SKIN CANCER PREVENTION IN NORTH DAKOTA FARMERS AND RANCHERS

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Skin Cancer Prevention in North Dakota Farmers and Ranchers

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ABSTRACT

It is widely known that skin cancer is a significant health concern. Studies show that farmers and ranchers are at increased risk of skin cancer, presumed to be secondary to the increased time they spend outdoors and their increased exposure to the sun. This study examined the current sun protection techniques utilized by a sample of North Dakota individuals, who spend the majority of their occupational time outdoors. After collecting information reflecting demographics and current sun protection measures practiced by the sample, educational material focusing on skin cancer prevention and healthy sun behaviors was distributed to the individuals and the primary researcher gave an educational power-point presentation. A post-survey was then given to the sample, identifying the effectiveness of the education, as well as the intentions of the individuals to change. It was found that 74% of participants had never received previous instruction on sunscreen use. The computed odds ratio showed that the intent of participants to observe sunscreen use after the presentation was 3.47 times than before. An encouraging 88% of the participants reported increased intent to complete a self-skin examination post-intervention. The research showed areas for improvement from numerous aspects, including provider and patient education, encouraging preventative techniques while working outdoors, and encouraging regular self-skin examinations. The findings support the importance and effectiveness of verbal communication of health care providers in the family practice setting to verbally discuss skin cancer and sun protection behaviors with their patients, as well as provide patients with written educational information. By identifying the benefits, barriers, and intent of the participants to change, interventions may be implemented.

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CHAPTER 1. BACKGROUND AND SIGNIFICANCE

Introduction

While positive strides have been taken to stabilize cancer incidence and reduce related mortality, cancer remains second to heart disease as a leading cause of death in the United States (Gosschalk & Carozza, 2010). The direct and indirect costs of cancer are estimated to be 200 billion dollars per year. Cancer is a significant health issue and needs to be addressed. Skin cancer is the most common of all cancers, affecting more than two million Americans each year, a number that is rising rapidly (Weigel, 2010). In 1935, the incidence of malignant melanoma was one in 1,500. In 2008, that statistic rose to one in 74, and it is predicted that in 2012, it will be one in 56 (Weigel, 2010). In North Dakota, there were 164 average annual cases of melanoma reported from 2005-2009. Furthermore, the number of annual cases in North Dakota males increased from 74 cases in 2005 to 99 cases in 2009 (North Dakota State Department of Health, 2012). In 2004, the total direct cost associated with the treatment for non-melanoma skin cancer alone was $1.5 billion (Weigel, 2010). Skin cancer is the easiest type of cancer to cure, with a 99% five-year survival rate for people whose melanoma is detected and treated before it spreads to lymph nodes (Vickers, 2009). When allowed to progress, however, skin cancer can result in disfigurement and even death. The aforementioned statistics are very alarming and indicate the need for additional research examining barriers to prevention and early detection of skin cancer.

The Merriam-Webster Dictionary (2012) defines a farmer as “a person who cultivates land or crops or raises animals as a source of income.” A rancher is defined as “one who owns or works on a farm for raising horses, beef cattle, or sheep.” Nearly 24% of North Dakota workers are farmers and ranchers or are employed in farm-related jobs (North Dakota State Government, 2010). While farmers and ranchers may spend some time in offices, the majority of their

occupational time is spent outdoors, regardless of the weather (United States Department of Labor, 2012). Due to the amount of time farmers and other agriculturalists spend outdoors, the risk of skin cancer is particularly concerning among this population (Christensen, Williams, Pfister, Pace & Palmar, 2007). Approximately 80% of skin cancers occur in locations on the body frequently exposed to the sun (Diepgen & Mahler, 2002). According to Harris and Alberts (2004), limiting unprotected UV exposure is the primary preventive measure for skin cancer. Time spent outdoors is significantly correlated with prevalence of skin cancer and precancerous lesions (Christensen et al., 2007). The American Cancer Society (2011) recommends specific protective measures to protect oneself from excessive sun exposure, such as limiting the time that one spends in the sun between the hours of 10:00 am and 4:00 pm and applying sunscreen with a sun protection factor (SPF) of 15 or greater 30 minutes before going outside. Furthermore, even though some sunscreens claim all day protection, sunscreen should be reapplied every two hours or more often if one is perspiring heavily (Weigel, 2010). It is also important that individuals that will be exposed to the sun wear clothing that covers the body and shades the face. While a baseball cap seems to be the favorite among those who work in agriculture, a wide-brimmed hat, such as a cowboy hat, offers better protection (Weigel, 2010). Despite these recommendations, Christensen and colleagues (2007) found that 70.2% of the rural participants included within their study rarely or never used SPF 15 sunscreen. Similar statistics were reported by national surveys supported by the Centers for Disease Control and Prevention (2012), which reported that in 2008, only 58% of adults reported using sunscreen, seeking shade, or wearing protective clothing when exposed to sunlight.

Although avoiding direct sunlight is the best defense against skin cancer (Weigel, 2010), for many occupations, such as farming and ranching, working outdoors is essential to the work

that is performed. Thus, it is crucial for individuals that are exposed to excessive sunlight to protect their skin as best that they can, while performing regular skin exams to promote early detection of skin cancer. The American Cancer Society recommends a skin cancer-related checkup and counseling about sun exposure as part of any periodic health examination for men and women beginning at age 20, while individuals with a history of melanoma should have a full-body exam at least annually and perform regular exams for new and changing moles (Weigel, 2010). Unfortunately, there are a number of barriers that inhibit individuals, especially those in rural communities, from engaging in preventative measures.

Statement of the Problem

It is known that farmers and ranchers are at an increased risk of being diagnosed with skin cancer because they are exposed to excessive amounts of sun during work activities (Weigel, 2010). In fact, results from a National Health Interview study found farmers to be at risk occupationally and recreationally for skin cancer; however, farmers are also the most reluctant to perceive risks associated with skin exposure and to make changes in regard to risk factors (Weigel, 2010). A study completed by Zahnd, Goldfarb, Scaife and Francis (2010) found that when compared with urban residents, rural residents were 33% less likely to wear sunscreen when exposed to the sun for more than one hour. A study completed by Glanz, Buller, and Saraiya (2007) addressed several barriers to sun protection by outdoor workers. Canadian outdoor workers and Georgia farmers said that they did not practice sun safety because they forgot, it was inconvenient, they wanted to get tan, and/or they were unconcerned about sun exposure. Other barriers reported included lack or encouragement from others and that it was too hot to wear protective clothing such as hats, long-sleeved shirts, or long pants. There is evidence to suggest rural populations are diagnosed at a more advanced stage of cancer than the general

population (Gosschalk & Carozza, 2010). This raises questions regarding skin cancer education, availability and utilization of preventive measures, and services in rural areas, especially when it is known that early detection and diagnosis of melanoma are the most critical factors for improved survival rates (Vickers, 2009). There is a need for the implementation of primary and secondary prevention measures and to increase skin cancer awareness for individuals with high levels of work-related UV radiation exposure, together with improved sun protection behaviors (Diepgen, Fartasch, Drexler, & Schmitt, 2012).

Purpose of the Clinical Dissertation Project

Primary prevention strategies for skin cancer have focused on behavioral modifications to minimize ultraviolet exposure, including the use of sunscreen, as well as early detection and screening (Harris & Alberts, 2004). The purpose of the project was to assess the effectiveness of a power point presentation and educational tools, specifically a pamphlet and an informational bookmark on a magnet, in providing knowledge to the target group about skin cancer prevention and early detection. Education included the benefits of frequent skin examinations. Information gathered from the participants was used to ascertain the effectiveness of a non-traditional teaching method of an educational presentation, as well as a pamphlet and a bookmark on a magnet that might also be used in clinical family practice. Expectations of the study were (1) to improve awareness and knowledge of skin cancer among individuals within the farming and ranching community, (2) to assess the effectiveness of the information provided by an educational presentation, as well as a pamphlet and bookmark on a magnet presented to the target group, (3) to provide information on skin cancer prevention methods and self-skin exams that may contribute to the early detection of skin cancers, and (4) to utilize the findings of the

study to improve practice of nurse practitioners and other primary care providers in family practice clinics.

Significance for Nurse Practitioners

Patient education plays a key role in preventing skin cancer (Guill & Orengo, 2001). To detect skin cancer in its early, treatable stages, patients need to learn prevention and detection methods, including protecting skin from excessive sun exposure and screening for skin cancer (Siegel, 2010). As previously stated, skin cancer occurrences are on the rise and have become a major public health concern. Nurse practitioners, regardless of practice setting, can play a vital role in the fight against skin cancer by engaging themselves in cancer control activities, such as providing patient education on cancer risk, cancer prevention and early detection, as well as contributing to policy development in support of cancer control activities in practice (Ayres, 2009).

Health promotion and disease prevention have long been a part of the scope of practice of the advanced practice nurse. Nurse practitioners are encouraged to deliver care in a variety of practice areas, to all ages, that can support individuals and communities in the prevention and early detection of cancer. Having nurse practitioners screen for skin cancer is important, easy to conduct, and inexpensive. Screening is imperative, as melanoma and squamous cell skin cancers are potentially fatal. The goal is to have greater involvement by nurse practitioners, improving early detection and offering skin cancer prevention counseling (Siegel, 2010). Furthermore, by teaching health maintenance and prevention, nurse practitioners offer the public greater control over and responsibility for their own health.

Nurse practitioners in the community are in an ideal position to educate the individuals with whom they work about the risk factors associated with skin cancer. They have the frequent

opportunity to educate patients, employees, and communities about skin cancer. Informing patients of their risk and the importance of regular cancer prevention and early detection can create an environment that supports and empowers patients and co-workers to adopt healthy skin protection behaviors (Ayers, 2009). Nurse practitioners have an important role in reducing morbidity and mortality of skin cancer through consistent patient education, proper screening, and early detection.

The significance to the Doctor of Nursing Practice for the project is highlighted in the evaluation of the effectiveness of an educational power point presentation, pamphlet, and bookmark on a magnet in increasing skin cancer awareness, prevention, and early detection. The significant increase in incidence of skin cancer is accompanied by a decreasing number of primary care providers, reinforcing the importance of tools for educating the patient within the clinical setting. Educating high-risk populations and providing a tool to assist them in early detection will not only increase knowledge of skin cancer, but also provide patients with a resource they can refer to when completing skin self-examinations. Education and resources to assist in early detection will give the patient support, yet also autonomy, in the prevention of skin cancer.

CHAPTER 2. LITERATURE REVIEW AND STUDY FRAMEWORK

Review of Related Literature

Skin cancers account for 40% of all cancers and the incidence is increasing (McCance & Huether, 2006). The explanation for the increasing incidence is thought to be increasing sun exposure. Skin cancer affects all age groups; however, the incidence is greater in men than in women, and increases with age. Basal cell and squamous cell carcinomas are the two most common types of skin cancer, as well as the most treatable. Malignant melanoma is the most serious skin cancer and the leading cause of death from cutaneous malignant disease (Goldman & Schafer, 2012). Areas exposed to solar radiation such as the face, neck, ears, and hands are highly vulnerable to develop cancerous lesions. The occupational exposure to UV radiation is high in many outdoor occupations (Fartasch, Diepgen, Schmitt, & Drexler, 2012). Occupations that involve primarily outdoor work are high-risk skin cancer populations (McCance & Heuther, 2006).

Pathophysiology

Exposure to sunlight, and especially ultraviolet (UV) radiation, has been strongly implicated as a causative factor in the development of melanoma. Melanomas originate from melanocytes, which are located predominantly in the basal cell layer of the epidermis and use the enzyme tyrosinase to synthesize melanin pigment, which serves to protect against UV damage (Goldman & Schafer, 2012). The damaging effects of ultraviolet radiation (UVR) on the skin are believed to be caused by direct cellular damage and alterations in immunologic function. UVR produces DNA damage (formation of cyclobutane pyrimidine dimers), gene mutations, immunosuppression, oxidative stress, and inflammatory responses, all of which have an important role in photo-aging of the skin and skin cancer. UVR creates mutations to p53 tumor

suppressor genes, which are genes involved in DNA repair or the apoptosis of cells that have significant DNA damage. Therefore, if p53 genes are mutated, they are no longer able to aid in the DNA repair process; as a result, there is dysregulation of apoptosis, expansion of mutated keratinocytes, and initiation of skin cancer. UVR has an important role in the carcinogenesis of stem cells of the skin and induces DNA damage, which causes inflammatory responses and tumorigenesis (Narayanan, Saladi, & Fox, 2010).

Precancerous Lesions Associated with the Sun

Actinic keratoses are common keratotic lesions with malignant potential. They are considered intraepidemal and are a precursor or early lesions of squamous cell carcinoma (Habif, Campbell Jr, Chapman, Dinulos, & Zug, 2011). Actinic keratoses are caused by cumulative sun exposure and keratinocyte damage, and individual lesions become progressively more common after age 40. Spontaneous regression and progression to squamous cell carcinoma can occur and it is difficult to predict which lesions will progress to invasive cancer; however, hypertrophic lesions seem to be more worrisome. Actinic keratoses are found predominantly on the face, head, neck, and dorsal hands and are often found along with other signs of chronic sun exposure, such as uneven pigmentation, atrophy, and telangiectasias. Actinic keratoses must be monitored closely, as advanced lesions may be difficult to distinguish from invasive squamous cell carcinoma without skin biopsy (Habif et al., 2011).

Basal Cell Carcinoma

Basal cell carcinoma (BCC) is the most common form of skin cancer and accounts for 75% to 80% of all newly reported cases of non-melanoma skin cancer (The Skin Cancer Foundation, 2011). BCC, a slow growing non-melanoma skin cancer that develops primarily on sun-exposed areas of the body, is most likely to occur among males over the age of 45 years

(Gaetano, Hodge, Clark, Ackerman, Burdick & Cook, 2009). BCC arise in the basal cells, which line the deepest layer of the epidermis. Almost all basal cell carcinomas occur on parts of the body that are exposed to excessive sun, especially the face, ears, neck, scalp, shoulders, and back (The Skin Cancer Foundation, 2011). Current literature clearly shows a significant increased risk of developing BCC for occupationally UV-exposed workers compared with non-exposed workers (Diepgen et al., 2012; Fartasch, et al., 2012).

Squamous Cell Carcinoma

Squamous cell carcinoma (SCC) is the second most common form of skin cancer. More than 250,000 cases are diagnosed annually, resulting in approximately 2,500 deaths (The Skin Cancer Foundation, 2011). SCC arises in the squamous cells that make up most of the epidermis. SCC may occur on all areas of the body, but like BCC, SCC is most common in areas frequently exposed to sun. SCC is two to three times more likely to develop in males than females (The Skin Cancer Foundation, 2011). SCC has a destructive pattern of growth and it metastasizes. SCC and BCC are the most common skin cancers in fair-skinned people all over the world. In the United States, it has been estimated that the incidence rate of SCC and BCC combined is about as high as all other types of cancer put together (Diepgen et al., 2012). Research has determined that BCC and SCC are directly linked to ultraviolet radiation exposure (Gaetano et al., 2009; Diepgen et al., 2012). A systematic appraisal of the epidemiological literature and meta-analysis completed by Schmitt, Seidler, Diepgen, and Bauer (2011) indicated that occupational UV light exposure is a substantial and robust risk factor for the development of cutaneous SCC and BCC, highlighting the need for preventive measures for individuals with high levels of work-related UV light exposure.

Malignant Melanoma

Malignant melanoma is the deadliest of the skin cancers, with the incidence in the United States rapidly increasing in the past two decades. Melanoma accounts for approximately three fourths of all skin cancer deaths (Saraiya, Glanz, Briss, Nichols, White & Das, 2003). Incidence of melanoma continues to rise at a faster rate than that of any other human cancer. The projected lifetime risk of melanoma for Americans born in the year 2000 is 1 in 75 (The Skin Cancer Foundation, 2011).

Melanoma is malignancy of the melanocytes, most often arising in the skin. Melanoma is potentially curable with early detection and treatment; late diagnosis of melanoma carries a poor prognosis. Factors that increase one's risk of developing melanoma include fair skin, presence of atypical nevi in both sun-exposed and sun-protected areas, personal or familial history of melanoma, history of blistering sunburn, and congenital nevi. Common early signs of melanoma include an increase in size, change in color, or change in shape of the lesion. The most common early symptom of melanoma is itching, but many are asymptomatic (Habif, Campbell Jr, Chapman, Dinulos, & Zug, 2011).

Skin Cancer in Males

The number of women who are the principle operators of a farm or ranch has increased over the past decade; however, the majority of farmers and ranchers are male (United States Department of Agriculture, 2007). Research also indicates that, in comparison to females, males are more frequently diagnosed with skin cancer. According to the Centers for Disease Control and Prevention (2010), 53,919 people in the United States were diagnosed with melanomas of the skin in 2006. Of those diagnosed, 30,560 of them were men and 23,359 were women. In that same year, 8,441 people in the United States died of melanomas of the skin, 5,477 of them men.

Furthermore, Caucasians and males older than 50 are at an even higher risk of developing melanoma than the general population (Weigel, 2010). The North Dakota State Department of Health (2012) reported 162 average annual cases of melanoma from 2005-2009, with a higher incidence in males than females. In 2005, 74 melanoma cases were reported in North Dakota males. By 2009, the annual incidence of melanoma in males had increased to 99 cases. When addressed by race, it was noted that all melanoma cases in males during this time frame occurred in white individuals (North Dakota State Department of Health, 2012).

Practices to Prevent Excessive Sun Exposure that Commonly Causes Skin Cancer

Approximately 80% of skin cancers occur in locations on the body frequently exposed to the sun (Diepgen & Mahler, 2002). Harris and Alberts (2004) stated that limiting unprotected UV exposure is the primary preventative measure for skin cancer. A study conducted by Christensen, Williams, Pfister, Pace and Palmar (2007) determined that time spent outdoors was significantly correlated with self-reported prevalence of skin cancer and precancerous lesions. However, 70.2% of the rural participants included within their study rarely or never used SPF 15 sunscreen. According to Saraiya et al. (2003), only one third of adults reported that they used sunscreen, sought shade, or wore protective clothing when exposed to sunlight.

Avoiding direct sunlight is the best defense against skin cancer (Weigel, 2010). However, for many occupations, such as farming and ranching, this is not an option. Thus, it is crucial for these individuals to protect their skin as best they can, while performing regular skin exams to promote early detection of skin cancer.

Common Barriers to Preventative Education

It has been determined that residents of rural areas experience more health disparities than residents of urban areas. Rural areas report a higher prevalence of chronic diseases,

including cancer; a finding that has been attributed, in part, to a population that is older, poorer, and less educated (Graves, 2010). Barriers such as finances, sociocultural issues, structural features and geography are known to decrease access to healthcare services in rural environments, leading to poor health outcomes. Rural areas are more likely than urban areas to have higher rates of uninsured or underinsured populations, higher rates of poverty, greater transportation barriers and limited care providers (Graves, 2010). In addition, it has been determined that the Upper and Central Midwest has the greatest shortage of health educators in the United States (MacDowell, Glasser, Fitts, Nielson & Hunsaker, 2010).

Rural, older adults often manage their health care in general isolation, separated geographically from healthcare providers, supportive services, and often emotionally from their community (Eisenhauer, Hunter & Pullen, 2010). Such individuals may have other reasons for not seeking formal care, such as mistrust of health providers, failure of healthcare providers to communicate meaningfully to patients, fear of hospitals, and misunderstanding of program quality guidelines (Eisenhauer, Hunter & Pullen, 2010). Due to an informal healthcare network, as well as to families' limited resources, a cultural norm that rural, older adults often put off seeking formal healthcare until their health needs are no longer manageable through self-care efforts and the help of family, friends and neighbors. Formal healthcare is sought more as a last resort for illness, rather than as an ongoing source of prevention and health promotion (Eisenhauer, Hunter & Pullen, 2010).

The Perceptions of Preventative Measures Among Males in Rural Communities

From 1973 through 2002, melanoma mortality rates have risen steeply in middle-aged and older men. Men's higher mortality rate from melanoma is hardly an isolated example of the ways in which men's health lags behind women's. Given the significantly higher melanoma

mortality rates of men compared with women, there is now a need for a melanoma education program targeted to middle-aged and older men and their closest contacts, including spouses, significant others, and health care professionals (Geller, Swetter, Leyson, Miller, Brooks & Geller, 2006).

It is known that farmers and ranchers are at an increased risk of getting skin cancer because they are exposed to excessive amounts of sun during their work activities (Weigel, 2010). In fact, results from a National Health Interview study found farmers to be at risk occupationally and recreationally for skin cancer; however, farmers are reluctant to perceive risks associated with skin exposure and to change these risk factors. Furthermore, there is evidence to suggest rural populations are diagnosed at a more advanced state of cancer (Gosschalk & Carozza, 2010). As previously stated, research findings raise questions regarding availability and utilization of preventive, screening, and diagnostic services in rural areas, as well as the existence of unique social and behavioral barriers.

A study completed by Zahnd, Goldfarb, Scaife and Francis (2010) analyzed the 2005 Health Information National Trends Survey, a survey of the noninstitutionalized, adult population performed by the National Cancer Institute. They used logistic regression analysis to adjust for confounding by age, race, income, education, health insurance, smoking, sex, marital status, and region. They found that when compared with urban residents, rural residents were 33% less likely to wear sunscreen when exposed to the sun for more than one hour. After adjusting for the above confounding variables, however, rural individuals were just as likely as urban individuals to use sunscreen with sun exposure.

Just as there is limited data on individual cancers in rural areas, there is also limited information on attitudes, social support, and other related behavioral characteristics present

within rural populations with respect to cancer. There are a variety of uniquely rural attitudes and barriers that may impact the stage of diagnosis. According to Gosschalk and Carozza (2010), attitudes that may contribute to delayed screening and diagnosis include fatalism, fear of stigma associated with cancer and denial of presenting symptoms.

There is a definite gap in research regarding the perceptions of preventative measures among males, especially those living in rural communities. One hypothesis is that the gap in research is strongly related to the lack of education and compliance in protecting oneself from excessive sun exposure. Although there are a number of studies that have examined the effectiveness of educational efforts, additional research revealing findings on barriers to skin cancer prevention is warranted, particularly in rural populations.

Current Research Base Examining Skin Cancer Education Methods

The following table and text reveals previous studies that have been conducted to analyze various methods of education regarding skin cancer prevention and early detection.

Table 1. Current Research Examining Skin Cancer Education Methods

Author & Date of Publication	Population and Sample Size	Intervention	Results	Limitations
Gaetano et al., 2009	N = 88 Outdoor workers at risk for skin cancer due to occupational sun exposure	Completion of two one-page forms, skin examination by medical resident, post-screening follow-up by primary care provider (PCP)	Increased awareness and behavior in preventing the development of skin cancer in outdoor workers; Confirmation that occupational health nurses can positively impact skin cancer morbidity and mortality	Lack of randomization, relatively small sample size, lack of diversity within population

(continued)

Table 1. Current Research Examining Skin Cancer Education Methods (continued)

Author & Date of Publication	Population and Sample Size	Intervention	Results	Limitations
Janda et al., 2009	N = 968 (96% retention rate) Males 50 years or older	Video-based intervention to improve skin self-examination behavior	13% reported conducting a thorough self-examination; 39% received whole-body skin examination by PCP in past year; Increased confidence in performing skin self-examination	Very specific population; difficult to make generalization Lack of long-term follow-up
Glanz, Schoenfeld, & Steffen (2010)	N = 596 (82.3% retention rate) Adults (age 20 to 65 years) at moderate and high risk for skin cancer from Honolulu, HI and Long Island, NY	Treatment group received tailored materials, including personalized risk feedback, and control group received general educational materials (Multivariate analyses compared sun protection and skin self-examination between groups)	The tailored materials had a significant effect on overall sun-protection habits, the use of hats, sunglasses and recency of skin self-examination	Primarily well-educated, affluent population (possible that print materials would not be as effective in less-educated groups) Different amounts of attention to treatment and control groups, lack of long-tem follow-up, and reliance on self-report
Kauffman, Shah, & Kauffman (2010)	N = 6,672 Intervention targeted at patients over the age of 50; study completed at Riverside Family Practice Center in Columbus, OH	Skin cancer education tool (informational postcard) distributed to targeted patients at check-in and made available in waiting room and exam rooms	No significant change in detection rates was demonstrated (RR=1.0, p=0.88) Significant increase in number of procedures performed for malignant and pre-malignant skin lesions (RR=2.4; p<0.0001); Positive response to tool from physicians, staff, and patients	Undiversified population at single institution, no change in cancers detected, short-term trial

(continued)

Table 1. Current Research Examining Skin Cancer Education Methods (continued)

Author & Date of Publication	Population and Sample Size	Intervention	Results	Limitations
Barysch et al. (2009)	N = 12,000 with 494 digital photographs sent for evaluation (232 (47%) from females and 262 (53%) from males)	Internet-based education, instruction for self assessment and teledermatological evaluation of skin lesions	8 (8.5%) malignant lesions were diagnosed by physicians; Internet-based, interactive educational programs, in addition to existing health promotion campaigns, can enhance public participation in the middle-aged male population in skin cancer prevention	Participation in follow-up questions was voluntary (researchers received responses from approximately half of those with suspicious lesions), resulting in a high number of unknown cases; Internet access and skill necessary for replication
Robinson, Turrisi, & Stapleton (2007)	N = 130; Training received either individually (n = 65) or with a partner (n = 65); Study completed in a clinical ambulatory care office of a hospital with individuals at increased risk for melanoma	Ten-minute educational presentation and skills training session about the ABCDE rule of early melanoma detection. Main outcome measure was SSE performance as measured by use of a body map	Attitudes toward SSE, self-efficacy, comfort with having someone help with SSE, and concern about developing sun-damaged skin were found to be significant mediators; Involvement of a partner in SSE skills training was more effective than solo learning	Small sample size, lack of evaluation of long-term effects, and partner relationship variables that could influence the effectiveness of partner learning
Jungers et al. (2003)	N = 136 (initial participation) N = 60 (completed second questionnaire); Study conducted on participants at a Indianapolis Indians baseball game	Dermatologist-staffed educational booth set up at baseball game; attendees educated through discussions and handouts. Attendees completed a self-administered questionnaire (in May) prior to this interaction and a mailed follow-up questionnaire in August 2000	The May results revealed that 92% believed that sun exposure caused skin cancer; 37% used sunscreens "sometimes" and 29% "never." There was a significant decrease in the number of hours spent outdoors per week during the summer of 2000 compared to 1999.	Small sample size, lack of long-term data

(continued)

Table 1. Current Research Examining Skin Cancer Education Methods (continued)

Author & Date of Publication	Population and Sample Size	Intervention	Results	Limitations
Mayer et al. (2007)	N = 2662; Postal service letter carriers	Intervention package that included increased access to protective hats, increased access to sunscreen, visual cues that prompted use of solar protective strategies, and delivery of brief education sun safety messages	At the 3-month follow-up evaluations, the odds ratio for regular sunscreen use was 2.8 times higher among the intervention group that among the control group; at the 2-year follow-up evaluations, rates remained significantly higher; Intervention participants also had significantly higher rates of hat use	Did not permit inferences about which intervention components were more powerful
Stock et al. (2010)	N = 148; Male outdoor workers	Participants in the intervention received or did not receive a UV photo of their face and watched either a photo aging or skin cancer educational video; Participants completed pre-intervention, immediate post-intervention, and 2-month and 1-year follow-up assessments	Participants in the UV photography and cancer information interventions reported higher levels of sun protection cognitions, which were significant partial mediators of increases in sun protection behaviors and decreases in skin color	Small, only-male population, lack of ethnic diversity and small range of skin type, and mediators were measured at the same time as sun protection behaviors and skin color

While the most common intervention revealed by these studies included education through written materials, several studies utilized technological interventions. Barysch and colleagues (2010) conducted a study using internet-based, interactive, educational programs, in addition to existing health promotion campaigns. The researchers found that such an intervention can enhance public participation in the middle aged male population in skin cancer prevention, pending the technological skill and internet access capability of the participants.

Kauffman and colleagues (2010) completed a study to determine the impact of a patient education tool on skin cancer detection and treatment in a primary care setting. While the study did not demonstrate a change in the number of cancers detected, an increased number of procedures were performed during the intervention period, demonstrating that the educational tool was effective at modifying patient behavior and suggested that more cancers/pre-cancers may have been found. Janda and colleagues (2009), conducted a similar trial using a video-based intervention to improve skin self-examination behavior among men 50 years and older. Confidence in finding time for and receiving advice or instructions by a care provider to perform skin self-examination were among the factors associated with thorough skin self-examination at baseline. While each of the aforementioned studies revealed important findings, there was a lack of information regarding the intent of the participants to change their current behaviors. Also, it would have been helpful to more thoroughly address the views of the participants regarding what they found to be the most helpful in educating and changing their usual behaviors. The lack of current research also is concerning and supports the need for studies focused on education regarding skin cancer prevention and early detection.

Research Gaps

The current literature on skin cancer prevention and screening has several limitations. A major limitation is the lack of research directed towards farmers and ranchers. There is also minimal research that has been conducted in the Upper Midwest. This study was focused specifically on individuals living in North Dakota with a primary or secondary occupation of farming, ranching, or both. An additional limitation is the lack of evidence linking skin cancer screening to improved health outcomes. Further research is needed to evaluate whether routine referral to dermatologic specialists might be effective. Given the lack of direct evidence,

modeling studies using available indirect evidence, including cost-effectiveness studies, may provide information on the usefulness of screening as a preventive strategy (Wolff, Tai & Miller, 2009).

There is a definite absence within current literature, as well as research assessing long-term effectiveness of sun safety education and skin cancer prevention methods. While Glanz and colleagues (2010) concluded that the aforementioned interventions are convenient, cost-effective, and can be implemented in a variety of settings, the researchers recognized that further research is needed to assess long-term effectiveness. Other limitations of current literature include a lack of large studies on accuracy of screening in the general population and a lack of information on whether screening in the general population would result in the identification of lesions at an earlier stage than regular care (Wolff, Tai & Miller, 2009).

Literature Summary

Although the prevalence of skin cancer is on the rise, the American Academy of Dermatology (2010) has determined that skin cancer has a cure rate of 99 percent with early detection. This illustrates the importance of health promotion and skin cancer prevention efforts. Such interventions include providing cancer education within the community, particularly emphasizing the importance of early detection through regular skin checks, encouraging primary care providers to comply with the current skin cancer screening regimens, encouraging the use of sunblock and hats, staying inside or in shaded areas during peak sun hours, and facilitating skin cancer education opportunities within the community.

There is a definite gap in research regarding the perceptions of skin cancer preventative measures among males, especially those living in rural communities. Additional research specifically addressing these perceptions is necessary. Although the aforementioned information

may be significantly related to the lack of education and compliance in protecting oneself from excessive sun exposure among the population, further research is needed to better understand the specific factors associated with skin cancer perceptions among the population at hand. The current study will add to the research base with the ultimate goal of improving prevention and detection of skin cancer among rural farmers and ranchers.

Theoretical Framework

Theories of health behavior change can identify targets for change and can help explain how health-promoting behaviors, such as skin protection measures, can be influenced (Keats, Culos-Reed, Courneya, & McBride, 2007). The Theory of Planned Behavior (TPB) is an extension of the Theory of Reasoned Action (TRA), incorporating the original model's limitations in dealing with behaviors over which people have incomplete volitional control (Ajzen, 1991). TPB can include non-volitional behavior of an individual which cannot be explained by TRA. A central factor in the TPB is the individual's intention to perform a given behavior. Intentions are the primary motivators in predicting a particular behavior and are indications of how willing people are to perform the behavior (Ajzen, 1991).

TPB has been shown to be very effective for explaining behavior. TPB states that intentions to perform a given behavior are predictive from attitudes towards the behavior, subjective norms, and perceived behavioral control (Keats, Culos-Reed, Courneya, & McBride, 2007). A subjective norm measures the perceived social pressure that an individual may feel to perform a specific behavior. Attitude reflects the individual's perceptions of performing the behavior and involves instrumental and affective subcomponents. Perceived behavioral control is comprised of self-efficacy and perceived control. In turn, these intentions, in addition to perceived behavioral control, account for actual behavior. Consequently, the TPB proposes that

individuals intend to perform a behavior when they evaluate it positively, believe that important others think that they should perform it, and perceive it to be under their control (Keats, Culos-Reed, Courneya, & McBride, 2007). Thus, education regarding skin cancer and sun protection measures, delivered by a provider in a family practice setting, offers individuals the knowledge that they need to take ownership in protecting and monitoring their skin.

The TPB attempts to account for the underlying beliefs that lead to attitude, subjective norm and perceived behavioral control. The first construct of intention recognized by the TPB is attitude toward a behavior. Attitude is proposed to be a function of behavioral beliefs, which refer to the perceived advantages and disadvantages of performing the behavior. Assessing attitude identifies if the individual has a positive or negative opinion of performing the behavior being researched (Ajzen, 1991). If an individual has a belief that practicing healthy sun protection behaviors has a desirable outcome, the individual's attitude and belief will be positive. If the individual believes that practicing certain sun protection behaviors would yield an undesirable outcome, the attitude and behavior belief would negatively impact his or her intention to practice these behaviors (McEwen & Wills, 2011).

The second construct used to predict intention is in identifying subjective norms with respect to behavior. Subjective norms constitute one's normative beliefs and can be defined as "the perceived social pressure to perform or not to perform the behavior" (Ajzen, 1991, p. 188). Azjen (2012) warns that motivation received from complying with social norms is only significant and useful in predicting intention if the person is motivated to agree with and has favorable feelings toward the person exerting the social pressure.

The third construct of intention in the TPB is the degree of perceived behavioral control guided by one's control beliefs. Control beliefs are thought to underlie perceived behavioral

control and focus on the presence or absence of the requisite resources and opportunities for performing the behavior (Keats, Culos-Reed, Courneya, & McBride, 2007). Azjen (1991) recognizes that perceived behavioral control "refers to the perceived ease or difficulty of performing the behavior and it is assumed to reflect past experiences as well as anticipated obstacles." The construct of perceived behavioral control includes factors that are not under an individual's direct control. Such factors may include educational opportunities, time, availability of resources, and skills (Ajzen, 1991). Typically, if attitudes and subjective norms regarding a particular behavior are positive, the perceived behavioral control will be greater, and the intention to perform the behavior will be stronger (McEwen & Wills, 2011). While support for the whole model has been established, the TPB variables of attitude and perceived behavioral control have been demonstrated to be the strongest predictors of intention (Keats, Culos-Reed, Courneya, & McBride, 2007).

Figure 1 shows the TPB model adapted for prevention of skin cancer and the use of skin protection measures. The intention to use sun protection is appropriately influenced by beliefs about sun protection and the regular use of sunscreen. Perceived barriers to use of sun protection measures further influence the intention of the individual. Demographics, including previous experiences, help create the belief system of the individual and may affect intention. Intention can be measured by self-reported practice and direct observation.

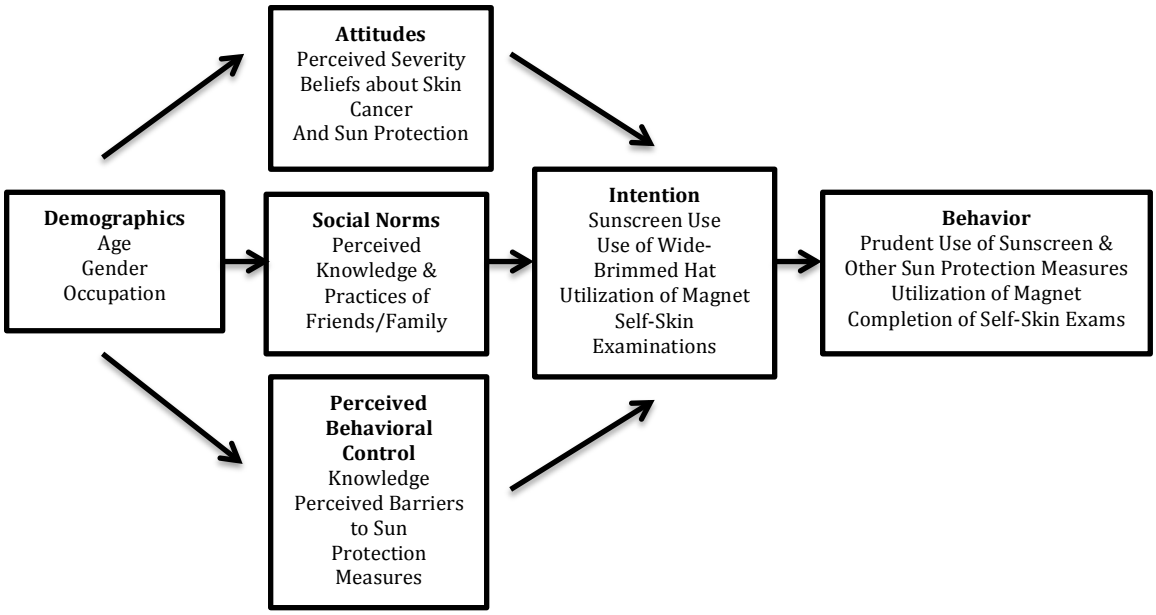

Figure 1. The TPB Model Adapted for Skin Cancer Prevention in Farmers and Ranchers

Clinical Dissertation Questions

The goal of the clinical dissertation project is to answer the following questions:

1. What are the current photoprotection practices of a sample of North Dakota farmers and ranchers?
2. Is a power point presentation, accompanied by written information, an effective method of providing skin cancer and sun protection education to a sample of North Dakota farmers and ranchers?
3. Would the use of verbal education, accompanied by written handouts, be useful in the family practice setting to provide knowledge to the patient about benefits of skin cancer prevention and screening?

Independent Variable- Verbal and written skin cancer education.

Dependent Variable- Intention to change behavior in regards to excessive sun exposure.

Assumptions

Assumptions for the clinical dissertation project are the following:

1. North Dakota farmers and ranchers want to protect themselves from excessive sun exposure and skin cancer.
2. The individuals that comprise the sample are interested in their health.
3. Human behavior is under the voluntary control of the individual.
4. Individuals think about the consequences and implications of their actions and behavior, prior to deciding whether or not to do something.
5. The stronger the intention to engage in a behavior, the more likely should be its performance.

Significance of Literature Review

The prevalence of skin cancer is increasing. Despite adequate knowledge of the effects of excessive sun exposure, many farmers and ranchers are at increased risk for skin cancer. By determining current health beliefs and attitudes of skin cancer prevention, one has a better understanding of what motivates individuals, allowing the opportunity to create preventative measures to decrease the risk of skin cancer among farmers and ranchers. Achievement of preventative measures will be done by determining where the gaps in education exist and promoting education to North Dakota farmers and ranchers in regard to excessive sun exposure and skin cancer prevention.

CHAPTER 3. METHODOLOGY

Clinical Dissertation Design

The purpose of the current study was to determine the effectiveness of a power point presentation, as well as an educational pamphlet and informational bookmark with an attached magnet in informing North Dakota farmers and ranchers about their increased risk of skin cancer. The above was completed by utilizing a descriptive, quantitative design. Effectiveness of the presentation and informational tools were the dependent variables, which were influenced by the independent variables: utilization of education and intention to change behavior in regards to excessive sun exposure.

Population and Sample

The research design utilized a convenience sample drawn from a Midwest agricultural population. The sample inclusion criteria consisted of the following characteristics: The subjects were male and female, primary residence was the state of North Dakota, present at the Morton County Soil Conservation Conference, included subjects with any skin type, 18 years of age or greater, and able to read and comprehend the English language.

Institutional Review Board Approval

Prior to the implementation of the study, approval was obtained through the Institutional Review Board (IRB) of North Dakota State University (#PH12157) (Appendix A). Completion of the survey presented little or no apparent risk for the participants. Benefits for the participants were educational in nature. An informational letter (Appendix B) was provided with the surveys explaining the study and that completion of the survey implied consent. Individual names were not submitted with the survey; therefore, participants remained anonymous.

Tools

An educational pamphlet and a bookmark, both created by the American Cancer Society, were utilized within the study to educate the participants about skin cancer. The author attached a magnet to each bookmark so that the participants would be able to place the bookmark on their fridge or filing cabinet where it would be a visible reminder to complete sun protection measures. The author explored the need for approval from the American Cancer Society to utilize the brochure and bookmark within the study. The response was that the educational materials may be used for public education and related research by the author. A power-point presentation was created and included information about the author along with objectives of the study, general information about skin cancer, statistics regarding skin cancer incidence in North Dakota, the different types of skin cancer, and healthy sun protection behaviors.

A literature review did elicit an appropriate tool for the study; a 13-item instrument to briefly assess participant demographics and skin cancer awareness of the individual. The tool was developed by Ragi, Patel, Masu, and Rao (2011) (Appendix C). Reliability and validity of the tool are in the process of being established. The questionnaire was utilized by Ragi and colleagues (2011) to assess individuals 18 and older who were seen at a private dermatologic practice in Fresno, California, in August 2009. Data collected by the questionnaire included age, sex, Fitzpatrick skin type (FST), the participant's baseline knowledge about skin cancer, and photoprotection strategies. Permission was obtained from Ragi et al. to utilize the survey from her study (Appendix D). A six question post-survey was created by the researcher to briefly assess the effectiveness of the presentation, pamphlet, and informational bookmark attached to a magnet, as well as intent of the participants (Appendix C).

Data Collection

The pre-survey was administered directly to the participants during the lunch hour at the 2012 Morton County Soil Conservation Conference in Mandan, ND. The pre-survey was attached to the outside of a packet, which included the informational handout, bookmark attached to a magnet, and the post-survey. The pre- and post-surveys were marked with corresponding numbers so that they could be paired during the data analysis. The participants were asked not to write their names, or any other identifying information, on the surveys to ensure participant confidentiality. The packet with pre-survey was administered at the beginning of the lunch hour, followed by an educational presentation, by the author, on health promotion and skin cancer prevention. The presentation incorporated skin cancer facts, health promotion techniques, and time for a question and answer period. The participants were then asked to review the educational materials prior to completing the post-survey inside the packet. All data collection took place on March 22, 2012. The results were then computed and analyzed by the author, with the assistance of a NDSU statistician.

Data Analysis and Dissemination of Results

The pretest was comprised of two sections: demographics and photoprotection. Participants were asked to include their age, gender, ethnicity, and occupation. They were also asked to identify their skin type and if they had a personal or family history of skin cancer. The photoprotection portion of the survey addressed sunscreen use, previous instruction on the use of sunscreen, and other sun protection measures currently used by the participant. The posttest addressed the effectiveness of the shared information, as well as intent of the participants to make changes to their previous sun protection practices. Following analysis of the data, results of the survey were divulged through the Morton County Soil Conservation newsletter. Results were

disseminated across the state of North Dakota on local radio and television stations, as well as through several articles published in area newspapers and magazines. A poster displaying the components and results of the project was displayed at the 3rd Annual North Dakota Nurse Practitioner Association Pharmacology Conference. Nurse practitioners from across the nation, as well as nurse practitioner students, were educated on the project and implications for practice. Approximately 80 educational pamphlets and bookmarks attached to a magnet were distributed at the conference.

CHAPTER 4. RESULTS

Sample Population

A total of 104 individuals, an estimated 100% of participants, agreed to participate in the study and completed the pre-survey; 94 of the participants completed both the pre- and post-survey. Various questions on seven of the surveys were left blank. After consultation with a NDSU statistician, all data sets were included in the overall analysis. However, the unanswered individual questions were excluded from data analysis of the individual questions. Percentages were calculated based on the number of responses per question.

Demographics

The first portion of the pre-survey focused on demographic information provided by the participants. Table 2 displays the demographic information of the participants. Forty-one of the participants were between the ages of 41 and 60. This age group included the largest number of participants (39%). Nine participants (9%) were 25 years of age or less, 29 (28%) participants were 25-40 years, 21 (20%) participants were 61-80 years, and four (4%) participants did not include an age on their survey. Seventy-three (70%) of the participants were male and 31 (30%) were female. All of the participants were of Caucasian/White ethnicity.

Occupation of the participants is displayed in Table 2. The options on the survey included farmer, rancher, both, and other. The primary occupation of one (1%) of the participants was farming only, 34 (33%) participants reported ranching to be their primary occupation, 22 (21%) participants reported farming and ranching to be their primary occupation, and 42 (40%) participants chose other as their primary occupation. Several of the participants that chose "other" as their primary occupation indicated on the survey that the majority of time spent at their occupation was outdoors or that they worked outside every day.

Some participants specifically mentioned their occupations, such as landowner or wildlife biologist. Five (5%) participants did not respond to this question.

The survey assessed the Fitzpatrick skin type of the participants. The primary skin type of participants was reported as "darker white, tans after initial sunburn." This skin type was reported by 57 (55%) participants. Five (5%) participants reported having skin that is "pale white, always burns, does not tan." Twenty-two (21%) participants reported having skin that is "white, burns easily, tans with difficulty." Fifteen (14%) participants reported having skin that is "light brown, tans easily, burns minimally." Four (4%) participants have skin that is "brown, tans easily, rarely burns." One (1%) participant reported having skin that is "dark brown to black, tans darkly."

Eleven of the participants reported having a personal history of skin cancer. Table 2 includes the breakdown of the type of skin cancer reported by these individuals. One may assume that several participants had more than one occurrence of skin cancer, as multiple locations of the cancer were chosen on the pre-survey by some of the participants that noted having a history of skin cancer. Twenty-four (23%) of the participants reported having family history of skin cancer. Sixty-five (63%) of participants did not have a family history of skin cancer, and 15 (14%) of participants did not respond to this question.

Table 2. Demographics and Participant Characteristics (Pre-Test)

Characteristic	n (%)
Demographics	
Age (in years)	(n=104)
Less than 25	9 (9%)
25-40	29 (28%)
41-60	41 (39%)
61-80	21 (20%)
No Response	4 (4%)
Gender	(n=104)
Male	73 (70%)
Female	31 (30%)
Ethnicity	(n=104)
Caucasian	104 (100%)
Primary or secondary occupation	(n=104)
Farmer	1 (1%)
Rancher	34 (33%)
Both	22 (21%)
Other	42 (40%)
No Response	5 (5%)
Skin type (FST)	(n=104)
1-Pale white, always burns, does not tan	5 (5%)
2-White, burns easily, tans with difficulty	22 (21%)
3-Darker white, tans after initial sunburn	57 (55%)
4-Light brown, tans easily, burns minimally	15 (14%)
5-Brown, tans easily, rarely burns	4 (4%)
6-Dark brown to black, tans darkly	1 (1%)
Personal history skin cancer	(n=104)
Yes	11 (11%)
No	93 (89%)
If yes, skin cancer type	(n=11)
Basal cell carcinoma	2 (18%)
Squamous cell carcinoma	1 (9%)
Basal cell and squamous cell carcinoma	1 (9%)
Melanoma	3 (27%)
I don't know	4 (37%)
Family history skin cancer	(n=104)
Yes	24 (23%)
No	65 (63%)
No Response	15 (14%)

Data Results

Question 1

The first clinical dissertation question was as follows: "What are the current photoprotection practices of a sample of North Dakota farmers and ranchers?" The second portion of the pre-survey included items that assessed the current photoprotection behaviors of the participants; the results of the survey are displayed in Table 3. It was found that 36% of participants did not use sunscreen and 50% of participants reported that they rarely or never included sunscreen as part of their daily routine. Participants age 25-40 reported the most frequent sunscreen use, as 21 of the 25 individuals (84%) within this age category reported that they use sunscreen. Participants age 60-80 were least likely to use sunscreen, as only 10 of the 21 participants (48%) in this age category reported using sunscreen. In considering those who did or did not have a personal history of skin cancer, those who had a personal history of skin cancer were more likely to use sunscreen than those who did not have a personal history of skin cancer. Nine of 11 individuals (82%) who had a personal history of skin cancer reported using sunscreen; whereas, 58 of 93 individuals (62%) who did not have a personal history of skin cancer reported using sunscreen. Those individuals who had a family history of skin cancer also reported greater use of sunscreen. Seventeen of 24 individuals (71%) who had a family history of skin cancer reported using sunscreen; 42 of 65 individuals (65%) without family history of skin cancer reported using sunscreen. Twenty-six percent of participants were unsure of when sunscreen should be applied prior to going outdoors and only 35% of participants believed that sunscreen should be applied the correct 20 minutes prior to sun exposure.

It was found that 74% of participants had never received instruction on sunscreen use, and of those that had received instruction, only 29% had received instruction by a general practitioner. A total of 24 subjects reported having received previous instruction on the use of sunscreen. The majority of participants (59%) received instruction on sunscreen use by a dermatologist. Seven of 24 (29%) subjects received instruction by a general practitioner, two (8%) subjects received instruction by a pediatrician, and one (4%) subject received instruction by a provider other than those listed above. Of those that had received instruction on the use of sunscreen, 11 of 14 subjects who had received instruction by a dermatologist reported current use of sunscreen. Five of the seven subjects who had received instruction on sunscreen use by a general practitioner reported current use of sunscreen. One of two subjects who had received instruction by a pediatrician reported current use of sunscreen, while the subject who had received instruction by a provider other than those listed reported not using sunscreen.

With regard to the use of other protective measures such as hats, sunglasses, umbrellas, and clothing, 101 subjects reported that they used one or more of those methods. Hats (reported by 88 subjects) were reported to be used most often, followed by sunglasses (reported by 70 subjects). Protective clothing was reported being worn by 63 subjects and one subject reported using an umbrella as a protective measure.

As mentioned above, hats were reported as being used most as a sun protection method by the subjects. When asked the type of hat worn, it was found that 70 (75%) subjects reported wearing a baseball cap, 17 (18%) subjects reported wearing wide-brimmed hats, 4 (4%) subjects wore both a baseball and wide-brimmed hat, and 3 (3%) subjects reported wearing a hat other than a baseball cap or wide-brimmed hat.

Table 3. Baseline Photoprotection Behaviors (Pre-Test)

Behavior	n (%)
Photoprotection Behaviors	
Current sunscreen use	(n=104)
Yes	67 (64%)
No	37 (36%)
SPF of sunscreen used	(n=77)
<4	1 (1%)
8	4 (5%)
15	19 (25%)
30	40 (52%)
50+	13 (17%)
Frequency of sunscreen use as part of daily routine	(n=104)
Always	5 (5%)
Often	21 (20%)
Often/Occasionally	1 (1%)
Occasionally	24 (23%)
Rarely	31 (30%)
Never	20 (19%)
No Response	2 (2%)
Frequency of sunscreen use	(n=104)
Always	4 (4%)
Often	21 (20%)
Occasionally	31 (30%)
Rarely	34 (33%)
Never	12 (11%)
No Response	2 (2%)
Frequency of reapplication of sunscreen (in hours)	(n=77)
≤2	13 (17%)
4	7 (9%)
8	6 (8%)
Once a Day	51 (66%)
Belief of when sunscreen should be applied prior to going outdoors	(n=94)
Immediately	34 (36%)
20 minutes	33 (35%)
2 hours	2 (2%)
4 hours	0 (0%)
After a sunburn	1 (1%)
Unsure	24 (26%)

(continued)

Table 3. Baseline Photoprotection Behaviors (Pre-Test) (continued)

Behavior	n (%)
Photoprotection Behaviors	
Application to ears when using sunscreen	(n=97)
Always	29 (30%)
Always/Often	1 (1%)
Often	22 (23%)
Occasionally	9 (9%)
Rarely	20 (21%)
Never	16 (16%)
Previous instruction on sunscreen use by a healthcare provider	(n=104)
Yes	25 (24%)
No	77 (74%)
No Response	2 (2%)
If yes, type of provider providing instruction	(n=24)
General practitioner	7 (29%)
Pediatrician	2 (8%)
Dermatologist	14 (59%)
Other	1 (4%)
Other sun protection behaviors utilized	(n=222)
Hat	88 (40%)
Sunglasses	70 (31%)
Umbrella	1 (1%)
Clothing	63 (28%)
Type of hat worn most frequently if hat is utilized	(n=94)
Wide-brimmed (ex. Cowboy hat)	17 (18%)
Baseball cap	70 (75%)
Both	4 (4%)
Other	3 (3%)

Question 2

The second clinical dissertation question was as follows: **"**Is a power point presentation, accompanied by written information, an effective method of providing skin cancer and sun protection education to a sample of North Dakota farmers and ranchers?" The results of the following post-survey questions revealed significant information that may be applied to nurse

practitioner practice in an attempt to improve patient knowledge regarding skin cancer and healthy sun protection behaviors.

Table 4 displays the results of the questions on the post-survey. The first question read, "Following today's presentation, I have a better understanding of skin cancer." Eighty-nine (95%) participants reported having a better understanding of skin cancer following the presentation and distribution of educational materials. Furthermore, sixteen of the participants answered that they "strongly agree" with this statement.

The second question on the post-survey read, "Following today's presentation, I am more likely to use sunscreen." Seventy-six (81%) participants reported increased intent to use sunscreen post-intervention. Eleven participants disagreed with the statement, five participants strongly disagreed with the statement, and one participant answered "unsure" for the question. Several participants who disagreed with the statement noted on their survey that they already used sunscreen, so they were not more likely to use it after the presentation because they currently did so.

A chi-square test was run to test the differences in proportion of sunscreen use and intent to use sunscreen from pre- to post-survey. There was a significant difference found between pre- to post-survey. The odds ratio showed that the intent of participants to observe sunscreen use after the presentation was 3.47 times than before. This was significant with p=0.0245 (CI=0.95).

The third question on the post-survey read, "Following today's presentation, I am more likely to wear a wide-brimmed hat vs. baseball cap." Sixty (64%) participants reported increased intent of wearing a wide-brimmed hat versus a baseball cap following the intervention. Thirty-one participants disagreed that they were more likely to wear a wide-brimmed hat versus a baseball cap and one participant answered "unsure" for this question. As, with the above

question regarding sunscreen use, several participants who disagreed with the statement "I am more likely to wear a wide-brimmed hat vs. baseball cap" noted on their survey that they already wear a wide-brimmed hat, so they were not more likely to wear one following the intervention than prior to because they currently did so.

The fourth question on the post-survey was, "Following today's presentation, I will place the magnet that I received on my fridge." Seventy-four (79%) participants reported intent to place the informational bookmark attached to a magnet on the refrigerator in their home or office. Twelve of the participants that agreed with the question answered that they "strongly agreed" with the statement. Fourteen participants disagreed with the previous statement and four participants strongly disagreed that they would place the magnet on their fridge.

The fifth question on the post-survey was, "Following today's presentation, I am more likely to complete self-skin examinations." Eighty-one (88%) participants reported increased intent to complete self-skin examinations post-intervention and twelve of those who agreed answered that they "strongly agree" with the statement. Nine participants disagreed that they were more likely to complete self-skin examinations, one participant strongly disagreed with this statement, and one participant answered "unsure" to the question.

Table 4. Post-Intervention Behavioral Intent (Post-Test)

Reported Response	n	(%)
Intent to Change Behavior		
Better understanding of skin cancer	(n=94)	
Strongly agree	16	(17%)
Agree	73	(78%)
Disagree	4	(4%)
Strongly disagree	0	(0%)
Unsure	1	(1%)
More likely to use sunscreen	(n=94)	
Strongly agree	9	(10%)
Agree	67	(71%)
Disagree	11	(12%)
Strongly disagree	5	(5%)
Unsure	1	(1%)
No Response	1	(1%)
More likely to wear wide-brimmed hat vs. baseball cap	(n=94)	
Strongly agree	9	(10%)
Agree	51	(54%)
Disagree	31	(33%)
Strongly disagree	0	(0%)
Unsure	1	(1%)
No Response	2	(2%)
Likeliness of placing educational magnet on fridge	(n=94)	
Strongly agree	12	(13%)
Agree	62	(66%)
Disagree	14	(15%)
Strongly disagree	4	(4%)
No Response	2	(2%)
More likely to complete self-skin examinations	(n=94)	
Strongly agree	12	(13%)
Agree	69	(75%)
Disagree	9	(10%)
Strongly disagree	1	(1%)
Unsure	1	(1%)
No Response	2	(2%)

Question 3

The third and final clinical dissertation question was "Would the use of verbal education, accompanied by written handouts, be useful in the family practice setting to provide knowledge to the patient about benefits of skin cancer prevention and screening?" The aforementioned research findings support that verbal and written education materials are effective methods of increasing skin cancer awareness and the intent to change current sun protection behaviors of farmers and ranchers. Figure 2 reflects the responses to the final survey question, "What was most helpful and will have the greatest influence on your future choices?"

The majority of participants found the presentation to be most helpful (61%), followed by the pamphlet and magnet, respectively. Several participants circled more than one answer for this question and four participants circled all of the options. One participant was unsure of what was most helpful and will have the greatest influence on future choices.

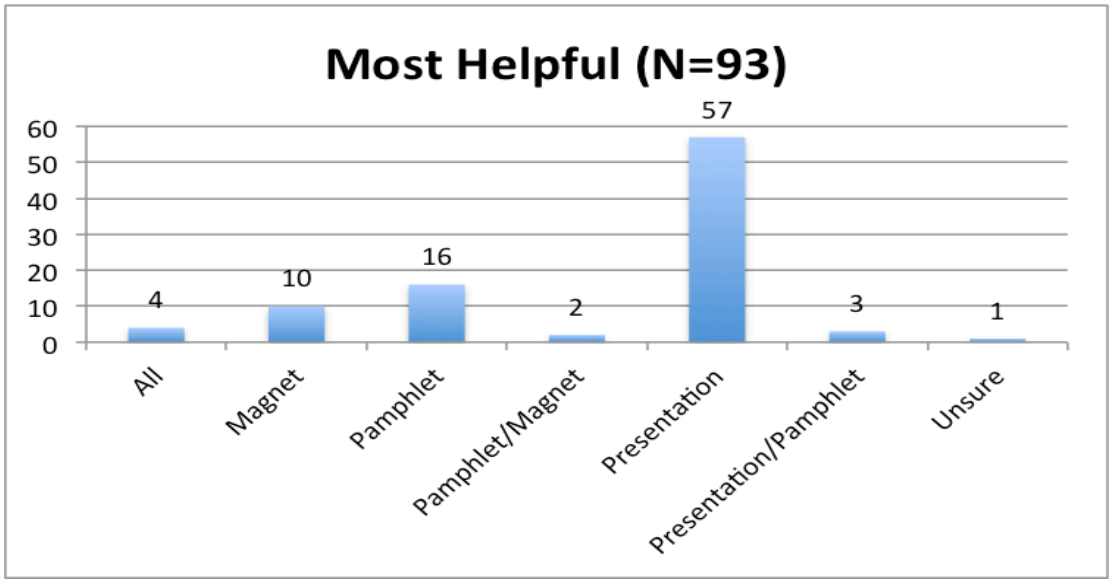

Figure 2. Post-Survey Question 6: Most Helpful Teaching Method of The Project Interventions

Cross Tabulations

Cross tabulations were completed to create contingency tables to assess interrelation between each item of the pre-test with the individual items included on the post-test. A normal approach would be to examine the chi-square outset. Due to the chi-square test being invalid in some cases as a result of low expected cell counts, primary emphasis was given to the Fisher's Exact Test. Based on the clinical dissertation questions, TPB model, and what was considered significant by the researchers, the data was analyzed. Concepts of the TPB model that were highlighted included demographics, attitudes (perceived severity and beliefs about skin cancer and sun protection), social norms (perceived knowledge and practices of friends/family), perceived behavioral control (knowledge and perceived barriers to sun protection measures), and intention (sunscreen use, the use of wide-brimmed hats, and completion of self-skin examinations). It is the hope of the researcher that intent would also influence behavior of the participants (prudent use of sunscreen and other sun protection measures and completion of self-skin examinations); however, this was not measurable in the study. The following contingency tables focus on the most salient subsets and items found most pertinent for the study.

Seventy-four of 90 participants reported intent to utilize sunscreen more post-intervention. Seventy-one percent of participants who did not use sunscreen pre-intervention, reported intent of being more likely to use sunscreen post-intervention. Eighty-nine percent of participants who reported using sunscreen pre-intervention, reported intent of being more likely to use sunscreen post-intervention. As previously mentioned, a chi-square test was run to test the differences in proportion of sunscreen use and intent to use sunscreen from pre- to post-survey. The odds ratio showed that participants were 3.47 times more likely to observe sunscreen use

after the presentation than before. This was significant with p=0.0245 (CI=0.95). Table 5 displays the cross tabulation of pre-sunscreen use by post-sunscreen use intent.

Table 5. Cross Tabulation of Pre-Sunscreen Use by Post-Sunscreen Use

Pre-Sunscreen Use	Post-Sunscreen Use		
	No	Yes	Total
No	10	24	34
Yes	6	50	56
Total	16	74	90
Chi-Square P-Value		0.0245	
Fisher's Exact P-Value		0.0439	

Eighty-seven participants reported having a better understanding of skin cancer post-intervention. Sixty-four percent of participants with a history of skin cancer reported having a better understanding of skin cancer post-intervention. Eighty-four percent of participants without a history of skin cancer reported having a better understanding of skin cancer post-intervention. Table 6 displays the cross tabulation of personal history of skin cancer by post-intervention understanding.

Eighty-seven participants reported having a better understanding of skin cancer post-intervention. Seventy-six percent of those who reported having a better understanding post-intervention had never received instruction on the use of sunscreen. Of the 25 participants who reported receiving previous instruction on sunscreen use by a healthcare provider, 16 reported that they had a better understanding of skin cancer post-intervention. Three participants who had received instruction on sunscreen use reported that they did not have a better understanding of

skin cancer post-intervention. Table 7 displays the results of the cross tabulation of instruction on sunscreen use by post-intervention understanding.

Table 6. Cross Tabulation of Personal History Skin Cancer by Post-Intervention Understanding

Personal History Skin Cancer	Post-Understanding				
	No Response	No	Unsure	Yes	Total
No Response	0	0	0	3	3
No	13	2	0	77	92
Yes	1	2	1	7	11
Total	14	4	1	87	106
Chi-Square P-Value			0.0108		
Fisher's Exact P-Value			0.0464		

Table 7. Cross Tabulation of Instruction on Sunscreen Use by Post-Intervention Understanding

Previous Instruction Sunscreen Use	Post-Understanding				
	No Response	No	Unsure	Yes	Total
No Response	0	0	0	5	5
No	9	1	0	66	76
Yes	5	3	1	16	25
Total	14	4	1	87	106
Chi-Square P-Value			0.0583		
Fisher's Exact P-Value			0.0518		

Eighty-three participants reported having skin types 1-3. All participants who reported having a personal history of skin cancer had skin types 1-3. No participants with the three darker

skin types reported having a personal history of skin cancer. Table 8 displays the cross tabulation of personal history of skin cancer by skin type.

Table 8. Cross Tabulation of Personal History of Skin Cancer by Skin Type

Personal History Skin Cancer	Skin Type		
	Skin Type 1-3	Skin Type 4-6	Total
No Response	0	3	3
No	72	20	92
Yes	11	0	11
Total	83	23	106
Chi-Square P-Value	0.001		
Fisher's Exact P-Value	0.002		

The majority (65%) of participants reported wearing a baseball cap most often when they wore a hat to protect themselves from the sun. Six of 11 participants who reported a personal history of skin cancer also reported wearing a baseball cap as their primary hat type. Three participants with a personal history of skin cancer reported a wide-brimmed hat as their primary hat choice and two participants with a history of skin cancer chose either "both" or "other" on the survey. Fourteen of 17 wide-brimmed hat wearers did not report a personal history of skin cancer. Table 9 displays the cross tabulation of personal history of skin cancer by hat type.

Twenty-one of 24 participants who reported having a family history of skin cancer also reported having fairer skin types 1-3. Three participants with the three darker skin types reported having a family history of skin cancer. Table 10 displays the cross tabulation of family history of skin cancer by skin type.

Table 9. Cross Tabulation of Personal History Skin Cancer by Hat Type

Personal History Skin Cancer	Hat Type			
	Baseball Cap	Wide-Brimmed	Both or Other	Total
No Response	0	0	3	3
No	63	14	15	92
Yes	6	3	2	11
Total	69	17	20	106
Chi-Square P-Value		0.0059		
Fisher's Exact P-Value		0.0192		

Table 10. Cross Tabulation of Family History of Skin Cancer by Skin Type

Family History Skin Cancer	Skin Type		
	Skin Type 1-3	Skin Type 4-6	Total
No Response	9	9	18
No	53	11	64
Yes	21	3	24
Total	83	23	106
Chi-Square P-Value	0.0054		
Fisher's Exact P-Value	0.0098		

As previously mentioned, the majority (65%) of participants reported wearing a baseball cap most often when they wore a hat to protect themselves from the sun. Twenty of 24 participants who reported a family history of skin cancer also reported wearing a baseball cap as their primary hat type. One participant with a family history of skin cancer reported a wide-brimmed hat as the primary hat choice and three participants with a family history of skin cancer chose either "both" or "other" on the survey. Fourteen of 17 wide-brimmed hat wearers did not

report a family history of skin cancer. Table 11 displays the cross tabulation of family history of skin cancer by hat type.

Sixty-six (62%) participants reported pre-intervention sunscreen use. Fifty-six participants who reported sunscreen use pre-intervention also reported having fairer skin types 1-3. Ten participants with skin types 4-6 reported sunscreen use pre-intervention. Table 11 displays the cross tabulation of family history of skin cancer by skin type. Table 12 displays the cross tabulation of pre-sunscreen use by skin type.

Forty-four of 66 participants who reported sunscreen use pre-intervention reported wearing a baseball cap as their primary hat type. Twelve participants who used sunscreen pre-intervention reported a wide-brimmed hat as the primary hat choice and ten participants who used sunscreen pre-intervention chose either "both" or "other" on the survey. Forty-four of 69 (64%) baseball cap wearers reported using sunscreen pre-intervention and twelve of 17 (71%) wide-brimmed hat wearers reported using sunscreen pre-intervention. Table 13 displays the cross tabulation of pre-sunscreen use by hat type.

Table 11. Cross Tabulation of Family History Skin Cancer by Hat Type

Family History Skin Cancer	Hat Type			
	Baseball Cap	Wide-Brimmed	Both or Other	Total
No Response	9	2	7	18
No	40	14	10	64
Yes	20	1	3	24
Total	69	17	20	106
Chi-Square P-Value		0.0348		
Fisher's Exact P-Value		0.0458		

Table 12. Cross Tabulation of Pre-Sunscreen Use by Skin Type

Pre-Sunscreen Use	Skin Type		
	Skin Type 1-3	Skin Type 4-6	Total
No Response	0	3	3
No	27	10	37
Yes	56	10	66
Total	83	23	106
Chi-Square P-Value	0.0014		
Fisher's Exact P-Value	0.0043		

Table 13. Cross Tabulation of Pre-Sunscreen Use by Hat Type

Pre-Sunscreen Use	Hat Type			
	Baseball Cap	Wide-Brimmed	Both or Other	Total
No Response	0	0	3	3
No	25	5	7	37
Yes	44	12	10	66
Total	69	17	20	106
Chi-Square P-Value	0.008			
Fisher's Exact P-Value	0.044			

CHAPTER 5. DISCUSSION AND CONCLUSION

Interpretation of Results

The aim of the study was to assess the current photoprotection practices of a sample of North Dakota farmers and ranchers, evaluate the effectiveness of verbal and written communication as an effective method of providing skin cancer and sun protection education to the sample, and to determine if the use of verbal education, accompanied by written handouts would be useful in the family practice setting to provide knowledge to patients about the benefits of skin cancer prevention and screening. It was found that 36% of participants did not currently use sunscreen and 50% of participants reported that they rarely or never include sunscreen as part of their daily routine. Participants age 25-40 reported the most frequent sunscreen use, as 21 of the 25 individuals (84%) within the age category reported that they use sunscreen. Participants age 60-80 were least likely to use sunscreen and those who reported a personal history of skin cancer were more likely to use sunscreen than participants who did not. Participants with a family history of skin cancer also reported greater use of sunscreen. Twenty-six percent of participants were unsure of when sunscreen should be applied prior to going outdoors and only 35% of participants believed that sunscreen should be applied the correct 20 minutes prior to sun exposure. The above findings support the need for education on the importance of proper sunscreen use, especially to older populations and individuals who have not had personal or familial experience with skin cancer.

A significant number (74%) of participants had never received instruction on sunscreen use, and of those that had received instruction, only 29% had received instruction by a general practitioner. Participants who had received instruction on sunscreen use were more likely to report current use of sunscreen. This finding illustrates the importance of health care providers,

especially nurse practitioners, to be diligent in educating their patients on proper sunscreen use.

The majority of participants found the presentation to be the most helpful intervention, followed by the pamphlet and magnet, respectively. The data of the research study supports the effectiveness of verbal and written education in informing individuals of skin cancer and healthy sun protection behaviors. These educational methods would likely be useful in the family practice setting to provide knowledge to the patient about benefits of skin cancer prevention and screening.

Seventy-one percent of participants who did not use sunscreen pre-intervention reported that they were more likely to use sunscreen post-intervention. Only six of 56 individuals who reported using sunscreen pre-intervention reported that they were not more likely to use sunscreen post-intervention. Some participants may have answered "no" because they already utilize sunscreen in their routine. The above finding emphasizes the importance of providing regular education regarding sunscreen use to patients.

Sixty-four percent of participants with a personal history of skin cancer reported having a better understanding of skin cancer post-intervention. Due to a history of skin cancer, it is likely that the individuals had significant education regarding skin cancer and sun protection behaviors; however, the research indicated that additional education was helpful in enhancing patient knowledge of skin cancer. Nurse practitioners should ensure that all individuals, regardless of personal or family history, are continually educated on skin cancer, sun protection behaviors, and regular skin self-examination.

Of the 25 participants who reported receiving previous instruction on sunscreen use by a healthcare provider, 16 reported that they had a better understanding of skin cancer post-intervention. The above finding reinforces the need for continuing education regarding skin

cancer and sunscreen use to individuals. Providers should incorporate sun protection education into patient visits whenever possible to emphasize the importance of sun protection behaviors and strengthen the knowledge of their patients.

All participants with skin type 4-6 who responded to the question on the post-survey, "I have a better understanding of skin cancer," answered that they did, in fact, have a better understanding of skin cancer post-intervention. Sixty-nine of 83 participants (83%) with skin type 1-3 also reported having a better understanding of skin cancer post-intervention. The above finding reinforces the importance of nurse practitioners providing skin cancer and sun protection education to all patients, regardless of skin type. Furthermore, over 75% of participants reported that they were more likely to complete self-skin examinations post-intervention. Nurse practitioners should properly educate and encourage patients to complete regular self-skin examinations.

Eleven participants reported having a personal history of skin cancer, all of whom had skin types 1-3. Nurse practitioners must be especially prudent in educating and monitoring patients with lighter skin types, as it is known that skin cancer is more common in those with fairer skin types. Six of 11 (55%) participants who reported having a personal history of skin cancer also reported a baseball cap as their primary hat type. Three (27%) participants with a personal history of skin cancer reported a wide-brimmed hat as their primary hat type and two (18%) participants with a personal history of skin cancer reported "both or other" as their primary hat type. Findings suggest that farmers may be more hesitant to utilize wide brimmed hats, reinforcing the importance of providing proper education regarding the increased protection offered by wide-brimmed hats, which can decrease sun exposure to the face and neck and ultimately decrease the incidence of skin cancer.

The majority of participants who reported having a family history of skin cancer also reported having skin type 1-3. Because skin type is an inherited trait, one may assume that many of the family members with a history of skin cancer also had fairer skin types. In addition, study findings revealed that participants who reported having a family history of skin cancer were also more likely to wear a baseball cap as their primary hat type. Additional research could be conducted to determine whether or not family members with a history of skin cancer utilized sun protection behaviors and if so, what type. Such information would add to the research, as well as recognize behaviors identified in the TPB model: attitudes, social norms, and perceived behavioral control.

Sixty-seven percent of participants with skin types 1-3 reported using sunscreen on the pre-survey, whereas only 43 percent of participants with darker skin types 4-6 reported using sunscreen on the pre-survey. Although skin cancer is less common in darker skinned people, it may account for a higher morbidity and mortality rate due to lack of awareness by patients and healthcare professionals (Godsell, 2012). Patients with darker skin are not completely protected from the sun's rays; thus, persons of all skin types should be strongly encouraged to utilize sunscreen and other sun protection measures.

Participants who chose baseball caps, as opposed to wide-brimmed hats, as their primary hat type were less likely to report using sunscreen pre-intervention. Individuals who wear baseball caps rather than wide-brimmed hats should be taking special precaution to apply sunscreen to their face. Those who primarily wear baseball caps should be strongly encouraged to be particularly diligent in applying sunscreen to areas of the face that are not directly covered by the cap (Ragi, et al., 2010).

Approximately 80% of skin cancers occur in locations on the body frequently exposed to the sun (Diepgen, 2002). Harris (2004) stated that limiting unprotected UV exposure is the primary preventative measure for skin cancer. Programs using brochures, brief conversations, and action learning can be effective in limiting unprotected UV exposure (Christensen, Williams, Pfister, Pace, & Palmar, 2007). Improvement in knowledge regarding risk for skin cancer and many sun exposure practices were the result of the study. Behaviors that showed significant improvement were an intended increased use of sunscreen and utilization of provided skin cancer prevention materials. Participants also noted that they were more likely to complete self-skin examinations following the intervention. There was a trend toward decreasing the sole use of baseball caps. Hat use is an area for additional focus and education, as men who tend to wear hats prefer baseball caps that leave the ears exposed to the sun, over wide-brimmed hats.

There are many campaigns to increase public awareness of skin cancer. For campaigns to be effective, one must assess the public's current knowledge of skin cancer, sun exposure, and photoprotection (Ragi, Patel, Masud, & Rao, 2010). Health promoters working with farmers and ranchers may be more effective if they stress that practicing a few behaviors will help them avoid skin cancer and ultimately save them time and money in the long run. The first step is increasing awareness and education, which will hopefully lead to increased use of sunscreen, wide-brimmed hats, and protective clothing. Small behavioral adaptations that move farmers and ranchers toward smart sun protection behaviors that do not interfere with their work may be an effective approach (Silk & Parrott, 2009).

Limitations

The research study had a relatively small sample size of 104 participants with 98 who completed every question on both the pre- and post-surveys. The sample population was not

diverse, consisting entirely of Caucasian participants, in one geographic location. Utilizing a larger sample size with greater diversity would generate better results and potentiate better data analysis with more generalization.

Data was collected from individuals who were attending an agricultural conference, which could have potentially influenced results. Individuals more involved in community events, such as this conference, may take more initiative to protect themselves and educate themselves about health promotion and disease prevention than the general population. Increased knowledge could potentially have led to healthier lifestyles by the participants. The research focused specifically on sun protection behavior pre-intervention and intent of participants to change post-intervention. The research only measured the intent of participants to change, not the actual behavior that changes post-intervention. Furthermore, the research did not examine any psychosocial or social determinants that influence behavior or intent to change behavior.

An additional limitation to the research was that only one behavior on the pre- and post-surveys was statistically analyzable. Sunscreen use reported on the pre-survey and intent to utilize sunscreen as reported on the post-survey was the only behavior that could be analyzed statistically. The pre- and post-surveys did address hat use, but due to limitations in the data, statistical comparisons could not be computed.

The length of the survey and the time necessary for completion may have affected results. The pre- and post-survey each took only approximately five minutes to complete; however, the fewer number of post-surveys that were completed than pre-surveys may have been a result of loss of interest during the presentation or not recognizing the importance of completing both surveys. A potential limitation is the inherent bias of the participants in responding to survey questions, as answers may have been affected by their desire to appease the researcher.

Implications for Nurse Practitioners

Health promotion is a core competency for nurse practitioners (Bradley, 2012), who are in an excellent position to provide education that will positively impact patients. "Knowledge, regarding sun protection, is essential to change behavior and to reduce sun exposure of patients at risk for skin cancer. Patient education regarding appropriate sun protection measures is a priority to reduce skin cancer incidence" (Thomas et al., 2011, p. 19). Seventy-four percent of participants reported that they had never received instruction on the use of sunscreen by a health care provider, presenting an excellent educational opportunity for all providers to become more aware of the importance of sun protection education, as well as the completion of regular skin examinations. The importance of sun protection education is supported by the finding that participants who had received instruction on proper sunscreen use by a health care provider had an increased likelihood of current sunscreen use. There is also an opportunity for the provider to teach the patient the importance of regular skin examinations at home, as well as how to properly complete self-skin examinations. The computed odds ratio showed that participants were 3.47 times more likely to observe sunscreen use after the presentation than before, reinforcing the importance of educating patients on skin cancer and sunscreen use. Sixty-one percent of participants found the presentation to be the most helpful in educating them on skin cancer and sun protection, followed by the pamphlet and magnet. Education including the UV-induced risk of skin cancer, as well as the importance of healthy sun protection measures, is of utmost importance in achieving skin cancer prevention (Thomas et al., 2011). The findings of this study support the importance and effectiveness of health care providers in the family practice setting to verbally discuss skin cancer and sun protection behaviors with their patients, as well as provide patients with written educational information.

Skin cancer incidence is on the rise, making sun protection a major public health management issue (Thomas et al., 2011). By screening for skin cancer, promoting early detection of skin cancer, and promoting healthy sun protection behaviors, nurse practitioners can impact the lives of their patients (Bradley, 2012). In addition to persistent patient education, continuing health education on sun protection should be encouraged in order to decrease the morbidity and mortality of skin cancer. It can be recommended that targeted educational interventions be developed to increase preventative and early intervention behaviors for the control of skin cancer (Bradley, 2012). Practitioners may want to collaborate with state public health agencies to enhance their available educational resources so that they may appropriately tailor and target effective health messages for different groups of farmers and ranchers (Silk & Parrott, 2009).

Recommendations for Future Research

Similar research to the current study should be completed in other regions of North Dakota, as well as across other parts of the United States. Additional studies would allow better generalization with the results and offer the opportunity for a comparison study. Do farmers and ranchers in other areas of the United States practice different skin protection habits? Do providers in warmer climates practice better health promotion in regard to skin protection and cancer prevention? The current study could be extended to primary care providers who are likely to give repeated education to patients.

A similar project examining long-term effects and actual resulting behaviors associated with skin cancer education and sun protection behaviors would be beneficial. Such a study could examine the effect of the intervention across the lifespan. Such a project would be particularly helpful in noting differences in skin cancer incidence in individuals with a personal or family history of skin cancer, as well as in those who practiced various sun protection behaviors.

Having an increased awareness of what sun protection behaviors are most effective would add to the body of knowledge supporting the proper education offered by care providers.

Additional research examining psychosocial or social determinants that influence sun protection behaviors would be helpful. Research specifically addressing attitudes and social norms would identify additional barriers and enhance educational focus and goals. Research is also needed to further develop technologies and vehicles for administering relevant and effective interventions for behavior change. Studying the effectiveness of web-based education, television, radio, and other media sources would identify valuable means of education and increase knowledge of healthy sun protection behaviors and skin cancer prevention.

Conclusion

The outdoor work force is a population at significantly high risk for the development of skin cancer due to occupational exposures to ultraviolet radiation (Gaetano, Hodge, Clark, Ackerman, Burdick, & Cook, 2009). Primary prevention and early detection continue to be of paramount importance in addressing the public health threat of both malignant melanoma and non-melanoma skin cancer (Kasparian, McLoone, & Meiser, 2009). The research study showed areas for improvement from many aspects and reinforced the need for more directed public education about skin cancer and photoprotection. There is definitely the need for education regarding excessive sun exposure and skin cancer prevention among North Dakota farmers and ranchers, as well as outdoor workers across the United States. Providers should recognize educational opportunities and the importance to discuss healthy skin behaviors and health promotion measures with their patients. Providers play a vital role in early education, as well as early detection. Providers should take advantage of visits with patients at increased risk for skin cancer, including education and skin examinations whenever possible. Furthermore, well child

visits should include education for parents, as well as patients, on protecting their child's skin. By providing education and sun protection practices early in life, one might reduce risk of skin cancers later in life. The Theory of Planned Behavior proposes that individuals intend to perform a behavior when they evaluate it positively, believe that important others think that they should perform it, and perceive it to be under their control (Keats, Culos-Reed, Courneya, & McBride, 2007). The aforementioned information reinforces the importance of primary care providers offering skin cancer and sun protection education, which will provide individuals with the knowledge that they need to take ownership in protecting and monitoring their skin.

Community based skin cancer awareness programs can also improve sun exposure behaviors and overall knowledge of skin cancer risk factors (Christensen, Williams, Pfister, Pace, & Palmar, 2007). Programs may include the distribution of educational materials at local agricultural events and meetings or articles in agricultural newsletters that provide information on sun safe behaviors such as the use of sunscreen and protective clothing. The study findings highlight that reported intentions may be significantly changed based on verbal and written instruction, which is very encouraging for nurse practitioners. There is great potential for increased skin cancer awareness and sun protection education in the lives of North Dakota farmers and ranchers.

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APPENDIX A. NDSU IRB LETTER OF APPROVAL

NDSU NORTH DAKOTA STATE UNIVERSITY

Institutional Review Board
Office of the Vice President for Research, Creative Activities and Technology Transfer
NDSU Dept. 4000
1735 NDSU Research Park Drive
Research 1, P.O. Box 6050
Fargo, ND 58108-6050

701.231.8995
Fax 701.231.8098
Federalwide Assurance #FWA00002439

Thursday, March 08, 2012

Dr. Norma Kiser-Larson
Nursing
Sudro Hall

Re: IRB Certification of Human Research Project:

"Skin Cancer Prevention in North Dakota Farmers and Ranchers"
Protocol **#PH12157**

Co-investigator(s) and research team: **Kathryn Gustin**

Study site(s): **varied** Funding: **n/a**

It has been determined that this human subjects research project qualifies for exempt status (category # 2) in accordance with federal regulations (Code of Federal Regulations, Title 45, Part 46, *Protection of Human Subjects*). This determination is based on the protocol form received 3/7/2012 and consent/information sheet received 3/8/2012.

Please also note the following:

- This determination of exemption expires 3 years from this date. If you wish to continue the research after 3/7/2015, the IRB must re-certify the protocol prior to this date.
- The project must be conducted as described in the approved protocol. If you wish to make changes, pre-approval is to be obtained from the IRB, unless the changes are necessary to eliminate an apparent immediate hazard to subjects. A *Protocol Amendment Request Form* is available on the IRB website.
- Prompt, written notification must be made to the IRB of any adverse events, complaints, or unanticipated problems involving risks to subjects or others related to this project.
- Any significant new findings that may affect the risks and benefits to participation will be reported in writing to the participants and the IRB.
- Research records may be subject to a random or directed audit at any time to verify compliance with IRB policies.

Thank you for complying with NDSU IRB procedures; best wishes for success with your project.

Sincerely,
Kristy Shirley
Kristy Shirley, CIP, Research Compliance Administrator

APPENDIX B. LETTER OF PERMISSION FROM JENNIFER RAGI

Jennifer Ragi [jenragi@gmail.com]

Tuesday, January 03, 2012 4:05 PM

Hello

Thank you for your interest in this topic and survey. I would be more than happy for you to utilize the survey and I think your topic sounds great. I would make a modification to the survey if you are interested in the focus of NMSC on the ear--> under photoprotection I would add a question about the type of hat (wide brim vs baseball) since I suspect that men are using baseball hats which does not adequately protect the ear.
I would be very interested in receiving a copy of your final dissertation and results.

Best,
Jennifer Ragi, MD

APPENDIX C. PROJECT LETTER OF CONSENT

NDSU | NORTH DAKOTA STATE UNIVERSITY

Hello, my name is Kathryn Gustin and I am currently a Doctor of Nursing Practice student at North Dakota State University. With the help of Dr. Norma Kiser-Larson, a professor of nursing at NDSU, I am conducting a research study to address current skin cancer incidence and skin cancer prevention knowledge in North Dakota farmers and ranchers. The aim of the study is to improve the knowledge base, prevention, and early detection of skin cancers among this population. The study involves filling out two questionnaires that will take less than 5 minutes each to complete.

The information that you include on each of the surveys will remain confidential and will only be divulged within the study as aggregate data.

The benefits of the study, in which you are about to participate, are educational in nature. Participation in the study does not present any risks to you as a participant.

It is completely up to you whether to participate. You may withdraw at any time and you may skip questions you would prefer not to answer.

If you have any questions about this research, please ask me now. If you have questions at a later time, you can contact me at the following:

Kathryn.Gustin@my.ndsu.edu or (701) 527-7688

For questions about the research project, you may also contact Dr. Norma Kiser-Larson at Norma.Kiser-Larson@ndsu.edu

For questions about research subjects' rights or to file a complaint regarding this research project, please contact NDSU Human Research Protection Office at (701) 231-8908 or ndsu.irb@ndsu.edu

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APPENDIX D. PROJECT PRE- AND POST-SURVEYS WITH RESPONSES

N= 104 NR= Number of non-responses

Demographics

Age:	Less than 25	**9, 9%**			
	25-40	**29, 28%**			
	41-60	**41, 39%**			
	61-80	**21, 20%**	NR= **4, 4%**		
Gender:	Male	**73, 70%**	Female	**31, 30%**	
Ethnicity:	Caucasian/White	**104, 100%**	Other	**0, 0%**	
Primary or secondary occupation: (circle one)			Farmer	**1, 1%**	
			Rancher	**34, 33%**	
			Both	**22, 21%**	
			Other	**42, 40%**	NR= **5, 5%**

Please check your skin type:

pale white, always burns, does not tan	**5, 5%**
white, burns easily, tans with difficulty	**22, 21%**
darker white, tans after initial sunburn	**57, 55%**
light brown, tans easily, burns minimally	**15, 14%**
brown, tans easily, rarely burns	**4, 4%**
dark brown to black, tans darkly	**1, 1%**

Do you have a personal history of skin cancer? yes **11, 11%** no **93, 89%**

If yes:

Which type of skin cancer? (N=11)

Basal Cell Cancer	**2, 18%**
Squamous Cell Cancer	**1, 9%**
Basal Cell/Squamous Cell	**1**, **9%**
Melanoma	**3, 27%**
I don't know	**4, 37%**

Location of skin cancer: (please circle)

Cheeks **-3**	Nose-**4**	Forehead-**1**	Ears-**3**	Scalp-**0**	Neck-**0**	Back-**2**
Chest-**0**	Hands-**2**	Abdomen-**0**	Arms-**4**	Thighs-**0**	Legs -**0**	Other-**1**

Do you have a family history of skin cancer: yes **24, 23%** no **65, 63%** NR=**15, 14%**

Photoprotection

Do you use sunscreen?	Yes	**67, 64%**	No	**37, 36%**
If yes, what is the SPF?		<4		**1, 1%**
		8		**4, 5%**
		15		**19, 25%**
		30		**40, 52%**
		50+		**13, 17%**

Is sunscreen part of your daily routine?

Always	**5, 5%**	
Often	**21, 20%**	
Often/Occasionally	**1, 1%**	
Occasionally	**24, 23%**	
Rarely	**31, 30%**	
Never	**20, 19%**	NR= **2, 2%**

How often do you use sunscreen?

Always	**4, 4%**	
Often	**21, 20%**	
Occasionally	**31, 30%**	
Rarely	**34, 33%**	
Never	**12, 11%**	NR= **2, 2%**

How often do you reapply your sunscreen? (answer in hours) (N=77)

≤2	**13, 17%**
4	**7, 9%**
8	**6, 8%**
Once a Day	**51, 66%**

Prior to going outdoors, when should sunscreen be applied? (N=94)

Immediately	**34, 36%**
20 minutes	**33, 35%**
2 hours	**2, 2%**
4 hours	**0, 0%**
After a sunburn	**1, 1%**
Unsure	**24, 26%**

When using sunscreen, how careful are you about applying sunscreen to your ears? (N=97)

Always	**29, 30%**
Always/Often	**1, 1%**
Often	**22, 23%**
Occasionally	**9, 9%**
Rarely	**20, 20%**
Never	**16, 16%**

Has any healthcare provider instructed you on the use of sunscreen? Yes **25, 24%** No **77, 74%** NR **2, 2%**

If yes, which provider? (N=24)

General practitioner	**7, 29%**
Pediatrician	**2, 8%**
Dermatologist	**14, 59%**
Other	**1, 4%**
NR= **1**	

Do you use any other sun protection? (circle all that apply) (N=222)

Hat	**88**
Sunglasses	**70**
Umbrella	**1**
Clothing	**63**

If you wear a hat to protect yourself from the sun, which of the following do you wear most often? (N=94)

Wide-brimmed hat (ex. Cowboy hat)	**17, 18%**
Baseball Cap	**70**, **75%**
Both	**4, 4%**
Other	**3. 3%**

Following Today's Presentation: (N=94), NR=Number of non-responses

I have a better understanding of skin cancer

Strongly agree	**16, 17%**
Agree	**73, 78%**
Disagree	**4, 4%**
Strongly disagree	**0, 0%**
Unsure	**1, 1%**

I am more likely to use sunscreen

Strongly agree	**9, 10%**
Agree	**67, 71%**
Disagree	**11, 12%**
Strongly disagree	**5, 5%**
Unsure	**1, 1%**
NR=	**1, 1%**

I am more likely to wear a wide-brimmed hat vs. baseball cap

Strongly agree	**9, 10%**
Agree	**51, 54%**
Disagree	**31, 33%**
Strongly disagree	**0, 0%**
Unsure	**1, 1%**
NR=	**2, 2%**

I will place the magnet that I received on my fridge

Strongly agree	**12, 13%**
Agree	**62, 66%**
Disagree	**14, 15%**
Strongly disagree	**4, 4%**
NR=	**2, 2%**

I am more likely to complete self-skin examinations

Strongly agree	**12, 13%**
Agree	**69, 75%**
Disagree	**9, 10%**
Strongly disagree	**1, 1%**
Unsure	**1, 1%**
NR=	**2, 2%**

What was most helpful and will have the greatest influence on your future choices?

All	**4, 4%**
Presentation	**57, 61%**
Pamphlet	**16, 17%**
Magnet	**10, 11%**
Pamphlet/Magnet	**2, 2%**
Presentation/Pamphlet	**3, 3%**
Unsure	**1, 1%**
NR=	**1, 1%**

APPENDIX E. SKIN CANCER BROCHURE INCLUDED IN PACKET

Skin Cancer

Of all the cancers that humans can get, skin cancer is the most common. In the United States, skin cancer is increasing in all races.

Who gets skin cancer?

People of all colors and races get skin cancer. Those with light skin who sunburn easily have a higher risk. Risk factors include: sunburns, family history of skin cancer, exposure to x-rays, weakened immune system, scarring caused by a disease or burn, and exposure to cancer-causing compounds such as arsenic. Using indoor tanning devices such as tanning beds and sunlamps also increases the risk of developing skin cancer.

What does skin cancer look like?

There are different types of skin cancer, and each tends to look a bit different.

■ ACTINIC KERATOSES (AK)

These dry, scaly patches or spots are considered the earliest stage in the development of skin cancer. In rare cases, an AK can progress to a type of skin cancer called squamous cell carcinoma (SCC).

Actinic Keratosis

People who get AKs usually have fair skin. Most people see their first AKs after 40 years of age because AKs tend to develop after years of sun exposure. But even teens can have AKs when they live in sunny areas or use indoor tanning. AKs form on skin that gets lots of sun exposure, such as the head, neck, hands, and forearms. Because AKs increase the risk of getting SCC, AKs are usually treated. Proper use of sunscreens can help prevent AKs.

■ BASAL CELL CARCINOMA (BCC)

This is the most common type of skin cancer. It frequently looks like a flesh-colored, pearl-like bump. It also can appear as a pinkish patch of skin. Like AKs, BCC develops on skin that gets frequent sun exposure, such as the head, neck, and arms. Many BCCs also form on the trunk and lower limbs. While BCC frequently develops in people who have fair skin, it can occur in people with dark skin. BCC usually does not grow quickly,

Basal Cell Carcinoma
J Am Acad Dermatol 2001;44:293-297

and it rarely spreads to other parts of the body. But it should be treated promptly. This cancer can invade the surrounding tissue and grow into the nerves and bones, causing damage and disfigurement.

■ SQUAMOUS CELL CARCINOMA (SCC)

SCC is the second most common type of skin cancer. This skin cancer often looks like a firm bump, scaly patch, or an ulcer that heals and then re-opens. SCC is usually reddish in color. It tends to form on skin that gets frequent sun exposure, such as the rim of the ear, face, neck, arms, and trunk. People who have light skin are most likely to develop SCC, but it can also develop in dark-skinned people, especially those who have scarring. Because SCC can grow deep, it can cause damage and disfigurement. Early treatment can prevent this and stop SCC from spreading to other areas of the body.

Squamous Cell Carcinoma

■ MELANOMA

This skin cancer frequently develops in a mole or appears suddenly as a new dark spot on the skin. Either way, melanoma can be deadly. Every year, more than 8,500 Americans (nearly one person per hour) die from melanoma, making melanoma the deadliest form of skin cancer.

Are there warning signs?

It is estimated that more than 120,000 Americans will develop melanoma this year. A change is often the first sign of melanoma; therefore, it is important to know where moles appear and what they look like. When detected and properly treated before it spreads, melanoma has a high cure rate. The ABCDE warning signs of melanoma can help people detect change:

A stands for **ASYMMETRY**; one half unlike the other half.

B stands for **BORDER**; irregular, scalloped or poorly defined border.

C stands for **COLOR**; varied from one area to another; shades of tan and brown, black; sometimes white, red or blue.

D stands for **DIAMETER**; while melanomas are usually greater than 6mm (the size of a pencil eraser) when diagnosed, they can be smaller.

E stands for **EVOLVING**; a mole or skin lesion that looks different from the rest or is changing in size, shape, or color.

Periodic self-examination

Early detection and treatment is key to surviving melanoma. It is beneficial to get assistance from a partner in performing skin self-exams. Get familiar with your skin and your own pattern of moles, freckles, and "beauty marks." Make sure to look at your entire body every month or two. Consult a dermatologist promptly if any changes are noticed.

1 Examine body front and back in mirror, then right and left sides, arms raised.

2 Bend elbows, look carefully at forearms, back of upper arms, and palms.

3 Look at backs of legs and feet, spaces between toes, and soles.

4 Examine back of neck and scalp with a hand mirror. Part hair and lift.

5 Finally, check back and buttocks with a hand mirror.

One type of skin exam is the skin self-exam. During a self-exam, people examine their own skin for signs of change. If a growth, mole, sore, or skin discoloration appears suddenly, or begins to change, see a dermatologist.

People who have spent time in the sun, have a family history of skin cancer (especially melanoma), have many moles or atypical moles, or have other risk factors for skin cancer should see a dermatologist for regular skin exams. Some people should have this exam once a year. Others need more frequent exams. A dermatologist will recommend the frequency that is best for each patient.

If during the skin exam, a dermatologist sees a potential skin cancer, the dermatologist will remove the growth (or part of it) so that it can be examined under a microscope. This is called a biopsy. A dermatologist can safely and quickly perform this procedure during an office visit.

If the biopsy report confirms that the suspicious growth is skin cancer, more treatment may be needed. When caught early and the entire growth is removed, sometimes further treatment is not needed. If further treatment is needed, the dermatologist will choose from an array of medical and surgical treatments for skin cancer. Treatment varies with the type of skin cancer, the size and location of the skin cancer, and the needs of the patient.

How can I protect myself?

Sun exposure is the most preventable risk factor for all skin cancers, including melanoma. You can have fun in the sun and decrease your risk of skin cancer. Here's how to Be Sun Smart®:

- **Generously apply a broad-spectrum water-resistant sunscreen** with a Sun Protection Factor (SPF) of 30 or more to all exposed skin. Broad-spectrum provides protection from both ultraviolet A (UVA) and ultraviolet B (UVB) rays. Re-apply approximately every two hours, even on cloudy days, and after swimming or sweating.
- **Wear protective clothing,** such as a long-sleeved shirt, pants, a wide-brimmed hat and sunglasses, where possible.
- **Seek shade** when appropriate, remembering that the sun's rays are strongest between 10 a.m. and 4 p.m. If your shadow is shorter than you are, seek shade.
- **Protect children** from sun exposure by playing in the shade, wearing protective clothing, and applying sunscreen.
- **Use extra caution near water, snow, and sand** as they reflect the damaging rays of the sun which can increase your chance of sunburn.
- **Get vitamin D safely** through a healthy diet that may include vitamin supplements. Don't seek the sun.
- **Avoid tanning beds.** Ultraviolet light from the sun and tanning beds can cause skin cancer and wrinkling. If you want to look like you've been in the sun, consider using a sunless self-tanning product, but continue to use sunscreen with it.
- **Check your birthday suit on your birthday.** If you notice anything changing, growing, or bleeding on your skin, see a dermatologist. Skin cancer is very treatable when caught early.

Check the Academy's Web site (www.aad.org) for the latest list of sun-protective products that meet the stringent criteria of the AAD SEAL OF RECOGNITION®.

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A dermatologist is a physician who specializes in treating the medical, surgical and cosmetic conditions of the skin, hair and nails. To learn more about skin cancer, log onto www.aad.org or call toll-free (888) 462-DERM (3376) to find a dermatologist in your area.

American Academy of Dermatology
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AAD Public Information Center: (888) 462-DERM (3376)
AAD Member Resource Center: (866) 503-SKIN (7546)
Web: www.aad.org

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APPENDIX F. EDUCATIONAL BOOKMARK INCLUDED IN PACKET