and purpose of the clinic aligned with their values. They all devote themselves to providing excellent patient care. The workflow is smooth and the relationship between the clinicians and other staff is pleasant and respectful. The culture at the clinic is intimate. Unfortunately, during individual interviews, the staff verbalized that their punishing work schedules have contributed to high levels of stress.

There were no standard assessment tools that providers were able to use to support patients' care in this clinic. In addition, it is noted that the ancillary staff do not participate in any data collection. These problems directly lead to incomplete assessment and evaluation of patients with chronic wounds. In turn, the quality of patient care may be negatively affected.

Needs Assessment

This project coordinator observed providers' assessment and treatment processes and collected patients' medical history to understand the characteristics of patient populations in this clinic. It was found that most patients with chronic wounds came in to seek medical attention with referrals. That meant the initial wound managements were unsuccessful for them. They often reported frustrations due to non-healing wounds and even unintended weight loss. With further observation over a couple of weeks, the surgeon made a relatively comprehensive wound care plan. The other three clinicians usually developed treatment plans without either nutritional therapy or psychological interventions. These practitioners based their intervention plan on their own training and assessments without a formalized approach to evaluating factors that can delay wound healing.

Nowadays, evidence-based medical practice (EBP) should be followed in a clinical practice environment. Any treatment for better patient outcomes should meet clinical practice guidelines and regulatory requirements. Therefore, the first task for this quality improvement (QI) project was to see if

a universal guideline for chronic wound treatment was available. However, the results were disappointing, and no universal guidelines were identified. When proceeding with the analysis of influencing factors of poor wound healing, multiple studies have suggested that psychological and nutritional issues of patients with chronic wounds can negatively affect wound healing (Barchitta et al., 2019; Renner & Erfurt-Berge, 2017).

Secondary Needs Assessment

For a QI project to be successful, it is necessary that the organization is ready for change. In order to assess the readiness for improvement, the project coordinator discussed these problems with all clinicians and the director at the morning meeting. All stakeholders were in complete agreement on the proposals. However, to obtain a clearer understanding of the characteristics of patient populations and identify the issues, patients with chronic wounds in this clinic should be further evaluated first. According to the results of evaluations, a QI project could be developed with clear objectives.

First of all, an evaluation tool should be identified to use. Wound-QoL-14 questionnaire of health-related quality of life (HRQoL) for chronic wounds has been widely employed in wound research and wound care (Von Stülpnagel et al., 2021). The lead physician and the director supported using the questionnaires in the clinic. It was crucial to ensure all patients with chronic wounds voluntarily answered the questionnaires with complete anonymity. The coordinator participated in administering the survey to avoid the involvement of patients with non-chronic wounds.

The QoL-14 questionnaire consists of three subscales: Body, Psyche, and Everyday Life. A 5-point Likert scale from 0 to 4 is used to rate each item on a scale that ranges from 0 (not at all) to 4 (very much) (Appendix A). It was used to analyze the characteristics of patient populations in the Wound Care Center in 1 month. Thirty-nine anonymous patients with chronic wounds were voluntarily surveyed. Descriptive statistics were used to analyze the collected data. The scores of each item in the questionnaires were totaled. The total scores of each item for 39 questionnaires ranged from 0 to 156.

Thus, an equation could be established with the actual total scores divided by the highest score to demonstrate the proportion of each item in the theoretical total score. In a similar way, the proportion of each subscale could be computed. The results of each item and three subscales were shown in three tables. The percentage of subscale body characteristics is described in Table 1. The percentage of subscale psyche characteristics is described in Table 2. And the percentage of subscale of everyday life characteristics is described in Table 3.

Table 1

The Percentage of Subscale Body Characteristics

1 ...my wound(s) hurt.	35.3%
2 ...my wound(s) had a bad smell.	12.8%[a]
3 ...there was a disturbing discharge from the wound.	27.6%
4 ...the wound has affected my sleep.	32.1%
5 ...the treatment of the wound has been a burden to me.	32.1%
Total	27.9%

Note. [a] The lowest patient-rated score.

Table 2

The Percentage of Subscale Psyche Characteristics

6 ...the wound has made me unhappy.	42.9%
7 ...I have felt frustrated because the wound is taking so long to heal.	57.1%[b]
8 ...I have worried about my wound.	51.3%
9 ...I have been afraid of the wound getting worse or of new wounds appearing.	50.6%
Total	50.5%

Note. [b] The highest patient-rated score.

Table 3

The Percentage of Subscale Everyday Life Characteristics

10 ...I have had trouble moving about because of the wound.	36.5%
11 ...I have had trouble with day-to-day activities because of the wound.	42.9%
12 ...the wound has limited my leisure activities.	41.7%
13 ...the wound has forced me to limit my activities with others.	41.7%
14 ...I have felt dependent on help from others because of the wound.	46.8%
Total	41.9%

As was shown in Table 1, the percentage of subscale 'body' was 27.9%, which was lower than the other two subscales. The lowest scores of two questions in all items were given by patients in this subscale; that is, the item of a bad smell on my wound(s) was 12.8%, and the item of a disturbing discharge from the wound was 27.6%. The lower scores suggested that wound infection was not a primary factor in these patients' delayed wound-healing process. Traditional signs of chronic wound infections include foul odor, purulent discharge, and increased pain (Falcone et al., 2021).

The percentage of subscale “Psyche” characteristics was 50.5%, the highest of the three subscales (Table 2). Most involved patients reported frustrations (57.1%) and worries about their wounds (51.3%). In other words, higher scores in the subscale “Psyche” meant the patients had more anxiety and worry. Although, in Table 3, the subscale' “Everyday Life” percentage was less than 50%, it was remarkably higher than that of the subscale “Body.” These findings suggested that chronic wounds substantially impacted patients' daily lives, possibly contributing to their psychological issues or dietary problems. However, it still needs further study.

According to the above results, addressing patients' emotional problems should be a consideration when clinicians develop treatment plans for patients with chronic wounds in this clinic.

The project coordinator reported the survey results and the findings of interviews with patients to the clinicians and the director at the morning meeting. A project of developing a clinician-driven wound care program was raised during the meeting. All clinicians and the director agreed with the need for the standardization of nutritional and psychological interventions to achieve better patient outcomes. In order to implement the project successfully in this clinic, the elements of the practice readiness for change were discussed, including the purpose of the project, leadership support of the project, the specific plans of implementation, the possibility of project failure, ways to improve project outcomes, and anticipated results of the project.

Project Identification

The treatments of patients with chronic wounds challenge the providers. The care plan for managing chronic wounds should be individualized and multifactorial because there are numerous causes contributing to extend healing times. Unfortunately, no universal guidelines for managing chronic wounds are available thus far due to complexities of chronic wounds and lack of robust evidence of therapeutic strategies (Mahmoudi & Gould, 2020).

The types of patients and the severity of wounds seen in chronic wound care clinics vary. In order for a practitioner to provide customized patient-centered services, it is necessary to obtain a clearer understanding of the characteristics of patient populations found at each wound care clinic. Patients with chronic wounds have frequently reported reduced food intake and/or weight loss. Dietary problems have been recognized as significant factors influencing wound healing. Hence, the nutritional status of patients should be assessed at first visits. Additionally, assessments of psychological issues of patients should also not be overlooked. Studies have demonstrated that at least 30% of patients with chronic wounds may experience stress, anxiety, and depression (Renner & Erfurt-Berge, 2017). Meanwhile, according to the findings of multiple trials, psychological interventions to affected individuals may improve wound healing (Robinson et al., 2017).

The practitioners in this wound care center base their intervention plan on their own assessments and therapeutic regimens without a formalized approach to evaluating risk factors that cause poor wound healing. Therefore, a clinician-driven protocol was developed to identify patients with high psychological and nutritional risks factors during the initial assessment. Based on the results of the assessment, clinicians initiated corresponding interventions to address the identified risk and potentially improve patient outcomes.

Purpose

The purpose of this project was to develop a screening tool and identify patients in two high risk categories known to influence wound healing. Following an initial screening and assessment, patients in high risk categories would receive individualized interventions based on identified wound-care best practices. Patients would be re-evaluated after 4 weeks of intervention.

Summary and Strength of the Evidence

Wound healing is a dynamic and complex process that can be impacted by multiple factors. More than 30% of patients with chronic, non-healing wounds are subject to significant depressive symptoms and anxiety (Renner & Erfurt-Berge, 2017). Several studies have suggested that psychological stress may cause the formation of non-healing wounds because prolonged exposure to stressors disrupts a state of homeostasis in the body that is maintained by activating sympathetic and parasympathetic nervous systems (Razjouyan et al., 2017). Renner and Erfurt-Berge (2017) also stressed the necessity of using wound QoL questionnaires to evaluate levels of depression in affected individuals in clinical practice, and psychological health therapy should be a part of their treatment. Therefore, the importance of addressing patients' psychological issues cannot be overemphasized.

Malnutrition is a common risk factor that may negatively affect the wound healing process, which includes a series of complex biological and molecular events: coagulation, inflammation, proliferation, and remodeling. Protein loss from wounds and inadequate nutrient intake may cause

disruption to biological and molecular events resulting in poor wound healing (Barchitta et al., 2019). In order to identify indicators of nutritional deficiencies that increase the risk for impaired wound healing, frequent monitoring and evaluation are crucial for any patient at nutritional risk (Doughty & McNichol, 2016). Doughty and McNichol (2016) suggested that the Mini Nutritional Assessment (MNA) questionnaire can be utilized to evaluate patients with chronic wounds to identify nutrition-related problems and their causes.

Based on the evidence above, compromised mental status and inadequate nutritional intake should be evaluated in affected individuals to identify the evidence of psychological issues and under-nutrition. Compromised mental and nutritional status requires prompt interventions and even referrals to obtain better patient outcomes. Studies have demonstrated the importance of using assessment tools in daily practice to ensure early identification and treatment of psychological and nutritional problems to prevent prolonged healing processes. The longer the wound healing process, the less likely it is to heal.

Methods

Setting and Population

The project was reviewed and approved by both institutional review boards of University of the Incarnate Word and the Methodist Healthcare System. The project was conducted at the Methodist Hospital Wound Care Center which is an outpatient unit in the heart of the San Antonio medical center. The wound care center has five treatment rooms, two hyperbaric chambers, and an average of 30 patient visits every day.

The wound care center serves primarily adults. Demographic data was not collected during this project; however, the majority of patients seen were either Hispanic or White. Generally speaking, male and female patients had no remarkably different admissions. The age distribution of patients with

chronic wounds was 39 to 94 according to the survey. Most patients had secondary diagnoses (e.g., diabetes, obesity, paraplegia).

Project Interventions

The authors of the project developed a clinician-led Detect and Act checklist (Appendix B) based on the original Wound-QoL-14, MNA questionnaire, and WoundAct (Augustin et al., 2014; Doughty & McNichol, 2016). Subscales “psyche” of the Wound-QoL-14, including items 6, 7, 8, and 9, were used to evaluate the psychometric properties of patients. At the same time, assessment of the nutritional status was performed by utilizing the six-item Mini Nutritional Assessment.

Patients with chronic wounds were consecutively recruited in 3 months. They voluntarily answered the questionnaires at the first visits. If patients answered the “psyche” questions with "quite a lot" or "very much," psychological interventions would be taken; that is, if patients were identified as having psychological concerns related to their wound healing, the short-term intervention would be focused education to reassure the patient that wound healing progression was advancing as planned. If the patients’ anxiety and concerns were legitimate, the providers would revise and design a new treatment plan. Even in this situation, the providers needed to provide positive encouragement and support for relieving anxiety and concerns as much as possible. Long-term, if the patient continued to have residual anxiety and ongoing issues a psychological referral would be made by the practitioner.

If the results of the nutritional assessment were less than 11, clinicians would plan nutritional therapy for a patient to promote wound healing. Oral nutritional supplements, including adequate amounts of calories, protein, vitamin, and minerals were recommended. Meanwhile, all involved patients were provided nutritional handouts (Northern Inyo Healthcare District, 2021) (Appendix C).

According to the survey results, all involved individuals were treated in the aspect of psychological and nutritional issues according to the Detect and Act checklist. The specific therapeutic

regimens for treatment of chronic wounds were performed according to fundamental wound management principles in this wound care center.

Multiple studies have demonstrated it is an important predictor of wound healing that wound sizes significantly decrease during the first 4 weeks of treatment (Gwilym et al., 2022). Therefore, all related data was re-collected at a 4-week follow-up visit after the interventions were received. Specifically, the Wound QoL-14 subscale questionnaires and MNA questionnaires were completed again by the same patients 4 weeks after treatment. Wound sizes were also measured and documented at this visit.

Statistical Analysis of Effective Data

In the first 2 weeks of the project there were 72 patients with chronic wounds who fully completed the questionnaires on the checklists. However, not all follow-up surveys were successfully collected during the 4-week follow-up visit. Patients missed some visits, and some surveys were missed by site staff. Therefore, effective data, which referred to both questionnaires and wound size measurement before-and-after the intervention, was obtained from 41 patients. Wound sizes were compared to see if the interventions were associated with effective wound healing. The paired-sample *t*-test was used to analyze the wound sizes of pre and post intervention from the same individuals. In the meantime, data comparisons of the pre and post intervention included the scores of the Wound-QoL-14 subscale ' Psyche' and mini nutrition assessment by the Wilcoxon signed-rank test to assess psychological and nutritional intervention outcomes. The level of significance was set at $p < .05$. All analyses were performed with IBM SPSS Statistics 29.0 statistical software.

Results

Forty-one patients completed the questionnaires and wound sizes were measured before and after the intervention. There was a significant decrease in psychological assessment scores following the Psyche interventions ($p = .002$, $n = 41$) (Table 4). The median psychological assessment scores were

lower after the Psyche interventions (*Mdn*. = 6.90) than before interventions (*Mdn*. = 9.56) (Figure 1). Similarly, a negative z score of -3.05 indicates the raw score as being more than 3 standard deviations below the mean.

The above findings suggested that patients' worries, frustration, and anxiety about wound healing decreased after the intervention. More specifically, in 29 patients the Psyche assessment scores improved. Ten patients' scores got worse after the interventions. There was no change in two patients' scores after the interventions (Table 5).

Table 4

Test Statistics[a] of Psychological Assessment Scores

	Psyche after – Psyche before
Z	-3.050[b]
Asymp. Sig. (2-tailed)	.002

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

Table 5

The Results of Wilcoxon Test of Psychological Assessment Scores

		N	Median Rank	Sum of Ranks
Psyche after – Psyche before	Negative Ranks	29[a]	20.97	608.00
	Positive Ranks	10[b]	17.20	172.00
	Ties	2[c]		
	Total	41		

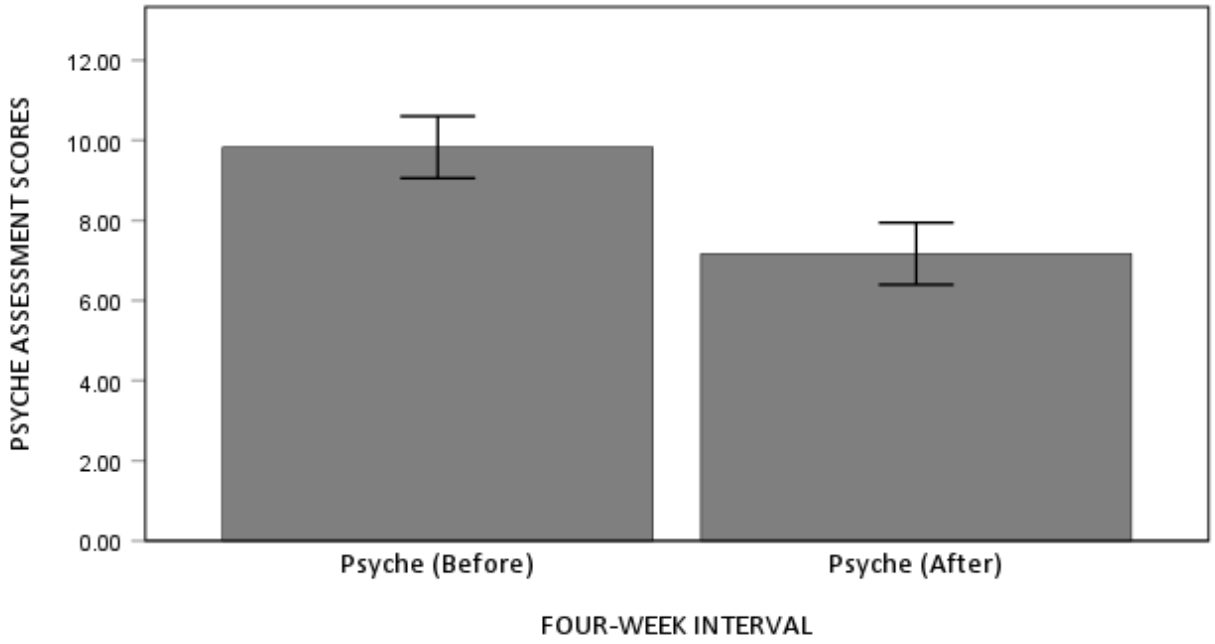
a. Psyche after < Psyche before

b. Psyche after > Psyche before

c. Psyche after = Psyche before

Figure 1

Variability in Medians of Psychological Assessment Scores Before and After Intervention



Note. This figure demonstrates variability in medians of psychological assessment scores of before-and-after intervention. The upper and lower horizontal lines on column charts indicate the range of a 95% confidence interval.

There was a significant decrease in nutritional assessment scores following the nutritional interventions (p = .003, n = 41) (Table 6). Nutritional assessment scores were greater after nutritional treatments (*Mdn*. = 12.46) than before treatments (*Mdn*. = 11.29) (Figure 2). A negative z score of -2.94 indicates the raw score as being approximately 3 standard deviations below the mean. According to the above findings, there was a significant association between nutritional interventions and improvement in a patients' nutritional status. More specifically, 20 patients' nutritional status improved. Six patients'

scores got worse after the interventions. The 15 patients' scores remained unchanged after the treatments (Table 7).

Table 6

Test Statistics of Nutritional Assessment Scores

	Nutrition2nd - Nutrition1st
Z	-2.941[b]
Asymp. Sig. (2-tailed)	.003

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

Table 7

Results of Wilcoxon Test of Nutritional Assessment Scores

		N	Median Rank	Sum of Ranks
Nutrition after – Nutrition before	Negative Ranks	6[a]	10.08	60.50
	Positive Ranks	20[b]	14.53	290.50
	Ties	15[c]		
	Total	41		

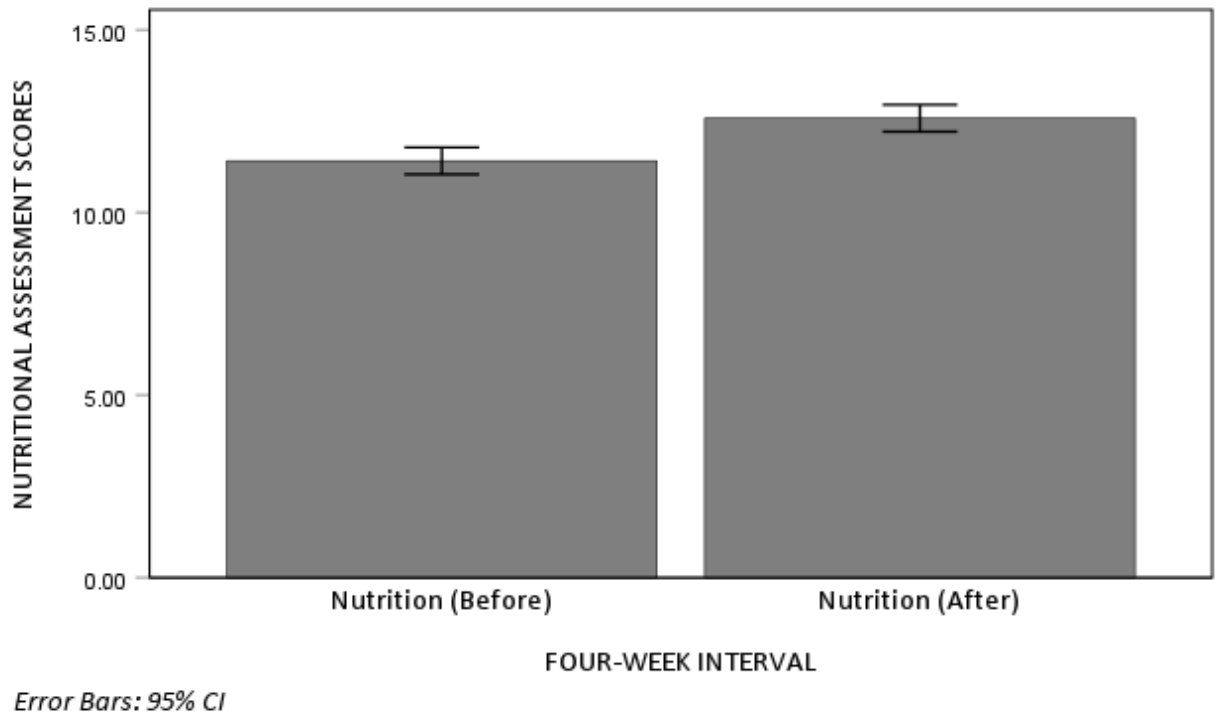
a. Nutrition after < Nutrition before

b. Nutrition after > Nutrition before

c. Nutrition after = Nutrition before

Figure 2

Variability in Medians of Nutritional Assessment Scores Before and After Intervention



Note. This figure demonstrates variability in medians of nutritional assessment scores of before-and-after intervention. The upper and lower horizontal lines on column charts indicate the range of a 95% confidence interval.

There was a significant decrease in wound sizes following the Psyche and nutritional interventions and wound treatments (p = .01, 95% CI [2.29, 15.72]) (Table 8). The mean of wound sizes was lower after the interventions (M = 1.90) than before interventions (M = 10.91) (Figure 3). According to the above findings, patients with two interventions and chronic wound care all experienced average to excellent wound healing rates.

Table 8

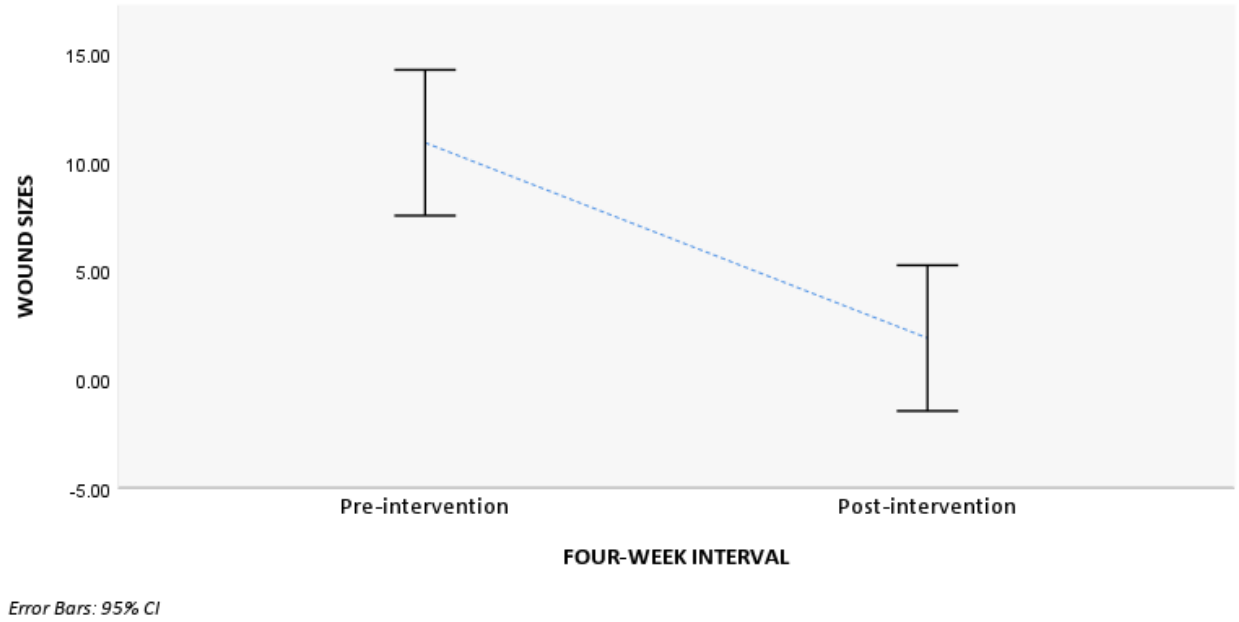
The Results of Paired-Sample T*-Test of Wound Sizes*

		Paired Differences				
					95% Confidence Interval of the Difference	
		Mean	Std.Deviation	Std. Error Mean	Lower	Upper
Pair	Preintervention - postintervention	9.00358	21.28327	3.323889	2.285751	15.721410

				Significance	
		t	df	One-Sided p	Two-Sided p
Pair	Preintervention - postintervention	2.709	40	.005	.010

Figure 3

Variability in Means of Wound Sizes Pre- and Post-Intervention



Note. This figure demonstrates variability in means of wound sizes of before-and-after intervention. The upper and lower horizontal lines indicate the range of a 95% confidence interval. The points of oblique lines intersecting with vertical lines indicate the means of wound sizes of before-and-after intervention.

Discussion

Successfully performing the project according to plan requires all clinicians to carry out the interventions in a timely and effective manner. Each provider that treated patients with positive survey screenings was tracked for compliance. When an intervention was not met on time, the project coordinator reviewed this with a lead physician for barriers and reinforced educational opportunities so that all providers involved in the project understood the importance of their participation on care outcomes. The educational opportunities were conducted through active communication, including

Email, group chat, and morning meetings. The coordinator attended to the project needs and provided frequent feedback on outcomes and progress with goals.

The implementation process at the beginning of the project could have been faster. The coordinator found that nursing staff seldom actively offered the questionnaires to patients because they were probably not open to new things and extra work. Therefore, a new strategy for evaluating patients was made immediately. An alternative approach was to reduce the intermediate links and let clinicians directly review the results of surveys. Specifically, an office secretary allowed patients to complete questionnaires in the waiting room; then, two completed questionnaires and protocol checklists were placed into charts of new patients so that all patient information was available for clinicians to develop an individualized care plan in treatment rooms.

Unexpectedly, a new medical team was hired in the closing stage of the project. The new team needed to be made aware of the project, processes and goals. To avoid negatively affecting project outcomes, new staff members were trained immediately. The disadvantage was mitigated by providing a large amount of information about the implementation of the project. In view of the problems described above, a smooth project implementation process could only be secured by seeking countermeasures and solving these problems promptly and efficiently.

Each patient with psychological issues was reevaluated at each visit. The general counseling, including identifying the causes of anxiety and depression, changing unhelpful thoughts that may trigger psychological issues, and developing personal coping strategies of relaxation techniques, was conducted by the providers. The counseling focused on improving the patient's confidence in recovery. The results of the psychological intervention showed a statistically significant decrease in the “Psyche” assessment scores (p =.002) after the treatments. Twelve patients' scores did not demonstrate improvement at the 4-week re-assessment. By reviewing the medical records of these patients, the reasons were as follows: 1) Wound healing time was longer than they expected. 2) Some individuals did not have access to

certain therapeutic options or advanced wound dressings because of limitations in their insurance coverage. 3) Home healthcare services were unsatisfactory, increasing anxiety and concerns in some patients.

Each patient was identified as a high nutritional risk in this project. In addition to providing nutrition handouts, dietary counseling, including fruit, vegetable, and wholegrain intake and/or oral nutritional supplements, was also conducted by the practitioners. Clinicians provided dietary advice and developed individualized, targeted food intake goals for patients based on their nutritional assessment scores. Providers also reviewed oral nutritional supplements with the patient in need to identify additional financial barriers. If the supplements were not covered by insurance, coupons for supplements were offered so that the patient could order them online at discounted rates. The information about San Antonio food pantries was given if patients were identified as food insecure. At follow-up visits, clinicians assessed their adherence to the nutritional plans and feedback. Analysis of the pre and post scores demonstrated a statistically significant increase in nutritional scores following the nutritional interventions (p = .003). Twenty-one patients' scores did not improve at the 4-week mark. By reviewing the medical records of these patients, the reasons were as follows: 1) Poor dietary habits remained, leading to inadequate nutrition intake. 2) Economic disadvantage in some patients resulted in a lack of access to various foods or supplements. 3) Other chronic illnesses in elderly patients negatively affected appetite and calorie absorption.

Although an association between decreased wound size and the use of the subscale Psyche and MNA was described, causality should not be inferred. The results of this project showed that the two interventions were associated with better patient outcomes and a reduction in wound size.

Limitations

During the counseling for 'Psyche' and nutrition issues conducted by clinicians, non-English speaking patients with questions and explanations of the materials often required interpreters to

translate because clinicians were not proficient in a second language. Some nurses could be helpful with Spanish, but it could be a challenge for clinicians with non-English and non-Spanish speaking patients. Hence, questionnaires and educational materials needed to be offered in multilingual form to overcome this barrier.

Patients with low socioeconomic status often need help with targeted food intake goals, especially in the current period of inflation. Although the corresponding measures were adopted to minimize the negative influence on patient outcomes, patients would benefit from individualized calorie intake plans to use inexpensive food sources without expensive supplements. However, developing these individualized plans would take much work for busy clinicians. Therefore, because of cost, varying insurances, and patients' ability to pay, the nutritional interventions adopted in this project could not have a cost associated with them. This limited the interventions recommended in current best practices.

Implications for Practice

This clinician-led wound care protocol was developed to place emphasis on a holistic view of treatment rather than develop specific strategies of chronic wound management; that is, the protocol did not focus on fundamental treatment principles for the management of chronic wounds (e.g., venous, arterial, diabetic, and pressure ulcers). Instead, effective adjuvant agents for treating chronic wounds, including psychological and nutritional statuses, were evaluated and treated in patients with chronic wounds. A positive trend by using this clinician-driven protocol is shown in improving the wound-healing process. Moreover, the protocol was well received by both patients and providers. Patients found it easy to complete, and the providers described it as an excellent adjunct to their baseline assessments. Future work should continue refining nutrition and psyche protocols and exploring other interventions to improve wound healing. Expanding the program to other wound clinics in the area is expected.

Recommendations

With an increasing volume of patients seen in this wound care center, practitioners alone may not be adequate in meeting patients' needs. Moreover, psychological and nutritional counseling is time-consuming for busy clinicians. There is growing recognition that nurses can offer psychological and nutritional counseling as a first-line intervention in affected populations. Studies have suggested the positive effects of nurses' role in psychological and dietary interventions (Chang et al., 2020; Cheng et al., 2021). Therefore, practitioners can benefit from nurse-led interventions to have more time to focus on serious wound issues. These nurse-led interventions may also be a vital part of wound care plans to help patients reach better wound healing goals.

Conclusion

Outpatient wound care clinics are indispensable resources to fulfill the increased patient demand for managing chronic wounds because most patients with chronic wounds are treated as outpatients in the United States (Sen, 2019). Due to the increasing volume of patients seen in outpatient wound care clinics, clinician tools were employed to help streamline the assessment of factors that could delay wound healing, which proved advantageous. The results of this project have produced assessment tools, which trigger clinician-driven interventions, and have expanded the integration of chronic wound care best practices.

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Appendix A

Wound QoL-14 Questionnaire

With the following questions, we aim to find out how your chronic wound(s) affect(s) your quality of life.

In the last seven days…	Not at all	A little	Moderately	Quite a lot	Very much
1 …my wound(s) hurt.					
2 …my wound(s) had a bad smell.					
3 …there was a disturbing discharge from the wound.					
4 …the wound has affected my sleep.					
5 …the treatment of the wound has been a burden to me.					
6 …the wound has made me unhappy.					
7 …I have felt frustrated because the wound is taking so long to heal.					
8 …I have worried about my wound.					
9 …I have been afraid of the wound getting worse or of new wounds appearing.					
10 …I have had trouble moving about because of the wound.					
11 …I have had trouble with day-to-day activities because of the wound.					
12 …the wound has limited my leisure activities.					
13 …the wound has forced me to limit my activities with others.					
14 …I have felt dependent on help from others because of the wound.					

THANK YOU! (FOR CLINICAL USE ONLY) DATE:

Appendix B

Detect and Act Protocol / Checklist

Subscales 'psyche' of the Wound-QoL-14

With the following questions, we aim to find out how your chronic wound(s) affect(s) your quality of life.

In the last seven days…	Not at all	A little	Moderately	Quite a lot	Very much
6 …the wound has made me unhappy.					
7 …I have felt frustrated because the wound is taking so long to heal.					
8 …I have worried about my wound.					
9 …I have been afraid of the wound getting worse or of new wounds appearing.					

Mini Nutritional Assessment

Please complete the screen by filling in the boxes with the appropriate numbers.

A. Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties?

0= sever decrease in food intake

1= moderate decrease in food intake

2= no decrease in food intake

B. Weight loss during the last 3 months

0= weight loss greater than 3 kg (6.6 lbs.)

1= does not know

2= weight loss between 1 and 3 kg (2.2 to 6.6 lbs.)

3= no weight loss

C. Mobility

0= bed or chair bound

1= able to get out of bed/chair but does not go out

2= goes out

D. Has suffered psychological stress or acute disease in the past 3 months?

0= Yes

2= No

E. Neuropsychological problems

0= severe dementia or depression

1= mild dementia

2= no psychological problems

F. Calf circumferences (CC) in cm

0= CC less than 31

3= CC 31 or greater

Screening score (max. 14 points)

12-14 points: Normal nutritional status

8-11 points: At risk of malnutrition

0-7 points: Malnourished

THANK YOU! (FOR CLINICAL USE ONLY) DATE:

Name: Date of Birth:

Detect and Act Protocol / Checklist

	Areas of relevant QoL impairments	Answer "quite" or "Very"	Possible actions after individual patient interview about reasons for the particular impairments
1	Wound has made unhappy		Why are you depressed? What can we do to change that? (Psychosocial consulting as needed)
2	Frustration due to slow healing		Explanation of clinical pattern and the adjunctive actions. Define treatment goals. Agree upon sub-goals.
3	Worried about wound		Determine in what the patient is afraid of (e.g., more wounds, amputation). (Psychosocial consulting as needed)
4	Fear of worsening/ new wounds		Tips on relapse prevention/adequate handling of material. Consultation on hygienic handling. (Psychosocial consulting as needed)

Results	Possible actions after individual patient interview about reasons for the particular impairments
12-14 points: Normal nutritional status	Recommend fortified or enhanced foods which can be made by adding ingredients to regular foods (e.g., oatmeal made with whole milk; cream soup made with whole milk). (Nutritional Handout)
8-11 points: At risk of malnutrition	Recommend Oral Nutritional Supplement. (Nutritional Handout) 1) Glucerna 2x/d in addition to food plus Juven 2x/d for patients with diabetes. 2) Nepro 1-2x/d in addition to food plus Juven 2x/d for patients on dialysis. 3) Enlive 2x/d in addition to food plus Juven 2x/d for patients w/o diabetes and/or not receiving dialysis.
0-7 points: Malnourished	Recommendations mentioned above. Dietitian nutritionist consulting.

Appendix C

Nutritional Handout in English

Eating Well for Wound Healing

How Does Good Nutrition Help With Wound Healing?

Eating well during wound healing can help your body heal faster and fight infection. To heal, you need more calories and more nutrients like protein, fluids, vitamin A, vitamin C, and zinc. Wounds heal faster when you get enough of the right foods.

If you have diabetes, kidney disease, or if you need to limit you fluids, talk to your doctor or dietitian before following the tips in this handout.

What Should I Eat?

In general, your body needs more calories (energy from food) while your wounds heal. Each day, try to eat foods from a variety of sources, especially from the following:

Protein

Prioritize protein! Protein provides the building blocks for muscle and skin repair; and you need more protein for wound healing. It also helps to boost immunity. Eat 3 to 4 servings per day. (One serving is 3-4 oz) Good sources include:

- Lean animal meat such as chicken, turkey, fish
- Beans, peas, lentils or tofu
- Nuts, peanut butter, or seeds
- Cheese, yogurt, cottage cheese or eggs
- Milk or a milk alternative like fortified soy

Carbohydrates

Carbohydrates supply the energy your body needs to heal. Choose whole grains over refined grains. Some examples include:

- Whole grain breads and cereals
- Potatoes, rice or pasta
- A variety of fruits and vegetables
- Avoid refined and added sugars—these can promote bacteria growth

Fluid

Fluid is critical to wound healing, and you need more than usual. Water replaces fluid lost due to draining wounds. Drink half of your body weight in ounces, unless your doctor advises you otherwise. Example, if you weigh 150 lbs, drink 75 oz/day. Fluids can include:

- Water
- Milk or fortified soy beverage
- 100% fruit or vegetable juice
- Soup
- Coffee or tea

Vitamins and Minerals

Vitamin A, vitamin C, and zinc help your body to repair tissue damage, fight infections and keep your skin healthy. Try these foods:

Vitamin A

Vitamin A is found in animal foods and some brightly colored vegetables and fruits.

- Apricots
- Cheese
- Leafy greens
- Eggs

- Cantaloupe
- Carrots
- Milk
- Liver
- Mango
- Pumpkin

Vitamin C

Many vegetables and fruits are high in vitamin C. Eat bright red, orange and green veggies and fruits.

- Broccoli
- Citrus fruits
- Cantaloupe
- Kiwi
- Strawberries
- Bell Pepper
- Tomatoes
- Potato with skin

Zinc

Zinc is a mineral that is found mainly in animal foods.

- Eggs
- Fish
- Beans and lentils
- Liver
- Meat and poultry
- Seafood
- Whole grains
- Potato with skin

Am I Eating Enough?

Some people have trouble eating enough at meals to promote wound healing. Here are some ideas that may help:

Eat smaller meals more often. It may be easier to eat 6 small meals per day rather than 3 large ones.

Consider having something to drink after your meals instead of before. This may help keep you from getting full too soon.

Eat healthy snacks. Snack in between meals on healthy foods such as:

- Cheese and crackers
- Cottage cheese and fruit
- Mixed nuts or trail mix
- Half a sandwich and a small piece of fruit
- Peanut butter and sliced apples
- Granola bars and fresh fruit

Ask your doctor or dietitian if you should take a nutritional supplement. If you're still having trouble getting the protein or calories you need to help you heal, talk with your healthcare provider about a nutritional supplement.

Diabetes and Wound Healing

Good blood sugar control is very important during wound healing. This helps you heal faster and reduces risk of infection. Chronically high blood sugars can lead to poor blood circulation, thus increasing wound healing time. Please ask your dietitian for tips on managing blood sugars.

What Else Can I Do To Help My Wound Heal?

If you use tobacco, quit. Nicotine can reduce blood and oxygen flow to your tissues which can increase healing time.

Appendix C

Nutritional Handout in Spanish

Comer bien para curar heridas

¿Cómo ayuda una buena nutrición para curar las heridas?

Comer bien durante la curación de heridas puede ayudar a que su cuerpo sane más rápido y combata las infecciones. Para sanar, necesita más calorías y más nutrientes como proteínas, líquidos, vitamina A, vitamina C y zinc. Las heridas sanan más rápido cuando usted obtiene suficientes alimentos adecuados.

Si usted tiene diabetes, enfermedad renal o si necesita limitar sus líquidos, hable con su médico o dietista antes de seguir los consejos de este folleto.

¿Qué debería comer?

En general, su cuerpo necesita más calorías (energía de los alimentos) mientras sanan sus heridas. Todos los días, trate de comer alimentos de una variedad de fuentes, especialmente de los siguientes:

Proteína

¡Prioriza la proteína! La proteína proporciona los componentes básicos para la reparación de los músculos y la piel; y necesita más proteínas para curar heridas. También ayuda a aumentar la inmunidad. Coma de 3 a 4 porciones por día. (Una porción es de 3 a 4 onzas) Buenas fuentes incluyen:

• Carne animal magra como pollo, pavo, pescado

• Frijoles, guisantes, lentejas o tofu

• Nueces, mantequilla de cacahuate o semillas

• Queso, yogur, requesón o huevos

• Leche o una alternativa a la leche como soya fortificada

Carbohidratos

Los carbohidratos suministran la energía que su cuerpo necesita para sanar. Elija granos integrales en lugar de granos refinados. Algunos ejemplos incluyen:

• Pan de grano entero y cereales integrales

• Papas, arroz o pasta

• Una variedad de frutas y verduras

• Evite los azúcares refinados y agregados, ya que pueden promover el crecimiento de bacterias

Líquido

El líquido es fundamental para curar las heridas y necesita más de lo habitual. El agua reemplaza el líquido perdido debido a las heridas que drenan. Beba la mitad de su peso en onzas, a menos que su médico le indique lo contrario. Ejemplo, si pesa 150 lbs, beba 75 oz/día. Los fluidos pueden incluir:

• Agua

• Leche o bebida de soya fortificada

• Jugo 100% de frutas o vegetales

• Sopa

• Café o té

Vitaminas y minerales

La vitamina A, la vitamina C y el zinc ayudan a su cuerpo a reparar el daño de los tejidos, combatir infecciones y mantener su piel saludable. Prueba estos alimentos:

vitamina a

La vitamina A se encuentra en los alimentos de origen animal y en algunas verduras y frutas de colores brillantes.

• Albaricoques • Queso

• Verduras de hojas verdes • Huevos

• Cantalupo • Hígado

• Zanahorias • Mango

• Leche • Calabaza

Vitamina C

Muchas verduras y frutas tienen un alto contenido de vitamina C. Coma verduras y frutas de color rojo brillante, naranja y verde.

• Brócoli • Fresas

• Frutas cítricas • Pimiento

• Cantalupo • Tomates

• Kiwi • Papa con piel

Zinc

El zinc es un mineral que se encuentra principalmente en alimentos de origen animal.

• Huevos • Carnes y aves

• Pescados • Mariscos

• Frijoles y lentejas • Cereales integrales

• Hígado • Papa con piel

¿Estoy comiendo lo suficiente?

Algunas personas tienen problemas para comer lo suficiente en las comidas para promover el curamiento de heridas. Aquí hay algunas ideas que pueden ayudar:

Coma comidas más pequeñas con más frecuencia. Puede ser más fácil comer 6 comidas pequeñas por día en lugar de 3 grandes.

Considere beber algo después de las comidas en lugar de antes. Esto puede ayudar a evitar que se llene demasiado pronto.

Come bocadillos saludables. Coma bocadillos entre comidas con alimentos saludables como:

• Queso y galletas

• Requesón y fruta

• Frutos secas y nueces

• Medio sándwich y una pequeña pieza de fruta

• Mantequilla de cacahuate y rodajas de manzana

• Barras de granola y fruta fresca

Pregúntele a su médico si debe tomar un suplemento nutricional. Si aún tiene problemas para obtener las proteínas o las calorías que necesita para recuperarse, hable con su

proveedor de atención médica acerca de un suplemento nutricional.

Diabetes y curacion de heridas

Un buen control del azúcar en su sangre es muy importante durante la curacion de heridas. Esto le ayuda a sanar más rápido y reduce el riesgo de infección. Los niveles altos de azúcar en la sangre de forma crónica pueden conducir a una circulación mala, puede aumentar el tiempo de curacion de las heridas. Pídale a su nutricionista consejos sobre cómo controlar los niveles de azúcar en la sangre.

¿Qué más puedo hacer para ayudar a sanar mi herida?

Si usa tabaco, déjelo. La nicotina puede reducir el flujo de sangre y oxígeno a los tejidos, lo que puede aumentar el tiempo de curación.