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Individualized Glycemic Targets for the Elderly Residing in Long Term Care Facilities

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INDIVIDUALIZED GLYCEMIC TARGETS FOR THE ELDERLY RESIDING IN LONG
TERM CARE FACILITIES

by

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Abstract

One out of four people age 65 and older residing in a long term care facility (LTCF) has Type 2 diabetes (T2DM) (Smide & Nygren, 2013). Care and management of this population is a challenge for nurses and other providers. Results of a needs assessment in a local LTCF identified deficiencies in the provision of evidence-based T2DM care for this target population. American Diabetes Association Guidelines (2017) recommend application of individualized HbA1c targets for the elderly residing in LTCFs, especially for those with compromises in clinical and functional status. This two-prong quality improvement project strove to educate nurses about these residents' needs, and incorporate the use of best practice diabetes standards in the nurse practitioner's practice. Specifically, emphasis was placed on HbA1c and finger stick monitoring, eye exams, and foot care. Results indicated that educational in-services designed for nurses were an effective approach to improving knowledge concerning care of complex T2DM patients. Although ophthalmology and podiatry referrals were not ordered routinely because of APRN, staff, and organizational resistance; utilization of standardized orders improved routine T2DM care pertaining to ordering HbA1c, renal panel, and urine to albumin creatinine ratio. The APRN now has the awareness to evaluate discrepancies between HbA1c results and finger stick values. QI projects in LTCF's may be difficult to implement and sustain related to staff turnover, understaffing, high patient acuity, and organizational and provider opposition. APRNs must advocate for continual utilization of evidence-based practice guidelines for all LTC residents.

Keywords: Type 2 diabetes, long term care facility, American Diabetes Association Guidelines

Overview of the Problem

The burden of diabetes is staggering. The Centers for Disease Control (CDC, 2014) report that in all age categories, approximately 29.1 million (9.3%) of the U.S. population is touched by diabetes; which includes the people diagnosed (21.0 million) and undiagnosed (8.1. million) with the disease. Diabetes was the seventh leading cause of death in 2011 and cost the U.S. \$176 billion in direct costs and \$69 billion in indirect costs. Indirect costs include disability, work loss, and premature death (Jones et al., 2014).

The CDC (2015a) asserts that for the last 34 years (1980-2014), there has been a sustained increase in the number of Americans diagnosed with type 2 diabetes (T2DM) (5.5 million to 22 million). By age, the prevalence of T2DM in Americans aged 65 and older was reported at 11.2 million (diagnosed and undiagnosed) or 25.9% of the U.S. population (American Diabetes Association [ADA], 2017b). The number of new cases was reported at 400,000 per year in 2012 at an unadjusted rate of 11.5 persons per 1,000 new cases (CDC, 2015b).

The Administration on Aging (2016) cited that in 2014, the proportion of the U.S. population aged 65 years and older accounted for 46.2 million, which represented 14.5% of the U. S. population (one in every seven Americans). The period between 2004-2014 indicated that the number of Americans who will reach the age of 65 over the next two decades is estimated to rise to 17.7% while those aged 60 and over will increase from 48.9 to 64.8 million (32.5%). Life expectancy rates for persons reaching the age of 65 have also lengthened an additional 19.3 years (20.5 years for females and 18 years for males). Projected estimates calculate that a child born in 2014 may live to 78.8 years, which is 30 more years than a child who was born in 1900. This immense explosion of the aging population is of critical significance in nursing and healthcare because diabetes mellitus affects over 20% of people over the age of 65 (Huang, 2016, p. 1).

For the state of Texas, data from the Texas Department of State Health Services (2016) indicates that the unadjusted prevalence rate of diabetes for Texas residents was at 11% (derived from a total population of 26,448,193) and it was found to be more common in Hispanics than whites. The annual age-adjusted death rates for all ages per 100,000 persons attributable to diabetes was recorded at 5,262 and was more than twice as likely to occur in blacks than whites. Hispanics were twice as likely to die from diabetes as whites. The annual age-adjusted hospitalization rate for adults 18 years and older with diabetes was reported at 12 per 100,000 adults (95% confidence interval) with a total cost burden over \$280 million in Medicaid dollars spent (total combines inpatient and outpatient care and professional fees) which averages \$1,113.62 in reimbursement per beneficiary (Texas Department of State Health Services, 2016).

Diabetes is a complicated disease. It is complicated by other co-existing conditions and complications including hypoglycemia, hyperglycemia, hypertension, hyperlipidemia, heart disease, stroke, blindness and visual problems, kidney disease, amputation, neuropathy, non-alcoholic fatty liver disease, periodontal disease, erectile dysfunction, hearing loss, and depression all of which makes its management inherently problematic (Jones, Hines, Narva, & Albright, 2014). Of the complications previously specified, cardiovascular disease (heart disease or stroke), blindness and other eye problems, kidney disease, and lower limb amputations are among the top four diabetes-related complications. The CDC (2014) reported the number of people in the U.S. age 35 years and older with diabetes and self-reported heart disease or stroke rose from 4.2 million to 7.6 million from 1997-2011. In 2011, 5 million people with diabetes stated having coronary heart disease, 3.7 million confirmed having other heart disease or condition, and 2.1 million confirmed having had a stroke. The number of adults aged 18 years or older with diagnosed diabetes reporting visual impairment from 1997-2011 increased from 2.7 million to 4.0 million. Data regarding the true prevalence

estimates of self-reported visual impairment may have been underestimated since approximately 25% of individuals with diabetes have not been formally diagnosed (CDC, 2014).

Diabetes-associated chronic kidney disease (CKD) is estimated to affect more than 20 million adults and was the ninth leading cause of death in the U. S. Overall, the prevalence of CKD increased from 12% to 14% between 1988 and 1994. From 1999 to 2004, the rate has remained relatively stable (National Institute of Diabetes and Digestive and Kidney Diseases [NIDDK], 2016). NIDDK (2016) described the largest increase since 1988 (4.5% to 6%) occurred in people with Stage 3 CKD. From 1980 to 2008, the number of persons initiating treatment for end-stage-renal-disease (ESRD) related to diabetes increased from over 2,600 to 48,374 in 2008. However, the rate of new cases since 1999 has decreased (CDC, 2014).

Ortman, Velkoff, and Hogan (2014) cited that T2DM in the elderly is an alarming health issue because the elderly population age 65 and older is calculated to double from 43.1 million to 83.7 million between 2012-2050. This exponential increase has been attributed to the aging baby boomers who started turning 65 in 2011 (Ortman et al., 2014). Due to the expansive growth of this older adult population, it is anticipated that the utilization of nursing facilities, alternative residential care facilities, or home care services will rise from 15 million to 27 million between 2000-2050 (CDC, 2016). More than two-thirds of this aging population will require some type of long term care facility (LTCF) services during their lifetime with a 46% possibility of residing in a nursing home (CDC, 2016).

Data regarding the number of Americans aged 65 and older requiring LTCF services are of remarkable significance for health care providers considering that one out of four Americans aged 65 and older who resides in nursing homes has T2DM and may receive substandard care (Smide & Nygren, 2013). Vijan, Sussman, Yudkin, and Hayward (2014) conducted a chart review of 245 cases

in 14 extended care facilities and found that the management of T2DM did not meet the recommended ADA standards of care for ambulatory adults. The authors also found that despite 36.7% of the residents meeting the target A1c goal, the effect of glucose variability on the A1c results was not accounted for. Likewise, Garcia and Brown (2011) conducted a systematic review of literature of 20 studies from six countries (predominantly in the U. S.) regarding the diabetes management in nursing homes or long term care settings. The results showed that there were varying levels of management practices and adherence to the recommended standards of care for T2DM and disease management was sporadic at best. Estimates indicate that the pervasiveness of T2DM in LTCFs in the U.S. is at 33.3% for those who are 65 years and older (Vajen et al., 2012). It is imperative that health care providers in this arena are properly trained to deliver high quality T2DM care.

Background of the Problem

De Fronzo (2009) stated that T2DM is a chronic progressive disease characterized by insulin resistance in the muscle and liver with beta cell failure as the central components of the disease process (otherwise known as the triumvirate). Patients in the top tiers of impaired glucose tolerance and at the highest strata of insulin resistance have over 80% loss of their beta cells which intimate that beta cell failure evolves at a much more expeditious and serious rate than previously speculated. The aforementioned trifecta is cited as the underlying core defect implicated in the development and progression of T2DM but its pathogenesis has now expanded to the paradigm of the *Ominous Octet*. The triumvirate (liver, muscle, and beta cell) now encompass the circuitous involvement of the fat cell (accelerated lipolysis), gastrointestinal tract (incretin/deficiency/resistance), alpha cell (hyperglucagonemia), kidneys (increased glucose reabsorption), and brain (insulin resistance) in the development and progression of T2DM (Figure 1).

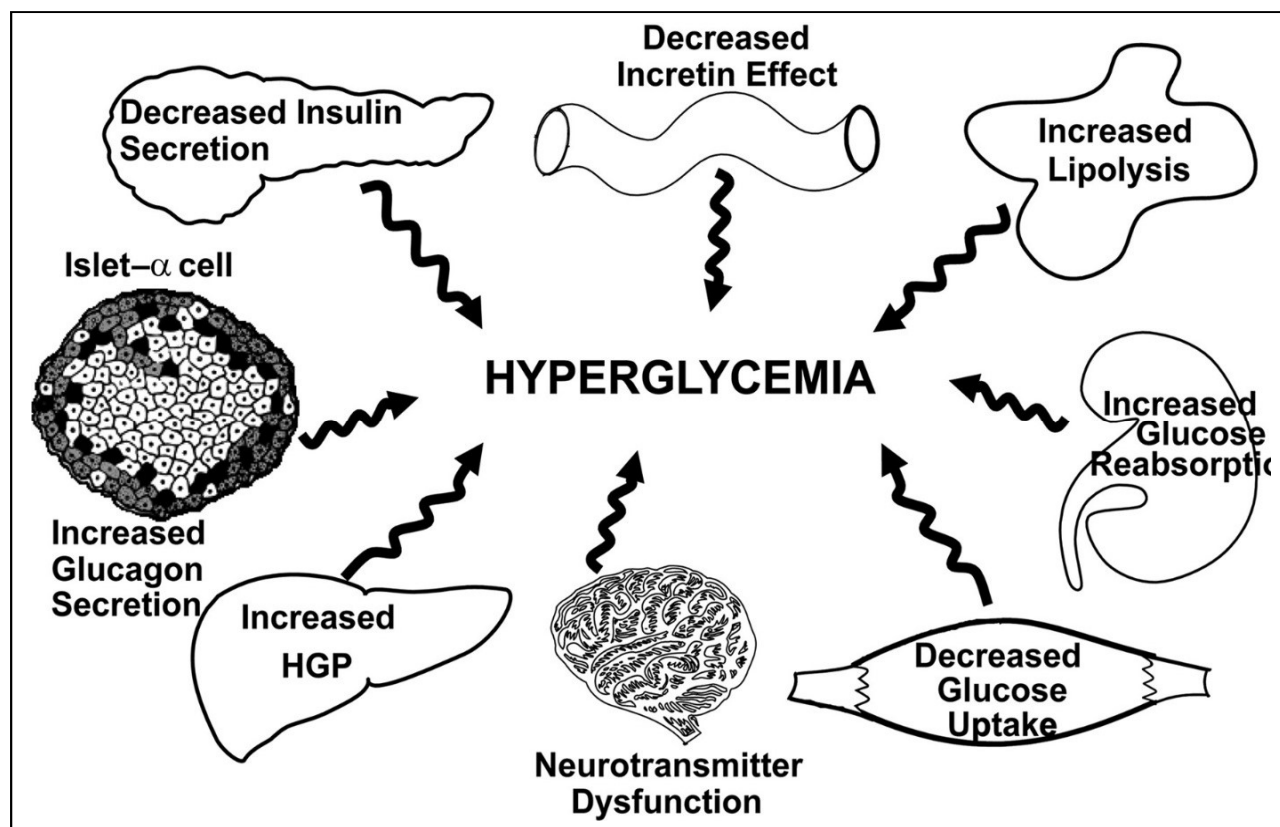


Figure 1. The Ominous Octet. This figure illustrates the development and progression of T2DM.

Reprinted from "From the triumvirate to the ominous octet: A new paradigm for the treatment of type 2 diabetes mellitus," by R. De Fronzo, 2009, *Diabetes*, 58, p. 782. Copyright 2009 by the American Diabetes Association.

Care for the elderly with T2DM diabetes mellitus requires special considerations due to age-related co-morbid complications in this vulnerable group including polypharmacy, decreased renal function, high risk for falls, poor vision, and cognitive decline (ADA, 2017a, p. 99). The current consensus regarding the treatment goals for the elderly is centered on individualizing glycemic targets based on their clinical and functional conditions (ADA, 2017a). The implicit expectation is, for those elderly patients who are cognitively and functionally intact and have reasonable life

expectancy rates, disease management should be similar to those standards established for younger adults (ADA, 2017a). Davis, Wenhui, Meyers, Kilpatrick, and Pandya (2014) noted that several organizations have made varying recommendations on the use of alternative Hemoglobin A1c (HbA1c) targets for older adults (65 and older) in poor health status (two or more co-morbid conditions and functional limitations). The ADA (2017a) advocates a desirable HbA1c target of <8.5% for elderly adults in LTCF, while organizations such as the Diabetes Program of Nova Scotia in concert with the Palliative and Therapeutic Harmonization program recommend targets be adjusted to >8.0% but lower than 12% depending on circumstances that complicate the care. CVAs and myocardial infarctions are among the deadly complications associated with hypoglycemia in this population. Likewise, the International Association of Gerontology and Geriatrics, the European Diabetes Working Party for Older People, along with an international taskforce of diabetes experts inferred the desirable HbA1c target for older adults aged 70 or older should be 7.0% -7.5% with further relaxation for those who live in LTCF (Davis et al., 2014). For the purpose of this project proposal, the 2017 ADA journal supplement *Standards of Medical Care in Diabetes* (ADA, 2017a) is utilized as the benchmark guideline for evaluation of care (Table 1).

Synopsis of the Microsystem

To shed some light on the T2DM care of the elderly in LTCFs, a needs assessment was conducted in a nursing home in southwest Texas to determine if its elderly residents ages 65 and above who had diabetes and other co-morbid conditions and functional limitations were receiving age-appropriate diabetes care based on the most current ADA guidelines. The nursing home is a for-profit, 126 bed LTCF that had an occupancy rate of 86 patients at the time the needs assessment was conducted. The facility is nestled within a quiet residential neighborhood and is 8.3 miles away (16 minutes) from the nearest hospital. The facility is part of a leading healthcare and rehabilitation

Table 1

ADA diabetes treatment guidelines

Condition	Complication	Frequency
Blood glucose control	HbA1c	Every 3 months until the target level is reached; thereafter, patients should be monitored at least every 12 months
Foot ulcers	Physical exam focused on ankle reflexes, dorsalis pedis pulse, vibratory sensation, and 5.07 monofilament touch sensation performed by a provider qualified to determine the level of risk for foot ulcers	Patients at very high risk should be seen every 3 months by a wound care nurse. Patients at increased risk and average risk should be screened annually
Microalbuminuria	Microalbumin/creatinine ratio	Annually
Retinopathy	Dilated eye exam by a trained eye services professional or Nondilated digital photography followed by a comprehensive exam for those who test positive	Patients with evidence of retinopathy should be screened annually. Patients without evidence of retinopathy should be screened every 2 years
Electrolyte and chemistry abnormalities	Serum creatinine and serum potassium	At least annually

Note. Retrieved from Diabetes Care. Copyright 2017 by the American Diabetes Association.

service provider for the elderly composed of 19 other LTCFs throughout Texas. The facility provides area residents with access to hospice/palliative care, rehabilitation services, respite care, skilled nursing services, transitional care, and long term residential care specifically tailored to the needs of elderly patients.

The LTCF is staffed by registered nurses, licensed vocational nurses, medications aides, certified nurse aides, a director of nursing, three assistant directors of nursing, a facility

administrator, rehabilitative services personnel, social workers, activities personnel, administrative personnel, (receptionist, admissions coordinator, medical records clerk, and business office staff), and other ancillary staff responsible for the day-to day functioning of the LTCFs (housekeeping and nutrition services) (Table 2). Staffing needs are dictated by the current census. Nursing related personnel are scheduled for 8-hour shifts (6:00 a.m. - 2:00 p.m., 2:00 p.m. - 10:00 p.m., and 10:00 p.m. - 6:00 a.m.) while the rest of the LTCF staff work from 09:00 a.m. to 5:00 p.m.

The Federal Nursing Home Reform Act (NHRA), as part of the Omnibus Budget Reconciliation Act (OBRA) of 1987 does not provide specific nurse-to-resident staffing ratios for registered nurses, licensed vocational nurses, or certified nurse aides as long as there is a registered nurse on duty at least eight hours a day, seven days a week (this includes the director of nursing) for facilities that have less than 60 residents), seven days a week and a licensed nurse (registered nurse or licensed vocational nurse) on duty the rest of the time. There is no required minimum staffing for CNAs (National Consumer Voice for Quality Long-Term Care, 2017).

From a financial standpoint, the facility administrator at the facility communicated that the ideal staffing ratio for twenty-two patients is one registered nurse or one licensed vocational nurse with a medication aid and a certified nurse aide. Input from the nurses at the facility revealed that they are frequently understaffed and overworked, particularly on the weekends. They stated that the nurse to patient ratio could be better given the high acuity level of the residents.

There are three physician group practices that deliver facility-based services to the LTCF. The microsystem of interest are the patients assigned under the services of Dr. A. Dr. A. is a DNP board certified family nurse practitioner who has been employed by one of the three physician practices for approximately six months. The group practice is one of the nation's leading providers

Table 2

Type of employees in LTCF

Nursing Staff	Number of Staff	LTCF Staff Description if Applicable
RNs	5	1 DON, 1 ADON, 3 staff RNs
LVNs	24	2 LVNs who are also ADONs and 2 LVNs that Accomplishes Minimum Data (MDS) full-time
CNAs	38	Full/part-time, and PRN
Med Aides	6	Full-time
Rehabilitation Services		
Physical Therapy (PT)	9	5 PTs and 4 PT assistants
Occupational Therapy (OT)	6	1 OT and 5 certified OT assistants
Speech Therapy (ST)	2	1 ST and 1 ST assistant
Activities	2	1 activities director and 1 activities assistant
Administrative Services		
Facility Administrator	1	
Human Resources	1	
Admissions Coordinator	1	
Business Office	2	
Medical Records	1	
Ancillary Services		
Receptionist	1	
Social Worker	1	
Housekeeping	2	
Nutrition Services	3	1 registered dietician and 2 dietary aides

Note. All staff are hired by the facility

of hospital medicine and other related facility-based services. Dr. A. is assigned to a total of three LTCFs and is expected to visit skilled nursing care patients three times per week and long term care residents every 60 days. This assignment is in addition to attending to acute issues that surface in the long term care residents, on-call coverage two to three times per week as well as every other weekend on-call coverage for her “pod” (which consists of a physician and two nurse practitioners). Dr. A. has an assigned a monthly patient quota of 240 visits per month. Currently, she sees 180 to 200 patients per month.

Based on direct observation of the workflow at the LTCF, the facility was frequently short-staffed, relied heavily on paraprofessional staff (licensed vocational nurse and medication aides), and lacked a unit clerk at the nurse’s station, which may have alleviated the burden for licensed personnel in answering phone calls, transcribing orders, and filing documentation. Lack of a unit clerk contributed to a chaotic environment by not having permanent personnel responsible for maintaining the accuracy and security of confidential health records. Laboratory, pharmaceutical, and radiology services were provided by outside contractors.

The providers did not have dedicated office space at the LTCF which was an ongoing practice issue. Unnecessary interruptions from patients, staff, and visitors were a frequent occurrence. The facility did not have an electronic medical chart system. Dr. A disclosed that most of her time was devoted to completing all necessary documentation by hand. There was an enormous pressure to meet the 240 visits per month quota along with ensuring that billing and coding was submitted in a timely manner for immediate reimbursement. Dr. A stated that the overwhelming amount of paperwork and productivity expectations impeded her time and ability to make certain that the recommended age appropriate T2DM guidelines for her group of patients were properly executed.

Leadership at the LTCF was unstable. The newly hired director of nursing who had been there for over one month at the time of the assessment was terminated since she did not attend work for two weeks. She did not notify anyone of her absence. Per staff report, this was the second director of nursing in eight months. At the time of the needs assessment, the facility administrator had only been in the position for over four months and ultimately resigned at the six-month mark. By the time the project was implemented, an interim facility administrator was in place and a permanent director of nursing had been hired.

The facility administrator conveyed that the facility accepts most insurances but Medicare and Medicaid are the predominant payers that provide coverage for their residents. Medicare reimburses at a rate of \$475 per day, while Medicaid reimbursement is at a rate of \$167 per day. Private pay patients are also accepted at a rate of \$4500 per month for semi-private rooms and \$9000 per month for private lodging. The facility does accept patients pending Medicare or Medicaid approval; but if funding falls through, the facility will absorb the financial loss. Services for the residents such as food, medications, radiology or laboratory services are bundled into this fee. Provider visits and off-site consultations are independently billed by the providers. Figure 2 for a breakdown of the mentor's patients according to payor source.

The clinical assessment data was collected using a personal interview involving the following healthcare personnel: one Advanced Practice Registered Nurse (APRN), four registered nurses (which includes one director of nursing, one assistant director of nursing, and two staff registered nurses), and eight licensed vocational nurses. These personnel were purposefully selected for the loosely structured interview since they were acquainted with the day-to-day care of the elderly residents with T2DM with co-morbid conditions in the LTCF (target population). The participants

were asked if they were aware of what the desirable HbA1c targets were for their population (Appendix A). They were reassured that there was no right or wrong answer and that the

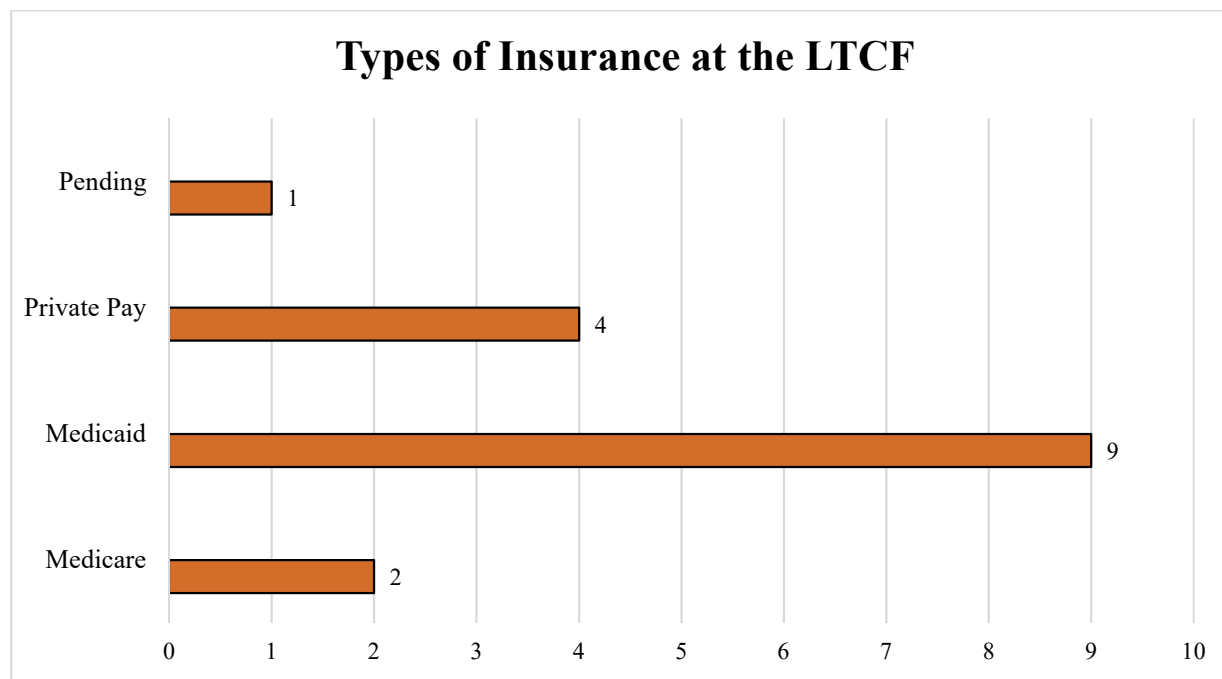


Figure 2. Payer types at the LTCF. Of the 16 mentor patient charts reviewed, 9 patients were Medicaid recipients, 4 were Private Pay, 2 were Medicare, and 1 was pending Medicare or Medicaid funding.

purpose of the interview was to determine their baseline knowledge and identify any potential deficiencies that may need to be corrected with education. Inquiry regarding the appropriate HbA1c targets for the elderly effortlessly transitioned to the next question, which was: Are you familiar with the diabetes treatment guidelines pertaining to periodic monitoring of complications associated with T2DM? See Appendix A for the complete list of questions. Responses received from the nurses indicated a general deficiency in adequate knowledge regarding the current guidelines pertaining to

T2DM care of the target population. For example, the nurses were not able to specify the frequency as to when routine blood draws associated with T2DM management need to be ordered.

Use of the key informant approach was the technique utilized in garnering more detailed information from the APRN, director of nursing, and facility administrator. These people were identified as the leaders, stakeholders, and key decision makers who were knowledgeable about the policies and procedures of the facility. Key informants are valuable in the manner that they are able to accurately identify priority needs and concerns regarding the care of the target population (Iowa State University, 2017). A confidential discussion with the APRN revealed several barriers that prevented her from achieving the best care possible for the target population such as ordering off-site consultations for ophthalmology and podiatry services. Difficulties in ensuring routine surveillance for the other complications associated with T2DM were also communicated.

The primary issue hindering the APRN from accomplishing this task was described as “competing priorities”. Minimal information was garnered from the director of nursing at the facility since that employee had been at the facility for just over one month. The facility administrator at the facility was helpful in providing information about the regulations surrounding the management of nursing home facilities and the billing/reimbursement practices for this predominantly Medicare and/or Medicaid covered group.

An existing data approach was used to determine the deficiencies in the care of the target population. A census list of the patients exclusively assigned to Dr. A’s services was obtained. Recommendations to exclude patients admitted for long term acute care, hospice/palliative care, rehabilitation services, and respite care was abided by since these patients were at the facility for a short duration of time. A medical demographic sheet was created to record information about the patient’s demographic variables, HbA1c results, and co-morbid conditions (Appendix B). This was

later expanded to include information on the frequency of ophthalmology and podiatry visits and routine laboratory values associated with T2DM care. As previously mentioned, the facility does not have an electronic medical record system. Data was manually extracted from the charts. No patient identifiable information was collected or recorded. The chart audit revealed that the top five medical diagnoses were type 2 diabetes mellitus, coronary artery disease, dementia, chronic renal failure and dementia. Anonymity of the patients was maintained using coded numbers; no names were used.

The face-to-face interview with the APRN revealed that she was aware that the target HbA1c should be above 7.0% for the target population but she was unable to provide details on the factors that dictated the need for individualization. The APRN reported that HbA1c results on the chart were taken at face value without further investigation of its concordance with the finger stick blood glucose values. There are contributing factors that may cause a discordance with the HbA1c values particularly for those patients that have conditions that impact the turnover of red blood cells such as low hemoglobin/hematocrit values (causes for HbA1c to be lower), iron deficiency anemia (causes HbA1c to be higher), or recent blood transfusions (HbA1c result is reflective of donor's HbA1c value). The HbA1c results has its limitations since it is an indirect measure of the average glycemic control for the past three months. For these patients, the best indicator for glycemic variability are the finger sticks (ADA, 2017a, p. 48). The value of the HbA1c needs to be reviewed in conjunction with the glucometer readings (finger stick results) to evaluate appropriate diabetes management and to determine if the frequency of the finger sticks is sufficient (ADA 2017a, p. 48).

The director of nursing at the facility was unsure of what the HbA1c targets were. The response received was "I know it should be higher." The assistant director of nursing and one licensed vocational nurse stated that it should be between 4%-5%, while the seven licensed

vocational nurses and two staff registered nurses openly acknowledged “I don’t know” adding that if the results fell within the recommended ranges specified on the laboratory results sheet the patient’s HbA1c was considered “under control.”

Medical records were reviewed to obtain further data about the microsystem. Sixteen out of thirty-seven charts reviewed at the facility were eligible for inclusion (65 years of age and above with T2DM and not admitted for hospice/palliative, skilled nursing services, rehabilitation, acute care, or respite care). The median age of the included patients was 75 years old (67-94 years old) (Figure 3) and consisting of eleven males and five females. Age distribution was broken down as

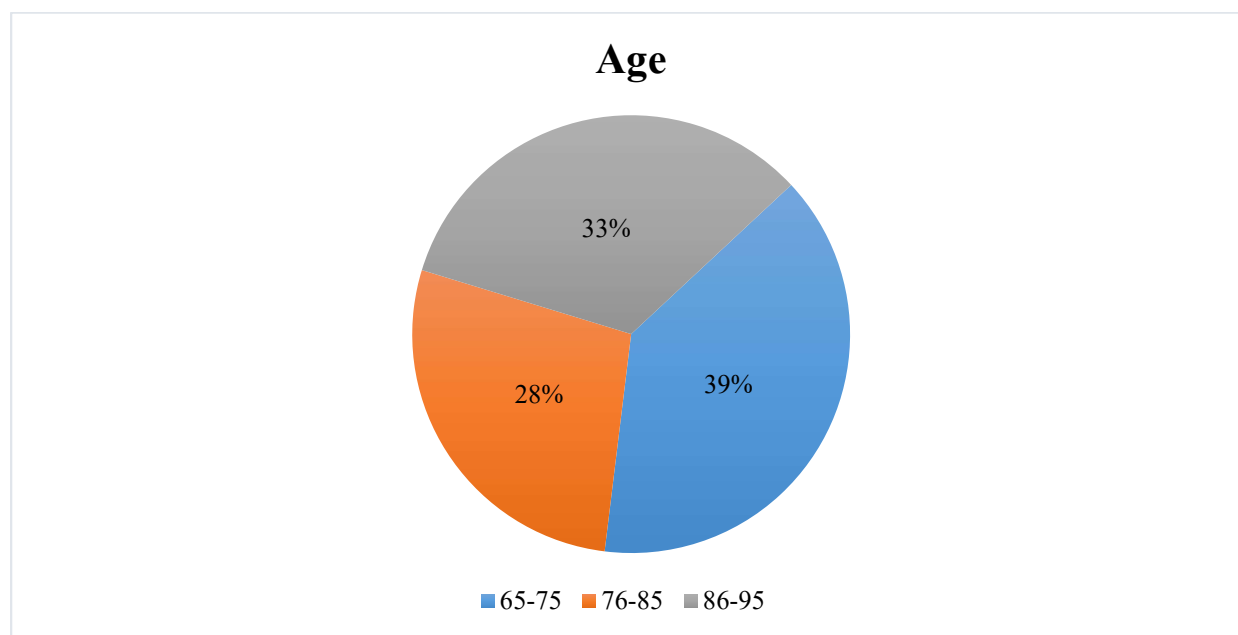


Figure 3. Age distribution of participants. This figure illustrates the age distribution of project participants.

follows: 65-75, 76-85, and 86-95 years of age which corresponded to seven, five, and four patients respectively).

The median HbA1c level for these patients was calculated at 6.7% (range was from 5.1%-10.5%). HbA1c ranges were established at <7.0%, 7.0%-7.5%, 7.5%-8.0%, and >8.0; corresponding to 11, 2, 1, and 2 patients). Three of the medical records did not have the HbA1c test ordered. The HbA1cs were generally lower than the recommended individualized target for this population (Figure 4).

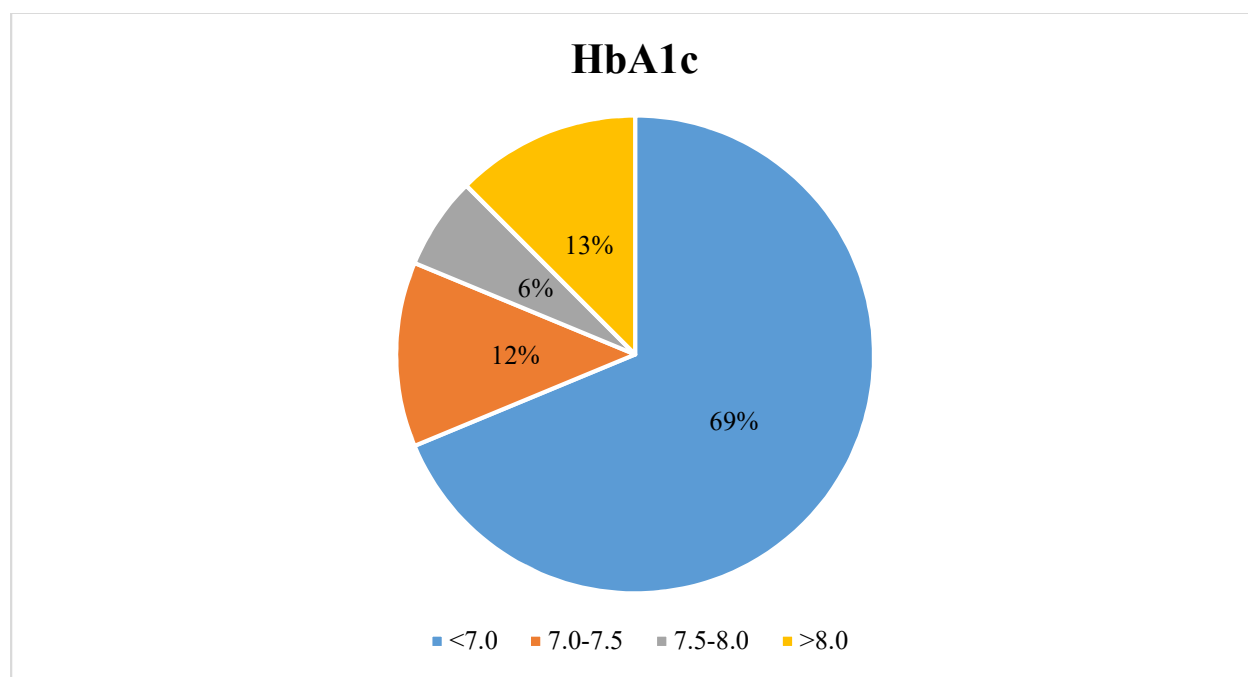


Figure 4. HbA1c levels of 16 project patients. This figure illustrates the HbA1c breakdown percentage of 16 patients.

The 16 patient records included for evaluation in this project had more than one co-morbid condition (see figure 5). Dementia (12 out of 16 patients) and the presence of macrovascular complications such as cerebrovascular accidents/transient ischemic attack (nine patients), coronary artery disease (10 patients), congestive heart failure (three patients), and peripheral vascular disease (three patients) were the leading co-morbidities that were identified. Eight out of 16 patients at the

LTCF had a documented diagnosis of CKD with two patients receiving hemodialysis three times per week (Figure 5).

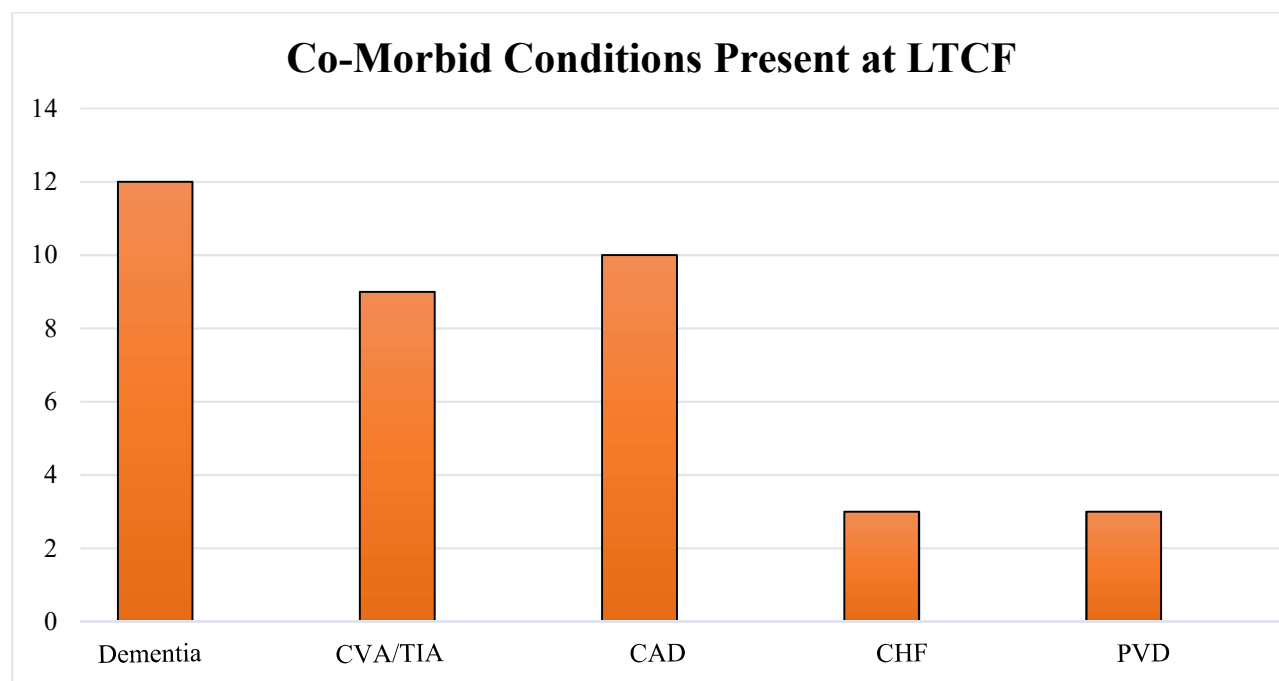


Figure 5. LTCF co-morbid conditions. This figure depicts the co-morbid conditions present amongst the 16 project patients.

Pertaining to routine T2DM care, the APRN indicated that since she has been there for six months, has not ordered any ophthalmology or podiatry referrals for any of the patients. Reportedly, she was informed by the APRN who oriented her that off-site referrals for these services were not seen as necessary since the patients were “on their way out.” She later acknowledged that the leading factor for not ordering the referrals was dependent on allowed services specific to each resident’s healthcare insurance carrier. For example, Medicaid will pay for an annual optometry visit for eyeglasses (coverage for this service is optional) but not for a dilated diabetic retinal exam (Medicaid.gov, 2017). Of the 16 charts reviewed, only four patients had ophthalmology visits for

glaucoma treatment and not for an annual diabetic retinal exam. The remainder of the charts (12) did not have ophthalmology visits recorded in the progress notes.

Among the 16 patient records, only five podiatry visits were noted on the charts and four of these were ordered at the request of the patient or the patient's family. The director of nursing disclosed that there is a podiatrist that comes to the facility but only to address specific problems and/or a request made by the staff. Once a patient is seen, the podiatrist becomes a listed service provider for the patient for routine checks provided there is a predisposing condition that justifies the visit. For Medicaid recipients, podiatry services may not be covered, but Medicare beneficiaries may be eligible for examination and treatment of the feet every six months when there is a documented diagnosis of diabetic sensory neuropathy and loss of protective sensation (Department of Health and Human Services [DHHS], 2010). Otherwise, routine T2DM care involving retinal examinations and foot checks were not done on the patients seen by the APRN.

The rates of compliance pertaining to routine laboratory checks for HbA1c, albuminuria, and renal function studies were low. Current ADA *Standards of Medical Care in Diabetes* stipulate quarterly HbA1c checks in patients who are not meeting glycemic targets and annual assessment of urinary albumin to creatinine ratio and renal function tests for diabetic kidney disease surveillance (ADA, 2017a). For the 16 patient records reviewed, HbA1c levels were ordered at a frequency of every month to six months. There were no microalbuminuria studies found on any of the charts; while renal function studies were ordered every other day, to weekly, or five months later. Dr. A. has acknowledged that the patient load demand, increased patient acuity, and expectations set by her employer play a critical factor in her inability to provide appropriately individualized T2DM care for the elderly patients assigned to her "pod".

Strengths identified at the LTCF were: (1) the APRN awareness about the issues restricting proper T2DM care for her assigned patients; (2) committed APRN receptiveness to improving T2DM care for her group of patients; (3) assistant director of nursing amenable to staff education and dedicated to residents' needs; (4) strong commitment by facility administrator to improve care and quality of life for residents, and (5) demonstration of staff willingness to work together to achieve a common goal.

Weaknesses identified included: (1) APRN assignment to three nursing homes limited the provider's time to ensure individualized T2DM care; (2) APRN decisions to order ophthalmology or podiatry referrals influenced by management; (3) healthcare staff's (registered nurses and licensed vocational nurses) knowledge deficit regarding evidenced-based T2DM care guidelines; (4) the need to modernize information system technology (i.e. electronic records); (5) facility administrator views healthcare from finance perspective – business demands of healthcare viewed as priority issue; (6) fragmentation of documentation due to contracted laboratory services; (7) unstable LTCF leadership; and (8) rapid staff turnover rate. Identification of the strengths and weaknesses available for certain opportunities and threats for the QI project implementation are illustrated in Table 3.

Significance of the Problem

Use of the Dartmouth Clinical Microsystem Assessment tool (Dartmouth College, 2008) unmasked numerous deficiencies at the LTCF. It revealed that there was poor communication and teamwork amongst the staff, potential understaffing, rapid staff turnover, unstable leadership, the absence of a centralized electronic medical record and most importantly, non-adherence to ADA recommendations for certain patients. These identified problems significantly impact the individualized care of older adults with diabetes who reside in LTCFs.

Table 3

Opportunities and threats for QI project implementation

Opportunities	Threats
* healthcare staff is given the leadership role to address geriatric health issues	* increasing health care costs resulting in falling revenue for the facility
* there is potential to formally coordinate how routine T2DM care services are rendered	* reduced funding from Medicare & Medicaid
* improve patient safety through individualized T2DM care for the elderly	* misinformation about T2DM care for the elderly
* collaborative effort to address the deficiencies ensure comprehensive T2DM care	* lack of electronic medical records system
* increased awareness of evidence-based practice	* too much management intervention regarding limiting costs
* collaborative health improvement effort addressing routine T2DM care may lower complications and hospitalization rates	* limited reimbursement for nursing homes
* standardization will prevent duplication of services	* older and sicker patients
	* information overload for the staff

Note. Sample strengths and weaknesses for the implementation of the QI project.

Dimensions addressed during the implementation of the quality improvement (QI) program included: (1) the healthcare team's lack of familiarity with the modified HbA1c targets for the elderly proposed by the most current ADA guidelines (Table 4); (2) the types of co-morbid conditions prevalent in the target population, the number of elderly patients who do not have individualized HbA1c targets that take into consideration their age and co-morbid conditions; and (3) ensuring that monitoring of conditions and complications associated with T2DM.

Hausken and Graue (2012) note the glaring discrepancies within the ADA's recommendations versus the true-to-life care of institutionalized elderly patients with T2DM patients in poor health conditions. High quality evidenced-based care is lacking in the treatment and care of this population due to the inadequate training of health care staff driven by the rising number of diabetes cases among those age 65 and older admitted to LTCFs with complex medical needs and

complicated treatment regimens (Hausken & Graue, 2012). Similarly, Smide and Nygren (2013) identified discernible gaps in levels of diabetes knowledge when LTCFs health care workers were presented with a case study regarding the proper care of an elderly patient with T2DM.

Table 4

HbA1c targets in older adults with T2DM

Patient characteristic/health status	Rationale	Reasonable HbA1c target goal
Healthy (few con-existing chronic illnesses, intact cognitive and functional status)	Longer remaining life expectancy	<7.5% (58 mmol/mol)
Complex/intermediate (multiple coexisting chronic illnesses or 2+ instrumental activities of daily living impairments or mild to moderate cognitive impairment)	Intermediate remaining life expectancy, high treatment burden, hypoglycemia vulnerability, fall risk	<8.0% (64 mmol/mol)
Very complex/poor health (LTC or end-stage chronic illnesses or moderate to severe cognitive impairment or 2+ activities of daily living dependencies)	Limited remaining life expectancy makes benefit uncertain	<8.5% (69 mmol/mol)

Note. Framework for considering treatment goals for glycemia. Adapted from “Standards of medical care in diabetes – 2017,” by ADA, 2017, *Diabetes Care*, 40(1), p. S101. Copyright 2017 by the American Diabetes Association.

Individualization of HbA1c targets in the elderly with T2DM and co-morbidities is of paramount importance because inappropriately tight glycemic targets can predispose this compromised group to a myriad of preventable complications such as diabetic retinopathy, diabetic kidney disease, diabetic peripheral neuropathy, and foot ulcers (ADA, 2017a). Routine screening for CKD and diabetic retinopathy; the two major microvascular complications associated with T2DM

needs to be emphasized. Urine albumin to creatinine ratio (UACr) and declines in glomerular filtration rate (eGFR) are the best clinical indicators of renal function status (ADA, 2017a). A study by Rodriguez-Poncelas et al. (2016) showed that CKD, elevated UACr and/or presence of declining GFR was associated with the development and progression of diabetic retinopathy. Benetos et al. (2013) note that a comprehensive ophthalmological examination that incorporates visual acuity, dilated-eye slit-lamp examination, and retinography is critical in the timely identification and treatment of diabetic retinopathy to minimize visual loss.

Purpose of the Project

The primary aim of the project was to improve the delivery of routine T2DM care in the elderly with comorbid conditions at one LTCF by having the APRN increase her knowledge of and follow an order set following the 2017 ADA *Standards of Medical Care in Diabetes* guidelines and increasing nursing staff's knowledge of diabetes care for this population. A change in the provider's ordering practice using a checklist sheet and standardized order sheet was intended to prevent and/or delay the progression of diabetes-related complications, to ensure safer care, to preserve functional abilities, to promote independence, and to maintain or improve quality of life for this susceptible population (ADA, 2017a).

The secondary aim of the project was to educate the registered nurses, and licensed vocational nurses regarding applicable 2017 ADA *Standards of Medical Care in Diabetes* evidence-based guidelines related to the treatment of elderly patients with T2DM with co-morbid conditions. Through the educational one-on-one in-services, it was communicated that tight glycemic control is not applicable for the elderly with complex health conditions and that although major goal of tight glycemic targets is to prevent long term complications, it is more pertinent for healthy and younger older adults (<65 years old) who have an additional life expectancy of at least 10 more years.

Review of Literature Evidence

Question Guiding Inquiry (PICOT)

Does the implementation of an evidenced-based diabetes toolkit improve the individualization of HbA1c targets and routine T2DM care in elderly patients with T2DM complicated by co-morbid conditions and functional limitations who reside in LTCF?

Benchmarking

In healthcare, benchmarking is the process of comparing an organization's key performance measures against nationally-recognized best practices, targets, or goals (Kay, 2007). For this quality improvement project, the *2017 ADA Standards of Medical Care in Diabetes* were used as the reference point for the evidence-based delivery of care for the target group. For the last 25 years, the ADA has steadfastly developed and distributed diabetes care standards, guidelines, and other related documents. Healthcare professionals tasked with the care of patients with diabetes have come to view the *ADA Standards of Medical Care in Diabetes*, position statements, and scientific statements as the blueprint for clinical decision making (ADA, 2017a).

Methodology (Search Strategy)

A literature search of relevant literature was performed from January 2015 to September 2017. Searches were made in the following databases: CINAHL, EBSCOHost, Medline, NCBI, PubMed, PubMed Central, and ScienceDirect. Search terms included "American Diabetes Association guidelines," "co-morbidities," "diabetes," "diabetes related knowledge," "diabetes management," "elderly," "evidenced-based diabetes management," "geriatric," "gerontology," "individualized care," "long term care," "modified HbA1c target," "nursing home," "older adults," "older people," "routine diabetes care," and "type 2 diabetes." The search terms were used for all fields (including title, abstract, keywords and full text). Searches were limited to English-language

peer-reviewed journals published in the last five years. The initial literature search yielded 22,098 peer reviewed articles on the topic. The final number of articles considered was 33. Other materials referenced were association reports, government websites, and society transactions.

Critique and Synthesis of Research Findings

To establish the evidence base for the recommended appropriate glucose control in the elderly, 10 intervention articles published in English were examined. The studies predominantly involved elderly adults with T2DM using various glucose lowering agents (GLA) to achieve intensive glucose control. Three recurring themes were identified from the selected articles (Table 5). All 10 articles investigated the effect of advancing age, co-morbid conditions, and what role the type of GLA therapy selected contributes to the incidence of hypoglycemic events.

Table 5

Identified themes from different evidence sites

Theme	Authors
Survival rates, role of various GLA therapies in inciting hypoglycemia, associated T2DM complications, and mortality rates in the elderly with co-morbid conditions.	Claesen et al. (2016); Fang et al. (2013); Huang et al. (2014); Lee et al. (2011); Lipska et al. (2015); Pilotto et al. (2014); Roumie et al. (2016); Tseng et al. (2014); Vijan et al. (2014); and Yau et al. (2012).
Guideline implementation for glycemic control in the elderly with T2DM.	Lee et al. (2011); Yau et al. (2012); Tseng et al. (2014); Vijan et al. (2014); and Yau et al. (2012).
Risks and benefits of intensive glycemic control in the elderly and its outcomes.	Fang et al. (2013); Lee et al. (2011); Lipska et al. (2015); Pilotto et al. (2014); Roumie et al. (2016); Tseng et al. (2014); Vijan et al. (2014); and Yau et al. (2012).

Note. Articles describing factors contributing to the incidence of hypoglycemic events.

Caution regarding the use of sulfonylurea with or without insulin in the elderly with co-morbid conditions was emphasized due to the following issues associated with aging: decreases in

hepatic and renal function affecting drug metabolism and clearance, dampened autonomic response to hypoglycemia, alterations in the presentation of symptoms, distortion in glycemic margins, heightened hypoglycemia unawareness, existence of multiple co-morbidities, and rampant polypharmacy (Jafari & Britton, 2015). Of significance is presentation of cardiovascular (CV) complications associated with T2DM (myocardial infarction and ischemic stroke) as the co-morbid condition that places elderly persons at highest risk for hypoglycemic events. Intensive glycemic control predisposes the elderly to fatal cardiac arrhythmias due to the prolongation of the QT interval brought about by catecholamine release as a response to hypoglycemia (Jafari & Britton, 2015).

Recommendations to adhere to the guidelines relaxing HbA1c targets based on life expectancy, functional, status, and patient preference were discussed in 5 out of the 10 articles (Claesen et al., 2016; Huang et al., 2014; Lipska et al., 2015; Pilotto et al., 2014; & Vijan et al., 2014). The consensus in 8 out of the 10 articles that the target HbA1c need to be individualized in the elderly population due to their compromised health status (Huang et al., 2014; Lee et al., 2011; Lipska et al., 2015; Pilotto et al., 2014; Roumie et al., 2016; Tseng, Soroka, Maney, Aron, & Pogach, 2014; Vijan et al., 2014; & Yau et al., 2012). Treatment goals for the elderly with T2DM need to be focused on preventing poor outcomes, maintaining quality of life, preventing injuries such as falls, and guaranteeing continued independence if possible (Pilotto et al., 2014; & Yau et al., 2012).

Six out of 10 articles selected were retrospective studies (Fang et al., 2013; Huang et al., 2014; Lipska et al., 2015; Pilotto et al., 2014; Roumie et al., 2016; & Tseng et al., 2014) that involved data extraction from healthcare expenditure records (National Alliance of Christian Mutualities, The Kaiser Permanente Northern California Diabetes Registry, and Veterans Health Administration Database) or derived from other large studies (National Health and Nutrition

Examination Survey and Metabolic Study). Huang (2016) noted that older patients with T2DM have been consistently excluded from large scale prospective clinical diabetes trials due to the inherent difficulties associated with their management. He cited two trials that attempted to accomplish this difficult task. The Action to Control Cardiovascular Risk in Diabetes (ACCORD) attempted to investigate the effect of intensive glycemic management in patients over the age of 80 but the high rates of hypoglycemic events that occurred after the participants were randomized into the intervention arms led to the revision of the study protocol to exclude patients over 80 years old (Huang, 2016). Likewise, researchers in the Japan Elderly Diabetes Intervention trial involving 1,173 patients were unable to evaluate a multiple risk factor intervention in patients aged 65-85 years due to treatment related hypoglycemic events in older patients (Huang, 2016). The remainder of the articles were small scale prospective studies (Fang et al., 2013; Lee et al., 2011; & Yau et al., 2012) and a simulation study (Vijan et al., 2014). Although small and simulated, it provided substantial information on other selected outcomes such as micro/macrovacular complications, functional outcomes, and quality of life issues. Overall, all 10 articles selected had the goal of providing targeted care management in the elderly. Care for the older patient with T2DM revolves around weighing the risks and benefits of tight glycemic control in this vulnerable group (Huang et al., 2014; Lee et al., 2011; Lipska et al., 2015; Roumie et al., 2016; Tseng et al., 2014; Vijan et al., 2014; & Yau et al., 2012).

Limitations (Literature Gaps)

Kirkman et al. (2012) asserted that despite the pervasiveness of diabetes in older adults aged 65 years and older, particularly those with co-morbid conditions and functional limitations, they have mostly been excluded from randomized controlled trials due to the complexity in their health conditions. Benetos (2013) noted that the overall dearth of evidence-based guidelines specific to the

management of diabetes in the elderly who reside in nursing homes is due to the heterogeneity of this population with regards to comorbidities, polymedication, and frailty. Anderson's (2014) national audit of 2,043 nursing homes reinforced that significant gaps in the care of these residents existed. Specifically, 63% of the homes audited lacked a representative accountable for diabetes management and 33% of homes lacked direct access to training materials supportive of diabetes care (Anderson, 2014). Findings from the Institute of Diabetes in Older people has created a push to provide better education and training for nurses and stricter governance to providing high-quality evidence-based care.

Methodology

Design (Intervention Strategy)

This two-pronged quality improvement project aimed to increase the APRN's (provider) knowledge and utilization of the *ADA Standards of Medical Care in Diabetes – 2017* guidelines and to educate staff nurses on current evidence-based practice for LTCF residents with diabetes. For the APRN provider, a one-on-one review on the *2017 ADA Standards of Medical Care in Diabetes* pertaining to the importance of adherence to the recommended diagnostic and therapeutic actions in the prevention and management of diabetes complications for the target population was accomplished on June 5, 2017. Emphasis was placed on the modified HbA1c targets for elderly patients with T2DM with co-morbid conditions and functional limitations. Recommendations to implement an individualized HbA1c target based on the risk to benefit ratio was presented via a handout (Appendix C). There was an emphasis that lower HbA1c goals for the target population was not necessarily better and aggressive control in patients with advanced diabetes and heart disease was not warranted.

The strengths and limitations of the HbA1c test as an accurate representation of the patient's average glucose was explored with the provider. It was highlighted that the HbA1c is not a perfect test. Examples of conditions that can cause a discordance between the HbA1c and mean glycemia were presented (Appendix D). The main talking point here was that hemoglobin and red blood cell pathologies renders the accuracy of the HbA1c as a potentially unreliable biomarker for glycemic control (ADA, 2017a, p. 50). Lastly, the routine T2DM checklist and standardized order sheet (Appendices E & F) developed with the input of the provider was incorporated into the charts of those patients who met the inclusion criteria to remind the provider when to order the recommended tests/procedures.

Exclusively for the provider, a pocket sized printed HbA1c glucose value converter was presented (Appendix G). Included in it were the conditions that can falsely lower HbA1c results, particularly clinical conditions that can shorten erythrocyte life span or decrease mean erythrocyte age. The primary purpose of the information sheet was to alert the APRN provider that HbA1c results may not accurately reflect glycemic control when clinical conditions that affect erythrocyte survival are present (ADA, 2017a). The expectation was that the provider would pursue investigation of those conditions that may cause discrepancies between HbA1c results and daily glucose values to enable the provision of timely patient interventions. With regards to individualization of HbA1c targets, the provider was encouraged to annotate on the progress notes the appropriately individualized HbA1c for the target population based on the ADA 2017 *Standards of Medical Care in Diabetes* guidelines (Table 1). Annotation of the modified HbA1c target on each patient's chart may ensure that optimal care is delivered since this serves as form of communication for other providers who may be responsible for the care of the patient in other circumstances.

Education for the APRN was planned according to Dayal and Alvarez's (2015) attestation that standardized order sets facilitated improved compliance with recommended evidenced-based standards of care while simultaneously ensuring appropriate resource utilization and delivery of cost-effective quality care. To improve compliance with the required routine T2DM care, a concise checklist and standardized order sheet was adapted from the *2017 ADA Standards of Medical Care in Diabetes* and added into the chart to avoid oversight of the crucial elements in the prevention of complications associated with T2DM. The purpose of the checklist was to improve efficiency by prompting the healthcare staff and provider when certain screenings and assessments were due to be ordered (Appendix E&F) and establish that none of the required routine care for T2DM was overlooked. Although it was not a part of the QI implementation project, information regarding annual lipid checks and the routine required immunization checks were included in the checklist and standardized order sheet per discussion with the project coordinator to ensure that the other *2017 ADA Standards of Medical Care in Diabetes* could be met.

For the nursing staff, the plan for the intervention strategy was to provide a one-one-one in-service program that educated the healthcare staff on the most current evidenced-based guidelines promulgated by the ADA in 2017. Specifically, the education intervention was intended to improve compliance with routine T2DM care for the target population. With permission from the LTCF management, a one-one-one in-service with the use of informational handouts was delivered in mid-June 2017 at a time that was convenient for the RNs/LVNs. The plan was to educate 80% of the nurses (23 out of 29) on all three shifts. The one-on-one in-service was conducted in a private conference room free of interruptions. The in-service provided a brief yet concise presentation of the most current evidence-based guidelines regarding the appropriate care and importance of individualized HbA1c targets in elderly patients with T2DM complicated by complex conditions

(Appendix C, D, & L). A checklist (Appendix E) and simplified standardized order sheet (Appendix F) was distributed to the 13 participants. Its potential value in improving the care of the target population was highlighted.

Setting and Sample Plan

The location of the QI program implementation project was a LTCF located in southwest Texas. Due to staff time constraints, the sampling strategy chosen for the education in-service was a non-probability convenience sampling. This sampling plan allowed for the evaluation of the effectiveness of the in-service education in a relatively fast and inexpensive manner (Lund Research Limited, 2012). For the patient medical record audit, the sampling strategy chosen was the non-probability purposive sampling method. The aim of the project was to evaluate data from a homogeneous sample, that is, a group of elderly patients 65 years and older with T2DM and co-morbidities who resided in a LTCF. A homogeneous sampling strategy was deemed appropriate for this project since the PICOT question that was addressed specifically targeted the attributes of the group of interest (Lund Research Limited, 2012).

Stakeholder Involvement

A stakeholder is anybody who can affect or is affected by an organization, strategy or project (Morphy, 2017). Involvement of the stakeholder, whether an individual or a group is crucial in achieving improved outcomes for the target group. For the LTCF, the stakeholders were the APRN provider, management, healthcare staff, and patients. The APRN provider was supportive in the development and planning of the QI project. Dr. A. provided substantial input on how to develop the standardized orders to ensure that the best outcomes were achieved for the patients. Likewise, support from management was obtained providing that it would not interfere with the healthcare staff's workflow and not cost the facility undue overtime costs. A suggestion from the facility

administrator was to conduct the in-service during the LTFC's planned monthly staff meeting. Ultimately, this strategy was not feasible due to an unplanned state inspection during the week the in-service was planned. Instead, the registered nurses and licensed vocational nurses were approached on a one-on-one basis at a time that was convenient for them. Interest by the healthcare staff in the QI project was shown by their desire to learn the current evidenced-based guidelines regarding the appropriate care of the target population during the microsystem needs assessment. Nurses specifically requested an in-service about the topic. Although the patients were not directly involved in the QI project, the outcome of the process and results of the effort could have a significant impact in their care. It was essential that Dr. A., the LTFC's management, and its staff were actively involved in the quality improvement program and intervention. Education, checklists, and standardized order sheets that were specifically designed in the care of the target population provided an increased opportunity for positive for the target population.

IRB Considerations

The process of obtaining an informed consent from the nurses or patients was not necessary as no hands-on patient healthcare interventions was performed. The proposed project plan was a QI strategy and did not involve direct patient care. Chart audits were kept confidential with no identifying information recorded. The records were stored securely in a locked file cabinet in compliance with the LTFC, university, and federal guidelines pertaining to the protection and confidentiality of the participants' identifiable information as mandated by the Health Insurance Portability and Accountability Act of 1996 (HIPAA). University of the Incarnate Word IRB exempt status approval was obtained, as well as a letter of support from the LTFC in lieu of IRB approval due to the facility's lack of an established IRB. Additionally, a letter of support for the completion of the project was obtained from the LTFC.

Evaluation Model

The New World Kirkpatrick Model (Kirkpatrick Partners, 2017) was the evaluation model selected for the implementation of the quality improvement program at the LTCF. It is the updated version of Kirkpatrick's original four levels of training evaluation. A brief explanation of the updated Kirkpatrick model is as follows:

1. Level I: Reaction. This level seeks to determine how much the participants are actively involved in the learning process and what their contributions are into the learning experience (*engagement*). It includes an inquiry regarding the pertinence of the training learned on the job (*relevance*) (Kirkpatrick Partners, 2017).
2. Level II: Learning. This level measures the efficacy of the training and if the objectives were accomplished based on five criteria: *knowledge* ("I know it"), *skill* ("I can do it right now"), *attitude* ("I believe this will be worthwhile to do on the job"), *confidence* ("I think I can do it on the job"), and *commitment* ("I intend to do it on the job").
3. Level III: Behavior. This level evaluates the participant's on-the-job use of the training they received and incorporates factors (processes and systems) that strengthen, facilitate, and positively reward performance of the crucial behaviors required to accomplish the job (*required drivers*).
4. Level 4: Results. This level examines the tangible outcomes of the training and the presence of short-term indicators that ensure that crucial elements in performance of the job are consistently being applied to achieve the desired outcomes.

Kirkpatrick's New World Evaluation model is beneficial in the methodical discovery of the quality improvement's (QI) value, quality, and significance based on a set of established criteria. Evaluation of the Kirkpatrick evaluation model was considered throughout the design, development,

and implementation of the QI project and brought to light problems that existed within the organization. For example, the nurses were not aware of the current ADA guidelines pertaining to the care of the elderly who reside in nursing homes. This information enabled the clarification and refinement of those issues along the way. The suitability of the Kirkpatrick evaluation model in the evaluation of the education in-service and T2DM routine checklist served as an unbiased measure of the projects efficacy at each of the essential levels (Kirkpatrick Partners, 2017). It was identified as the most appropriate evaluation model for the program implementation since the effectiveness of the training program needed to be measured.

Objectives and Timeline

- I. By June 15, 2017, 100% of the provider (one provider) and 80% of the RNs/LVNs (23 out of 29) at the LTCF will:
 - a) Able to identify the current guidelines that exists for treating diabetes in elderly patients following a one-on-one evidence-based educational in-service presentation.
 - b) Able to identify the issues that need to be considered in individualizing treatment recommendations for elderly patients.
 - c) Be familiarized and proficient with the use of the routine T2DM checklist and standardized order sheet for T2DM routine care.
- II. By July 30, 2017, after implementation of the educational in-service and T2DM routine checklist, the APRN provider will:
 - a) Improve the individualization of HbA1c targets in elderly patients with T2DM complicated by complex medical conditions and functional limitations.

- b) Use the standardized order sheet that delineates the recommended test/procedures for routine T2DM care on a consistent basis.
 - c) Pursue investigation of underlying conditions that may cause discordance between the HbA1c and finger stick glucose values.
- III. By July 30, 2017, after implementation of the educational in-service and T2DM routine checklist, 80% of the healthcare staff will:
- a) Recognize the importance of routine T2DM care in the prevention/delay of diabetes related complications.
 - b) Use the routine T2DM checklist consistently in elderly patients with T2DM complicated by complex medical conditions and functional limitations.
- IV. By September 30, 2017, 80% of the elderly residents at the LTCFs with T2DM complicated by co-morbidities and functional limitations will:
- a) Have appropriately individualized HbA1c targets.
 - b) Have routine T2DM tests/care ordered according to the recommendations set forth by the 2017 *ADA Standards of Medical Care*.

Evaluation Plan

The evaluation tool for the QI project were derived from the 2017 *ADA Standards of Medical Care in Diabetes* and were adapted to fit the specific needs of the LTCF. The tools (Appendix H & I) have not been tested for reliability and validity but have been formulated by leading authorities in the field of endocrinology (ADA, 2017a). The information used to adapt the questionnaire for the nurses and the checklist were free of charge and easily accessible online; therefore, free of copyright restrictions regarding its use and duplication. To evaluate the impact of the nursing educational program implementation, a pre- and post-test questionnaire was administered

to those nurses who took part in the in-service (Appendix H). The pre- and post-test served as a direct evaluation of the participants' learning and it quantified the extent of the participant's baseline knowledge about the topic before the presentation and assessed the amount of learning achieved thereafter (Boston University, *n.d.*).

Data Analysis Plan

A checklist was developed (Appendix J) to guide the formal post-intervention medical record audit. The purpose of the chart audit was to systematically determine the outcomes of the QI program implementation (Duke University, 2016). A baseline and post QI project implementation chart audit was performed. Twenty-two charts that met the following criteria were included in the post-intervention audit: Patients 65 years of age and above with T2DM and not admitted for hospice/palliative care, skilled nursing services, rehabilitation services, acute care, or respite care were included. The following information was collected by August 1, 2017 and evaluated by September 15, 2017 to determine the effectiveness of the QI project:

- 1) Routine T2DM laboratory tests (HbA1c, urine albumin to creatinine ratio, serum creatinine and GFR) ordered per the 2017 ADA *Standards in Medical Care in Diabetes* guidelines.
- 2) Routine T2DM physical exams (eye exam and foot exam) ordered per the guideline recommendations.
- 3) Individualized HbA1c targets set for the target population and were they annotated on the progress notes.
- 4) Clinical conditions contributing to discrepancies on HbA1c results and finger sticks further investigated?

Data from the pre/post-test questionnaires (Appendix H), program feedback evaluation (Appendix I), and chart audits (Appendix J) were collected. To analyze the results of the pre/post-test questionnaires and as a measure of the outcomes of the nursing education in-service, the number of correct answers were totaled and divided by the total number of questions. Then a mean score was calculated and pre- and post-test results were compared. Results from the questionnaires remained anonymous. A code number was assigned to each nurse's questionnaire so that pre- and post-education questionnaires could be matched for statistical testing. Nurses did not sign their names to the questionnaires. The timeline for project completion is depicted in a Gantt chart (Appendix K).

Results

Analysis of Data

The 22 medical records that met the inclusion criteria for the QI project and were reviewed for analysis of project objectives included 13 females and nine males (Table 6). The age composition of the residents and racial makeup are included in the table. The racial composition was predominantly Hispanic 82% (n=18). The clinical characteristics of the sample were burdened with multiple co-morbidities that significantly impacted their functional status. For the whole patient population (all age groups), the top five common co-morbidities were chronic kidney disease/end stage renal disease (77%), dementia (64%), coronary artery disease (77%), cerebrovascular accident (45%), and peripheral vascular disease (9%). The mean HbA1c was at 7% (SD = 1.38) minus one that was identified as missing during the pre-implementation chart review. Functional status level specifying the patient's ability to manage activities of daily living such as basic self-care eating, bathing, dressing, toileting, transferring, and continence) and instrumental activities of living (managing money, shopping, telephone use, travel in community, housekeeping, meal preparation,

Table 6

Characteristics of residents with diabetes selected for the QI project.

Categories	Number of Residents
Gender	
Male	9
Female	13
Age	
65-75	8
76-85	7
86-95	5
>96	2
Race	
Hispanic	18
Caucasian	4
Co-morbidities	
CKD/ESRD	17
Dementia	14
Coronary artery disease	14
Cerebrovascular accident	10
Peripheral vascular disease	2
HbA1c	
<7.0	12
7.0-7.5	2
7.5-8.0	3
>8.0	4
Missing	1
Functional Status	
Dependent	20
Partially dependent	2
Independent	0
Healthcare carrier	
Medicaid	19
Medicare	1
Private pay	2

Note. This table depicts characteristics of the 21 residents included in this study.

and taking medications as prescribed) were collected from the intake sheets (University of Michigan Medical School, 2003). The predominant payer type for healthcare coverage was Medicaid (86%).

Results of Findings Corresponding to Objectives

For the first objective, the target was to provide one-on-one educational in-services to the APRN provider and 80% (23 out of 29) of the nurses. This goal was achieved with the provider (100%) but only 13 (45%) of the nurses. Unforeseen circumstances such as rapid staff turnover, short staffing, high patient acuity, patient emergencies, and unannounced state inspections hampered nursing participation. The nurses were approached for the in-services at a time that was convenient for them without interfering or compromising patient care as requested per the administration. A pre-test consisting of 10 questions was administered at week one to determine baseline knowledge followed by a post-test at week two and week four. The respondents consisted of an APRN, three RNs, and nine LVNs.

Results of the pre-assessment showed a significant deficiency in the diabetes-related knowledge regarding the care of LTCF residents with T2DM. The top three missed questions from the pre-test assessment (Table 7) were regarding individualization of HbA1c targets in the elderly (question # 6 and #7) and the recommended HbA1c goal for most patients set forth by the ADA (question #2). At post-test #1, results almost mirrored that of the pre-test; with the top three missed questions as being the recommended HbA1c goal for most patients by the ADA (question #2) as the most missed, followed as a tie by individualization of HbA1c targets in the elderly (question #6) and priority of care for older adults (question #10). By post-test #2, the top three missed questions were regarding individualization of HbA1c targets (question #7), conditions that increase hypoglycemia in older adults (question #8), followed as a tie by question #6 (HbA1c individualization) and question # 3 (mortality risk for elderly patients with non-individualized HbA1c targets). Overall, results of the

total scores indicated a significant improvement in diabetes-related knowledge specific to the care of the target population (Figure 6). The differences in scores by type of nurse is illustrated in Figure 7.

Table 7

Most missed questions from the pre/post-test Questionnaires

Type	Question Missed
Pre-test	<u>Question #6:</u> What would be a reasonable HbA1c goal for a 72-year-old woman with a Complex health status, blood pressure of 140/90 mmHG, and fasting glucose of 100 to 150 mg/dL?
	<u>Question #7:</u> What would be a reasonable HbA1c target for an older patient with history of recurrent hypoglycemia, limited life expectancy, multiple co-morbid conditions, advance chronic kidney disease, and history of strokes?
	<u>Question #2:</u> The HbA1c goal for most patients recommended by the ADA should be at?
Post-test #1	<u>Question #2:</u> The HbA1c goal for most patients recommended by the ADA should be at?
	<u>Question #6:</u> What would be a reasonable HbA1c goal for a 72-year-old woman with a Complex health status, blood pressure of 140/90 mmHG, and fasting glucose of 100 to 150 mg/dL?
	<u>Question #10:</u> The priority or care for older adults with T2DM is the avoidance and prevention of?
Post-test #2	<u>Question #7:</u> What would be a reasonable HbA1c target for an older patient with a history of recurrent hypoglycemia, limited life expectancy, multiple co-morbid conditions, advance chronic kidney disease, and history of strokes?
	<u>Question #8:</u> Which of the following conditions increases the risk of hypoglycemia in older adults?
	<u>Question #6:</u> What would be a reasonable HbA1c goal for a 72-year-old woman with a complex health status, blood pressure of 140/90 mmHG, and fasting glucose of 100-150 mg/dL?
	<u>Question #3:</u> Elderly patients with complex conditions are at what mortality risk with tight blood sugar control?

Note. Selected LTCF nursing personnel participated in pre- and post-questionnaires.

For the second objective, the provider was expected to individualize the HbA1c targets for each patient that met the inclusion criteria, use the standardized order sheets that delineated the recommended test/procedures for routine T2DM care, and pursue investigation of underlying conditions that may have caused a discordance between the HbA1c and finger stick glucose values.

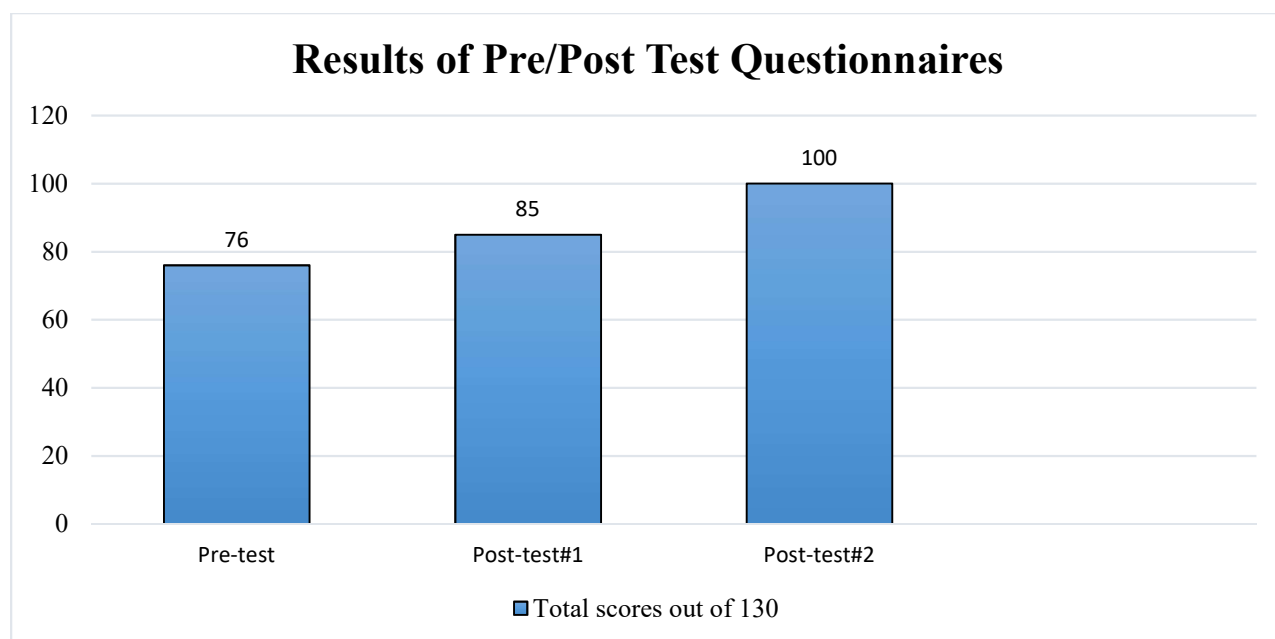


Figure 6. Results of the total scores from the pre/post-test questionnaires. This figure depicts the comparison results determining the level of understanding obtained between the pre- and post-tests.

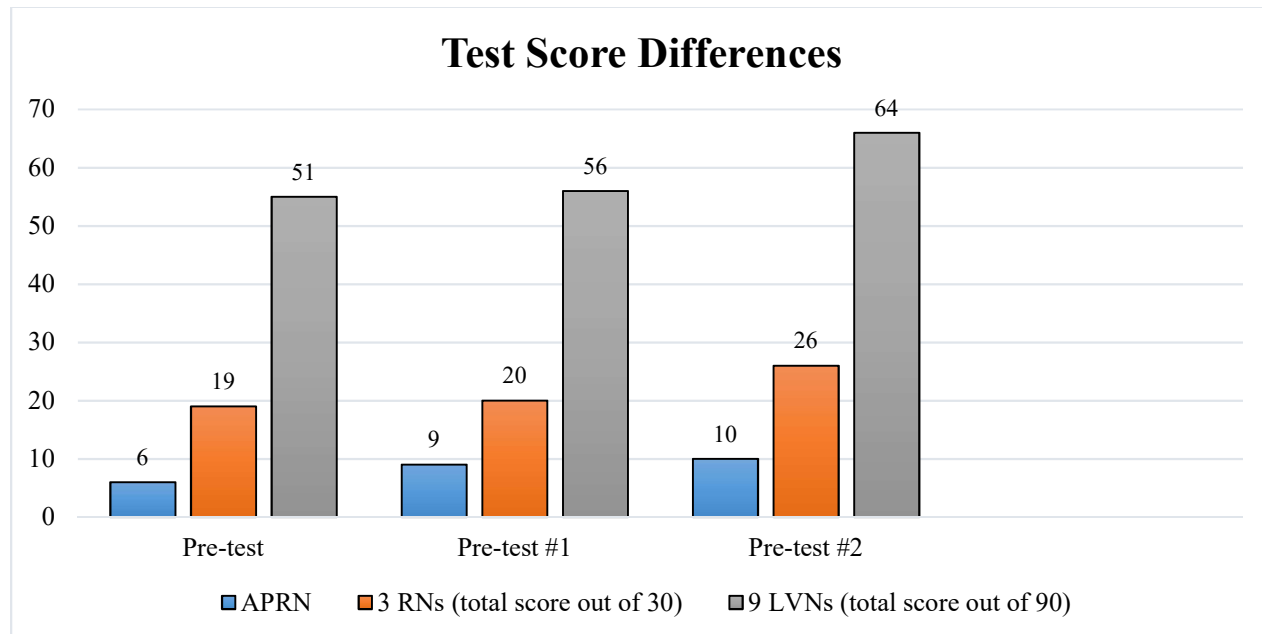


Figure 7. Differences in total test scores by type of nurse. This figure depicts the test score differences among nursing personnel (APRN, RNs, and LVNs).

The APRN was assisted with setting individualized HbA1c targets for each patient as noted in Table 8. There was 100% incorporation of the standardized order sheets into the charts.

Table 8

Individualized HbA1c targets set for each patient

HbA1c Target	Number of Patients
<7.5%	2
7.5%-8.0%	4
<8.0%	4
8.0%	12

Note. The table represents the individualized HbA1c target for the APRN's patients.

However, of the 22 patients, only two patients had the individualized HbA1c annotated in the progress notes (Figure 8). With regards to the APRN pursuing discordant HbA1c values, six of the HbA1cs were identified as inaccurate. Five were further pursued to investigate the underlying condition contributing to the discrepancy and one was missed (Figure 9). Because the HbA1c results did not correlate with the patient's daily finger stick glucose variability, the APRN provider ordered further laboratory testing (complete blood count and iron panels) to determine the exact pathological process contributing to the discordance. Conditions such as blood loss or hemolytic anemia can falsely lower HbA1c results due to the shortened life span of the erythrocyte. Conversely, conditions that contribute to increased erythrocyte survival such as iron deficiency anemia influence the reliability of the HbA1c as a measure of glycemic control (ADA, 2017a, p. 50).

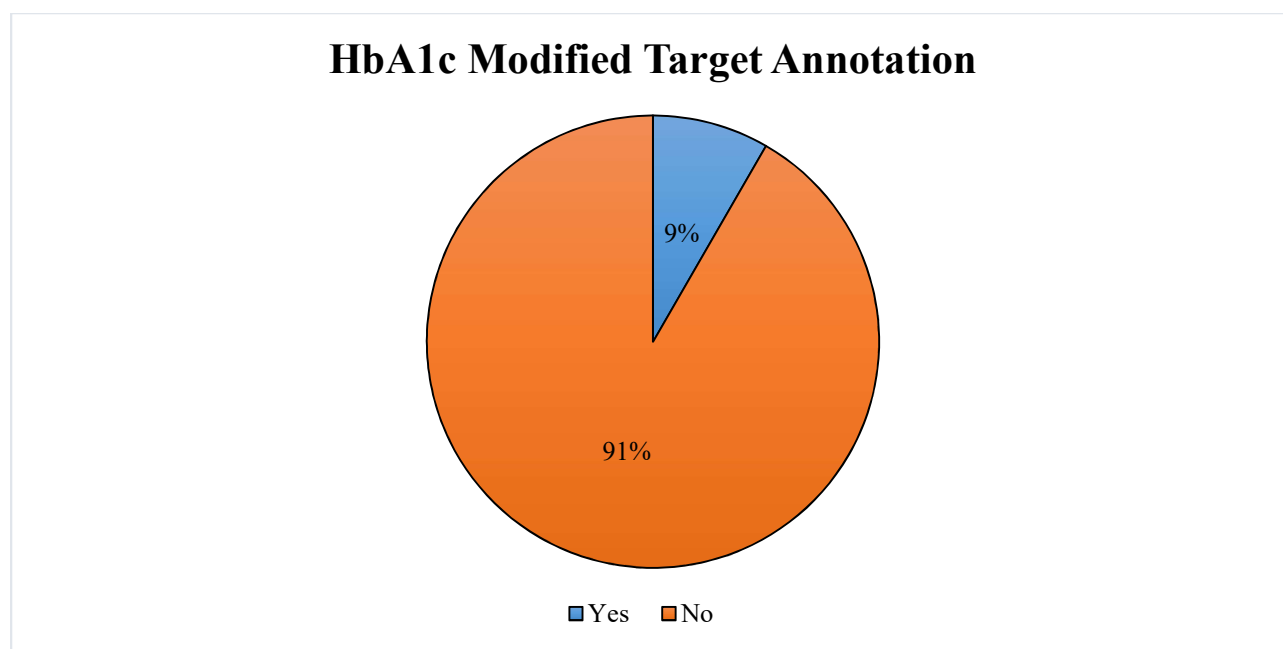


Figure 8. HbA1c modified target annotation in the progress notes. This figure illustrates the notation of modified HbA1c targets found in the 22 selected patient's progress notes.

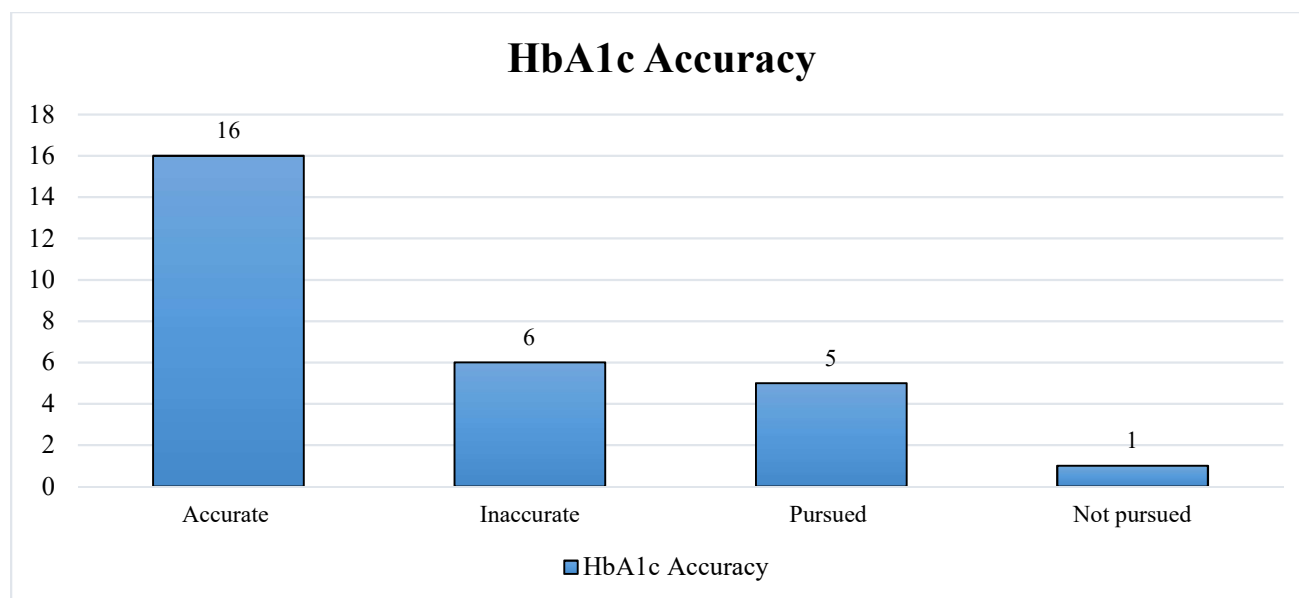


Figure 9. HbA1c accuracy. This figure illustrates the HbA1c accuracy for the 22 inclusive patient chart audit.

For objective three, the goal was for 80% (23 out of 29) of the nurses to recognize the importance of routine T2DM care in the prevention/delay of diabetes related complications and to use the routine T2DM checklist consistently in the selected LTCF residents. As previously discussed only 13 (45%) of the nurses were able to participate in the in-services. Knowledge regarding the importance of routine T2DM was assessed through a pre/post-test questionnaire with the results cited in Figure 6 and 7. Similar to the standardized order sheets, there was 100% incorporation of the checklists into the charts. The nurses' knowledge regarding routine T2DM care of the target population improved from a total score of 76 (pre-test) to 85 (post-test #1), and 100 points (post-test #2).

Lastly, for the final objective, the goal was for 80% of the 22 patients to have appropriately individualized HbA1c targets and have routine T2DM laboratory tests (HbA1c, urine albumin to creatinine ratio, serum creatinine, and GFR) and physical exams (eye exam and foot exam) ordered according to the recommendations set forth by the 2017 ADA *Standards of Medical Care in Diabetes*. All the patients (100%) had an individualized HbA1c target annotated on the footnote of the routine T2DM care checklist; but, the APRN provider was only able to annotate two in the progress notes (Figure 8). Pertaining to routine T2DM test/care the chart audit indicated results were as follows: there were 13 HbA1cs due to be ordered; 12 were ordered and 1 was missed (Figure 10); only one renal panel was due and it was ordered (Figure 11); and five of the UACRs were due and were all ordered (Figure 12). Among the unforeseen outcomes identified was that some of the labs that were not due to be done and were inadvertently repeated. None of the foot or ophthalmology exams were ordered as anticipated in all 22 patients. A favorable outcome was that the HbA1c, urine albumin/creatinine, serum creatinine, and GFR were now triggered to be routinely ordered for all 22

patients. Of note, the planned program evaluation was unable to be analyzed. The nurses did not return any of the participant feedback forms which may have been the result of questionnaire fatigue.

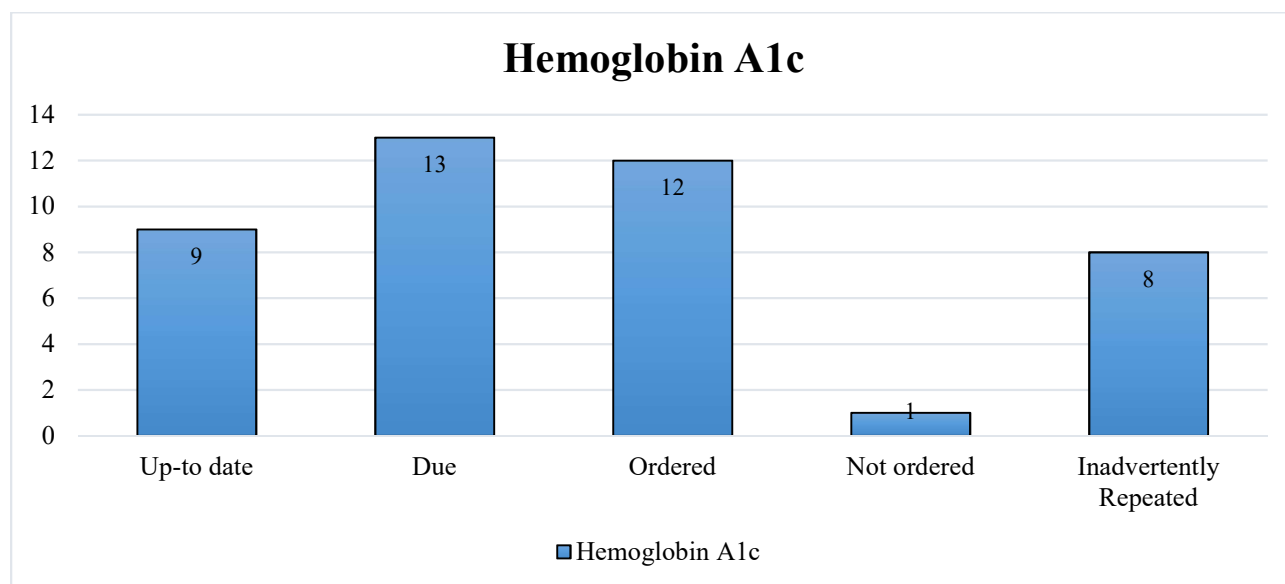


Figure 10. Breakdown of HbA1c tests from chart audit. This figure illustrates the breakdown of HbA1c tests obtained from the 22 inclusive patient chart audit.

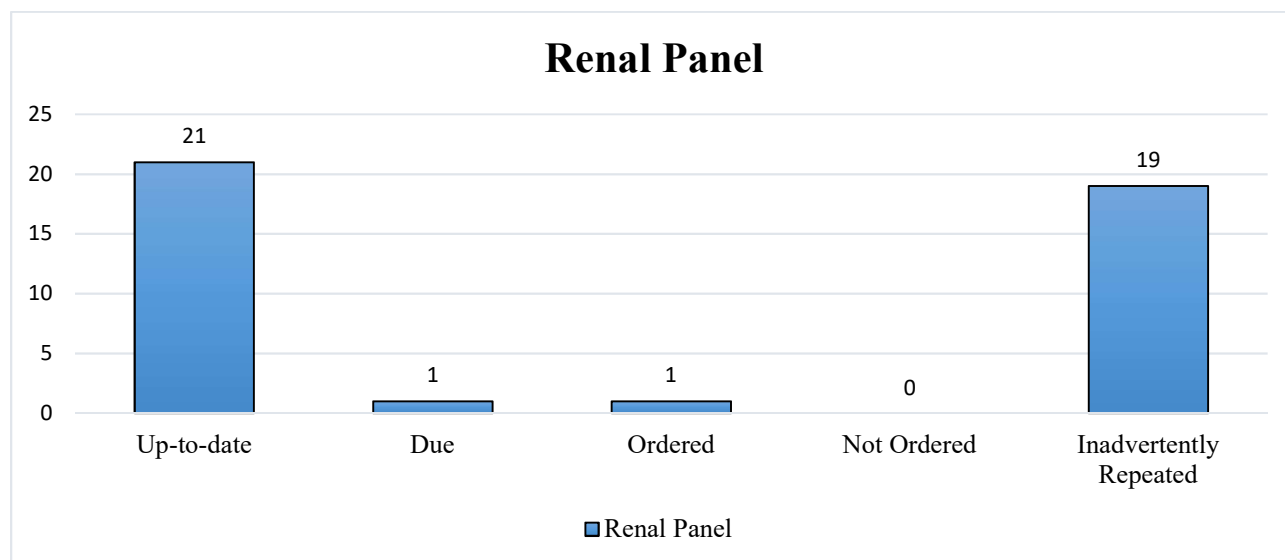


Figure 11. Breakdown of renal panels from chart audit. This figure depicts the breakdown of renal panels obtained from the 22 inclusive patient chart audit.

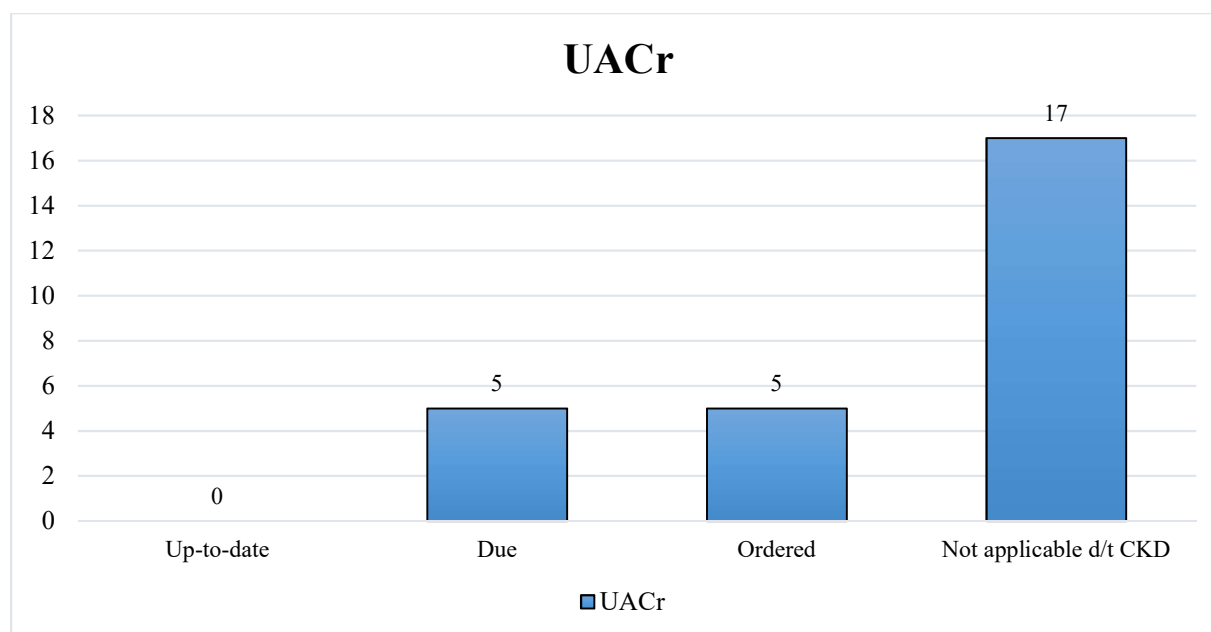


Figure 12. Breakdown of UACRs from chart audit. This figure depicts the breakdown of urine albumin/creatinine from the 22 inclusive patient chart audit

Discussion and Conclusions

Elderly patients with T2DM complicated by co-morbid conditions have higher rates of morbidity and mortality compared to their younger counterparts. Intensive glycemic targets raise this risk even further (ADA, 2017a). Results from the pre-test assessment revealed that there was a general lack of awareness on what the appropriate HbA1c targets were for this population. This finding provided verification that education on what the current ADA diabetes guidelines are was a priority for the nursing staff. Similar concerns were raised by Hausken and Graue (2012) in that there was significant need for nurses to be educated in the appropriate management of T2DM patients who reside in LTCFs. The in-services provided a means of emphasizing that the goal of treatment was to maintain quality of life, preserve independence, and minimize the risk of cardiovascular events triggered by intensive glycemic control, which may result in hospitalization or

death. Improvement in the overall total questionnaire scores indicated that knowledge regarding this type of care was increased. The QI project confirmed that a program specifically designed to improve professional competence for nurses who care for T2DM patients in LTCFs is an effective approach to improving knowledge.

Emphasis on the unreliability of the HbA1c as the indicator for glycemic control was demonstrated by the provider by pursuing those that were inaccurate (5 out of 6). For these patients, the FS are the best measure of glycemic control. Vajen et al. (2012) note that treatment plans exclusively based on HbA1c without reference to daily glucose logs makes it improbable that evidence-based guidelines are being scrupulously adhered to. The FS values are the fail-safe method that pursues the discordance between the HbA1c results and FS values. Medications will hopefully not be discontinued based on the HbA1c results when in fact, the patient's FS were uncontrolled. The provider now has the awareness to order work-ups for anemia as one option to identify the root cause of the discrepant values and to enable timely intervention. This information was of significance since the chart audit revealed that 17 out of the 22 patients had CKD. This finding is a valuable indicator that the patient may have CKD related anemia which can alter the accuracy of the HbA1c results for these patients (Kliger et al., 2013).

For the other required T2DM routine care, use of the checklists and standardized order sheets that specified the frequency of when the HbA1c, UACr, and RFPs was a decisive solution. Final results of the chart audit showed that these labs were now ordered on a routine basis as per the ADA guidelines. Order standardization may help lessen the burden for the APRN and provide the staff some level of accountability in following the recommended routine care for elderly patients with T2DM with poor health conditions. With regards to ophthalmology and podiatry referrals, the outcome was poor related to APRN resistance and healthcare coverage restrictions. Of significance,

64% (17 out of 22) patients had dementia. Thorpe et al. (2012) found that patients with dementia were less likely to receive individual tests such as eye exams. Among the barriers cited were the burden imparted on patients and caregivers in scheduling appointments and arranging transportation compounded by the fact that cooperation in completing the actual exam may be an impossibility due to cognitive deficits. It is important to highlight that the findings supported those of Haugsvet (2016) regarding the presence of discrepancies between diabetes guideline recommendations and clinical diabetes practice in LTCFs, individualized treatment goals for HbA1c, and the establishment of routine T2DM tests and exams.

Limitations

The QI project has limitations. One limitation was that there was a low rate of participation from the nurses. In addition, the management communicated the in-service was not to interfere with the routine care of the patients. Hausken and Graue (2012) cited that the success of a diabetes care training for nurses in a LTCF is considerably dependent on organizational support of the educational program. The in-service was originally scheduled to take place during the monthly staff meeting to capture more nurses, but was canceled due to an unscheduled state inspection. The alternate viable solution was to approach the nurses on a one-on-one basis at opportune times during their shifts.

The different educational needs of the nurses based on previous education and clinical experience was also not considered and may have affected the total scores on the questionnaires. The use of a pre/post-test questionnaire may not necessarily indicate that an improvement in performance occurred but rather, measured the nurses' ability to retain and recall the known facts regarding T2DM care in LTCF residents.

The small sample size of the patients selected for the QI project was also a limitation; but it allowed for the QI project to be conducted in a relatively short amount of time and restricted financial costs.

Lastly, the absence of a centralized electronic medical record had a negative impact on the annotation of individualized HbA1c targets in the progress notes. Van Doorn-Klomberg et al. (2014) found that the use of an electronic patient registry is a positive organizational determinant in the provision of high-quality diabetes care. The silver lining for this project was that despite the barriers faced by the APRN, she was supportive in the development, implementation, and evaluation of the QI project.

Implications and Recommendations

What was derived from this QI project was that an educational in-service regarding evidenced-based T2DM care for LTCF residents was needed by nurses. Future endeavors should be focused on improving the delivery of preventive eye and foot exams for the residents. The essential component to ensure preservation of the resident's quality of life devoid of any diabetes related complications demands collaborative effort from the administration, provider, and nurses. Gershater, Pilhammar, and Riojer (2013) cited that the organization must take the responsibility in taking a proactive approach in formally educating their nurses. It is counterintuitive that the focus of care is provision of acute services for preventable complications. It needs to be communicated to management and healthcare staff that preventive care translates to considerable monetary savings for the LTCF and better health outcomes for its residents and that an investment in staff education may promote these cost savings.

The implications of the QI project for the APRN in a DNP role is that DNP-prepared APRNs are in a prime position to advocate for the delivery of high-quality, evidence-based care which can

achieve positive health care outcomes for our patients. A comprehensive presentation of the role of the DNP in the interdisciplinary team based on the American Association of Colleges of Nursing (AACN) Essentials of Doctoral Education for Advanced Nursing Practice is presented in Table 9.

The presence of co-morbidities and functional limitations that complicate care in the elderly patient with diabetes who resides in LTCF demands the utmost professional competence. As DNP prepared APRNs, the ultimate challenge is to improve diabetes care in nursing homes. Among the lessons learned from this QI project is that even a miniscule improvement can potentially contribute to significant improvements in the LTCF residents' quality of life and favorable organizational support is needed to successfully achieve the objectives of a QI project to allow for its sustainability in the long-run. The role of the APRN with a DNP role is to provide the leadership and expertise to lay the foundation for exceptional diabetes care in LTCF residents.

Table 9

Connection of QI project to DNP role

Essentials	Connection to DNP Role
<i>Essential I: Scientific Underpinnings for Practice</i>	DNPs possess a comprehensive cache of knowledge from other areas of sciences that strengthens the foundation for exemplary practice rooted in scientific knowledge that facilitates successful planning, implementation, and evaluation of the QI project.
<i>Essential II: Organization and Systems Leadership for Quality Improvement and Systems Thinking</i>	DNPs are tasked with promoting improved health outcomes. Exceptional leadership skills and exhaustive knowledge of the processes involved in quality improvement is requisite criteria in order to correct the identified deficiencies in the care of the elderly patients with T2DM in LTCFs.
<i>Essential III: Clinical Scholarship and Analytical Methods for Evidenced-Based Practice</i>	DNPs base translation, application, and evaluation of quality improvement programs from evidenced-based practice to solidify its credibility and guarantee positive health outcomes for T2DM elderly patients with co-morbid conditions residing in LTCFs.
<i>Essential IV: Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care</i>	Where applicable, DNPs are proficient in the use and application of Information/systems technology that can effect positive changes in our faltering health care system.
<i>Essential V: Health Care Policy for Advocacy in Health Care</i>	DNPs take a proactive role in influencing health policies that promote ethical and equitable care for the elderly. Preservation of quality of life and dignity are the fundamental aspects of T2DM care for this vulnerable group.
<i>Essential VI: Interprofessional Collaboration for Improving Patient and Population Outcomes</i>	DNPs are prepared to collaborate with other health care disciplines to achieve the mandate of the Institute of Medicine to achieve safe, timely, effective, efficient, equitable, and patient centered care in a complex health care environment. DNPs are expected to assume a leadership role of function as a highly skilled member of the team where necessary.
<i>Essential VII: Clinical Prevention and Population Health for Improving the Nation's Health</i>	DNPs are qualified to meet the national call for health promotion and disease prevention to achieve the national goal of improving the health of the population of the U.S. It can be initiated on a small scale at a LTCF in elderly patients with T2DM complicated by co-morbidities.
Essential VIII: Advance Nursing Practice	DNPs are primed to function in a variety of health care settings (LTCF) with the distinct capacity to comprehensively integrate requisite knowledge obtained from advance practice training; and apply it to an area of specialized practice (T2DM in the elderly) to affect an improvement in care.

Note. Adapted from The Essentials of Doctoral Education for Advanced Nursing Practice. Copyright 2006 by the American Association of Colleges of Nursing.

References

- Administration on Aging. (2016). *Profile of older Americans: 2015*. Retrieved from https://aoa.acl.gov/Aging_Statistics/Profile/2015/3.aspx
- Agency for Healthcare Research and Quality. (2014). *Clinical guidelines and recommendations*. Retrieved from <https://www.ahrq.gov/professionals/clinicians-providers/guidelines-recommendations/index.html>
- Ahmed, A., Jabbar, A., Zuberi, L., Islam, M., & Shamim, K. (2012). Diabetes-related knowledge among residents and nurses: A multicenter study in Karachi, Pakistan. *BMC Endocrine Disorders*, 12(18) 1-8.
- American Association of Colleges of Nursing. (2006). *The essentials of doctoral education advanced nursing practice*. Retrieved from <http://www.aacn.nche.edu/publications/position/DNPEssentials.pdf>
- American Diabetes Association. (2017a). *Standards of medical care in diabetes – 2017*. Retrieved from www.diabetes.org/diabetescare
- American Diabetes Association. (2017b). *Statistics about diabetes*. Retrieved from <http://www.diabetes.org/diabetes-basics/statistics/>
- Anderson, P. (2013). Managing diabetes in nursing and care homes. *Nursing Times*, 110(34-35), 20-21.
- Barbera, E. (2014). The keys to reducing turnover in long term care. *McKnight's Long Term Care News*. Retrieved from <http://www.mcknights.com/the-world-according-to-dr-el/the-keys-to-reducing-turnover-in-long-term-care/article/333071/>

- Benetos, A., Novella, J., Guerci, B., Blickle, J., Boivin, J., Cuny, P., Delemer, B., Weryham, G. (2013). Pragmatic diabetes management in nursing homes: Individual care plan. *Journal of the American Medical Association*, 14, 791-800.
- Bluestone, J., Johnson, P., Fullerton, J., Carr, C., Alderman, J., & Bon Tempo, J. (2013). Effective in-service training design and delivery: Evidence form an integrative literature review. *Human Resources for Health*. Retrieved from <http://human-resources-health.biomedcentral.com/articles/10.1186/1478-4491-11-51>
- Boston University (n.d.). *Pre- and post-testing*. Retrieved from <http://www.bu.edu/cms/www.bumc.bu.edu/fd/files/PDF/Pre-andPost-Tests.pdf>
- Boulin, M., Diaby, V., & Tannenbaum, C. (2016). *Preventing unnecessary costs of drug- induced hypoglycemia in older adults with type 2 diabetes in the United States and Canada*. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5029920/>
- Burton, T. (2016). *The Best approach to healthcare analytics*. Retrieved from Health Catalyst website <https://www.healthcatalyst.com/process-vs-outcome-measures-healthcare>
- Centers for Disease Control. (2013). *Long-term care services in the United States: 2013 overview*. Retrieved from https://www.cdc.gov/nchs/data/nsltcp/long_term_care_services_2013.pdf
- Centers for Disease Control. (2014). *Diabetes public health resource*. Retrieved from <https://www.cdc.gov/diabetes/statistics/cvd/fig1.htm>
- Centers for Disease Control. (2015a). *Number (in millions) of civilian, non-institutionalized persons with diagnosed diabetes, United States, 1980-2014*. Retrieved from <https://www.cdc.gov/diabetes/statistics/prev/national/figpersons.htm>
- Centers for Disease Control. (2015b). *National diabetes statistics report, 2014*. Retrieved from <https://www.cdc.gov/diabetes/statistics/prev/national/figpersons.htm>

- Centers for Disease Control. (2016). *At a glance 2015: Diabetes, working to reverse the US epidemic*. Retrieved from <https://www.cdc.gov/chronicdisease/resources/publications/aog/pdf/2016/diabetes-aag.pdf>
- Centers for Disease Control. (2016). *Long-term care providers and services users in the United States: Data from the national study of long-term care providers, 2013–2014*. Retrieved from https://www.cdc.gov/nchs/data/series/sr_03/sr03_038.pdf
- Claesen, M., Gillard, P., De Smet, F., Callens, M., De Moor, B., & Mathieu, C. (2016). Mortality in individuals treated with glucose-lowering agents: A large, controlled cohort study. *The Journal of Clinical Endocrinology & Metabolism*, 101(2) 461-469.
- Dartmouth College. (2008). *Global and specific aim statement*. Retrieved from <http://nacfdl.cff.org/Documents/BB06%20Global%20and%20Specific%20Aim%20Statement.pdf>
- Davis, K. L., Wenhui, W., Meyers, J. L., Kilpatrick, B. S., & Pandya, N. (2014). Association between different hemoglobin A1c levels and clinical outcomes among elderly nursing home residents with type 2 diabetes mellitus. *Journal of the American Medical Directors Association*, 15, 757-762.
- Dayal, A. & Alvarez, F. (2015). The Effect of implementation of standardized, evidence-based order sets on efficiency and quality measures for pediatric respiratory illnesses in a community hospital. *Hospital Pediatrics*, 5(12), 624-629.
- De Fronzo, R. (2009). From the triumvirate to the ominous octet: A new paradigm for the treatment of type 2 diabetes mellitus. *Diabetes*, 58, 773-795. <https://doi.org/10.2337/db09-9028>

- Department of Health and Human Services. (2010). *Foot care coverage guidelines*. Retrieved from <https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNMattersArticles/downloads/SE1113.pdf>
- Duke University. (2016). *Chart audits in quality improvement*. Retrieved from http://patientsafetyed.duhs.duke.edu/module_b/quaility_improvement.html
- Fang, F., Xiao, H., Li, C., Tian, H., Li, J., Li, Z., & Cheng, X. (2013). Fasting glucose level is associated with nocturnal hypoglycemia in elderly male patients with type 2 diabetes. *The Aging Male, 16*(3), 132-136.
- Garcia, T. & Brown, S. (2011). Diabetes management in the nursing home. *The Diabetes Educator, 72*(2) 167-187.
- Gershater, A., Pilhammar, E., & Roijer, C. (2013). Prevention of foot ulcers in patients with diabetes in home nursing: A qualitative interview study. *European Diabetes Nursing, 10*(2), 52-57.
- GroupHealth. (2015). *Type 2 Diabetes Screening and Treatment Guideline*. Retrieved from <https://wa.kaiserpermanente.org/static/pdf/public/guidelines/diabetes2.pdf>
- Grove, S., Burns, N., & Gray, J. (2013). *The practice of nursing research* (8th ed.). Philadelphia, PA: Elsevier.
- Hausken, M. & Graue, M. (2012). Developing, implementing and evaluating diabetes care training for nurses and nursing aides in nursing homes and municipal home-based services. *European Diabetes Nursing, 10*(1), 19-24.
- Haugsvedt, A., Graue, M., Aarflot, M., Heimro, L., Johansson, H., Hjaltadottir, I., & Sigurdardottir, A. (2016). Challenges in maintaining satisfactory documentation routines and evidence-based diabetes management in nursing homes. *International Diabetes Nursing, 13*, 37-42.

Huang, E. S. (2016). Management of diabetes mellitus in older people with comorbidities.

British Medical Journal, 353, 1-12.

Huang, E. S., Laiteerapong, N., Liu, J. Y., John, P. M., Moffet, H. H., & Karter, A. J. (2014). Rates of complications and mortality in older patients with diabetes mellitus: The diabetes and aging study. *JAMA Internal Medicine*, 174(2) 251-258.

Iowa State University. (2017). *Needs assessment strategies for community groups and organizations*. Retrieved from <https://rio.urban.uiowa.edu/smart-planning-toolbox/needs-assessment-strategies-for-community-groups-and-organizations>

Jafari B. & Britton, M. E. (2015). Hypoglycemia in elderly patients with type 2 diabetes mellitus: review of risk factors, consequences, and prevention. *Journal of Pharmacy Practice and Research*, 45, 459-469.

Jones, W., Hines, R., Narva, A., & Albright, A. (2014). *Healthy people 2020 progress review: Diabetes and chronic kidney disease*. Retrieved from https://www.healthypeople.gov/sites/default/files/HP2020_%20D_CKD_progress_review_presentation_0.pdf

Kay, J. (2007). *Health care benchmarking*. Retrieved from <http://www.fmshk.org/database/articles/06mbdrflkay.pdf>

Kirkman, M., Briscoe, V., Clark, N., Florez, M., Haas, L., Halter, J, ... Swift. C. (2012). Diabetes in older adults. *Diabetes Care*, 35(12), 2650-2664.

Kirkpatrick Partners. (2017). *The new world Kirkpatrick model*. Retrieved from <http://www.kirkpatrickpartners.com/OurPhilosophy/TheNewWorldKirkpatrickModel/tabid/303/Default.aspx>

- Kliger, A. S., Foley, R. N., Goldfarb, D. S., Goldstein, S. L., Johansen, K., Singh, A., & Szczech, L. (2013). KDOQI US Commentary on the 2012 KDIGO clinical practice guideline for anemia in CKD. *American Journal of Kidney Diseases*, 62(5), 849–859.
- Lee, S. J., Boscardin, W. J., Cenzer, I. S., Huang, E. S., Rice-Trumble, K., & Eng, C. (2011). The risks and benefits of implementing glycemic control guidelines in frail older adults with diabetes mellitus. *Journal of the American Geriatrics Society*, 59, 666-672.
- Lipska, K. J., Ross, J. S., Miao, Y. Shah, N. D., Lee, S. J., & Steinman, M. A. (2015). Potential overtreatment of diabetes mellitus in older adults with tight glycemic control. *JAMA Internal Medicine*, 175(3), 356-362).
- Lund Research Limited. (2012). *Purposive sampling*. Retrieved from <http://dissertation.laerd.com/purposive-sampling.php#homogenous>
- Medicaid.gov. (2017) *List of Medicaid benefits*. Retrieved from <https://www.medicaid.gov/medicaid/benefits/list-of-benefits/index.html>
- Morphy, T. (2017). *Stakeholder definition*. Retrieved from <https://www.stakeholdermap.com/stakeholder-analysis.html>
- National Consumer Voice for Quality Long-Term Care. (2017). *Nursing home reform law (OBRA '87)*. Retrieved from <http://theconsumervoice.org/issues/other-issues-and-resources/federal-resources/nursing-home-reform-law-obra>
- National Institute of Diabetes and Digestive and Kidney Diseases. (2016). *Kidney disease statistics for the United States*. Retrieved from <https://www.niddk.nih.gov/health-information/health-statistics/Pages/kidney-disease-statistics-united-states.aspx>
- Office of Surveillance, Evaluation, and Research. (2015). *2013 diabetes fact sheet –Texas*. Texas Department of State Health Services. Retrieved from <http://dshs.texas.gov/diabetes/tdcdata.shtm>

- Ortman, J. M., Velkoff, V. A., & Hogan, H. (2014). *An aging nation: The older population in the United States*. Retrieved from <https://www.census.gov/prod/2014pubs/p25-1140.pdf>
- Pilotto, A., Noale, M., Maggi, S., Addante, F., Tiengo, A., Perin, C., . . . & Crepaldi, G. (2014). Hypoglycemia is independently associated with multidimensional impairment in elderly diabetic patients. *BioMed Research International*, 2014, 1-7.
- Rodriguez-Poncelas, A., Mundet-Tuduri, X., Miravet-Jimenez, S., Casellas, A., Barrot-De la Puente, J. F., . . . & Coll-de Tuero, G. (2016). *Chronic kidney disease and diabetic retinopathy in patients with type 2 diabetes*. Retrieved from <http://journals.plos.org/plosone/article?id=10.1371%2Fjournal.pone.0149448>
- Roumie, C. L., Min, J. Y., Greevy, R. A., Grijalva, C. G., Hung, a. M., Lui, X., . . . Griffin, M. R. (2016). Risk of hypoglycemia following intensification of metformin treatment with insulin versus sulfonylurea. *Canadian Medical Association Journal*, 188(6), 104-112.
- Smide, B. & Nygren, U. (2013). A pilot study to determine levels of diabetes knowledge among health care workers in nursing homes. *European Diabetes Nursing*, 10(1), 13-18)
- Texas Department of State Health Services. (2016). *Diabetes data: Surveillance and evaluation*. Retrieved from <http://dshs.texas.gov/diabetes/tdcdata.shtm>
- Thorpe, C., Thorpe, J., Kind, A., Bartels, C., Everett, C., & Smith, M. (2012). Receipt of diabetes monitoring in older adults with co-morbid dementia. *Journal of American Geriatrics Society*, 60(4), 644-651.
- Tseng, C. L., Soroka, O., Maney, M., Aron, D. C., & Pogach, L. M. (2014). Assessing potential glycemic overtreatment in persons at hypoglycemic risk. *JAMA Internal Medicine*, 174(2) 259-268.

- University of Michigan Medical School. (2003). Geriatric functional assessment. Retrieved from <http://www.med.umich.edu/lrc/coursepages/m1/HGD/GeriatricFunctionalAssess.pdf>
- Vajen, B. M., Holt, R., Marx, T., Schwartz, F. L., & Shubrook, J. H., (2012). How well are we managing diabetes in long-term care? *Journal of Family Practice*, 61(1), 467-472.
- Van Doorn-Klomberg, A., Braspenning, J., Wolters, R., Bouma, M., De Grauw, W., & Wensing, M. (2014). Organizational determinants of high-quality routine diabetes care. *Scandinavian Journal of Primary Health*, 32, 124-131.
- Vijan, S., Sussman, J. B., Yudkin, J. S., & Hayward, R. A. (2014). Effects of patients' risks and preference on health gains with plasma glucose level lowering in type 2 diabetes mellitus. *JAMA Internal Medicine*, 174(8), 1227-1234.
- Yau, C. K., Eng, C., Cenzer, I. S., Boscardin, W. J., Rice-Trumble, K., Lee, S. J. (2012). Glycosylated hemoglobin and functional decline in community-dwelling nursing home-eligible elderly adults with diabetes mellitus. *Journal of the American Geriatrics Society*, 60, 1215-1221.

Appendix A

Provider and Staff Questionnaire About Routine T2DM Care

Care of the Elderly with T2DM Questionnaire

- 1) Are you aware of the modified HbA1c targets in the elderly?

- 2) What do you think the HbA1c target should be?

- 3) Are you familiar with the diabetes treatment guidelines pertaining to periodic monitoring of complications associated with T2DM such as eye exams, podiatry visits, HbA1c checks, renal function studies, and annual microalbuminuria checks?

- 4) How often do you think their routine care tests should be ordered?

Appendix B

Demographic Sheet for LTCF Chart Review

ID #: _____ Age: _____ Gender: _____

Co-morbid conditions:

Dementia _____ CVA/TIA _____ CAD _____ PVD _____ CKD _____ CHF _____

Lab results:

HbA1c: _____ Dates: _____

Alb/cr: _____ Dates: _____

RFP: _____ Dates: _____

Routine T2DM care:

Ophthalmology:

Podiatry:

Dates: _____

Dates: _____

Reason: _____

Appendix C

HbA1c Treatment Goals for Older Adults with Diabetes

Patient characteristics /health status	Rationale	Reasonable HbA1c Goal
Health (few coexisting chronic illnesses, intact cognitive and functional status)	Longer remaining life expectancy	<7.5% (58 mmol/mol)
Complex/intermediate (multiple coexisting chronic illness or 2+ instrumental ADL impairments or mild-to moderate cognitive impairment)	Intermediate remaining life expectancy, high treatment burden, hypoglycemia vulnerability, and fall risk	<8.0% (64 mmol/mol)
Very complex/poor health (LTC or end-stage chronic illnesses or moderate to severe cognitive impairment or 2+ ADL dependencies)	Limited remaining life expectancy makes benefit uncertain	<8.5% (69 mmol/mol)

Reminders:

- Co-existing chronic illnesses are as follows: arthritis, cancer, congestive heart failure, depression, emphysema, falls, hypertension, incontinence, stage 3 or worse chronic kidney disease, myocardial infarction, and stroke.
- End-stage-chronic illnesses are defined as stages 3-4 congestive heart failure or oxygen dependent lung disease, chronic kidney disease requiring dialysis, or uncontrolled metastatic cancer that may cause significant symptoms or impairment of functional status and significantly reduce life expectancy.
- Loose HbA1c targets higher than 8.5% (69 mmol/mol) is not recommended since this predisposes the patient to more frequent higher blood sugar values that can lead to glycosuria, dehydration, hyperglycemic osmolar syndrome, and poor wound healing.

Appendix D

Conditions that Affect the Accuracy of HbA1c

Conditions	Description
Hemoglobinopathies	Any inherited conditions that alter the oxygen-carrying protein of the red blood cells such as sickle cell anemia and thalassemias -> causes for HbA1c results to be falsely lower
Anemias affecting average lifespan	
Hemolytic anemia or bleeding	Causes increased red blood cell (RBC) production -> more new RBCs relative to entire RBC group --> less time for glycosylation -> lower HbA1c
Iron/B12/Folate deficiency	Causes decreased RBC production -> fewer RBCs relative to entire RBC group -> more time for glycosylation -> higher A1c
Blood transfusion	A1c is unreliable since this is not the patient's blood

Reminders:

- The above clinical conditions will render the HbA1c test unreliable. Use the fingersticks as the measure of glycemic control.
- If a discrepancy between the HbA1c and fingersticks are identified, pursue investigation of possible conditions mentioned above.

Appendix E

LTCF Routine T2DM Checklist.

MICROVASCULAR COMPLICATION		MACROVASCULAR COMPLICATION	
<input type="checkbox"/> Retinopathy/Albuminuria <input type="checkbox"/> Overt Nephropathy <input type="checkbox"/> Neuropathy <input type="checkbox"/> Gastroparesis <input type="checkbox"/> Prior Foot Ulcer Amputations		<input type="checkbox"/> CAD/MI <input type="checkbox"/> CVA/TIA <input type="checkbox"/> PVD	
LABS			
<input type="checkbox"/> Current Due: _____ <input type="checkbox"/> Please order	Hemoglobin A1c	Perform every 3 months unless at goal. If patient is at target, order at least twice annually.	
<input type="checkbox"/> Current Due: _____ <input type="checkbox"/> Please order	Lipid panel	Perform annually.	
<input type="checkbox"/> Current Due: _____ <input type="checkbox"/> Please order	Urine albumin-to-creatinine ratio	Perform annually. <i>DO NOT order if patient has chronic kidney disease.</i>	
<input type="checkbox"/> Current Due: _____ <input type="checkbox"/> Please order	Serum creatinine and calculated GFR	Perform annually.	
EXAMS/REFERRALS			
<input type="checkbox"/> Current Due: _____ <input type="checkbox"/> Please order	Annual dilated and comprehensive eye exam	Perform annually. It may be done less frequently (every 2-3 years) following ≥ 1 normal exams.	
<input type="checkbox"/> Current Due: _____ <input type="checkbox"/> Please order	Annual comprehensive foot examination	Perform annually.	
IMMUNIZATIONS			
<input type="checkbox"/> Current Due: _____ <input type="checkbox"/> Please order	Review eligibility for flu and pneumonia vaccination.	Perform flu shots annually and Pneumonia vaccines as per guidelines. (Administer 1-time dose to PCV13-naïve adults at age 65 years, followed by a dose of PPSV23 12 months later).	

Appendix F

Simplified Order Form for Provider

Standing orders for diabetes mellitus type 2

LABORATORY TESTS:

- ☐ Hemoglobin A1c every 3 months
- ☐ Fasting lipid profile every year
- ☐ Urine Microalbumin/Creatinine ratio every year (*DO NOT order if patient has CKD*)
- ☐ Renal panel every year

IMMUNIZATIONS:

- ☐ Influenza vaccine every year (as per facility schedule)
- ☐ Pneumonia vaccine (Administer 1-time dose to PCV13-naïve adults at age 65 years, followed by a dose of PPSV23 12 months later).

REFERRALS:

- ☐ Dilated eye exam every year
- ☐ Foot exam every year

OTHER:

Provider: _____

Date: _____

Appendix G

HbA1c Conversion Pocket Guide

DiabetesChart

Chart design ©2000-2014
DiabetesChart.org
Chart no. 2

Convert HbA1c (%) to estimated
Average Glucose (mg/dl)

eAG for plasma calibrated meters

HbA1c	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9
Glucose	68	71	74	77	80	82	85	88	91	94
HbA1c	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9
Glucose	97	100	103	105	108	111	114	117	120	123
HbA1c	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9
Glucose	125	128	131	134	137	140	143	146	148	151
HbA1c	7.0	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9
Glucose	154	157	160	163	166	169	171	174	177	180
HbA1c	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9
Glucose	183	186	189	192	194	197	200	203	206	209
HbA1c	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9
Glucose	212	214	217	220	223	226	229	232	235	237
HbA1c	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9
Glucose	240	243	246	249	252	255	258	260	263	266
HbA1c	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9
Glucose	269	272	275	278	280	283	286	289	292	295
HbA1c	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9
Glucose	298	301	303	306	309	312	315	318	321	324
HbA1c	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9
Glucose	326	329	332	335	338	341	344	346	349	352

REMINDERS:

- If HbA1c results conflict with the daily fingerstick values, investigate other medical conditions that may cause a discordance between the two values.
- Contributing factors that may cause a discordance with the HbA1c values particularly for those patients that have conditions that impact the turnover of red blood cells such as low hemoglobin/hematocrit values (causes for HbA1c to be lower), iron deficiency anemia (causes HbA1c to be higher), or recent blood transfusions (HbA1c result is reflective of donor's).

Appendix H

Pre/Post Learning Assessment Questionnaire

Pre/Post Test Questionnaire

- 1) Diabetes blood sugar targets for older adults must take into consideration that these patients:
 - a. Have higher rates of premature death and physical disability
 - b. Are more prone to co-existing illnesses such as hypertension, heart disease, and stroke
 - c. Are significantly at increased risk for common conditions associated with the aging process
 - d. All of the above**
- 2) The HbA1c goal for most patients recommended by the American Diabetes Association should be at:
 - a. <6.5%
 - b. <6%
 - c. <7.0**
 - d. <8%
- 3) Elderly patients with complex health conditions are at _____ mortality risk with tight blood sugar control.
 - a. Higher**
 - b. Lower
- 4) Older people do not need to have regular eye exams, foot exams, and tests of kidney functioning.
 - a. Yes
 - b. No**
- 5) What are two effective ways of lowering the chances of hypoglycemia during transfer of older patients from the hospital to long-term care facilities?
 - a. Telephone call.
 - b. Written medication dosing information and careful medication reconciliation.**
 - c. Face to face conversation between care team members.
 - d. Texts specifying written medication dosing.

Appendix H (continued)

- 6) What would be a reasonable HbA1c goal for a 72-year-old woman with a complex health status, blood pressure of 140/90 mmHG, and fasting glucose of 100 to 150 mg/dL?
- a. <7%
 - b. <7.5%
 - c. <8%**
 - d. <8.5%
- 7) What would be a reasonable HbA1c target for an older patient with a history of recurrent hypoglycemia, limited life expectancy, multiple co-morbid conditions, advanced chronic kidney disease, and a history of strokes?
- a. 6%-7%
 - b. 7%-8%**
 - c. 8%-9%
 - d. 9%-10%
- 8) Which of the following conditions increases the risk for hypoglycemia in older adults?
- a. Chronic liver disease
 - b. Chronic kidney disease**
 - c. Heart Disease
 - d. Gastroparesis
- 9) There is potential to cause harm in lowering HbA1c in older adults to less than 6.5%.
- a. True**
 - b. False
- 10) The priority for older adults with T2DM is the avoidance and prevention of:
- a. Cardiovascular complications
 - b. Hypoglycemia**
 - c. Hyperglycemia
 - d. Hyperlipidemia

Appendix I
Program Evaluation Form
Participant Feedback Form

Date of Session: **Date** 2017

Didactic Topic: **"Title"**

Please indicate your level of agreement with each statement below by checking the appropriate box. Add your comments and suggestions at the end of the form. Thank you.	Strongly Agree	Moderately	Slightly Agree	Slightly Disagree	Moderately Disagree	Strongly Disagree
<u>KNOWLEDGE</u> I had sufficient knowledge of the discussion topic <i>before</i> the presentation/session. I have sufficient knowledge of the discussion topic <i>after</i> the presentation/session.	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
<u>CONFIDENCE</u> I felt confident with regards to the treatment of complex diabetes patients <i>before</i> this session. I feel confident with regards to the treatment of complex diabetes patients <i>after</i> this session.	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
<u>PRACTICE</u> I am likely to make changes to my treatment practice for patients with diabetes based on what I learned in the session today.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>COMMENTS/SUGGESTIONS</u> The delivery method was appropriate. The presenter demonstrated professionalism and expertise in the subject area.	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
What comments or suggestions do you have to help us improve this session?						

Which best describes your professional background?

☐ Physician
☐ LVN

☐ NP/CNS/PA
☐ Non-medical

☐ Registered Nurse

Appendix J

LTFC Chart Audit Form

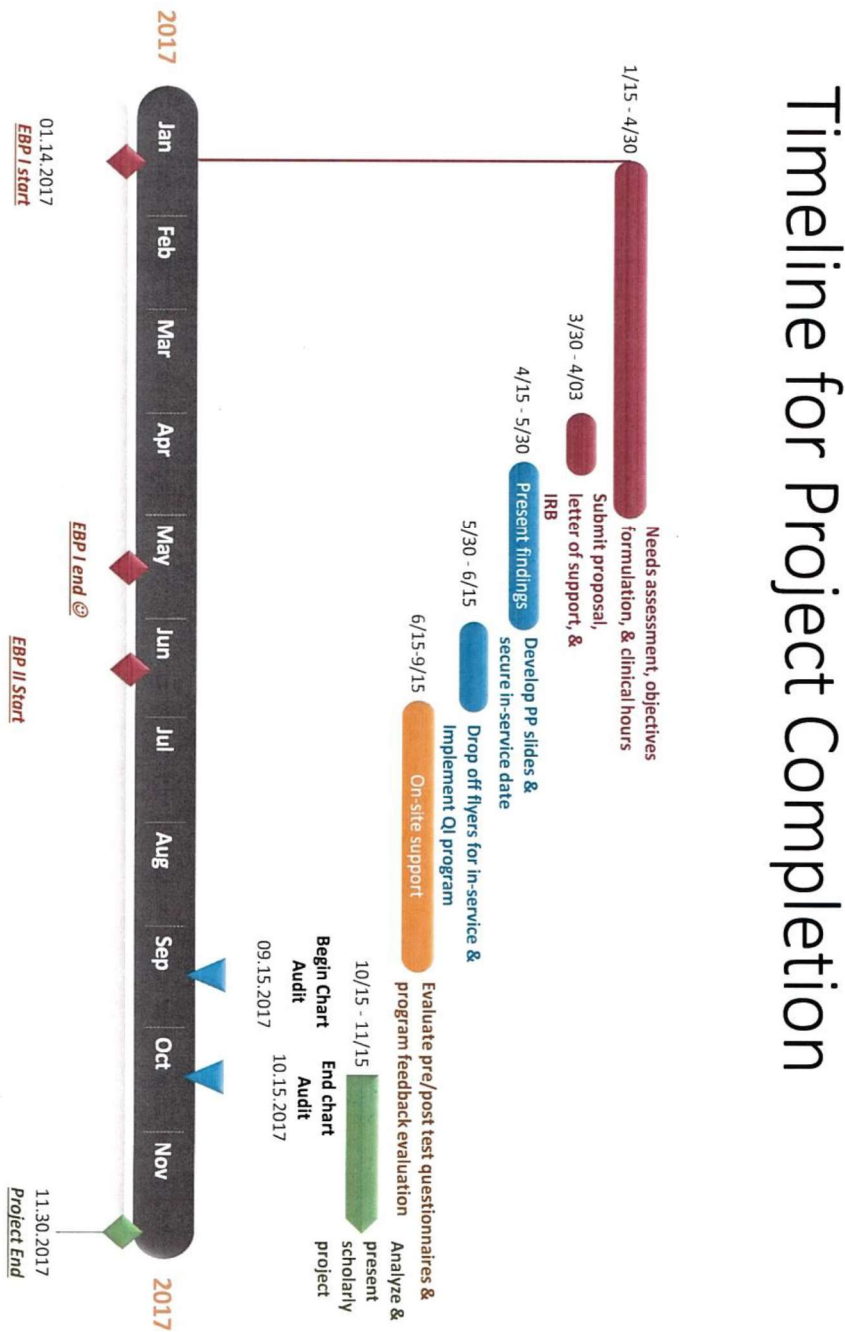
Checklist for LTCF chart audit

Subject ID	Age/ Sex/ Race	Healthcare Coverage	Co-morbid conditions.	Was HbA1c level ordered quarterly?	Was HbA1c discordance investigated?	Was individualized HbA1c annotated in progress notes?	Annual UACR & renal panel present?	Was annual dilated retinal exam ordered?	Annual foot exam ordered?
1		Medicaid	Y	Y	n/a	N	n/a	N	N
2		Medicaid	Y	Y	n/a	N	Y/Y	N	N
3		Medicaid	Y	Y	N	N	Y/Y	N	N
4		Medicaid	Y	Y	Y	N	n/a	N	N
5		Medicaid	Y	Y	Y	N	n/a	N	N
6		Medicaid	Y	Y	Y	N	n/a	N	N
7		Medicaid	Y	Y	Y	Y	n/a	N	N
8		Medicaid	Y	Y	n/a	N	n/a	N	N
9		Medicaid	Y	Y	n/a	N	Y/Y	N	N
10		Medicaid	Y	Y	n/a	N	n/a	N	N
11		Medicaid	Y	Y	n/a	N	n/a	N	N
12		Medicaid	Y	Y	n/a	N	n/a	N	N
13		Medicaid	Y	Y	n/a	N	n/a	N	N
14		Medicaid	Y	Y	n/a	N	n/a	N	N
15		Medicaid	Y	Y	n/a	Y	n/a	N	N
16		Medicaid	Y	Y	Y	N	n/a	N	N
17		Medicaid	Y	Y	n/a	N	n/a	N	N
18		Private	Y	Y	n/a	N	Y/Y	N	N
19		Private	Y	Y	N	N	n/a	N	N

Subject ID	Age/ Sex/ Race	Healthcare Coverage	Co-morbid conditions.	Was HbA1c level ordered quarterly?	Was HbA1c discordance investigated?	Was individualized HbA1c annotated in progress notes?	Annual UACR & renal panel present?	Was annual dilated retinal exam ordered?	Annual foot exam ordered?
20		Medicaid	Y	Y	n/a	N	n/a	N	N
21		Medicare	Y	Y	n/a	Y	Y/Y	N	N
22		Medicaid	Y	Y	n/a	N	n/a	N	N
23									
24									
25									

Notes:

Appendix K
Project Timeline



Appendix L

2017 ADA Routine T2DM Care Guidelines

Laboratory Tests and Why?	Frequency
<i>Hemoglobin A1c (HbA1c)</i> measures the amount of glucose attached to the red blood cells. It shows the average blood sugar level for the past 2-3 months.	Every three months.
<i>Urine check for microalbumin (alb/cr)</i> checks the urine for small proteins (microalbumin) which is a hallmark for early kidney damage.	Once a year.
<i>Lipid Profile</i> measures the level of triglycerides and total cholesterol.	Once a year or more often if needed.
Physical Exams and Why?	Frequency
<i>Retinal eye exam by ophthalmologist</i> exam involves taking a picture of the eye with a special camera without having to dilate the eye to check for signs of nerve damage to the eye (retinopathy).	Once a year for those with retinopathy. Every 2 years for those who do not have signs of retinopathy.
<i>Foot exam by podiatrist</i> checks for foot problems such as calluses, bunions, sores, and loss of sensation on the feet to allow for early intervention and prevent serious complications.	Once a year. More often if foot problems are identified.
Immunizations and Why?	Frequency
Flu and Pneumonia shots people with diabetes are at high risk for acquiring the flu and pneumonia vaccine	Every year for flu shot. <u>Pneumonia:</u> 1 dose of PCV13 and at least 1 dose of PPSV23 depending on age and health status.