Improving Type 2 Diabetes Mellitus Related Clinical Inertia in Primary Care

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Abstract

Background: Clinical inertia (CI) is a phenomenon where there is a delay of initiation or intensification of chronic disease management. Type 2 Diabetes Mellitus (T2DM) is primed for provider driven CI due to the rapid development and availability of diabetes-related medications, provider beliefs, and role ambiguity. These factors can overwhelm Primary Care Providers (PCPs) and lead to suboptimal diabetes management. An evidence-based solution to combat provider driven CI recommends a structured continuing education program focused on current American Diabetes Association (ADA) guidelines.

PICO: In a primary care clinic, how does a diabetes mellitus (DM) education program and intensive diabetes care clinic (IDCC) optimization impact provider attitudes towards DM management, medication use, and IDCC utilization?

Project Design: Pre/post education intervention for twelve family medicine PCPs consisted of seven weekly 20-minute sessions taught by a clinical pharmacist. Session topics covered current ADA guidelines, anti-diabetic medications, and IDCC referral criteria. The Diabetes Attitude Survey version 3 (DAS3) questionnaire was completed pre and post-intervention. PCP anti-diabetic medication prescribing history and IDCC utilization was audited monthly, beginning three months prior through one month after intervention.

Results: Medication use audit showed an increase in anti-diabetic medications prescribed during/post-intervention (p = .003). There was an increase in newer generation drug classes prescribed during/post-intervention (p =.009). DAS3 pre/post provider attitudes showed no overall statistical change. Providers under the age of 40 were more likely to perceive that patients should have autonomy in T2DM management (p =.043). IDCC showed no change in utilization.

Implications for Practice: T2DM left uncontrolled may affect medical readiness by limiting service member assignability, deployability, and retention. Prescribing newer generation anti-diabetic medications can aid patients to achieve control and meet standards for retention. PCPs collaborating with patients to improve T2DM can delay disease progression and improve patient outcomes.

Improving Type 2 Diabetes Mellitus Related Clinical Inertia in Primary Care

Introduction

Diabetes mellitus (DM) affected 34.1 million of the United States population aged 18 and older and was the seventh leading cause of death in the United States (Centers for Disease Control and Prevention, 2020). DM is a metabolic disorder characterized by an insufficient amount of insulin produced from the pancreas, or the body's inability to utilize insulin (World Health Organization, 1999). Type 2 diabetes mellitus (T2DM) is characterized by prolonged, elevated blood glucose levels and tissue that does not respond well to insulin. The United States military has 61,500 service members with the diagnosis of diabetes, of which over 16,000 are on anti-diabetic medications (Department of Defense [DOD], 2019; Meadows et al., 2015). This posed a readiness issue as service members diagnosed with T2DM may have limited worldwide assignability, be prohibited from deploying, or be medically separated from military service due to the severity of the member's diabetes (DOD, 2011).

Clinical inertia is a phenomenon that hinders primary care providers (PCPs) from optimizing T2DM management and preventing T2DM co-morbid conditions. Clinical inertia is defined as the delay of the provider to "...initiate or intensify treatment or taking treatment steps that do not follow evidence-based guidelines" (Reach et al., 2017, p. 501). Reach et al. (2017) stated that a provider's behavior can be considered clinical inertia if all the following occurred: there was a specific guideline, the provider was aware of the guideline, they believed the guideline applied to the patient, and resources to apply the guideline were available, yet the provider did not follow the guideline. PCPs without the knowledge of newer generation anti-diabetic medication and T2DM management guidelines could have been a driving factor of

clinical inertia.

The seemingly simple solution to controlling a patient's T2DM was to utilize the plethora of newer generation medications (Reach et al., 2017). There were 12 different anti-diabetic drug classes with an additional 560 diabetes-related medications in development (Harris et al., 2020). This rapid development of newer generation anti-diabetic medications may have overwhelmed PCPs and led to suboptimal DM management. Additionally, there was a higher prevalence of T2DM that moved disease management away from specialty providers, such as certified diabetic educators and endocrinologists, to the PCP (Harris et al., 2020). PCPs were comprised of advanced practice nurses, physician assistants, and physicians. PCPs were prompted to manage patients in a standard 20-minute appointment. These appointments included acute and chronic concerns such as T2DM. In contrast, a specialist typically had longer appointment times and focused on singular disease management.

Problem Synthesis

Clinical inertia was multifactorial and influenced by the PCP, patient, and healthcare system (Ruiz-Negron et al., 2019). This project specifically addressed provider driven factors of clinical inertia. A PCP's professional practice which led to clinical inertia included the following: limited knowledge of how to manage T2DM or knowledge about available anti-diabetic medications, the PCP's behavior such as lack of confidence in treatment intensification, emotions created by management of T2DM for non-adherent patients, role ambiguity with the management of patients seen by multiple specialists, and beliefs surrounded by consequences of treatment intensification (Rushforth et al., 2016). DeFronzo (2009) stressed that clinical inertia needed to be addressed; elevated and sustained blood glucose levels led to disease progression, microvascular, and macrovascular damage to multiple organ systems.

A hemoglobin A1C (A1C) laboratory value represented a 3 month blood glucose average (American Diabetes Association [ADA], 2023). Evaluation of a patients T2DM disease state was monitored with recurrent A1C values, which helped determine whether a patient is meeting glycemic control (ADA, 2023). The 2022 ADA guideline set an A1C target goal of less than 7.0%. Therefore, a sustained A1C greater than 7.0% despite multiple PCP appointments was indicative of clinical inertia (ADA, 2022).

Local Needs Assessment

Data was pulled regarding DOD wide T2DM prevalence within the Military Health System. There was a total of 2.9 million TRICARE beneficiaries with T2DM (Chao et al., 2013). Navy Medicine Readiness and Training Command (NMRTC) Bremerton Family Medicine Clinic (FMC) had 911 patients diagnosed with T2DM and of those patients over 500 had an A1C greater than 7.9% (L. McEntire, personal communication, November 22, 2021). Per clinic policy, newly diagnosed patients, and patients with uncontrolled T2DM should have been referred by their PCP to the Intensive Diabetes Care Clinic (IDCC). This 90-minute appointment consisted of three 30-minute meetings with the registered dietitian, embedded clinical pharmacist, and provider, respectively.

NMRTC's FMC IDCC was started four years ago and ran twice a month, historically booking to the full capacity of 10 appointments per session. Prior to project implementation, the IDCC ran once a month and scheduled an average of 6 to 8 of the 10 allotted appointments. This was due to a gradual decrease in the number of referrals placed and shifting personnel (S. Walsh, personal communication, June 13, 2022).

Relevance to Military Nursing

Medical readiness was defined as "…service members are free from health-related

conditions…that could limit their ability to care out their duties" (Brauner et al., 2012). T2DM directly affected medical readiness. U.S. military service members diagnosed with T2DM may have had limited assignability, deployability, or have been medically separated due to disease severity (DOD, 2011). T2DM controlled without the use of insulin or long-acting sulfonylurea medication may have been considered for a waiver to regain readiness (DOD, 2011). PCPs who were well versed in updated T2DM management guidelines were poised to utilize newer generation anti-diabetic medications that are in line with retention standards.

T2DM was a chronic and complicated disease that required frequent monitoring of blood glucose levels and medication alterations. Collaborating with patients to improve glucose levels and delay disease progression allowed them to remain fit for duty and worldwide deployable. The Navy fleet relied on the medical team to screen, educate, and provide care to our warfighters, which kept in line with the Surgeon General's goal of "ensuring our warfighters are medically ready to fight today and tomorrow" (Gillingham, n.d.).

Clinical Question

In a primary care clinic, how does a diabetes mellitus (DM) education program and Intensive Diabetes Care Clinic (IDCC) optimization impact provider attitudes towards DM management, DM medication use rates, and IDCC utilization?

Search Strategy/Results

A literature review was performed using PubMed@USU and Uniformed Services University of the Health Sciences Learning Resource Center PowerSearch. The following search terms were applied: "primary care providers", "clinician", "military", "active duty", "knowledge", "attitude", "fear", "uncertainty", "lack of confidence", "knowledge gap", "decision making", "influence", "implementation", "education intervention", "American

Diabetes Association", "diabetes treatment", "management", and "maintenance". Human studies on adults aged 18 and older published between May 1999 and April 2021 were selected. Inclusion criteria consisted of the following: articles published between May 1999 and April 2021, written in English, found in scientific journals, and studies conducted on human subjects. Exclusion criteria consisted of the following: animal studies, written in languages other than English, and human subjects younger than age 18.

Data was collected independently by two blinded reviewers via Covidence. Both agreed with the articles selected. 70 studies were imported for screening, 3 duplicates were removed, leaving 67 studies to be screened against the title and abstract. 13 studies were excluded due to irrelevance. 54 studies were reviewed for full-text eligibility. 44 studies were excluded at this time for the following reasons: wrong study design, not a solution for topic, wrong subject, other study with this topic is better, older study, language other than English, study about treatment, wrong comparator, wrong indication, and wrong intervention. 10 studies were included in the final literature review. See appendix A for the PRISMA data table.

The Johns Hopkins Nursing Quality of Evidence-Based Practice Guide was utilized on the 10 remaining studies for solution synthesis (Dang et al., 2022). Each article was appraised by both team members and conflicts were resolved by discussion. The appraisal process provided the following levels of evidence of the 10 reviewed articles: one IA article, one IC article, one IIA article, one IIB article, one IIIA article, two IIIB articles, two VA articles, and one VB article. See appendix B for the critical appraisal evidence table.

Solution Synthesis

Upon literature review completion, four solutions were found as potential provider focused solutions to clinical inertia. These solutions were:

- implementing Nurse Certified Diabetic Educators into the primary care clinic,
- feedback and reminders to PCPs regarding their patients A1C,
- integrating Clinical Pharmacist into the management of diabetic patients, or
- providing education to the PCPs to enhance their knowledge of anti-diabetic medications and guidelines (Almetahr et al., 2020; Beaser & Brown, 2013; Cowart & Sando, 2019; Luo et al., 2019; Marcial & Graves, 2019; Meredith et al., 2020; Zgibor et al., 2018; Ziemer et al., 2006).

After reviewing all possible evidence-based practice solutions for applicability, feasibility, and effectiveness in addressing provider driven clinical inertia at NMRTC's FMC; our team implemented continuing education that focused on anti-diabetic medications and updated ADA guidelines delivered by a subject matter expert (SME). Per Luo et al. (2019) the SME may be a trained individual with at least one advanced degree who had acquired expert knowledge regarding new anti-diabetic medications and updated ADA guidelines; this project had two embedded clinical pharmacists acting as SMEs.

An accumulative two hours of training by the clinical pharmacist was needed as seen in Beaser and Brown (2013) and Marcial and Graves (2019), with the opportunity for additional time. Weekly training was conducted during the clinic's provider meeting. A total of five 20-minute sessions was completed to inform the providers about the updated ADA guidelines and new anti-diabetic medications. Multiple education sessions lasted no more than 20 minutes to aid in adult learning, attention, and comprehension (Bradbury, 2016). Two additional sessions were facilitated for the completion of pre and post-intervention attitude questionnaires and IDCC criteria review.

Focus Areas

The main focus of this project was to decrease provider driven clinical inertia pertaining to T2DM management. There were three aims for this project. The first aim was to create a T2DM educational program to enhance anti-diabetic medication knowledge and increase provider confidence in managing T2DM patients (Rushforth et al., 2016). The second aim was to provide weekly education on ADA guidelines and anti-diabetic medication via a SME. The third aim was to evaluate for change in provider prescribing practices, provider attitudes, and IDCC utilization.

Business Case Analysis

See appendix C.

Organizing Framework

The RE-AIM framework was used to evaluate the project's interventions and assess its applicableness in a military primary care clinic (Glasgow & Estabrooks, 2018). RE-AIM (Reach, Effectiveness, Adoption, Implementation, and Maintenance) provided an easy roadmap to evaluate health interventions focused on changing individual behaviors (King et al., 2010). The project's intention was to **R**each the entire provider population within the FMC. The **E**fficacy of the intervention was to look for change in attitude and utilization rates. **A**doption consisted of the number of providers who agreed to make a change (i.e., applying the ADA guidelines) in their practice. **I**mplementation measured the degree to which providers changed their practice. Providers' capability to **M**aintain their newly changed practice over time is the final stage.

Project Design

General Approach

This project utilized a multimedia pre and post-educational intervention aimed at decreasing provider driven clinical inertia. Pre and post-intervention data were collected to

assess provider attitudes towards T2DM, provider prescribing use of anti-diabetic medication, and for change of IDCC utilization rates.

Setting and Population

NMRTC's FMC was a military outpatient clinic located in Bremerton, WA. There were 10,408 empaneled patients with 911 patients that had been diagnosed with T2DM (L. McEntire, personal communication, November 22, 2021; K. West, personal communication, November 30, 2021). Of the 911 patients with T2DM, over 500 had an A1C greater than 7.9% (S. Walsh, personal communication, June 13, 2022). The clinic was staffed by 15 licensed PCPs, one clinical pharmacist, and two population health registered nurses (R. Newnam, personal communication, November 9, 2021).

Participants

The staff involved in the intervention consisted of 12 full time, empaneled providers that included nurse practitioners, physician assistants, and physicians assigned to the NMRTC's FMC. Three providers did not meet inclusionary criteria to participate in the intervention as they were categorized as part-time, not empaneled, or as needed providers.

Procedural Steps with Timeline

Medication Use Audit. Retrospective medication utilization reports for each provider were generated. The P0630 Report was generated for the three months prior to project implementation then monthly until one month past the intervention.

IDCC Utilization Audit. The IDCC schedule was audited pre, during, and post-intervention. The number of appointment slots booked was compared to the total number of appointments available. This audit was conducted monthly for three months prior to project implementation then monthly until one month past the intervention.

Educational Intervention. Each education session was recorded with the conference room media or project lead personal recording device. No patient information was discussed or displayed. Verbal consent was obtained from all participants prior to recording. Recordings were distributed internally via secure email and the clinic shared drive. Providers unable to attend were able to retrospectively watch the session. Additionally, providers were able to refer to recordings as a resource. Attendance was collected each week with in-person or completion of virtual recording verified.

Week 1. The first week consisted of the pre-intervention DAS3 questionnaire completion. If a provider was unable to attend, a DAS3 questionnaire was provided and asked to be completed prior to attending any educational sessions. The IDCC referral criteria was discussed. This session lasted 10 minutes.

Week 2. The second week consisted of a 20-minute education session on 2022 ADA guidelines. Providers received a printed version of the current ADA Professional Practice Committee's "Pharmacologic treatment of hyperglycemia in adults with type 2 diabetes" handout. See appendix D.

Week 3. The third week consisted of a 20-minute educational session on Biguanides and Sodium-glucose co-transporter 2 (SGLT2) inhibitors. Providers received a handout from the ADA titled "Drug-specific and patient factors to consider when selecting anti-hyperglycemic treatment in adults with type 2 diabetes" table. See appendix E.

Week 4. The fourth week consisted of a 20-minute education session on Glucagon-like peptide 1 (GLP-1) agonists and Dipeptidyl peptidase 4 (DPP-4) inhibitors.

Week 5. The fifth week consisted of a 20-minute education session on Thiazolidinediones (TZDs) and second generation Sulfonylureas.

Week 6. The sixth week consisted of a 20-minute education session on insulin and available glucose monitoring equipment.

Week 7. The seventh week consisted of the post-intervention DAS3 questionnaire completion. The IDCC referral criteria was discussed a second time. This session lasted 10 minutes.

Measures

P0630 Report. The "P0630 Report" in the Citrix Workspace electronic healthcare record was used to generate reports of anti-diabetic medication type and frequency prescribed per provider. The report was generated monthly, beginning three months before the intervention, and continued monthly until one month after the intervention. The report contained the following information: month, provider name, anti-diabetic medication name, quantity of medication dispensed, number of days' worth of medication, medication dosage, medication refills, and date medication prescribed. The following data was collected: month, provider identification number, anti-diabetic medication name, quantity of medication dispensed, number of days' worth of medication, medication route, medication dosage, medication frequency, and medication refills. A predesignated number was given to each individual provider. A separate document included an identification key regarding which number was given to each provider.

IDCC utilization. A measurement of the IDCC utilization was conducted by a pre and post-intervention chart audit. The IDCC schedule was audited monthly, beginning three months before the intervention, and continued monthly until one month after the intervention. The number of appointments scheduled was compared to the total number of appointments available. No patient information was gathered.

Diabetes Attitude Survey. The University of Michigan Diabetes Research and Training

Center's Diabetes Attitude Survey version 3 (DAS3) was utilized to assess provider attitudes pre and post-intervention as described in Marcial and Graves (2019), Almetahr et al. (2020), Beaser and Brown (2013), and Corriere et al. (2014). The DAS3 was a valid and reliable general measure of diabetes-related attitudes for providers (Anderson et al., 1998). There were five subscales encompassed: 1) need for special training to provide diabetes care, 2) seriousness of T2DM, 3) value of tight glucose control, 4) psychosocial impact of diabetes, and 5) attitude toward patient autonomy (Anderson et al., 1998). Cronbach's alpha for each defined subscale were as follows: need for special training, 0.67; seriousness of type 2 diabetes, 0.80; value of tight control, 0.72; psychosocial impact of diabetes, 0.65; and patient autonomy, 0.76 (Anderson et al., 1998). The content validity of DAS3 was assured using the modified Delphi technique that involved interaction with the panel by mail. Anderson et al. (1998) stated that "[t]he Delphi technique is a method developed to facilitate the interaction of a panel of peers about a particular topic so that each expert's input is given equal consideration" (p. 1404). The panel consisted of physicians, nurses, dietitians, social workers, and patients from the University of Michigan Diabetes Research and Training Center.

This 33-statement survey utilized a five-point Likert scale with the options of: strongly agree, agree, neutral, disagree, or strongly disagree (Anderson et al., 1989). The means score within each subscale indicated how strongly the provider believed in the importance of the attitudes represented in the subscale. Pre and post-intervention mean scores from each of the five above-mentioned subscales were then compared for outcomes. On average it took six minutes for providers to complete the DAS3 questionnaire. See appendix F.

Data Analysis Plan

The results of this project were evaluated using descriptive statistics. The data for this

project was analyzed using IBM SPSS statistics version 28 (DAS3 questionnaire) and R version 4.0.2 (medication use reports). Provider attitudes regarding T2DM were compared pre and post-intervention. Prescribing practices of anti-diabetic medications of each provider was compared pre, during, and post-intervention. Additionally, utilization of the IDCC was compared pre, during, and post-intervention. Refer to appendix G for the data analysis table.

Potential Barriers

One potential barrier to the implementation of this EBP project included provider's perception of interference with clinic or administration time. To mitigate this barrier the project team presented a clear, beneficial program that could be easily implemented and replicated. The project leads engaged with command leadership and clinic providers prior to the intervention to review the purpose and logistics of the project. Emphasis was placed that no additional time was added to the provider's schedule to complete DAS3 questionnaires or educational session participation. All training sessions were conducted during preauthorized administrative time focused on clinical updates and education.

Other barriers included small population sample, tight project turnaround, and limitation in data system for retrospective medication prescribing review. Future projects could consider expanding training to multiple clinics or a larger group of providers. Due to time constraints, tracking of patient A1C was not an option. Adding this data point could have been beneficial in evaluating provider's response to the educational program. Furthermore, the P0630 Report used to generate monthly medication use by provider did not contain International Classification of Diseases version 10 codes as a categorical option. Therefore, the data extracted was unable to delineate whether an anti-diabetic medication was prescribed for T2DM versus another chronic disease. This was important as some anti-diabetic medications were utilized for other co-

morbidities (i.e., chronic kidney disease, polycystic ovarian disorder, obesity, congestive heart failure, etc.). This distinction could have added validity to the data to ensure medications prescribed are specific for patients diagnosed with T2DM.

Lastly, patient resistance may have been another barrier as patient's adherence to T2DM treatment are individual and variable. NMRTC Bremerton practiced a patient-centered medical homeport model where there was a shared decision making process. This project was aimed to decrease provider driven clinical inertia, not patient's attitude regarding T2DM management.

Sustainment and Dissemination Plan

Upon completion of the project, the team evaluated and presented findings to key stakeholders. A presentation was conducted during a NMRTC Bremerton FMC provider meeting of the project's findings. Project leads encouraged NMRTC Bremerton FMC leadership to include T2DM anti-diabetic medication and ADA guideline training annually to providers. A program champion was encouraged to be appointed for integration and maintenance of the project into clinic practice.

A presentation was given to NMRTC Bremerton's Chief Nursing Officer and Director of Medical Services. Project results disseminated via poster at Tri-Service Nursing Research Program Dissemination course and 2023 Uniformed Services University research week. Accepted for podium presentation at 2023 American Association of Nurse Practitioners national conference.

Health Insurance Portability and Accountability Act (HIPAA) Concerns

Standard privacy practices were maintained throughout the project. No patient or protected healthcare information (PHI) was retained, ensuring preservation of patient healthcare privacy. Information was stored on a common access card (CAC) enabled computer.

Provider's names and DAS3 questionnaire results were considered for official use only and kept confidential. A predesignated number was given to each individual provider with the same number given on the pre and post-intervention DAS3 questionnaire. A separate document included the identification key for which number was given to each provider. If providers, staff, or others had concerns related to this project, they were referred to Madigan Army Medical Center's Institutional Review Board Exempt Determination Officer.

Project Results

This project consisted of three primary arms. The first arm of the study measured provider attitudes pre and post-intervention. A double-entry method for data entry was utilized to minimize error. Differences were tested using Wilcoxon Sign Rank. The second arm of the study measured IDCC utilization pre, during, and post-intervention. The third arm of the study measured medication use pre, during, and post-intervention. Differences were tested using Chi-Square. A P-value of .05 or less was considered significant for both arms.

Demographics

There were 12 full time empaneled providers, all of which participated. Staff ranged from age 29-67 with 50% between age 29-40 and 50% between age 41-67. 66.6% were female, and 33.3% were male. Table 1 contains sample characteristics of providers that participated.

Table 1

Provider Sample Characteristics

Characteristic	N	%
Age		
Less than 40	6	50
Greater than 40	6	50
Gender		
Male	4	33.3
Female	8	66.7

Race		
Black	1	8.3
White	8	66.7
Hispanic	0	0
Asian	1	8.3
Native American/ Pacific Islander	0	0
Other	2	16.7
Prefer not to say	0	0
Employment Status		
Active Duty	8	66.7
Civilian G.S.	3	25.0
Contractor	1	8.3
Credentials		
FNP	3	25
PA	1	8.3
MD	7	58.3
DO	1	8.3
Rank		
LT/O3	5	41.7
LCDR/O4	2	16.7
CDR/O5	1	8.3
GS	3	25.0
CTR	1	8.3
Years in Practice		
Less than 10	9	75
More than 10	3	25

Retrospective medication audits were performed monthly starting three months before the intervention then monthly through one-month post-intervention. A total of 479 anti-diabetic medications were prescribed pre-intervention with an increase to 668 anti-diabetic medications prescribed during/post-intervention ($p = .003$). Linear regression was used to assess for change in prescribing practices from pre-intervention to intervention. SGLT-2 inhibitors and GLP-1 receptor agonists had an increase in prescriptions ($p = .009$). SGLT-2 inhibitors were prescribed 26 more times in the intervention phase with a percentage change increase of 7.1. GLP-1 receptor agonists were prescribed 71 more times in the intervention phase with a percentage change increase of 1.2. While Biguanides increased in prescribing from 219 to 301, there was a

percentage change decrease of 0.2. Table 2 contains pre-intervention and intervention medication utilization results. Picture 1 contains pre-intervention and intervention medication utilization percentage change results.

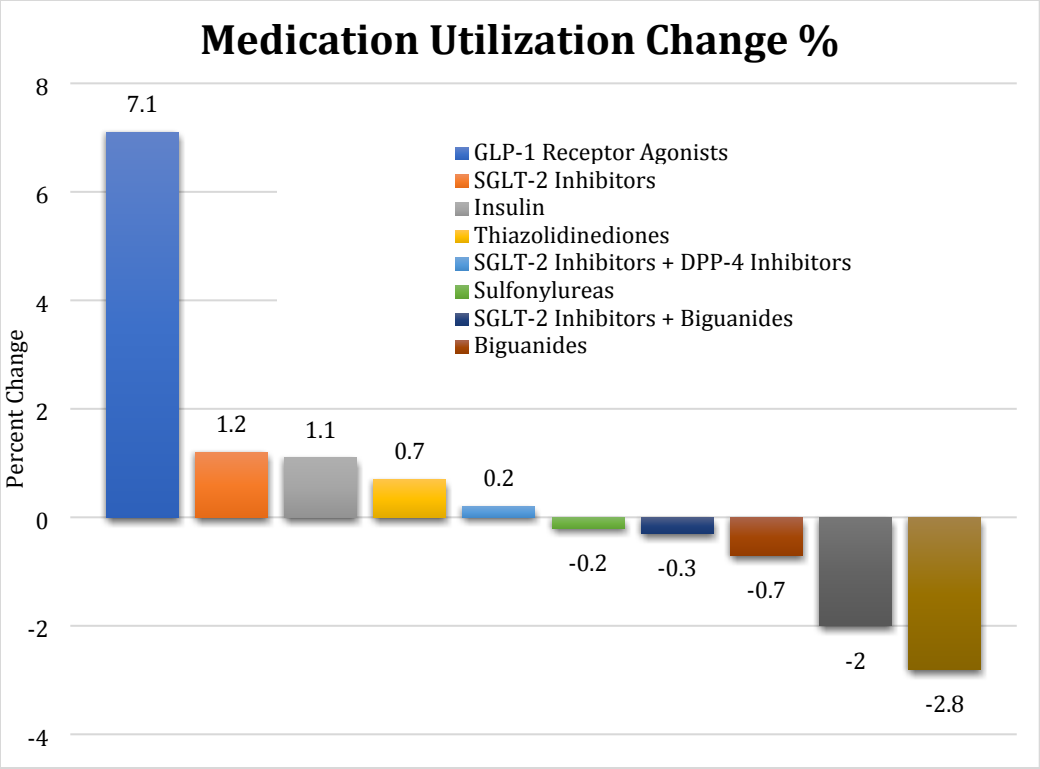
Table 2

Medication Utilization Pre-intervention and Intervention

Class	**Pre-Intervention**	**Intervention**
Biguanides	219	301
SGLT-2 Inhibitors	86	112
GLP-1 Receptor Agonists	59	130
DPP-4 Inhibitors	26	18
Thiazolidinediones	2	8
Sulfonylureas	9	11
Insulin	44	54
DPP-4 inhibitors + Biguanides	32	31
SGLT-2 inhibitors + Biguanides	2	1
SGLT-2 inhibitors + DPP-4 inhibitors	0	2
Total	**479**	**668**

Picture 1

Medication Utilization Change Pre-intervention and Intervention



IDCC Utilization

There were no changes in the number of patients booked into appointments or the number of unbooked available appointments. The IDCC was offered twice monthly in September and January, while maintaining a once monthly frequency in all other months. Table 3 contains monthly data of IDCC appointment utilization.

Table 3

IDCC Appointment Utilization

Month	# Patients Seen	# Appointments Available	% Patients Seen
August	6	9	66%
*September	10	14	71%
October	2	6	33%
November	5	7	71%
December	5	6	83%
*January	9	10	90%
February	6	9	66%

*Held twice during the months of September and January

Diabetes Attitude Survey

Pre to post-intervention DAS3 questionnaire showed no overall statistical change in provider attitudes. Due to small sample size, median results were used. A Wilcoxon signed rank test was performed showing no changes in pre or post-intervention subscales for need for special training (z = -1.095, p = .273), seriousness of T2DM (z = -.051, p = .959), or value of tight control (z = -.179, p = .858). There was a decrease in the median for psychosocial impact of DM (z = -.302, p = .763) and patient autonomy (z = -.944, p = .345), but it was not statistically significant. Table 4 contains the pre to post-intervention DAS3 subscale change variants.

Table 4

DAS3 Pre- to Post-intervention Subscale Change Variants

Median	Pre-intervention	Post-intervention	Change variable analysis	Wilcoxon-signed rank
Need for Special Training Subscale	4	4	0	p = .273 (z= -1.095)
Seriousness of T2DM subscale	3.8571	3.8571	0	p = .959 (z= -.051)
Value of Tight Control subscale	3.8571	3.8571	0	p = .858 (z= -.179)
Psychosocial Impact of DM subscale	4.1667	4	.1667	p = .763 (z= -.302)
Patient Autonomy subscale	4.125	4	.125	p = .345 (z= -.944)

Mann-Whitney U test was performed to evaluate whether there was a change in attitude amongst subscales pre- to post-intervention based on provider characteristics of age, gender, and combined credentials of physician (MD or DO) and non-physician (FNP and PA). Kruskal-

Wallis test was performed the evaluate whether there was a change in attitude amongst subscales pre- to post-intervention based on provider characteristics of race, employment status, rank, and years in practice. There was no change in attitude amongst subscales based on gender, race, employment status, credential, rank, or years in practice. There was a significant change in attitude amongst the subscale of patient autonomy based on provider age from pre- to post-intervention. Providers aged less than 40 were more likely to perceive that patients should have autonomy with their T2DM management ($U = 5.5$, $p = .043$). Table 5 contains the pre to post-intervention DAS3 subscale comparison by age.

Table 5

DAS3 Pre- to Post-intervention Subscale Comparison by Age

Variable	Need for Special Training	Seriousness of T2DM	Value of Tight Control	Psychosocial Impact of DM	Patient Autonomy
Age					
<40	6.42 (n=6)	5.42 (n=6)	7.33 (n=6)	7.83 (n=6)	8.58 (n=6)*
>40	6.58 (n=6)	7.58 (n=6)	5.67 (n=6)	5.17 (n=6)	4.42 (n=6)
Mann-Whitney U	17.5 (p =.935)	11.5 (p =.295)	13.0 (p =.421)	10.0 (p =.189)	5.5 (p =.043)*

*Denotes significance at .05 level

A Spearman's rho test was performed to determine if there was a pre- or post-intervention relationship between subscales. Pre-intervention indicated a strong relationship between subscales of psychosocial impact and value of tight control ($p = 0.033$). Post-intervention indicated strong relationship between subscales of psychosocial impact and need for special training ($p < .001$), and psychosocial impact and value of tight control ($p = .005$). Tables 6 and 7 contains pre- and post-intervention Spearman correlations between subscales.

Table 6

DAS3 Spearman Correlations Between Subscales Pre-intervention

Variable	Need for Special Training	Seriousness of T2DM	Value of Tight Control	Psychosocial Impact of DM	Patient Autonomy
Need for Special Training	-	.326	.452	.556	.352
Seriousness of T2DM		-	-.043	-.112	.249
Value of Tight Control			-	.616*	.219
Psychosocial Impact of DM				-	.368
Patient Autonomy					-

*Denotes significance at .05 level
**Denotes significance at .001 level

Table 7

DAS3 Spearman Correlations Between Subscales Post-intervention

Variable	Need for Special Training	Seriousness of T2DM	Value of Tight Control	Psychosocial Impact of DM	Patient Autonomy
Need for Special Training	-	.427	.660*	.826**	.269
Seriousness of T2DM		-	.163	.554	.391
Value of Tight Control			-	.755**	.376
Psychosocial Impact of DM				-	.536
Patient Autonomy					-

*Denotes significance at .05 level
**Denotes significance at .001 level

Analysis of Results

The impact of the structured multimedia educational program showed mixed results

amongst the three measures. Provider participation for this project was nearly 100%. One provider missed one session and did not review the recorded session prior to the completion of the intervention, resulting in 98.8% provider participation.

Measure #1

The first measure was to assess provider attitudes of T2DM pre and post-intervention. There was no statistically significant change found amongst the pre and post-intervention DAS3 questionnaires. The next measure was to assess for change in provider attitudes based off provider characteristics from pre to post-intervention. There was a change in attitudes amongst providers regarding the subscale of patient autonomy. Providers under the age of 40 were more likely to perceive that patients should have autonomy regarding their T2DM management.

Subscales were then analyzed to look for relationships. The pre-intervention data revealed that providers who stated that DM had a higher psychosocial impact tended to also place increased value on tight glucose control ($p = .033$). Post-intervention, providers who stated diabetes had a higher psychological impact tended to also place increased value on special T2DM training for healthcare professionals and tight glucose control ($p = .005$).

The lack of statistical significance of the DAS3 questionnaire could have been attributed to the high pre-intervention medians suggesting that providers had favorable attitudes toward T2DM management prior to the intervention. The high pre-intervention subscale values seen in this project were consistent with the findings from the original DAS and the DAS3 (Anderson et al., 1989; Anderson et al., 1998). Due to the small population sample for this project, median results for each subscale were used instead of means as seen in Anderson et al. (1989 and 1998). We acknowledge that the original DAS advised to use caution when detecting individual differences in four of the eight subscales with low reliability, however, these subscales were

removed or revised in DAS3 (Anderson et al., 1989). All subscales within the DAS3 had a Cronbach alpha of greater than .65 from the 1,843 providers and patients surveyed, indicating it had superior subscale reliability compared to the original DAS (Anderson et al., 1998). There was no information on the minimum providers needed for reliability with the use of the DAS3.

The DAS was developed to "…evaluate the effectiveness of educational programs…" and no time factor was associated with the validity or reliability of the questionnaire as a general tool to measure changes in provider attitudes (Anderson et al., 1989, p. 126). Almetahr et al. (2020) completed their continuing education intervention over three days, while Marcial and Graves (2019) conducted a two-hour educational intervention before the DAS3 post-questionnaire was distributed. This showed that the project timeline of seven weeks allowed ample time for providers to potentially change their attitudes.

Measure #2

The second measure was to evaluate IDCC utilization pre, during, and post-intervention. There was no change in the number of patients seen within the clinic pre, during, or post-intervention. This may have been due to the 90-minute time commitment for patients attending the IDCC. The raw data also showed a decrease in the number of available appointments per month, from nine pre-intervention to six during the intervention. This was likely due to IDCC appointments being converted to FMC acute appointments for non-T2DM patients.

Despite no change in availability of IDCC appointments, providers were informed of this additional embedded resource for newly diagnosed or uncontrolled diabetics. The educational program addressed role ambiguity between the IDCC and the PCP as there were six to nine IDCC appointments per month as opposed to 16 to 20 daily appointments per PCP. FMC leadership also expressed the intention to offer the IDCC twice per month, allowing more

appointments to be available in hopes of increasing utilization.

Measure #3

The third measure was a retrospective audit of anti-diabetic medications prescribed by each provider pre and during/post-intervention. The medication use audit produced the most significant results that can be attributed to the intervention. There was a statistically significant increase in total anti-diabetic mediations prescribed during/post-intervention (p = .003). There was a statistically signification increase in newer generation drug classes from pre to during/post-intervention (p =.009). Further analysis of medications by drug class allowed for change differences to be highlighted. Biguanides have long been established as the first-line anti-diabetic drug. Recent updated ADA guidelines recommended starting with GLP-1 receptor agonists or SGLT-2 inhibitors if the patient had other co-morbidities such as chronic kidney disease or obesity. Although Biguanides continued to be the most prescribed anti-diabetic medication during/post-intervention, its prescribing use decreased by 0.7%. Concomitantly, GLP-1 receptor agonists and SGLT-2 inhibitors showed a 7.1% and 1.2% increase, respectively.

Despite the increased use of GLP-1 receptor agonists and SGLT-2 inhibitors, DPP-4 inhibitors and other newer generation drug class combinations decreased in their use percentages. These mixed results are likely impacted by the tight turnaround when analyzing the intervention and the knowledge that every T2DM patient does not need to be placed on newer generation anti-diabetic medications if their current regimen provided control. Using the prescribed anti-diabetic medications as a measure of the educational intervention was a reliable way to show provider practice change and theoretical patient A1C improvement. Zigbor et al. (2018) utilized medications intensification (new or dose increase) as an outcome measure with correlating average decrease of 1% in A1C with their intervention (p. 206). This demonstrated a

correlation between an intensification of anti-diabetes medications, with better patient T2DM control. Bieszk et al. (2016) also performed a retrospective review of therapy intensification from their 12-month educational intervention.

Organizational Impact

The results of this project showed that there was a greater utilization of superior drug classes during/post-intervention. This may be attributed to increased confidence in prescribing practices or an increase in the knowledge of evidenced based T2DM management. Despite no statistical significance in DAS3 questionnaire scores, the project leads observed positive provider engagement during the sessions. This positive engagement demonstrated that 20-minute educational sessions allowed for material depth without clinic burden. The addition of having the sessions recorded and available on a shared drive, along with T2DM management handouts and SME PowerPoint slides, provided depth of presented material. Providers who missed live educational sessions were able to receive the same training and materials. Additionally, providers were given open resources to review the information discussed during the sessions, which boosted their T2DM resource toolkit for future practice.

Addressing questions, concerns, and open dialogue surrounding the information being presented by the clinical pharmacist allowed for clarification of provider driven clinical inertia. One significant barrier identified and addressed was the cost of anti-diabetic medications, specifically newer generation drug classes. Week two of the educational session, a few providers expressed concerns about not being good stewards of taxpayers' money by prescribing newer generation anti-diabetic medications or continuous glucose monitoring machines. This was a driving factor for continued use of older drug classes. The clinical pharmacist clarified the comparable cost of newer to older generation anti-diabetic medications. Each subsequent week

of the educational program the clinical pharmacist included the cost of each anti-diabetic medication and continuous glucose monitoring system in the training.

Two SMEs were used for this project, both clinical pharmacists, one assigned to the Internal Medicine Clinic and the other to the FMC. Both SMEs had intimate knowledge and understanding of the ADA guidelines, newer generation anti-diabetic medications, medications covered by TRICARE insurance, and hospital formulary medications. The SMEs are civilian staff employed by the hospital. This embedded knowledge had no additional cost burden to the clinic and acted as a resource to clinic PCPs. Additionally, the educational sessions were more likely to continue despite the transient flow of military medical staff at NMRTC Bremerton. Project leads recommended a civilian SME to be appointed for project maintenance on annual continuing education of updated ADA guidelines.

Future Directions for Research and Practice

While the DAS3 questionnaire was a valid and reliable tool to measure diabetes related attitudes for an education program, it is limited in its ability to be "…as sensitive to changes in a particular population as an attitude measure designed specifically for a particular population of health care professionals" (Anderson et al., 1998, p. 1407). A recommendation for future projects would be to collaborate with a researcher to develop provider targeted diabetes knowledge and attitude questionnaire that is more sensitive in evaluating PCPs. Future projects could also provide PCPs with feedback evaluations after the educational program on how they perceived the intervention.

Future projects could consider incorporating a longer time frame to assess the impact of the educational sessions. This would give project leads the opportunity to utilize patient A1Cs to analyze impact related to changes in PCPs T2DM management. To overcome the limitation

identified in this project regarding inclusion of anti-diabetic medications prescribed for non-T2DM diagnoses (i.e., chronic kidney disease, polycystic ovarian syndrome, obesity, congestive heart failure), the retrospective prescribing review could correlate to the prospective International Classification of Diseases, tenth revision codes. This may be done using a capable data system or through manual verification via the patient's clinical encounter.

This project focused on provider driven factors of T2DM clinical inertia. Future projects could address patient driven factors of T2DM management clinical inertia, such as medication adherence, knowledge, emotions, and attitudes (Rushforth et al., 2016). For this project's RE-AIM framework, it concluded in the maintenance phase for the annual ADA guidelines and T2DM anti-diabetic medications. Future projects could assess the long-term impact of this intervention.

Conclusion

Clinical inertia was a multifactorial issue where the patient, provider, and organization contributed to the delay of initiation or intensification of chronic disease management. PCPs managing more patients with T2DM, plus the rapid development of newer generation anti-diabetic medications, combined with other factors, could have overwhelmed PCPs and led to suboptimal management. A two-hour structured multimedia continuing education program broken down into 20-minute sessions discussing ADA guidelines and anti-diabetic medications could have effectively addressed provider driven factors of T2DM clinical inertia. While provider attitudes did not show statistical significance, retrospective medication use audits demonstrated an increase in newer generation drug classes prescribed during/post-intervention (p = .003). Additionally, there was a statistically significant change in medication prescribed during/post-intervention (p = .003). Future projects may be considered to address patient driven

factors of clinical inertia such as medication adherence, knowledge, emotions, and attitudes of T2DM.

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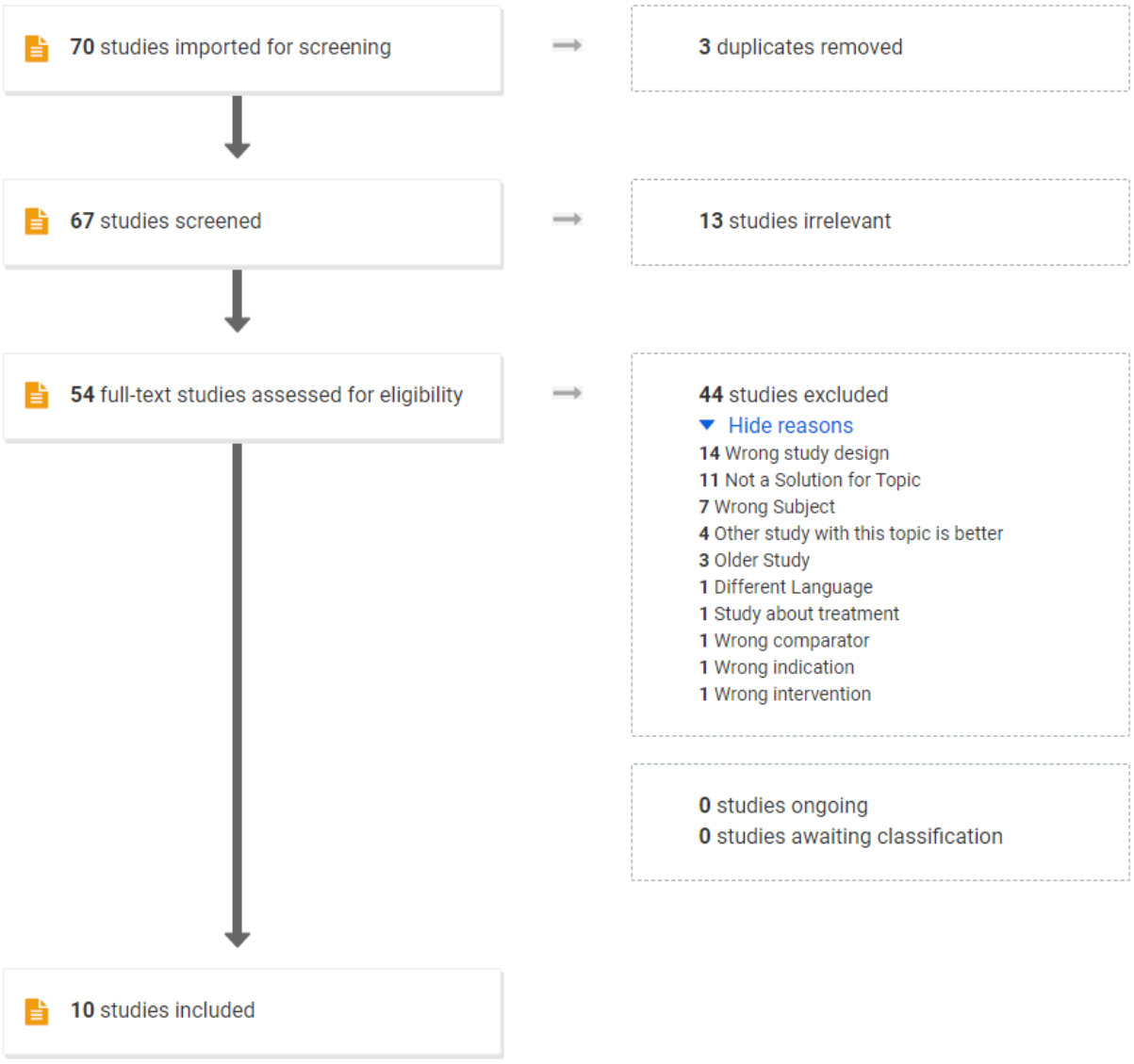
Appendix A

PRISMA Flow



Appendix B

Evidence Table

1st Author Name (Publication Yr)	Study Purpose/Aims	Research Questions/Hypotheses (IF different from/specifically described separately from study purpose & aims)	Study Design	Total Sample Size (How many initially, how many at final analysis?)	Sampling Plan	Independent Variables AND LEVEL OF MEASUREMENT	Dependent Variables AND LEVEL OF MEASUREMENT	Statistical Analyses - what tests were used for which research questions?	Results	Strengths (how promoted internal/external validity)	Weaknesses (biases; poorly controlled threats to internal/external validity)	LEVEL OF EVIDENCE - using JHNEBP tool (Strength and Quality)
Almetahr et al., 2020	Determine the effectiveness of a continuing education (CE) program regarding the knowledge, attitudes, and practices of Primary Healthcare Physicians (PHPs)	None specified	Quasi-experimental study, composed of pre-test post-test uncontrolled experimental design	51 PHPs enrolled data on 48 PHPs	Setting: Physicians working at governmental primary healthcare centers affiliated to the Ministry of Health in the study cities in the Aseer region, Saudi Arabia. Convenience sampling	CE program on designed to teach participants about diabetes mellitus management and the prevention of complications, as well as to facilitate skill development Nominal data	PHPs level of knowledge and attitudes towards diabetes pre and post CE via diabetes attitude survey (DAS3). Ordinal data	paired t-test and Wilcoxon signed rank test were used to compare the differences between pre-intervention and post-intervention scores	Improvement ranging from 7.4% in the self-management domain to 57.1% in the gestational DM domain. The domains with the most substantial improvement after the intervention were those related to gestational DM with a 57.1% increase ($p = 0.005$) and DM complications with a 39.7% rise ($p < 0.001$). However, the increase in the self-management domain was	Findings were consistent with the literature from other countries (Malaysia, United Kingdom, United States)	1) Single group pre-test and post-test quasi-experimental design, where the participants acted as their own controls poses a threat to internal validity. 2) Small sample size (51 PHPs) 3) Study did not account for PHPs' views on how the CE program could be improved or the perspectives of the patients from how their PHP's interactions may have changed	IIB

									not statistically significant (p = 0.06). The mean scores for all knowledge domains before and after intervention were 14.33 and 17.61, respectively. Thus, there was a 22.8% increase in the overall knowledge score after the intervention (p < 0.001). Participants with good knowledge increased from 39 (76.5%) before the intervention to 51 (100.0%) after the intervention (p < 0.001). Participants' attitudes towards diabetes did not substantially change between the pre-intervention period and after completing the CE program (p > 0.05 for all questions)			

Beaser & Brown, 2013	Determine the impact of a guided professional improvement CME for optimizing T2DM management.	None specified	4-hour cardio metabolic risk assessment "Diamond" workshop involving both providers and staff on ways to optimize patient care related to managing patients with T2DM.	Number not identified	Not identified	4 hour PI CME focused on process improvement CME for optimizing T2DM management	providers and staff taking class	Not identified	12-14% and up to 20% improvement in patient outcomes category 39% improvement in patient outcomes (i.e., A1C, LDL) from baseline to follow up 12-57% improvement in the five outcomes measurements		Sample size, statistical analysis, and level of measurement not identified	VA

Bieszk et al., 2016	1) Assess the impact of an educational intervention specifically designed to align patients and their physicians with 2012 American Diabetes Association (ADA) guidelines on glycated hemoglobin (A1c) testing frequency and insulin initiation via the "Act on Threes" which includes: the timely measurement of A1c levels every 3 months; timely treatment intensification to meet A1c goals, with treatment intensified every 3 months if A1c is not at goal; and insulin initiation when	None specified	12-month, prospective, randomized, interventional study of adult patients with type 2 diabetes evaluated the effects of the Act on Threes educational intervention on A1c testing frequency and insulin initiation through the analysis of administrative claims data from the Humana database	9,159 enrolled data on 6,243 reported	a priori alpha level for all inferential analyses was set at 0.05, and all statistical tests were 2-tailed	Group 1) general and targeted type 2 diabetes educational material mailed to patient and treating physician twice. Group 2) standard of care and no messages/educational material mailed to the patient or the provider Nominal data	1) # of type 2 diabetes patients who had ≥ 1 A1c measure within 12 months 2) # of patients who had A1c measures every 3 months 3) # of patients who initiated insulin 4) # of patients who switched to insulin 5) # of patients with any change in treatment. Interval data	Patients with ≥ 2 A1c tests in the pre- and post-intervention periods were evaluated for each group using the McNemar test; the Student's t-test was used to evaluate between-group differences. Bivariate comparisons of outcome measures in the intervention and control groups were made using X2 tests to evaluate for statistical significance of differences in proportions of patients. Multiple logistic regression analysis of the entire study cohort was used to assess predictors of insulin initiation in the post hoc analysis. All analyses of	Percentage of patients with ≥ 2 A1c tests per year was significantly higher post-intervention compared with pre-intervention in the intervention and control groups ($P < 0.001$). However, when the pre- to post-intervention change was compared for intervention and control patients, there was no significant difference between the groups in the proportion of patients who received ≥ 2 A1c tests ($P = 0.995$). For patients with pre- and post-intervention	Exclusion criteria: No treating physician was involved in the care of intervention and control group patients.	1) No attempt to measure patient or physician engagement with the educational materials 2) may not be generalizable due to only selecting Medicare type 2 diabetes patients from the Humana administrative claims database 3) No external testing or validation of the educational materials was conducted to determine their utility for patients and physicians alike.	IC

	appropriate, including in patients already receiving ≥ 3 oral anti-diabetes drugs (OADs) with A1c not at goal 2) Identify factors that predict insulin initiation in patients with type 2 diabetes							data were conducted using SAS software, version 9.1	A1c measurements (intervention group: n = 1,503; control group: n = 539), A1c levels were similar for the intervention (mean [SD]: pre-intervention, 7.94% [1.47] vs. post-intervention, 7.98% [1.45]; P = 0.540) and control groups (mean [SD]: pre-intervention, 7.98% [1.57] vs. post-intervention, 7.94% [1.52]; P = 0.630). No difference in the A1c level when comparing the pre- to post-intervention change for patients in the intervention			

									and control groups (P = 0.240). Patients who initiated insulin therapy post-intervention was similar for the intervention and control groups (6.3% vs. 7.6%, respectively; P = 0.059). There were no statistically significant differences in Act on Threes campaign-related measures between the study groups (P > 0.05)			

Corriere et al., 2014	Determine: 1) how often clinical diabetes guidelines are used among practicing physicians 2) whether there is an association between using clinical diabetes guideline and provider decision making 3) determine whether a provider's specialty, practice size, a diabetes patient volume makes a difference in the first two study aims	None specified	Survey regarding frequency of use of the Point of Care Information Technology (POC-IT) evidence based resource, knowledge-based diabetes questions, and clinical decision making questions.	383 physicians	Setting: Physicians working at Johns Hopkins University.	16 question survey regarding the management of type 2 diabetes mellitus in adults and management of pre-diabetes Ordinal data	Physicians' knowledge of type 2 diabetes mellitus management and pre-diabetes management Ordinal data	Stata version 12 statistical software Chi-squared test for binary outcomes T-test for continuous outcomes	53% of participants were guideline users (GU) 47% of participants were non-guideline users (NGU) Endocrinologists had more GU (7.7% GU vs 2.2% NGU, p=0.01) "Other" subspecialties not primary care tended to be NGU (51.1% NGU vs 36.1% GU p=0.003) 37.1% of GU reported diagnosing diabetes at a higher frequency than NGU with 22.8%, p=0.002 mean diabetes knowledge score was higher among GU (3.37) vs NGU (2.76) p<0.001 diabetic foot ulcer risk factor knowledge was the same between GU and NGU 78.4% of GU vs 66.8% of NGU correctly answered that early diagnosis and treatment of diabetes can prevent complications, p=0.046 67.3% of GU	Survey was sent out to 80,000 users of POC-IT website to allow wide net of potential participants	The survey tool utilized was not validated	IIIB

									vs 40.7% of NGU 'somewhat' or 'completely' understood which diabetic medication was available in their practice p<0.001 NGU reported provider unfamiliarity with insulin was a significant barrier to prescribing			

Cowart & Sando, 2019	Determine if there is a difference in time to treatment intensification in patients with type 2 diabetes mellitus when managed by a pharmacist under a collaborative practice agreement or through usual medical care		Retrospective matched cohort study at 2 academic family medicine clinics within the University of Florida academic health center	483 patients with T2DM aged 18-80 and A1C >8.0% 50 patients (25 patients per cohort) at final analysis as they were matched 1:1 with primary care providers based on age, gender, and race	50 patients from 2 academic health centers within the University of Florida health center matched with either Pharmacist-Physician management care or Usual Medical Care with Physician alone	1) Usual medical care by provider only Nominal data 2) Pharmacist-Physician management care under a collaborative practice agreement	1) Time to treatment intensification 2) # of patients who achieved A1C reduction of >0.5% 3) # of patients who achieved A1C goal 4) Time to A1C goal 5) Mean change in A1C from baseline Ratio data	Chi-square and independent samples t-test. P value <0.5 was considered statistically significant Data analysis was performed using SPSS version 22	1) Time in days to treatment intensification (200 for PPM vs 325 for UMC p=.50) 2) # of patients who achieved A1C reduction of >0.5% (60% PPM vs 44% UMC, p=0.41) 3) # of patients who achieved A1C goal (52% of PPM vs 32% of UMC p=0.57) 4) Time to A1C goal (200 +/- 66 days PPM vs 306 +/- 66 days UMC p=0.90) 5) Mean change in A1C from baseline (1.8% PPM vs 2.2% UMC p=0.24)	Cohort groups were split evenly based on demographic data, tobacco use, and medical insurance Pharmacist was given the autonomy to initiate, modify, and discontinue therapy during each visit	PPM group had higher baseline A1C, and high number of patients were on insulin, making it difficult to intensify treatment PPM Pharmacist appointment times were 60 minutes vs UMC appointment times of 20 minutes which may have allowed for further diabetes discussion	IIIB

Luo et al., 2019	Determine how the use of academic detailing can educate clinicians on how to improve the medical management of type 2 diabetes in the modern pharmacologic era	None specified	Case studies of 4 contemporary academic detailing interventions focused on diabetes care	4 programs with 30 to ~750 providers at each location	Setting: 4 case studies of academic detailing programs in Massachusetts, Pennsylvania, Vermont, and Saskatchewan province	Academic detailer providing education interventions focused on diabetes care Nominal data	Clinician feedback on knowledge, comfort level, and adherence to evidence-based use of newer glucose lowering medications in primary care settings.	None	Academic detailing can be an effective way to overcome challenges to the evidence-based use of newer glucose lowering medications in primary care settings	Academic detailing performed in 4 different health centers with a large number of providers	1) No statistical analysis was performed 2) low JHNEBP level of evidence	VA

Marcial et al., 2019	Determine whether: 1) educational intervention regarding American Diabetes Association (ADA) guidelines can improve provider's knowledge and attitude on diabetes management compared to usual practice 2) implementation of ADA guidelines on Hispanic patient population can improve diabetes outcome measures in a 12-week period	None specified	two-phase quality improvement project was implemented in a primary care clinic serving a Hispanic community located in Miami-Dade, Florida from December 2017 to March 2018.	1) 49 PCPs 2) 1,500 patients	Setting: clinic serving a Hispanic community of Miami-Dade County. This organization includes more than 60 PCPs and approximately 4,500 adults Hispanic patients across South Florida including patient services and education focused on diabetes	1) Primary care providers (PCPs) at a Hispanic primary care clinic who provide care to adult minority patients with chronic conditions such as diabetes, hypertension, and other comorbidities. Inclusion criteria: providers with direct contact with patients (i.e., registered nurse, advanced registered nurse practitioner, Doctor of Nursing practice, family nurse practitioner, medical doctor, nutritionist, optometrist, podiatrist, nephrologist, and physical therapist). Exclusion criteria: Providers without direct contact with patients' Nominal data 2) Electronic clinical quality measures (eCQM) were obtained from bimonthly clinic generated aggregate reports extracted from patient electronic health records Nominal data	1) Diabetes Attitude Scale (DAS) third version that PCPs completed pre and post-intervention. Ordinal data 2) eCQM reports to assess quality of diabetes care. Ordinal data	Data analysis was performed using the Statistical Package for Social Sciences (SPSS version 16; SPSS Inc., Chicago, IL, USA) version 16. Two separate t-test statistical analyses were used to determine the success of implementation of the ADA guidelines into practice using both PCPs pre- and post-test questionnaire data and eCQM report data	1) average patient autonomy subscale score improved from 2.66 to 2.96 after the intervention. The mean psychosocial impact of diabetes also improved to 3.04 from 2.24. Similar improvements are observed across all five subscales of the DAS3. Statistical testing using a paired sample t-test of the pre-and post-intervention DAS3 scores revealed statistically significant changes in all DAS3 dimensions subscale score averages 2) notable gains in the maximum values in the 19 measures (improvements from as much as 40% to 80%). Differences between the pre-and post-intervention eCQM scores were significant ($t = 9.31$, $p < .001$)	All PCPs at the clinic are bilingual in English and Spanish and patients can decide which language they would like to speak/receive their healthcare.	Study was initiated in 75 days leaving not enough time to determine if there were changes in A1c levels	VB

Meredith et al., 2021	Evaluate rates of clinical inertia in people whose diabetes is managed by both pharmacists and primary care providers Rate of treatment intensification for patients with diabetes enrolled in pharmacist run cardiovascular risk reduction (CVRR) clinics, regardless of A1C.	None specified	Retrospective chart review of people with diabetes managed by pharmacists at a county health system of a metropolitan area that serves an urban community of underserved, underinsured, and/or uninsured patients in the Midwestern United States	363 patients, 1,192 pharmacists, 1,739 provider visits	Setting: county health system of a metropolitan area that serves an urban community of underserved, underinsured, and/or uninsured patients in the Midwestern United States	CVRR pharmacist run clinic provider (PCP) run clinic Nominal data	Type of treatment intensification	Minitab 18.1 Statistical Software. Rate of treatment intensification was assessed with the Chi-square test or Fisher's exact test Continuous variables were analyzed using student's t-test Non-parametric data was assessed using Mann-Whitney U test or Wilcoxon signed rank test P=0.05	Therapy intensification at 60.5% of CVRR pharmacist visits and 39.3% of PCP visits p<0.001 Median interventions made per visit 1 per CVRR visit and 0 per PCP visit p<0.001 Median time between interventions 49 days CVRR vs 105 days for PCPs p<0.001 CVRR group more likely to intensity treatment with GLP-1 agonists, SGLT-2 inhibitors PCP group more likely to intensify treatment with insulin and sulfonylureas	CVRR group was able to practice autonomy of prescribing diabetic medications	No control group	IIIA

Zgibor et al., 2018	Evaluate changed in A1C, blood pressure, LDL levels in patients who receive care where certified diabetes educators (CDE) implemented standardized protocols to intensify treatment compared with usual care	None specified	Clustered, randomized clinical trial in community based practices		Setting: 15 non-academic primary care practices from the University of Pittsburgh Medical Center (UPMC) participated in a 12 month trial	REdesigning MEDication Intensification Effectiveness Study for Diabetes (REMEDIES 4D) group Usual care group Nominal data	Changes in A1C, blood pressure, LDL levels Ratio data	two sampled t-tests for continuous variables McNemar's test for dependent proportions A priori same size calculations $p<0.3$ was considered eligible for final univariable mixed-effects model	REMEDIES 4D group had lower blood pressure (129.1/76.8) vs usual care (133.6/79.6) p=0.04 Usual care group with lower A1C (8.2%) vs REMEDIES 4D (8.8%) p=0.007 No significant difference in LDLs between groups REMEDIES 4D group had higher depression scores on PHQ-9 than usual care group REMEDIES 4D group had statistically significant improvement in A1C from baseline while usual care group remained stable At the one year mark, REMEDIES 4D group had a significant difference in A1C which was 0.66 (95% CI -1.11 to -0.22) lower than usual care REMEDIES 4D group had patients at A1C goal at 12 months (35%) vs 15% of usual care at	Generalized to population as non-academic and across 15 settings	Patients in REMEDIES 4D study were given $50.00 per session to help offset costs but usual care group was not given monetized incentive >80% of patients were non-Hispanic white, meaning that the study may not be generalized to other ethnic or racial groups	IIA

									goal p<0.05 Usual care showed no significant change in patient's achieving A1C, LDL, or blood pressure at 12 months			

Ziermer et al., 2006	Evaluate change in A1C with computerized reminders providing patient-specific recommendations at each visit and/or feedback on performance every 2 weeks for 3 years.	Improving health care provider behavior—reducing clinical inertia—might lead to better diabetes management in the primary care setting	Longitudinal randomized control trial	345 internal medicine residents over 4038 patient visits	Setting: Grady Medical Clinic with 60,000 patients that are predominantly African American and economically disadvantaged. Staffed by residents, nurse practitioners, physician assistants, and attending physicians, with support from pharmacists, nutritionists, health educators, and social workers. Lasted 3 years.	Patient-specific recommendations and/or feedback on performance	Impact of the interventions and healthcare provider intensification behavior on change in HbA1c levels	Linear mixed effects models for repeated measures data	Intensification increased most during the first year and then declined. However, intensification increased more in the feedback alone and feedback plus reminders groups than for reminders alone and control groups (P<.001). After 3 years, healthcare provider behavior in the reminders alone and control groups returned to baseline, whereas improvement with feedback alone and feedback plus reminders groups was sustained: 52% did anything, and 30% did enough (P<.001 for both vs the reminders alone and control groups)	The impact of the feedback on performance intervention on healthcare provider behavior withstood adjustment for demographic and other patient-related factors	Intensification of therapy improved in all groups during the first year of the study, presumably due in part to contamination, the Hawthorne effect—altered behavior from recognition of being monitored—and recommendations for aggressive management	IA

Appendix C

Business Case Analysis

Proposed Title for Project/Initiative/Opportunity to Improve *Proposed Title*
Improving type 2 diabetes mellitus related clinical inertia in primary care
Opportunity Statement *(Description of proposed project/initiative/opportunity to improve)* *Opportunity Statement*
Implementing appropriate evidence-based measures to decrease clinical inertia among military primary care providers and improve diabetes management of service members, veterans, and their dependents.
Business Opportunity/Objectives *(Prioritize listing – macro and micro objectives)* *Business Opportunity*
1. Improve provider attitude 2. Decrease clinical inertia 3. Decrease associated cost of diabetic care and management 4. Improve military medical readiness
Potential Impact of the Initiative/Project *(Identify outcome metrics & benchmarks/and how objectives align with Quadruple Aim, Value Based Care, and HRO goals)* *Potential Impact*
1. Increase provider confidence in decision making and action to change plan of care 2. Optimize time used to address, prescribe, and manage A1Cs by utilizing evidence-based treatment 3. Decrease referrals to specialty care, inpatient hospitalization, and progression of comorbidities caused by uncontrolled T2DM 4. Improve worldwide assignable service members, retention, and duty days lost to diabetes illness

Alternatives (courses of action) chosen for Analysis *Alternatives*

1. Provide formal education to PCPs regarding diabetic management
2. Integrate clinical diabetic educators (CDE) into a primary care clinic
3. Provider performance feedback from specialist and patient-specific recommendations given at each visit
4. Integrate clinical pharmacist within the outpatient clinic
5. *"Status Quo"*: Utilize familiar oral anti-diabetic medications that are familiar to individual providers

Analysis of Alternatives *Alternatives*

Alternative 1:	Provide formal education to PCPs regarding diabetic management

Pros	**Cons**
- Performance improvement education to primary care PCPs and ancillary staff to improve the practice processes and increase knowledge -Post-education assessments show improvement in provider knowledge	-No change in attitude towards diabetes management after formal education -Work time spent educating PCPs reduce access to care/workload potential

Alternative 2:	Integrating clinical diabetic educators (CDE) into a primary care clinic

Pros	**Cons**
-Subject matter experts manage diabetic patients -Additional time spent to specifically address patient's diabetes concerns -Protocols utilized to intensify treatment -PCP appointments available for other patient concerns	-PCP not involved in decision making -While statistically significant, no clinical significance in the reduction of A1C

Alternative 3: Provider performance feedback from specialist and patient-specific recommendations given at each visit	
Pros	**Cons**
-Feedback from the specialist to the provider shows significant impact to overcome clinical inertia -Reminders can be set to notify automatically, no labor needed	-Reminders are found to have no significant independent impact -Cost and time taken out of clinic for specialist to observe and mentor provider
Alternative 4: Integrate clinical pharmacist within the outpatient clinic	
Pros	**Cons**
- Allows one clinician to manage all T2DM pts - Smaller number of clinicians to stay up to date on evidenced based medications -Increases access to care and closer follow up	- PCP not involved in decision making - No clinical significance in the reduction of A1C upon literature review
Alternative 5:	*"Status Quo"*: Utilize familiar oral anti-diabetic medications that are familiar to individual providers.
Pros	**Cons**
- High provider confidence leading to safe prescribing of known medication - Utilization of older yet cheaper oral anti-diabetic medications - Better education regarding medication - Does not overwhelm provider	- Potentially less than optimal medication and T2DM management - No advancement of evidence-based medicine

Assumptions *Assumptions*

-The United States military has 2.6% of its service members with the diagnosis of diabetes, 26.1% of which are on diabetic medications (Meadows et al., 2015). This equates to 61,500 service members who are diagnosed with diabetes across all branches (Department of Defense [DOD], 2019).
-U.S. military service members diagnosed with prediabetes or T2DM may have limited worldwide assignability, be prohibited from deploying, or be medically separated from military service due to severity of the member's diabetes (DOD, 2011).
-Diabetes mellitus controlled without the use of insulin or long-acting sulfonylurea medication may be considered for a waiver. Waiver requests must include documentation of current medications, current hemoglobin A1C level, and documentation of the presence or absence of any end organ damage (Department of the Navy, 2019).
-Per the DOD (2020):

> the condition must persist despite appropriate treatment and impair function to preclude satisfactory performance of required military duties of the member's office, grade, rank, or rating...Diabetes mellitus, unless hemoglobin A1c can be maintained at less than eight percent using only lifestyle modifications (e.g., diet and exercise) or with the following medications (alone or in combination): (1) Metformin; (2) Dipeptidyl peptidase 4 inhibitors; or (3) Glucagon-like peptide-1 receptor agonists.

-Increased prevalence in prediabetes and T2DM has moved disease management away from specialty providers, such as certified diabetic educators and endocrinologists, to the primary care provider (PCP) due to demand (Harris et al., 2020).
-PCPs who lack the knowledge, confidence, or ignore best practice guidelines are thought to be part of a phenomenon known as clinical inertia.

Recommendation and Rationale *Make a choice*

Recommendation *Make a choice*

COA1: Provide formal education to PCPs regarding diabetic management

Rationale *Make a choice*

-Formal education has been shown to increase provider knowledge and 12-14% improvement of patient outcomes (Beaser & Brown, 2013).
-The mean knowledge score increased from 14.33 (± 3.37) to 17.61 (± 2.57) ($p < 0.001$), and the rate of good knowledge increased from 39 (76.5%) before to 51 (100.0%) after ($p < 0.001$). There was no significant difference in the mean attitude scores before and after the intervention (3.79 vs 3.86; $p = 0.10$), respectively. Overall, PHPs' practices related to glycosylated hemoglobin estimation ($p = 0.004$), foot care ($p = 0.02$), diet ($p < 0.001$), exercise ($p < 0.001$), and weight assessment ($p < 0.001$) significantly improved following the intervention. (Almetahr, 2020)

Value Based Care - Investment Required by the Organization and the Associated "VALUE" or $ GAINED.

Value = Quality + Service

I. Quality projected based on:

	Value
Better A1c control of all TRICARE beneficiaries with T2DM, which includes 61,500 AD members (Chao et al., 2013; Meadows et al., 2015)	**2,907,537** beneficiaries (includes 61,500 AD)
Decreased cost related to co-morbidities from T2DM	**$9,601** in excess expenditures per year (Yang et al., 2018)

	Total	**$27,915,262,737**
II. Service projected based on:		
	Patient Health Benefit- A1c review (A1c decrease based on research	Improvement of **39%** (Beaser & Brown, 2013)
	Provider Knowledge-Increased provider competence of oral T2DM medications and management	**+22.8%** (Almetahr et al., 2020)
	Total	n/a
III.	*Cost projected based on:*	
	Program Design and Development- time of the instructor not actively seeing patients (administrative time) and time away from patient care for providers attending knowledge intervention.	$478 per visit (Moses et al., 2018) 6 appointments (2hrs of training) 20 providers = **$57,360**

Project Management- FNP students, zero cost as we are not empaneled and minimal office material costs. Injection samples to be obtained by pharm company for free. Marketing - zero cost. Emails and word of mouth announcements at huddles	2 cents per printed 5 papers per person x 20 people = **$2.00** **$0**
Total	**$57,362**

PROJECTED VALUE:

Risks and Mitigation Plan *Consider the risks:*	
Risks	**Plan**
1. Pt non-compliance with medications	1. Scheduled f/u appts for all pts with change to DM medication regimen
2. Pt resistance to starting new medications	2. Educate providers about what to say to the patient to get buy in
3. Pt f/u compliance	3. Ensure reminders and schedule multiple appointments
4. Provider acceptance of education/recommendations	4. Provide accurate EBP information and educational pamphlets/resources to utilize in their practice
5. Other factors involved with T2DM management (diet and exercise)	5. Promote nutrition referrals and health promotions resources

Implementation Plan *Implementation plan*	
Phase 1:	Gather data
Milestone Description:	Number of beneficiaries with T2DM, anti-diabetic medication at the MTF, Intensive Diabetes Care Clinic (IDCC) background

Deliverables	Due Date	Accountable Person
- # T2DM pts - Anti-diabetic medication available at MTF - IDCC utilization booking	1-2 months upon arriving to NH Bremerton	DNP students Clinical Pharmacist Population health person

Provider- improved morale and motivation due to decreased barriers to prescribing evidence-based anti-diabetic medication with minimal cost (time out of active patient care)	
Patient- delay of complications from disease process, decreased waiting to start/increase/change anti-diabetic medication due to concern of stigma with diabetes diagnosis	

-# anti-diabetic meds dispensed within the last 6 months - # providers in Primary care -ADA medication recommendations, what is on formulary/needs prior authorization		
Resources Needed		
-Healthcare business (population health program) -Primary care department provider roster -Population health nurse/provider/champion -Pharmacist and Tricare formulary search tool https://www.express-scripts.com/frontend/open-enrollment/tricare/fst/#/		
Expected Level of Benefit		
Provides baseline information regarding T2DM prevalence, current management, compliance, control, and severity of the disease within the population.		
Phase 2:	Develop provider training, select EBP survey, and brief key stakeholders on project	
Milestone Description:	Develop a presentation of training to include provider resources and resources to give to patients. Ensure enough time is allowed during scheduled "training day" to cover proper training. Modify an existing evidence based survey that can be used to track provider knowledge of oral DM meds. Present DNP project to Bremerton leadership.	
Deliverables	Due Dates	Accountable Person
- Pt handouts (algorithms, ADA guidance, EB articles, list of formulary medications) - Presentation slides -Injection/medication models - Survey and tracking system	1-2 months after all data is collected	DNP students Clinical pharmacist
Resources Needed		
-Printer -Office supplies to print surveys and resources -Time during stakeholder meeting to present EBP		

-Medication models that would allow providers to get firsthand experience (Trulicity, Bydureon, glucagon injection, etc.)		
Expected Level of Benefit		
Create robust training for providers that demonstrates how the benefits outweigh the cons of learning and managing T2DM patients. Ensure buy-in from leadership and increase probability of the continuation T2DM training.		
Phase 3:	Pre-training survey, implement training, post-training survey	
Milestone Description:	Supply practitioners with diabetes attitude version 3 (DAS3) pre-training survey regarding their attitude with providing care for patient with T2DM. Provide educational intervention training via SME as developed in Phase 2 during allotted day and time while allowing for questions and concerns. Supply the practitioners with DAS3 post-training survey.	
Deliverables	Due Dates	Accountable Person
- Completed presentation - Completed handouts - Completed surveys	Next training day following the completion of the planning (Phase 2)	DNP students Clinical pharmacist (SME)
Resources Needed		
-Space to accommodate 25 people (tables, chairs, etc.) -Computer and projector -Sufficient amount of time during a training day		
Expected Level of Benefit		
This implements the training by the subject matter expert (clinical pharmacist) to educate the providers on evidenced based management of T2DM.		
Phase 4:	Medication audit	
Milestone Description:	Medication utilization reports for each provider from the previous three months. The P0630 Report will be generated monthly until one month past the intervention month.	
Deliverables	Due Dates	Accountable Person

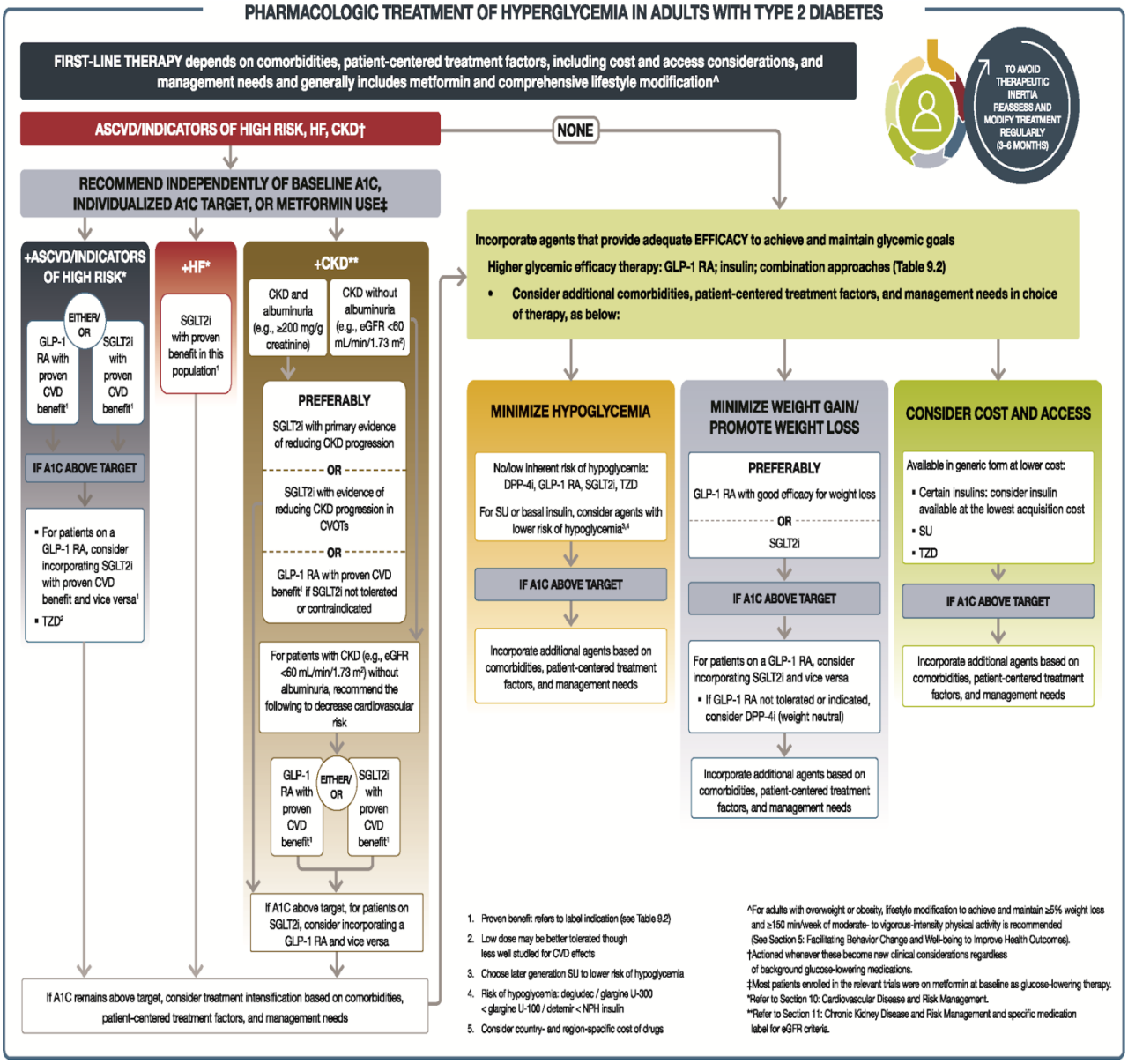
- Monthly report of anti-diabetic medication prescribed per provider	1 month prior to intervention Monthly during intervention 1 month post-intervention	DNP students Clinical Pharmacist (SME)
Resources Needed		
P0630 report Computer with Excel software		
Expected Level of Benefit		
The collection of anti-diabetic medication prescribed by the provider should increase in the quantity of prescriptions placed and/or the increase in anti-diabetic drug classes being prescribed, thus showing effectiveness of educational intervention.		

Phase 5:	IDCC utilization audit	
Milestone Description:	IDCC schedule and enrollment will be audited monthly, beginning three months before the intervention, and continue for one month after the intervention.	
Deliverables	Due Dates	Accountable Person
- Pre and post-intervention IDCC utilization - # of new referrals placed post-intervention	3 months prior to intervention 1 month post-intervention	DNP students Population health nurse
Resources Needed		
MHS Genesis PowerChart Computer with Excel software		
Expected Level of Benefit		
The audit of the IDCC utilization shows that providers are referring T2DM patients to a specialized embedded clinic aimed at improving T2DM outcomes.		

Appendix D

Pharmacologic Treatment of Hyperglycemia in Adults with Type 2 Diabetes Mellitus

Handout



Appendix E

Drug Specific and Patient Factors to Consider Handout

	Efficacy	Hypoglycemia	Weight change	CV effects		Cost	Oral/SQ	Renal effects		Additional considerations
				ASCVD	HF			Progression of DKD	Dosing/use considerations[a]	
Metformin	High	No	Neutral (potential for modest loss)	Potential benefit	Neutral	Low	Oral	Neutral	▪ Contraindicated with eGFR <30 mL/min/1.73 m^2	▪ Gastrointestinal side effects common (diarrhea, nausea) ▪ Potential for B12 deficiency
SGLT2 inhibitors	Intermediate	No	Loss	Benefit: empagliflozin[c], canagliflozin[i]	Benefit: empagliflozin[d], canagliflozin, dapagliflozin[e], ertugliflozin	High	Oral	Benefit: canagliflozin[g], empagliflozin, dapagliflozin[g]	▪ See labels for renal dose considerations of individual agents ▪ Glucose-lowering effect is lower for SGLT2 inhibitors at lower eGFR	▪ Should be discontinued before any scheduled surgery to avoid potential risk for DKA ▪ DKA risk (all agents, rare in T2D) ▪ Risk of bone fractures (canagliflozin) ▪ Genitourinary infections ▪ Risk of volume depletion, hypotension ▪ ↑LDL cholesterol ▪ Risk of Fournier's gangrene
GLP-1 RAs	High	No	Loss	Benefit: dulaglutide[c], liraglutide[j], semaglutide (SQ)[f] Neutral: exenatide once weekly, lixisenatide	Neutral	High	SQ; oral (semaglutide)	Benefit on renal end points in CVOTs, driven by albuminuria outcomes: liraglutide, semaglutide (SQ), dulaglutide	▪ See labels for renal dose considerations of individual agents ▪ No dose adjustment for dulaglutide, liraglutide, semaglutide ▪ Caution when initiating or increasing dose due to potential risk of nausea, vomiting, diarrhea, or dehydration. Monitor renal function in patients reporting severe adverse GI reactions when initiating or increasing dose of therapy.	▪ **FDA Black Box:** Risk of thyroid C-cell tumors in rodents; human relevance not determined **(liraglutide, dulaglutide, exenatide extended release, semaglutide)** ▪ GI side effects common (nausea, vomiting, diarrhea) ▪ Injection site reactions ▪ Pancreatitis has been reported in clinical trials but causality has not been established. Discontinue if pancreatitis is suspected.
DPP-4 inhibitors	Intermediate	No	Neutral	Neutral	Potential risk: saxagliptin	High	Oral	Neutral	▪ Renal dose adjustment required (sitagliptin, saxagliptin, alogliptin); can be used in renal impairment ▪ No dose adjustment required for linagliptin	▪ Pancreatitis has been reported in clinical trials but causality has not been established. Discontinue if pancreatitis is suspected. ▪ Joint pain
Thiazolidinediones	High	No	Gain	Potential benefit: pioglitazone	Increased risk	Low	Oral	Neutral	▪ No dose adjustment required ▪ Generally not recommended in renal impairment due to potential for fluid retention	▪ **FDA Black Box:** Congestive heart failure **(pioglitazone, rosiglitazone)** ▪ Fluid retention (edema; heart failure) ▪ Benefit in NASH ▪ Risk of bone fractures ▪ Bladder cancer (pioglitazone) ▪ ↑LDL cholesterol (rosiglitazone)
Sulfonylureas (2nd generation)	High	Yes	Gain	Neutral	Neutral	Low	Oral	Neutral	▪ Glyburide: generally not recommended in chronic kidney disease ▪ Glipizide and glimepiride: initiate conservatively to avoid hypoglycemia	▪ FDA Special Warning on increased risk of cardiovascular mortality based on studies of an older sulfonylurea (tolbutamide)
Insulin – **Human insulin**	High	Yes	Gain	Neutral	Neutral	Low (SQ)	SQ; inhaled	Neutral	▪ Lower insulin doses required with a decrease in eGFR; titrate per clinical response	▪ Injection site reactions ▪ Higher risk of hypoglycemia with human insulin (NPH or premixed formulations) vs. analogs
Insulin – **Analogs**						High	SQ			

Appendix F

Diabetes Attitude Survey

University of Michigan Diabetes Research and Training Center

Diabetes Attitude Survey

Below are some statements about diabetes. Each numbered statement finishes the sentence "In general, I believe that..." You may believe that a statement is true for one person but not for another person or may be true one time but not be true another time. Mark the answer that you believe is true most of the time or is true for most people. Place a check mark in the box below the word or phrase that is closest to your opinion about each statement. It is important that you answer every statement.

Note: The term "health care professionals" in this survey refers to doctors, nurses, and dietitians.

In general, I believe that:	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
1. ...health care professionals who treat people with diabetes should be trained to communicate well with their patients.	☐	☐	☐	☐	☐
2. ...people who do not need to take insulin to treat their diabetes have a pretty mild disease.	☐	☐	☐	☐	☐
3. ...there is not much use in trying to have good blood sugar control because the complications of diabetes will happen anyway.	☐	☐	☐	☐	☐
4. ...diabetes affects almost every part of a diabetic person's life.	☐	☐	☐	☐	☐
5. ...the important decisions regarding daily diabetes care should be made by the person with diabetes.	☐	☐	☐	☐	☐
6. ...health care professionals should be taught how daily diabetes care affects patients' lives.	☐	☐	☐	☐	☐

DAS Diabetes Research and Training Center

University of Michigan Diabetes Research and Training Center

In general, I believe that:	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
7. ...older people with Type 2* diabetes do not usually get complications.	☐	☐	☐	☐	☐
8. ...keeping the blood sugar close to normal can help to prevent the complications of diabetes.	☐	☐	☐	☐	☐
9. ...health care professionals should help patients make informed choices about their care plans.	☐	☐	☐	☐	☐
10. ...it is important for the nurses and dietitians who teach people with diabetes to learn counseling skills.	☐	☐	☐	☐	☐
11. ...people whose diabetes is treated by just a diet do not have to worry about getting many long-term complications.	☐	☐	☐	☐	☐
12. ...almost everyone with diabetes should do whatever it takes to keep their blood sugar close to normal.	☐	☐	☐	☐	☐
13. ...the emotional effects of diabetes are pretty small.	☐	☐	☐	☐	☐

* Type 2 diabetes usually begins after age 40. Many patients are overweight and weight loss is often an important part of the treatment. Insulin and/or diabetes pills are sometimes used in the treatment. Type 2 diabetes is also called noninsulin-dependent diabetes mellitus or NIDDM; formerly it was called "adult diabetes."

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
In general, I believe that:					
14. ...people with diabetes should have the final say in setting their blood glucose goals.	☐	☐	☐	☐	☐
15. ...blood sugar testing is not needed for people with Type 2* diabetes.	☐	☐	☐	☐	☐
16. ...low blood sugar reactions make tight control too risky for most people.	☐	☐	☐	☐	☐
17. ...health care professionals should learn how to set goals with patients, not just tell them what to do.	☐	☐	☐	☐	☐
18. ...diabetes is hard because you never get a break from it.	☐	☐	☐	☐	☐
19. ...the person with diabetes is the most important member of the diabetes care team.	☐	☐	☐	☐	☐
20. ...to do a good job, diabetes educators should learn a lot about being teachers	☐	☐	☐	☐	☐
21. ...Type 2* diabetes is a very serious disease.	☐	☐	☐	☐	☐
22. ...having diabetes changes a person's outlook on life.	☐	☐	☐	☐	☐

* Type 2 diabetes usually begins after age 40. Many patients are overweight and weight loss is often an important part of the treatment. Insulin and/or diabetes pills are sometimes used in the treatment. Type 2 diabetes is also called noninsulin-dependent diabetes mellitus or NIDDM; formerly it was called "adult diabetes."

In general, I believe that:	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
23. ...people who have Type 2* diabetes will probably not get much payoff from tight control of their blood sugars.	☐	☐	☐	☐	☐
24. ...people with diabetes should learn a lot about the disease so that they can be in charge of their own diabetes care.	☐	☐	☐	☐	☐
25. ...Type 2* is as serious as Type 1† diabetes.	☐	☐	☐	☐	☐
26. ...tight control is too much work.	☐	☐	☐	☐	☐
27. ...what the patient does has more effect on the outcome of diabetes care than anything a health professional does.	☐	☐	☐	☐	☐
28. ...tight control of blood sugar makes sense only for people with Type 1† diabetes.	☐	☐	☐	☐	☐

* Type 2 diabetes usually begins after age 40. Many patients are overweight and weight loss is often an important part of the treatment. Insulin and/or diabetes pills are sometimes used in the treatment. Type 2 diabetes is also called noninsulin-dependent diabetes mellitus or NIDDM; formerly it was called "adult diabetes."

† Type 1 diabetes usually begins before age 40 and always requires insulin as part of the treatment. Patients are usually not overweight. Type 1 diabetes is also called insulin-dependent diabetes mellitus or IDDM; formerly it was called "juvenile diabetes."

In general, I believe that:	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
29. ...it is frustrating for people with diabetes to take care of their disease.	☐	☐	☐	☐	☐
30. ...people with diabetes have a right to decide how hard they will work to control their blood sugar.	☐	☐	☐	☐	☐
31. ...people who take diabetes pills should be as concerned about their blood sugar as people who take insulin.	☐	☐	☐	☐	☐
32. ...people with diabetes have the right not to take good care of their diabetes.	☐	☐	☐	☐	☐
33. ...support from family and friends is important in dealing with diabetes.	☐	☐	☐	☐	☐

Revised 12/18/98

Appendix G

Data Analysis

		Variable Name	Variable Description and type of measure	Data Source	Possible Range of Values	Level of Measurement	Time Frame for Collection	Statistical Test	Decision Rule
Population or **Event**	**IV**	Type 2 Diabetes Mellitus (T2DM) refresher training for providers	Training for providers on T2DM medication management with patients diagnosed with T2DM.	Records review	Completed or Not Completed	Nominal	Seven weeks	N/A	N/A
	DV	DV1: Provider Medication Utilization	Monthly data of anti-diabetic medications prescribed by provider at NMRTC Bremerton pharmacy	Record Review	Not ordered: 0 Ordered: 1	Nominal and Interval	Nine months	Wilcoxon signed-rank test	Meredith et al. (2021) tracked anti-diabetic medication prescribing practices among clinical pharmacists and primary care providers, finding that pharmacists tended to prescribe GLP-1 agonists and

									SGLT-2 inhibitors while providers prescribed insulin and sulfonylurea. This was significant as ADA guidelines had changed during the study to encourage GLP-1 agonists and SGLT-2 inhibitors as first line.
		DV2: IDCC utilization	Monthly utilization	Records review	0-25% utilized -0 26-50% utilized- 1 51-85% utilized- 2 68-100% utilized- 3	Ordinal	Nine months	Wilcoxon signed-rank test	Time to treatment intensification (200 days with the pharmacist run DM clinic vs 325 days by usual medical care) and found 60% of patients with the pharmacists run DM clinic vs 44% of patients with usual medical care achieved an

									A1C reduction of greater than 0.5% (Cowart & Sando, 2019).
		DV3: Provider attitude of T2DM management	Pre-training and post-training knowledge survey	Survey results	Significant knowledge: 3 Moderate knowledge: 2 Little knowledge: 1	Ordinal	Seven weeks Collected Pre-training and post-training	Wilcoxon signed-rank test (one IV-nominal and DV is ordinal and paired groups)	>20% increase in provider knowledge 22.8% increase in provider knowledge of oral T2DM medications and management was statistically and clinically significant (Almetahr et al., 2020).

Appendix H

Team Mentor Agreement Form

Appendix H: Daniel K. Inouye Graduate School of Nursing
DNP Project Team Mentor (Committee Membership) Agreement Form

DOCTOR OF NURSING PRACTICE PROJECT
DNP Project Clinical Question and Team Mentor (Committee Membership) Agreement Form

Graduation Year: 2023

Name(s) of DNP Project Student Team:

1. LCDR Brennda Tsuhako Phase II Site: NH Bremerton FNP/WHNP
2. Maj Patrick Burns Phase II Site: NH Bremerton FNP

The tentative title of the DNP Project Proposal for this student group is:

Improving Type 2 Diabetes Mellitus Related Clinical Inertia in Primary Care

Committee Approved DNP Project Clinical Question:

In a primary care clinic, how does a diabetes mellitus (DM) education program and Intensive Diabetes Care Clinic (IDCC) optimization impact provider attitudes towards DM management, DM medication use rates, and IDCC utilization?

Names of DNP Project Team Mentors *(type the name and obtain signatures)*:

I agree to serve as a member of the DNP Project Team (Team Mentors) for the above DNP Student Project Team. As a Project Team Mentor, I agree to the duties and responsibilities outlined within the DNP Project Manual which include but are not limited to the provision of consultation and guidance supporting the entire DNP project journey and to ensure the DNP project is of sufficient rigor and demonstrates doctoral level scholarship to meet the requirements for USUHS GSN graduation.

NOTE: You may have 3-4 DNP Team Mentors [committee members including your DNP Senior Mentor (Chair)]. The Phase II Site Director may also be a member of the group, as well as other USUHS faculty or others who may serve as content experts. All non-USUHS faculty selected as a Team Mentor must be approved by the DNP Project Director.

Senior Mentor (Chair): Dr. Jennifer Trautmann Signature: TRAUTMANN.JENNIFER.L.1074795443 Digitally signed by TRAUTMANN.JENNIFER.L.1074795443 Date: 2023.04.27 15:08:29 -04'00' Date:

Team Mentor (Committee): CDR Rachel Newnam Signature: NEWNAM.RACHEL.ELAINE.1288580657 Digitally signed by NEWNAM.RACHEL.ELAINE.1288580657 Date: 2023.04.14 14:25:36 -07'00' Date: 14Apr23

Form Version: 4 Sept 2016

Appendix I

CITI Certificates

CITI PROGRAM

Completion Date 17-Apr-2021
Expiration Date 16-Apr-2024
Record ID 41975549

This is to certify that:

Patrick Burns

Has completed the following CITI Program course:

Not valid for renewal of certification through CME.

GCP – Social and Behavioral Research Best Practices for Clinical Research
(Curriculum Group)
GCP – Social and Behavioral Research Best Practices for Clinical Research
(Course Learner Group)
1 - Basic Course
(Stage)

Under requirements set by:

Office of the Under Secretary of Defense (Personnel and Readiness)

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?wacb7c969-563b-48ab-9fae-c986248617e1-41975549

CITI PROGRAM

Completion Date 15-Apr-2021
Expiration Date 14-Apr-2024
Record ID 42073162

This is to certify that:

Brennda Tsuhako

Has completed the following CITI Program course:

Not valid for renewal of certification through CME.

GCP – Social and Behavioral Research Best Practices for Clinical Research
(Curriculum Group)
GCP – Social and Behavioral Research Best Practices for Clinical Research
(Course Learner Group)
1 - Basic Course
(Stage)

Under requirements set by:

Office of the Under Secretary of Defense (Personnel and Readiness)

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?wf5319414-438b-4f72-a139-60f44cd1cdd1-42073162

Appendix J

USU (VPR) Form 3202N

USUHS FORM 3202N
DANIEL K. INOUYE GRADUATE SCHOOL OF NURSING
EVIDENCE-BASED PRACTICE/PERFORMANCE IMPROVEMENT PROPOSAL

VPR Date Stamp

Project Number: GSN-61-13067 (VPR will assign)

Project Title: Improving Type II Diabetes Mellitus Related Clinical Inertia in Primary Care

SECTION A: STUDENT POC INFORMATION

1. Name (Last, First, MI): Tsuhako, Brennda, A and Burns, Patrick, A Student E-mail: brennda.tsuhako@usuhs.edu; patrick.burns@usuhs.edu
2. Home Address: [redacted] Cell Number: [redacted]

SECTION B: COMMITTEE CHAIR / SENIOR MENTOR INFORMATION

3. Name (Last, First, MI): Newnam, Rachel
4. Telephone [redacted] Fax: E-mail: rachel.newnam@usuhs.edu
5. USUHS Building/ Room No.: 1 Boone Road Bremerton, WA 98312

SECTION C: PROJECT INFORMATION

6. Attach the Abstract for the proposal, including the following sections: Site Location of the Project, Title, Authors, Background or Problem/Issue, Clinical Question/Purpose, Project Design, Anticipated Organizational Impact/Implications for Practice and also include the Proposed Timeline. Single space the abstract and use Times New Roman font, size 12.
7. Is this proposal related to an active research project of the Chair/Senior Mentor identified in Section B? ☐ Yes X ☐ No
   If yes, complete below; if no, proceed to Part 8.
   Project Number: _____
   Project Title: _____
   Project Start Date: _____ Project End Date: _____
8. Anticipated period of performance: Project Start Date: 29NOV2022 Project End Date: 01APR2023
9. Performance Site(s): Naval Hospital Bremerton Family Medicine Clinic
10. Does this project involve any classified information? (Contact the USUHS Security Office for guidance) ☐ Yes X ☐ No
11. Do you have a funding source for this project? ☐ Yes X ☐ No ☐ NA
    If yes, specify the funding agency and the amount provided:

SECTION D: SIGNATURES

The following signatures attest to the validity of the above information:

BURNS.PATRICK.A.1512791367 Digitally signed by BURNS.PATRICK.A.1512791367 Date: 2022.12.02 09:28:31 -08'00'
Student (Project Point of Contact for the Group) (Signature and Date)

NEWNAM.RACHEL.ELAINE.1288580657 Digitally signed by NEWNAM.RACHEL.ELAINE.1288580657 Date: 2022.12.01 11:01:50 -08'00'
Chair/Senior Mentor (Signature and Date)

JOHNSON.HEATHER.L.1073935110 Digitally signed by JOHNSON.HEATHER.L.1073935110 Date: 2022.12.13 14:26:13 -05'00'
Chair/Program Director (Signature and Date)

Chair/Program Director (Signature and Date)

DNP Project Director or PhD Director (Signature and Date)

SEIBERT.DIANE.C.1084932279 Digitally signed by SEIBERT.DIANE.C.1084932279 Date: 2022.12.13 11:47:55 -05'00'
Associate Dean for Academic Affairs, GSN (Signature and Date)

SIMMONS.ANGELA.MARIE.1143313375 Digitally signed by SIMMONS.ANGELA.MARIE.1143313375 Date: 2022.12.13 14:50:36 -05'00'
Associate Dean for Research, GSN (Signature and Date)

ROMANO.CAROL.A.1032050294 Digitally signed by ROMANO.CAROL.A.1032050294 Date: 2022.12.13 15:18:35 -05'00'
Dean, DKI Graduate School of Nursing (Signature and Date)

In light of the above signatures, the project is approved.

WOODBERRY.MITCHELL.WAYNE.1060957114 Digitally signed by WOODBERRY.MITCHELL.WAYNE.1060957114 Date: 2023.03.07 15:52:31 -05'00'
USUHS Vice President for Research Date

USUHS Form 3202N (VPR) - Revised Sep 2015 v1.2
Previous versions are obsolete

Appendix K

MTF IRB/PI Letter of Determination

DEPARTMENT OF THE ARMY
MADIGAN ARMY MEDICAL CENTER
9040 JACKSON AVENUE
TACOMA, WA 98431-1100

MCHJ-ISI 25 October 2022

MEMORANDUM FOR LCDR Brennda Tsuhako, USN, NC, DNP Student, and Capt Patrick Burns, USAF, NC, DNP Student, Uniformed Services University ofthe Health Sciences

SUBJECT: Determination of Not Research for "Improving Type 2 Diabetes Mellitus Related Clinical Inertia in Primary Care". Reference # 223008

1. The Madigan Army Medical Center Human Research Protections Office initially received the above-referenced project on 12 October 2022 to review for applicabilityof human subjects protections regulations. Following minor revisions, the application was resubmitted with all required documents on 24 October 2022.

2. This project will utilize an educational intervention aimed at decreasing clinical inertia by improving provider attitudes towards T2DM, increasing diabetic medication use rates, and increasing utilization of the Intensive Diabetes Care Clinic. The PICO question guiding this work is: In a primary care clinic (Population), how does a diabetes mellitus (DM) education program (Intervention) and Intensive Diabetes Care Clinic (IDCC) (Intervention) optimization compared to usual care (Comparison) impact provider attitudes towards DM management (Outcome), DM medication use rates (Outcome), and IDCC utilization (Outcome)? This intervention will include a pre-post survey on providers' attitudes about diabetes care, 5 weeks of virtual or in-person provider education from an Internal Medicine Clinical Pharmacist, and data collectionfor medication prescribing rates and utilization of the IDCC. These strategic solutions have been extracted from the literature review on clinical inertia surrounding providers and T2DM care; this initiative may enhance both provider and patient satisfaction.

3. This study does not constitute research as defined under the human subjects protections regulations, as it is not "a systematic investigation . . . designed to develop or contribute to generalizable knowledge." [32 CFR 219.102(l)] Additionally, per DoD Instruction (DoDI) 3216.02, "activities, including program evaluation, customer satisfaction surveys, user surveys, outcome reviews, and other methods, designed solely to assess the performance of DoD programs where the results of the evaluation are only for the use of Government officials responsible for the operation or oversight of the program being evaluated and are not intended for generalized use beyond such program" are not research involving human subjects, and as such, are not covered under the requirements of DoDI 3216.02.

MCHJ-ISI
SUBJECT: "Improving Type 2 Diabetes Mellitus Related Clinical Inertia in Primary Care". Reference # 223008

4. **This determination should not be construed as approval to conduct this project**. It is your responsibility to identify and obtain any necessary permissions or approvals to conduct the project prior to initiation. This activity may proceed with no further requirement for review by the Madigan Army Medical Center Human Research Protections Office, pending other required approvals.

5. In addition, your project may become research subject to IRB review if it becomes and/or includes a systematic investigation to develop or contribute to generalizable knowledge. In the event there is a change to the above-described project that may impact its determination, please submit a modification form for review and determination. No change to this activity may be implemented until the review is completed and you have been notified that there is no revision to our determination that your activity is still deemed not to be research. A request for our review does not need to be submitted for the following changes to your activity: (1) personnel conducting the activity; (2) location or site at which activities will be conducted; (3) number of respondents; or (4) period of time over which the activity will be conducted. You are not authorized to take project data away from the institution.

6. All publications, presentations or abstracts arising from this work must be cleared through appropriate publication clearance procedures prior to publication IAW your institutions local publication clearance policy. Many journals are interested in publishing projects that are not research. If you do decide to publish your findings, please use paragraph headings such as: "issue," "procedures for collecting and evaluating information," "information found," "lessons learned," etc. and avoid using headings such as "research questions or hypothesis," "methods," "results," "study limitations," etc.

7. The Madigan Army Medical Center Human Research Protections Office point of contact for this review is Dr. Mary S. McCarthy in the Center for Nursing Science & Clinical Inquiry at 253-968-3695 or mary.s.mccarthy1.civ@health.mil.

[redacted]

Exempt Determination Official
Center for Nursing Science & Clinical Inquiry

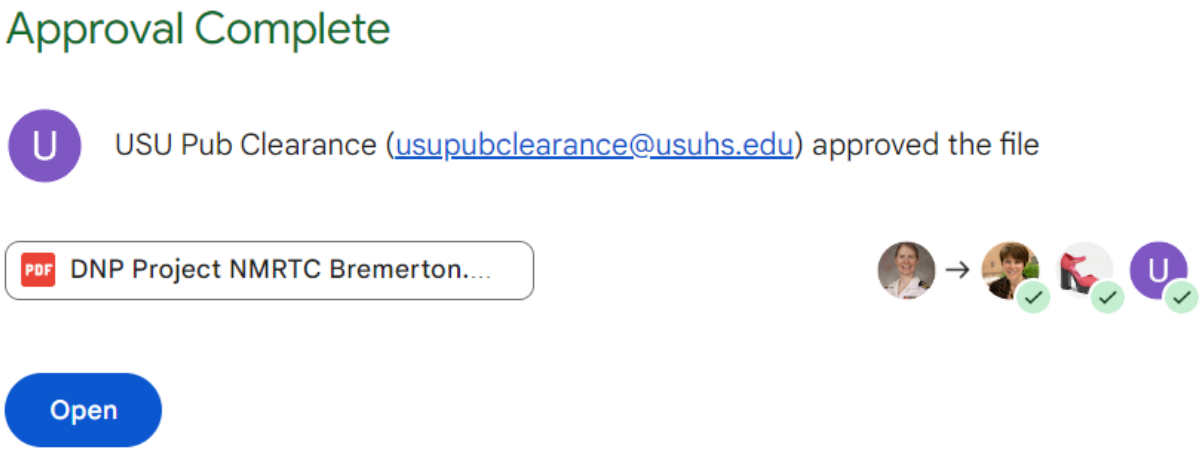
Appendix L

PAO Clearance/Level of Dissemination Classification

BUMEDINST 5721.3D

Local Command

Authority	Name	Phone Number	E-mail Address	Approve Y/N	Signature	Date
OPSEC Officer	LTJG Pinzas, Alejand	[redacted]	alejandro.m.pinzas.m	Y	PINZAS.ALEJANDRO.MAURICIO.1467540145 Digitally signed by PINZAS.ALEJANDRO.MAURICIO.1467540145 Date: 2023.05.10 15:30:08 -07'00'	10 May 2023
Command ethics counselor	LCDR Stutts		michael.j.stutts.mil@h	Y	STUTTS.MICHAEL.JOSH.1256869191 Digitally signed by STUTTS.MICHAEL.JOSH.1256869191 Date: 2023.05.24 13:33:37 -07'00'	24 May 2023
Public affairs	douglas h stutz		douglas.h.stutz.civ@h	Y	STUTZ.DOUGLAS.HAMILTON.1163056697 Digitally signed by STUTZ.DOUGLAS.HAMILTON.1163056697 Date: 2023.05.05 14:10:06 -07'00'	05 May 2023
Commanding Officer or Appointed Designee	Patrick J. Fitzpatrick		patrick.j.fitzpatrick2.m	Y	FITZPATRICK.PATRICK.JOSEPH.1046545601 Digitally signed by FITZPATRICK.PATRICK.JOSEPH.1046545601 Date: 2023.05.26 10:09:16 -07'00'	25 May 2023



Appendix M

DNP Project Completion Verification Form

Appendix G: Daniel K. Inouye Graduate School of Nursing
DNP Project Completion Verification Form

DOCTOR OF NURSING PRACTICE PROJECT
Completion Verification Form

The DNP Project titled:

Improving Type 2 Diabetes Mellitus Related Clinical Inertia in Primary Care

was completed at: NMRTC Bremerton

by the following student(s):

(type student name)	*(signature)*	*(date)*
Patrick A. Burns	BURNS.PATRICK.A.1512791367 Digitally signed by BURNS.PATRICK.A.1512791367 Date: 2023.05.08 11:26:32 -07'00'	05/08/2023
Brennda A. Tsuhako	TSUHAKO.BRENNDA.ANN.1411046563 Digitally signed by TSUHAKO.BRENNDA.ANN.1411046563 Date: 2023.05.08 11:19:46 -07'00'	05/08/2023

The DNP Practice Project Team verifies that the following components of the DNP project, accomplished by the above students, is of sufficient rigor and demonstrates doctoral level scholarship to meet the requirements for USUHS GSN graduation:

- Presentation of DNP project to the leadership/stakeholders at the Phase II Site,
- Abstract/Impact Statement (*Appendix F*), and
- DNP Project written report.

Verified by:

	(type name)	*(signature)*	*(date)*
Senior Mentor:	Jennifer Trautmann	TRAUTMANN.JENNIFER.L.1074795443 Digitally signed by TRAUTMANN.JENNIFER.L.1074795443 Date: 2023.05.09 16:51:07 -07'00'	8 May 2023
Team Mentor:			
Team Mentor:			
Phase II Site Director:	Rachel Newnam	NEWNAM.RACHEL.ELAINE.1288580657 Digitally signed by NEWNAM.RACHEL.ELAINE.1288580657 Date: 2023.05.08 12:11:36 -07'00'	5/8/2023

For RNA Students only - add the following additional signature for final verification of project completion:

RNA Project Director *(type name)*	*(Signature)*	*(Date)*

Form Version: 26 Aug 2017/30 Mar2020