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DIABETES UNDERSTANDING AMONG STAFF NURSES: EXAMINING THE
ACTUAL VERSUS PERCEIVED KNOWLEDGE IN THE ACUTE CARE SETTING

By

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A thesis submitted to the faculty of
Gardner-Webb University School of Nursing
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Abstract

Diabetes is the fourth leading cause of death world-wide claiming a staggering 3.8 million lives globally each year to related complications (World Health Organization, 2011). Diabetes complications account for 20% of all acute care admissions or 1 in every 5 patients have a diabetes-related condition (American Diabetes Association, 2011). Patient education in the areas of lifestyle modification, healthy eating habits, and proper medication administration is research-supported to clinically decrease the likelihood of acute complications. Bedside, acute care nurses are at the front line of patient education delivery and have the opportunity to determine behavioral stages related to a patient's readiness to change. The primary nurse can furthermore evoke a sense of relationship between the acute complication and the importance of preventative action and maintenance through bridging these knowledge fundamentals. This descriptive study sought to identify knowledge gaps and inconsistencies in the delivery of diabetes self-care education to patients in the acute care setting. The study was conducted using a convenience sampling of acute care nurses surveyed for their perceived versus actual diabetes knowledge using the Diabetes Self-Reporting Tool (DSRT) and the Diabetes Basic Knowledge Tool (DBKT). Although their perceived knowledge was closely relative to their actual knowledge about the disease, extreme gaps in current and accurate knowledge were identified.

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Chapter I:

Introduction

Statement of the Problem

There are over 285 million individuals world-wide living with diabetes, with a prediction of this number to rise to a total of 438 million over the next 20 years. (International Diabetes Federation, 2010). Five countries that lead the global ranking in diabetes cases include: India (40.9 million), China (39.8 million), United States (25.8 million), Russia (9.6 million), and Germany (7.4 million). To note, another seven million people develop the disease annually. As the fourth leading cause of death, the overall risk of dying from diabetes is double the likelihood of people without disease; globally, 3.8 million deaths are attributable to diabetes annually (World Health Organization, 2011).

Diabetes is a complex metabolic disorder requiring daily self-management skills in order to prevent complications of the disease. Lifestyle choices are crucial in regulating food intake, monitoring blood glucose levels, and staying physically active. Without significant behavior modification and self-efficacy of management, those diagnosed can experience an array of severe adverse events, including heart disease, stroke, neuropathy, nephropathy, and retinopathy. Although costs associated with self-care have been identified as a primary deterrent to maintaining treatment compliance, the relative expenditure of preventive management shows a positive alternative to the price tag of treating long-term complications in the hospitalized acute episodes.

It is estimated that up to 22% of hospital inpatient days are incurred by people with diabetes (AACE, 2011). In the acute care of diabetes patients, an understanding of the pathophysiology is essential to nurses as they interact daily with patients to optimize their understanding of the disease and the self care critical to survival through avoidance

of complications. A diabetes educator can be consulted in a large number of cases where assistance is indicated, however, reinforcement of this education by a primary nurse utilizing the most current and correct information is vital to patients' knowledge retention and goal attainment. Conversely, many hospitals rely solely on staff nurses to perform diabetes education (Chan & Zang, 2007). Differing levels of perceived and actual knowledge may affect their overall performance in teaching diabetes self-care. Whether nurses have the necessary knowledge to educate patients effectively is questionable in light of the continually recurrent patient acute admissions/visits. Perception of the nurse's ability is another factor in assessing the knowledge and capability to teach the patients proper self care prior to discharge.

Background

Medical care costs for people with diabetes is said to be more than two times higher than for those without diabetes (CDC, 2011). Figures from 2007 data from the Centers for Disease Control (CDC, 2011), reports a total expenditure for diabetes care in the United States estimated at \$174 billion for direct and indirect patient care costs. Complications from the disease are a significant factor in the national and global economic burden. Common complications of the disease include: heart disease and stroke, blindness, hypertension, kidney and neurovascular disease, amputations secondary to circulatory problems, pregnancy complications, and dental disease (CDC, 2011).

In an attempt to quantify the impact of diabetes by state and in reference to this study's locale, a view of South Carolina's economic burden of the disease on society is researched. South Carolina's (SC) prevalence of diabetes currently ranks 10th in the nation for diagnosed individuals with an estimated 300,000-350,000 people living with the disease locally. In particular, the state spent a total of \$928 million in 2001 on acute hospital care alone for the primary diagnosis of diabetes and its complications. The

estimated emergency department visits in S.C. for the treatment of adversities rose from the year 1997 to 2001 by 115% (South Carolina Department of Health and Environmental Control, 2011).

Categorically, four types of diabetes exist. Type 1, historically referred to as juvenile diabetes and Type 2 which has been known as adult-onset are the types most commonly presented. With a dramatic increase nationally in childhood obesity, and a resultant insulin resistance, a need for revision of the terminology for diabetes types was recognized. Between 2007 and 2008, the occurrence of children aged 2-5 years, diagnosed with the disease, increased 5% to 10.4%; in teens ages 6-11 years, it increased from 6.5% to 19.6% (CDC, 2011). Another common form of diabetes not evaluated in this study but noteworthy in regards to its prevalence is gestational diabetes. Gestational diabetes is a hyperglycemic state induced by the placental hormones antiregulatory effect upon insulin commonly targeted in women with hereditary influences (ADA, 2011). The significance of yet another form of diabetes state, 'prediabetes' has emerged in recent years in lieu of complications even when blood glucose levels are not diagnostically high, but other warning signs of the preeminence of diagnosis are observed: hereditary factors, elevated body mass index (BMI) and increased triglyceride and cholesterol levels.

Aside from the astronomical numbers of people now living with diabetes nationwide, it is estimated that another 7.0 million people are undiagnosed. This 'pre-diabetes' subgroup consists of another 79 million Americans. It is in this early stage of insulin resistance that studies suggest organ damage and deterioration begin. The diagnosis of pre-diabetes is often made when A1C and/or blood glucose levels are higher than considered normal but not high enough to be classified as diabetes (CDC, 2011). The American Diabetes Association (ADA, 2011) estimates 12% of hospitalized patients who are not diagnosed upon admission, will in fact convert to a stress-induced

hyperglycemic state during acute health episodes secondary to hereditary and lifestyle influence. This phenomenon occurs primarily as a result of bodily insult or injury during illness with underlying predispositions to abnormal responses of counter regulatory hormones resulting in insulin resistance as in the pre-diabetic group.

Pre-diabetes is a relatively new term that has been used to describe those clients with multiple risks factors predisposing them to diabetes. A clustering of identifiers referred to as metabolic syndrome suggests that clients presenting with obesity, BMI greater than 40, elevated LDL, triglyceride, and cholesterol levels, low HDL levels, and significant family history of diabetes and an elevation in fasting blood glucose are in the 'pre-diabetic' state. Researchers have recently identified a significant correlation between this state before conversion to diabetes and complications relative of cardiac adversity and the increased potential for poor healing and infection (ADA, 2011). The staff nurse's ability to recognize identifying symptoms of this state as a crucial teaching opportunity is yet another reason for identifying the nurse's knowledge base in the area of diabetes. Prevention of further decline at this point in the disease process is vital.

Type 1 diabetes is a result of an immune response to some form of antigen where the body inadvertently attacks the pancreatic beta cells, diminishing their insulin-producing function. Type 1 clients typically present with acute weight loss, polydipsia and polyuria. Additionally, approximately 35% of these patients will show evidence of ketoacidosis with an ongoing risk of this life-threatening acute complication (International Diabetes Federation, 2010). This subgroup is also dependent upon exogenous insulin and without daily injections, can develop acute complications which can be potentially fatal. Imploring upon the patient, the necessity of insulin to this patient type is critical for the nurse to instill upon discharge.

The onset of Type 2 is influenced by a variety of characteristics. Again, the likelihood of developing this ‘insulin-resistant’ state is affected by factors like obesity, family history, physical weight distribution and laboratory findings. A precursor to its development is an overabundance of insulin in an effort for the pancreas to produce more insulin to move sugar into the tissue cells, a state of cell intolerance becomes apparent due to the contributing factors listed above. Over time, the pancreatic beta cells diminish in function from overstress to produce enough insulin to drive the sugar from the bloodstream into the cells (International Diabetes Federation, 2010). Significant education for this patient consists of encouraging regular monitoring of blood glucose levels, teaching target ranges of parameters, and promoting exercise.

Other types of diabetes, such as MODY (mature onset diabetes of the young), LADA (latent autoimmune diabetes of adulthood), and Type 1½ (patients present with insulin sensitivity and diminished insulin production) have gained popularity in recent years possibly suggestive of atypical occurrences within the pancreatic physiology. There are a number of other types such as; trauma and medication-induced diabetes as well, however for the purpose of this study, diabetes Types 1 & 2 will be the focus of interest (ADA, 2011). The bedside nurse’s awareness of varying types of diabetes may help them to understand why some patients react in different ways to certain treatments. Again, the importance of this knowledge is a valuable tool in helping the patient to understand these physiological changes as well.

As of June 2007, 45 of the 46 counties in SC were designated ‘medically underserved’ counties by the US Public Health Service for either the total county or a majority of each county. The ratio of diabetes-educated physicians-to-patients is a staggering 1000 to 1 in most counties of the highest diabetes populations in S.C. Another nine counties in the state have no certified diabetes educator coverage. These numbers

support the need for adequately trained nurses caring for this population in the acute phase of their conditions to accurately offer information and spend quality time educating this population to prevent complications (SCDHEC, 2011). This acute patient interaction may be the only access some individuals encounter.

South Carolina has seen a tremendous rise in the number of diabetes cases from the year 2000 to 2007 by a staggering 400,000. Hospital admissions and emergency visits are steadily climbing as an increase in the aged population and diverse nationalities move into the rural communities. The key to prevention has unanimously been researched to include education of self-care as the defining factor in blood glucose control and prevention of short and long complications.

Staff nurses in primary acute care settings have the greatest access to patients and subsequently, to teaching opportunities. Key elements in preventive treatment of diabetes are patient knowledge and awareness of the disease and subsequently learning self-care which is aimed at patient empowerment (Chan & Yang, 2007). Nurses, therefore have a professional responsibility to seek and maintain a knowledge base current and accurate to further promote competent self-care. Further developing nursing knowledge requires that the nature of the knowledge be determined and researched in the effort to grow an educational foundation in a specialized area.

Theoretical Framework

Patricia Benner's Novice to Expert Model of Skill Acquisition lends itself well to the study of knowledge in a variety of nursing situations. While befitting to many nursing educational institutions, it can successfully be applied to the acquisition of a knowledge base useful in teaching and reinforcing diabetes self-care.

Benner asserts nurses move through five skill acquisition stages in the context of the Dreyfus Model (Tomey & Alligood, 2006). Initially, nurses lack the intuitive

background experience needed for situational decision-making; novice phase. Secondly, the advanced beginner can perform in a marginally acceptable manner if exposed to the particular situation to increase knowledge. The competent nurse during the third phase is able to demonstrate some efficiency in time management, planning and knowledge of the situation. According to Benner (1984) the competent nurse has a "...feeling of mastery and the ability to cope with and manage the many contingencies of clinical nursing" (p. 231). The fourth phase is the proficient nurse. Benner asserts these nurses are able to view the situation as a whole rather than focusing on individual tasks at hand. It is crucial for the nurse to understand completely the physiology and reasoning for enforcing this education. The fifth and final phase of acquisition is the expert nurse who when applied to diabetes education would consistent with a certified educator. For the purpose of this study, the staff nurse managing the primary care of the acute patient will therefore not be expected to reach this level of Benner's acquisition model as expert, but will strive to attain proficiency in their ability to provide the patient with the pathophysiology, basic survival skills, target range blood glucose levels, healthy food choices, and the importance of maintaining an active lifestyle. And lastly, the proficient phase will entail the giving of correct and consistent information by each staff nurse caring for acute diabetes patients.

The stages of Benner's model in teaching diabetes education are detailed in all five levels with respect to skill acquisition in relating knowledge to the patient, family, and/or caregiver. Stages of Benner's model are further categorized according to the nurse's acquisition of diabetes instruction (see Appendix A). This theoretical reference in no way suggests that each nurse caring for a diabetes patient will become expert or specialized in this certifiable specialty, but moreover implies that novice to proficient references the nurse's progression from a mere base knowledge of diabetes

pathophysiology to acquisition of concepts of education to hands-on care components. Future stages induce further progression of the ability to provide accurate, evidenced-based diabetes education and to uphold and reinforce that information offered to the patient by a certified diabetes educator, dietitian, and/or endocrinologist.

Purpose and Rationale of the Project

The importance of instructing self-care in the population of diabetes and pre-diabetes is clearly research-supported making healthcare professional's knowledge paramount in providing the patient with proper education to accomplish self-care goals. A fragmented knowledge base when providing patient education can lead to further decline or possibly induced complications. Complications of diabetes are abundant and since clients are living with a chronic disease over the lifespan, which may take years of toll on the body, the likelihood of acute admissions is very high. Adversities of uncontrolled diabetes include: kidney failure, heart attacks, blindness, cerebrovascular accidents, amputations related to poor circulation and infection and high blood pressure and cholesterol levels (SCDHEC, 2011). Nurses are in unique positions to assist in providing client education in a variety of clinical settings by educating and reinforcing accurate self-care information regarding diabetes complication prevention and the importance of maintaining blood glucose control.

Current research evidence clearly identifies client self-care as significant for making long-term strides in management. In most cases, with reliance on the staff nurse in most cases to instruct the diabetes patient upon discharge from the acute care setting, efforts to ensure continuity, accuracy and standardization of information given must be conducted. Understanding the perceived and actual diabetes knowledge related to self-care is important for future professional development of health education processes. Phenomenally, society takes an active role in recommending diabetes 'home treatments'

and clearly pass non evidenced-based information from person to person owing to the significant problem of incorrect knowledge and subsequent inappropriate care.

In this nearly two decades of caring for and working with diabetes in-patients, and as co-worker of multiple generations of nurses, the researcher has witnessed a knowledge gap in the area of diabetes pathophysiology and the inability of nurses to properly educate this growing population of patients who desperately need and seek accurate information for the prevention of complications. Learning and staying clinically inept in teaching diabetes care is laborious at best. The ability to educate on key elements of self-care to prevent complications is crucial when a shortage of time and specialized expertise are poignant deterrents of proper patient education. There currently exists a plethora of evidenced-based research in the area of treatment protocols addressing this disease's impact; another wealth of research has been conducted to promote self-care education. However, the nurse as agent of change in a down-cycling spiral of patient admissions and readmissions has not been privy to the same research attention with adequate knowledge surveys nor updated education contributing to the continual diabetes complication cycle.

This study will attempt to seek and promote the positive research findings implicating diabetes self-care as a key component of diabetes complication prevention and avoidance of revisit/readmission. The study will furthermore trial and lay the groundwork to establish a bridge of knowledge as to the significance the primary nurse plays in caring for, case managing and assisting in preventing complications experienced by the patient who is discharged from an acute setting with the diagnosis of diabetes. The central focus of this project is to identify the diabetes knowledge gaps of the acute care nursing staff; perceived versus actual knowledge; and to add to the research base, the support findings indicating nurses in the acute setting need more standard diabetes

prevention knowledge with which to instruct and educate patients of this population further reducing readmissions for complications.

Research Objectives:

1. To stress the importance of accurate and adequate diabetes knowledge among the front-line acute care staff nurse
2. To identify knowledge gaps in the staff nurses' perceived versus actual knowledge of Diabetes
3. To explore the differences in nurses' knowledge levels throughout the acute setting
4. To add to the research foundation, documentation of the necessity for ongoing staff nursing diabetes education.

Research Questions:

1. Do gaps in diabetes care knowledge exist among the staff nurses caring for diabetes patients in the acute care setting?
2. What is the perceived level of knowledge of diabetes among nurses working in an acute care setting?
3. What is the actual level of knowledge among nurses working in the acute care setting?

Chapter II

Review of Literature

Self-Care Management

The importance of patient self-care management has long been researched and supported in various avenues of disease intervention and control. Diabetes is one chronic condition that can be significantly and positively impacted through proper self-monitoring, adequate exercise, and healthy dietary habits. Understanding the significance of this potential impact is crucial for both the patient and the nurse caring for the patient to assist in the prevention of complications, to decrease length of hospital stay and reduce revisits and readmissions for acute care. In light of this significance, a review of documented studies indicating the importance of self care was conducted. Research indicating the efficacy of instruction, is plentiful. Methods of instructing patients in diabetes care planning are varied and must be individualized considering multiple factors related to knowledge retention. Lasting lifestyle changes must be made to prevent long term complications (ADA, 2008).

In the ‘China Do Qing Prevention Study’: a 20-year follow-up, Guangwei Li and colleagues (ADA, 2008) researched the long term effects of an earlier study of participants to find out how many of them had developed diabetes or heart disease and how many had died from complications after a group-style program several years earlier. The study acknowledged those with instruction experienced a delay in diabetes complication onset for many more years after the program’s end; whereas an uneducated control group had frequent and early onset complications.

A randomized controlled trial called Diabetes Education and Self Management for Ongoing and Newly Diagnosed (DESMOND), studied the gaps in patient education by testing a structured program in terms of medical, psychosocial, and lifestyle issues.

Additional findings concluded that significant weight loss, increased physical activity, more improved levels of triglycerides and increases in smoking cessation were the majority achieved goals of participants in a diabetes education program (Davies, et. al, 2008).

Preferences for methods of education sessions vary by race, ethnicity, language proficiency, and self-reported health literacy. Individual teaching sessions in one study were found to be more costly than group session activity with “group visits statistically significantly [reducing] outpatient visit charges” (Clancy, et.al, 2008, p.43). New curricula for instruction such as conversation mapping have also shown to provide excellent acquisition of information and improved long-term outcomes according to the *American Diabetes Association* (ADA) (2008). Conversation mapping tools provided in a group interactive environment allow individuals to focus on specific challenges they face with other participants facing similar problems (Healthy I, 2009). The information is offered in a game format where each participant can provide individual input and respond to other participants based upon their own experiences. Role playing is yet another form of teaching activity utilized in the group setting which provides realistic situations that may serve to direct individuals whose learning styles are more visually inclined.

Recruitment and retention to education are two major challenges in the implementation of health behavior interventions. The purpose of a study by Helitzer (2007) was to determine if stage-of-change measures for seven diabetes prevention behaviors are indicative of subsequent attendance to a diabetes intervention program. As hypothesized, the results showed that people are in varying stages of change in lifestyle behaviors upon their follow-up diabetes group sessions. This means that while one person is in the initial preparation stage to change habits, another individual may be in the

maintenance stage for certain already acknowledged behaviors, like increasing exercise or dietary control. Researchers concluded that because of these degrees of variability and acceptance, participants required varying degrees of educational intervention and teaching strategies. Limitations to this study were the exclusion of financial stability and educational coping level which could have diverse results while providing a stronger insight into the precise variability required with instruction. Overall, this study did significantly contribute to providing educators with the knowledge to recognize typical behavior of each stage which may serve to help in developing individualized criteria for teaching.

Barriers to Self-Care Management

As indicated in the literature, the significance of self-care is clearly documented and well-defined. Quality outcomes and complication prevention can be more readily achieved with successfully managing diabetes on a daily basis. However, when barriers to this care exist, the chain of prevention is broken leaving an opening for the intrusion of disease exacerbation.

The literature also thoroughly outlines these barriers of diabetes self-care; a review of the study of these obstacles is essential in defining the placement of nurses' teaching habits for this population and how a lack of proper nurse education fits into the equation of barriers to self-care.

Numerous obstacles to maintaining diabetes self care following education exists. Among these are: financial stressors, lack of social support systems, and educational limitations. Psychological barriers impeding knowledge retention and subsequent self care include: misperception, denial, anger, depression, and grief. With more than 18 million Americans presently diagnosed with the disease, staggering monetary costs exists in the daily maintenance and treatment of acute complications associated with controlling

this enigma. The American Diabetes Association (ADA) estimates “approximately half of the lifetime health costs for patients with diabetes are related to potentially preventable complications” (ADA, 2008, p.1). Even those without diabetes help to foot the bill; about half of diabetics have medical insurance through government programs such as Medicare, according to the Employee Benefit Research Institute (*USA Today*, 2008).

“Diabetes treatment is expensive” (National Diabetes Information Clearinghouse, 2004, p.1). According to the ADA (2008), people who have this disease spend an average of \$13,243 per year on health care expenses. The provision of routine care such as doctor’s visits and medication costs are relatively low, but the real expenses come from uncontrolled diabetes, which can lead to dialysis and kidney transplants, heart attacks and strokes with subsequent long term therapies, rehabilitation, and skilled care.

One research study representing the magnitude of this American financial strain was conducted by the Centers for Disease Control (CDC) with results indicating half of diabetes’ direct costs come from visits to acute inpatient hospital care (CDC, 2009). President of the National Business Group on Health, a non-profit organization that represents large employers, states that over the next few decades, diabetes will handicap both state and local economies as communities divert money from education to cover the vast expense created by chronic conditions like diabetes (*USA Today*, 2008).

Another study depicting cost analysis, conducted by Franklin Lakes, Medco pharmacy benefits manager, indicates that by the end of 2009, spending on diabetes treatments in the U.S. could soar by nearly 70 percent. The report, ‘2007 Drug Trend’, found that year-over-year spending on diabetes drugs is expected to grow between 16 and 20 percent per year alone. “What’s driving this [increased cost] is obesity in the U.S.” (Prial, 2007, p. 1). With complacency in providing diabetes education, more and more effort will be placed on enhancing drug therapy which will therefore increase costs to

patients and stretch the overall economy. This effect could encourage long term savings in the area of stroke and heart attack prevention. The savings however would be much further down the road in terms of accrual to the financial health system.

In an effort to investigate diabetes cost coverage, which may be according to some studies, the most common cause of noncompliance, researchers studied a total of 556 diabetic subjects from various urban and rural backgrounds (Ramachandran, et.al, 2007). With an annual income average of \$2273 for urban subjects versus rural subjects, the total median expenditure on diabetes care was \$227 for urban and \$142 for rural participants. Treatment costs for both groups increased over time with the duration of the disease. The study provided a long term questionnaire which concluded that both regional subjects experienced significant economic burden in both urban and rural sites, with rural subjects experiencing a somewhat higher increase in costs over the long term for diabetes self care. The gaps in this study were the lack of discussion of causative factors related to the cost increase.

Directing clients in the areas of cost assistance for diabetes supplies is mandated in the effort to ensure compliance. The U.S. Department of Health and Environmental Control published a report of assistive payment sources for the diabetes patient (Avalere, 2005). In this report, Medicare and Medicaid participants seem to have the greatest likelihood of receiving the necessary supplies and instruction as these entities strive to pay for preventive services albeit at the expense of all taxpayers. Individual insurances frequently pay more by percentage for preventive care than for acute, diabetes-related episodes.

A new plan by managed care companies that patients should seek to help themselves if payment is to be rendered on their behalf is catching on across the board. Varying assistance programs like, Easter Seals, Amputee Coalition for America, and

Pharmacy prescription assistance programs are available for indigent populations as well (National Diabetes Information Clearinghouse, 2004). These and other such programs seek to assist with supplies, medications, and long term planning, but must be shared with patients via the medical team in order for them to reap the benefits. Staff nurses are at the forefront of this information drive.

Monitoring of cost containment and diabetes populations across the nation is conducted by the Center for Disease Control. By studying the prevalence of diabetes-related preventive care practices in the U.S., the CDC determines the compliance of attendance to class sessions for diabetes education. This study, which is accomplished through telephone interviews of newly diagnosed diabetics, is presently on-going and does not reveal reasons for non attendance, but rather acts as follow-up for preventive measures assessment. The limitations of the study were the exclusion of patients without phones, those in nursing homes or skilled care facilities, and self-reported bias.

It is estimated that less than half of newly diagnosed diabetics are referred to a trained or certified educator for diabetes education (ADA, 2008). Research studies supporting the benefits of education in the prevention of diabetes complications are numerous. This evidenced-based research is paramount in sharing with physicians who do not refer. The degree of attendance to any mode of instruction has been significantly reported in published studies but a lack of compliance after instruction and its relationship to the above variables has not been largely represented in literary research. (Sarkar, et.al, 2008). The role of acute care nurses in providing and promoting instruction in self care has seen far less research attention.

Other potential barriers to self care in terms of diabetes management exist in several pertinent studies offering possible reasons why clients lean toward noncompliance of lifestyle alterations. One such study in the *American Journal of*

Managed Care concluded that in a country with universal healthcare, patients from lower socioeconomic levels had an actual increased prevalence of diabetes with a greater adherence to preventive healthcare measures, but were less successful in meeting target treatment goals (Clancy, 2008). Another study supports the theoretical assumption indicating education by a diabetes educator can significantly decrease negative patterns like frequent hospitalizations (Schechtman, et.al, 2002). This finding adamantly supports the necessity of adequately trained bedside nurses in light of the low number of certified diabetes educators.

Negative perceptions also serve to influence patient self care as one study report suggests (Lerman, et.al, 2009). Although cliché, perception is reality; by improving patient perception and acceptance of lifestyle alterations, earlier and more aggressive intervention and optimization of glycemic control can be attained. The study revealed that patients who held a negative attitude toward insulin and its administration were the majority of those without education and poor diabetes-related knowledge. This subgroup was from varying educational levels and social standing. Negative attitudes as well often produce negative reception of information. According to one researcher, negative or depressed individuals can bias the way in which information is processed; information that is congruent with one's mood is more easily processed and recalled (Snoek, et al., 2008). Nurses caring for these patients in the acute setting have opportune chances to provide repetitive reassurance.

Significant strides in control were associated with the additional support of a diabetes nurse educator; whereas the support by knowledgeable nurses is provided daily during hospitalization improving the likelihood of the patient to gain knowledge themselves. Dispelling myths and misperceptions are paramount in the instruction of patients with diabetes as they are often times implications of initial self-defeat. Another

study, focusing on interventions aimed at diet modification implies that individuals perceive an extreme cost adjustment if they are to adhere to diabetes medical nutrition plans. In *Diabetes Medicine* (2005), one study to evaluate these barriers led researchers to conclude that these perceptions and lack of knowledge are to blame for potential non adherence to change (Vijan et.al, 2005). The research suggests that treatment guidelines be aimed toward concentration of changing these perceptions individually according to patient preferences when setting goals for treatment.

The barriers of cost, cost perception, access to care and instruction, and continuity of care are all factors that could impede or enhance an individual's positive outcomes from diabetes education. Still other, more abstract factors for noncompliance also exist. According to Sousa and Zauszniewski (2003), self care management is the appropriate modality of care for people with all types of chronic disease. In Sousa and Zauszniewski's study of diabetes self-care management, they use Bandura's Self-Efficacy and Orem's Self-Care theories as conceptual frameworks for self-care modes of instruction for diabetes care. They reference empirical studies that propose personal and environmental factors affect one's behaviors and actions to achieve desirable outcomes of health and wellbeing. The researchers propose there must be several identifiable traits included in personal capacity in order for learning to take place: perception, memory, orientation, motivation, decision-making skills, persistence, and purposeful goal setting. Patients must perceive their need for knowledge, and believe in their personal capability. In some cultures, these factors can be construed, or absent altogether. Instruction must be culturally sensitive and appropriate for all levels of learning and adaptation (Schechtman, et. al., 2002).

Multiple studies regarding patient barriers to self-care of diabetes are published in the literature and cite obstacles such as cost, perception of ability, social support and

health literacy as causes of non-compliance. However, more focus of barriers to care can be found relative to the patient's abilities, and obstacles. Nurses and their knowledge of the disease and its management should be at the front line in identifying areas of focus for ensuring patient compliance. The literature is not altogether devoid of studies indicating a need for increased nursing education, but there is more focus on the instruction provided by certified diabetes educators to patients, who are not always available for the vast population served. As previously acknowledged, the specialized educator to patient ratio in South Carolina is a staggering 1000 to 1 signifying the necessity of the numbers needing education. In light of this educational need, a review of what nurses on the front lines of patient care can offer by way of diabetes education is vital to optimal health outcomes.

Nursing Knowledge of Diabetes

A lack of diabetes knowledge among healthcare professionals has contributed to diabetes patients receiving inadequate instruction in health care (Scheiderich, et.al., 1983). Understanding the staff nurse's knowledge of diabetes and diabetes management is important for the safety of the patient as well as for the projection of long-term complications. With the significance of self-care by the patient in maintaining lifestyle modifications, ensuring a consistent and accurate diabetes knowledge base by those nurses caring for acutely ill diabetic patients is relevant to research.

According to the Bureau of Labor Statistics (2011), the largest healthcare occupation is nursing, accounting for approximately 2.6 million jobs in the U.S. in 2008 with an expected growth of 22% by 2018. Registered Dietitians counted for approximately 60,300 jobs in the U.S. in 2008 with a growth of only 9% expected by 2018. The American Association of Diabetes Educators (AADE), reports there are approximately 15,000 certified diabetes educators currently practicing in the U.S.

Noticeably, these numbers indicate the necessity for those staff nurses on the ‘front line’ of patient care to be sufficiently educated in the area of diabetes self-care instruction (AADE, 2011).

The literature, though most studies are somewhat dated contains several studies using the Diabetes Basic Knowledge Test (DBKT) and the Diabetes Self Report Tool (DSRT) in evaluating nurses’ actual and perceived knowledge of diabetes. The DBKT is a 45 item multiple choice questionnaire with a focus on ‘actual’ knowledge. The DSRT consists of 22 statements utilizing a 5-point Likert scale with a focus on ‘perceived’ knowledge (Drass, et al., 1989).

Indications in the literature suggest that nurses may have higher perceived knowledge than actual knowledge pertaining to nutrition and diabetes. A cluster analysis study was performed by researchers using a modified version of the DBKT, termed MDBKT. Chan and Zang (2007) sought to identify a relationship in profiles of nurses working in two hospitals in Hong Kong to distinguish between nurses’ actual and perceived knowledge of diabetes. The two-step analysis yielded three clusters: 1) a small collection of nurses were characterized by relatively good competence and high diabetes knowledge, 2) a large group of nurses exhibited both positive and moderate levels of competence in diabetes knowledge, and 3) a third group reported low competence in diabetes. Statistical significance was found among all three groups. This relevance to practice suggests that patients receive a plethora of varying levels of educated care in relation to diabetes which can have significant implications as to the empowerment of their own self-care.

El-Deirawi and Zuraikat (2001) assessed nurses’ knowledge of actual and perceived knowledge of diabetes in a 155 bed community hospital using the DBKT and DSRT respectively. They too, determined actual knowledge to be less than the perceived

knowledge of nurses caring for diabetes patients, with a resultant, $r=0.42$, $p<0.0001$. Furthermore, the level of education showed a direct positive relationship of $r=0.318$, $p<0.004$, while a negative correlation existed with nurses' perceived competence; $r=-0.281$, $p<0.12$. Conclusively, the researchers suggest an argument as to the question of competence in teaching diabetes education among staff nursing.

Another significant study of knowledge relating to nursing care of the diabetes patient, evaluated 127 staff nurses employed at three university-affiliated community hospitals. Actual and perceived knowledge was assessed yet again using the DSRT and DBKT. Nurses with a higher level of education responded better than those with fewer years of education. Nurses with fewer years of experience did considerably better than those with greater years of experience. Although this variability existed, overall competence of educating diabetes patients was noted to be adequate. However, questions still remained after the study concerning the general adequacy of nursing's overall knowledge of diabetes self-care instruction (Gossain, 1993).

Further studies indicate that nurses perceive 'lack of time and resources' rather than 'lack of knowledge' as the primary barrier to delivery of diabetes patient education. Nurses also report limited confidence in taking on the sole responsibility for educating patients with diabetes (Spollett, 2006). Researchers in one study aiming to identify the actual misunderstandings of diabetes by staff nurses, suggested nurses expand their knowledge base to include the following:

1. Diabetes medications-a) action of oral medications b) insulin therapy and its use
2. Hypoglycemia-a) recognition of signs/symptoms b) treatment protocols
3. Diabetes pathophysiology
4. Self-care education-a) methods for teaching diabetes skills (Spollett, 2006)

Baxley et al., (1997), also used the DBKT to assess perceived and actual knowledge of diabetes management among nursing staff at an acute-care hospital in the United States. This time, the DBKT was completed by 32 staff nurses who had an average score of 88% for perceived knowledge and 75% for actual knowledge. Only 53% of respondents considered themselves competent in diabetes knowledge. Alarming, only 7 of 32 nurses responded in knowing nutritional self-care for hypoglycemic reactions. While this study was limited, the results suggest a need for diabetes and nutrition education among nurses, who often encounter patients with diabetes and hypoglycemia.

Another facet of concern over the importance of nursing knowledge is its relation to the knowledge of the practicing physician in teaching self-care to their patients. Even without the element of time constraints to instruct this education, physician knowledge for teaching this information and its importance is also significant. In a study conducted by a team of endocrinologists, medical residents, and a diabetes educator, a 21-item questionnaire was developed to assess general diabetes knowledge among nurses (48) to medical residents (115). The results showed a mean score among nurses as 66% out of 100% and that nurses scored significantly higher than resident physicians regarding adequate knowledge base of diabetes self-care (Rubin, et.al, 2007)

A 42-item questionnaire to assess diabetes knowledge of nursing staff and nursing students showed no significant difference in the mean score relative to a difference in knowledge regarding diabetes between the nurses and nursing students. The questionnaire covered topics such as insulin dosing, hypoglycemic episodes, diabetes medications, and complications (Trepp, et al., 2011).

The results of the studies reviewed collectively suggest there may be a knowledge gap among nurses regarding general diabetes knowledge. Yet another facet of

importance in the care of diabetes patients for the healthcare professional is the awareness of the significance of continuing education for this topic.

Using a 35-item questionnaire based on client lifestyle and behavior change, researchers found out of 103 nurses who reported they provide diabetes care, 28% had not received diabetes education updates in the past 2 to 15 years (McDonald, et al, 2010). Another previous study by Baxley (1997) showed 44% of respondents have not received any diabetes in-servicing in over 2 years. This is a significant concern with respect to diabetes guidelines in self-management as they are being continually updated. Healthcare professionals are responsible for staying abreast of the most current information surrounding diabetes self-care. By keeping current with standardized guidelines they can effectively communicate accurate and consistent instruction to patients thereby reducing diabetes-related complications, length of hospital stay, readmissions, and revisits to acute care.

Chapter III

Research Design and Methodology

Research Design/Setting

A quantitative approach, of descriptive research, and a correlational study design was used to examine the demographic data, perceived and actual knowledge of staff nurses in an acute-care, 125-bed facility in South Carolina. The target participants were inclusive of all inpatient, acute care licensed nursing staff, stratified by degree of licensure. A self-reported questionnaire was used to collect demographic data. The study facility averages an inpatient census of approximately 65 on an average weekday. Nursing departments include an intensive care unit, medical-surgical, and step-down telemetry. The facility also houses a women's center department; for the purpose of this study, gestational diabetes care will not be inclusive; therefore, surveys from this particular nursing unit will be stratified out of the testing samples. The facility employs a dietitian for inpatient consultations as well as a contracted, part-time dietitian for the purpose of teaching outpatient diabetes follow-ups and referrals from community physicians. A certified diabetes educator is also on staff for the purpose of coordinating, and instructing the outpatient diabetes program and in a consult position for inpatient, discharges teaching. Written permission was obtained to conduct the study at the 125-bed acute care facility by its Executive Administrative Team.

Sampling Methods/Subjects

The convenience sample consisted of 50 acute care RNs working in the acute, inpatient setting. For sake of clarity, nurses whose licensure included LPN status, or those nurses not currently working in a clinical role were excluded from the study. No one was excluded from the study with respect to race or gender. Nurses were recruited during the facility's annual competency fair week held May 23rd-May 27th and were

offered the surveys/questionnaires upon arrival and enrollment to the fair. No signatures or identifying marks were assigned to the surveys and the 3-portion surveys/questionnaires were secured to one another to ensure accurate results of perceived versus actual knowledge testing. Also included was a demographic survey completed by each study participant. The study was approved by the executive administration team of the facility.

Instruments

Three instruments were used in this study: a background, demographics form, the Diabetes Self Reporting Tool (DSRT), and the Diabetes Basic Knowledge Test (DBKT). The demographics form included a question as to the amount of diabetes-related continuing education credits obtained by the participant within the prior 2 years. Participants were also queried as to whether they or a close family member was diagnosed with diabetes in any form.

The DSRT uses a Likert scale format of 20 items assessing diabetes-related content such as diabetes etiology, basic treatment plans for types 1 and 2 diabetes, surgical nursing care of the diabetes patient, performing and interpreting blood glucose levels, and management of 'sick day rules' for the diabetes patient. Scoring on the scale ranged from 1 (*strongly disagree*) to 4 (*strongly agree*). The reported Cronbach alpha value for the DSRT was .91. This questionnaire acted as an instrument of assessing perceived knowledge of the staff nurse; a ranking of each knowledge base was obtained based upon how much the staff nurse perceives he/she knows about the subject matter.

The DBKT was used to measure actual knowledge of diabetes. A 52-question, multiple-choice evaluation assessed the nurses' knowledge of 20 varied content areas. Modifications to this tool were completed by researchers of a similar study (Gerard, et al., 2009) due to the lack of current verbiage surrounding the question content such as

changing the “diabetic” to “a person with diabetes”. Content and meaning of all questions remained unchanged from its original form created by researchers twenty years prior. In addition, for this study, seven new questions were added to the instrument by the prior study researchers to enhance its validity with current diabetes issues. Inclusive of this new content was: new medications, genetic roles, current technology, and recent trends in diabetes knowledge. These additions were furthermore developed in conjunction with the expertise of physicians, and nursing experts in the field of diabetes. Pilot studies were completed using the modified version of this tool. Resultant mean scores of the DBKT modified version using the original 45 questions and the additional 7 questions were Cronbach alpha of .79 with a Cronbach alpha of .75 computed for the original 45-question DBKT. Written permission to utilize the modified versions of the DSRT and the DBKT as well as the accompanying demographics form were obtained from the researcher of the 2009 study, Sally Gerard, DNP, RN, CNL, Assistant Professor of Nursing at Fairfield University in Fairfield, Connecticut.

Ethical Procedures

Prior to conducting the study, approval was acquired by the Institutional Review Board Committee of the university as well as from the Executive Administrative Team at the facility in which the study was conducted. In compliance with the outlined regulations brought forth by the facility, the investigator provided contact information to each participant in lieu of questions regarding participation in the survey. Participants were assured of anonymity in joining the study and were informed of its voluntary participation.

Data Collection Procedures

Data collection was conducted exclusively by the investigator. Demographic forms, DSRT and DBKT questionnaires were distributed to fifty acute care nurses

holding registered nursing licenses. A convenience sample was obtained by way of offering the surveys to those nurses working in acute care inpatient settings during nursing competency fair which is mandated for attendance by all nurses within the facility. Again, nurses who chose to participate in completion of questionnaires were informed that their participation was strictly voluntary, results were confidential, and anonymity would be maintained. Their returning the questionnaires implied informed consent.

Data Analysis Procedures

Descriptive statistics were collected for all participants. Each returned the demographics data form, DSRT and DBKT questionnaires. Individual surveys and demographics forms were assigned an identifying number. The data was then entered into a personal computer using the Statistical Package for Social Sciences (Version 19) for calculation of results. Data analysis was intended to include frequency tables and Pearson correlation coefficient results. Results were provided to participants and the study facility upon completion of data analysis.

Chapter IV

Results

Demographics

The participants consisted of a total of 50 inpatient nurses employed at a 125-bed acute care facility located in a rural community of the southeastern United States. The convenience sample included those nurses holding a registered nurse licensure coupled with their attendance to a week-long competency fair sponsored by the education department of the facility. A total of 52 questionnaires were obtained with two being discarded due to incompleteness of the DBKT survey.

The ages of participants ranged from 29 to 63 years respectively with a mean age of 44.12 years (N=50) as detailed in Figure 1. As noted in Figure 2, forty participants or 80% were Caucasian, eight (16%) were African-American, one Asian (2%), and one (2%) listed 'other' as indicator of ethnicity on the demographic survey. Most nurses surveyed were female (N=50; 96%). In regard to diabetes history, 22 participants or 44% answered 'yes' when questioned about their own diagnosis of diabetes or their having an immediate family member with diabetes. Two of the respondent's questions were discarded due to answers of a spouse having the disease; therefore irrelevant to familial disposition for the participant.

The RNs participating in the study were primarily prepared in the associate degree (ADN) nursing program track: 54%; n= 27 were ADN-prepared, 30%; n=15 in baccalaureate (BSN), and 10%; n=5 in a diploma nursing program. Another 6%; n=3 were unidentifiable due to the participants listing 'RN' as their graduating degrees. Nurses in the study were also queried as to the number of continuing education hours they had received in the area of diabetes in the last 2 years. Participants gave a mean of 2.2 hours spent in diabetes education in the past 2 years; 12 of the 50 sample subjects, or

24% of the nurses answered they had experienced no diabetes education in the two years prior to the study (Figure 4). Lastly, participants were asked whether they had any family history or relative experience with diabetes on a personal level with results visible in Figure 5.

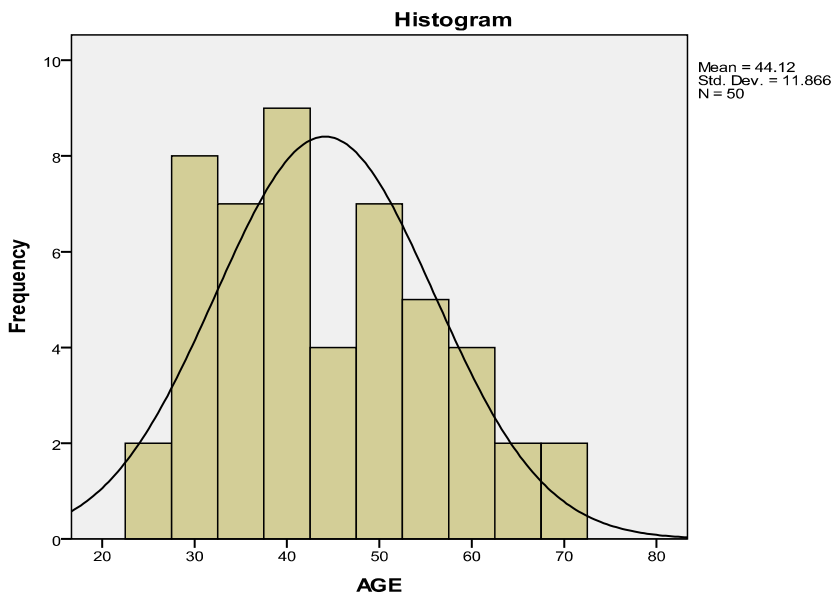


Figure 1: Age Variations of Subjects

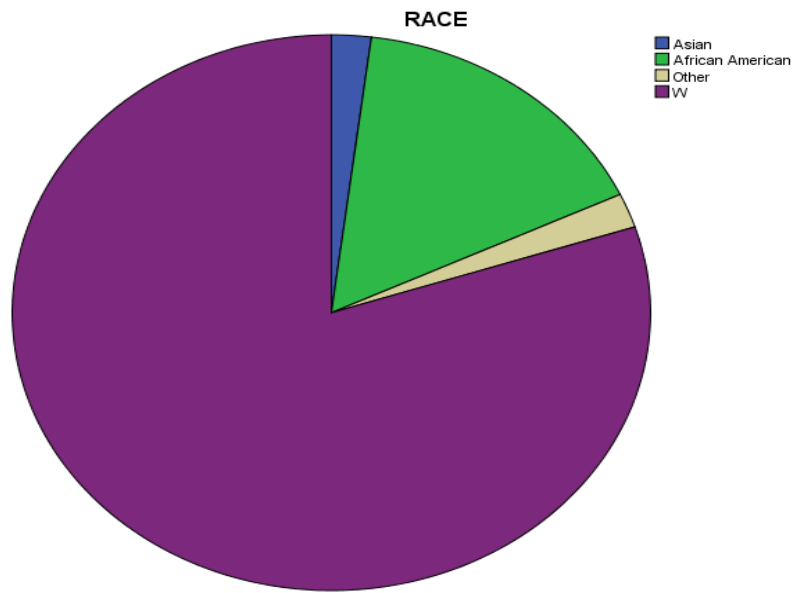


Figure 2: Frequency of Race/Ethnicity of Subjects

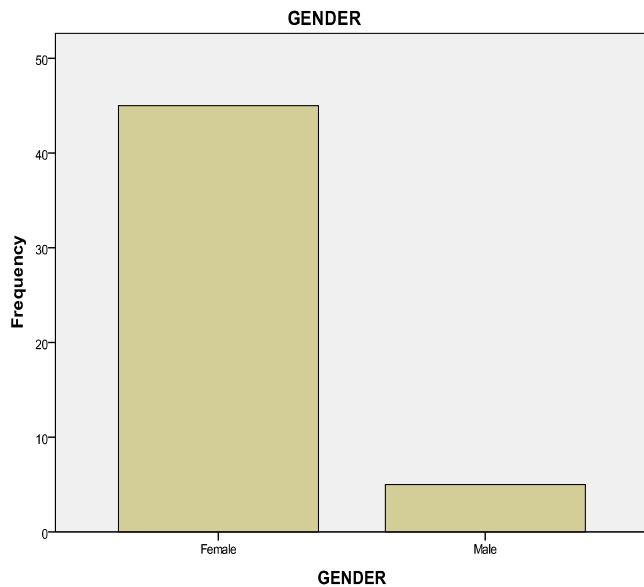


Figure 3: *Frequency of Gender among Subjects*

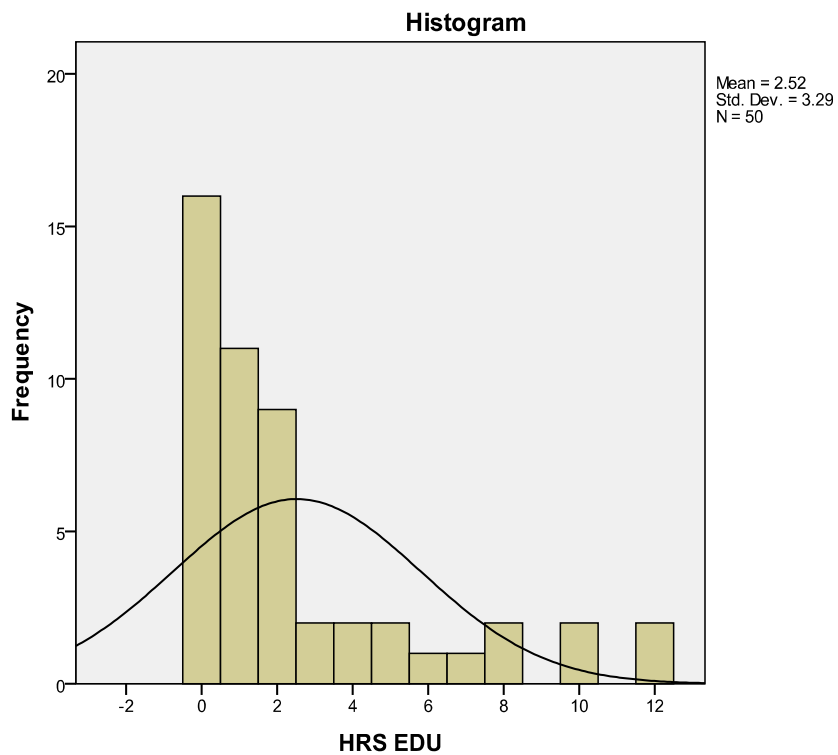


Figure 4: *Frequency of Hours of Continuing Diabetes Education*

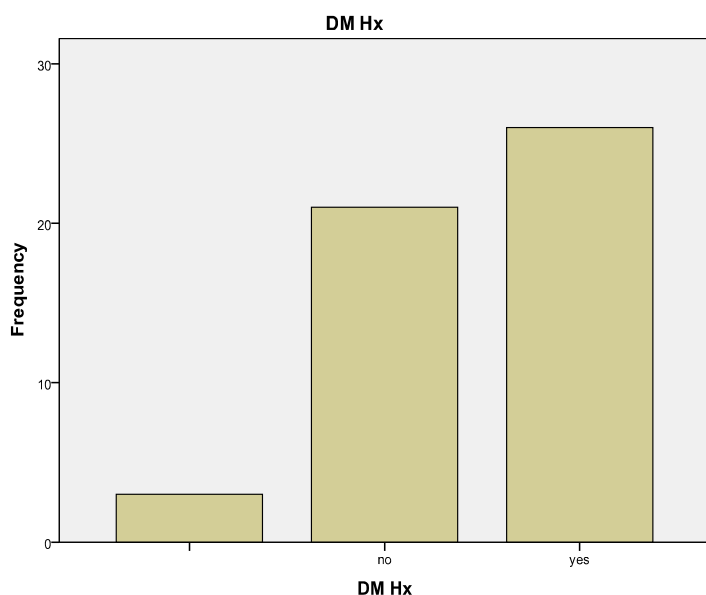


Figure 5: *Frequency of Subjects Reporting Diabetes Self/Familial History*

Perceived Knowledge of Diabetes

Of the two survey questionnaires used in the study, the Diabetes Self Reporting Tool (DSRT), consisted of twenty Likert scale questions regarding a self-perceived knowledge of diabetes education. Possible scores for the cumulative DSRT ranged from 20%-80%. Cumulative scores in this particular study ranged from 30%-72%. The mean score was 59.76 with a standard deviation of 8.9 (Figure 6). This score represents an overall favorable perception of the nurse's knowledge of and ability to teach diabetes. Table 1 lists the number of times each rank of the Likert scale was chosen in reference to nurse's perception of their diabetes knowledge.

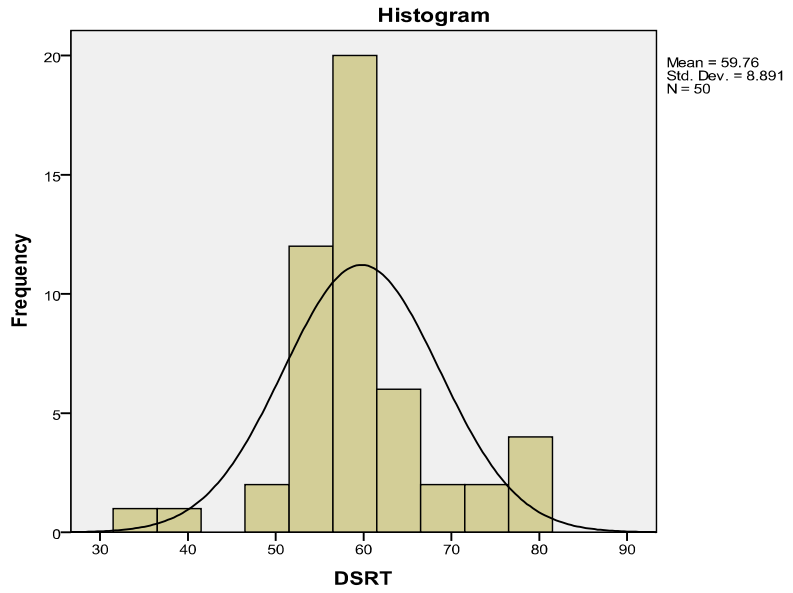


Figure 6: *Frequency Distribution of Scores for the Diabetes Self Reporting Tool*

Table 1: *Frequency of Rank Chosen by each Participant*

Rank	Degree of Agreement	Number of Rankings Chosen
1	Strongly Disagree	39
2	Disagree	102
3	Agree	662
4	Strongly Disagree	197

1=equates to the subject's strongly perceived lack of knowledge
 4=equates to the subject's strongly perceived confidence of knowledge

Actual Knowledge of Diabetes

The DBKT consisted of fifty-two questions (45 from the original instrument and 7 additional questions added by a more recent study research team) directly related to 20 diabetes concepts. This questionnaire tool was utilized to evaluate the actual level of knowledge of diabetes in the same participant group. Data calculation included overall scores on the examination and is reflected in Figure 7. The mean score of the participant's individual tests was 59.54 (SD = 14.51). The range of scores varied dramatically from 7% to 90%.

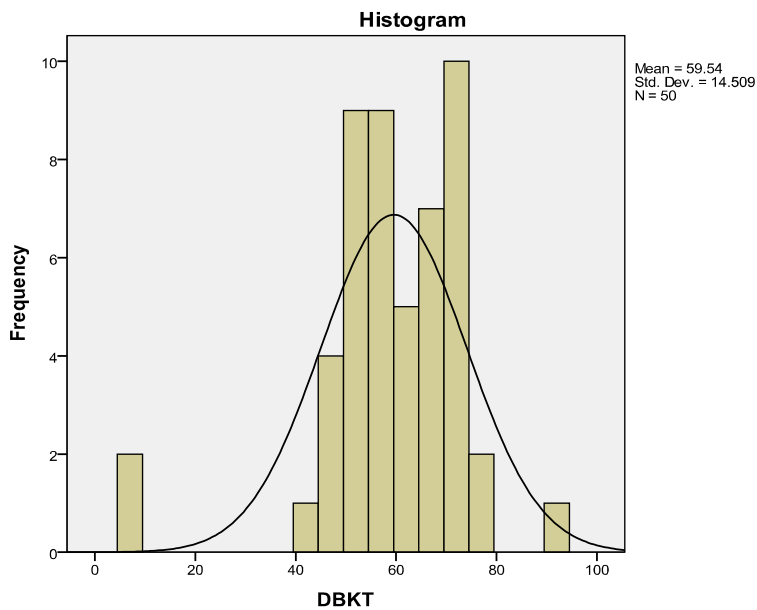


Figure 7: *Frequency Distribution of Scores for the Diabetes Basic Knowledge Test*

Relationship of perceived and actual knowledge

Using the mean score from the perceived knowledge, as evidenced by the scores on the DSRT, and the actual knowledge based upon the DBKT mean, the Pearson correlation was $r = .321, p < 0.05$. A positive correlation was noted in Table 2 between the perception of knowledge and the actual knowledge of nurses in the study.

Conclusively, results indicate a positive correlation between actual and perceived knowledge of diabetes by the acute inpatient nursing staff. Or rather, participants in this study perceived a lack of their actual knowledge relative to their predominately low scores of the DBKT overall.

Table 2: *Correlations between Perceived/Actual Knowledge of Diabetes*

		Correlations	
		DSRT	DBKT
DSRT	Pearson Correlation	1	.321*
	Sig. (2-tailed)		.023
	N	50	50
DBKT	Pearson Correlation	.321*	1
	Sig. (2-tailed)	.023	
	N	50	50

*. Correlation is significant at the 0.05 level (2-tailed).

Correlational Findings Related to Demographics

Further evaluation using one of the demographic components, 'hours of continuing education, was calculated in the interest of a possible relation to knowledge was completed and revealed in Table 3, a negative correlation between the number of mean hours of education to the DBKT cumulative scores: $r = -.035, p = 0.05$ while a positive relationship albeit weak, exists among the mean score of 2.84 hours of education and the perception of knowledge: $r = .008, p = 0.05$. This data could be further

suggestive of a low number of hours in negative relation to the nurse's actual knowledge, which equaled to a low scoring mean.

Table 3: *Correlation between Hours of Continuing Diabetes Education/Actual Knowledge*

		Correlations		
		DSRT	DBKT	HRS EDU
DSRT	Pearson Correlation	1	.321*	.008
	Sig. (2-tailed)		.023	.954
	N	50	50	50
DBKT	Pearson Correlation	.321*	1	-.035
	Sig. (2-tailed)	.023		.809
	N	50	50	50
HRS EDU	Pearson Correlation	.008	-.035	1
	Sig. (2-tailed)	.954	.809	
	N	50	50	50

*. Correlation is significant at the 0.05 level (2-tailed).

Chapter V

Discussion

Interpretation of Findings

This study was conducted to examine the levels of perceived and actual knowledge of diabetes care in nurses practicing in the acute, inpatient clinical setting. Furthermore, the study sought to identify and explore the presence of a statistical relationship between perceived versus actual knowledge in diabetes core concepts. Data analysis revealed varied responses overall in the actual knowledge of nurses caring for the inpatient diabetes population. Furthermore, there was statistical significance identified. Findings in the mean scores of actual, accurate and current knowledge of diabetes suggests a gap in understanding of the disease processes, crucial for educating patients prior to discharge for the prevention of readmissions and complications.

Additionally, a considerable number of nurses included in the subject group conveyed a lack of any diabetes continuing education within the past two years of practice. Calculation of the hours of continuing education in diabetes over the past 2 years and the actual knowledge scores was performed as an addendum to seek any other potential relationships in the present variables. The remaining demographics collected for sampling evaluation in this study may serve to further examine the relationship of gender, age, degree and clinical years of practice relative to actual or perceived knowledge among the participants.

Implications for Nursing

Research suggests diabetes education is a vital step in ensuring self-care for individuals wishing to achieve successful health outcome goals, subsequently avoiding life-altering complications related to uncontrolled diabetes (ADA, 2011). Disease self-

management requires support from professionals in the healthcare team who have accurate knowledge of the most current, and evidenced-based practices related to diabetes care. Diabetes touches millions of lives each year with numbers continuing to climb relative to the obesity epidemic. Seen in primary and secondary comorbid states, diabetes often affects the physiology of multiple bodily organs. Nurses in all settings need to be clinically inept in teaching and supporting patients diagnosed with diabetes. Glycemic control is accomplished through a menagerie of behavioral acceptance, lifestyle modifications and informational skill building. It is critical that accurate, consistent and current knowledge be afforded the patient who has the self-efficacy to care for themselves or a supportive caregiver who is battling for glucose control.

The acute care setting can provide a cohesive process for evaluating, and initiating a patient's progression toward glycemic maintenance. The significance of positive impacts of inpatient diabetes educators in acute care institutions is well researched and documented even though limited funding often prohibits availability in some institutions. A large number of patients do not receive outpatient diabetes education and 54% of persons with Type 2 diabetes are above target glycemic levels (Gerard, et al., 2009). These findings represent a tremendous need for diabetes instruction during the acute hospitalization period. Acute care nurses have extreme leverage with patient trust and rapport; of which are both paramount in patient acceptance of information.

As one of the most trusted professions, nursing has a tremendous responsibility in providing quality care and outcomes. An inadequate knowledge base, limited expertise, and inadequate resources in the area of diabetes, are less than ideal for the assurance of quality diabetes outcomes. Amid a sometimes complex and overburdened health care system, nurses still reign supreme as the primary care figure during an acute hospital stay.

Given this reality, nurses are in unique positions to assist with patient acceptance of the disease, and subsequently giving clarity to the provision of self-care. Quality has been defined as practice consistent with current professional knowledge (Gerard, et.al. 2009). Diabetes quality outcomes are relative with a team approach to care. With nurses as an integral part of that team, coupled with societies' belief and confidence in the profession, the accuracy and current knowledge of diabetes is essential in ensuring patients effectively maintain their diabetes plans of care.

Implications for Further Research

Transforming diabetes care in the acute hospital setting while improving glycemic management requires a multidisciplinary approach. Ensuring self-management following discharge requires no less than a multi-level, multi-faceted educational plan consisting of the delivery of accurate, consistent and current instructional information.

This study explored the area of perceived to that of actual diabetes knowledge in the acute care nursing group, partly to assess for and dispel diabetes care-related myths and societal-acquired diabetes fallacies. Limitations to this study relate to the small convenience sample, and the length of time necessary for nurses in the subject group to complete all three questionnaires. The approximate time to complete the three documents averaged a total of 45 minutes. A concise, current, and reliable tool in keeping with current guidelines for measuring diabetes practices in the acute care setting would be valuable to this type of study in the future.

It is imperative to have consistent and precise information provided to patients in both the acute care as well as outpatient care settings. The role of the nurse as professional caregiver and trusted liaison can act as a two-edged sword should discharge information be inaccurate, inconsistent, or obsolete. Dispelling incorrect health information and building consistent self-management care plans are the responsibility of

all clinicians caring for the acute care patient. This study provides foundational research for expounding upon the consideration of the significance of what nurses perceive to be current knowledge versus what actual knowledge they truly possess in regards to diabetes education. Knowing a relationship exists among these entities helps to fashion a more profound basis for acceptance of the creation of continuing education programs related to diabetes. Furthermore, the realization exist that front- line, bedside nurses frequently lack integral knowledge essential to relay to their diabetes patient population and further highlights an even more critical call to individual nurses to maintain professional competency.

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Appendix A

Conceptual-Theoretical-Empirical Structure for Research

Patricia Benner's Model has five distinct phases of skill acquisition which with success moves the nurse from novice to expert, in a given situation.

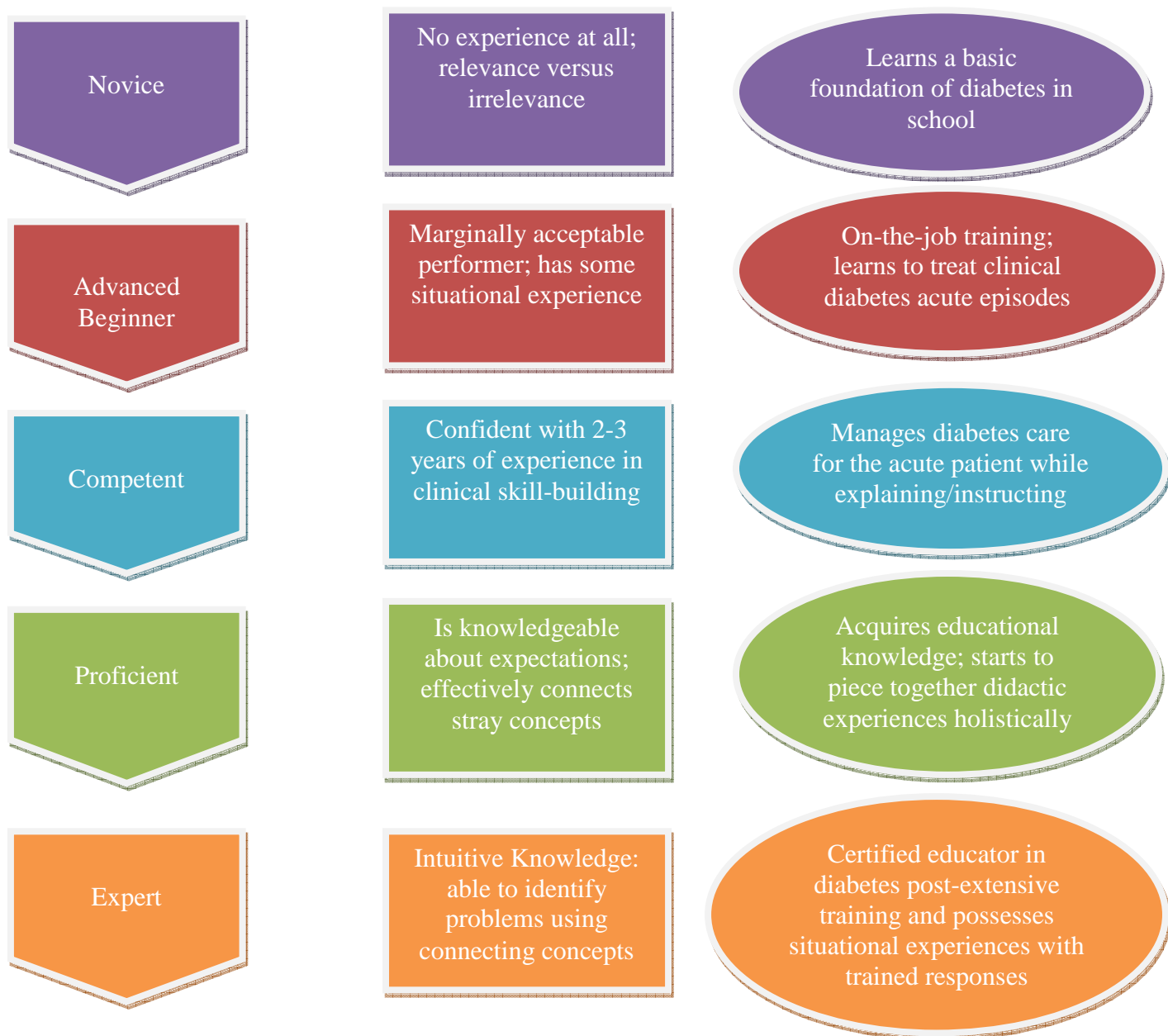


Diagram 1:

*Conceptual-Theoretical-Empirical Representation of the Research:
Patricia Benner's Model*

Appendix B
Participant Information Form

RESEARCH PARTICIPANT INFORMATION FORM

I am a student in the Master of Science in nursing program at Gardner-Webb University, Boiling Springs, North Carolina. As part of the requirements of the program, I am conducting a research study concerning the impact of staff nursing knowledge about diabetes to the rate of readmissions of the diabetes population in the acute care setting.

This study has the potential for future benefits to you through assessment of and future addition to your knowledge base about diabetes, Upstate Carolina Medical Center's customer satisfaction scores, and the patients served in this subgroup by decreasing their rate of readmission and revisit for diabetes complications subsequent to improved nursing education.

Your participation in this study is strictly voluntary and you are under no obligation to participate. You may refuse to participate, discontinue participation, or skip any questions you don't wish to answer at any time without penalty to you. Completion and subsequent return of the Diabetes Basic Knowledge Test survey will serve as your consent to participate. All completed questionnaires may be placed in the education mailbox in the workroom of the facility.

Any information you submit will remain anonymous. To ensure anonymity in completing the questionnaire, please be careful not to place your name or any other identifying marks on any portion of the survey questionnaire.

At the completion of the research study, results will be made available to you on the Upstate Carolina Medical Center internal intranet Education link with no participant identifying information. In the event of publication of the research, no personally identifying information will be disclosed.

Questions about this research study should be directed to the primary investigator, Rebecca Ledbetter @ 864-487-1629, or advisor, Dr. Janie Carlton, School of Nursing, Gardner-Webb University, Boiling Springs, North Carolina, 28017, phone: 704-761-5017.

If you elect to participate in this study, please complete the attached questionnaire, and return it to me.

Thank you for your participation.
Rebecca B. Ledbetter, RN, BSN, CDE
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Gaffney, S.C. 29340
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Appendix C
Demographic Data Form

ID # _ _ _

Background Data Form

Please fill out the following information:

1. Sex:

Female _____

Male _____

2. Age: _____

3. Total Years of Nursing Experience: _____

4. Highest degree held in nursing: _____

5. Please mark the type of unit you most often are assigned:

Medical _____ Surgery _____

ICU _____ Telemetry _____

ED _____ Other _____

Pediatrics _____ PACU _____

Outpatient _____ Postpartum _____

L&D _____ Newborn nursery _____

6. Ethnicity:

White _____ Black _____

Asian _____ Hispanic _____

Other _____

7. Do you or anyone in your immediate family have diabetes?

No _____

Yes _____ If yes, Who _____

ID # _ _ _

8. Approximately how many hours of nursing education have you had in the last two years on the topic of diabetes education? _____

Appendix D

Diabetes Self Reporting Tool

Diabetes Self Report Tool

Please place a circle around the appropriate response to each statement. Please be as honest as you can in evaluating your knowledge and skills in taking care of people with diabetes.

4= strongly agree 3= agree 2= disagree 1= strongly disagree

1. I can describe the etiology of Type 1 diabetes.	4	3	2	1
2. I can describe the etiology of Type 2 diabetes.	4	3	2	1
3. I can describe the basic treatment plan for Type 1 Diabetes.	4	3	2	1
4. I can describe the basic treatment plan for Type 2 Diabetes.	4	3	2	1
5. I cannot identify the nursing needs of a person with Diabetes going to the operating room.	4	3	2	1
6. I can manage the nursing care of a patient experiencing mild hypoglycemia.	4	3	2	1
7. I can manage the nursing care of a person with Diabetes that experiences loss of consciousness.	4	3	2	1
8. I can instruct a person with diabetes on self-care management for a "sick day".	4	3	2	1
9. I can instruct/describe the action and effect of Insulin	4	3	2	1

Self Report Tool (cont'd)

4= strongly agree 3= agree 2= disagree 1= strongly disagree

10. I can list the steps of the procedure for administering insulin.	4	3	2	1
11. I can describe the action and effect of oral hypoglycemic agents.	4	3	2	1
12. I can assess for the development of diabetic ketoacidosis.	4	3	2	1
13. I cannot explain how stress affects diabetes control	4	3	2	1
14. I can identify the long-term complications associated with diabetes.	4	3	2	1
15. I cannot explain how exercise affects diabetes control.	4	3	2	1
16. I can describe the diet recommended for someone with diabetes.	4	3	2	1
17. I cannot perform on method of blood glucose monitoring.	4	3	2	1
18. I can instruct on daily personal care for someone with diabetes.	4	3	2	1
19. I can identify three sites for the administration of insulin.	4	3	2	1
20. I can manage the nursing needs of a person with diabetes experiencing hyperglycemia without ketosis.	4	3	2	1

Appendix E

Diabetes Basic Knowledge Assessment Tool

Diabetes: Basic Knowledge Test

By: Karen Baker, RN, BSN Priscilla Boykin, RN, MSN
Janice Drass, RN, BSN, Joanne Muir-Nash, RN BSN
Anne Schafer, RD Jane Turkek, RN,MSN

Instructions:

- For each item, select the one best answer to the question. The last answer to each question, “I don’t know” should be used if you truly do not know the answer.
- Circle the letter corresponding to your answer on the separate answer sheet. Please do not write on the questionnaire.
- **Please answer all the questions.**

Source of test: Modified version of “Diabetes Knowledge Test” by Sandra Scheiderich
Revised for use in 2007 by Sally Gerard

Diabetes Basic Knowledge Test

1. Which statement is characteristic of the etiology of Type 1 diabetes?
 - a. strongly associated with obesity
 - b. predominantly genetic
 - c. autoimmune, viral or toxic destruction of the beta cells
 - d. I do not know
2. Which of these statements about the management of Type 1 diabetes is true?
 - a. insulin injections are necessary to maintain life
 - b. insulin injections are not always necessary if diet and exercise are well controlled.
 - c. oral hypoglycemic agents are sufficient for blood control in most patients
 - d. I do not know.
3. Which statement is characteristic of the etiology of Type II diabetes?
 - a. predominately non-genetic
 - b. frequently associated with obesity and resistance to insulin
 - c. autoimmune, viral or toxic destruction of the beta cells
 - d. I do not know
4. Which of these statements about management of Type II diabetes is true?

- a. insulin injections are necessary to maintain life
- b. a controlled diet and exercise program is the most effective treatment.
- c. oral hypoglycemic agents are sufficient for blood control in most patients
- d. I do not know

5. What effect does insulin have on blood glucose?

- a. insulin causes blood glucose to increase
- b. insulin causes blood glucose to decrease
- c. insulin has no effect on blood glucose
- d. I do not know

6. Which are physiological actions of insulin?

1. transports glucose across cell membranes for use by the cells
2. enhances the formation of proteins for amino acids
3. enhances the breakdown of fats for energy

- a. 1 and 2
- b. 1,2 and 3
- c. 1 and 3
- d. 2 and 3
- e. I do not know

7. If a person with diabetes is found unresponsive which of these assumptions should guide your initial actions?

- a. The blood sugar may be very high
- b. The blood sugar may be very low
- c. The blood sugar may be normal
- d. I do not know

8. Normal fasting blood glucose level can be best described as:

- a. below 150 mg/dl
- b. between 100 and 200mg/dl
- c. between 65 and 110 mg/dl
- d. I do not know

9. Which of the following affect the accuracy and preparation of test results obtained with most of the blood glucose strips?

1. size and placement of the blood sample
2. timing of the test
3. expiration of test strips
4. the patient's hematocrit level

- a. 1,2 and 3
- b. 1,2 and 4

- c. 1, 2, 3 and 4
 - d. I do not know
10. What would a negative urine glucose test indicate about the blood glucose level in a diabetic with a normal renal threshold?
- a. it is less than 100 mg/dl
 - b. it is less than 200 mg/dl
 - c. it is less than 60 mg/dl
 - d. I do not know
11. Which of the following tests can determine the patient's average blood glucose control over an extended period of time?
- a. glycosylated hemoglobin
 - b. plasma renin activity (PRA)
 - c. insulin antibodies
 - d. I do not know
12. Which of these statements indicates one of the best reasons for utilizing blood glucose monitoring rather than urine testing?
- a. drugs such as penicillins, ASA, cephalosporins, barbiturates, etc. can create falsely negative urine test results.
 - b. urine retention and changes in kidney function can increase the lag time between blood glucose rise and spill over of glucose into the urine.
 - c. the diagnosis of diabetes can be more readily confirmed at the patient's bedside than by laboratory testing.
 - d. I do not know
13. A "double-voided" urine specimen can be described as:
- a. urine that is collected and tested 30 to 60 minutes after the bladder has been emptied
 - b. urine that is collected and tested twice a day, in the morning and at bedtime.
 - c. urine that is collected and tested twice before the result is recorded
 - d. I do not know
14. When should a person with diabetes check urine for ketones?
- a. whenever exercising
 - b. after eating ice cream
 - c. whenever blood glucose is greater than 240 mg/dl.
 - d. I do not know
15. What should a person with diabetes do when he/she has a blood glucose greater than 240/mg/dl for two consecutive days and now has positive ketone urine tests?

- a. omit the next dose of insulin or oral hypoglycemic medication and test blood as usual.
 - b. call the doctor, continue to test blood every four hours or as directed by physician and continue insulin or oral hypoglycemic medication.
 - c. continue with insulin or oral hypoglycemic medication and blood testing as usual. these are normal results for diabetics
 - d. I do not know
16. The maximum effect (peak) of regular insulin occurs:
- a. 2-4 hours after injection
 - b. 6-12 hours after injection
 - c. 24-28 hours after injection
 - d. I do not know
17. The maximum effect (peak) of both NPH and Lente insulin occurs:
- a. 2-4 hours after injection
 - b. 8-12 hours after injection
 - c. 24-28 hours after injection
 - d. I do not know
18. Where should one store insulin that is presently being used?
- a. in the refrigerator near the freezer section
 - b. in the refrigerator away from the freezer section
 - c. at room temperature away from the excess light
 - d. I do not know
19. A person with diabetes contaminates the needle while preparing an insulin injection. What would be the best action to take?
- a. dispose of the needle even if this means disposing of the insulin and syringe and starting the preparation from the beginning.
 - b. wipe the needle with an alcohol sponge and continue preparing the injection.
 - c. continue to prepare the injection, but wipe the injection site thoroughly with alcohol.
 - d. I do not know
20. When short acting (regular) and intermediate-acting (NPH) are ordered to be given by injection at the same time, the nurse should:
- a. use separate syringes to administer each insulin
 - b. mix them in the syringe drawing up the intermediate acting first.
 - c. notify the doctor since these two insulins should not be given together.
 - d. mix them in the syringe drawing up the short acting first.
 - e. I do not know

21. The duration of action of glipizide (Glucotrol) is:
- 6-12 hours
 - 10-24 hours
 - 24-60 hours
 - I do not know
22. Which is not a reported side effect of oral hypoglycemic agents?
- gastrointestinal upset
 - allergic reaction
 - skin rash
 - constipation
 - I do not know
23. A symptom of hypoglycemia (low blood sugar) is:
- frequent urination
 - dry mouth and dry skin
 - nervousness
 - I do not know.
24. A symptom of hyperglycemia (high blood sugar) is:
- frequent urination
 - low grade fever
 - cool clammy skin
 - I do not know.
25. What is one cause of hypoglycemia (low blood sugar) in someone who is taking insulin or oral hypoglycemic agents?
- skipping a meal
 - emotional stress
 - too little exercise
 - I do not know
26. What is one cause of hyperglycemia (high blood sugar)?
- decreased food intake
 - infection
 - excessive insulin
 - I do not know
27. One symptom associated with diabetic ketoacidosis (diabetic coma) is:
- cold, clammy skin
 - acetone (fruity) breath
 - negative urine for glucose

- d. I do not know
28. What is one cause of diabetic ketoacidosis (diabetic coma) in Type 1 diabetes?
- a. excessive exercise
 - b. excessive intake of diet soft drinks over a prolonged period
 - c. failure to take daily insulin dose
 - d. I do not know
29. What effect does illness (for example a “sick day”) have on a person with diabetes’ insulin requirements?
- a. illness causes a decreases in insulin requirements
 - b. illness causes an increase in insulin requirements
 - c. illness causes no changes in insulin requirements
 - d. I do not know
30. In general, changes in the pattern of insulin administration for the person undergoing surgery might include which of the following?
- a. increase the dose of long-acting insulin the night before and the morning of surgery.
 - b. discontinue all subcutaneous insulin the day of surgery and instead infuse long acting insulin intravenously at a constant drip.
 - c. on the day of surgery, reduce the usual a.m. dose of insulin and give subcutaneous or IV boluses of short acting insulin per frequent blood glucose monitoring results
 - d. I do not know
31. Which of the following long-term complications are associated with diabetes?
- a. eye changes
 - b. renal and cardiovascular changes
 - c. nervous system changes
 - d. all of the above
 - e. I do not know
32. The effect of physical and emotional stress on diabetes control include:
- a. the secretion of stress hormones that cause an elevation in blood glucose levels.
 - b. the secretion of stress hormones that cause a decrease in blood glucose levels.
 - c. the secretion of stress hormones that has no effect on blood glucose levels
 - d. I do not know
33. Why is it necessary that people with diabetes pay special attention to proper care of their feet?

- a. several years of injecting insulin into the thighs can cause edema in both the legs and the feet.
- b. flat feet are commonly associated with diabetes unless preventative measures are routinely used.
- c. persons with diabetes often have changes in sensation and poor circulation in their feet.
- d. I do not know

34. A person with diabetes has a small corn on the right foot and wants it removed. What should be done first?

- a. use a liquid corn remover, following the directions carefully.
- b. refer the person to a podiatrist
- c. carefully trim the corn with a sterile cutting instrument
- d. I do not know

35. A person with diabetes has just received a minor abrasion on the left leg. What should be done to treat the abrasion?

- a. wash gently with mild soap and water, dry with clean towel and observe carefully for any signs of infection.
- b. wash gently with mild soap and water, apply a small amount of iodine and observe carefully for any signs of infection.
- c. apply a small amount of iodine and call the doctor
- d. I do not know

36. What effect does exercise have on blood glucose when the diabetics blood glucose is less than 300 mg/dl?

- a. decrease blood glucose
- b. increase blood glucose
- c. has little effect on blood glucose
- d. I do not know

37. What effect does increased exercise have on the food needs of a person with well-controlled type 1 diabetes?

- a. decreases the need for food
- b. increases the need for food
- c. has little effect on the need for food
- d. I do not know

38. Which is the most appropriate INITIAL action to take for a person with diabetes who is having a hypoglycemic reaction (low blood sugar)?

- a. drink 4oz of regular soda
- b. drink 4 oz of orange juice with 2 tsp. Of sugar
- c. eat 4 crackers with butter or margarine
- d. I do not know

39. A person with Type 1 diabetes does not like one of the food items on the meal tray. What would be the BEST action for the nurse to take?
- advise the patient to eat all other items on the tray and omit that one item.
 - advise the patient to omit that item and adjust the next scheduled dose of insulin to accommodate this deletion.
 - explain to the patient that the diabetic diet is carefully calculated and that the dietitian will be consulted about exchanging this item for another.
 - I do not know
40. Which of these is the main objective when developing a meal plan for the person with Type 2 diabetes?
- a calorie-controlled diet that will achieve and maintain ideal body weight.
 - a high-carbohydrate, high protein diet that encourages an increase in body protein reserves.
 - a low-carbohydrate, high protein diet that will prevent fluctuations in blood glucose levels.
 - I do not know
41. A diabetic diet is calculated for which of the following nutrients:
- carbohydrates
 - protein
 - fats
- 1 and 2
 - 1 and 3
 - 1, 2 and 3
 - I do not know
42. Which of these is the main objective when developing a meal plan for a person with diabetes?
- a nutritionally balanced, six , small-meal –per –day plan that will prevent delayed stomach emptying time.
 - an individualized diet plan that will maintain euglycemia and normal growth and development to include foods from the basic four food groups, while ensuring that calories are evenly distributed to prevent excess weight.
 - a low-fat, low-fiber diet to prevent excessive weight gain and minimize the risk of cardiovascular disease.
 - I do not know
43. A person with diabetes has refused an evening snack of fruit juice and one half of a sandwich. You should substitute with:
- give graham crackers and 8oz of plain yogurt
 - six crackers and 2 oz of cheese
 - a piece of fresh fruit, 1oz of peanut butter and 4 crackers

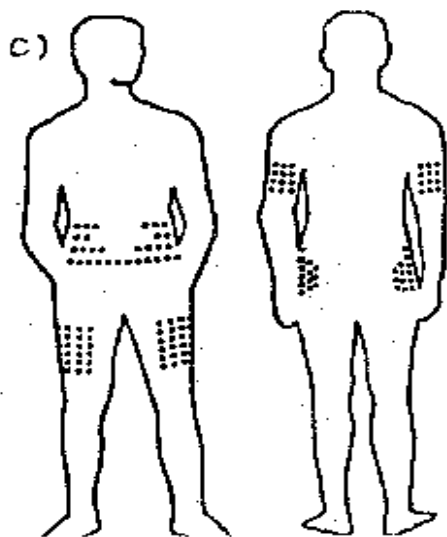
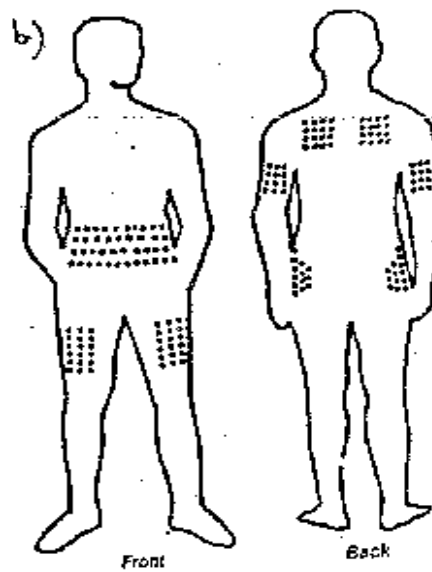
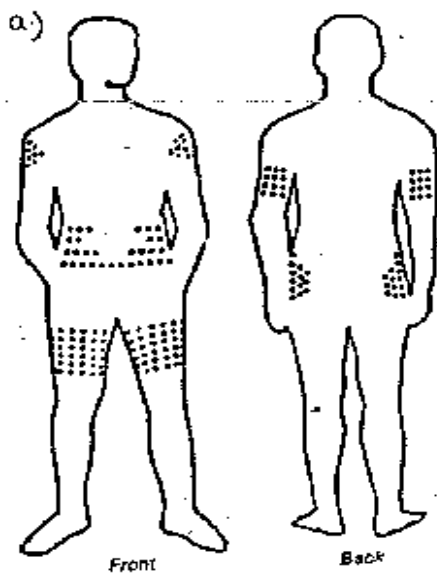
d. I do not know

44. For the past 2 days a person with diabetes has demonstrated the following:
wide fluctuations in blood glucose, levels over several hours often unrelated to meals, hyperglycemia upon awakening, preceded by nocturnal sweating, nightmares or headache.

Based on this assessment data, which of the following is the patient demonstrating?

- a. pass-through or flashback phenomenon
- b. somogi or rebound effect
- c. dawn phenomenon
- d. I do not know

Which of the following sets of figures best illustrated the correct sites for subcutaneous insulin administration?



d) I do not know

46. In recent years the average age of onset for type 2 diabetes has decreased. The average age of Americans diagnosed with type 2 diabetes is:

- a. Between 30 and 39 years old
- b. Between 40 and 49 years old
- c. Between 50 and 59 years old
- d. Between 60 and 69 years old
- e. I do not know.

47. Which of the following factors is not associated with the increasing incidence of diabetes in America?

- a. High carbohydrate diets
- b. High protein diets
- c. Decreased amounts of physical activity
- d. Increased in obese children
- e. I do not know

48. Which of the following is not true about the drug exenatide (extendin-4)?

- a. It is used in type 1 diabetes
- b. It is used in type 2 diabetes
- c. It must be injected
- d. It is used in conjunction with oral medications
- e. I do not know

49. Continuous insulin infusion therapy (insulin pumps) can be a treatment option for which of the following types of diabetes?

- a. Type 1 diabetes
- b. Type 2 diabetes requiring insulin injections
- c. Both type 1 and type 2 requiring insulin injections
- d. I do not know

50. Studies have found a clear genetic link in the onset of type 1 diabetes and little or no environmental factors leading to the development of this disease.

- a. True
- b. False
- c. I do not know

51. Which of the following insulins have an onset time of 0-15 minutes?

- a. Glargine (Lantus)
- b. NPH (Humalin N, Novalin N)
- c. Lispro (Humalog)
- d. Regular (Humalin R, Novalin R)

52. The American Diabetes Association's goal for optimal glycemic control is a glycosylated hemoglobin of:

- a. less than 6.5%
- b. 7-9 %
- c. 9-11%
- d. I don't know