TEXAS WOMAN'S
UNIVERSITY

Interdisciplinary Approach to Oral Care among Patients with Type 2 Diabetes: A Quality Improvement Project

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Section I: Introduction/Background

(Centers for Disease Control and Prevention, 2020).

Introduction/Background

- In the United States, there are 34.2 million people diagnosed with diabetes
- 1.5 million are newly reported cases
- These numbers continue to grow
- Diabetes is the 7th leading cause of death

(Centers for Disease Control and Prevention, 2020).

Background

- American Diabetic Association standards of care (2021) recommends annual dental exams.
- Diabetes develops systemic inflammation that leads to pancreatic dysfunction and impacts insulin resistance (Chappel & Genco, 2013).
- Periodontitis (infection of the gums) risk is 3 times greater diabetics and is higher in patients with poor glycemic control (Bissett et al, 2015)

Background (cont.)

- Consensus report found periodontal care was associated with a HbA1c reduction of about 0.4% at a three month recheck comparable to adding a second antidiabetic medication (Chapple and Genco, 2013)

Needs Assessment: SWOT

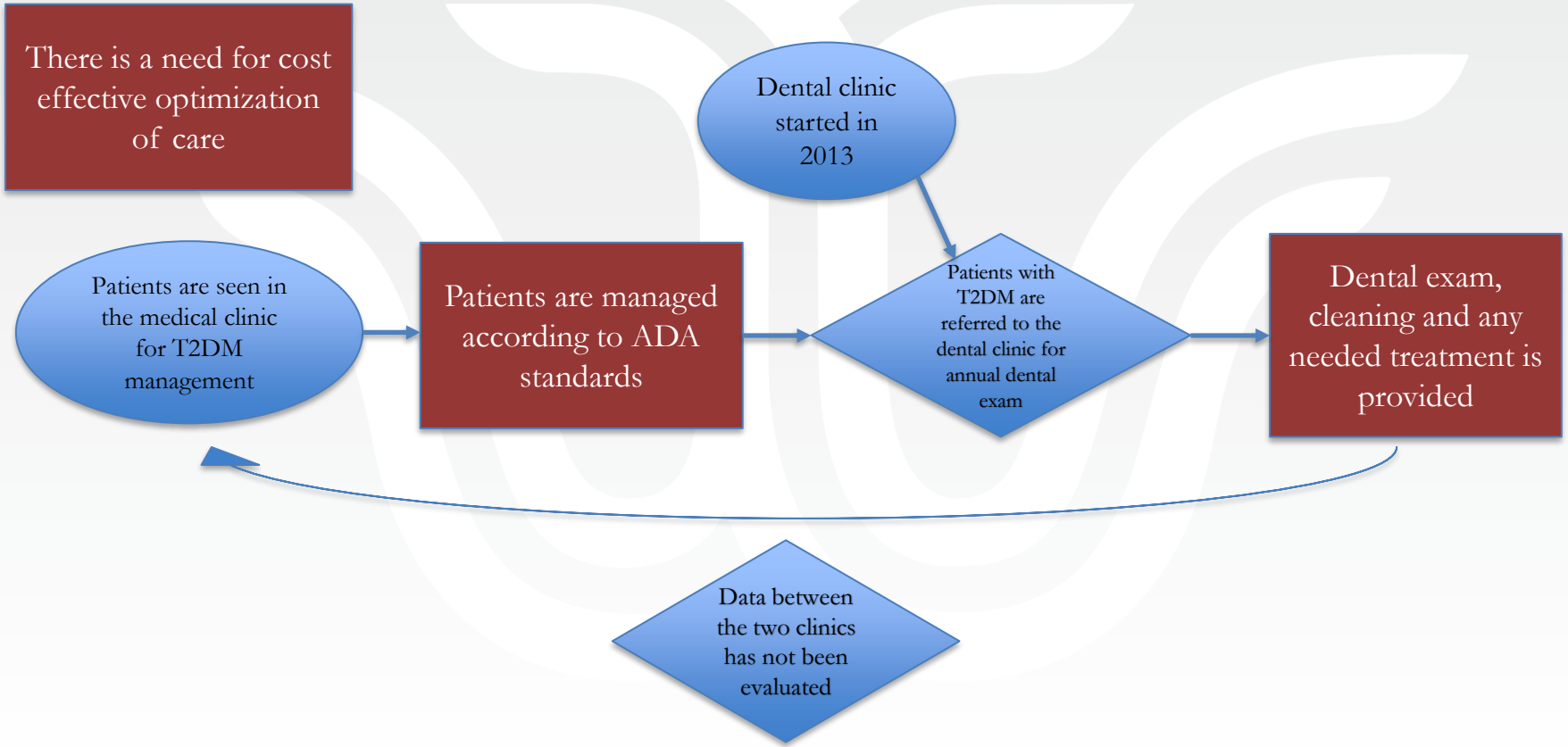
Strengths Patient Centeredness Interdisciplinary Care is provided through the medical clinic, dental clinic and vision clinic Volunteer providers	**Weaknesses** Limited patient pool Potential transient nature of indigent care Single site makes data not generalizable Volunteer providers may cause a variation in care
Opportunities Increase the body of knowledge Improve patient outcomes Quantify the data between the medical and dental clinic	**Threats** Clinic funding Patient finances Potential variance in care related to the volunteer roster Patient compliance or ability to comply with plan of care

Needs Assessment (cont.)

- Practice setting- a community and grant supported medical ministry
- Care for about 3,000 patients annually, with 25,815 annual visit and 16,895 dental visits annually.

(TOMAGWA, 2021, February 2)

Needs Assessment (cont.) flow



Inquiry Question

In adult (18-65 years-of-age) patients with a diagnosis of type 2 diabetes, does standardized prophylactic dental treatment (SPDT) care (dental exam, cleaning, and education) impact HbA1c and active vs stable dental status levels over 2 years (2018-2019)?

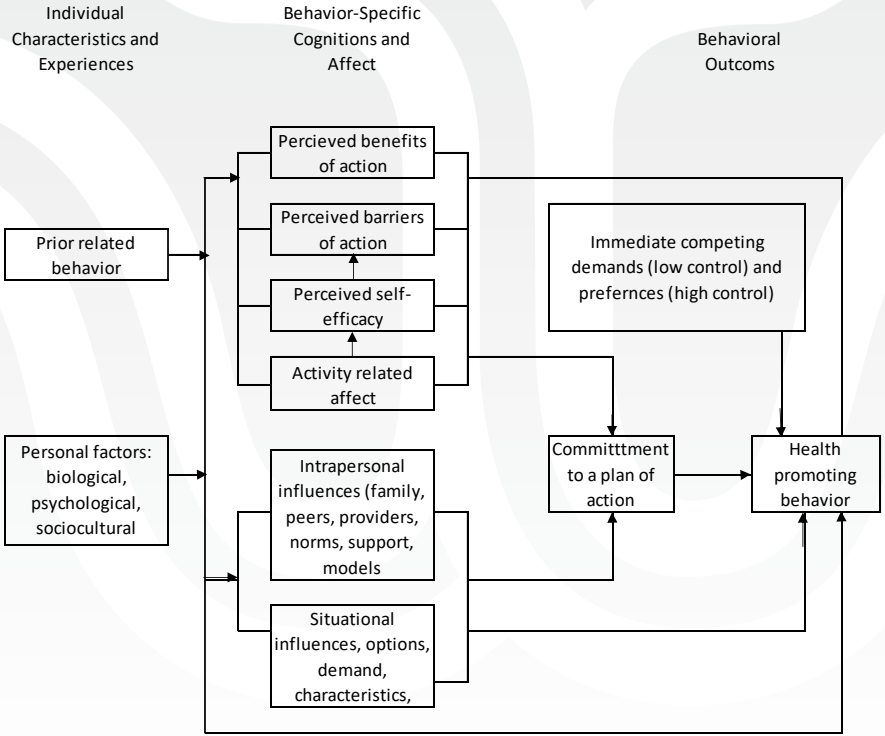
PICOT

P	• Adult (18-65 years of age) with diagnosis of type 2 diabetes
I	• Standardized Prophylactic Dental Treatment (SPDT) care (dental exam, cleaning and education)
C	• None
O	• HgA1c • Active vs. stable dental status
T	• 2 year time period (2018-2019)

Purpose/Aim

1. Analyze glycemic control in patients with type 2 diabetes by reviewing HgA1c levels pre- and post- SPDT
2. Evaluate how the implementation of SPDT for patients with T2DM impacts HgA1c levels
3. Evaluate the impact of active vs. stable dental status of SPDT
4. Evaluate the adherence of recommended follow-up; are the patients keeping the appointments
5. Standardize the provider referral process for SPDT

Theoretical Frameworks (Pender's Health Promotion Model)



Murdaugh et al. (2019)

Section II:
Evidence Synthesis

Section II: Presentation of Evidence

- Search terms were: Diabetes Mellitus Type 2, oral health, periodontitis or periodontal disease

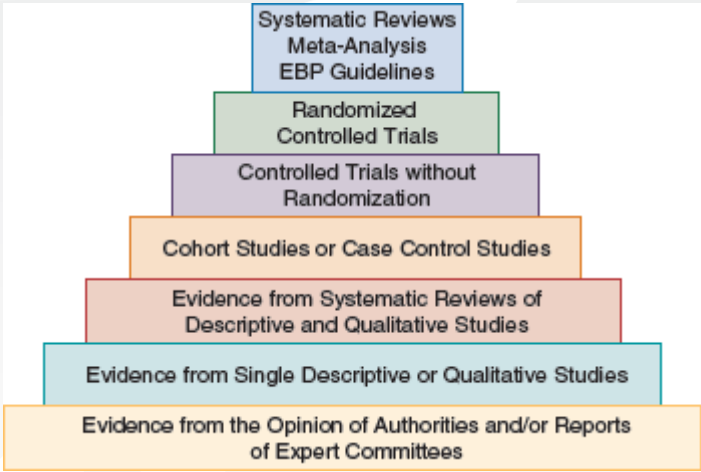
- Journals@Ovid Full Text, PubMed Remote, ScienceDirect, Scopus, ProQuest Nursing and Allied Health Source, Cochrane Library, CINAHL Plus with Full Text, Health Science: A SAGE Full-Text Collection and Academic Search Complete.

Presentation of Evidence (cont.)

- Inclusion/Exclusion (675/22)
  - Articles that were English language or translated
  - Peer-reviewed
  - 2010-2021
  - Adult patients
- Critical Appraisal
  - Johns Hopkins Critical Appraisal Tool
  - High to good quality overall

Presentation of Evidence (cont.)

- Systematic Reviews 8
- Randomized Controlled Trials 5
- Cohort Studies or Case Control 7
- Evidence from the Opinion of Authorities and/or Reports of Expert Committees 2



Themes

1. Treatment of periodontal disease for glycemic control
   - Focused on effect of periodontal disease treatments on glycemic control in patients with diabetes.
2. Glycemic control on periodontitis
   - Focused on level of glycemic control and the degree of periodontal disease.

Evidence Synthesis

- Periodontal treatment by scaling and root planing does lower HgA1c by 0.29% at 3-4 months and continued periodontal treatment would be necessary for improvements to continue past 6 months (Simpson et al., 2018)
- Agarwal et al. (2016) found that periodontal treatment of scaling and root planing resulted in HgA1c reduction of 0.94% in patients with chronic periodontal disease.
- A relationship between diabetes and the development of gingival and periodontal diseases was found(Kathiresan et al., 2017)

Evidence Synthesis (cont.)

- Graziani et al. (2017) found that patients with higher HgA1c's had a higher incidence of periodontitis.
- Katagiri et al. (2012)found that glycemic control did improve bleeding on probing without periodontal treatment by reducing inflammation.
- Borgnakke (2019) indicates that elevated blood glucose levels can impact oral health and similarly treatment of oral conditions can improve glucose levels supports an interdisciplinary approach to diabetes care.

Section III: Methodology

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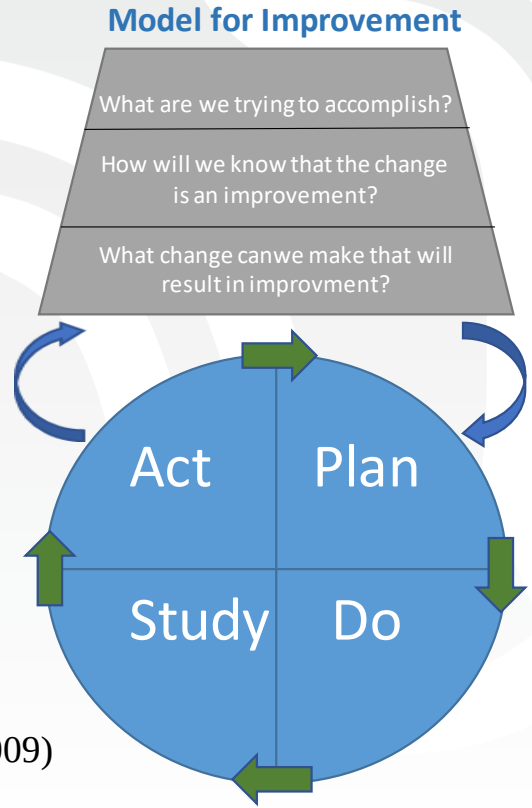
In adult (18-65 years-of-age) patients with a diagnosis of type 2 diabetes, does standardized prophylactic dental treatment (SPDT) care (dental exam, cleaning, and education) impact HbA1c and active vs. stable dental status over 2 years (2018-2019)?

Project Methodology

- Type of Project: Quality Improvement (QI)
- QI Framework: MFI-PDSA
- Implementation Framework: RE-AIM
- Project Participants
  - Adult (age 18-65) patients diagnosed with type 2 diabetes mellitus
  - Referral to the dental clinic

Project Type (Quality Improvement)



The Model for Improvement (MFI-PDSA) will be used as the framework for this project

(Langley et al., 2009)

The Model for Improvement (PDSA)

- **What are we trying to accomplish?**
  - Improving the outcomes for patients diagnosed with T2DM
- **How will we know that a change is an improvement?**
  - Stabilized HgA1c
  - Stabilized periodontal disease
  - Standardized provider referral process
- **What change can we make that will result in improvement?**
  - Standardized prophylactic dental treatment
  - Standardized provider referral process

(Langley et al., 2009)

The Model for Improvement (cont.)

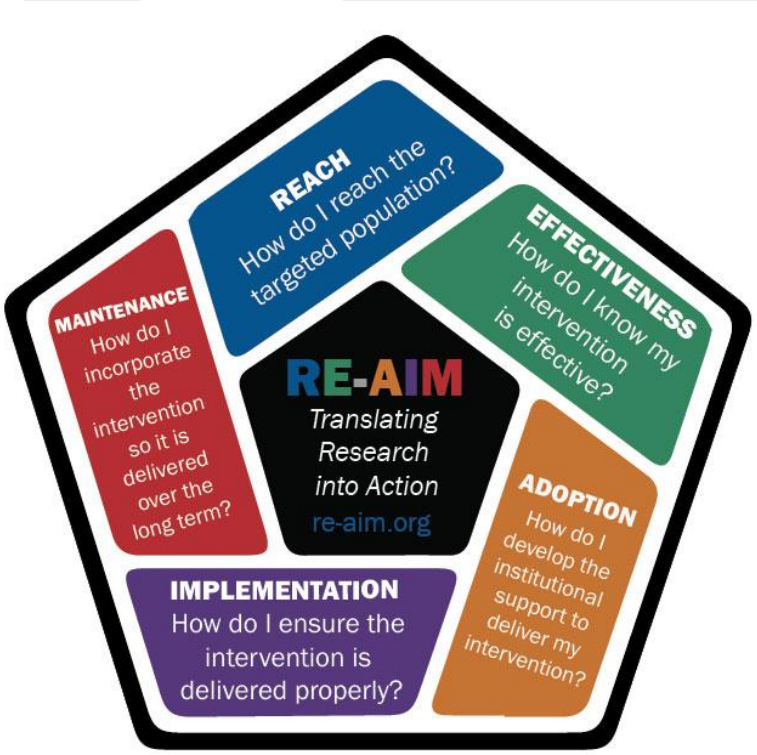
- Outcome Measures
  - HgA1c
  - Stable vs. active periodontal disease
- Process Measures
  - Referrals to the dental clinic
  - Visit adherence
  - Standardize provider referral process for SDPT

The Model for Improvement (cont.)

- Balancing Measure
  - Is there a measurable impact of the dental clinic on diabetic care?

Implementation Framework (RE-AIM)

RE-AIM is a model that helps to translate research to practice and implement and sustain the changes that are needed to improve patient care. (Glasgow, 2003)



Project Methodology

- Intervention
  - Referral of the patient diagnosed with T2DM to the dental clinic for SDPT
  - HgA1c values will be evaluated pre- and post-dental clinic visits
  - Dental status assessment of active vs. stable periodontal disease

Operational Definitions

Variables	Operational Definition
Gender	Male = 1 Female = 2
Race/ Ethnicity	African American = 1 Caucasian = 2 Hispanic = 3 Asian = 4
Marital Status (M, S, D, W)	Married = 1 Single = 2 Divorced = 3 Widowed = 4
Living situation (#)	The number of people living in the home.
Age (##)	The patient's year of age at the time of the first visit.
Date of medical visit (MM/DD/YY)	Date of patient's medical visit.
Clinic Provider (XX)	Initials of provider.
Height (inches)	How tall the patient is in inches.
Weight (pounds)	How much the patient weighs in pounds.
BMI (##.#)	The calculated body mass index calculated from height and weight.

Operational Definitions cont.

Medical Clinic Variables	Operational Definition
New Diagnosis of DM (Y/N)	Is the patient newly diagnosed with T2DM?
Smoker (Y/N)	Is the patient a current smoker.?
HTN (Y/N)	Identification of hypertension as a diagnosed comorbidity.
Heart disease (Y/N)	Identification of heart disease as a diagnosed comorbidity.
Hyperlipidemia (Y/N)	Identification of hyperlipidemia as a diagnosed comorbidity.
Hypothyroidism (Y/N)	Identification of hypothyroidism as a diagnosed comorbidity.
Diabetic Medications:	Identification of medications the patient is taking for T2DM
Date of Dental Referral (MM/DD/YY)	Date the patient was referred to dental for annual exam
HbA1c (#.#)	Hemoglobin A1c is a "test that measures the level of hemoglobin A1c in the blood as a means of determining the average blood glucose concentration for the preceding two to three months" (Merriam-Webster, n.d.)
Date of Fasting or Random Glucose (MM/DD/YY)	The date of the random or fasting glucose levels.
Fasting Glucose (###)	Fasting glucose is when the patient has not had anything to eat for the last 8 hours.
Random Glucose (###)	Random glucose is a glucose that is taken regardless of having anything to eat.

Operational Definitions cont.

Dental Clinic Variables	Operational Definition
Date of first dental visit (MM/DD/YY)	Identify the date the patient was initially seen in the dental clinic.
Date of Dental Visit (MM/DD/YY)	Identification of the date of the dental visit
Provider Initials (XX)	Provider initials
Date of Glucose (MM/DD/YY)	Date of either the fasting or random glucose that is obtained prior to the dental visit.
Fasting Glucose (###)	Fasting glucose is when the patient has not had anything to eat for the last 8 hours.
Random Glucose (###)	Random glucose is a glucose that is taken regardless of having anything to eat.
Dental Status (Stable/Active)	Stable: Less than 30% bleeding on probing during dental exam. Active: Greater than 30% bleeding on probing during dental exam.
Number of teeth (##)	The number of teeth the patient has at the initial visit.
Extractions? (#)	Removal of a tooth due to carries or gum disease
Education Documented (Y/N)	Documentation of education of dental care.
Handouts (Y/N)	Documentation of handouts given.
Toothbrushing (Y/N)	Education of proper toothbrushing.
Flossing (Y/N)	Education of proper flossing.

Data Collection Analysis Plan

- The patients will be identified by the diagnosis code for diabetes.
- The medical chart will be reviewed for descriptive demographic data and for clinical data as per the data collection form.
- The dental chart will then be reviewed for the needed information.

Sample Data Collection Form

	Participant #												
1	Sex (M/F)	Male	Female	Other									
2	Race												
3	Ethnicity	Hispanic/Latino		Other									
4	Mariatal Status (M, S, D, W)												
5	Living situation												
6	Age (##)												
7	Date of medical visit (MM/DD/YY)												
8	Clinic Provider (XX)												
9	Height (inches)												
10	Weight (pounds)												
11	BMI (##.#)												
12	New Diagnosis of DM (Y/N)												
13	HTN (Y/N)												
14	Heart disease (Y/N)												
15	Hyperlipidemia (Y/N)												
16	Hypothyroidism (Y/N)												
17	Diabetic Medications:												
18	Date of Dental Referral (MM/DD/YY)												
19	HbA1c (#.#)												
20	Date of Glucose (MM/DD/YY)												
21	Fasting Glucose (###)												
22	Random Glucose (###)												
23	Date of first dental visit (MM/DD/YY)												

Data will be manually collected on to the form and entered into an Excel file for import into SPSS

Section IV:
Findings and Results

Inquiry Question

In adult (18-65 years-of-age) patients with a diagnosis of type 2 diabetes, does standardized prophylactic dental treatment (SPDT) care (dental exam, cleaning, and education) impact HbA1c and active vs stable dental status levels over 2 years (2018-2019)?

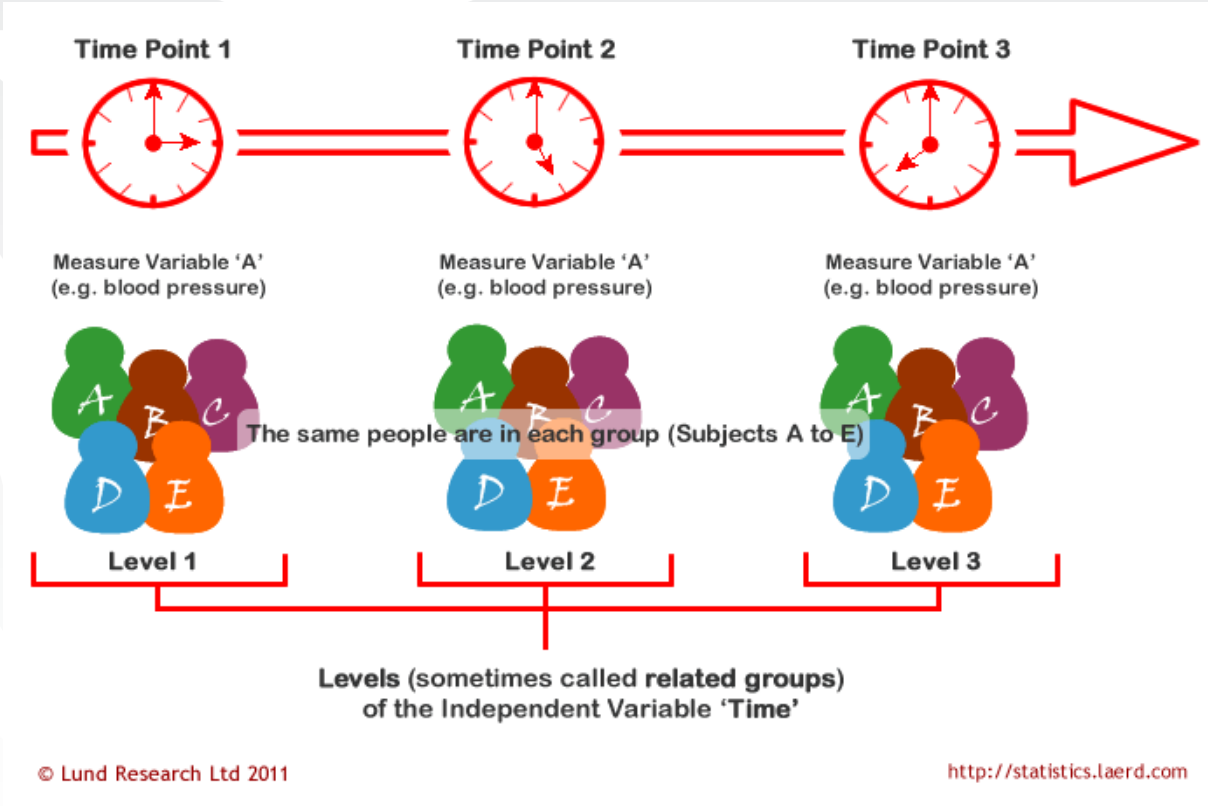
Data Analysis Plan

- Descriptive analysis will be conducted to define the group in regard to:
  - Basic demographics
  - Clinical demographics
- Repeated Measures Analysis of Variance (ANOVA) will be conducted using series of 3 Hb1Ac values: Pre-, Post- SPDT #1, and Post-SPDT #2 (Pallant, 2020, p. 274)
- *Dental status* in terms of active versus stable status will also be analyzed using descriptive trend analysis.

Data Analysis Plan (cont.)

Repeated Measures ANOVA of HbA1C:

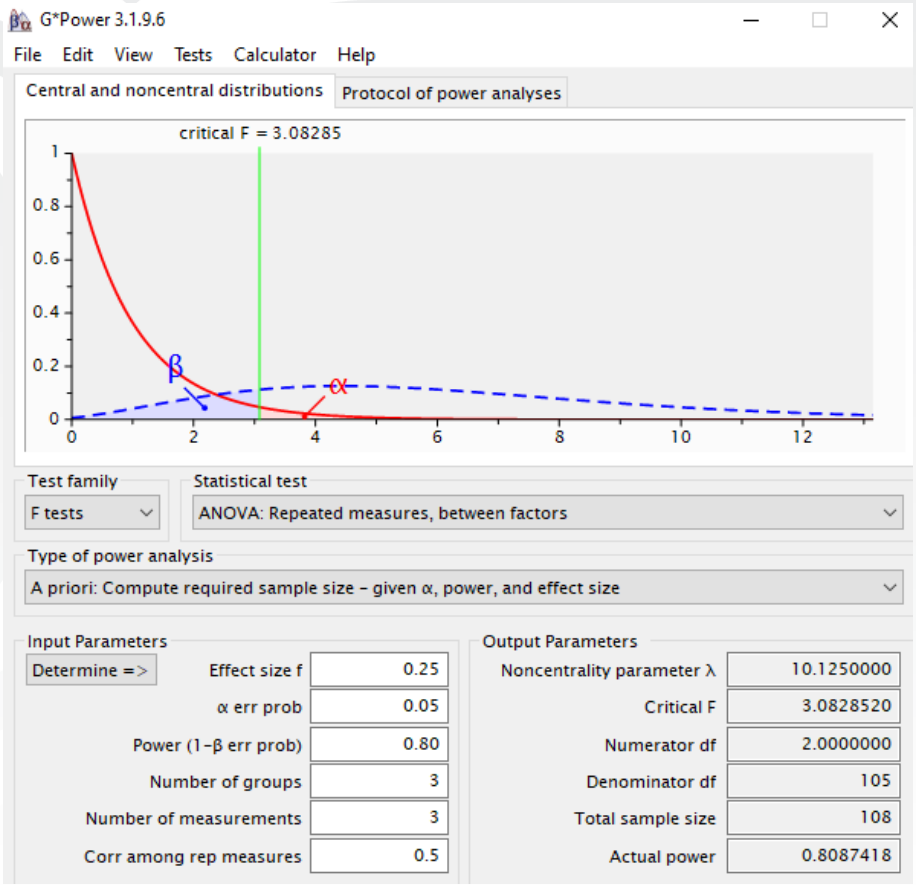
1. Pre-SPDT
2. Post-SPDT #1
3. Post-SPDT #2



Power Analysis via G-Power

- Power of 80%
- Alpha of .05
- Small effect size of .25
- Three groups
- Three measures

Target Sample of 108 records



IRB

- There is no formal IRB process for the clinic
- TWU IRB

Section V:
Recommendations and Implications of Practice

Recommendations/Implications

- ACDEFG

Gantt Chart

- ABCEDFG

Time Line (Proposed)

Problem/need Identification	1/12/2021							
Meet with Faculty Lead		2/9/2021						
Project approval obtained		2/9/2021						
Project Proposal Defense				4/26/2021				
Submit to TWU IRB					5/6/2021			
Data Collection					5/26/2021			
Evaluationof data						6/15/2021		
Final Project Defense						6/20/2021		
August 2021 Graduation								8/1/2021
	January	February	March	April	May	June	July	August

Next Steps

- ABCDEFG

DNP Essentials

- ABCDEFG

Dissemination

- ABCDEFG

Any Questions?

Contact: Rachel Weaver rweaver@twu.edu

References

- ABCDEFG