THE RELATIONSHIP BETWEEN SELF-MANAGEMENT BEHAVIORS AND ASSOCIATED FACTORS IN PATIENTS WITH DIABETIC FOOT ULCERATION

by

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Self-management behaviors support patient and family members' engagement in treating diabetes. Such behaviors are most effective when accompanied by knowledge, beliefs, and social facilitation. Interprofessional collaborative (IPC) teams have the ability to promote self-care behaviors and patient engagement in treating diabetes. To date, no study has specifically looked at the relationship between patient perceptions of IPC teamwork (PP-IPCT) and self-management behaviors (SM). The purpose of this study was to examine the relationship between SM, family support (FS), PP-IPCT, health-related quality of life (HRQoL), wound size (WS), glycemic stability (SMBG), and demographics in patients with diabetic foot ulceration (DFU).

Using a cross-sectional, descriptive, correlational research design, participants diagnosed with DFU completed a demographic data form and instruments to measure the associated factors. A variable summary was computed using descriptive statistics. Measures of central tendency (mode, median, and mean), and measures of dispersion (range and standard deviation) were used to initially analyze participant results of the demographic data, Patient Activation Measure (PAM), Family Adaptation, Partnership, Growth, Affection, Resolve (APGAR), Patients' Insights and Views of Teamwork (PIVOT), and Short-Form 12 version 2 (SF-12v2) survey tools. A Pearson correlation coefficient was used to determine the strength and direction of relationships between SM, FS, PP-IPCT, and HRQoL. The lowest group means scores occurred for role physical (RP [M = 8.59]), role emotional (RE [M = 24.22]), and general health (GH [M = 26.95]), where all the means are less than 30. The highest means were observed for mental health (MH [M = 62.97]) and bodily pain (BP [M = 50.39]). There were very weak correlations between the PIVOT, PAM, and Family APGAR scales. The PIVOT scale had one positive medium correlation with the SF-12 physical functioning (PF) scale (*r* = .33) and small correlations with the other SF-12 scale scores. The PAM had one positive medium correlation with the GH scale (*r* = .31), and small correlations with the other SF-12 scales of PF (*r* = .13), RP (*r* = .12), BP (*r* = -.04), vitality (VT [*r* = .16], social functioning (SF [*r* = -.01]), RE (*r* = .18), and MH (*r* = .14). The Family APGAR scores had small correlations with all the SF-12 scales such as PF (*r* = .11), RP (*r* = .06), BP (*r* = .03), GH (*r* = .23), VT (*r* = .02), SF (*r* = -.07), RE (*r* = .10), and MH (*r* = .08). The two strongest correlations among the SF-12 scales included a large positive correlation (*r* = .51) between RP and RE, and a medium positive correlation (*r* =.42) between MH and BP. Findings from this study inform the development of interventions involving IPC teamwork and FS to improve individual and population health outcomes.

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Doctor of Philosophy in Nursing

by

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DEDICATION

The most important title I have is Mom. To Hayley and Connor, who brighten my world and life with laughter, opinions, and debate daily, may our adventures continue. The foundation and strength of our family is my partner in crime, Monty. He has never doubted the goals I set for myself even when I was unsure. My life's journey began with the support of my parents, Joe and Rita Bongiorni, and sister, Jody Bongiorni Gidley. All of you have been my ultimate cheerleaders throughout everything that I have done, and I love you more than I can put into words.

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CHAPTER 1: INTRODUCTION

Background

Diabetes is a global health problem. Internationally, an estimated 463 million adults are living with diabetes resulting in a direct annual cost to countries, health systems, and individuals of more than $760 billion (International Diabetes Federation [IDF], 2019; World Health Organization [WHO], 2016). Thirty-four million Americans, or 10.5 % of the U.S. population, are living with diabetes, giving the nation one of the highest prevalence rates among industrialized countries (Beck et al., 2017; Bus & van Netten, 2016; Centers for Disease Control and Prevention [CDC], 2020; IDF, 2019; Somayaji et al., 2017; WHO, 2016). North Carolina’s diabetes prevalence rate of 12.5% is higher than the global rate of 9.3% and the national rate of 10.5% (IDF, 2019; National Center for Chronic Disease Prevention and Health Promotion [NCCDPHP], 2021; North Carolina Diabetes Advisory Council [NCDAC], 2020).

Diabetic foot ulceration (DFU) is a common complication of diabetes affecting 40 to 60 million people globally which can lead to infection, amputation, poor quality of life, and increased mortality (Armstrong et al., 2017; Armstrong et al., 2020; Bus & van Netten, 2016; IDF, 2019; Raghav et al., 2018). Approximately one-third of patients diagnosed with diabetes will develop a DFU (IDF, 2019; Armstrong et al., 2020).The prevalence of diabetic foot complications in North America is 13% compared to the global average of 6.4% (IDF, 2019). Half of the patients diagnosed with DFU will develop an infection with 17% of those patients requiring an amputation (Armstrong et al., 2020). The five-year mortality rate of patients diagnosed with a DFU is over 30% with the greatest risk factor being a previously healed DFU (Armstrong et al., 2020). The global cost of care exceeds $1.5 billion a year (IDF, 2019). The United States (U.S.) spends $237 billion for direct medical costs and $90 billion in reduced work productivity (ADA, 2018; NCCDPHP, 2021) with patients who have DFUs having five times higher healthcare costs than those without foot ulcers (IDF, 2019). The rising incidence of diabetes and DFU highlights the need to improve understanding of approaches to manage complications of chronic disease. Effective self-management behaviors may prevent the development of DFU.

Self-management behaviors, defined as the continued process of purposefully incorporating health-related behaviors, including self-care activities and skills, to achieve stability of one's condition, health, and well-being (Ryan & Sawin, 2009) supports patient and family members' engagement in treating diabetes. Such behaviors are most effective when accompanied by knowledge about patient illness, as well as family and peer support (Chlebowy et al., 2010). Diabetes self-management improves patient knowledge about their condition and has a direct relationship with positive changes in health outcomes (ADAb, 2021; Powers et al., 2020; Strawbridge et al., 2017; Surucu & Kizilci, 2012). Information obtained from providers and peers provides patients with knowledge needed to develop self-management behaviors (Chlebowy et al., 2010). Patients found provider communication addressing general information and management strategies of Type 2 diabetes mellitus (T2DM) in conjunction with family support important to their diabetes self-management (Chlebowy et al., 2010). Family support in conjunction with provider communication has been shown to influence self-management behaviors and encourage involvement in diabetes treatment (Chlebowy et al., 2010; Ravi et al., 2018; Shen et al., 2016; Xu et al., 2008). A patient's belief in the effectiveness of their treatment regimen is positively affected by family support, resulting in improved self-management behaviors (Xu et al., 2008).

The interprofessional collaborative (IPC) team is important to the development of self-management behaviors (Ryan & Sawin, 2009). Interprofessional collaborative teams have the ability and knowledge to educate, reinforce self-management skills, and support behavior change that can influence diabetic outcomes (Beck et al., 2017). Improving patients' and families' decision-making capabilities concerning healthcare has the potential to lead to improved quality of life and clinical outcomes including glycemic stability (Institute of Healthcare Improvement [IHI], 2011). Research has shown a positive correlation between self-management, self-care behaviors and glycemic stability, strengthening the importance of developing this association (ADAb, 2021; Chlebowy et al., 2019; D'Souza et al., 2017; Saad et al., 2018). The relationship between SM, FS, PP-IPCT, health, HRQoL, WS, SMBG, demographics, and patients with DFU was the phenomenon of interest for the research study.

Significance

Type 2 diabetes mellitus is the most common type of diabetes that affects 22% of U.S. adults 65 and older, and comprises 90% of all cases diagnosed (CDC, 2020; IDF, 2019). The number of North Carolinians with diabetes or pre-diabetes has progressively increased; this increase in prevalence has impacted individual and population economics and productivity (NCDAC, 2020). North Carolina statistics reflect the national racial inequities of T2DM; 15.9% of African Americans and 19% of American Indians are living with a T2DM diagnosis, compared to 12.2% non-Hispanic Whites and 7.7% Hispanics (NCDAC, 2020). Research has shown that all racial and ethnic groups report an increase in prevalence with age, but older African Americans with T2DM exceed that 'norm' (NCDAC, 2020). Diabetes was the third leading cause of death in North Carolina for American Indians, fourth for African Americans, and seventh for non-Hispanic Whites (NCDAC, 2020). In addition to racial and ethnic variations, geographic differences exist in North Carolina. The largest cities of North Carolina (Charlotte, Raleigh, Greensboro, and Durham) report a prevalence rate of 11.4%, while eastern and western North Carolina have a higher rate at 14.4% and 13% respectively (NCDAC, 2020).

The financial impact of T2DM for both individuals and society is significant. The medical economic burden, defined as expenditures directly related to diabetes, is 2.3 times higher in patients with diabetes than those without (NCDAC, 2020). Diabetes was associated with increased hospital admission rates and cost North Carolinians $454 million on patient stays averaging 4.73 days (NCDAC, 2020). Hospital stays in North Carolina in 2017 averaged $33,000 per admission, totaling $11 billion, a number that includes lost productivity (NCDAC, 2020). In addition to national and state economic implications, chronic conditions such as T2DM and its complications significantly affect families personally and financially. Efforts must continue to evolve in the management and treatment of T2DM in order to address the cost of diabetes-related care.

The management of T2DM, while multi-faceted, becomes more complex when a diabetic complication occurs. Complications of diabetes typically occur due to consistently high blood glucose levels and can include cardiovascular disease (CVD), blindness, kidney damage, and lower-limb amputation (American Thoracic Society [ATS], 2008; IDF, 2019). The CDC (2020) reports that smoking, overweight and obesity, physical inactivity, elevated HbA1c levels, hypertension, hyperlipidemia, and hyperglycemia are risk factors for diabetes complications. Coexisting conditions such as stroke, ischemic heart disease, cardiovascular disease, diabetic ketoacidosis, and lower extremity amputation are common reasons for hospitalizations for individuals with diabetes (CDC, 2020).

Diabetic foot ulceration, a common complication of T2DM is defined as an ulceration of the foot associated with nerve damage leading to neuropathy and/or peripheral arterial disease of the lower limb in a patient with diabetes (Alexiadou & Doupis, 2012). Diabetic foot ulceration has serious implications for patients, their families, and the healthcare system. Of the global projections that 600 million people will have T2DM by 2035, 50% will develop peripheral neuropathy, and at least 15% of those will develop at least one foot ulcer (Armstrong et al., 2020; Bus & van Netten, 2016). Research has identified DFU as the most common reason for hospitalization in individuals with diabetes resulting in more than $40,000 per occurrence (Armstrong et al., 2020; Davis et al., 2018). Additionally, more than half of diabetic foot ulcers become infected, and 17% of infected foot ulcers results in some level of amputation (Armstrong et al., 2020). The increased prevalence of DFU results in a mortality rate three times higher than those without this complication in patients with diabetes (Armstrong et al., 2020; WHO, 2016). Due to the high risk of reoccurrence and mortality of patients experiencing DFU, additional approaches to their prevention need to be considered such as those proposed in this study that include patient perceptions of the IPC team in managing their care.

Health promotion activities such as self-management support patient and family member engagement in the treatment of chronic conditions. Self-management behaviors have been widely recognized as an integral part of chronic illness care that empowers patients, improves health outcomes, and reduces costs (Bodenheimer et al., 2002; Lorig & Holman, 2003; van Houten et al., 2013). Self-management is defined as the process required for a patient to manage their condition by using knowledge, skills, and abilities (Mehravar et al., 2016). Lorig et al. (2003) identified five core skills of self-management: (1) problem solving, (2) decision making, (3) resource utilization, (4) forming a patient healthcare provider partnership, and (5) taking action. Within the self-management paradigm, patients are considered the experts of their health condition. A collaborative partnership featuring patients, families, and healthcare teams sharing expertise and responsibility for care and goal setting is an integral part of self-management of a chronic illness (ADAa, 2021; Bodenheimer et al., 2002; Canadian Interprofessional Health Collaborative [CIHC], 2010). In N.C. half of all adults diagnosed with diabetes have participated in education to help manage their illness (NCDAC, 2020).

Traditionally, the U.S. healthcare system has focused on the care of acute illnesses where healthcare professionals made decisions and the patient's role was to be a passive participant in their care (Grady & Gough, 2014; Lawn & Schoo, 2010; Lorig & Holman, 2003). Relatively short lengths of stay provide patients with limited opportunity to participate in, and establish, a care routine (Lawn & Schoo, 2010). Advances in healthcare have resulted in more people living longer with chronic conditions, and patients and families have become the primary caregivers (Bodenheimer et al., 2002; Grady & Gough, 2014; Lorig & Holman, 2003). Now the usual process for patients and families to manage their day-to-day health needs is with periodic provider oversight (ADAa, 2021; Bodenheimer et al., 2002). The role of the IPC team supports a paradigm shift to a joint care model with the patient and family at the center of any healthcare decisions. Given this level of autonomy for patients and families, it is critical for patients and families to have timely and accurate knowledge to support their treatment and care decisions in order to be competent in their self-care.

Interprofessional collaborative team support of patient and family self-management behaviors can provide an opportunity to impact HRQoL and lead to fewer hospital admissions and a reduction in treatment costs (Grady & Gough, 2014). Although early screening and diagnosis are essential, access to organized, sustained care by a team of healthcare professionals can influence outcomes at the primary care level. The WHO defines IPC practice as multiple health and social care professionals providing comprehensive, safe, and quality health services by working with communities, patients, and families (WHO, 2010). It has now been determined after more than 50 years of practice that effective collaboration among healthcare teams enhances and builds health services that improve health outcomes (WHO, 2010). The IPC team approach has been found to be successful in integrating care of individuals who have chronic conditions with varied needs that require both self-management and lifestyle modifications (McGill et al., 2017; Ryan & Sawin, 2009). In this approach, the patient is an equal participant and actively manages their condition by setting goals and sharing responsibility with the IPC team (McGill & Felton, 2007; McGill et al., 2017). Thus, the IPC team can be an important element in supporting self-management behaviors in chronic conditions such as diabetes.

Metrics related to diabetes have been shown to improve with the engagement of an interprofessional team (McGill et al., 2017). Global guidelines for glycemic stability generally emphasize the attainment of HbA1c levels between 6.0 –7.0%, although more than half of individuals with diabetes do not meet these recommendations (ADAc, 2021; McGill & Felton, 2007). The IPC team method has been found to improve glycemic stability and HRQoL while reducing HbA1c levels, lower limb amputation, and mortality in individuals with diabetes compared to care provided by individual providers (McGill et al., 2017). The specialization of healthcare and the complexity of managing a chronic disease has led to international recognition of the benefits of diabetes management by a team of health and social professionals that includes the patient as an active participant (Beck et al., 2017; McGill et al., 2017; Ogrin et al., 2015). The IPC team approach blends the expertise of all professions resulting in a comprehensive, yet individualized, plan for treatment and goal setting.

Current research supports an IPC team methodology to diabetes care, although patient perceptions of teamwork vary. The ability to clearly communicate changes in assessment findings and treatment strategies was viewed as an important attribute of the IPC team (Pullon et al., 2011; Wyskiel et al., 2015). Patients believe that IPC teams give the best care when comprised of family members alongside appropriate health and social professionals (Cutler et al., 2019). Patients valued explanations of team dynamics and made assumptions based on previous experiences if the dynamics were not explained (Henry et al., 2016). Therefore, past negative experiences often impacted their involvement and confidence in the IPC team (Cutler et al., 2019; Henry et al., 2016). Patients sometimes recognized that shifting priorities in their care often signaled a change in roles and leadership of the IPC team (Cutler et al., 2019).

Strong leadership alongside an inclusive and coordinated IPC team approach is valued by patients (van Dongen et al., 2017). An organized, structured approach to IPC teamwork reflects preparation and integration of care to patients (Burdick et al., 2017; Cutler et al., 2019; LaDonna et al., 2016). Patients have shared that large numbers of IPC team members is overwhelming and creates obstacles to communication of their health needs (Bilodeau et al., 2015; van Dongen et al., 2017).

The possible benefits of IPC teams to influence care of patients with chronic health conditions has been increasingly studied. Patient perceptions reveal that IPC teamwork must be clearly explained and apparent in order to be valued and useful (Pullon et al., 2011). The complexity of chronic disease treatments supports an IPC team approach, although little is known about the relationship between IPC teams and patient, population, and system outcomes.

Purpose of the Study

The purpose of this study was to examine the relationship between SM, FS, PP-IPCT, HRQoL, WS, SMBG, demographics, and patients with DFU.

Theoretical Model

The development of middle-range theories has become important to producing practical nursing theories that guide and question nursing practice (Meleis, 2018). Ryan and Sawin (2009) partnered in the development of the Individual and Family Self-Management Theory (IFSMT), a mid-range descriptive theory that allowed the opportunity for self-management to be studied through a distinctive lens (Ryan & Sawin, 2009). The theory arose inductively from the authors' determination to address the lack of family inclusion in self-management behaviors in previous theories. Ryan and Sawin (2009) valued patient and family responsibility, reflected by the use of self-management behaviors as a determinant of HRQoL. The IFSMT was derived from observations made in clinical practice and focuses solely on chronic disease states. They define self-management as health behavior that involves patients and families who assume responsibility for health-related outcomes. As previously noted, self-management behaviors serve a critical function in the maintenance of diabetes and management of diabetic foot ulceration. Patients and families should be supported in developing the knowledge and skills necessary to change behaviors and successfully manage chronic disease.

The IFSMT supports the development of SM and is conceptually viewed as a continuum consisting of three dimensions: context, process, and outcomes (Ryan & Sawin, 2009). Factors within the context and process dimensions can be influenced by one another and directly impact proximal and distal outcomes. Interventions focusing on increasing SM such as IPC indirectly effects outcomes by improving factors within the context and process dimensions. In order to further explore the complexities of factors that may impact the development of SM this study focused on factors that were: condition specific, individual and family, social facilitation, and proximal and distal outcomes of SM and HRQoL respectively in participants diagnosed with DFU.

Major Dimensions

The IFSMT (Ryan & Sawin, 2009) was used as the theoretical model to guide this study (Figure 1). The IFSMT is not limited by individual and family, environmental, or condition-specific factors but rather includes a process dimension with distinctive concepts to develop self-management behaviors. The theory maintains self-management as situation-specific which offers simultaneous individual and family perspectives. The individual and family viewpoints support a comprehensive approach that incorporates context, process, as well as proximal and distal outcomes.

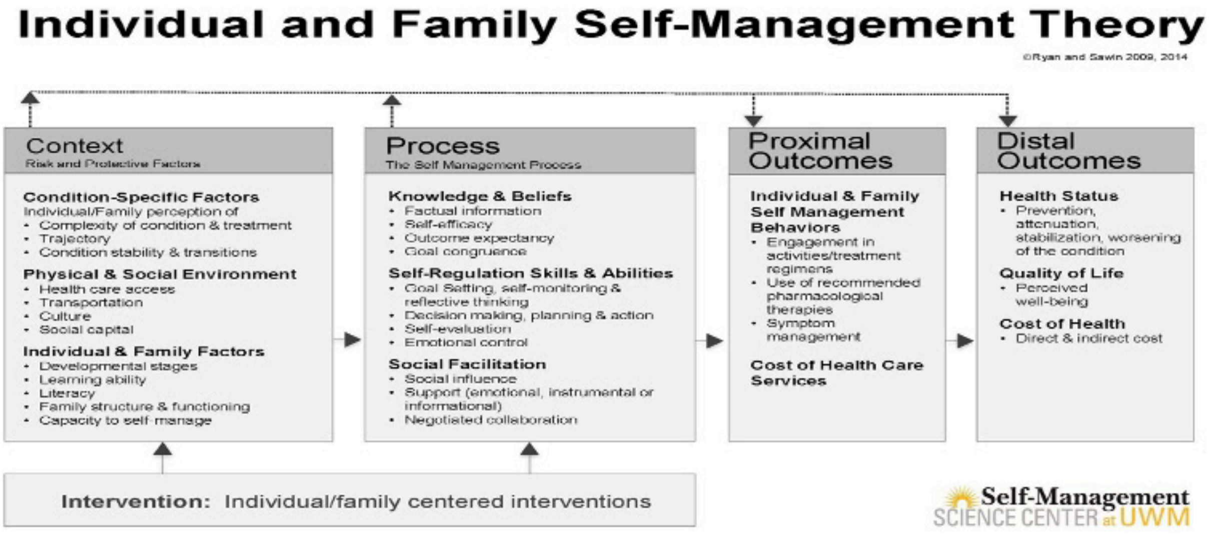


Figure 1. The conceptual structure of the Individual and Management Self-Management Theory. From "The Individual and Family Self-Management Theory: Background, and Perspectives on

Context, Process, and Outcomes," by P. Ryan and K.J. Sawin, 2009, *Nursing Outlook, 57*(4), p.223. Copyright 2009 by Polly Ryan & Kathleen J. Sawin.

The context dimension primarily consists of risk and protective factors that may influence individual and family engagement in the process of self-management (Ryan & Sawin, 2009). The risk and protective factors context dimension are further categorized into condition specific, physical and social environment, and individual and family characteristics. Employing the context dimension to care of patients experiencing chronic health conditions provides baseline knowledge into the effects of diagnosis, environment, and family dynamics on their capacity to develop SM (Ryan & Sawin, 2009).

The process dimension identifies knowledge and beliefs, self-regulation skills and abilities, and social influence factors as integral to the SM process (Ryan & Sawin, 2009). The process dimension acknowledges the influence of these factors in SM behavior change.

The final dimension of the IFSMT is divided into proximal and distal outcomes. Relationships exist between the context and process dimensions that influence the achievement of both proximal and distal outcomes (Ryan & Sawin, 2009). For example, if patient perceptions of IPC teamwork are found to be positive, SM may improve and therefore HRQoL and SMBG may improve.

Basic Assumptions

Basic assumptions underlie this study. It was assumed that the measurements of wound size have been accurately measured and recorded in the participant's electronic medical record. Also, an assumption that the participants would accurately report their most recent self-monitored blood glucose level at the time of data collection. Additionally, it was assumed that the participants were capable of SM and truthfully answered all of the survey questions included in this study.

Theoretical and Operational Definitions

A theoretical definition is a broad, abstract general meaning of a variable or concept of interest (Polit & Beck, 2017). An operational definition specifies how the variable or concept of interest will be measured. Theoretical and operational definitions for each variable and concept of interest for this study are organized using the dimensions of the IFSMT and are depicted in Figure 2.

Context

Context refers to individual and family risk and protective factors that influence the self-management process and outcomes (Ryan & Sawin, 2009). The review of the context dimension by the authors included factors that are specific to patient: condition, physical and social environment, and individual and family. The context dimension factors addressed in this study were condition specific and individual and family characteristics.

Condition specific factors

Condition specific factors are defined as "the physiological, structural, or functional characteristics of the health condition" (Ryan & Sawin, 2009, p. 223). Condition specific factors includes prevention and treatment that may impact what is needed for the individual and family to participate in self-management behavior. Comorbidities are common in patients with diabetes and may impact their ability to self-manage their care (Piette & Kerr, 2006). The reoccurrence of 75% of DFUs has been found to be preventable, which indicates a greater need for patient and family competence in self-management behaviors. Each patient with DFU and family is distinctive in this dimension. For this study the condition specific factors were operationalized to focus on physiological data and data obtained to assess the condition of T2DM and persons diagnosed with DFU. This data included comorbidities, Body Mass Index (BMI), and DFU.

Comorbidities

Comorbidities are defined as unrelated pathological or disease processes occurring at the same time (Medical Dictionary, The Free Dictionary, n.d.). The comorbidities included: high cholesterol, high blood pressure, kidney disease, lung disease, heart disease, or other conditions. The identification of comorbidities was operationalized by participant identification and self-report from the demographic data form.

Body mass index

Body Mass Index (BMI) was defined as a measure of weight in relation to height (Medical Dictionary, The Free Dictionary, n.d.). The BMI was computed by entering the participants weight in pounds and height in inches into a calculation tool (United States Department of Health and Human Services, BMI, n.d.). The BMI was operationalized by participant self-report of weight and height from the demographic data form.

Diabetic foot ulceration

Diabetic foot ulceration was defined as an ulceration of the foot associated with nerve damage (Alexiadou & Doupis, 2012). The presence of DFU was operationalized for this study by confirmation in the medical record of the ICD-10 code E11.621.

Individual factors

Individual factors were defined as direct individual characteristics that may impact the ability to complete self-management behaviors (Ryan & Sawin, 2009). In this study the individual factors that were operationalized included education, gender, age, and duration of diabetes diagnosis.

Education

Education was defined as the process of acquiring a body of knowledge or information about a particular subject (The Free Dictionary, n.d.). For this study, the education level was operationalized as the participants highest level of education as recorded on the demographic data form. The educational levels were categorized as: less than high school, high school/general educational development (GED), some college, and college or post-graduate.

Gender

Gender was defined as the category to which an individual is assigned by self or others, on the basis of sex (Medical Dictionary, The Free Dictionary, n.d.). Gender was operationalized in this study as the participants self-report as recorded on the demographic data form.

Age

Age was defined as the period that had elapsed since birth (Medical Dictionary, The Free Dictionary, n.d.). For this study, the age was recorded on the demographic data form as the participant's age at their last birthday.

Duration of diabetes diagnosis

Duration of diabetes diagnosis was defined as the length of time participants have been diagnosed with T2DM. The duration of diabetes diagnosis was divided into categories of less than one year, one – five years, greater than five years, greater than 10 years, and greater than 15 years.

Process

In the second dimension of the self-management process, located within the process aspect of the theory, knowledge, beliefs, and social facilitation are addressed. The self-management process dimension actively interacts with condition-specific factors to influence outcomes (Ryan & Sawin, 2009). Traditional models of patient education and intervention such as education without follow-up or support are not effective in eliciting behavior change single-handedly (Krist et al., 2017). Research has shown that actively engaging patients with chronic disease in their care significantly lowers their mortality risk (Krist et al., 2017). Knowledge and beliefs directly affect the self-management process through an individual's confidence and goal congruence. Social facilitation includes the concepts of social influence, support, and negotiated collaboration (Ryan & Sawin, 2009), including interprofessional collaboration. Interprofessional collaboration uses social facilitation to support patients with DFU as they navigate the specialization of healthcare and the complexity of diabetes. Interprofessional collaborative care facilitates information sharing, encourages discussion, and supports patients and families as active healthcare partners to improve health outcomes (CIHC, 2010). The process dimension highlights the primary focus of this study by exploring relationships between SM, FS, PP-IPCT, and member composition of the IPC team in patients diagnosed with DFU.

Self-regulation skills and beliefs

Self-regulation skills and beliefs were defined as proficiencies used to change health behavior (Ryan & Sawin, 2009). In this study, data related to self-regulation were obtained by assessing self-management behaviors.

Self-management behaviors

Self-management behaviors refer to the ongoing process of purposefully incorporating health-related behaviors, including self-care activities and skills, to achieve stability of one's condition, health, and well-being (Ryan & Sawin, 2009). Self-management behaviors were operationalized as a score measured by the PAM (Hibbard et al., 2004). The PAM is a 10-item assessment of a person's underlying knowledge, skills, and confidence essential to lifestyle changes, and self-management behaviors with higher scores associated with greater levels of patient participation in self-management behaviors (Hibbard et al., 2004).

Social facilitation

Ryan and Sawin (2009) described social facilitation as the relationship between influence, support, and collaboration in order to participate in behavior change. For this study social facilitation was operationalized as FS, PP-IPCT, and member composition of the IPC team.

Family support

Family support was defined as the patient's awareness of perceptible knowledge and emotional support from friends and family members (Shen et al., 2016; Xu et al., 2008) and operationalized as a score measured by the Family APGAR (Smilkstein,1978; Smilkstein et al.,1982). The instrument has three potential response options ranging from 0 (hardly ever), 1 (some of the time), and 2 (almost always) with higher scores indicating higher satisfaction with family function (Smilkstein,1978; Smilkstein et al.,1982).

Patient perceptions of IPC teamwork

Patient perceptions of IPC teamwork were defined as patient reported observations of the health and social professional's collaborative team behaviors (Henry et al., 2014). For this study IPC was operationalized as a score on the Patients Insights and Views of Teamwork (PIVOT) survey (Henry et al., 2014). The PIVOT consists of a 16-item Likert scale with higher scores associated with greater observed team behaviors.

Member composition of the IPC team

Member composition of the IPC team consists of the different professions represented as members of the IPC team. For this study the member composition of the IPC team was operationalized by participant identification of the professions involved in their care in the last six months reported in the demographic data form. The professionals identified by participants as members of the IPC team were the nurse, physician, nutritionist, physical therapist, diabetes educator, pharmacist, and bariatric technician.

Proximal and Distal Outcomes

The final dimension of the IFSMT addresses proximal and distal outcomes. Proximal or short-term outcomes include individual and family self-management behaviors, symptom management, and the cost of healthcare services. Distal or long-term outcomes include HRQoL, quality of life, and cost of health (Ryan & Sawin, 2009). The proximal and distal outcomes of HRQoL reflected by self-monitored blood glucose level, wound size, and quality of life were examined in this research. The distal outcomes referred to in the IFSMT model reflect the emphasis of the research question investigating relationships between HRQoL, WS, & SMBG. The framework provided by the IFSMT provides the structure for the study (Figure 2).

Health related quality of life

Health related quality of life, an outcome of self-management behaviors was defined as "how well a person functions in their life and in his or her perceived well-being in physical, mental, and social domains of health" (Karimi & Brazier, 2016, p. 646). Health Related Quality of Life (HRQoL) was operationalized by as a score measured using the Short Form-12 ([SF-12v2] Ware et al., 1996; Ware et al., 2002) a 12-item scale the measures physical and mental domains of health (Ware et al., 2002). Higher scores are associated with greater HRQoL.

Wound size

Wound size refers to the measurement of the size of the diabetic foot ulceration. This was determined by the recorded wound measurements that included length, width, and depth. The measurement was obtained by a nurse employed by the Wound Healing Center using a metric ruler at patient treatment visits one, four, and eight. Wound length, width, and depth were obtained at weeks one, four, and eight of treatment from the patient health record. Wound area was then calculated by multiplying length by width.

Glycemic stability

Glycemic stability was defined as individual stability of blood glucose levels over time. Glycemic stability was obtained by patient self-monitoring of blood glucose (SMBG) levels. The American Diabetes Association (ADAc, 2021) recommends blood glucose levels of 80-130 mg/dL fasting pre-meal and less than 180 mg/dL two hour post-prandial as indicative of glycemic stability (ADAc, 2021). The SMBG levels were operationalized by patient self-report of their most recent blood glucose result through the demographic data form and chart review.

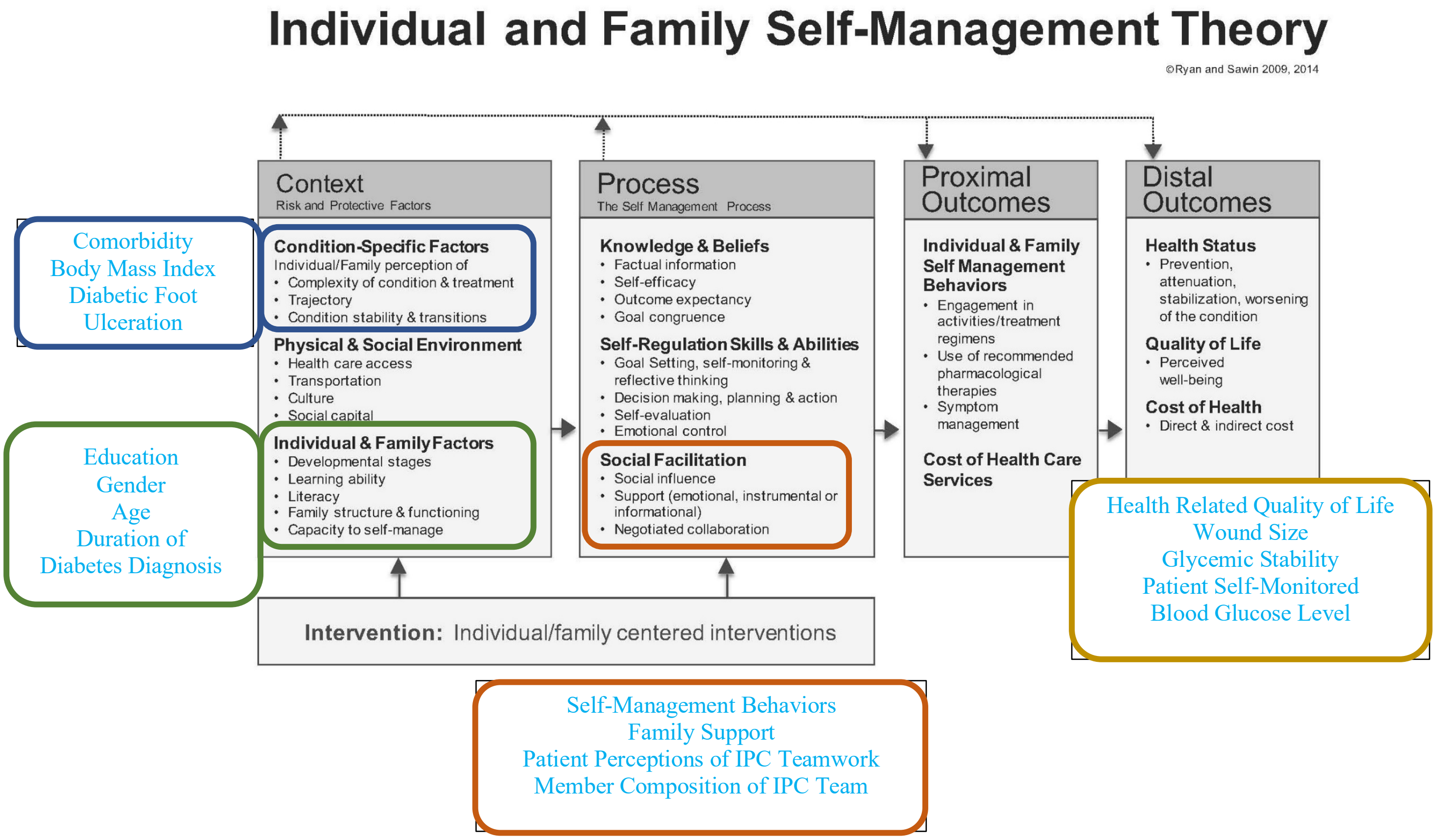


Figure 2. Adaptation of Individual and family Self-Management Theory for research study. Adapted from "The Individual and Family Self-Management Theory: Background, and Perspectives on Context, Process, and Outcomes," by P. Ryan and K.J. Sawin, 2009, *Nursing Outlook, 57*(4), p.223. Copyright 2009 by Polly Ryan & Kathleen J. Sawin.

Specific Aims and Research Questions

This study focused on patients with a diagnosis of DFU and the relationships between SM, FS, PP-IPCT, HRQoL, WS, SMBG, and demographics in a wound care specialty clinic with superior outcomes in southeastern North Carolina.

The goal of this research was to address the following specific aims and research questions:

Aim 1. Describe the characteristic of persons with the diagnosis of DFU who received care in a wound care specialty clinic with superior outcomes in southeastern North Carolina.

> Research Question (RQ) 1. What were the socio-demographic and clinical characteristics of the study sample?

Aim 2. Examine the relationship between health condition support factors and clinical characteristics of patients with a diagnosis of DFU.

> RQ 2. What was the level of SM, FS, PP-IPCT, and HRQoL in patients with a diagnosis of DFU?
>
> RQ3. What were the relationships among SM, FS, PP-IPCT, and HRQoL in patients with a diagnosis of DFU?
>
> RQ4. Did subgroups of the study sample emerge relevant to comorbid conditions, member composition of the IPC team, and HRQoL in patients with a diagnosis of DFU?

Summary

Self-management behaviors are considered necessary skills for patients coping with a chronic disease. Complications of diabetes such as DFU magnify the need for emphasis on patients and families' abilities to manage their disease. A limited number of studies have focused on the patient perceptions of the IPC team while undergoing care of chronic conditions and the resulting patient outcomes. Previous research in the field of IPC teams has been restricted to provider perceptions and interprofessional education, and not patient perceptions of IPC and the influence of these perceptions on self-management behaviors. There remain many unanswered questions about the relationship between IPC teams, self-management behaviors, and their relationship to improved glycemic stability. The purpose of this cross-sectional, descriptive, correlational multiple linear regression design study was to examine the association between SM, PP-IPCT, HRQoL, WS, and SMBG in patients with DFU. The research study was guided by the IFSMT that has its origins in management of chronic disease states. Findings of this study may guide interprofessional collaborative teams of health and social professionals with enhanced knowledge to support individuals and families in self-management of their condition. The increase in knowledge, skills, and abilities through IPC team support of self-management behaviors of individuals and families will lead to improved health outcomes and reduced healthcare spending in North Carolina and the nation at large.

This dissertation consists of chapters 1, 2, and 3 for the background, review of literature, and methods portions. Chapters 4 and 5 consists of two separate manuscripts. Chapter 4 includes manuscript 1 and is titled, "Patient Perceptions of Teamwork in the Context of the Interprofessional Education Collaborative (IPEC) Core Competencies for Interprofessional Collaborative Practice". Manuscript one will be submitted to the *Journal of Interprofessional Care*. Chapter 5 contains the second manuscript titled "Relationships Among Family Support, Patient Perceptions of Teamwork, Self-Management Behaviors, and Health-Related Quality of Life in Patients with Diabetic Foot Ulceration." Manuscript two will be submitted to the *Diabetes Research and Clinical Practice* Journal.

CHAPTER 2: REVIEW OF THE LITERATURE

Introduction

The purpose of this study was to explore the relationship between SM, FS, PP-IPCT, HRQoL, WS, and glycemic stability in patients with DFU. Consistent with the aims of this study, the review of the literature was inclusive of that which describes the relationship of self-management or self-care behaviors to: (a) patient outcomes; (b) patient knowledge and education; (c) family and social support and psychological factors; (d) patient perceptions and the influence of the interprofessional collaborative team; (e) HRQoL; (f) wound size and (g) glycemic stability. Additionally, the Ryan and Sawin (2009) Individual and Family Self-Management Theory (IFSMT) guided this literature review through the inclusion of selected context, process, and outcome dimensions.

Theoretical Perspectives

The concept of self-management was addressed as early as the mid-1960s in the literature by Thomas Creer in reference to patients who actively participated in their treatment (Lorig & Homan, 2003). Creer recognized that self-management concepts were founded in Bandura’s Social Learning Theory ([SLT] Creer, 2008). In SLT individual behavior is determined by interactions between environment, cognitive, and behavioral factors that result in certain responses (Bandura, 1977). Corbin and Strauss (1991) further advanced the components of self-management theories by associating tasks of living with a chronic condition.

Further development of SLT yielded additional components and the theory became more comprehensive as nurse scientists continued to explore self-management processes within the framework of chronic health conditions. The Self- and Family Management Theory ([SFMT] Grey et al., 2006) was developed as a synthesis of factors that detailed risk and protective characteristics that influenced individual and family SM and outcomes. Ryan and Swain (2009) further developed the SFMT to include the addition of engagement, health status, and quality of life as proximal and distal outcomes in their IFSMT. The literature supports linkages between individual and family behaviors and the impact of those decisions on management and positive health outcomes. Theoretical models continue to progress that address the implications of individual and family dynamics on self-management behaviors of chronic disease.

In the United States, 60% of the population has a chronic disease such as heart disease, cancer, and diabetes (CDC, 2020). About 90% of all healthcare expenses are used for treating people with chronic and mental health conditions (CDC, 2020). The increasing numbers of people living with chronic conditions and the expense involved in their care directly impacts the ability of a strained healthcare system to meet their needs (Barlow et al., 2002). The focus has shifted from the patient as a passive recipient of care to them actively participating in managing their chronic condition (Barlow et al., 2002). The IFSMT proposes that active involvement by patient and families in daily management of care is essential to positive outcomes in today's health environment (Grey et al., 2015; Ryan & Sawin, 2009).

Context Dimension

Two factors within the contextual dimension for this study are condition specific and individual and family factors. A critical evaluation of existing research was accomplished in relation to self-management and the physiological characteristics of DFU, comorbidity, BMI, education, and duration of diabetes diagnosis.

Self-management is defined as the process required for a patient to manage their condition by facilitating required knowledge, skills, and abilities (Mehravar et al., 2016). Self-management behaviors include diet regulation, exercise and medication adherence, monitoring blood glucose levels, and foot self-care (Xu et al., 2008). Self-care behaviors are defined as the process of maintaining health through activities that promote health and manage illness (Kav et al., 2017). The two terms are often used interchangeably and are similar in scope. The knowledge and skill acquisition from self-management behaviors supports the activities of self-care behaviors to improve health. Self-management or self-care behaviors are an integral part of successful diabetic care (Kav et al., 2017; Penn et al., 2015; Shen et al., 2016).

Condition specific

Condition specific factors are physiological, structural, or functional characteristics of a condition (Ryan & Sawin, 2009, p. 223). These characteristics influence the prevention or treatment of the condition and the type of behaviors needed for engagement in self-management behaviors. For this study, the review of the literature focused on the condition specific factors of DFU, comorbidities, and BMI.

Diabetic foot ulceration

The health outcomes of persons diagnosed with diabetes have not noticeably improved with the advances in technology and treatment (Costa et al., 2020). Chin et al. (2019) surveyed patients hospitalized with DFU regarding their pre-hospitalization self-management behaviors. The study reported that the majority of participants did not check their blood glucose levels and less than 5% sought treatment in the first 24 hours after discovering a DFU (Chin et al., 2019). The presence of diabetic foot ulcers not only increases patient mortality, but they are also the leading cause of lower extremity amputations (Armstrong et al., 2020; IDF, 2019). In a randomized controlled trial, Subrata et al. (2020) compared a three-month self and family support program (SFSP) to usual care. Fifty-six eligible participants were enrolled in either the control or experimental group. The control group received usual care which consisted of only a health education component, while the experimental group received the additional elements of skills training and motivational interviewing over a three-month period (Subrata et al., 2020). Their findings suggested that short term self-management programs increase patient and family's abilities to perform DFU care as well as improve HbA1c levels and decrease wound size. Costa et al. (2020) in a grounded theory study of persons diagnosed with DFU found that patients perceived their obstacles to engaging in SM were influenced by internal and external factors. The most frequently shared reasons for participants' use of self-management behaviors were the fear of amputation and wanting to return to daily life routines. Most participants shared that they needed additional information regarding foot care practices. The authors reported that a perceived lack of knowledge led to decreased confidence and engagement which led to development of DFU and amputation for some participants.

Comorbidity

In a recent study, Kim and Han (2020) surveyed participants diagnosed with DFU regarding factors influencing their self-care behaviors. Diabetes self-management scores were found to have a significant positive association with the presence of patient comorbidities. The SM scores of participants with two or more chronic conditions were higher than those without comorbidities (Kim and Han 2020).The authors found that those participants with more than two health conditions reported higher diabetes self-management scores than others in the study (Kim & Han, 2020). Furthermore, the authors reported a significant positive association between the level of diabetes self-management and those participants with more than two chronic conditions (Kim & Han, 2020). The authors concluded that the severity of a patients' health condition may positively impact their self-care behaviors. Conversely, Costa et al. (2020) in their study of individuals with DFU reported that participants credited aging and the complexities of management responsibilities when living with multiple chronic conditions as negatively impacting their ability to engage in SM.

Body Mass Index

Gao and colleagues (2013) studied over 200 participants diagnosed with T2DM to examine influences on self-care and glycemic control. In addition, Lin et al. (2017) studied 254 outpatient participants with T2DM. Both studies noted that participants with higher BMI measurements had higher HbA1c values than those that did not (Gao et al., 2013; Lin et al., 2017). Al-Dwaikat et al. (2019) observed a positive significant relationship between most recent BMI measurement and level of participant education. The study noted that as levels of family support and education increased, BMI was predicted to be lower (Al-Dwaikat et al., 2019). They also recorded positive levels of family and social support as significant predictors of improved BMI measures (Al-Dwaikat et al., 2019). However, the ability to engage in SM behaviors was not found to predict a lower BMI (Al-Dwaikat et al., 2019) and BMI did not influence participants engagement in SM (Kim & Han, 2020).

Individual and family factors

Individual and family factors are specific characteristics of the individual and family that impacts their ability to engage in self-management behaviors (Ryan & Sawin, 2009). For this study, the review of the literature focused on the individual and family factors of education and duration of diabetes diagnosis.

Education

The attainment of knowledge by patients with diabetes is constant and essential to the management of chronic disease (Atak et al., 2008). Many adults living with T2DM lack even elementary knowledge of their chronic condition (Atak et al., 2008). The time spent in school has been found to influence prevalence rates of T2DM, with higher prevalence rates related to less years spent in school (Haire-Joshu & Hill-Briggs, 2019). Dupree et al. (2015) reviewed a national database of over 9000 adults aged 80- 90 years diagnosed with T2DM and found those with fewer years of education had significantly higher HbA1c levels. Half of adults living with T2DM express awareness of their level of glycemic control, with 63% and 22% cognizant of their blood pressure and cholesterol respectively (Stark et al., 2013). The current healthcare climate requires patients to undertake additional responsibility for their care, while questions remain regarding how to best assist them in this process (Penn et al., 2015; Ryan & Sawin, 2009). The relationship of self-management or self-care behaviors and patient education and knowledge were examined in several studies.

Diabetic education interventions including foot assessment and care, injury prevention, assessing food labels, portion control, blood glucose targets, and when to seek assistance from healthcare providers, positively increased patients' knowledge of self-care behaviors (Atak et al., 2008; Borges & Ostwald, 2008; Chlebowy et al., 2010; Grohmann et al., 2017; Kav et al., 2017; Mehravar et al., 2016; Sharoni et al., 2018; Sharoni et al., 2012; Shen et al., 2016; Surucu & Kizilci, 2012; Vedhara et al., 2014; Wendling & Beadle, 2015; Whitehead et al., 2017; Xu et al., 2008). In a qualitative study of educational interventions, Whitehead et al. (2017) found that a majority of patients diagnosed with T2DM and hyperglycemia sustained change in their daily diabetes management at three and six months post educational intervention. While no negative correlations between education and outcomes were identified, Borges and Ostwald (2008) and Sharoni et al. (2018) reported that diabetic education interventions did not increase knowledge over time. In a qualitative case study of a T2DM patient, Surucu and Kizilci (2012) found a direct relationship between patient knowledge, increased involvement in self-care behaviors, self-management behaviors, and positive changes in health status. Chlebowy et al. (2010) and Grohmann et al. (2017) identified the importance of peers and healthcare providers as sources of information regarding T2DM. They reported that patients gained knowledge about diabetes self-management by seeking information through peers and healthcare providers, which ultimately increased their belief in treatment effectiveness (Chlebowy et al., 2010; Grohmann et al., 2017). Kav et al. (2017) found that a patient's educational level, knowledge of HbA1c levels, and past experience of diabetes education was significantly associated with their self-care behaviors. An educational intervention study conducted by Shen et al. (2016) compared diabetes education led by peers and professional coaches to that provided by community health professionals. The authors reported significant differences in SM in the experimental peer-led group such as the recognition of signs and symptoms of hypoglycemia and self-management of diet, medication, and exercise (Shen et al., 2016).

In a study of patients diagnosed with T2DM in an outpatient clinic, Atak et al. (2008) reported that changes in self-management or self-care behaviors following a diabetes educational intervention were minimal concerning the importance of diet, weight control, measuring blood pressure, and self-foot care. Significant changes were noted only after education in walking and regulating blood glucose to prevent diabetic retinopathy was given. Sharoni et al. (2018) evaluated participants residing in an elder care setting as they participated in a diabetic educational program. The control group received traditional information regarding self-foot care while the intervention group received an enhanced educational program with follow-up. Self-foot care knowledge in the intervention group significantly increased between baseline and follow-up at week four. This finding is similar to previous studies that confirm an increase in self-care knowledge immediately after an education intervention, however knowledge decreases over time if not reinforced (Sharoni et al., 2012; Sharoni et al., 2018) Both Xu et al. (2008) and Grohmann et al. (2017) found that patients' knowledge of diabetes did not directly shape their self-management behaviors, but instead enhanced their beliefs in treatment effectiveness.

Vedhara et al. (2014) found that patients who gained a greater understanding of diabetic ulcer care were more likely to engage in foot self-care behaviors over time. The relationships between self-management or self-care behavior knowledge and health outcomes become more important in a complex patient population.

Duration of diabetes diagnosis

The literature reflected differing views of the impact of duration of diabetes diagnosis on self-management behaviors in persons diagnosed with diabetes and DFU. Gao et al. (2013) found that the longer the duration of diabetes, the higher the HbA1c level. D'Souza et al. (2017) examined relationships between demographic attributes and self-care behaviors among adult participants with T2DM. The authors found that adults with longer duration of a diabetes diagnosis were more likely to perform self-care behaviors (D'Souza et al., 2017). Additionally, longer duration of diabetes led to increased patient confidence with medication, diet, exercise, believed to be due to extended time practicing self-care behaviors (D'Souza et al., 2017).

Process Dimension

A factor within the process dimension addressed in this study is social facilitation. A critical evaluation of existing research and findings was done in relation to self-management and FS, PP-IPCT, and member composition of the IPC team.

Social facilitation

Ryan and Sawin (2009) define the concept of social facilitation as social support and influence and collaboration among the healthcare team. Individuals and family members are considered full participants in the activities of the healthcare team. For this study, the review of the literature focused on social facilitation factors of FS, PP-IPCT, and member composition of the IPC team.

Family support

Social support is defined as the patient's awareness of tangible informational and emotional support from friends and family members (Meek et al., 2018; Shen et al., 2016; Xu et al., 2008). Upwards of 90% of older adults have at least one chronic condition, with over 70% reporting at least two chronic conditions (Meek et al., 2018). Social support has been found to promote positive behavior change and is considered as a determinant of improved healthcare outcomes in individuals with chronic conditions (Al-Dwaikat et al., 2019). In a study of African American adults experiencing T2DM, Al-Dwaikat et al. (2019) found positive correlations between self-management behaviors and the function, quality, and structure of patient social support. Social support was found to have both direct and indirect influences on patients' self-management behaviors. Xu et al. (2008) found that family support, defined as feeling valued or cared for, did not directly shape self-management but had an impact on patient beliefs in treatment effectiveness. Additionally, provider-patient communication, which included physician approachability and clear explanations also indirectly influenced self-management behaviors through patient beliefs in their treatment regimen (Aikens et al., 2005; Xu et al., 2008). Conversely, Ravi et al. (2018) reported that family support directly affected patient self-management behaviors such as routine blood glucose testing and managing carbohydrate intake. Furthermore, when investigating the effect of direct and indirect psychosocial factors on self-care behavior and glycemic control, Cosansu and Erdogan (2014) and Al-Dwaikat et al. (2019) found a positive correlation between social support, self-management, and self-care behaviors, with patient motivation as the only variable that directly impacted self-care and glycemic control. Supportive family members contributed to patient self-management behaviors by positively influencing patients' compliance to their diabetes treatment regimen (Chlebowy et al., 2010; Mayberry et al., 2016; Ravi et al., 2018; Shen et al., 2016).

The contribution of family and friends in the self-care activities of family members experiencing T2DM can have both a positive and negative impact (Mayberry et al., 2019). Family members' and friends' direct participation in patient self-care was found to be more predictive of self-management behaviors than emotional support alone (Mayberry et al., 2016). In addition, patients whose family members verbalized disapproval of their self-care actions were less adherent to self-management behaviors and experienced less glycemic control (Mayberry et al., 2016; Mayberry et al., 2019).

Social support has been found to be significantly related to patients' psychological health. Studies by Chlebowy et al. (2019), Gonzalez et al. (2016), Kav et al. (2017), and Lin et al. (2017) evaluated the relationships between social support and depression. There was a significant negative correlation between patients' depression and their glycemic control (Chlebowy et al., 2019; Gonzalez et al., 2016; Kav et al., 2017). Social support by family members and friends related to medication management and education was stated by participants as essential to managing their T2DM (Chlebowy et al., 2010). A positive correlation was found between participants that lived alone, higher depression scores, and higher HbA1c levels leading to the belief that social support may play an important role in self-management behaviors (Kav et al., 2017). In a population of T2DM outpatients, depression and diabetes-related distress decreased glycemic control self-management behaviors with an indirect impact of HbA1c levels (Lin et al., 2017). Lin et al. (2017) and Meek et al. (2018) reported a trending but not significant association between diabetes self-management and depression. However, Chlebowy et al. (2019) reported significant positive correlations between self-management behaviors among depression, dietary risk assessment, and HbA1c levels, and no significant correlation between depression, anxiety, stress and self-management behaviors. The study results indicated that self-management behaviors did not significantly impact depression, anxiety, and stress levels (Chlebowy et al, 2019). Although many interventions exist to improve and maintain SM in persons with T2DM, strengthening family and social support mechanisms may contribute to improved psychosocial functioning and glycemic stability.

Patient perceptions of IPC teamwork

Interprofessional collaborative (IPC) teamwork is defined as an integrative and interdependent process in which health and social care professionals work together to provide services to improve the quality of health (Institute of Medicine [IOM], 2015). Patient perceptions of the relationship of interprofessional teamwork on patient, population, or system outcomes has rarely been examined (IOM, 2015). No articles were found that specifically examined the relationship between patient perceptions of IPC teamwork in patients with diabetes or diabetic foot ulceration (DFU), however previous research was found that addressed patient perceptions of IPC teamwork.

LaDonna et al. (2016) found that patients experiencing heart failure frequently identified nurses and family members as important supporters on their care team. Patient interview transcripts reflected an increase in knowledge and information gained, as well as the impression of a more holistic approach, when care involved an IPC team (Coulourides et al., 2015; Whitehead et al., 2017).

IPC teamwork and diabetes care. Myers (2017) examined the relationship between IPC teamwork and diabetes health outcomes in participants with multiple complex health conditions. In this study, 40% of participants reported improvement in self-care behaviors after interprofessional management of diabetes treatment, resulting in a statistically significant decrease in HbA1c levels in 75% of the study participants, and further reductions in BMI, blood pressure, and triglyceride levels. McGill & Felton (2017) reported a decrease in HbA1c levels and number of hospital admissions in patients with T2DM with treatment from multiple disciplines.

Ogrin et al. (2015) evaluated clinical outcomes of patients diagnosed with DFU who were treated by an IPC team. Complete wound healing with IPC team management occurred in 28% of patients, averaging 7.35 weeks and required three to four visits to the clinic. The average healing rates after 4 weeks of IPC team care was 28% as compared to 12% of care by an individual provider. Somayaji et al. (2017) studied the impact of an IPC team approach with 49 patients diagnosed with DFU in a community wound healing center. Significant wound closure rates were identified following the IPC team assessment and care with a decrease in the number of weekly dressing changes from 4.32 per week to 3.54 per week.

Despite initial findings supporting a relationship between IPC teams and positive diabetes- related outcomes, there are few comprehensive studies describing the relationship between patient perceptions of IPC teams, family support, improvement in self-management behaviors, and positive health outcomes. Previous research has largely overlooked the importance of the role of family support in IPC teamwork. There is a need to relate improved diabetes-related outcomes to a decrease in patient and system financial expenditures to further support the importance of IPC team care.

Member composition of the IPC team

In a study of individuals diagnosed with heart failure, La Donna et al. (2016) interviewed participants regarding their understanding of the composition of their care team and their roles. Patients identified a wide range of care-team members that included health professionals and informal providers. Patients most frequently identified family, friends, themselves, physicians, and nurses as members of their care team. Patients viewed team members roles through the lens of their current healthcare need. For example, if their health needs were more acute, the patient anticipated more attention and team members involved in their care. In a focus group study of participants experiencing chronic conditions, Cutler et al. (2019) found that patients viewed the structure of the IPC team as varying in accordance with individual patient needs. In this study, participants perceived team hierarchies both positively and negatively. The presence of hierarchies was seen as positive when explaining how the mix of experience could be beneficial to their care. In contrast, the team hierarchy was seen as a disadvantage when patients perceived a lack of willingness to make decisions by team members viewed as not in charge.

Proximal and Distal Outcomes Dimension

The literature was reviewed to address the proximal and distal outcomes dimension of individual and family self-management. Proximal outcomes refer to engaging in condition-specific behaviors of self-management (Ryan & Sawin, 2009). Distal outcomes are partially related to successful results of proximal outcomes (Ryan & Sawin, 2009). This review of the literature addresses the relationship of self-management behaviors and the outcomes of HRQoL, wound size, and glycemic stability.

Health related quality of life

Sharoni et al. (2018), Shen et al. (2018), and Al-Dwaikat et al. (2019) evaluated relationships between self-management or self-care behaviors and HRQoL with conflicting results. Sharoni et al. (2018) evaluated HRQoL in an educational intervention group by asking participants diagnosed with T2DM how diabetes and foot self-care affected their daily activities, relationships, and feelings. The study included educational interventions consisting of a PowerPoint presentation and an informational pamphlet that addressed foot self-care. Overall HRQoL physical symptoms and psychosocial functioning scores improved over time for the intervention group. Shen et al. (2018) appraised differences between an intervention group that received four weekly diabetic education classes to a standard care control group. Standard care consisted of a review of the patient's health record, referral for diabetic instruction, and educational material. No significant differences in HRQoL were found between the control and intervention groups at any time during the study. This finding was explained by the authors in several ways. First, even though participants were older (M= 71 years) they had relatively high levels of HRQoL prior to the intervention so achieving significant improvement would have been difficult. Second, the authors concluded that behavior changes that lead to increased HRQoL scores may take more time to achieve beyond the length of their study. Furthermore, Al-Dwaikat et al. (2019) and Lin et al. (2017) reported that self-management behavior scores were not successful predictors of depression, stress, or anxiety levels in a population of African American and Chinese patients with T2DM respectively in their study.

Health-related quality of life in patients with DFU was investigated by Alosaimi et al. (2019), Nemcova et al. (2017), Siersma et al. (2017), and Spanos et al. (2017). Alosaimi et al. (2019) conducted a case-control study comparing HRQoL and psychosocial determinants of participants experiencing DFU. The findings suggested that depressive symptoms were determinants of poor HRQoL independent of the severity of DFU. Nemcova et al. (2017) surveyed 525 persons diagnosed with DFU about quality of life. The authors reported a significant positive relationship between HRQoL and patients that received information regarding their disease and treatment. Siersma et al. (2017) found a statistically significant relationship between HRQoL and DFU length of treatment in a sample of 1088 participants treated for DFU. Conversely, Spanos et al. (2017) found that HRQoL improved in DFU patients after initiation of a patient treatment plan regardless of the treatment outcome, such as healing, minor amputation, or major amputation.

Wound size

Jeffcoate and colleagues (2006) conducted a prospective study of over 400 participants with a DFU greater than one cm^2 to assess outcome measurements after referral to a multidisciplinary foot care clinic. Although relationships of outcomes relevant to the impact of the IPC team approach were not measured, length of healing time and mortality rates were consistent with previous literature. Of the original patient cohort in this study, only 60% remained healed at the end of 12 months with an 18% mortality rate reported. Nube et al. (2016) found that factors most associated with delayed healing in DFU were advanced age, infection, presence of ischemia, large wound size, cardiac and renal comorbidities, male, immobility, and depressive symptoms.

Glycemic stability

Several studies were found that demonstrate a relationship between self-management or self-care behaviors and glycemic control or HbA1c levels (Chlebowy et al., 2019; Cosansu & Erdogan, 2014; D’Souza et al., 2017; Gao et al., 2013; Lin et al., 2017; Saad et al., 2018).

Glycemic stability determined by controlled HbA1c or blood sugar levels can have a direct impact on the prevention of diabetes complications, resulting in healthcare cost savings. Chlebowy et al. (2019) examined psychosocial variables such as depression, anxiety, stress, and the impact on engagement in SM in African American adults with T2DM. The authors reported a positive correlation between depression, anxiety, stress, and HbA1c levels, with anxiety having the strongest correlation with HbA1c (Chlebowy et al., 2019). In other studies, exploring indirect and direct effects of psychosocial factors on self-care and glycemic control of T2DM patients, Cosansu and Erdogan (2014) and Lin et al. (2017) reported a positive significant relationship between HbA1c and patient confidence in their SM. Additionally, patient motivation for improving their health indirectly influenced HbA1c levels through increased engagement in SM (Lin et al., 2017; Saad et al., 2018). In addition, Saad et al. (2018) found that improved diet self-management behaviors predicted improved HbA1c levels. Gao et al. (2013) and D'Souza et al. (2017) reported a positive direct effect of social support and patient-provider communication to improved diabetes self-care in a population of Chinese and Middle Eastern adults with T2DM respectively. Self-care behaviors were found to indirectly impact improved HbA1c levels (D'Souza et al., 2017; Gao et al., 2013). Cosansu and Erdogan (2014) found that psychosocial variables such as social support, perceived interference, and outcome expectancies did not significantly impact HbA1c in their study of Turkish adults with T2DM, suggesting that the psychosocial impact on glycemic control is a complex phenomenon that may not always be quantified.

Summary

This literature review supports the need for additional understanding of how individuals with T2DM engage in self-management behaviors that improve health outcomes. With the increased prevalence of T2DM and mortality associated with DFU the need to explore factors that support patient and family engagagement in SM is needed. Important aspects of patient-centered care such as the integration of IPC teams, patients, and families in comprehensive plans of care need further examination. The direct participation by the IPC team in the support process may lead to increased patient and family engagement in self-management behaviors that improve health outcomes. Healthcare outcomes of patients with diabetes including glycemic stability and HRQoL have been found to be influenced by psychosocial elements. There is some data related to IPC team care with patients diagnosed with diabetes. There is limited information about the link between IPC teams and SM. Additionally, there is limited evidence regarding patient perceptions of IPC teams and the work they are responsible for. With the increasing number of patients diagnosed with diabetes and responsibilities for care shifting to the home further research addressing the context, process, and outcome factors of self-management behaviors is needed.

This research study added to the knowledge and conprehension of self-management behaviors through exploring associated factors in patients diagnosed with DFU. The information gained from this study will influence self-management and IPC team interventions as well as health outcomes of individuals and families diagnosed with DFU.

CHAPTER 3: METHODS

Introduction

Chapter three reviews the methodology to explore the relationship between patients with a diagnosis of DFU, SM, FS, PP-IPCT, HRQoL,WS, SMBG, and demographics in a wound care specialty clinic with superior outcomes in southeastern North Carolina. This includes the study design, setting, sample, setting, human subjects protection protocol, instruments, data collection procedures, data analysis procedures, and the full results of the study as they addressed the research questions. A partial discussion of the study results are presented in Chapter 5: Manuscript Two. A discussion of limitations and summary is also included.

Design

A cross-sectional, descriptive, correlational research design was used to investigate SM in patients with a DFU utilizing the IFSMT framework. Data included condition specific factors (comorbidity, BMI, DFU), individual factors (education, age, gender, duration of diabetes diagnosis) self-regulation (PAM scores), social facilitation (Family APGAR scores, PIVOT scores, member composition of the IPC team), and outcomes (HRQoL scores, WS, SMBG).

The purpose of a cross-sectional, correlational research design is to measure data from a singular point in time to describe associations among variables (Polit & Beck, 2017). Data were collected data to gain understanding of relationships between PP-IPCT, FS, SM, and HRQoL. The methodology was suitable for the theoretical framework because the theory postulates connections between the variables of interest. The first aim of this study was to describe persons with the diagnosis of DFU who received care in a wound care specialty clinic with superior outcomes in southeastern North Carolina. The second aim was to examine the relationship between health condition support factors and clinical characteristics of patients with a diagnosis of DFU. A descriptive, correlational design was appropriate for these aims because participant characteristics and interrelationships among variables was explored (Polit & Beck, 2017).

Setting

The setting for this research was a regional healthcare system wound healing center (WHC) located in Whiteville, North Carolina. Whiteville, North Carolina, the county seat of Columbus County, is located 44 miles west of Wilmington, North Carolina with a population of 5,299 inhabitants. The median age of individuals residing in Whiteville is 40 years; the male to female ratio is 0.8:1; and 30.6% of the population is Black or African American, 63.1% is White, 2.67% Hispanic, and 92% speak English. The county census reports that 83% of the population has attained a high school education or higher with a mean household income of $36,398. Eighty-six percent of the population reports insurance coverage for healthcare with the percent of uninsured citizens decreasing in the most recent census report (United States Census Bureau, 2019).

The regional healthcare system was founded in 1935 and expanded to its current facility in 1977. The hospital is currently licensed for 154 bed capacity. The regional healthcare system is a not-for-profit organization, accredited by the Joint Commission on Accreditation of Healthcare Organizations, and is governed by a local board of trustees. In 2007, the board of trustees selected a larger healthcare system to assume management of the regional healthcare system. In February of 2018, Carolinas HealthCare System changed its name to Atrium Health. Atrium Health is an integrated, nonprofit health system with more than 70,000 employees serving patients at 42 hospitals and more than 1,500 care locations (Atrium Health, 2021).

The WHC is a free-standing wound care specialty clinic known for superior outcomes in wound care and served as the setting for the study. The WHC opened in 2014 and had over 3000 visits and 500 wounds treated in the first year of operation. The average days to wound healing at the WHC is 41, compared to the national average of 63 (Wound Healing Center [WHC], 2015). The wound care specialty clinic reports 92% of all wounds healed compared to a national average of 80% (WHC, 2015).

The specialty team model of the WHC includes a registered nurse, a certified wound care nurse, a general surgeon, a podiatrist, a bariatric chamber certified staff member and a physician assistant. Additional care professionals such as diabetes nurse educators, physical and occupational therapists, home health nurses and care aides, and pharmacists are available on a referral basis at locations outside of the WHC. A letter of support from the WHC confirming the research collaboration is provided in Appendix D.

Sample

The target population for this study was a purposive, convenience sample of patients diagnosed with DFU who received care from the WHC. Participant inclusion criteria were: (a) age 18 or older; (b) could read and comprehend English; (c) admitted to the wound care specialty clinic with a diagnosis of DFU confirmed by medical record ICD-10 code E11.621; (d) attendance of a minimum of four treatment sessions; and (d) volunteered for the study. Exclusion criteria included: (a) younger than 18 years of age; (b) inability to read or write in English; (c) diabetic ulceration not located on the feet; (d) attendance of less than four treatment sessions; and (e) ulceration not due to diabetes. The inclusion criteria chosen for the study were based on the review of literature as consistent with other studies of SM in patients diagnosed with diabetes.

To understand the relationships between the variables of interest a pilot study was indicated. A prior analysis using G*Power (Faul et al., 2009; Faul et al., 2007) was conducted to determine the pilot study size (Faul et al., 2009; Faul et al., 2007; Pallant, 2016). Based on an alpha of .05, a pilot sample size of N = 64 was estimated to obtain a statistical power of .80 and an effect size of .3 (Faul et al., 2009; Faul et al., 2007; Pallant, 2016).

Humans Subjects Protection

Research ethics approval was obtained for this study from the East Carolina University and Medical Center Institutional Review Board (UMCIRB). All requirements pertaining to approval was met. Informed consent (Appendix B) and HIPAA privacy authorization (Appendix C) was obtained as per UMCIRB protocol utilizing standardized forms and instructions from UMCIRB (Appendix A). Demographic data were collected at the beginning of the survey. Protected health information (PHI) was not collected nor included in the surveys, but chart review was used to extract the key variables of WS and SMBG.

The PI and the staff of the WHC were the only individuals in contact with the surveys and chart information during the data collection process. Protection of study participants was maintained by obtaining informed consent and maintaining participant confidentiality and anonymity. All results preserved anonymity by not collecting identifying information that could link responses to the research participants. Patients were identified only through a number randomly assigned to their case and study documents. A master log of participant identification numbers and assigned case numbers were secured separately from all data collection forms in a locked file cabinet in a locked office. Once data collection was completed the master log was destroyed.

Potential risks to the participant included identification of depression requiring intervention from the results of the SF-12v.2 and anxiety due to sharing private information as part of completing the study packet. No patients showed any indications or survey results identifying depression or anxiety. If any participant would have expressed, or the PI determined by survey results any indication of depression or anxiety, survey completion would have been terminated and referral and counseling to the appropriate resources would have been initiated.

Instruments

Data for the study were collected using an investigator developed demographic data form and standardized instruments. The standardized instruments included: (a) Patient Activation Measure (PAM), (b) Family APGAR, (c) Patients' Insights and Views of Teamwork Survey (PIVOT), and (d) Short-Form 12 Version 2.0 (SF-12v2).

Demographic Data Form

An investigator-developed survey was used to acquire descriptive characteristics of the participants such as age, gender, height, weight, race, ethnicity, educational level, marital status, duration of diabetes diagnosis, member composition of the IPC team, and comorbidities (see Appendix E). Income and insurance data were not available for collection at the site.

Patient Activation Measure (PAM)

The assessment of a person's underlying knowledge, skills, and confidence essential to managing their individual health and healthcare was measured using the PAM (Hibbard et al., 2004). The PAM is a 10-item, self-rated, unidimensional, Guttman-like instrument with four potential response options that range from 1 (disagree strongly) to 4 (agree strongly) and an added 'not applicable' option (Moljord et al., 2015). Participants are scored by proprietary instructions; results place them into four increasing levels of activation or self-management: (1) disengaged and overwhelmed, (2) becoming aware but still struggling, (3) taking action and gaining control, and (4) maintaining behaviors and pushing further (Hibbard et al., 2004). The PAM has been translated and validated in 35 languages. Validation of the PAM has occurred in many populations including hospitalized patients and patients that have diagnoses of mental health disorders, diabetes (DM), chronic heart failure (CHF), chronic obstructive pulmonary disease (COPD), and chronic renal disease ([CRD] Bos-Touwen et al., 2015; Prey et al., 2016). The PAM was found to be internally consistent in the four primary care and hospitalized participant populations of DM, CHF, COPD, and CRD with an α = .88 and in hospitalized participants with the same diagnoses with an α =.81 (Bos-Touwen et al., 2015; Prey et al., 2016). The Cronbach's alpha in this study was .78. The developer of the PAM granted permission for its use in this study. A copy of the PAM is in Appendix F.

Family APGAR

The assessment of family support was measured by the Family Adaptation, Partnership, Growth, Affection, Resolve instrument (Smilkstein, 1978; Smilkstein et al., 1982). The Family APGAR is a five-item self-rated questionnaire. The questionnaire assesses five parameters of family function: adaptation, partnership, growth, affection, and resolve. The three potential response options range from 0 (hardly ever) to 2 (almost always), and item responses are added together resulting in a total score (Smilkstein et al., 1982). Total scores range from 0 to 10, with higher scores reflecting higher satisfaction with family function (Smilkstein et al., 1982). Validation of the Family APGAR has taken place in many populations including college students and psychiatric and family practice outpatients and has been translated to Chinese for use in Taiwan. The Family APGAR was found to be internally consistent with an α = .80 (Smilkstein et al., 1982). The Cronbach's alpha in this study was .96. The developer of the Family APGAR instrument granted permission for its use in this study. A copy of the Family APGAR is in Appendix G.

Patients' Insights and Views of Teamwork Survey (PIVOT)

Patient observations of teamwork-related behaviors were measured by the Patients' Insights and Views of Teamwork (PIVOT) survey (Henry et al., 2014). While the subject of teams and teamwork have often been the subject of assessment by team colleagues, patient perceptions have not often been queried. As improving clinical teamwork has been more readily identified as a means to improve quality, and safety of patient care, patients are most often surveyed regarding satisfaction and communication. The PIVOT was created in order to further explore quality and safety initiatives from the patient point of view (Henry et al., 2014). This 16-item Likert scaled instrument is one of few scales that measures patient perspectives of teamwork and was initially validated in the emergency department. The PIVOT survey participants select response options that range from 1 (not at all) to 5 (all the time). Cronbach alpha for internal consistency was high at .87. The Cronbach's alpha in this study was .71. The range of possible PIVOT scores is from 0 to 80, with higher total scores suggesting greater levels of perceived teamwork-related behavior. Permission to use the PIVOT in this study was granted by the author. A copy of the PIVOT is in Appendix H.

Short-Form 12 Version 2.0 (SF-12v2)

Self-reported HRQoL was measured using the SF-12v2. The SF-12v2 is one of the most widely used survey instruments for reporting well-being (Huo et al., 2018). The SF-12v2 has been used and validated in multiple settings involving participants with chronic diseases and mental health conditions. The instrument consists of a twelve-item Likert-type scale with a 3- or 5-response option range that measures eight health sub-domains. The eight subdomains include Physical Functioning (PF), Role Physical (RP), Bodily Pain (BP), General Health (GH), Vitality (VT), Social Functioning (SF), Role Emotional (RE), and Mental Health (MH) (Ware et al., 1996). Summary scores of the physical (PCS) and mental (MCS) health domains were calculated for each participant by using the scores of the twelve questions ranging from 0 to 100 (Ware et al., 1996). The lowest level of HRQoL is represented by a 0 and 100 designates the highest level of HRQoL (Ware et al., 1996). In adults with mental health conditions, the internal consistency reliability of the mental (MCS) and physical (PCS) component summary scores were high ($\alpha >$ .80) (Cheak-Zamora et al., 2009). Test-retest reliability was high in the PCS (ICC = .78) while moderate test-retest reliability (ICC = .60) was shown in the MCS (Cheak-Zamora et al., 2009). Mosier's alpha was calculated to be .88 for the PCS and .82 for the MCS when used with the adults with mental health conditions (Huo et al., 2018). The Cronbach's alpha in this study was .77. Permission to use the SF-12v2 was granted. A copy of the SF-12v2 4-week recall version is in Appendix I.

Procedures

The PI interacted directly with the staff of the WHC regarding the process of data collection to enhance collaboration and understanding. Information was shared regarding how the PI would: (a) screen for eligibility; (b) obtain informed consent; (c) complete data collection instruments; and (d) follow data management procedures. Participants could elect whether to be read the survey questions by the PI, respond to them via a pencil and paper survey, or enter survey responses electronically on an iPad. The PAM (Hibbard et al., 2004), Family APGAR (Smilkstein, 1978; Smilkstein et al., 1982), PIVOT (Henry et al., 2014), and SF-12v2 (Ware et al., 1996) surveys were available in pencil and paper format and electronic version using two researcher-provided iPads. The iPads were used solely for data collection. Eligible participants received a $25.00 Walmart gift card after the surveys were completed.

Study participants were solicited through WHC nurse referral during their scheduled wound care appointments. The purpose of the study was explained to all eligible participants and any resulting questions were answered by the PI. The PI explained the study instruments and meaning of informed consent to all participants. Study participants who met the inclusion criteria and consented to participate were asked by the PI to sign a consent form informing them of their rights and responsibilities as a research study participant. Participants were informed that they had the right to withdraw from the study at any time without consequences. Those who agreed to participate in the study by signing the written consent were asked to complete the study instrument packet organized in this order: (a) demographic data form; (b) PAM; (c) Family APGAR; (d) PIVOT; and (e) SF-12v2. The order of instrument administrations was selected to decrease the likelihood of response set bias (Polit & Yang, 2016). Survey fatigue from response set bias was reduced by alternating the flow of the surveys, beginning with the instruments that were longer in length (Polit &Yang, 2016). The study packet was administered and collected by the PI at the wound care appointment.

Completed surveys were placed in a locked box and transported in a locked suitcase by the PI for input into a secure university drive for analysis. The surveys recorded on the iPads were available only to the PI and were downloaded to the secure university drive after collection. The surveys and iPads were stored in a safe in the PI's locked campus office. The PI was available onsite to collect data and surveys. Data collection occurred over a period of nine months.

Data Analysis

Prior to data analysis, the data set was screened and cleaned for errors. First, the PI checked the data set for minimum and maximum values for each variable and examined all variable data for values that scored outside of range responses. Second, the number of missing cases were examined, and missing data was kept as missing. Third, frequencies were run for each variable. If data entry or variable inconsistencies were noted, surrounding columns were reviewed. Lastly, corrections to the data were made and variable frequencies were repeated in order to confirm a reliable data set. In addition, four negatively worded PIVOT items were reverse coded before computing the total score in order to align with the focus of the positively worded items (Henry et al., 2014).

A variable summary was computed using descriptive statistics. The International Business Machines Statistical Package for the Social Sciences (IBM SPSS) version 24.0 software (IBM Corporation, 2020) was used to calculate measures of central tendency (mode, median, and mean), and measures of dispersion (range and standard deviation) to initially analyze participant results of the demographic data, PAM, Family APGAR, PIVOT, and SF-12v2 survey tools. A Pearson correlation was used to determine the strength and direction of relationships between SM, FS, PP-IPCT, and HRQoL. It is recommended that "preliminary analyses be performed to ensure no violation of the assumptions of normality, linearity, and homoscedasticity are present" prior to running the correlation (Pallant, 2016, p. 139).

Methodological challenges to conducting this research included patient literacy levels and access to participants. Literacy was addressed by the evaluation of tools for reading level. Reading grade level of the research instruments and demographic data form was evaluated using the Flesch-Kincaid grade level. The reading grade level for all study instruments was determined to be 4.3 (Microsoft Word, 2019). The percent of high school graduates and beyond high school graduates age 25 and older was 83% in Columbus County, therefore no literacy level adjustments were determined to be necessary (United States Census Bureau, 2019). The challenge related to participant access was addressed by developing a strong rapport among the WHC leadership and staff as well as the community research site. It should be noted that arrival of the COVID-19 pandemic and resulting delays related to human participant research lengthened the data collection timeline.

Data Analysis for Specific Aims and Research Questions

Data analysis procedures were chosen to address the specific aims and research questions of this study. Descriptive statistics were used to describe the characteristics of the sample. Calculations were made to determine measures of central tendency, such as mean, median and mode. The use of standard deviation, minimum and maximum variable ranges, kurtosis, and skewness were calculated to determine measures of variability. All instruments were assessed for internal consistency using Cronbach's alpha. This assessment technique is frequently used when instruments items have at least three or more possible values as answer choices (Huck, 2012).

Aim 1 described persons with the diagnosis of DFU who received care in a wound care specialty clinic with superior outcomes in southeastern North Carolina.

Research Question (RQ) 1. What were the socio-demographic and clinical characteristics of the study sample?

Descriptive statistics were used to determine the sociodemographic (gender, age, race, marital status, and educational level) and clinical characteristics (duration of diabetes diagnosis, comorbidities, member composition of the IPC team, number of providers seen, BMI, WS, and SMBG). Categorical values were reported as frequencies and percentages. The results of continuous variables were reported as means, medians and standard deviations. Results reflect information from 64 study participants. The sociodemographic data results reported were gender, race, marital status, and educational level (Table 1). There were no Hispanic participants in the study sample. Clinical characteristics of participants analyzed included duration of diabetes diagnosis, comorbidities, member composition of the IPC team, number of providers seen (Table 2), BMI, WS, and SMBG. A paired-samples t-test was used to compare means of wound area measurements at baseline, week four, and week eight. Effect size calculations were based on Cohen's (1988) criteria of .01 for small effect, .30 for medium effect, and .50 for large effect (Pallant, 2016, p. 221). The BMI of participants ranged from 16.20- 58.40, with a mean of 34.53 and a standard deviation of 9.42. Wound data was calculated on 60 patients at baseline and at four weeks. Four participants wound measurements were not available at the time of data analysis. Participants average wound area at baseline was 13.11 cm^2 and 11.73 cm^2 at four weeks. The median wound area increased from baseline in 25 (41.7%) of the participants. The average wound size increase was 5.13 cm^2 (Mdn = 2.5 cm^2 , SD =6.26 cm). Wound area decreased in 35 (58.3%) of the participants, with an average decrease of 2.81 cm^2 (Mdn = 2.18 cm^2, SD = 2.45 cm). There were no significant changes in average wound size during the eight weeks. There were not an adequate number of SMBG results to inform characteristics of the sample.

Table 1

Sociodemographic Characteristics of Participants (N = 64)

Characteristic	n	%
Gender		
Female	20	31.3
Male	44	68.8
Race		
White	45	70.3
Black	19	27.7
Marital status		
Single	16	25.0
Married/partnered	24	37.5
Divorced/separated	10	15.7
Widowed	14	21.9
Highest educational level		
Less high school	11	17.2
High school	29	45.3
Some college	9	14.1
University or post-graduate degree	15	23.4
Age		
< 60	28	43.8
60 – 69	18	28.1
70 – 88	18	28.1

Table 2

Clinical Characteristics of Participants (N = 64)

Characteristic	n	%
Diabetes duration		
<1 year	3	4.7
1-5 years	9	14.1
>5 years	51	79.7
Missing	1	1.6
Co-Morbidities		
High cholesterol	43	67.2
High blood pressure	56	87.5
Heart disease	22	34.4
Kidney disease	20	31.3
Lung disease	8	12.5
Other	10	15.6
IPC Team Members		
Nurse	62	96.9
Doctor	62	96.9
Nutritionist	19	29.7
Physical therapist	27	42.2
Bariatric counselor	2	3.1
Diabetes educator	20	31.3
Pharmacist	17	26.6
Other	7	10.9
Number of Providers Seen		
1	3	4.7
2	16	25.0
3	20	31.2
4 – 6	25	39.1

Aim 2 examined the relationship between health condition support factors (SM, FS, PP-IPCT) and HRQoL of patients with a diagnosis of DFU.

RQ 2. What was the level of SM, FS, PP-IPCT, and HRQoL in patients with a diagnosis of DFU?

Descriptive statistics were used to report the mean, standard deviation, and range for the results of the PAM, Family APGAR, PIVOT, and SF-12v.2 (Table 3). An independent samples t-test comparing the adult diabetic general population norm group versus the study group and the PF, RP, BP, SF, RE, and MH scales of the SF-12v2 revealed statistically significant differences (Table 4). A significant difference was found between the average PF for the norm group (*M* = 41.92, *SD* = 11.57), and the study group (*M* = 34.99, *SD* = 12.33), *t* (606) = 4.50, *p* = < .001; η^2 = .033. Significant differences were also found between the average norm group and study group for RP (*M* = 23.49, *SD* = 9.60), *t* (598) = 13.05, *p* < .001; η^2 = .222, and BP (*M* = *37.22*, *SD* = 16.39), *t* (608) = 4.52, *p* < .001; η^2 = .033, GH (*M* = 30.49, *SD* = 7.26), *t* (597) = 8.08, *p* < .001; η^2 = .099, SF (*M* = 35.43, *SD* = 12.94), *t* (589) = 6.01, *p* < .001; η^2 = .057, and RE (*M* = 22.18, *SD* = 18.26), *t* (598) = 13.64, *p* < .001; η^2 = .237. The biggest differences between the study sample and the norm group were noted in the RP and RE scales.

Table 3

Descriptive Statistics for Study Measures

Measure	M	SD	Theoretical Range	Cronbach's Alpha
Patients' Insights and Views Of Teamwork Survey Total Score (PIVOT)	68.50	9.58	0-80	.71
Patient Activation Measure Total Score (PAM)	31.78	3.67	10-40	.78
Smilkstein's Family System APGAR Total Score (APGAR)	8.09	3.22	0-10	.96
Short Form SF-12v2 Total Score				.77
Physical Functioning (PF)	37.50	35.91	0-100	
Role Physical (RP)	8.59	26.06	0-100	
Bodily Pain (BP)	50.39	40.21	0-100	
General Health (GH)	26.95	16.85	0-100	
Vitality (VT)	43.75	32.24	0-100	
Social Functioning (SF)	47.66	32.03	0-100	
Role Emotional (RE)	24.22	40.82	0-100	
Mental Health (MH)	62.97	25.74	0-100	

Table 4

Comparison of Diabetic Study Sample on Standard SF-12v2 with Adult Diabetic Norms for the 1998 General Population on the Standard SF-12v2

SF-12v2 Scales	Norm Sample		Study Group		df	t	p	η^2
	M	SD	M	SD				
Physical Functioning	41.92	11.57	34.99	12.33	606	4.50	<.001	.033
Role Physical	42.95	11.49	23.49	9.60	598	13.05	<.001	.222
Bodily Pain	44.40	11.41	37.22	16.39	608	4.52	<.001	.033
General Health	41.34	10.44	30.49	7.26	597	8.08	<.001	.099
Vitality	46.04	10.33	45.23	12.98	589	0.57	.566	<.001
Social Functioning	44.84	11.68	35.43	12.94	589	6.01	<.001	.057
Role Emotional	44.80	12.72	22.18	18.26	598	13.64	<.001	.237
Mental Health	47.76	10.47	46.48	12.55	604	0.90	.366	.001
Physical Summary	41.52	11.07	31.49	10.28	592	6.90	<.001	.074
Mental Summary	47.28	10.72	39.45	12.59	592	5.41	<.001	.047

RQ 3. What were the relationships among SM, FS, PP-IPCT, and HRQoL in patients with a diagnosis of DFU?

The Pearson correlation coefficient was used to determine the strength and direction of relationships among the variables of SM, FS, PP-IPCT, and HRQoL in the sample population (Table 5). Preliminary analyses were performed to confirm no violations of normality, linearity, and homoscedasticity. The strength of the relationships was determined using the suggestions made by Cohen (1988) of r = .10 to .29 for small effect, r = .30 to .49 for medium effect, and r = .50 to 1.0 for large effect. No association was found between self-management behaviors (PAM), family support (Family APGAR), and patient perceptions of IPC teamwork (PIVOT). Although not significant, a small positive association (r = .17) was found between patient perceptions of teamwork and SM. There were several significant positive correlations identified among the variables. A medium positive correlation (*r* = .33, p < .01) was found between patient perceptions of teamwork and physical functioning. A medium positive correlation (*r* = .31, p < .05) was also found between self-management behaviors and general health. A large positive association (*r* = .51, p < .001) was found between the RP and RE scales of the SF-12v2. Three medium positive correlations were found between MH and HRQoL. Bodily pain (*r* = .42, p < .01), SF (*r* = .36, p < .01), and RE (*r* = .30, p <.05) all had significant positive correlations with MH. No associations were found between HRQoL and Family APGAR.

Table 5

Correlations for Study Variables

Variables	1	2	3	4	5	6	7	8	9	10	11
1. PIVOT	_										
2. PAM	.17	_									
3. APGAR	.08	.02	_								
4. PF	$.33^{**}$	.13	.11	_							
5. RP	.11	.12	.06	$.37^{**}$	_						
6. BP	.11	-.04	.03	$.37^{**}$	.09	_					
7. GH	.06	$.31^{*}$	.23	$.30^{*}$	$.28^{*}$	.12	_				
8. VT	.08	.16	.02	.14	.04	.11	.22	_			
9. SF	-.15	-.01	-.07	$.26^{*}$	.24	$.36^{**}$	$.30^{*}$	.12	_		
10. RE	-.14	.18	.10	.21	$.51^{***}$	.08	.16	-.06	$.27^{*}$	_	
11. MH	-.07	.14	.08	.02	-.01	$.42^{**}$	.12	.13	$.36^{**}$	$.30^{*}$	_

$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

RQ 4. Did subgroups of the study sample emerge relevant to comorbid conditions, member composition of the IPC team, and HRQoL in patients with a diagnosis of DFU?

A classification analysis was completed on the study sample to determine whether there were subgroups of the sample based on (1) differences in comorbid conditions, (2) differences in usage of healthcare team members, and (3) differences in level of HRQoL (Table 6). Participant responses were recorded as frequencies and percentages. The results of the comorbidity subgroups revealed high blood pressure and high cholesterol as the most common comorbidities associated with DFU in the study population. The healthcare provider subgroup showed usage of a physical therapist, nutritionist, and diabetic educator as the most common IPC team members consulted by the study population. The higher HRQoL subgroups reported role emotional (RE) and social functioning (SF) as highest predictive importance variables. The means on the HRQoL subgroups were based on a 100-point scale, where higher mean scores indicate higher HRQoL. The larger group had lower HRQoL means on all scales compared to the smaller group, where lower scores indicate lower health status.

Table 6

Classification Analysis Results

Co-Morbidity Subgroups

Co-Morbid Condition	Group 1 (n = 17, 26.6%)		Group 2 (n = 47, 73.4%)	
	n	%	n	%
High cholesterol	0	00.0	43	91.5
Heart disease	0	00.0	25	53.2
HBP	11	64.6	45	95.7
Kidney disease	2	11.8	18	38.3
Lung disease	0	00.0	8	17.0

Interprofessional Collaborative Team Member Subgroups

IPC Team Member	Group 1 (n = 32, 50%)		Group 2 (n = 32, 50%)	
	n	%	n	%
Physical therapist	27	84.4	0	00.0
Nutritionist	19	59.4	0	00.0
Diabetic counselor	16	50.0	4	12.5
Nurse	32	100.0	30	93.8
Pharm	8	25.0	9	24.1
Bari	1	3.1	1	3.1
MD	31	96.9	31	96.9

Health Related Quality of Life Subgroups

SF-12 Scales	Group 1 (n=35, 54.7%)	Group 2 (n = 29, 45.3%)
	M	M
Role emotional	00	53
Social functioning	31	68
Bodily pain	34	71
Mental health	52	76
General health	21	34
Role physical	00	19
Physical functioning	29	47
Vitality	42	46

Intercorrelations of female and male participants were calculated to explore relationships between gender and study variables. Four significant large positive correlations were identified between female participants (Table 7). In the female participant population relationships were noted between GH and Family APGAR (*r* = .50, p < .05), RP and PF (*r* = .63, p < .01), SF and VT (*r* = .51, p < .05), and RE and RP (*r* = .57, p < .05). No large positive correlations were noted among the male data, although several medium correlations were noted (Table 8). Both male and female participants shared four positive correlations: RP and RE, BP and SF, BP and MH, and RE and MH.

Table 7

Intercorrelations of Study Variables for Female Patients (n = 20)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. PIVOT	_													
2. PAM	.37	_												
3. APGAR	-.12	-.22	_											
4. Age	.12	-.24	.10	_										
5. BMI	-.29	.20	.00	-.18	_									
6. Area	.09	.06	.18	-.38	-.05	_								
7. PF	.12	.17	.14	.32	-.10	-.32	_							
8. RP	.09	-.20	.08	.15	-.10	-.16	$.63^{**}$	_						
9. BP	.02	-.14	-.04	.42	-.25	.04	$.47^{*}$	$.49^{*}$	_					
10. GH	.12	.25	$.50^{*}$	-.21	.00	$.46^{*}$	.22	.02	.21	_				
11. VT	.08	.27	-.04	.07	.08	.12	.38	.13	.27	.22	_			
12. SF	-.24	.20	.21	-.16	.02	.43	.24	.36	.38	.44	$.51^{*}$	_		
13. RE	.03	-.06	.25	$-.46^{*}$	-.08	.14	.16	$.57^{**}$	.17	.24	-.03	.34	_	
14. MH	.06	.12	.16	.00	.09	-.26	.13	.19	.30	.23	.25	.21	.31	_

* $p < .05$. ** $p < .01$.

Table 8

Intercorrelations of Study Variables for Male Patients (n = 44)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. PIVOT	_													
2. PAM	.05	_												
3. APGAR	.31*	.06	_											
4. Age	-.02	-.21	.16	_										
5. BMI	-.02	-.12	-.18	-.14	_									
6. Area	.06	.05	-.16	-.05	-.08	_								
7. PF	.45**	.14	.13	.01	-.24	.03	_							
8. RP	.14	.24	.05	.05	-.05	-.15	.28	_						
9. BP	.10	.01	.09	.12	-.23	-.06	.27	-.08	_					
10. GH	-.04	.35*	.13	.08	-.27	-.02	.31*	.38*	.03	_				
11. VT	.11	.11	.05	-.04	-.01	-.19	.04	-.01	.04	.23	_			
12. SF	-.12	-.11	-.19	.09	-.04	-.03	.26	.18	.35*	.23	-.10	_		
13. RE	-.27	.28	.03	-.07	.00	-.16	.26	.49**	.05	.14	-.08	.25	_	
14. MH	-.22	.15	.05	.10	-.01	-.18	-.05	-.10	.47**	.06	.07	.44**	.30*	_

* p < .05. ** p < .01.

Limitations

The use of convenience sampling of patients with DFU at a single location limited the ability to generalize this study to the general population. Survey results may have been influenced by misinterpretation of questions, survey fatigue, and receipt of incentives for participation.

The PIVOT tool was used to investigate patient perceptions of teamwork. Although an IPC team approach was promoted by the WHC, participants often did not recognize the presence of teamwork. The WHC reported an average wound healing rate of eight weeks for patients diagnosed with DFU. However, data collected in this study reflects that wound size changed minimally during an eight-week period. Glycemic stability was assessed by self-monitored blood glucose reported at the time of data collection and obtained through chart review. The majority of participants did not monitor their blood glucose at home and therefore minimal data were available for this important self-management indicator. Although this may be an indirect reflection of the lack of participant self-management behaviors, a HbA1c would have been more direct method of measurement but was not available.

Research has shown that inequities exist in the prevalence of those diagnosed with diabetes in areas where low income and racial and ethnic minorities exist (Hill-Briggs et al., 2021). Educational, occupational, and economic status as a predictor of engagement in self-management behaviors was not directly investigated in this study. The importance of levels of education, poverty and other social determinants of health should be considered in future studies of patients diagnosed with chronic conditions such as T2DM.

The data collection period was during the COVID-19 pandemic. It is not known how the presence of the pandemic impacted participant responses and research results at this time.

Summary

This study was conducted using a descriptive, cross-sectional, correlational research design after ECU UMCIRB approval. Participants with DFU were recruited from a wound care specialty clinic in southeastern North Carolina known for superior outcomes. This study described socio-demographic and clinical characteristics of a sample of participants diagnosed with DFU. Through the individual and family self-management theory of Ryan and Sawin (2009), the study also examined the relationship of self-management behaviors, family support, patient perceptions of interprofessional collaborative teamwork, health related quality of life, wound size, and glycemic control. A convenience sample of 64 participants were recruited from the WHC. Self-management behaviors were measured by the PAM (Hibbard et al., 2004), and FS by the Family APGAR (Smilkstein, 1978; Smilkstein et al.,1982). The PIVOT (Henry et al., 2014) was used to measure patient perceptions of IPC teamwork and the SF-12v2 (Ware et al., 1996) was used as a measure of well-being and HRQoL. The wound measurements recorded from each treatment session in the patient health record were used to determine the wound size. Glycemic control was recorded by patient SMBG reported at each treatment session and from chart review. The results of this study will add to the body of self-management and IPC knowledge that tests the influence of self-management behaviors, IPC team care, and their effects on HRQoL and healthcare outcomes.

CHAPTER 4: PATIENT PERCEPTIONS OF TEAMWORK IN THE CONTEXT OF THE INTERPROFESSIONAL EDUCATION COLLABORATIVE CORE COMPETENCIES FOR INTERPROFESSIONAL COLLABORATIVE PRACTICE MANUSCRIPT

This chapter consists of the first manuscript to be submitted for publication. The first manuscript focuses on an integrative summary of the literature evaluating patient perceptions teamwork through the lens of the Interprofessional Education Collaborative (IPEC) Core Competencies for Interprofessional Collaborative Practice. The significance, methods, findings as well as implications on future research are included. Manuscript one will be submitted to the Journal of Interprofessional Care.

Abstract

Background: Advances in healthcare have resulted in more people living longer with chronic conditions, and patients and families have become the primary caregivers. The role of the interprofessional collaborative team supports a paradigm shift to a joint care model with the patient and family at the center of healthcare decisions. However, patients' and family views of interprofessional collaborative (IPC) team care have rarely been studied or reviewed.

Objective: To explore and summarize in an integrative review the literature regarding patient and family perceptions of teamwork in the context of the Interprofessional Education Collaborative (IPEC) Core Competencies for Interprofessional Collaborative Practice.

Methods: This review presents a critical reflection of patient and family perceptions of teamwork in the context of the Core Competencies for Interprofessional Collaborative Practice, noting gaps in the literature and areas for future research. Databases searched included PubMed, CINAHL, and PsycINFO. The literature search followed the PRISMA guidelines. Full text articles meeting the inclusion criteria were retrieved and reviewed. Thematic analysis of synthesized data was evaluated through the lens of patient perceptions of IPC care in the context of the IPEC Core Competencies for Interprofessional Collaborative Practice.

Results: Of 68 articles retrieved, 17 met the inclusion criteria and were included in this review. The findings identify varying perspectives by patients of the impact of the IPC team in their care which suggests that interventions are needed to increase knowledge about IPC team care from the patient and family perspective is needed.

Discussion: This review of the literature reflects a current gap in understanding IPC teams from the patient and family viewpoint within the context of the IPEC Core Competencies for Interprofessional Collaborative Practice. To fully implement the IPC team vision patients' and family's perceptions of teamwork must be fully understood. This review identifies several incongruencies in patient and provider perspectives of IPC teams and recognizes the need for additional research about patient and family perspectives of teamwork.

Keywords: patient care experience, patient family centered care, interprofessional collaborative teamwork, core competencies

Introduction

Traditionally, the United States (U.S.) healthcare system focuses on the care of acute illnesses from the perspective of healthcare professionals making decisions for patients, with patients serving as a passive participant in their care (Grady & Gough, 2014; Lawn & Schoo, 2010; Lorig & Holman, 2003). Relatively short lengths of hospital stay have contributed to limited opportunity by patients to participate in and establish an ongoing care routine (Lawn & Schoo, 2010). Advances in healthcare have resulted in more people living longer with chronic conditions, and families have become primary caregivers (Bodenheimer et al., 2002; Grady & Gough, 2014; Lorig & Holman, 2003). Typically, patients and families manage their day-to-day health needs with periodic provider oversight (Bodenheimer et al., 2002).

The role of the interprofessional collaborative care (IPC) team for patients with chronic illnesses supports a paradigm shift to a joint care model with the patient and family at the center of any healthcare decisions. While provider perceptions of IPC teams and teamwork have been frequently reported, patient and family perceptions of the IPC team and of their role as IPC team members have rarely been shared. For IPC teamwork to truly be grounded in a patient and family-centered care model, perceptions from these key team members must be known.

Background

The Interprofessional Education Collaborative (IPEC) defined interprofessional teamwork as relationships between professions providing patient and family-centered care through cooperation, coordination, and collaboration (IPEC, 2016). It has now been determined after more than 50 years of emphasis on team-based practice that effective collaboration among healthcare teams enhances and builds services that improve health outcomes (WHO, 2010). The fundamental contribution of an IPC team approach to patient care is the ability to provide interdisciplinary, evidence-based knowledge, in addition to meeting integrated patient-centered support and goal setting (McGill et al., 2017; Ryan & Sawin, 2009). With a healthcare team-focused approach the patient is an equal participant and actively manages their condition by setting goals and sharing responsibility with the IPC team (McGill & Felton, 2007; McGill et al., 2017).

The IPEC's most recent update expanded their conceptual model to include interprofessional collaboration as the central domain, emphasizing a patient, family-centered, community, and population focus (IPEC, 2016). Four core IPEC competencies exist within the singular interprofessional collaboration domain: 1) values and ethics for interprofessional practice, 2) roles and responsibilities, 3) interprofessional communication, and 4) teams and teamwork (IPEC, 2016). These core competencies represent a shared taxonomy that promotes a streamlined and integrated approach to implementation and evaluation of IPC team-based care (IPEC, 2016).

Bodenheimer and Sinsky (2014) describe how the IPEC Core Competencies were broadened from their previous structure to include a population health focus to better achieve the Quadruple Aims (Q-Aims). The Q-Aims have been proposed as a framework to address the currently fragmented U.S. healthcare system by improving the patient care experience, enhancing population health, reducing costs, and improving provider experiences (Valaitis et al., 2020). The objective of the IPEC Core Competencies (2016) to increase the integration of IPC teams across patient/population-centered and population healthcare has been proposed to positively impact achievement of the Q-Aims by focusing on access to efficient, cost-effective, quality care in underserved communities (Valaitis et al., 2020). Additionally, the central principle of patient and family-centered care as a key IPC team element has become important to achieving the goals of the Q-Aims (Bodenheimer & Sinsky, 2014).

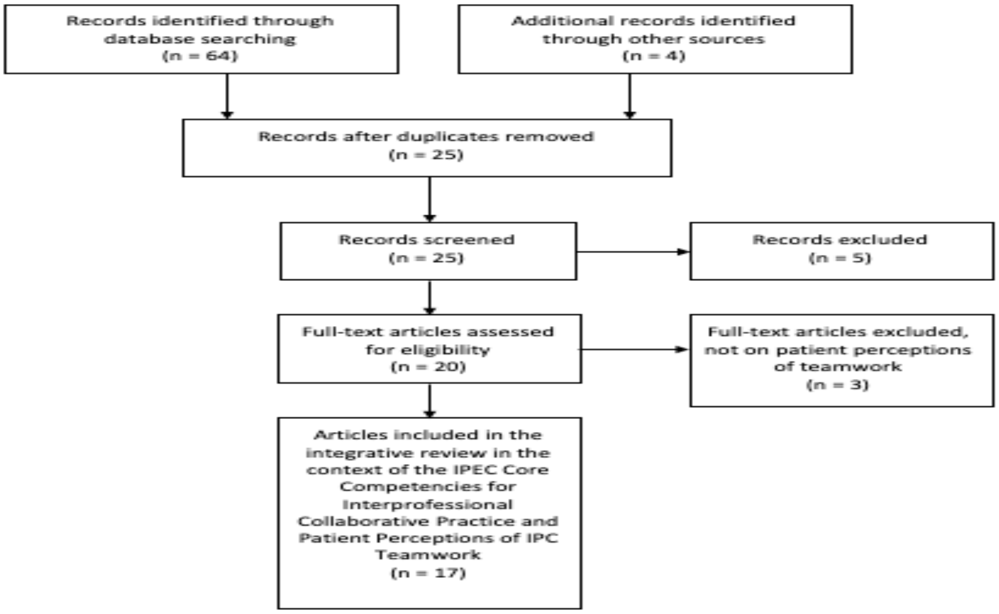
To demonstrate the value of teamwork the benefits must be clearly visible to patients and families (Pullon et al., 2011). However, while patient and family-centered care is considered by health care providers to be a key component of IPC, few research studies have examined patient perceptions of teamwork. To better understand the influence of IPC teams when assessing health outcomes, it is important to recognize patient perceptions of teamwork. Therefore, the purpose of this review of the literature is to examine patient and family perceptions of teamwork within the context of the four IPEC Core Competencies.

Method

The literature search was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA [Moher et al., 2009]). Search strategies were developed by the first author (LS) and a university medical research librarian. Databases searched included PubMed, CINAHL, and PsychINFO. Search terms used to capture patient perceptions of teamwork included "interprofessional relations", "interdisciplinary communication", "interprofessional team", "collaborative team", "interdisciplinary treatment approach", "collaborative teamwork", "patient perceptions", and "patient-reported outcome measures". These terms were entered in different combinations to ensure an exhaustive search. To be included, articles were research-based, focused on patient perceptions of teamwork, and were published between January 2000 and December 2020. Studies were excluded if they were not research-focused and did not include patient perceptions of teamwork. Articles were searched using key words and phrases and selected based on the inclusion criteria. After the key words and phrases were entered into the databases, articles were screened by their titles and abstracts. Potential articles were then read in full to determine eligibility. Articles that met inclusion criteria were imported into EndNote, where duplicates were identified. In addition, the reference lists were searched to identify other possible articles. Seventeen articles met the inclusion criteria for the integrative review. The PRISMA flow chart (Figure 1 [Moher et al., 2009]) shows the stages of the literature search. The literature retained in the search was then examined for patient perceptions of interprofessional collaborative (IPC) teamwork in the context of the IPEC Core Competencies for Interprofessional Collaborative Practice.

Figure 3

PRISMA (Moher et al., 2009) flow chart of search and accepted studies



Results

IPEC Core Competencies for Interprofessional Collaborative Practice and Patient Perceptions of IPC

The IPEC Core Competencies for Interprofessional Collaborative practice are key initiatives to foster the success patient-centered, team-based care. Yet there is limited understanding of how healthcare consumers perceive this model of care. In the following sections, patient perceptions of IPC team-based care are presented as they align with the four IPEC Core Competencies for Interprofessional Collaborative Practice.

IPEC Core Competency 1: Values and Ethics

IPEC Core Competency 1: Values and Ethics states the importance of values and ethics to the success of IPC practice and conveys the significance of shared values and mutual respect within the team composition (IPEC, 2016). Additionally, the attributes of honesty, trust, dignity, privacy, and integrity are applied to relationships with patients and families as IPC team members (IPEC, 2016). Interprofessional collaborative teamwork should reflect the cultural diversity and individual differences of patients, families, and communities as well as the diversity of healthcare providers who are members of the IPC team (IPEC, 2016). A foundational tenet of IPC team care involves maintaining an environment of respect and shared values to best serve patients, families, and populations (IPEC, 2016).

Evidence from the literature supports that patient-centered care, as a vital part of interprofessional collaborative practice, involves elements of respect, empathy, support, trust, and shared values (Bastian et al., 2016; CIHC, 2010). Trust, empathy, and support have been identified by patients as key attributes of good teamwork (Bastian et al., 2016; Bilodeau et al., 2015; Burdick et al., 2017; Pullon et al., 2011; van Dongen et al., 2017). The receipt of trustworthy information while encountering respectful, nonconfrontational instruction regarding their health condition has been found to enhance patients' positive perceptions of teamwork (Bastian et al., 2016; Beaird et al., 2017; Pullon et al., 2011). Individuals who expected a strong trusting and attentive relationship with their IPC team were pleased when the team jointly discussed their condition in their presence (Hewitt et al., 2015; Pullon et al., 2011). Conversely, a lack of trust and respect were perceived if patients felt they were unable to develop a personal relationship with their provider (Henry et al., 2016). Studies have found that the capacity to comfortably engage with healthcare providers contributed to patient perceptions of team effectiveness, and if relationships were perceived as impersonal, patients reported feeling anxiety and confusion about their care (Bilodeau et al., 2015; Hewitt et al., 2015). Henry et al. (2016) found that patients' and families' perceptions of positive team function were often linked to whether professionals appeared congenial and supportive of each other, which in turn enhanced their trust and confidence in teamwork. In addition, the IPC team's aptitude in establishing rapport with patients and families has been found by patients to enhance trust and a positive assessment of teamwork by patients (Hewitt et al., 2015). An individualized focus and holistic approach that allows for the development of genuine relationships with the team has been reported to be valued by patients in several studies (Bilodeau et al., 2015; Hustoft et al., 2018; van Dongen et al., 2017).

The IPEC Core Competency addressing values and ethics conveys the significance of mutual respect and shared values to the success of the IPC team from the health professions' point of view (IPEC, 2016). Furthermore, the development of an honest, trusting relationship between the patient, family, and IPC team was viewed as key to individualized, holistic care (IPEC, 2016; van Dongen et al., 2017). The summary of the literature indicates that patients and families interpret attributes that contribute to team success such as honesty, trust, and integrity similarly to healthcare providers within the IPC team (Bastian et al., 2016; Bilodeau et al., 2015; Burdick et al., 2017; CIHC, 2010; Pullon et al., 2011; van Dongen et al., 2017). The appearance of respectful, cooperative relationships between team members is viewed by patients as evidence of trust and positive team experiences (Henry et al., 2016; Hewitt et al., 2015). Patient perceptions of the importance of values and ethics and their influence on positive team function corresponds with what is known about the role of these core competencies among healthcare providers. (Bastian et al., 2016; Bilodeau et al., 2015; Burdick et al., 2017; CIHC, 2010; Cutler et al., 2019; Henry et al., 2016; Hewitt et al., 2015; IPEC, 2016; Pullon et al., 2011; van Dongen et al., 2017).

IPEC Core Competency 2: Roles and Responsibilities

IPEC Core Competency 2: Roles and Responsibilities refers to the IPC team members responsibility, both individually and collectively, to effectively address the healthcare needs of patients and populations (IPEC, 2016). Roles and responsibilities include the IPC team's ability to recognize, communicate, and use the full scope of their unique professional roles to elevate patient health needs and population health (IPEC, 2016). Patient and family engagement in their own health has become an important component aspect of maintaining and improving healthcare (Cutler et al., 2019). The ability of patients and families to understand not only their specific role as a team member, but the roles of other IPC team members are fundamental to appropriate plans of care that lead to satisfaction with care and favorable health outcomes (CIHC, 2010; Cutler et al., 2019). While patients' active participation in their care is crucial to managing their chronic conditions, requisite knowledge is needed regarding the structure and function of their care team (LaDonna et al., 2016).

The review of the literature about patient perceptions of their role as a member of the IPC team conveyed differing points of view. For example, patients believed they had more influence within the IPC team structure with increased knowledge and self-management of their health condition (Cutler et al., 2019; Henry et al., 2016; LaDonna et al., 2016). Patients felt that when general, non-acute health services were required it was more important to actively participate as part of the IPC team as opposed to when acute, emergent services were needed (Cutler et al., 2019). Demographics such as education level, age, language, and cultural differences were found to potentially influence shared decision-making within the IPC team structure (Cutler et al., 2019; Henry et al., 2016).

The physician-led IPC team hierarchy was viewed by patients as both an advantage and disadvantage to teamwork by patients. This type of hierarchy was viewed as beneficial by patients in terms of understanding who oversaw decision-making (Cutler et al., 2019). However, the hierarchy structure of a physician-led IPC team was viewed by some patients as a disadvantage when team members were hesitant to make decisions in the absence of the physician (Cutler et al., 2019). For patients who typically experienced traditional models of care with individual practitioners providing care, team care was perceived as lacking in consistency (Cutler et al., 2019). In some studies, patients were found to embrace the opportunity to participate in an active role and serve as their own advocate in the IPC team (Bilodeau et al., 2015; Burridge et al., 2015; Cutler et al., 2019). Patients valued inclusion in healthcare conversations when they felt spoken *to*, and not just *about*, resulting in their willingness to negotiate aspects of care such as medications and self-management behaviors (Burridge et al., 2015; van Dongen et al., 2017; van Wissen & Blanchard, 2020). Yet in some instances the perceived provider-patient hierarchy has been found to be intimidating to patients within the shared decision-making process of the IPC team (Cutler et al., 2019; Real et al., 2020; Soklaridis et al., 2017). Unclear or ambiguous knowledge about patients' and families' roles in the IPC team and the roles of healthcare providers within the team has been reported to result in lack of role clarity and feelings of intimidation, distrust, and discomfort when patients are called upon to participate in IPC team activities, resulting in increased dependence upon the primary care provider to make decisions (Bilodeau et al., 2015; Pullon et al., 2011). Nursing roles have been reported by patients and families as unclear within the IPC team context, with some individuals expressing ambiguous knowledge of nurses' clinical capabilities and responsibilities in the care of chronic conditions (Pullon et al., 2011). Nurses have been seldom viewed by patients as decision-makers and are viewed as ancillary to the physician (LaDonna et al., 2016; Pullon et al., 2011).

The inclusion of family members in the healthcare team has been found to be valuable in the delivery of interprofessional care and in navigation through the healthcare system. Reeves et al. (2015) found that family members perceived their role as an advocate between not only the patient and IPC team, but as a translator of information to other family members. Patients have identified spouses, spiritual leaders, community members, neighbors, and other informal caregivers as helpful to them in maintaining their independence as essential members of their healthcare team (LaDonna et al., 2016). LaDonna et al. (2016) found that that patients named family and friends as the second most frequently identified team members after nurses. Patients ranked the importance of team members based on the varied needs of their individual health condition (LaDonna et al., 2016).

The IPEC Core Competency addressing roles and responsibilities conveys the significance of team members' roles to the success of the IPC team from a health professional's point of view (IPEC, 2016). In addition, the ability to communicate and engage in interdependent relationships among team members to enhance population health remains a goal of the IPC team (IPEC, 2016). The summary of the literature indicates that patient perceptions of IPC team members roles and responsibilities varied. Patients who were well-informed in relation to their health condition and self-management behaviors viewed themselves as having positive contributions to the IPC team (Burridge et al., 2015; LaDonna et al., 2016; van Dongen et al., 2017; van Wissen & Blanchard, 2020). Furthermore, patients perceived the presence of family members within the IPC team dynamic as valuable in the role of an engaged advocate (LaDonna et al., 2016; Reeves et al., 2015). Conversely, the provider-patient hierarchy remains an intimidating process for patients and may inhibit them from fully participating in IPC team relationships (Bilodeau et al., 2015; Cutler et al., 2019; Pullon et al., 2011; Real et al, 2020; Soklaridis et al., 2017). Patient perceptions of the importance of knowledge of roles and responsibilities of the IPC team and their influence on positive team function supports the patient-centered aspects of the IPEC Core Competency addressing roles and responsibilities (Bilodeau et al., 2015; Burridge et al., 2015; Cutler et al., 2019; LaDonna et al., 2016; Pullon et al., 2011; Real et al., 2020; Reeves et al., 2015; Soklaridis et al., 2017; van Dongen et al., 2017; van Wissen & Blanchard, 2020).

IPEC Core Competency 3: Interprofessional Communication

IPEC Core Competency 3: Interprofessional Communication addresses the importance of communication among the IPC team (IPEC, 2016). This core competency states the value of supportive communication techniques such as confidence, clarity, and active listening to facilitate crucial conversations among the IPC team regarding care decisions among the IPC team (IPEC, 2016). Effective communication skills are essential for IPC teams to promote and maintain the health of individuals, as well as for the prevention and treatment of disease (IPEC, 2016).

The summary of the literature reveals differing patient perspectives of IPC team communication. Hewitt et al. (2015) reported that “efficient, open, and equitable communication” within the team was a prominent indicator of effective communication, mentioned by 53 patients and family members in their study (p. 355, para 8). More importantly, the authors found that communication with the patient and family was considered by patients to be a meaningful indicator of teamwork.

Several concerns were identified regarding patient perceptions of interprofessional communication among IPC team members. Patient perceptions of communication were complimentary when the IPC team reported information shared by the participant to other members of the team. The discussion of health condition prognosis and progress with the patient was also considered a positive indicator of good communication abilities by the patient and family participants (Hewitt et al., 2015). Patient concerns about communication with the IPC team may stem from the power hierarchy between providers, patients, and families (Murphy et al., 2015; Real et al., 2020). For example, a lack of establishment of rapport by the physician-led IPC team was perceived to inhibit open communication between the patient and family (Murphy et al. (2015). Real et al. (2020) found that rapport with the physician-led IPC team was easily established by activities such as simple as team introductions and not standing over the patient while conferencing about their condition.

Not having adequate time with healthcare providers to address concerns is commonly expressed by patients. Murphy et al. (2015) found that patients expressed interest in having more time from their healthcare provider for guidance and sharing information about their health condition from their healthcare provider, however many participants were mindful of provider time demands and lacked confidence in pursuing their concerns. Real et al. (2020) reported that the length of time a physician spoke at IPC team rounding influenced the number of team members that attended, patient rapport, and length of stay (LOS). The authors found that the longer the physician spoke, the fewer number of team members attended, and less patient rapport and longer LOS were also reported. Real et al. (2020) also found that IPC team communication with patients before and after rounding positively influenced patient rapport. An impediment to effective communication between patients and providers is the frequent inability of providers to access information from electronic health records, resulting in patients having to repeat the same information multiple times (Cutler et al., 2019; Reeves et al., 2015). Cutler et al. (2019) reported that patients and families felt frustrated with repetition of the same information at the beginning of each appointment.

Treating the patient as a case, rather than an individual, and using medical jargon has been viewed as disrespectful and inhibits open communication between patients and the IPC team (Reeves et al., 2015; van Dongen et al., 2017). A perception of a lack of autonomy, such as the absence of provider encouragement to engage in collaborative decision-making can prevent the patient and family from asking questions and voicing opinions of their care (Murphy et al., 2015). Further, the absence of effective communication can manifest as failure of team members to introduce themselves, interrupting each another, or having an abrupt information delivery style (Cutler et al., 2019; van Dongen et al., 2017). The failure of the IPC team to effectively communicate often results in patient perceptions of annoyance, stress, confusion, and abandonment (Cutler et al., 2019; Hewitt et al., 2015).

The IPEC Core Competency addressing interprofessional communication conveys the significance of effective communication to the success of the IPC team from the health professions point of view (IPEC, 2016). Furthermore, the ability to clearly express knowledge and opinions between the patient, family, and IPC team has been viewed as a key component of IPC teamwork (IPEC, 2016). The summary of the literature indicates that patients and families believe that inclusion and attention to their health condition and prognosis reflects positively on IPC team communication (Hewitt et al., 2015; Real et al., 2020). Patients also expressed positive perceptions of communication when multiple members of the IPC team communicated with them during bedside rounding (Cutler et al., 2019; Hewitt et al., 2015; Real et al., 2020). Moreover, effective communication was negatively impacted by a traditional provider hierarchy that did not encourage patient collaboration in care or an individualized and holistic approach (Reeves et al., 2015; van Dongen et al., 2017). This lack of encouragement results in patients' apprehension in communicating with providers when they are not encouraged to be involved in their care (Hewitt et al., 2015; Murphy et al., 2015; Real et al., 2020). Patient perceptions of the importance of IPC team communication and their role and influence in positive team functioning confirms the relevance of IPEC Core Competency addressing interprofessional communication (Cutler et al., 2019; Hewitt et al., 2015; Murphy et al., 2015; Real et al., 2020; Reeves et al., 2015; van Dongen et al., 2017).

IPEC Core Competency 4: Teams and Teamwork

IPEC Core Competency 4: Teams and Teamwork refers to the importance of the IPC team and the work of teamwork (IPEC, 2016). The IPEC Core Competency emphasizes the value of applying basic concepts of team dynamics and relationship building to improve effectiveness of patient care (IPEC, 2016). The National Academy of Sciences defines a team as two or more individuals brought together who are working or interacting on one or more common goals with different roles and responsibilities that impact a system, with linkages to the broader system or environment (IOM, 2015; National Research Council [NRC], 2015). The specific role of IPC teams is to apply team dynamics in providing patient and family-centered care in an equitable, ethical manner (IPEC, 2016). Effective teams, including IPC teams are typically assessed by the ability to communicate and meet their goals and are often measured by their composition and leadership ability (Real et al., 2020).

The complexities and rapid advances of modern healthcare have highlighted the need for an IPC team approach to patient-centered care. The traditional model of a singular clinician providing expert care for all health conditions is no longer sustainable. The ability of a team of professionals to adopt shared responsibilities to treat health conditions also supports a clear and coordinated approach that may minimize risk to patients (Gonzalo et al., 2021; Higginson et al., 2021). To this end, IPC teams have become an integral part of models for high reliability in successful hospital organizations (Gonzalo et al., 2021; Higginson et al., 2021). Due to information gathered from high reliability organizations there has been great interest in factors associated with effective teams, leading to research in the area of team science.

Team science is described as a method of addressing complex health problems through teams of health and science professionals with the aim of improving the quality of patient and population care (Little et al., 2017). As the subject of teams and teamwork becomes more prominent in research and reported in the literature, the importance of the relationship of these aspects of care to quality and safety outcomes are more apparent (Gonzalo et al., 2021; Higginson et al., 2021). The linkage between behaviors associated with IPC teams and improvement in patient and population outcomes is continuously evolving. The National Academy of Science proposes that team science include studies focused on improving research methodologies to better understand relationships between IPC teams and patient population-centered care across a variety of clinical environments (IOM, 2015; NRC, 2015).

One of the most frequently mentioned attributes deemed important by the patient-family-IPC team triad has been the ability to clearly communicate (Pullon et al., 2011; Wyskiel et al., 2015). Effective IPC team communication has been described in multiple ways such as recognition of family members as experts in patient status changes, sharing findings among team members, and efficient follow-up to questions (Hewitt et al., 2015; LaDonna et al., 2016; Pullon et al., 2011; Real et al., 2020; van Dongen et al., 2017). Consistent team interactions and discussions have been found to be valued and perceived by patients and families as efficient, open, and equitable communication (Beaird et al., 2017; Hewitt et al., 2015; Pullon et al., 2011). The opportunity to communicate healthcare preferences, advocate for care decisions, and individualize support has been viewed positively by patients and families as contributing to open and effective communication (Choi et al., 2015; Wyskiel et al., 2015).

Patient perceptions of IPC teams and teamwork is often discussed in terms of communication. In a study of 984 rehabilitation patients, Hustoft et al. (2018) found that patients reported a positive association between IPC team communication and patient-reported activities of daily living (ADLs). In this study, patients also reported increased satisfaction with care when they perceived mutual respect and shared knowledge and goals within the team.

How patients perceive team functioning can lead to assumptions that can influence care. In a survey of emergency department patients, Henry et al. (2016) concluded that patients found IPC team dynamics interesting and made assumptions about how they functioned within the team if operations were not clearly explained to them. The authors found that patients valued an explanation of how the team operated and if these explanations were not disclosed patients formed assumptions based on previous experiences and observation of team dynamics. Such assumptions, when negative often affect participation and confidence in the IPC team (Cutler et al., 2019; Henry et al., 2016).

Shifting healthcare needs can result in patients recognizing the prominence of certain team members over others in their care. Patients perceive this phenomenon as a unique quality of IPC teams (Cutler et al., 2019; LaDonna et al., 2016). Cutler et al. (2019) found patients identified different IPC team members were involved in their care depending on the level of need or acuity. Patients have been reported to recognize inter-team hierarchies and in such cases were sometimes confused about who was responsible for autonomous clinical decision-making within the team. Cutler et al. (2019) reported that in the presence of a hierarchy where a leader of the IPC team was identified, patients observed that other team members were increasingly able to understand and function more fully in their roles. In this study, patients perceived that for the hierarchical arrangement to work the IPC team leader must have the trust and respect of other members, thus resulting in increased effectiveness and collaboration. There are mixed reports of patient perceptions of who was responsible for decision-making within the IPC team. Some patients reported that they were aware of who was responsible for decision-making within the IPC team, while others felt they had to repeat requests and navigate through several layers of professionals for decisions to be made (Burdick et al., 2017; Cutler et al., 2019; LaDonna et al., 2016).

Efficiency and confidentiality were identified as concerns by patients cared for by IPC teams. Some questioned the efficiency of the team and maintenance of confidentiality when many members of the team were involved in their care (Burdick et al., 2017; van Dongen et al., 2017). Introducing a new team member was found to be of concern to patients with regard to perceptions of provider competence and continuity of communication and care (Bilodeau et al., 2015; Fortin et al., 2010; Real et al., 2020).

Strong leadership has been perceived to increase effectiveness of the IPC team (Cutler et al., 2019; LaDonna et al., 2016). Studies have found that patients rarely recognize the shared or shifting nature of leadership responsibilities, and patients and families tend to consider their primary care physician as the leader of their healthcare team (Beaird et al., 2017; Burdick et al., 2017; Cutler et al., 2019; Fortin et al, 2010; LaDonna et al., 2016; Pullon et al., 2011; Roberge et al., 2016). The rapport built over years with a primary provider has been perceived by patients as a valuable resource that impacts a holistic approach to treatment and prevention (Cutler et al., 2019; LaDonna et al., 2016).

Although advanced practice registered nurses and physician assistants are sometimes thought of as co-leaders in care, patient perceptions of team members responsible for acute care decision-making tend to rest with physicians (Beaird et al., 2017; Pullon et al., 2011). The time and attention of nurses on the IPC team has been recognized by patients as a fundamental benefit of teamwork (Pullon et al., 2011), although several studies reported that in spite of frequent contact with nurses as opposed to other professions, nurses were not viewed as leaders in the team (Beaird et al., 2017; Burridge et al., 2015; Fortin et al., 2010; Pullon et al., 2011). Nevertheless, nurses were perceived by patients as consistently available to discuss issues other than direct care (Pullon et al., 2011; Roberge et al., 2016).

Patients and families recognize that the IPC team often provides a broad range of services in addition to clinical expertise (Cutler et al., 2019). For example, patients reported that their IPC shared team goals impacted more than their physical well-being, when services such as financial assistance, counseling, and social aspects of care were provided (Cutler et al., 2019; van Dongen et al., 2017). The IPC team's assistance in gaining prompt access to and continuity of care for patients has been found to be influential in creating positive perceptions of teamwork (Hustoft et al., 2018; Tremblay et al., 2017). It is important to note that the IPC team may include non-traditional, supportive team members such as clergy, community members, and neighbors (LaDonna et al., 2016).

An inclusive and coordinated IPC team approach is valued by patients. van Dongen et al. (2017) reported patients valued a prepared, structured approach from the IPC team that addressed their concerns and health condition. Patients and families felt a structured approach was indicative of a coordinated and integrated team approach (Burdick et al., 2017; Cutler et al., 2019; LaDonna et al., 2016). The lack of preparation for IPC team meetings has been interpreted as chaotic and uncoordinated (van Dongen et al., 2017).

Having large numbers of members on the IPC team can be perceived by patients as burdensome and a barrier to effective communication and teamwork. Patients have reported that having large numbers of members on their IPC team made the ability to communicate their wishes difficult and cumbersome (Bilodeau et al., 2015; van Dongen et al., 2017). Suggestions by patients to improve team collaboration have included advanced preparation of IPC team meeting agendas that include clarification of team roles, updating pertinent healthcare information, using a focused problem list, and the presence of a competent leader (Henry et al., 2016; van Dongen et al., 2017).

The benefit of IPC teams to impact patient healthcare is highlighted in a growing number of research studies (Hustoft et al., 2018; Murphy et al., 2015; Pullon et al., 2011; van Wissen & Blanchard, 2019). Patient perceptions reveal that to be valued and effective, aspects of IPC teamwork must be clear to the patient and family (Pullon et al., 2011). Yet several studies report that from the patient's perspective there appears to be a general unawareness that a team approach to their care exists (Cutler et al., 2019; Hewitt et al., 2015; Pullon et al., 2011; van Dongen et al., 2017). Hewitt et al. (2015) in a study of patients receiving stroke care reported that patients did not realize who was treating them in terms of the provider's professional role and did not recognize what role the provider played in the team structure. Patients frequently were unable to distinguish between the roles of professional staff and found the team concept confusing. Moreover, patients and families reported that it was more difficult to recognize IPC team approaches to their care after discharge from an acute care facility when their post-discharge needs were attended to by solo providers (Hewitt et al., 2015; Hustoft et al., 2018).

The IPEC Core Competency addressing teams and teamwork conveys the significance of team development and processes to the success of the IPC team from the health professions point of view (IPEC, 2016). Furthermore, the ability to apply leadership principles and shared decision-making in patient-centered care is viewed as a key component of IPC teamwork (IPEC, 2016). The review of the literature indicates that patients and family's value different aspects of teamwork that overlap the within the four IPEC Core Competencies of values and ethics, roles and responsibilities, interprofessional communication, and teams and teamwork. Patients perceived value in clinical care preparation and clear communication as indicative of positive team relationships (Hewitt et al., 2015; Hustoft et al., 2017; LaDonna et al., 2016; Pullon et al., 2011; Real et al., 2020; van Dongen et al., 2017; Wyskiel et al., 2015). Patients recognized shifting roles and responsibilities among the IPC team based on their specific healthcare needs and level of acuity (Cutler et al., 2019) and recognized the benefits and challenges associated with those modifications (Burdick et al., 2017; Cutler et al., 2019; LaDonna et al., 2016; van Dongen et al., 2017). Team leadership was commonly associated with the physician role and recognized as contributing to the success of IPC team activities (Beaird et al., 2017; Burdick et al., 2017; Burridge et al., 2015; Cutler et al., 2019; LaDonna et al., 2016; Pullon et al., 2011; Roberge et al., 2016). Nurses are perceived as the coordinators of patient care and are frequently the team member patients have the most contact with, yet they are rarely viewed by patients as IPC team leaders (Cutler et al., 2019; Hustoft et al., 2018; Tremblay et al., 2017; van Dongen et al., 2017). Family members, neighbors, and clergy were also perceived by patients as important members of the IPC team (LaDonna et al., 2016). Several studies confirmed that patients and families often do not recognize a team approach to their care (Cutler et al., 2019; Hewitt et al., 2015; Pullon et al., 2011; van Dongen et al., 2017). Overall, patient perceptions of the importance of IPC team characteristics and their impact on the ability to operationalize patient-centered care aligns with the healthcare systems view of the value of teams and team-based care. (Beaird et al., 2017; Bilodeau et al., 2015; Burdick et al., 2017; Burridge et al., 2015; Cutler et al., 2019; Henry et al., 2016; Hewitt et al., 2015; Hustoft et al., 2018; LaDonna et al., 2016; Pullon et al., 2011; Real et al., 2020; Roberge et al., 2016; Tremblay et al., 2017; van Dongen et al., 2017; Wyskiel et al., 2015).

Discussion

This integrative review of the literature discussed patient perceptions of IPC care in the context of the IPEC Core Competencies for Interprofessional Collaborative Care. The IPEC Core Competencies guide interprofessional collaborative practice; however, a key gap in the implementation of these competencies is the acknowledgement of the role of patient perceptions of IPC team care.

In terms of values and ethics, the literature suggests that patients perceive cordial relationships among providers as evidence of trust and positive team dynamics (Henry et al., 2016; Hewitt et al., 2015). Patients also value attributes such as honesty, trust, integrity, empathy, and support as necessary elements of positive team experiences and success (Bastian et al., 2016; Bilodeau et al., 2015; Burdick et al., 2017; CIHC, 2010; Cutler et al., 2019; Pullon et al., 2011; van Dongen et al., 2017).

Patient perceptions of roles and responsibilities of the IPC team tend to vary depending on their health status and healthcare team dynamics. Patients believed that their capacity to collaborate with the IPC team was dependent on knowledge of their health condition. This knowledge directly correlated with their views of team success (Burridge et al., 2015; LaDonna et al., 2016; van Dongen et al., 2017; van Wissen & Blanchard, 2020). Family members were valued as patient advocates and their inclusion in discussions about the patient's health status contributed to the perception of positive team experiences (LaDonna et al., 2016; Reeves et al., 2015). Perceptions of the patient/provider hierarchy remains a concern. Some patients expressed reticence to sharing private health information with the IPC team due to lack of rapport and overwhelming numbers of team members present (Bilodeau et al., 2015; Cutler et al., 2019; Pullon et al., 2011; Real et al., 2020; Soklaridis et al., 2017).

Interprofessional communication is viewed by patients as dependent on the IPC team's knowledge of their health status (Hewitt et al., 2015; Real et al., 2020). Patients perceived positive team experiences if they were encouraged to participate in healthcare discussions with the IPC team (Cutler et al., 2019; Hewitt et al., 2015; Real et al., 2020). In contrast, if the IPC team did not encourage collaboration, patients' perceptions of the team tended to be negative and the IPC team was viewed as unsupportive (Hewitt et al., 2015; Murphy et al., 2015; Real et al., 2020).

Teams and teamwork are probably the least understood aspect of IPC from the patient's perspective, however the value of communication among team members is reported consistently in the literature (Hewitt et al., 2015; Hustoft et al., 2017; LaDonna et al., 2016; Pullon et al., 2011; Real et al., 2020; van Dongen et al., 2017; Wyskiel et al., 2015). Team leadership is commonly associated with the physician role, but recognition of role modification due to changing needs and acuity is also recognized (Burdick et al., 2017; Cutler et al., 2019; LaDonna et al., 2016; van Dongen et al., 2017). Patients perceived the value of family members, clergy, and other caregivers in their ability to manage their health condition, although these individuals were not necessarily members of their healthcare team (LaDonna et al., 2016). Patients often did not recognize a team approach to care or were not interested in how the IPC team functioned (Cutler et al., 2019; Hewitt et al., 2015; Pullon et al., 2011).

This summary of the literature describes patient perceptions of IPC healthcare teams in the context of the IPEC Core Competencies. Patient perceptions of IPC care were often congruent with concepts identified within the IPEC Core Competencies for Interprofessional Collaborative Care, however perceptions of teams and teamwork seemed to be less clear. With the emphasis on team-based care and team science, efforts should be directed toward clarifying the role of the patient and interprofessional providers in the IPC team structure, and in making these roles explicit to patients.

Conclusion

The IPEC Core Competencies for Interprofessional Collaborative Practice (2016) were updated as healthcare reflected that IPC teams are central to attaining the goals of the Quadruple Aim (IPEC, 2016). The inherent right of all patients and families to receive safe, quality, cost-effective care must be viewed through the lens of population health (IPEC 2016). Patient-centered care that includes family members in a prominent role has become instrumental in IPC team success (IPEC, 2016). An individual’s expertise in their own or family member’s health condition cannot be overlooked. Yet research about patients’ and families’ perceptions of the IPC team has been scarce and incomplete.

This review of the literature reflects a current gap in the understanding of IPC teams from the patient and family viewpoint. To fully implement the IPC team vision, patients' and families' perceptions of teamwork need to be fully understood. This review identifies several incongruencies in what is known from provider and patient perspectives of IPC teams and recognizes the need for additional research in patient and family perspectives of teamwork.

CHAPTER 5: RELATIONSHIPS AMONG FAMILY SUPPORT, PATIENT PERCEPTIONS OF TEAMWORK, SELF-MANAGEMENT BEHAVIORS AND HEALTH RELATED QUALITY OF LIFE IN PATIENTS WITH DIABETIC FOOT ULCERATION MANUSCRIPT

This chapter consists of manuscript two to be submitted for publication regarding research on relationships among family support, patient perceptions of teamwork, self-management behaviors, and health-related quality of life in patients with diabetic foot ulceration. The significance of this topic is discussed, followed by study methods and findings. Research implications are also shared. Manuscript two will be submitted to the *Diabetes Research and Clinical Practice* Journal.

Abstract

Aims: The study aimed to explore relationships between family support (FS), patient perceptions of interprofessional collaborative teamwork (PP-IPCT), self-management behaviors (SM), and health-related quality of life (HRQoL) among patients diagnosed with diabetic foot ulceration (DFU).

Methods: A cross-sectional descriptive, correlational design was employed. Participants (*N* = 64) were recruited for a purposive, convenience sample from a wound care specialty clinic in southeastern North Carolina. Data were collected using an investigator developed demographic data form and standardized instruments. The standardized instruments were: (a) Patient Activation Measure (PAM), (b) Family Adaptation, Partnership, Growth, Affection, Resolve (APGAR), (c) Patients' Insights and Views of Teamwork Survey (PIVOT), and (d) Short-Form 12 Version 2.0 (SF-12v2).

Results: Most participants (*n* = 28) were under age 60 and had diabetes for more than 5 years (*n* = 51). The Pearson correlation coefficient was used to determine strength and direction of relationships between SM, FS, PP-IPCT, and HRQoL in the sample. Self-management behavior scores had one positive medium correlation with the general health scale (*r* = .31) and small correlations with all other HRQoL scales. A medium positive correlation was noted between Patient Perceptions of Teamwork and Physical Functioning (*r* = .33). The two largest correlations among HRQoL scales included a large positive correlation (*r* = .51) between role physical (RP) and role emotional (RE). A medium positive correlation (*r* = .42) between mental health (MH) and bodily pain (BP) was also noted.

Conclusions: Self-management was found to be associated with improved quality of life in this study. In addition, patient perceptions of teamwork were found to be associated with greater physical functioning. Participants reported increased feelings of being downhearted, blue and less calm. This finding was found to be positively associated with increased reports of bodily pain, accomplishing less, and being less careful in daily work. In addition, participants reported physical and emotional problems interfered with social activities. Further exploration of PP-IPCT, FS, SM and HRQoL are necessary to develop interventions that impact individual and population health outcomes, particularly in younger populations with a prolonged duration of Type 2 diabetes.

Keywords: patient perceptions, interprofessional collaborative teamwork, self-management behaviors, quality of life, diabetic foot ulceration

Introduction

Thirty-four million Americans, or 10.5 % of the U.S. population, are living with diabetes, one of the highest prevalence rates among industrialized countries (Beck et al., 2017; Bus & van Netten, 2016; Center for Disease Control and Prevention (CDC), 2020; International Diabetes Federation [IDF], 2019; Somayaji et al., 2017; World Health Organization [WHO], 2016). Type 2 diabetes mellitus (T2DM) is the most common type of diabetes that affects 25% of U.S. adults 65 years and older and comprises 90% of all cases of diabetes diagnosed (CDC, 2020; IDF, 2019). North Carolina's diabetes prevalence rate of 12.5% is slightly higher than the national rate of 10.5% and the global rate of 9.3% (North Carolina Diabetes Advisory Council [NCDAC], 2020). The number of North Carolinians with diabetes or pre-diabetes has progressively increased; this fact has impacted individual and population economics and productivity (NCDAC, 2020).

The management of T2DM, while multi-faceted, becomes more complex when a diabetic complication occurs. Complications of diabetes typically occur due to consistently high blood glucose levels and can include cardiovascular disease (CVD), blindness, kidney damage, and lower-limb amputation (IDF, 2019). The CDC (2020) reports that smoking, obesity, physical inactivity, hypertension, hyperlipidemia, and hyperglycemia are risk factors for diabetes complications. Coexisting conditions such as stroke, ischemic heart disease, cardiovascular disease, diabetic ketoacidosis, and lower extremity amputation are common reasons for hospitalizations for individuals with diabetes (CDC, 2020).

Diabetic foot ulceration (DFU) is a common complication of diabetes that can lead to infection, amputation, poor quality of life, and increased mortality (Armstrong et al., 2017; Armstrong et al., 2020; Bus & van Netten, 2016; Raghav et al., 2018). Diabetic foot ulceration is defined as an ulceration of the foot associated with nerve damage leading to neuropathy and/or peripheral arterial disease of the lower limb in a patient with diabetes (Alexiadou & Doupis, 2012). Research has identified DFU as the most common reason for hospitalization in individuals with diabetes (Armstrong et al., 2017; Armstrong et al., 2020; Davis et al., 2018; Hicks et al., 2014). These admissions can cost more than $40,000 per occurrence with total expenditures exceeding $1.5 billion a year (Armstrong et al., 2020; Davis et al., 2018; Hicks et al., 2014). Additionally, more than half of diabetic foot ulcers become infected, and 20% of infected foot ulcers result in some level of amputation, leading to increased mortality (Armstrong et al., 2020; Davis et al., 2018; Hicks et al., 2014). Diabetic foot ulceration has serious implications for patients, their families, and the healthcare system. The rising incidence of diabetes and DFU highlights the need to improve understanding of approaches to managing complications of chronic disease.

Traditionally, the U.S. healthcare system has focused on the care of acute illnesses according to a model in which healthcare professionals make the decisions and the patient's role is to be a passive participant (Grady & Gough, 2014; Lawn & Schoo, 2010; Lorig & Holman, 2003). Relatively short lengths of hospital stay provide patients with limited opportunity to participate in and establish a care routine. (Lawn & Schoo, 2010). Advances in healthcare have resulted in more people living longer with chronic conditions, and families have become the primary caregivers (Grady & Gough, 2014; Lorig & Holman, 2003). Although early screening and diagnosis are essential, access to organized, sustained care by a team of healthcare professionals can influence chronic disease outcomes at the primary care level. The World Health Organization (WHO) defined interprofessional collaborative practice as multiple health and social care professionals providing comprehensive, safe, and quality health services by working with communities, patients, and families (WHO, 2010). It has now been determined after more than 50 years of emphasis on team-based practice that effective collaboration among healthcare teams enhances and builds services that improve health outcomes (WHO, 2010). The fundamental difference that an interprofessional collaborative (IPC) team approach can contribute to patient care is the ability to provide evidence-based knowledge, as well as support that centers on an individual's needs and goals in an integrated manner (McGill et al., 2017; Ryan & Sawin, 2009). In an IPC team approach, the patient is an equal participant and actively manages their condition by setting goals and sharing responsibility with the IPC team (McGill & Felton, 2007; McGill et al., 2017). Thus, the IPC team can be an important element in supporting health-related quality of life in chronic conditions such as diabetes. The role of the interprofessional collaborative team supports a paradigm shift to a joint care model with the patient and family at the center of all healthcare decisions.

Metrics related to diabetes have been shown to improve with the engagement of an interprofessional team. The IPC team approach has been found to improve glycemic stability and HRQoL while reducing HbA1c levels, risk of lower limb amputation, and mortality in individuals with diabetes compared to care provided by individual clinicians (McGill et al., 2017). The specialization of healthcare and the complexity of managing chronic disease has led to international recognition of the benefits of diabetes management by a team of health and social professionals that includes the patient as an active participant. (Beck et al., 2017; McGill et al., 2017; Ogrin et al., 2015).

Current research supports an IPC team approach to diabetes care although patient perceptions of IPC teams vary. Many patients believe that IPC teams give the best care when comprised of family members alongside appropriate health and social professionals (Cutler et al., 2019). The complexity of chronic disease supports an IPC team approach, although little is known about the relationship between IPC teams and patient, population, and system outcomes. The objective of this study was to explore the relationship between family support (FS), patient perceptions of teamwork (PP-IPCT), self-management behaviors (SM), and health-related quality of life (HRQoL) in patients diagnosed with diabetic foot ulceration.

Subjects

Sample and Setting

After approval was obtained from the institution review board, participants were recruited from a wound care clinic located in rural southeastern North Carolina. The sample consisted of participants with a diagnosis of a diabetic foot ulceration confirmed by medical record ICD-10 code E11.621. The participants were admitted to the wound care clinic for a minimum of eight treatment sessions. All participants were at least 18 years of age, could read and comprehend English, and volunteered for the study. Study participants were screened for eligibility through a wound care specialty clinic nurse referral during their scheduled wound care appointments. Exclusion criteria included any participants not diagnosed with diabetes with ulcerations of the lower extremities and patients who could not read and comprehend English.

Materials and Methods

Design

A cross-sectional descriptive correlational design was used to answer the research question: What were the relationships among family support, patient perceptions of teamwork, self-management, and health-related quality of life in patients with a diagnosis of diabetic foot ulceration?

Measures

Demographic Data Form

Participants completed an investigator-developed demographic data form to collect descriptive characteristics on the participants and three standardized instruments to measure the study variables. The demographic data form included self-reported sociodemographic information (education, age, race, and gender) and clinical characteristics (body mass index [BMI], diabetes duration, comorbidities, and the member composition of IPC team). Income and insurance data were not available for collection at the site. Descriptive statistics were used to inform summary characteristics of the sample.

Calculations were made to determine measures of central tendency, such as mean, median and mode. The use of standard deviation, minimum and maximum variable ranges, kurtosis and skewness were calculated to determine measures of variability. All instruments were assessed for internal consistency using Cronbach's alpha.

Instruments

Standardized instruments included the: (a) Family Adaptation, Partnership, Growth, Affection, Resolve (APGAR), (b) Patients Insights and Views of Teamwork Survey (PIVOT), (c) Patient Activation Measure (PAM), and (d) Short-Form 12 Version 2.0 (SF-12v2), a self-reported health-related quality of life (HRQoL) measure..

Family APGAR

The assessment of family support was measured by the Family APGAR instrument, a five-item self-report questionnaire (Smilkstein, 1978; Smilkstein et al., 1982). It assesses five parameters of family function: adaptation, partnership, growth, affection, and resolve. The three response options range from 0 (hardly ever) to 2 (almost always), and item responses are added together resulting in a total score from 0 to 10, with higher scores reflecting higher satisfaction with family function (Smilkstein et al., 1982). The Family APGAR was found to be internally consistent with a Cronbach's alpha .80 (Smilkstein, et al., 1982). The Cronbach's alpha in our study was .96. The developer of the Family APGAR instrument granted permission for its use in this study.

Patients' Insights and Views of Teamwork (PIVOT)

Patient observations of teamwork-related behaviors were measured by the Patients' Insights and Views of Teamwork (PIVOT) survey (Henry et al., 2014). This 16-item Likert scale instrument is one of few scales that measures patient perspectives of teamwork. The PIVOT survey elicits response options that range from 1 (not at all) to 5 (all the time). The Patients' Insights and Views of Teamwork survey was found to be internally consistent with a Cronbach's alpha of .87 (Henry et al., 2014). The range of possible PIVOT scores is from 0 to 80, with higher total scores suggesting greater perceived levels of teamwork-related behavior. The PIVOT survey was found to be internally consistent with a Cronbach 's alpha of .87 (Henry, et al., 2014). The Cronbach's alpha in this study was .71. The developer of the PIVOT instrument granted permission for its use in this study.

Patient Activation Measure (PAM)

The assessment of a participant's underlying knowledge, skills, and confidence essential to managing their individual health and healthcare was measured using the Patient Activation Measure ([PAM]; Hibbard et al., 2004). The PAM is a ten-item, self-rated, unidimensional, Guttman-like instrument with four potential response options that range from 1 (disagree strongly) to 4 (agree strongly) and an added 'not applicable' option (Moljord et al., 2015). Validation of the PAM has occurred in many populations including ambulatory care and hospitalized patients that have diagnoses of mental health disorders, diabetes (DM), chronic heart failure (CHF), chronic obstructive pulmonary disease (COPD), and chronic renal disease (CRD). Participants are scored by proprietary instructions; results place them into four increasing levels of activation or self-management which are: (1) disengaged and overwhelmed, (2) becoming aware but still struggling, (3) taking action and gaining control, and (4) maintaining behaviors and pushing further (Hibbard et al., 2004). The PAM was found to be internally consistent in the four primary care and hospitalized participant populations of DM, CHF, COPD, and CRF with an $\alpha = .88$ and in hospitalized participants with a Cronbach's alpha of .81 (Bos-Touwen et al., 2015; Prey et al., 2016). The Cronbach's alpha in this study was .78. The developer of the PAM granted permission for its use in this study.

Short-Form-12 version 2 (SF-12v2)

Self-reported health-related quality of life (HRQoL) was measured using the Short-Form-12 version 2 ([SF-12v2]; Ware et al., 1996). The SF-12v2 is one of the most widely used survey instruments for reporting well-being (Huo et al., 2018; Ware et al., 1996). The SF-12v2 has been used and validated in multiple settings involving participants with chronic diseases and mental health conditions (Huo et al., 2018; Ware et al., 1996). The instrument consists of a twelve-item Likert-type scale with two to six response options per item that measure eight domains of health (Ware et al., 1996). The domains are physical functioning (PF), role physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role emotional (RE), and mental health (MH). The scores on the eight scales are summed to scores that range from 0 – 100, with higher scores indicating higher levels of HRQoL (Ware et al., 2002). Internal consistency reliability estimates of the eight scales ranged from 0.73 – 0.87 (Ware et. al. 2002). The Cronbach's alpha in this study was.77. The developer of the SF-12v2 instrument granted permission for its use in this study. A key for identifying instruments and variables definitions and abbreviations is included in Table 9 .

Table 9

Abbreviations for Instruments and Variables

Abbreviation	Instrument	Range	Variable Measured
1. PIVOT	Patients' Insights and Views of Teamwork Survey	16-80	Patients' Perceptions of Teamwork
2. PAM	Patient Activation Measure	23-40	Self-Management Behaviors Engagement Level
3. Family APGAR	Smilkstein Family System Adaptation, Partnership, Growth, Affection, Resolve	0-10	Family Support
4. SF-12v2	Short Form 12 version 2	0-100	Health Related Quality of Life
	Subdomains of Short Form 12 version 2		
5. PF	Physical Functioning	0-4	Rating of ability to complete moderate activities, climbing several flights of stairs
6. RP	Role Physical	0-2	Rating of if physical health impacts daily activities
7. BP	Bodily Pain	0-4	Rating of how much pain interfere with normal work
8. GH	General Health	0-4	Rating of general health
9. VT	Vitality	0-5	Rating of energy level
10. SF	Social Functioning	0-4	Frequency health problems interfered with socializing
11. RE	Role Emotional	0-2	Rating of how much emotional problems impact daily activities
12. MH	Mental Health	0-5	Rating of frequency feeling peaceful, downhearted/blue

Procedures

Participants attending the wound care clinic who met eligibility requirements had the purpose of the study explained to them in order to provide informed consent. The study packet containing the questionnaires was administered and collected by the principal investigator (PI) at the fourth scheduled wound care treatment session. This was selected as it is the usual midpoint of the number of sessions that are needed for diabetic foot ulceration wound healing. Additionally, surveying participants on the fourth treatment session allowed participants to encounter team-based care. The reading level of the study instruments was at a fourth-grade level. Completion of the study packet lasted approximately 20 minutes. All eligible patients that completed the study packets provided complete data (*N* = 64). Data collection was conducted in one session. The timeframe for the data collection was nine months. Eligible participants received a $25.00 Walmart gift card after the surveys were completed.

Data Analyses

An a priori analysis using G*Power (Faul et al., 2009; Faul et al., 2007) was conducted to determine the sample size (Pallant, 2016). Based on an alpha of .05, a sample size of *N* = 64 was estimated to obtain a statistical power of .80 and an effect size of .3 (Faul et al., 2009; Faul et al., 2007; Pallant, 2016). Data were verified for accuracy and frequencies were examined to determine missing data points. Demographic data were analyzed using univariate and descriptive statistics. Preliminary analyses did not identify any violations of normality, linearity, and homoscedasticity. Pearson correlation coefficients were calculated to describe the strength and direction of linear relationships between continuous variables. The strength of the relationships was determined using the suggestions made by Cohen (1988) of *r* = .10 to .29 for small, *r* = .30 to .49 medium, and *r* = .50 to 1.0 as large effect sizes. All data were analyzed using the

International Business Machines Statistical Package for Social Science (IBM SPSS) software, version 24.0 (SPSS, Inc., Armonk, NY). Descriptive frequency tables were used for the categorical demographic and clinical-related variables. Means and standard deviation were calculated for the PIVOT, PAM, and Family APGAR scales, and for the eight scales of the SF-12v2. Pearson correlations were conducted to examine relationships among the PIVOT, PAM, Family APGAR, and eight subscales of the SF-12v2. Statistical significance was defined as a p-value < .05.

Results

Descriptive statistics were used to describe the characteristics of the study sample (Table 10). Most of the participants were male (n =44) and White (n = 45) and nearly half of the sample were high school graduates (n =29) and less than sixty years of age (n =28).

Table 10

Sociodemographic Characteristics of Participants (N = 64)

Characteristic	n	%
Age		
< 60	28	43.8
60 - 69	18	28.1
70 – 88	18	28.1
Gender		
Female	20	31.3
Male	44	68.8
Race		
White	45	70.3
Black	19	27.7
Marital status		
Single	16	25.0
Married/partnered	24	37.5
Divorced/separated	10	15.7
Widowed	14	21.9
Highest educational level		
Less high school	11	17.2
High school	29	45.3
Some college	9	14.1
University or post-graduate degree	15	23.4

Table 11 presents the clinical characteristics of the patients. The majority of patients (*n* = 51) had diabetes for more than five years, had high cholesterol or high blood pressure, and were most often treated by a doctor, nurse, or physical therapist. When asked how many providers of the healthcare team they had seen during the past six months, over 70% of the patients (*n* =45) reported seeing three to six providers.

Table 11

Clinical Characteristics of Participants

Characteristic	n	%
Diabetes duration		
<1 year	3	4.7
1-5 years	9	14.1
>5 years	51	79.7
Missing	1	1.6
Co-Morbidities		
High cholesterol	43	67.2
High blood pressure	56	87.5
Heart disease	22	34.4
Kidney disease	20	31.3
Lung disease	8	12.5
Other	10	15.6
IPC Team Members		
Nurse	62	96.9
Doctor	62	96.9
Nutritionist	19	29.7
Physical therapist	27	42.2
Bariatric counselor	2	3.1
Diabetes educator	20	31.3
Pharmacist	17	26.6
Other	7	10.9
Number of Providers Seen		
1	3	4.7
2	16	25.0
3	20	31.2
4 – 6	25	39.1

The means and standard deviations of the study measures are presented in Table 12. The researchers found that the means for the PIVOT, PAM, and APGAR were all at the higher end of the theoretical range for the three scales. The eight SF-12v2 scale scores are based on a 0 –100 -point scale. The lowest group mean scores were for role physical ([RP] *M* = 8.59), role emotional ([RE] *M* = 24.22), and general health ([GH] *M* = 26.95). The highest means were observed for mental health ([MH] *M* = 62.97) and bodily pain ([BP] *M* = 50.39).

Table 12

Descriptive Statistics for Study Measures

Measure	M	SD	Theoretical Range	Cronbach's Alpha
Patients' Insights and Views Of Teamwork Survey Total Score (PIVOT)	68.50	9.58	0-80	.71
Patient Activation Measure Total Score (PAM)	31.78	3.67	10-40	.78
Smilkstein's Family System APGAR Total Score (APGAR)	8.09	3.22	0-10	.96
Short Form SF-12 Total Score				.77
Physical Functioning (PF)	37.50	35.91	0-100	
Role Physical (RP)	8.59	26.06	0-100	
Bodily Pain (BP)	50.39	40.21	0-100	
General Health (GH)	26.95	16.85	0-100	
Vitality (VT)	43.75	32.24	0-100	
Social Functioning (SF)	47.66	32.03	0-100	
Role Emotional (RE)	24.22	40.82	0-100	
Mental Health (MH)	62.97	25.74	0-100	

Pearson correlations among the study measures are presented in Table 13. There are small correlations between the PIVOT, PAM, and APGAR scales. A small positive correlation was noted between the PIVOT and PAM (*r* = .17), and PAM and APGAR (*r* = .02). The PIVOT scale had a significant medium positive correlation with the SF-12v2 physical functioning (PF) scale (*r* = .33) and small positive correlations with RP (*r* = .11), BP (*r* = .11), GH (*r* = .06), and vitality ([VT] (*r* = .08). Small negative correlations were found between PIVOT scores and social functioning ([SF] (*r* = -.15), RE (*r* = -.14), and MH (*r* = -.07). The PAM had one medium positive correlation with the general health (GH) scale (*r* = .31), and small correlations with the other SF-12v2 scales PF (*r* = .13), RP (*r* = .12), BP (*r* = -.04), VT (*r* = .16), SF (*r* = -.01), RE (*r* = - .18), and MH (*r* = .14). The Family APGAR scores had small correlations with all the SF-12v2 scales such as PF (*r* = .11), RP (*r* = .06), BP (*r* = .03), GH (*r* = .23), VT (*r* = .02), SF (*r* = -.07), RE (*r* = .10), and MH (*r* = .08). The two largest correlations among the SF-12v2 scales included a large positive correlation (*r* =.51) between role physical (RP) and role emotional (RE), and a medium positive correlation (*r* =.42) between mental health (MH) and bodily pain (BP). No association was found between FS and PP-IPCT. No associations were found between HRQoL and FS.

Table 13

Correlations for Study Variables

Variables	1	2	3	4	5	6	7	8	9	10	11
1. PIVOT	_										
2. PAM	.17	_									
3. APGAR	.08	.02	_								
4. PF	.33**	.13	.11	_							
5. RP	.11	.12	.06	.37**	_						
6. BP	.11	-.04	.03	.37**	.09	_					
7. GH	.06	.31*	.23	.30*	.28*	.12	_				
8. VT	.08	.16	.02	.14	.04	.11	.22	_			
9. SF	-.15	-.01	-.07	.26*	.24	.36**	.30*	.12	_		
10. RE	-.14	.18	.10	.21	.51***	.08	.16	-.06	.27*	_	
11. MH	-.07	.14	.08	.02	-.01	.42**	.12	.13	.36**	.30*	_

$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Discussion

Few research studies have examined associations between patient perceptions of teamwork, family support, self-management behaviors, and health-related quality of life. In the past the ability to attribute improved patient management of chronic conditions to the presence of family support and IPC teams was not noted in the literature. The available studies that address these variables show promise in positive care outcomes when family and providers combine efforts with the IPC team to address care (Chlebowy et al., 2010; Mayberry et al., 2016; McGill & Felton, 2017; Myers, 2017; Ogrin et al., 2015; Ravi et al., 2018; Shen et al., 2016; Somayaji et al., 2017). This was evident in our study where small correlations, though not statistically significant were identified between the PIVOT, PAM, and Family APGAR scores. These findings may indicate that interventions by care givers that are inclusive of patient perceptions of teamwork, self-management knowledge and skills, and family support would be impactful to patients diagnosed with diabetes foot ulceration. The findings of the study also reflect the importance of patient perceptions of teamwork and health-related quality of life, as demonstrated by associations between PIVOT and general health SF-12v2 scales. Relationships between teamwork, family support, and self-management behaviors and their possible influence on HRQoL were supported by the findings of our study and merit further investigation. This further emphasizes that the team approach to wound healing affects patients with diabetic foot ulcers in many positive ways. For example, self-management behaviors were found to have a significant positive association with the general health scale of the health-related quality of life measurement. Interventions by the healthcare team that address patients' general health concerns may positively influence their quality of life. Therefore, the area of general health should be considered a prominent focus by the IPC healthcare team.

Family support has frequently been considered as a determinant of improved healthcare outcomes in individuals with chronic conditions (Chlebowy et al., 2019; Gonzalez et al., 2016; Kav et al., 2017). Relationships between family support and psychological health are often cited in the literature (Chlebowy et al., 2019; Gonzalez, et al., 2016; Kav et al., 2017). In this study, all five parameters of family functioning measured by the Family APGAR scale had small correlations with all SF-12v2 scales, meaning that family support influences health-related quality of life. Several small correlations were identified between psychological health and HRQoL. In this study there was a significant small positive correlation noted between mental health and bodily pain, and a significant large correlation between role physical and role emotional. Mental health was found to have significant relationships with bodily pain, emotional concerns, and the ability to socialize. It is important for the healthcare team to identify depression, anxiety and other psychological mental health conditions as an important indicator of quality of life. Interventions that emphasize improving emotional and psychological health may have led to improved self-management behaviors and health outcomes for those patients diagnosed with diabetic foot ulceration. These findings are consistent with previous studies and support investigation into clinical interventions that support the connection between physical and psychological health.

The age demographic of adults diagnosed with diabetes is changing. Incidence rates in adults age 45 – 64 have outpaced those younger than 44 and older than 65 (CDC, 2020). Surprisingly, over 40% of the individuals in our study were less than 60 years of age and had already developed a DFU. This younger population of individuals with a DFU is directly impacted by healthcare expenditures and employment challenges of reduced productivity, absenteeism, or inability to work. The presence of DFU can also contribute to loss of productivity within the household such as difficulties with childcare and family responsibilities. Interventions that address HRQoL would be particularly important to this younger group of patients diagnosed with DFU due to the increased their likelihood of an active family life.

Limitations

Limitations of this study include the cross-sectional design and use of a convenience sample at a single location. The sample of patients diagnosed with DFU at a single location in southeastern North Carolina may not be representative of the population nationwide. In this study, participants were younger with a longer duration of diabetes than is typical of patients diagnosed with DFU. The younger age and length of experience with their health condition may have increased their awareness and knowledge of their health condition which in turn may have influenced their responses to survey questions. Relationships between family support, patient perceptions of IPC teamwork, self-management behaviors, and HRQoL have rarely been explored and a follow-up study with a larger sample size of participants would be useful to fully investigate associations.

Although survey descriptions, definitions, and examples were explained clearly and consistently, understanding among participants may have been varied. Several participants requested that the PI read the survey instruments to them due to poor visual acuity; this process may have impacted their responses to the survey. The lack of visual acuity will be addressed in future versions of the study packet with an increase in font size in order to better accommodate participants with sight impairment. Data were obtained through self-report and responses may have been influenced by survey fatigue. The award of a gift card for completion of the survey may have introduced incentive-related bias.

Research has shown that inequities exist in the prevalence of those diagnosed with diabetes in areas where low income and racial and ethnic minorities exist (Hill-Briggs et al., 2021). Educational, occupational, and economic status as a predictor of engagement in self-management behaviors was not directly investigated in this study. The importance of levels of education, poverty and other social determinants of health should be considered in future studies of patients diagnosed with chronic conditions such as T2DM.

The data collection period was during the coronavirus pandemic. It is not known how the presence of the pandemic impacted participant responses and research results at this time.

Conclusion

This study described correlations between family support, patient perceptions of teamwork, self-management behaviors, and health-related quality of life in patients diagnosed with DFU. The HRQoL scales reflected lower than normative mean scores for RP, RE, and GH and support the need for additional interventions in these areas for patients experiencing complications from diabetes. The importance of FS and IPC team-based approaches to individual and population health outcomes of chronic conditions has not been studied sufficiently. The concept of IPC team care and the benefits of this care model to healthcare outcomes appears to be unclear to patients and families. Our study may guide the development of interventions that take advantage of the patient-family-IPC team triad to positively impact individual and population health outcomes. Additionally, larger cohort studies may offer additional insight into how to best enhance these relationships. Future studies should consider education of patients, families, and IPC team members on best collaborative practices that support self-management behaviors of chronic conditions. Studies such as ours can serve as a basis to offer IPC teamwork as a support mechanism to enhance self-management behaviors in patients that are newly diagnosed with chronic conditions to reduce the development of end-organ complications and mortality.

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Appendix A: UMCIRB Approval

EAST CAROLINA UNIVERSITY

University & Medical Center Institutional Review Board
4N-64 Brody Medical Sciences Building· Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office **252-744-2914** Fax **252-744-2284** rede.ecu.edu/umcirb/

Notification of Initial Approval: Expedited

From: Biomedical IRB
To: Lorie Sigmon
CC: Pamela Reis

Date: 2/14/2020
Re: UMCIRB 18-002499
The Relationship of Self-Management Behaviors and Associated Factors in Patients with Diabetic Foot Ulceration

I am pleased to inform you that your Expedited Application was approved. Approval of the study and any consent form(s) occurred on 2/13/2020. The research study is eligible for review under expedited category # 5,7. The Chairperson (or designee) deemed this study no more than minimal risk.

Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a Final Report application to the UMCIRB prior to the Expected End Date provided in the IRB application. If the study is not completed by this date, an Amendment will need to be submitted to extend the Expected End Date. The Investigator must adhere to all reporting requirements for this study.

Approved consent documents with the IRB approval date stamped on the document should be used to consent participants (consent documents with the IRB approval date stamp are found under the Documents tab in the study workspace).

The approval includes the following items:

Name	Description
02_10_SigmonDissertationProposal.docx	Study Protocol or Grant Application
Citi Basic Certificate	Additional Items
Citi Refresher Certificate	Additional Items
Patient Activation Measure Questionnaire_tcm75-889764.pdf	Surveys and Questionnaires
PIVOT survey final draft for 2014.docx	Surveys and Questionnaires
SF12-RCH.pdf	Surveys and Questionnaires

Sigmon_02_10_Survey-Research-Consent-Letter-1.docx	Consent Forms
Sigmon_12092019Demographic Data Form.docx	Data Collection Sheet
Sigmon_12092019DemographicForm	Surveys and Questionnaires
Sigmon_HIPAA-Authorization-Template-9-5-19.docx	HIPAA Authorization
Smilkstein_FamilyAPGAR.docx	Surveys and Questionnaires

For research studies where a waiver of HIPAA Authorization has been approved, each of the waiver criteria in 45 CFR 164.512(i)(2)(ii) has been met. Additionally, the elements of PHI to be collected as described in items 1 and 2 of the Application for Waiver of Authorization have been determined to be the minimal necessary for the specified research.

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

IRB00000705 East Carolina U IRB #1 (Biomedical) IORG0000418
IRB00003781 East Carolina U IRB #2 (Behavioral/SS) IORG0000418

Appendix B: Survey Research Consent Letter

Dear Participant,

I am a student at East Carolina University in College of Nursing. I am asking you to take part in my research study entitled, "The Relationship Between Self-Management Behavior and Associated Factors in Patients with Diabetic Foot Ulceration".

The purpose of this research is to identify ways to assist patients and families in the support of managing their chronic conditions such as diabetes and diabetic foot ulcerations. By doing this research, I hope to learn whether the support of interprofessional teams and families can improve self-management of diabetic foot ulceration, and improve quality of life, wound size, stability of blood glucose levels**.** Your participation is completely voluntary.

You are being invited to take part in this research because of your relationship with the Wound Healing Center. The amount of time it will take you to complete this survey is 10 minutes.

If you agree to take part in this survey, you will be asked questions that relate to identifying healthcare team members, family members that help you with care, how you manage your diabetes, and quality of life. In addition, I would like your permission to review your medical records for your self-reported blood-sugar and the size of your diabetic foot ulceration at the 1st visit, 4th visit, and 8th visit to the wound healing center.

We will be able to pay you for the time you volunteer while participating in this study. We will compensate you with a $25.00 Walmart gift card upon completion of the study.

This research is overseen by the University and Medical Center Institutional Review Board (UMCIRB) at ECU. Therefore, some of the UMCIRB members or the UMCIRB staff may need to review your research data. However, the information you provide will not be linked to you. Your surveys will be assigned a random case number that will not be linked to your name. Therefore, your responses cannot be traced back to you by anyone, including me.

Your information collected as part of the research, even if identifiers are removed, will not be used or distributed for future studies.

Please call Lorie Sigmon at 252-452-0975 for any research related questions. If you have questions about your rights when taking part in this research, call the University and Medical Center Institutional Review Board (UMCIRB) at 252-744-2914 (days, 8:00 am-5:00 pm). If you would like to report a complaint or concern about this research study, call the Director of Human Research Protections, at 252-744-2914

You do not have to take part in this research, and you can stop at any time. If you decide you are willing to take part in this study, place the date and your signature below then continue with the survey.

Thank you for taking the time to participate in my research.

Sincerely,
Lorie Sigmon
Principal Investigator

Signature____**Date**___________

Appendix C: UMCIRB HIPAA Privacy Authorization

UMCIRB HIPAA Privacy Authorization

East Carolina University (ECU)/Vidant Medical Center (VMC): Research Participant Authorization to Use and Disclose Protected Health Information for Research

For use only with the research consent form for UMCIRB#: 18-002499
Principal Investigator: Lorie Sigmon
Title: The Relationship of Self-Management Behaviors and Associated Factors in Patients with Diabetic Foot Ulceration

<u>Location where research will be conducted</u>
The members of the research team will conduct the research study at:
☒ East Carolina University (ECU) ☐ VMC ☐ ECU & VMC ☒ Other Wound Healing Center at Columbus Regional Healthcare System

When taking part in research, protected health information (PHI) is collected, used, and shared with others who are involved in the research. Federal laws require that researchers and health care providers protect your PHI. Also, federal laws require that we get your permission to use collected PHI for the research. This permission is called authorization.

In order to complete the research project in which you have decided to take part, the research team needs to collect and use some of your PHI as described below.

<u>What types of protected health information (PHI) about me will be used or disclosed?</u>
(Select all that apply.)

ECU Health Care Component:
[☐] ECU Physicians
[☐] School of Dental Medicine
[☐] Speech, Language, and Hearing Clinic
[☐] Human Performance Lab
[☐] Physical Therapy
[☐] Student Health
[☒] Other Health Entity
(please list):Wound Healing Center at Columbus Regional Healthcare System

Vidant Health Entity:
[☐] Entire Vidant Health system
[☐] Vidant Medical Center
[☐] Other Vidant Health Entity
(please list):

Type of Records:
[☒] Medical/clinic records
[☐] Billing records
[☐] Lab, Pathology and/or Radiology results
[☐] Mental Health records
[☐] PHI previously collected for research
[☐] Records generated during this study
[☐] Other:

Type of Vidant Records:
[☐] Medical/clinic records
[☐] Billing records
[☐] Lab, Pathology and/or Radiology Results
[☐] Mental Health records
[☐] PHI previously collected for research
[☐] Records generated during this study
[☐] Other:

Who will use or disclose my PHI?
[☒]Principal Investigator
[☒]Other members of the research team
[☒]Other providers involved in your care during research procedures, outpatient/inpatient stays during which research is being performed, or physician office visits during which research is being performed.

Who will receive my PHI?
[☐] Sponsor or other funding source to provide oversight for entire research project
[☒] Research investigators to conduct and oversee the research project
[☒] Principle Investigator and research team members to participate in the various research activities
[☐] FDA or other regulatory agencies to provide regulatory oversight
[☒] UMCIRB to provide continuing review of the research project
[☒] Institutional officials in connection with duties for monitoring research activity
[☒] Other providers involved in your care during research procedures, outpatient/inpatient stays during which research is being performed, or physician office visits during which research is being performed.
[☐] Researchers at other sites—List sites:
[☐] Data and Safety Monitoring Board and its staff
[☐] Contract Research Organization and its staff
[☐] Other

We will share only the PHI listed above with the individuals/agencies listed above. If we need to share other PHI or if we need to send PHI to other individuals/agencies not listed above, we will ask for your permission in writing again

How my PHI may be released to others:
ECU and Wound Healing Center at Columbus Regional Healthcare System are required under law to protect your PHI. However, those individuals or agencies who receive your PHI may not be required by the Federal privacy laws to protect it and may share your PHI with others without your permission, if permitted by the laws governing them.

What if I do not sign this form?
You will not be eligible to participate in this study if you do not sign this Authorization form.

How may I revoke (take back) my authorization?
You have the right to stop sharing your PHI. To revoke (or take back) your authorization, you must give the Principal Investigator your request to revoke (or take back) your authorization in writing. If you request that we stop collecting your PHI for the study, you may be removed from the study. If you are removed from the study, it will not affect your ability to receive standard medical care or affect payment, health plan enrollment or benefit eligibility. PHI collected for the research study prior to revoking (or taking back) your Authorization will continue to be used for the purposes of the research study. Also, the FDA (if involved with your study) can look at your PHI related to the study even if you withdraw this authorization.

Restrictions on access to my PHI:

You will not be able to see your PHI in your medical record related to this study until the study is complete. If it is necessary for your care, your PHI will be provided to you or your physician.

How long may the PHI about me be used or disclosed for this study?

Research information continues to be looked at after the study is finished so it is difficult to say when use of your PHI will stop. There is not an expiration date for this authorization to use and disclose your PHI for this study.

If you have questions about the sharing of PHI related to this research study, call the principal investigator Lorie Sigmon at phone number 910-962-2598. Also, you may telephone the University and Medical Center Institutional Review Board at 252-744-2914. In addition, if you have concerns about confidentiality and privacy rights, you may phone the Privacy Officer at East Carolina University at 252-744-5200.

Authorization

To authorize the use and disclosure of your PHI for this study in the way that has been described in this form, please sign below and date when you signed this form. A signed copy of this Authorization will be given to you for your records.

Name of Participant or Authorized Representative (print) Signature Date

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If an Authorized Representative has signed on behalf of a Participant please print on the line above the authority of the Legal Representative to do so (*such as parent, court-appointed guardian, or power of attorney*).

Person Obtaining Authorization Signature Date

Appendix D: Site Affiliation Agreement

Columbus Regional
HEALTHCARE SYSTEM

December 3, 2018

East Carolina University
University and Medical Center Institutional Review Board
600 Moye Boulevard
BSOM 4N-70
Greenville, NC 27834

Dear, ECU UMCIRB,

Wound Healing Center at Columbus Regional Healthcare System fully supports the use of our facility and the recruitment of our clients for the study titled The Relationship of Self-Management Behaviors, Patient Perceptions of the Interprofessional Collaborative Team, and Health-Related Quality of Life in Patients with Diabetic Foot Ulceration to be conducted by Lorie Sigmon, DNP, RN.

In addition, we agree to facilitate recruitment of participants for the proposed surveys by referring our clients who meet the study criteria to Lorie Sigmon or trained staff member if they are interested in participating in the study.

Thank you for being part of this important research.

Sincerely,

Allison Ray RN, BSN, WCC

Allison Ray, RN, BSN, WCC
Department Manager
Wound Healing Center

500 Jefferson Street • Whiteville, North Carolina 28472
www.crhealthcare.org • 910-642-8011

Appendix E: Demographic Data Form

Please share some background information:

Your age at your last birthday: __________

Your gender: ____

Height:____________________ Weight:___________________

Which ethnic group best fits you? Check all that apply:

___ American Indian or Alaska Native
___ Asian
___ Black or African American
___ Hispanic or Latino
___ Native Hawaiian or other Pacific Islander
___ White
___ More than one race _____________
___ Other

Your highest level of education:

___ High school diploma
___ Some college
___ College degree
___ Graduate education
___ Graduate degree

Your marital status:

___ Single (never married)
___ Married, or in a domestic partnership
___ Widowed
___ Divorced
___ Separated

How long have you had diabetes? (in years)

____

Please select other health problems besides diabetes that you have. Check all that apply:

___ High Cholesterol
___ High Blood Pressure
___ Kidney Disease
___ Lung Disease
___ Heart Disease
___ Other

Which members of the health-care team have you had contact with in the last 6 months? Check all that apply:

___Nursing
___Physician
___ Nutrition/Diet
___ Physical Therapy
___ Bariatric Therapy
___Diabetes Educator
___Pharmacist
Other ____________

Appendix F: Patient Activation Measure

Below are some statements that people sometimes make when they talk about their health. Please indicate how much you agree or disagree with each statement as it applies to you personally by circling your answer. Your answers should be what is true for you and not just what you think the doctor wants you to say.

If the statement does not apply to you, circle N/A.

1.	When all is said and done, I am the person who is responsible for taking care of my health	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
2.	Taking an active role in my own health care is the most important thing that affects my health	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
3.	I know what each of my prescribed medications do	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
4.	I am confident that I can tell whether I need to go to the doctor or whether I can take care of a health problem myself.	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
5.	I am confident that I can tell a doctor concerns I have even when he or she does not ask.	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
6.	I am confident that I can follow through on medical treatments I may need to do at home	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
7.	I have been able to maintain (keep up with) lifestyle changes, like eating right or exercising	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
8.	I know how to prevent problems with my health	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
9.	I am confident I can figure out solutions when new problems arise with my health.	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
10.	I am confident that I can maintain lifestyle changes, like eating right and exercising, even during times of stress.	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A

Appendix G: Smilkstein's Family System APGAR

SMILKSTEIN'S FAMILY SYSTEM APGAR ITEMS

	Almost Always	Some of the Time	Hardly Ever
1) I am satisfied that I can turn to my family for help when something is troubling me.			
2) I am satisfied with the way my family talks over things with me and shares problems with me.			
3) I am satisfied that my family accepts and supports my wishes to take on new activities or directions.			
4) I am satisfied with the way my family expresses affection and responds to my emotions, such as anger, sorrow, and love.			
5) I am satisfied with the way my family and I share time together.			

Rating Scale:
Almost Always = 2 pts.
Some of the Time = 1 pt.

Hardly Ever = 0 pts.

Scoring:
8-10 = Highly Functional
4-7 = Moderately Dysfunctional

0-3 = Dysfunctional

Example:
Total = 7 pts.
Moderately Dysfunctional

Appendix H: Patients’ Insights and Views of Teamwork Survey

From your perspective, please tell us about the team of people providing patient care in this unit. These individuals may have worked directly with you or your family member or worked on the team in other ways. Fill in the response option that best fits each statement. If you really feel that you have no basis for judgment, you may leave that item blank.

---

1 **I thought the team worked together well**
○ Not at all ○ Rarely ○ Sometimes ○ Often ○ All the time

2 **I thought team members enjoyed working together**
○ Not at all ○ Rarely ○ Sometimes ○ Often ○ All the time

3 **I thought the team coordinated patient care well**
○ Not at all ○ Rarely ○ Sometimes ○ Often ○ All the time

4 **I thought team members kept each other informed**
○ Not at all ○ Rarely ○ Sometimes ○ Often ○ All the time

5 **I felt as if team members talked in front of me as if I wasn't there**
○ Not at all ○ Rarely ○ Sometimes ○ Often ○ All the time

6 **I felt that team members told me conflicting things**
○ Not at all ○ Rarely ○ Sometimes ○ Often ○ All the time

7 **I thought team members supported each other to get the work done**
○ Not at all ○ Rarely ○ Sometimes ○ Often ○ All the time

8 **I felt team members were considerate of one another**
○ Not at all ○ Rarely ○ Sometimes ○ Often ○ All the time

9 **I saw team members treating each other with a lack of respect**
○ Not at all ○ Rarely ○ Sometimes ○ Often ○ All the time

10 **I heard arguments between team members, inside or outside the room**
○ Not at all ○ Rarely ○ Sometimes ○ Often ○ All the time

11 **I was told the names of the people who worked on the patient care team**
○ Not at all ○ Rarely ○ Sometimes ○ Often ○ All the time

12 **I was told how the team worked as a whole**
○ Not at all ○ Rarely ○ Sometimes ○ Often ○ All the time

13 **People told me what their jobs were on the team**
○ Not at all ○ Rarely ○ Sometimes ○ Often ○ All the time

14 **I knew who was in charge**
○ Not at all ○ Rarely ○ Sometimes ○ Often ○ All the time

15 **I heard team members use each others' names as they worked together**
○ Not at all ○ Rarely ○ Sometimes ○ Often ○ All the time

16 **I felt there was good communication between team members**
○ Not at all ○ Rarely ○ Sometimes ○ Often ○ All the time

Appendix I: Short Form-12 Version 2 (4-week recall)

SF-12 Health Survey

This survey asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities. **Answer each question by choosing just one answer**. If you are unsure how to answer a

1. **In general, would you say your health is**:

☐1 Excellent ☐2 Very good ☐3 Good ☐4 Fair ☐5 Poor

The following questions are about activities you might do during a typical day. Does <u>your health now</u> <u>limit you</u> in these activities? If so, how much?

	YES, limited a lot	**YES, limited a little**	**NO, not limited at all**
2. **Moderate activities** such as moving a table, pushing a vacuum cleaner, bowling, or playing golf.	☐1	☐2	☐3
3. Climbing **several** flights of stairs.	☐1	☐2	☐3

During the <u>past 4 weeks</u>, have you had any of the following problems with your work or other regular daily activities <u>as a result of your physical health</u>?

	YES	**NO**
4. **Accomplished less** than you would like.	☐1	☐2
5. Were limited in the **kind** of work or other activities.	☐1	☐2

During the <u>past 4 weeks</u>, have you had any of the following problems with your work or other regular daily activities <u>as a result of any emotional problems</u> (such as feeling depressed or anxious)?

	YES	**NO**
6. **Accomplished less** than you would like.	☐1	☐2
7. Did work or activities **less carefully than usual**.	☐1	☐2

8. **During the <u>past 4 weeks</u>, how much <u>did pain interfere</u> with your normal work (including work outside the home and housework)?**

☐1 Not at all ☐2 A little bit ☐3 Moderately ☐4 Quite a bit ☐5 Extremely

These questions are about how you have been feeling during the <u>past 4 weeks</u>. For each question, please give the one answer that comes closest to the way you

have been feeling. How much of the time during the <u>past 4 weeks</u>…

	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	N o ti
9. Have you felt calm & peaceful?	☐1	☐2	☐3	☐4	☐5	☐
10. Did you have a lot of energy?	☐1	☐2	☐3	☐4	☐5	☐
11. Have you felt down-hearted and blue?	☐1	☐2	☐3	☐4	☐5	☐

12. **During the <u>past 4 weeks</u>, how much of the time has your <u>physical health or emotional problems</u> interfered with your social activities (like visiting friends, relatives, etc.)?**

☐1 All of the time ☐2 Most of the time ☐3 Some of the time ☐4 A little of the time ☐5 None of the time