

Taylor While

**What to Expect When You Have a Wound: The Importance of Education to the Continued Improvement in Wound Care**

**Abstract:**

Wound care is a field that is dedicated to the diagnosis and treatment of wounds of all different types. Combining clinical internship experience, and a thorough review of previous research from outside sources, this project explores the challenges that patients face when they have a wound, and aims to educate institutions, clinicians, patients, and students on what wound care is and why it is an important area of medicine. The patient experience is discussed by detailing the experience of an actual patient inflicted with a serious wound for the first time in their life. Furthermore, previous research is discussed to highlight the importance of both patient education and greater knowledge of wound care in general. This research is used to prescribe a potential solution to help improve patient outcomes in the wound care setting.

**Introduction:**

The skin is the largest organ of the human body and is responsible for the following important functions: sensation of pain, pressure sensitivity, temperature regulation, and conservation of water. The skin is also the body's first line of protection against the physical and microbial environment outside of the body. However, when this protective barrier is broken due to injury or other types of skin breakdown, a wound is created. Wounds cause not only an area of pain, but also the potential for infection and further harm to a person's health and well-being.

Wound care is the area of medicine that involves the evaluation and treatment of wounds. Frequently patients are unaware of wound care practices until they have a wound and need to seek treatment. Wound care isn't a new field of medicine, it has a history that is as expansive as the history of humankind. In a 2012 article, Jayesh B. Shah claimed that understanding the history of wound care is essential to continued advancements in the field (Shah, 2011). Wound care has been around since as early as the times of the ancient Egyptians and is still a crucial part of medicine today.

In the United States, chronic or non-healing wounds affect 6.5 million people, and it is estimated that wounds account for an estimated \$50 billion a year in healthcare spending in the United States (US Wound Registry, 2017). Chronic wounds are wounds that do not heal in the expected amount of time or follow the normal course of healing. They are typically uncommon in people who are otherwise healthy, and disproportionately affect people with pre-existing conditions. Conditions such as diabetes, obesity, diseases leading to decreased blood perfusion, autoimmune disorders, organ failure, excess pressure, or shear on a part of the body due to

physical disabilities, bodily malformations, and lack of proper weight transfer in those who are wheelchair or bed bound. Due to the burden that chronic wounds inflict on the health care system and the increasing rates of comorbid conditions, the need for wound care providers is increasing. Moreover, this leads for an increased need in medical professionals who treat patients who have wounds.

The rising need for wound care is in part explained by the rising prevalence of comorbid medical conditions. For example, wounds such as foot ulcers are considered a comorbidity of diabetes. The prevalence of Type 2 diabetes in the United States is on the rise. 37.3 million people have a Type 2 diabetes diagnosis, and 96 million people aged 18 and over are considered prediabetic (CDC, 2021). When wounds are labeled a comorbidity of a disease they are often overlooked as a primary diagnosis. A comorbid condition such as diabetes might impair treatment of a wound due to the treatment of the patient's primary condition taking precedence over the care of the wound, and a patient's notion that one diagnosis may be more severe than the other. Patients presenting with a wound, and a comorbid condition are considered complex and need to be treated for the primary condition, as well as for the wound.

Students in healthcare fields often lack awareness about wound care and consequently they are less likely to pursue the area as a career. Wound care is a field that students don't consider because they are not typically given extensive education and experience in that area. Some health care students are never exposed to wound care as a potential career path during their undergraduate career. Most students in medical school receive less education on the care of wounds than is sufficient. Furthermore, the need for wound care clinicians is increasing as more people are faced with both acute and chronic wounds, related to diabetes, accidents, pressure on their body, and insufficiencies in the vascular system. With the increasing prevalence of patients

experiencing wounds, it is necessary to further educate health care-oriented students on the treatment and prevention of wounds, and the wound care process in general. Moreover, students in health care fields need more experience with wound care to consider it as part of their career.

### **History of Wound Care**

Wound care is not a new area of medicine; it has been utilized since the earliest times in human history and continues to be an increasingly important area of medicine. A 2012 article explained that ancients and early moderns used different types of plasters to dress wounds (Shah, 2011). These plasters were composed of mud or clay, herbs, or dried plants and often oils. The oils helped to keep away bacteria, as bacteria struggle to grow in oil. The oil also prevented the plaster-like dressings from sticking to the wound. Historically, beer was also used on wounds as an early disinfectant strategy (Shah, 2011). Oil and other lubrication substances in wound dressings are still common practice, to help keep the wound bed moist and prevent the dressings from sticking to the wound. While beer is not used in wound care currently, other antiseptic substances are still used, so the idea was very practical.

This article also included information about the earliest wound care strategies, all the way up to the status of modern wound care. Shah started by identifying the relevance of the wound care practices of the ancient Egyptians. The ancient Egyptians were the first to use honey on wounds. Honey is a powerful anti-microbial that is still used in many wound products today. The ancient Egyptians also used grease and lint in their dressings. The lint acted as an absorbent layer to pull wound drainage, referred to as exudate, away from the wound, and acted as a barrier from the outside environment. The grease prevented the lint from sticking to the wound and kept the wound moist. The ancient Egyptians also painted wounds green with the belief that the green represented life. However, this green paint contained copper which is known to have

antimicrobial properties. The ancient Egyptians are known for the way they preserved bodies and Shah concluded that these methods of preservation may have also helped them understand infection control (Shah, 2011).

Shah addressed the ancient Greeks who stressed the importance of cleanliness in wound care. The ancient Greeks recommended washing wounds with water that had been boiled, vinegar, or wine, substances they believed to be clean. The Greeks were the first to define the difference between fresh or acute wounds and non-healing or chronic wounds. They were also the first to describe the signs of inflammation—redness, heat, pain, and swelling.

George Broughton and colleagues wrote an article that similarly addressed the long history of wound care. Early textbooks on the subject in the 1880's discussed the importance skin cleansing, removal of foreign particles, and irrigation with carbolic acid in the treatment of wounds (Broughton et. al 2006). The term debridement, which means to remove debris or infected and dead tissue from a wound, was first used by a Russian military surgeon. This surgeon recommended a more extensive mechanical cleansing of wounds, which he stated demonstrated saved the lives of patients that he treated during the Russo-Turkish war (Broughton et. al 2006).

The article also addressed a different type of debridement that is used historically and is still used today in wound care. This method, which is termed biological debridement, is the use of maggots to eat away the dead or necrotic tissues of the wound. Since maggots are selective and only eat dead tissues, they can be used safely to remove dead tissue from wounds. The article written by George Broughton claimed the first reported use of maggots for wound care is credited to Ambroise Paré, who noted the benefits of maggot therapy in the wounds of soldiers in 1557 (Broughton et. al 2006). Likewise, maggots were also beneficial to Napoleon's armies and

were used during the Civil War due to their unique ability to only attack deadened tissues. The first scientific studies of maggots for wound care purposes were conducted by a doctor named Dr. W.S Baer, who studied blowfly maggots after treating soldiers during World War 1 who's wounds were heavily infested with maggots. Despite the maggot infestation, the wounds displayed healthy granulation tissue (Broughton et. al 2006). Today, sterile maggots are used in wound care for debridement purposes when other methods of debridement are too painful or prove unsuccessful. The sterile maggots are applied to the wound and caged in with bandaging material. They eat away at the dead tissues and are eventually discarded when they outgrow their cage. New maggots could be applied then if necessary.

George Broughton and colleagues also addressed Johnson and Johnson as the company who made the first true wound dressings. In fact, they were the first company to mass produce sterilized dressings. These dressings were produced by sterilizing cotton and gauze with dry heat, steam, and pressure (Broughton et. al 2006). This advancement in sterilization meant that wound products were not contributing to introducing contaminants to the wound, and they could be used to keep contaminants out, which prevent infection.

Today, there are many sterile until opened wound products. Shah wrote about the status of wound care today and emphasized that today's market includes over five-thousand wound healing products (Shah, 2011). Some of these products are highly absorbent and made up of alginates, foam or carboxymethylcellulose. Other dressings are occlusive or semi-occlusive. There are dressings that contain growth factors, medical grade honey, and even anti-microbial or cleansing factors. Other wound healing techniques include negative pressure wound therapy, hyperbaric oxygen therapy and bioengineered tissues. Newer treatments and technologies for

healing wounds would not have been possible had early people not realized the importance of treating wounds and strived for advancements in wound care.

Wound care today is a specialty area of medicine. In the article by Shah, he closed by saying that even though the first wound care practices were described around five millennia ago, wound care as a practice has proved necessary and withstood the test of time (Shah, 2011). Shah emphasized the importance of the history of wound care and that wound care is an ever-developing field that is continually improving.

### **Types of Wounds, Wound Causes, and Wound Prevention**

There are many potential causes of wounds. The largest cause of acute wounds is accidents and injuries. People get minor cuts and scrapes all the time that don't require much attention. They might even be involved in more serious incidents and get larger cuts and scrapes. Typically, wounds that are caused by an injury like this heal quickly and without much intervention. However, when wounds don't heal in the normal amount of time, or don't follow the typical course of healing for any reason, they become considered chronic. Chronic wounds take longer to heal, and might need more intervention, such as frequent wound debridement or treatment with antibiotics.

Wounds can originate by both internal conditions and external injury. Internal causes of wounds include diabetes, obesity, blood flow insufficiencies, impaired immune system function, and impaired nervous system function. External caused wounds are usually limited in cause to injury or any penetrating break in the skin.

Wounds can also be classified as open or closed. Open wounds, also called penetrating wounds, are wounds where the underlying tissue is exposed by injury that cuts through the full

thickness of the skin. Open or penetrating wounds create the risk to the tissues below, by exposing those tissues to the outside environment. Closed wounds do not pose that same risk as they are usually superficial. Some causes of penetrating wounds are stab wounds, gunshot wounds, skin cuts, and surgical incisions. Some causes of closed wounds are contusions and abrasions. Other types of wounds include thermal wounds or burns, chemical wounds, bite, and sting wounds.

Another way wounds can be classified is on the basis of cleanliness; contaminated or not. Contaminated wounds can be infected with bacteria or be exposed to debris or other foreign material within the wound. This debris or foreign matter is removed during debridement. However, infections typically need a course of antibiotics to clear.

Since all wounds are considered acute when they first develop, how can a minor wound be treated to prevent it from becoming a chronic problem? Minor wounds have the potential to cause serious issues if they are not properly taken care of and become infected. Proper care of minor wounds includes three main pieces of guidance: 1) Keep the wound clean, 2) Keep it covered, and 3) Keep the wound environment moist. Clean the wound with sterile saline, a wound cleansing solution or gentle soap and water. Cover the wound with a bandaging product that separates the wound from the external environment, Lastly, use a moistening product such as Polysporin to keep the wound moist. Other preventative measures to avoid wounds of internal origin include prioritizing your health, maintaining a healthy weight, exercising regularly, eating a healthy diet, and addressing health concerns in a timely manner.

### **Wound Treatment Challenges**



When a patient first has a wound, they might not realize the severity of needing wound care. Their wound may seem minor, or it may in fact be serious. Wounds can heal quickly, but they can also get worse quickly due to infection and improper care. There are many different wounds and different treatments for each patient's unique situation. Patients might need to take time off work, change their diet, or change parts of their lifestyle to help heal their wound. Furthermore, wound care is costly to the patient, and taking time off work might not be an option. Having a wound also contributes negatively to a patient's overall mental health and well-being. Sometimes patients do not comply with the treatment plan set forward to help heal their wound. Overall, several challenges during wound healing can be difficult to both the patient and the wound care provider to deal with when trying to heal a wound.

Nutrition is a large piece of wound healing. To heal a wound the body needs more protein than typical and more nutrients in general. Patients often need guidance on what to eat to nourish their bodies while healing a wound. An article by Diane Langemo and colleagues discussed the importance of proper nutrition to the body's ability to heal a wound. Langemo and colleagues highlighted the importance of proper nutrition in the body's response to infection and inflammation. When faced with a major wound or infection, the body's need for energy and protein is increased because of pathologic and stress-induced changes (Langemo et. al 2006). The inflammatory response of the body causes increased blood flow to the site of the wound or infection, and an increase in metabolic rate. Furthermore, glycogen and protein storages are used by the increased metabolism to meet the need for glucose and stress factors (Langemo et. al 2006). Moreover, the need for adequate zinc, Vitamin A, Vitamin C, and protein is also crucial to timely wound healing.

As a result of these metabolic changes patients may face weight loss and other side effects of the depletion of their body storages. Some patients struggle with changes to their diet, and this is something that can delay complete healing of their wound. Ultimately, wound care providers also help patients with the dietary changes to help heal their wounds. However, when a patient is facing weight loss and struggling with dietary changes, they might also need to see a nutrition specialist. Medical nutrition therapy can be instrumental in the healing of wounds where a patient might be struggling with eating a proper diet.

Another hardship patients might face in their wound treatment journey is the immense cost of dressings and specialized care. In fact, the cost for wound care and wound care dressings to patients is steep. A 2015 article by Susan Cantrell highlighted the rising costs and rising demand for wound care and wound care products. The article stated “The global market value for advanced wound dressings will increase from \$2.87 billion in 2014 to \$3.51 billion by 2021, driven primarily by rising risk factor rates and the need for cost-efficient treatments. The U.S. will remain the largest market, with its value approaching \$1.73 billion by 2021” (Cantrell, 2015). Rising prices for dressings equate to a larger financial burden to patients, in addition to receiving specialized care to help their wounds heal. Furthermore, Cantrell emphasized that risk factors such as diabetes, cardiovascular disease, obesity and the rising rates of these risk factors in the United States continue to drive the need for wound care and ultimately end up driving the rising prices too.

Prevention is the best way to avoid the high costs of caring for a wound. Cantrell emphasizes the benefits of taking a preventative approach to wound care by suggesting screening patients who are having surgeries about various factors which may affect healing of their surgical incision. These factors include but are not limited to smoking history, obesity, activity level,

previous healing outcomes, and alcohol use. Using this approach allows surgeons to assess a patient's risk for wounds postoperatively before they do surgery; essentially preventing a preventable wound.

Lastly, Cantrell talks about the different types of products on the market that allow patients to wait a longer time between dressing changes. Less frequent changes also helps to reduce cost for the patient and help offset some of the environmental issues created with frequent dressing changes. Wound care products that fight infection using anti-microbial agents have a longer wear time and control moisture on the wound surface, can help to eliminate some of the patient cost for wound care (Cantrell, 2015).

Among other challenges wound care patients face is a different type of struggle. Many wound patients struggle with the mental impact of having a wound. Having a wound can create changes in a patient's daily life. Specifically, they might experience pain, lose some functional abilities, and might need to change their day-to-day lifestyle when they have a wound. A 2013 survey of healthcare practitioners treating chronic wounds shows that more than 60% of respondents to the survey indicated that 25-50% of patients with chronic wounds report mental disorders such as anxiety and depression (Woo, 2013). This clearly indicates that mental health care needs to be considered when treating patients with chronic wounds.

Sometimes even given all the information and care needed to heal their wound, patients just don't comply. It can be difficult for patients to make lifestyle changes and sometimes that hurdle seems to be too much for some patients. However, when patients don't comply with treatment guidelines, it can delay or impair the healing of their wound altogether. This not only adds to their healing time but also can be frustrating for the health care professionals treating them.

Overall, it is important for wound care providers to treat the whole patient in addition to their wound, and to realize that the wound might not be the only challenge the patient is facing. Wound care patients often struggle with nutrition, mental-health, money, and other adjustments as they work to close their wound.

## **Education**

To best care for patients with wounds, it is necessary to have health care providers who have specialty training to treat wounds. Nurses, physical therapists specializing in wounds, and some doctors all treat wounds. Other specialties also contribute to the care of wounds such as infectious disease specialists and vascular doctors. A 2009 article by Chandan K Sen., highlighted the need for more focus on educating health care students on the treatment of wounds. American medical students specifically, receive less education on the care of wounds when compared to treatment of other conditions. The mean hours of education given on the physiology of tissue injury at fifty American medical schools is 0.5 hours and 0.2 hours in the first and second years respectively, and none in the third and fourth years (Ken 2009). Additionally, the mean hours of education in the physiology of tissue repair are 2.1 hours and 1.9 hours in the first and second years (Ken, 2009). These numbers of education hours are surprisingly low considering the health care burden caused by the issue of chronic wounds. This lack of education designated towards wound care, leads to lack of confidence in the area, less students choosing to specialize in wound care, and outdated practices being used when newer technologies exist (Ken, 2009).

To manage chronic wounds effectively, a provider needs knowledge in the anatomy and physiology of tissue repair, the causes of wounds, and the knowledge to effectively pick dressings and prescribe appropriate interventions. Nurses receive education on the treatment of

wounds but face barriers to treatment since they do not have the ability to order a culture of the wounds bacterial content and cannot prescribe medications to treat such infections. Physical therapists similarly treat many different types of wounds, but also face similar barriers. Physical therapists can only remove deadened tissue and cannot prescribe antibiotics. Doctors can prescribe antibiotics, culture any tissue deemed necessary, and can refer patients to other specialists.

Further exposure to wound care to all types of medical students creates opportunities for students in health care to choose wound care as part of their career. Specialty wound care curriculum could also further encourage students to choose this path.

### **Case Study:**

*This case study follows a single patient from onset of wound symptoms to closure of the wound, and addresses diagnosis, treatments, and challenges faced throughout the course of the healing process.*

A 38-year-old woman presented to the wound care clinic for treatment of a wound located on her left ankle and foot. The patient believed the injury to be caused by a rolled ankle, but upon further inspection the injury was discovered to be worsening due to an infection. The patient had no previous history of wounds and was completely new to wound care. Upon examination, the patient's foot appeared to be covered in blisters filled with significant amounts of exudate (wound drainage). Prior to seeking treatment, the patient had been taking Aleve and performing RICE (Acronym for Rest, Ice, Compression, Elevation), but her injury only worsened. She sought more care and was treated by a Physician's Assistant (PA), which led to a diagnosis of cellulitis, a type of infection, and referral to the wound care clinic.

Cellulitis is an infection of the skin caused by bacteria that enters the dermis of the skin through a break in the skin. The infection usually presents with swelling, redness, and warmth to the touch. It is typically isolated to one side of the body and more often occurs in a lower limb. In the United States, there are an estimated 14.5 million cellulitis infections a year (Raff, 2016).



**Figure 1.** This image shows the patient's foot early in the stages of developing a wound. The patient is presenting with visible redness and swelling in the picture. The patient was also experiencing warmth in the area and pain. However, the patient believed this to be a result of a sprained ankle.

The patient had believed that the swelling and redness she was experiencing was caused by a rolled ankle she had suffered prior to the onset of the infection. This assumption delayed the diagnosis of cellulitis. She was given antibiotics and was also prescribed Tramadol for pain. When the patient arrived for wound care, she was in excruciating pain despite taking the Tramadol prescription. The wound care specialist worked gently to try to remove as much dead tissue as possible, through conservative debridement, to hopefully eliminate tissue for bacteria to

feed on. The patient's wound was bandaged using moist bandaging and she was sent home to rest and elevate the infected foot.



**Figure. 2** This image shows early development of the open wound on the patient's foot. The patient presents with some blistering, obvious discoloration of the area, and some discharge from under the skin.

The patient's second appointment was cancelled due to a severe snowstorm that moved through the area. This extra time between appointments may have allowed the patient's infection to worsen. The patient later returned for a third appointment and the wound appeared necrotic, meaning that parts of the wound were black with color and the tissue was dead. The patient was treated and sent to the ER. While in the ER, the patient was told she may lose her foot. Ultimately, a doctor performed a bedside debridement of the wound, removing all the dead tissue down to the level of finding healthy tissue. The patient was administered IV antibiotics to try to treat the infection. She stayed in the hospital for a few days.



**Figure. 3** This picture shows the patient's foot with active infection. The infection had spread, and the wound was open. The blackened tissue was necrotic or dead and needed to be removed. The patient was sent to the ER after this visit.



**Figure. 4** This picture shows the patient's foot after the surgical debridement procedure. The patient presents with bleeding, and has a lot of space for new tissue to fill in.

The patient later returned to the wound clinic to seek further care after the operation. The patient reported being treated with IV antibiotics and had recently switched to taking oral antibiotics. The patient stated that her pain was very significant. There was very little debridement that could be done due to the patient's uncontrolled pain. Debridement is the



process of removing dead tissue from the wound and can be done with saline and gauze or with a scalpel.

Ultimately, the patient was placed on a wound vacuum. The wound vacuum is essentially a small vacuum, connected to the patient with a sponge and plastic drape that sticks to the skin. It is battery powered and rechargeable and is operated on a continuous basis. It works by pulling exudate away from the wound to control fluid levels in the wound and has numerous other affects. Other beneficial healing affects include macro-deformation, micro-deformation, fluid removal, and environmental control. Macro-deformation is achieved through the use of open pore foam, which helps to helps to pull the edges of the wound together. Micro-deformation is another beneficial healing effect, which helps to facilitate cell division and proliferation. The vacuum also helps with fluid removal, by removing large amounts of fluid from the extracellular space. Lastly, the vacuum accomplishes environmental control of the wound by creating an insulated, warm, moist environment. Secondary effects of the wound vacuum include granulation tissue formation, cell proliferation, and modulation of inflammation, change in neuropeptides, and change in bacterial levels (Orgill et al. 2015).



**Figure. 5** This picture displays healthy granulation tissue filling the wound. The tissue is bright red and has a granular texture. The wound vacuum helps the tissue to grow like this and fill in the space of the wound.

The patient was in the care of the wound care specialist from March 12<sup>th</sup>, 2021- November 18<sup>th</sup>, 2021. The patient spent much of that time utilizing the wound vacuum for treatment. The wound vacuum application and dressing changes were very painful and time consuming for this patient. The soiled dressings had to be removed tediously because the patient's wound stuck to the dressings. The wound care techs and specialists had to use a large amount of saline and lidocaine to try to reduce the pain during dressing changes. Luckily, while on the wound vacuum the patient needed very little debridement. The patient's wound was extremely difficult to treat because it would stick to all the bandages and wound vacuum foam. Even dressings that were not supposed to stick to wounds, would stick to this patient's wound. The wound care specialist ended up using a mixture of white and black wound vacuum foam to have optimum tissue growth and to help prevent some of the sticking during dressing changes. The black foam is more porous and would stick more, while the white foam is less porous and moistened. The wound vacuum was used until the wound was small enough and had enough fluid control to switch to normal bandaging. At that time the patient still needed to use an highly absorbent bandage, called an ABD pad, to absorb the wound exudate. Ultimately, the wound bridged into two wounds and the smaller wound closed, and the eventually the larger wound closed as well.

After the initial closure of the wound, the patient had some struggles with keeping the wound closed. Excess fluid in the patient's feet pushed out of the newly closed skin. This was

mediated with the patient continually seeking wound care and wearing compressive garments on her legs to help control her fluid levels.

The patient theorized that the infection may have been a result of a cat scratch or bite to her swollen ankle after rolling it. The wound care specialist agreed that this could have been the source of the infection. When the patient rolled her ankle, it was swollen due to excess blood in the area. If she was scratched or bitten by her pet cat, this could have introduced bacteria into the area and the excess blood and swelling could have created the perfect storm for the massive infection to begin.

The patient was very concerned with taking proper care of her wound, and followed all instructions given to her to aid in the healing of the wound. The patient knew that she had the possibility of losing her foot if the infection was allowed to spread or if the wound became necrotic. The patient exercised changes to her diet to include more protein and more vegetables that would offer her a better healing outcome. She called with any and every concern, and never changed her plan of care without calling to talk to the wound care specialist. Furthermore, she never turned the vacuum off unless there was a leak, and in those cases, she cut open the bandages and came in for further care, like she was instructed to do. The patient took months off from work in order to elevate and rest her leg, this helped to control the fluid in her wound. Overall, the patient's healing was greatly improved due to her willingness to listen and make the necessary changes in her life to improve her chances of healing completely. After the wound closed the patient wore compression garments to help manage her fluid and ensure that the wound did not reopen. The patient likely had decreased healing time due to the care she took to ensure her wound would close. However, the patient did experience many complications throughout the treatment of her infection that contributed to extending her healing time as well.



Figure. 5

This image shows the patient's foot after closure of the wound. The patient does present with some scarring on her foot, but the scarring is not terrible considering the severity of her wound.

### **Personal Perspective**

The author's first exposure to the practice of wound care occurred in her senior year of undergraduate education. The author participated in an internship as part of a requirement for graduation with an undergraduate degree in Kinesiology. The internship was self-selected, and the area of wound care as a specialty career of physical therapy was discovered. After having internship experience in wound care, it became obvious that similar students on a pre-physical therapy path receive little to no education about wound care as a potential career, and that wound care providers are becoming more and more necessary to medicine. The author met many patients receiving wound care for different types of wounds and realized that wound care is a very necessary area of medicine, especially in combination with physical therapy. Physical therapy patients often have wounds, either from surgery or because of other conditions. The

treatment of these wounds presents a potential specialty opportunity for physical therapy students. In turn, students choosing physical therapy careers can also fill a gap in the need for healthcare professionals practicing wound care.

However, with further research it became clear that in general, education on the area of wound care and the treatment of wounds given to American students pursuing higher education for medical careers is severely lacking. This lack of exposure closes opportunities for students to decide to pursue wound care as a part of their career. With further exposure to the field and opportunities for internship, it is possible to attract more health care students such as nursing students, physical therapy students and medical students to choose to practice wound care. These students will create more options for patients with wounds seeking care and help to expand wound care.

## **Conclusion**

Wound care has developed throughout history and will continue to develop toward improving patient outcomes. The history of wound care is expansive and will continue to expand with the improvement of wound care products and treatments. Chronic or non-healing wounds affect 6.5 million Americans presently, and that number continues to rise with the increased occurrence of diabetes in the United States. The presence of chronic, non-healing wounds creates an immense disruption to a patient's life and creates a huge economic burden on the healthcare system. To have the best outcomes in wound care, it is necessary to have a coordinated plan of treatment between the patient and the provider, and ensure the patient is being treated in addition to the wound.

When prevention of wounds fails, it is immensely important to have health care providers who care for wounds and can devise a comprehensive plan to treat the patient for their wound and follow up on what might be contributing to the development of the wound. Proper education about wound care as a career can contribute to the success of treatment and introduce students to a field they may not have previously considered. Overall, colleges in the United States should focus on providing pre-professional health students with diverse experiences in health care, so that they have many clinical experiences to consider when making decisions about their career.

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