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Review Article

# A Step Forward: Improving Outcomes of Foot Ulcerations in Native Americans

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## Abstract:

The Native American population experiences an alarmingly disproportionate prevalence of foot ulcers when compared to the United States general population. The reasons for this discrepancy include complex socioeconomic determinates of health such as geographic isolation, high rate of poverty, lack of clean water, and lack of access to specialty care (Nez, 2020). Foot ulcers have a devastating impact on quality of life, often leading to lower extremity amputations. The consequences of lower extremity amputations are devastating for these families and communities, as almost 50% of amputees will die within one year (Kandi & Tan 2020). Strategies to prevent diabetic foot ulcerations in the Native American population must address broader socioeconomic determinants of health affecting this community.

**Keywords:** speech; behavior; reflects; spiritual; emotional; mental wellbeing

## Background

Understanding wellness from a Native American (indigenous) worldview is vital to establishing any effective health policy. Health is not only a physical state but reflects a state of being and journey to obtaining wellness. Native American culture emphasizes that humans can be self-empowered through responsible thought, speech, and behavior and reflects a state of being and journey to wellness. This philosophy provides a moral and behavior guide for living a healthy life and including kindness, respect, spirituality, generosity and authentic reciprocity (Kahn-John et al. 2015). Therefore, the indigenous perspective of wellness is a holistic one and focuses not only the physical but also the spiritual, emotional, and mental wellbeing.

The Native American health care system has been historically been burdened by lack of trained staff and outdated healthcare facilities. While the Snyder Act and Transfer Act marked the first steps toward funding and establishing healthcare for indigenous tribes, the 1975 Indian Self-Determination and Education Assistance Act (ISDEAA) expanded funding and Native American sovereignty by allowing tribes to manage and operate their own healthcare facilities. Funding further expanded with the Indian Health Care Improvement Act (IHCIA), which allowed Indian Health Service (IHS) and tribal facilities to bill Medicare and Medicaid. With the reauthorization of the IHCIA, under the Affordable Care Act (2010), and the Federally Qualified Health Centers expansion, health services for Native Americans improved (Warne & Frizzell, 2014). Although the IHS is often mistaken as an entitlement program such as Medicare, the availability of IHS services is a direct result of discretionary funding by Congress and not a type of health insurance (Skinner, 2016). While legislative policies permit Congress to appropriate funds for Native American healthcare, there is no

guarantee that Congress will continue to approve IHS funding for Native American healthcare. In fact, throughout history the IHS has been underfunded (Warne & Frizzell, 2014).

The ISDEAA allows for Native American tribes to contract with the IHS and use federal funds for tribes to administer and operate their own healthcare system (Warne, 2014). Under tribal management, there is a provision of more holistic and integrated health services such as mental health care and expansion of preventative screenings. (Knudson et al, 2012). These priorities reflect the indigenous values of holistic care, which often contrasts traditional Western medicine. The benefits of Native American tribes operating their own healthcare services are gaining recognition, but some challenges do exist as the need for resources in attaining accreditation (Knudson et al, 2012)

**Native American Barriers to Healthcare**

Forced urbanization, overemphasis on Western medicine, substance abuse, systemic racism, and ongoing trauma are elements of the social determinants of health that lead to health risks in the Native American population. European colonization resulted in physical, mental, and spiritual trauma to the tribe. Children were forcibly removed from families to attend boarding schools, communities faced violent relocation, and tribes were stripped of their freedom to engage in their cultural practices (United Nations, 2023). These physical and psychological stressors of historical trauma trigger the sympathetic nervous system, resulting in increased catecholamine and cortisol release. Adaptation of chronic stress leads to immunocompromised states, chronic fatigue, and chronic diseases such as type II diabetes. Over time, even when a direct stressor is removed, the physiologic response remains in place perpetuating a cycle of disease (Tiedt & Brown, 2014). Further contributing to chronic disease, indigenous people have been disconnected from their traditional diets. Proposed solutions to this food insecurity tend to focus on individual circumstances and funding rather than the root causes: disrupted access to traditional foods, lack of clean water, and loss of access to traditional land, loss of food harvesting practices (United Nations, 2023).

Sanitation and lack of clean water has also led to a public health crisis for multiple tribes. It's estimated that 48% of homes on reservations do not have access to clean water. Overall, Native Americans are 19 times more likely to lack running water in their homes when compared to Whites. For example, approximately 75% of the Hopi Tribe is drinking contaminated water, including arsenic (Tanana et al., 2021). Additionally, there are about 3,400 Navajo homes that lack water and sewer facilities. These families live in remote areas and need to haul water to their homes. Subsequently, families are forced to decide between drinking water and handwashing with their limited water resources (Nez, 2020). The rapid spread and high prevalence of COVID-19 in Native American communities was likely a result of this lack of access to clean water and sanitation (Tanana et al, 2021). Access to safe water and sanitation facilities are essential for preventing and treating medical condition such as foot ulcerations. Without access to sanitation, rates of infection and associated complications increase.

Another challenge that has contributed to the prevalence of foot ulceration is lack of primary care and specialty physicians. Recruitment and retention of specialty providers has been a challenge for IHS due to low provider salaries and small patient populations. According to a 2011 study, 59% of IHS primary care physicians reported that they were managing patients with a high level of complexity and lacked specialty consultation (Kruse et al 2022). Some efforts have been made by the IHS to expand access to specialty care, most notably the establishment of Contract Health Services (CHS), also referred to as Purchased and Referred Care, a budget line item to pay for services from private sector specialists. However, CHS includes gatekeeping functions such as authorizing referrals as the funds for this program is highly dependent on Congressional funding. When budgets are limited, routine screenings are delayed and access to services are based on priority status (Dixon & Roubideaux, 2001). Lack of preventive care and specialty care has resulted in an epidemic of uncontrolled diabetes, peripheral neuropathy, and vascular disease in the Native American population. Foot ulcerations are often a complication of these chronic disease states.

**Foot Ulceration Prevalence**

The incidence of diabetic foot ulcers in American Indians is 7.0%, which is higher than all other groups: 6.0% for whites, 6.3% for African Americans, and 6.4% for Hispanics (Tan et al. 2020). Estimates project that by 2050, 34% of people with diabetes will experience a foot ulcer (Tan et al., 2020). The Center for Disease Control and Prevention reported that Native Americans face a 15% prevalence rate of diabetes, which is higher than any other population (Kandi & Tan 2020). Despite this increased incidence, Native Americans are still less likely to receive preventative care or early intervention for foot ulcerations.

While standard guidelines for preventing foot ulcerations have been widely accepted by the medical community, Native Americans are significantly less likely to receive guideline directed care than non-Hispanic Whites (McDermott et al, 2023). For example, revascularization is fundamental practice to increase the likelihood of a foot ulceration healing. Native Americans with a foot ulceration are less likely to receive revascularization care than other groups (Tan et. al, 2019). This is especially surprising considering the epidemic of peripheral vascular disease in Native American populations. A large study of 96,440 Native Americans found that prevalence of peripheral vascular disease in this group is twice the rate in non-Hispanic Whites (Hackler et al, 2021).

**Impact of Foot Ulcerations**

Foot ulcers have a devastating impact on quality of life and often lead to lower extremity amputations. Native Americans with a diabetic foot ulcer are 1.9 times more likely to undergo a lower extremity amputation when compared to a White individual (Tan et al, 2020). A worldwide study of 10 centers collected data from 1995 to 1997 and found that the Navajo nation had the highest rate of lower extremity amputation of all these international groups (Unwin, 2000). The consequences of lower extremity amputations are devastating for these communities, as almost 50% of amputees will die within one year (Kandi & Tan 2020). Diabetic foot ulcers

also carry a financial burden, with an estimated annual cost between $9 to $13 billion (Rice et al., 2014). Strategies to prevent diabetic foot ulcerations in the Native American population must address broader socioeconomic determinants of health affecting the Native American community.

**Implications of Research**

Research demonstrates that foot ulcerations are a widespread problem in the Native American population. Historical trauma of Western colonization including forced removal from ancestral homelands has led to an increase in chronic disease, poverty, and mortality. Diabetes, vascular disease, and peripheral neuropathy are the conditions that are most likely to have complications such as foot ulcerations and infections. While Native Americans with a foot ulcer are more likely to suffer complications such as amputation or death, they are also less likely to receive preventative care or early intervention. Since the consequences of foot ulcerations and amputations can be deadly, it is important to consider prevention as the key to the future health of tribes.

Lower extremity amputation is preventable by empowering tribal initiatives directed towards primary care, expanding access to specialized podiatric care, and ensuring access to diabetic shoe gear. Promisingly, community led interventions such as The Community Outreach and Patient Empowerment (COPE) program have improved outcomes for tribe members living with diabetes (Trevisi et. al, 2020). In an attempt to expand specialty care on a local level, the Special Diabetes Program for Indians, funded in 1997 by Congress, has expanded to all IHS and tribally managed health services. The program values tribal leadership and prioritizes indigenous traditions to improve diabetes outcomes. Corresponding with the initiation of this program, diabetes prevalence has been steadily decreasing since 2013 (Kruse et. al 2022). This reinforces the notion that that tribal led programs yield superior healthcare outcomes over outsourcing care to non-tribal services.

There exist multiple policy options to properly addressing the rising issues of chronic disease and lack of preventative care. Each of these options have their own benefits and challenges. In order to establish and effective policy, it is important to consider the cultural context of the Native American culture and the specific barriers of accessing healthcare.

**Policy Options**

Increasing access to specialty care physicians for patients with foot ulcerations has been statistically significant in reducing the number of lower extremity amputations (Tan et al, 2020). Podiatrists, vascular surgeons, and wound care specialists can not only treat foot ulcerations but also prevent ulcerations from occurring. The International Working Group on the Diabetic Foot (IWGDF) was created to establish multidisciplinary guidelines through a scientific process for prevention and management of diabetic foot ulcerations. The IWGDF 2019 guidelines recommend a foot examination by a professional every one year for low-risk diabetics, and every three months for high-risk patients who have vascular disease and loss of sensation (Schaper et al., 2019).

A multidisciplinary team approach may benefit in preventing foot ulcerations. This would involve IHS and tribally managed health programs employing or contracting with full time podiatrists, vascular surgeons, and wound care nurses to prevent foot ulcerations. This option would address the longstanding transportation issues of Native Americans accessing specialty care. Currently, patients may have to travel hundreds of miles to see a specialist, which may not be possible for the chronically ill. While this would be a medically effective strategy, this option is dependent on budget constraints. Additionally, the historic high turnover of staff in the IHS and difficulty recruiting multiple specialists to live in a remote area would be very difficult and can affect the sustainability of establishing a consistent multi-disciplinary group. These limitations can be addressed through special Congressional funding that would allow more competitive salaries and benefits with IHS physician and provider staff employment.

**Home Health Agencies**

Home health agencies can increase access to medical care and address the barrier of limited transportation that many patients experience. Home health agencies can be very medically effective at reducing foot ulcerations. The Home health aides could visit patients with foot ulcers three times a week for dressing changes and report any new signs of infection to the ordering physician. Early intervention of an infection could reduce further complications and decrease the likelihood of future ulcerations (Kartika et. al., 2021). Home health nurses can also identify pre-ulcerative lesions and calluses, which can be treated before a wound occurs. Since many patients lack transportation for regular outpatient appointments and since agencies can prevent the need for inpatient treatment, ultimately a home health agency can lead to a reduction in the overall cost of treating foot ulcerations. Home health agencies can also train and employ local tribal members, which could improve health outcomes as well and increase employment opportunities for tribal members. Additionally, tribally led home health agencies are more likely to provide culturally competent care.

**Mobile Orthopedic Shoe Clinic**

Inappropriate fitting shoe gear is a major cause of foot ulcerations. People with loss of sensation in their feet or peripheral vascular disease are recommended to have professional sizing of shoe gear (Schaper et al, 2019). Due to the geographic isolation of Native American reservations, many patients lack access to appropriate extra depth orthopedic shoe gear. Many tribal members do not have resources to travel hundreds of miles to purchase appropriate shoes. While the remote nature of these areas limits the establishment of a full-time orthopedic shoe store, increasing access to preventive shoe gear can be accomplished through a mobile shoe clinic. This clinic would employ a prosthetist to properly measure patients' feet and would visit each area yearly. (Singh, 2005) A mobile shoe clinic would greatly improve accessibility to foot care. Appropriate shoe gear is highly medially effective at reducing foot ulcerations (Singh, 2005). Professional therapeutic shoe gear can demonstrate a plantar pressure relieving effect, which has a long-term effect in preventing foot ulcerations (Schaper et al, 2019). The cost of a

mobile shoe clinic would be significantly less than multiple permanent shoe stores and has the ability to travel throughout multiple tribal communities. Mobile and satellite clinics have also been effective in preventative care as seen with community vaccination efforts.

**Home Foot Care Kits**

Home foot examination kits are very inexpensive and usually include an extendable mirror and educational material. The low cost of these kits and their medical effectiveness at preventing ulcerations make it a valuable policy alternative. Even brief education on the prevention of foot ulcers has proven effective in reducing their prevalence. One randomized control trial of 121 diabetic patients found that the group that received a 2-hour education on foot care had a 0% incidence of foot ulcerations, while the group that did not receive this lesion experienced a 10% incidence (Monami, 2015). The foot examinations kits and education is performed at home, making this a widely accessible option.

## Conclusions

The Native American community faces a disproportionate rate of foot ulcerations and associated complications. In order to understand the etiology behind these statistics, it is important to consider the historical and cultural context. Native Americans face unique social determinants of health, which lead to a disproportionate rate of chronic disease and subsequently face increased morbidity. Lack of clean water, lack of access to preventative care, geographic isolation, and disruption of native diets are all factors that have led to negative health outcomes for this community.

Increased rates of diabetes, peripheral vascular disease, and peripheral neuropathy all influence the prevalence of foot ulcerations. As the number of foot ulcerations rise, lower extremity amputations increase. Amputations are a devastating consequence of foot ulcerations and often lead to death. Another consequence of foot ulcerations that is not often discussed is the social impact to the community. Loss of employment and social isolation can lead to depression and poverty. In order to prevent these devastating outcomes, preventative care and access to orthopedic shoe gear is essential.

Indigenous culture values a holistic approach to wellness, and current Western policies in place do not adequately embrace this indigenous worldview. Of the presented policy options, a mobile orthopedic shoe clinic demonstrates the most medically effective, sustainable, and economical option. Alternative policy options also include distribution of home foot care kits, establishing home health agencies, and forming multidisciplinary health care teams. Lower extremity amputation can be prevented by empowering tribal initiatives to improve health services, expanding access to specialized podiatric care, and ensuring access to orthopedic shoe gear.

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