

UC San Diego
SCHOOL OF MEDICINE

**Department of
BioMedical Informatics**

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Diabetic Care and Prevention



About Me

- 25 years living in San Diego
- CSUSM Alumni 2016
- Graduate Student 2019
- Global Health Emphasis – I.P.V.
- Over 3 years work experience at Pharmaceutical Companies
- Love to Cook, Travel, and go to the beach





Outline

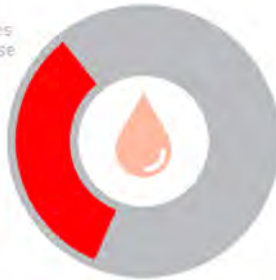
DIABETES IS
ON THE RISE



422 MILLION
adults have diabetes

3.7 MILLION
deaths due to diabetes
and high blood glucose

1.5 MILLION
deaths caused
by diabetes



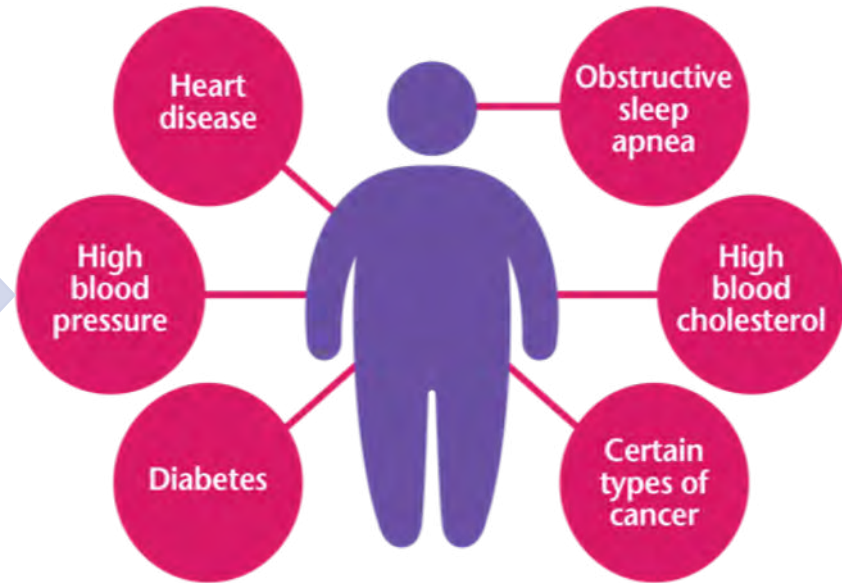
- ❖ Causes
- ❖ Prevention
- ❖ Diagnosis
- ❖ Types of Diabetes
- ❖ Management
- ❖ Society and Culture
- ❖ “Never” Outcomes



Causes

Risk Factors

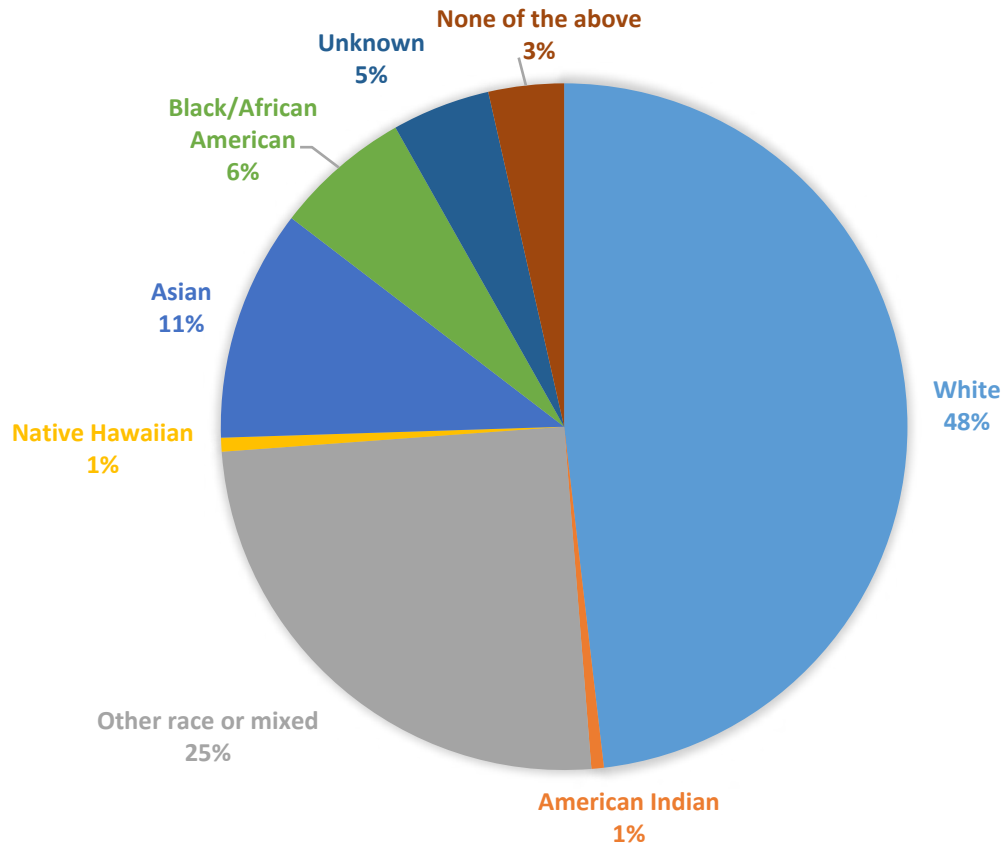
- Obesity
- Family History
- Inactivity
- Diet



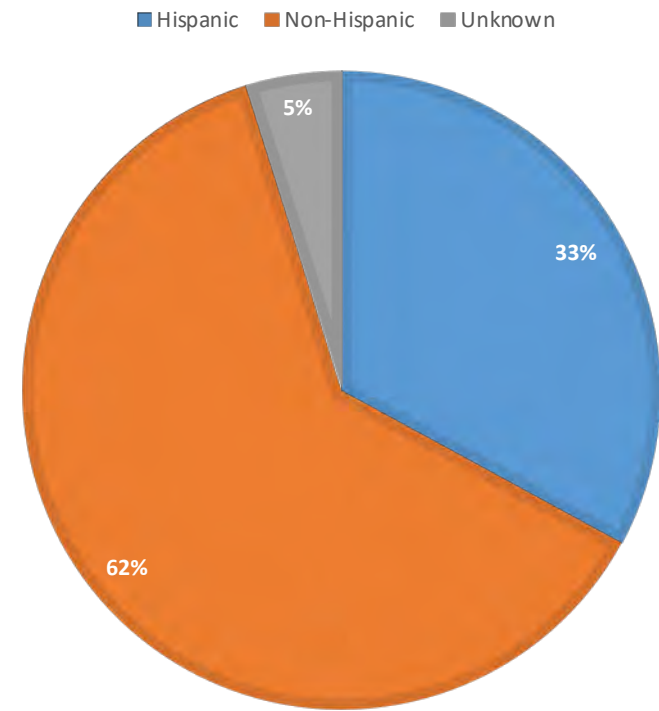


Total Patients Diagnosed with Diabetes 2010–2019

ALL UCSD DIABETIC PATIENTS SINCE 2010 (RACE)



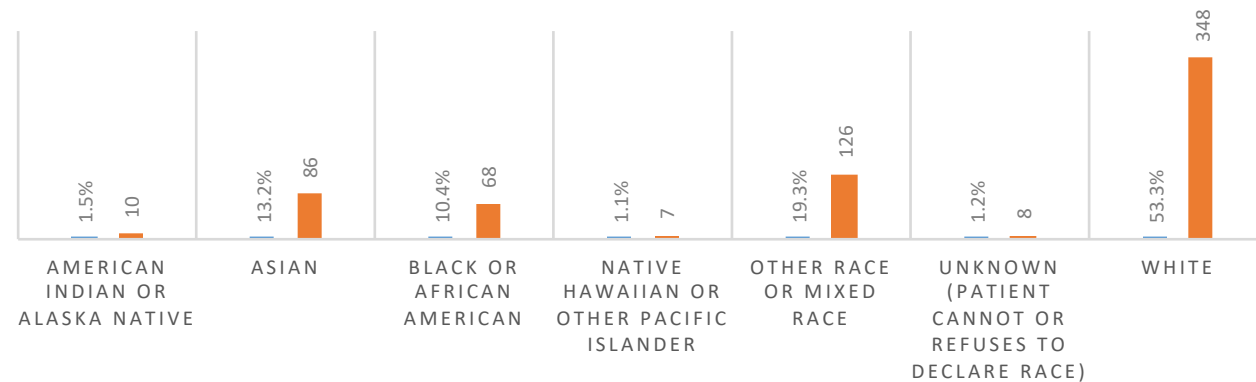
UCSD DIABETIC PATIENTS SINCE 2010 (ETHNICITY)



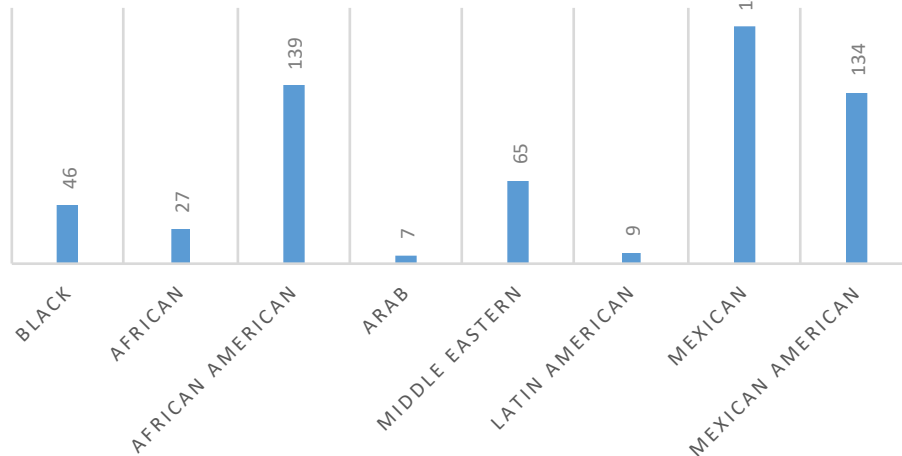


Race Detail and Level 2 Ethnic Groups Diagnosed with Diabetes

DIABETES POPULATION: % BY RACE

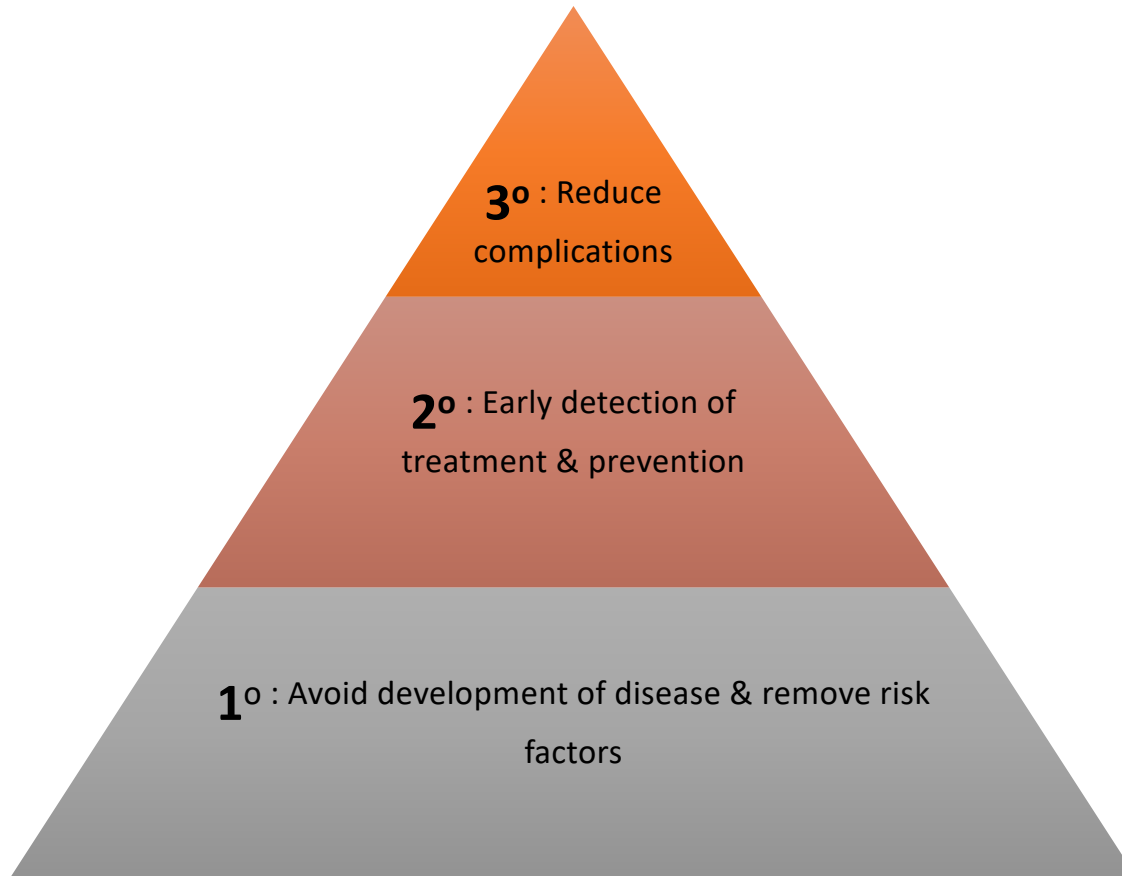


UCSD HIGH RISK ETHNICITY VOLUME





Prevention



- ❖ **Physical Activity** is an important component of type II diabetes prevention initiatives (Boyer, 2017).
- ❖ **Screening** for HLA to identify those with high risk genes may best allow for provision of primary prevention efforts (Beauchamp, 2015).
- ❖ Primary prevention via **dietary intake** (Beauchamp, 2015).



Diagnosis

Pre-Diabetes

- Hypertension identification and control
- Hyperlipidemia

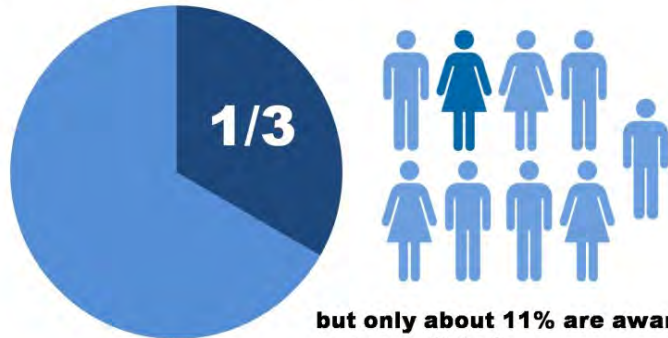
All Diabetes

- Hypertension identification and control
- Hyperlipidemia
- Eye exams
- Monofilament foot exam

Complicated Diabetes with Poor Control, Comorbidity or complications

- $HbA_{1c} > 9$
- High blood sugar –high blood pressure
- Cardiovascular events – stroke, heart attack
- Retinopathy
- Chronic Kidney disease
- Foot callous & amputation

An estimated one-third of US adults aged 20 years or older have prediabetes...



but only about 11% are aware they have prediabetes.

Types of Diabetes

Main types of diabetes



TYPE 1 DIABETES

Body does not produce enough insulin



TYPE 2 DIABETES

Body produces insulin but can't use it well



GESTATIONAL DIABETES

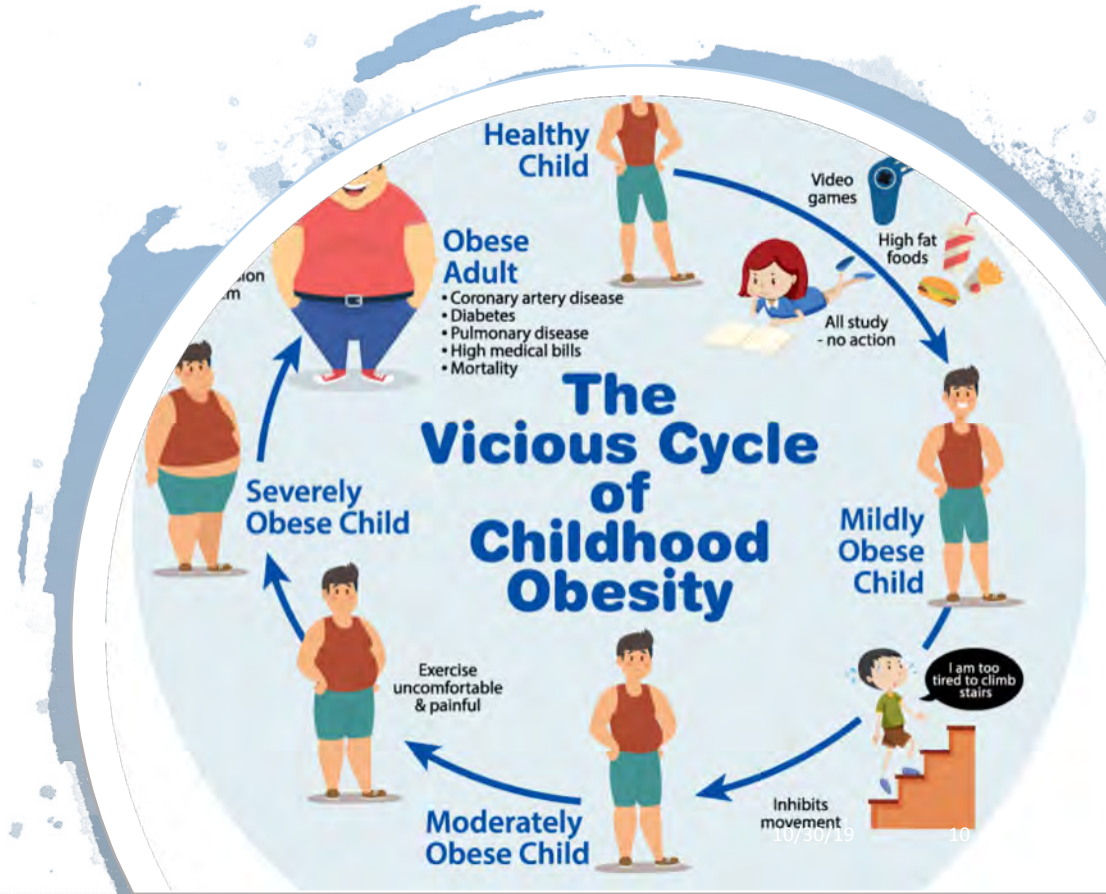
A temporary condition in pregnancy

- ❖ Among adults aged 20-79 worldwide 8.8% were estimated to have diabetes in 2015, and the prevalence of diabetes is estimated to increase to 1 in 10 adults by 2040 (Sun, 2017).

Type I Diabetes



- Evidence continues to accumulate that type I diabetes is a heterogeneous disorder with respect to its immunogenetics and pathology. (Ziegler, 2016).



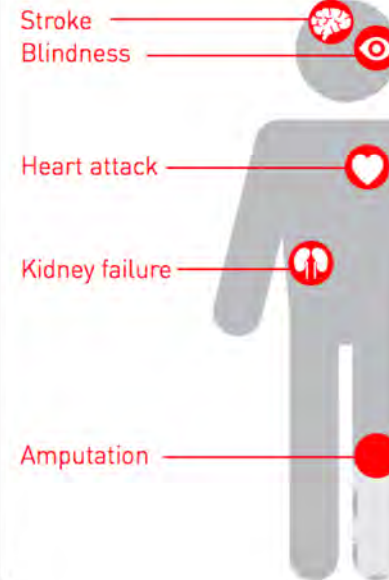
Type II Diabetes



❖ Diabetes has contributed to substantial increases in total economic costs in the US from 174 billion in 2007 to 245 billion in 2012 and shows no signs of slowing down (Sun, 2017).

Consequences

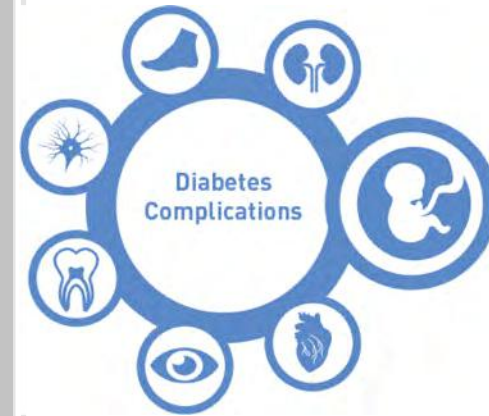
Diabetes can lead to complications in many parts of the body and increase the risk of dying prematurely.





Gestational Diabetes Mellitus (GDM)

- ❖ The Hyperglycemia and Adverse Pregnancy Outcome Study reported that an average of 17.8% of pregnancies are affected by GDM and its frequency as high as 25.5% in some countries. (Silva-Zolezzi, 2017).

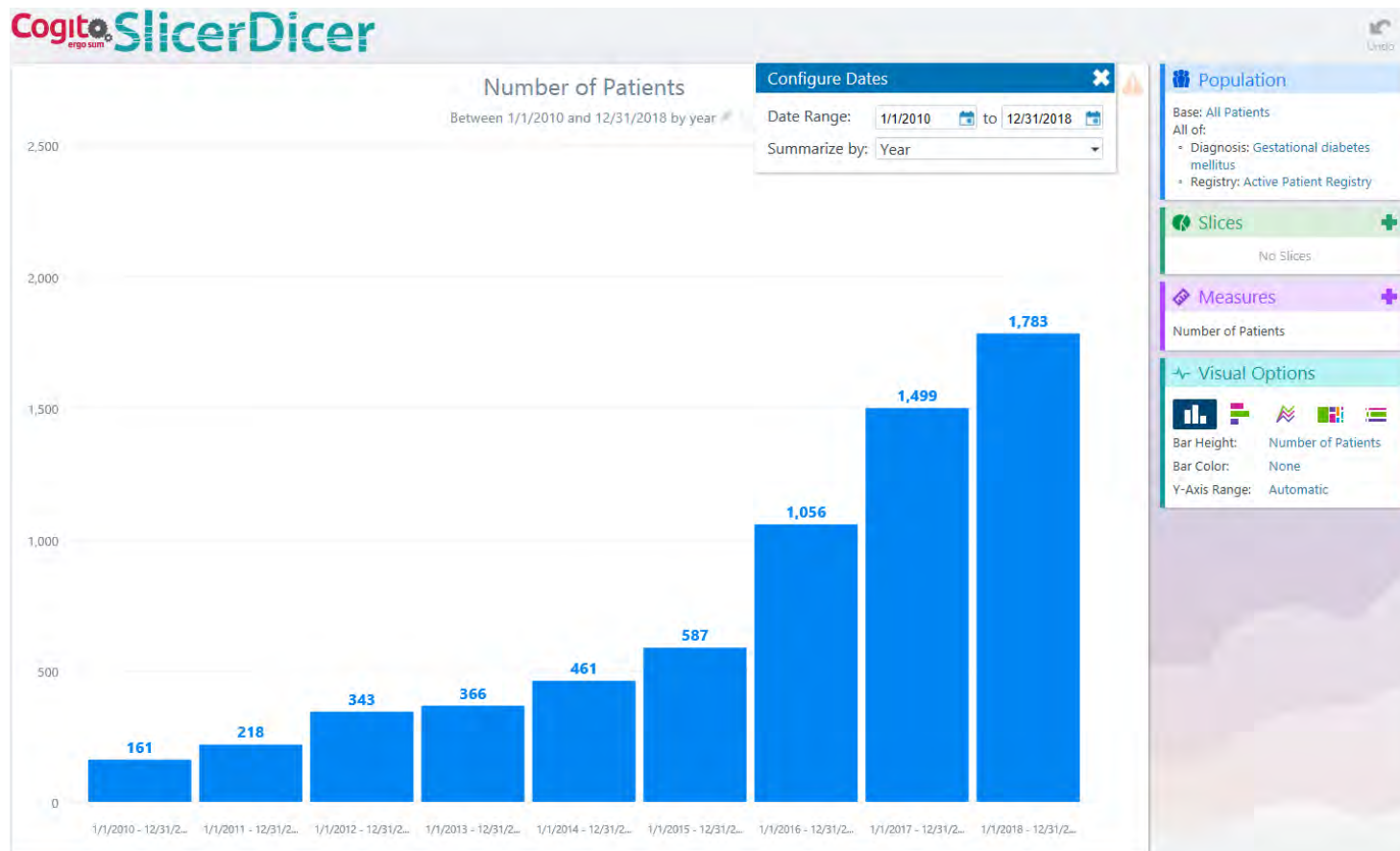


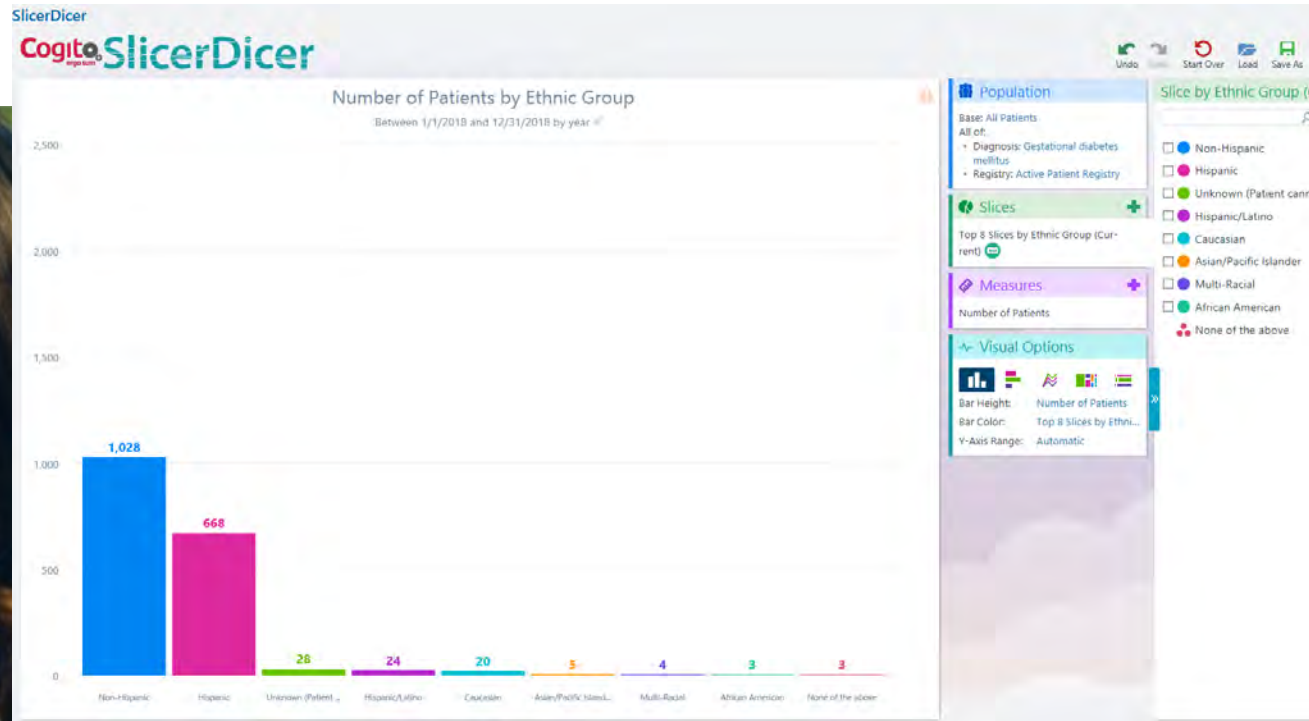
Children who are exposed to high blood glucose in the womb are at higher risk of developing type 2 diabetes later in life





Gestational Diabetes [SNOWMED]: 1 700 Patients in Past 8 Years





668 Hispanic Women Diagnosed with Gestational Diabetes



Management: Then vs. Now

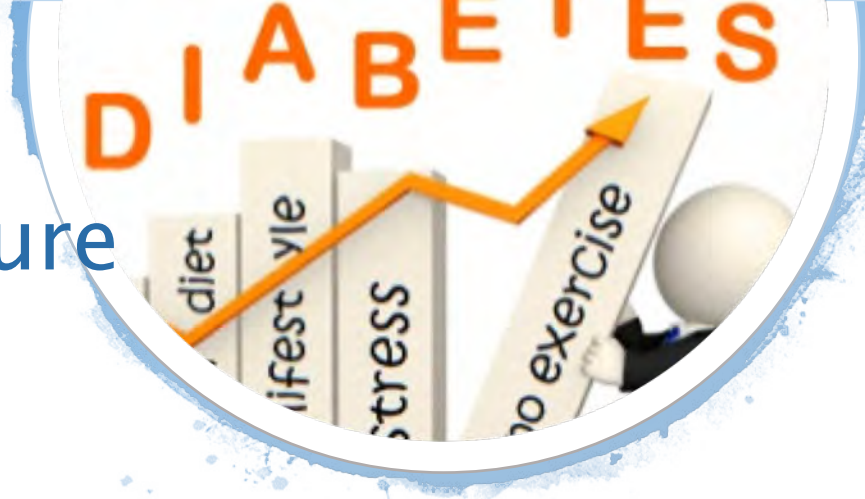
- ❖ Studies had demonstrated that physiological intervention can increase diabetes treatment adherence, improve glycemic control and improve psychosocial functioning. (Rosenbloom, 2003).



- ❖ Telemedicine allow diabetes care to go directly into the patient home, minimizing disruption for diabetes clinic visits and improving touch points with the care team (Prahalad, 2018).

Society and Culture

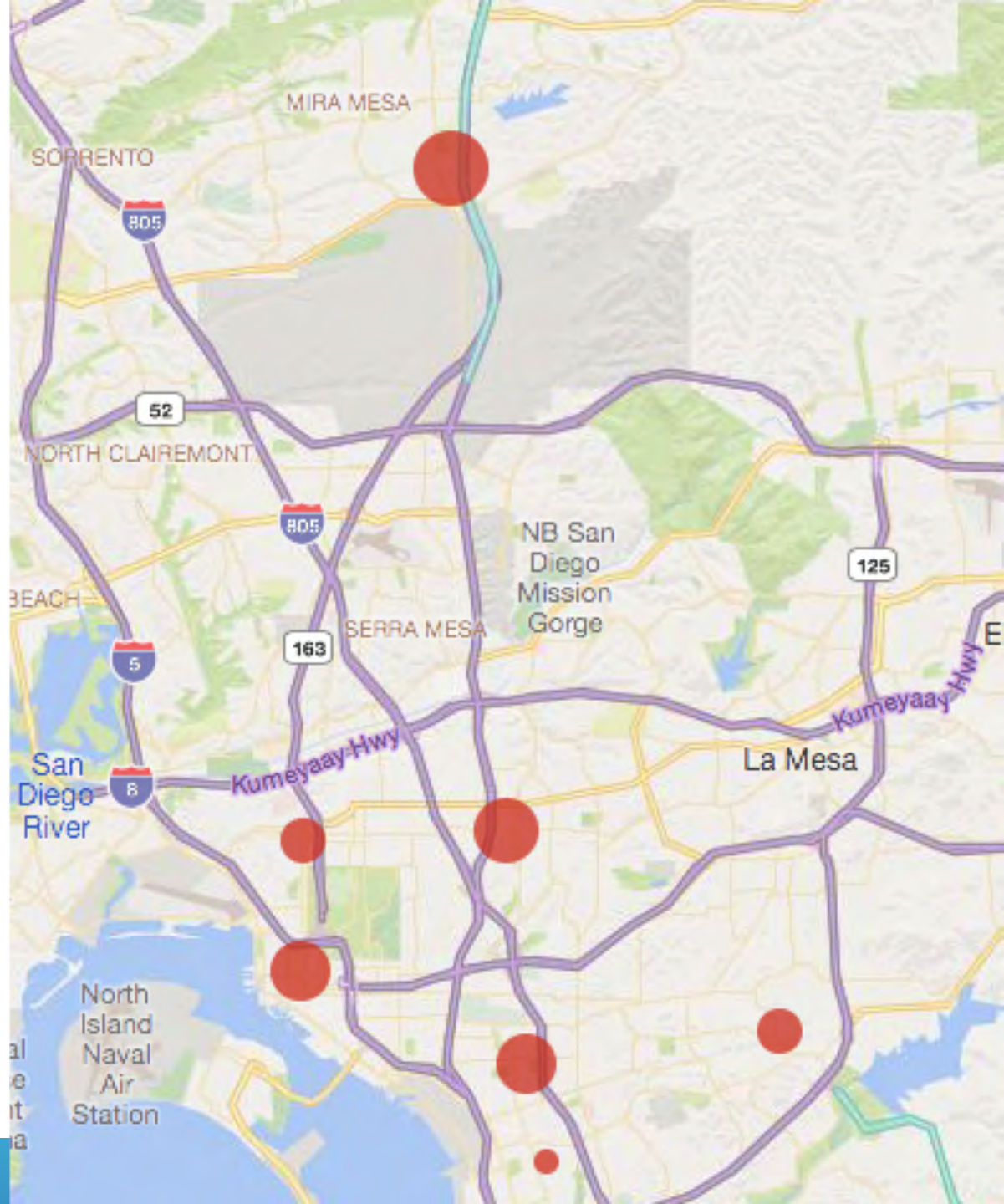
- ❖ Geospatial regions have been associated with increased smoking, physical inactivity and poorer control of blood pressure which can contribute to development of diabetes and its complications (Spanakis, 2013).





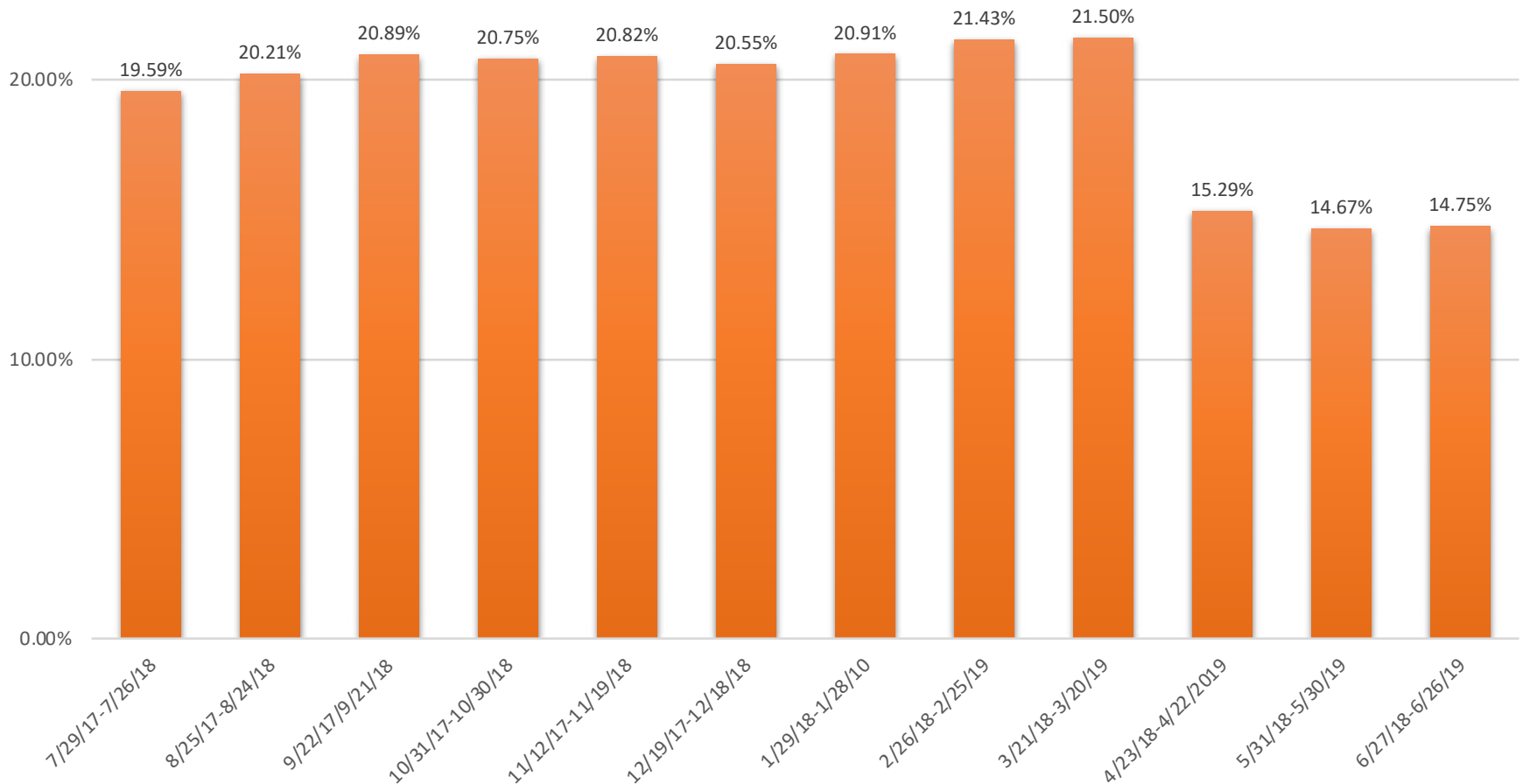
UCSD Top 9 Zip Codes by Volume with Diabetes

Zip Code	Diabetic Patients (Alive or Deceased) Sine 2010
All Others	70,537
91911	1,441
91950	1,355
92101	1,986
92103	1,730
92105	2,039
92113	1,915
92114	1,688
92126	2,148
92231	1,520
92243	1,579





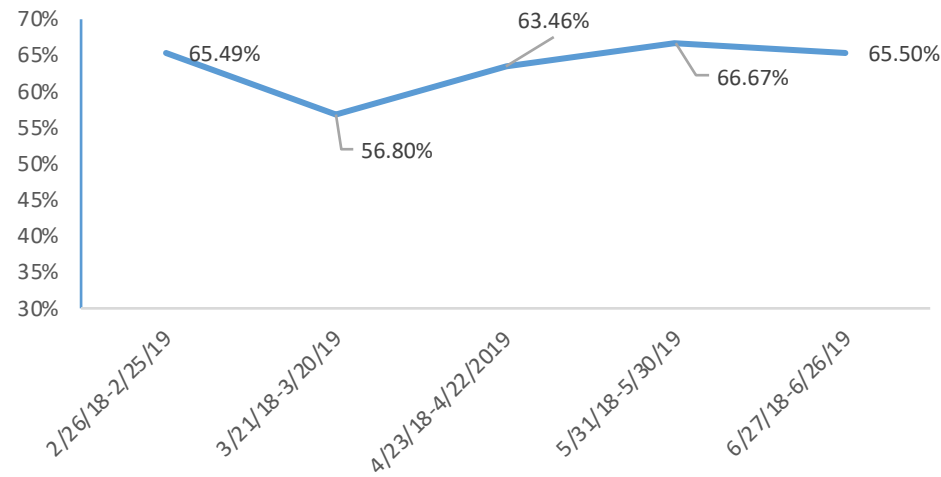
Comprehensive Diabetes Care: HbA1c Poor Control (>9.0%)



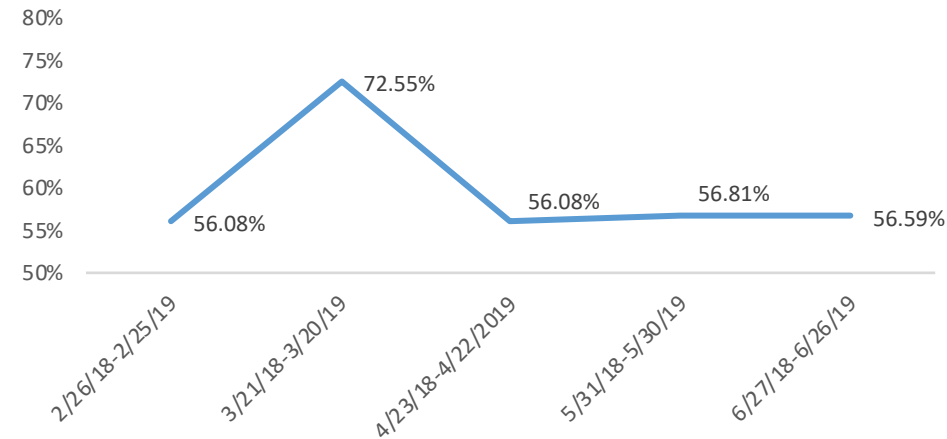


Quality Improvement Program

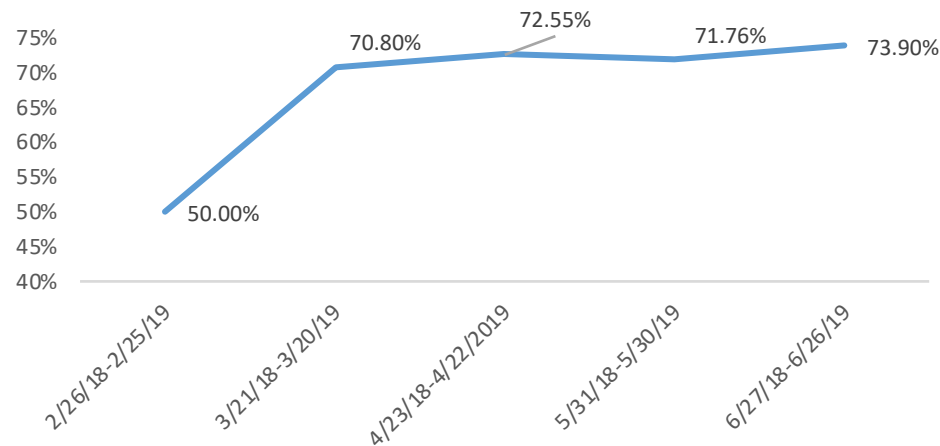
Comprehensive Diabetes Care: A1C Control



Comprehensive Diabetes Care: Eye Exam



Comprehensive Diabetes Care: Blood Pressure Control

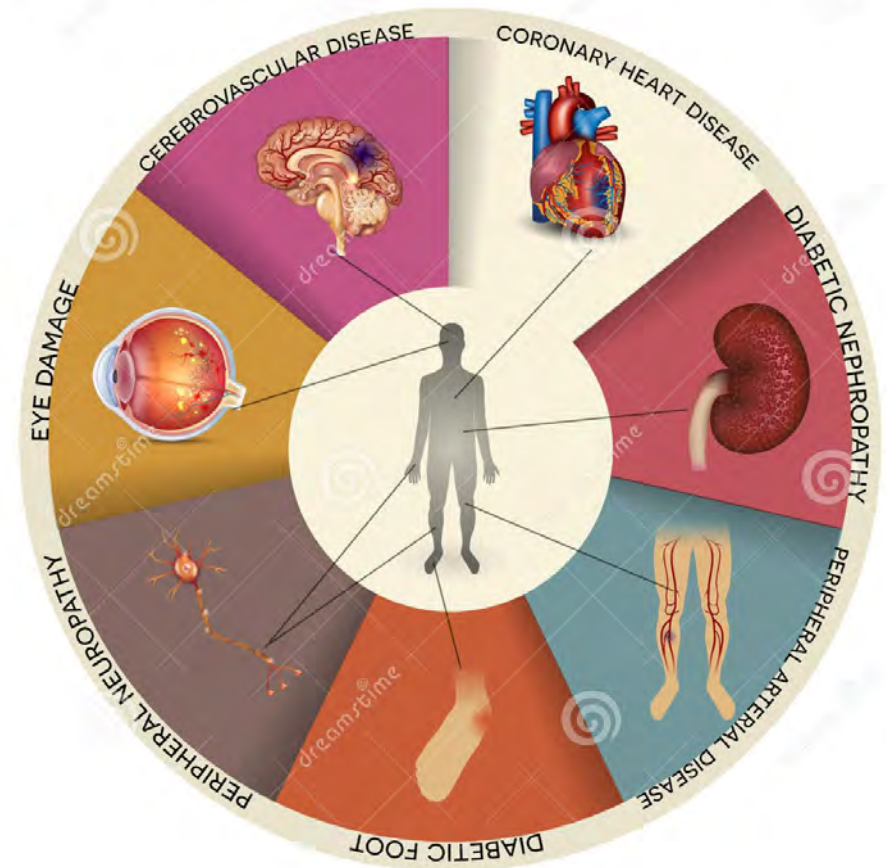




Building a Culture for Intolerance of the “Never” Outcomes

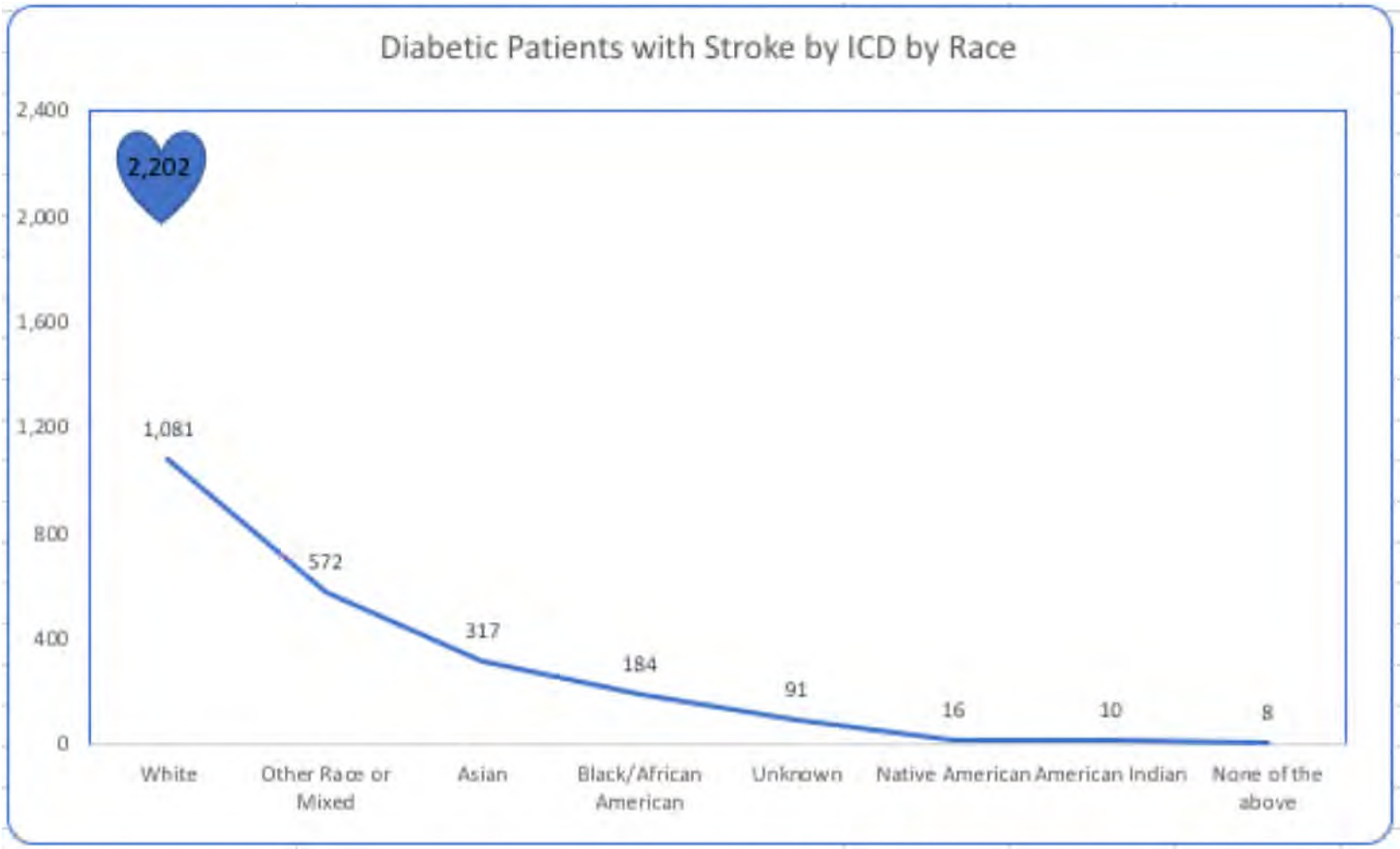
- ❖ Stroke
- ❖ Blindness
- ❖ Dialysis
- ❖ Amputation
- ❖ Death

Uncontrolled Diabetic Mellitus



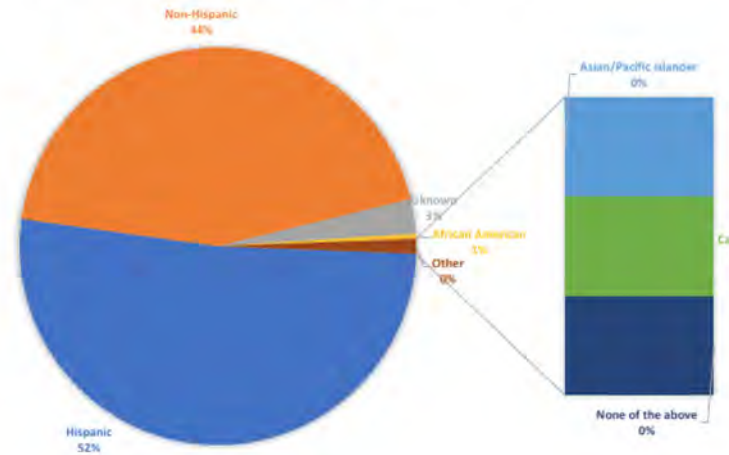


Never Outcomes – 2200 Stroke Patients at UCSD





PATIENTS WITH BLINDNESS IN DIABETIC COHORT BY (ETHNICITY)



Never Outcomes – 250 Diabetics with Blindness



Sight Loss and QALY: 16 Patients: 7 Non-Hispanic and 9 Hispanic

Table 4

Quality-of-Life Losses

Quality-of-Life Measure	0–17 Years of Age	18–39 Years of Age	Total Younger than 40 Years
QALY losses			
Visual impairment	79 799	110 534	190 333
Blindness	1663	23 177	24 840
Total QALYs lost	81 462	133 711	215 173
Monetary value of quality-of-life losses			
\$50 000 per QALY*	\$4073	\$6686	\$10 759

QALY = quality-adjusted life year.

Units of measure for the first 3 rows are QALYs.

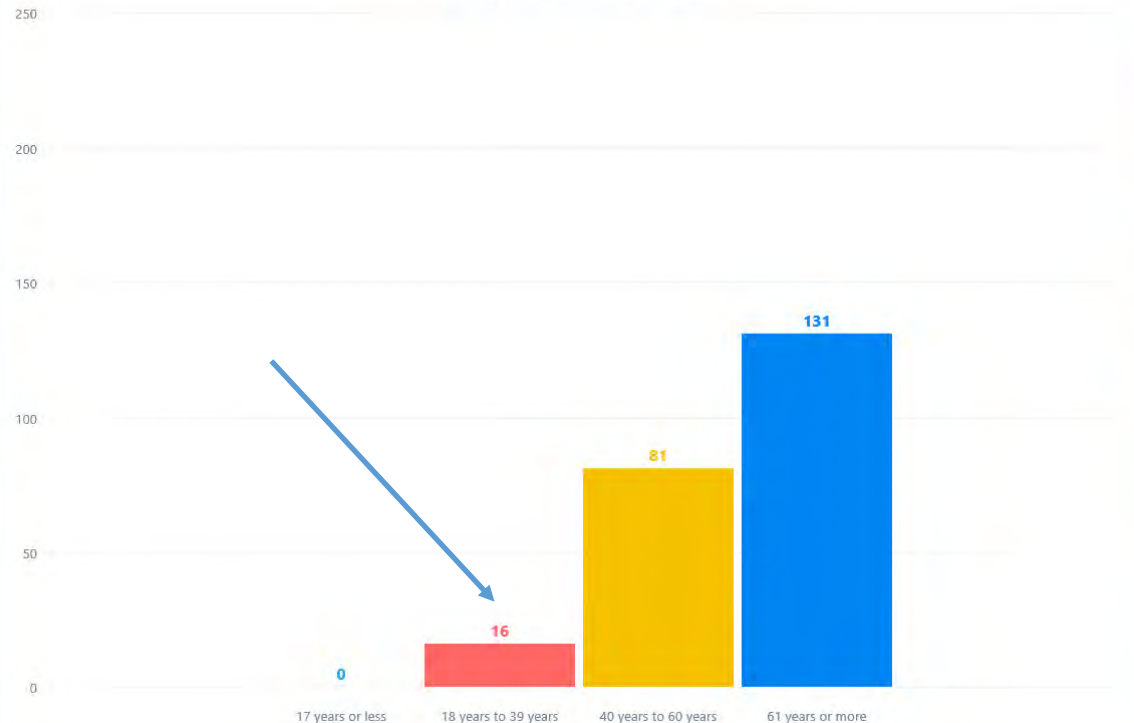
*Monetary costs are in millions.

SlicerDicer

Cogito SlicerDicer

Number of Patients by Age in Years Range

Between 1/1/2018 and 12/31/2018 by year






UCSD General Risk for Diabetes: More than 1200 Patients WITH High Risk Score >20

UCSD DIABETIC PATIENTS 7/1/18 - 6/30/19

35,363 **Total Patients**



3,043 **Tobacco users with increased risk for CVD**



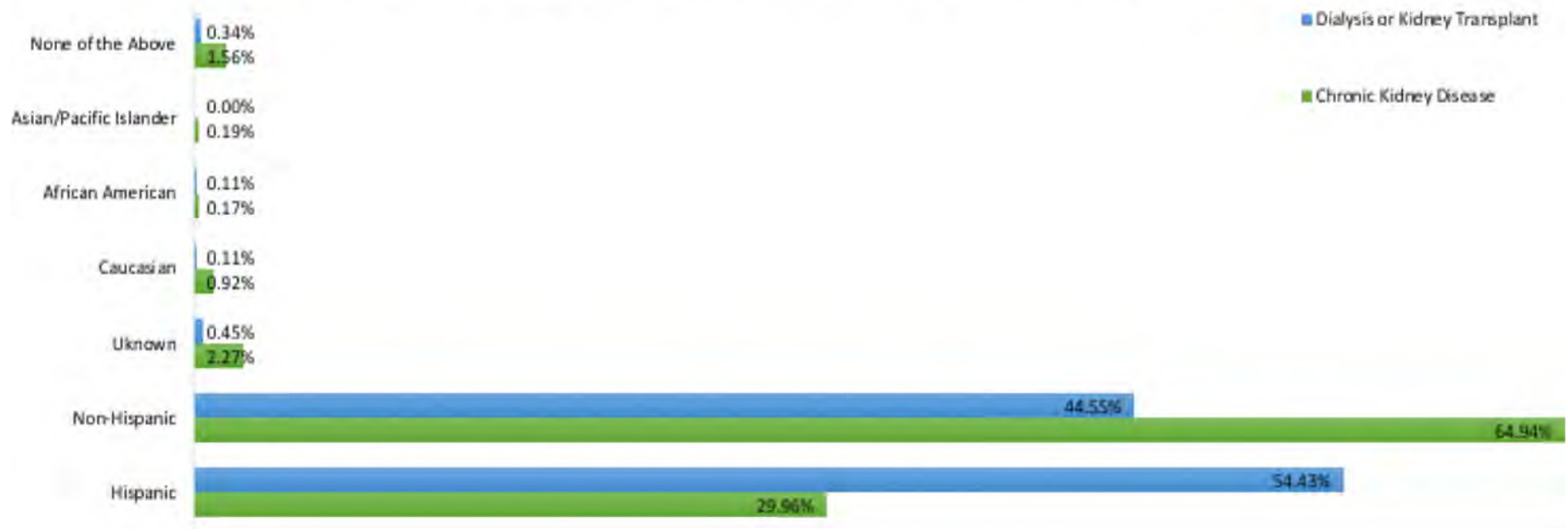
General Risk for Diabetics 7/1/18 - 6/30/19





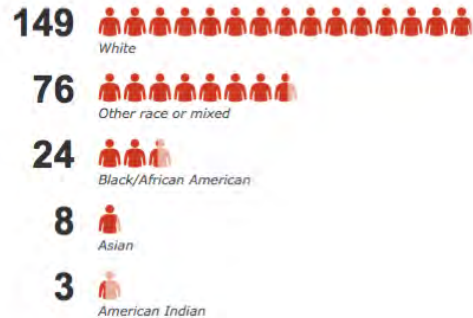
Never Outcomes – 880 Diabetics on Dialysis or Kidney Transplant

Diabetic Patients (Ethnicity) with CKD and Dialysis or Kidney Transplant

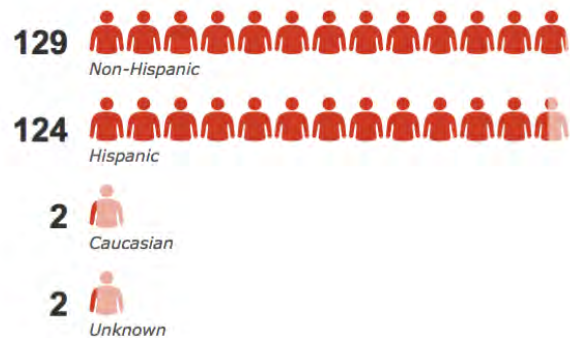




TOTAL PATIENTS WITH AMPUTATIONS (RACE)



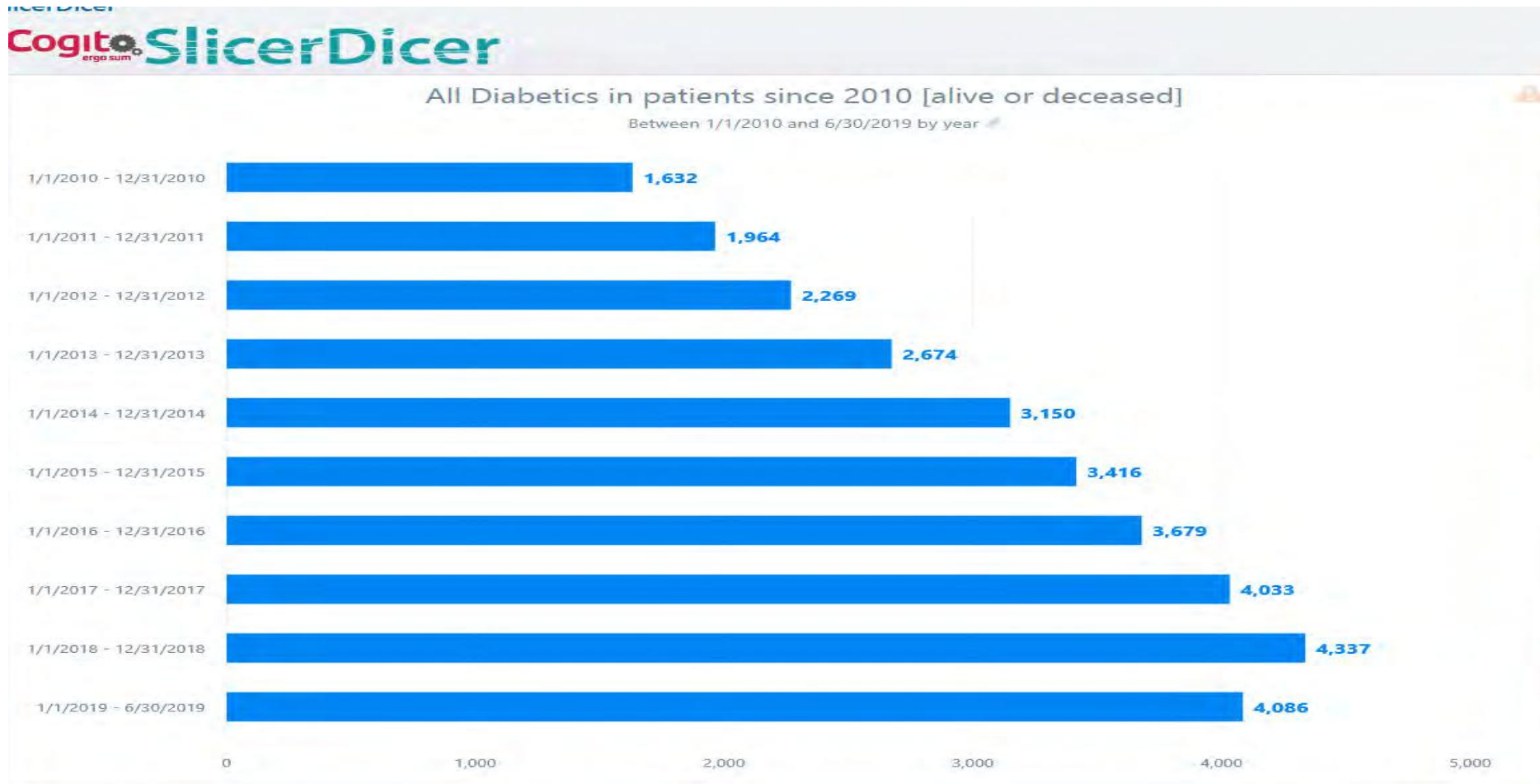
TOTAL PATIENTS WITH AMPUTATIONS (ETHNICITY)



Never Outcomes – 266 Diabetics with Amputations



Never Outcomes – Nearly 300 Patients are Known to Die with Diabetes each Year





Cost and Utilization

- Substantial increases in total economic costs in the US from 174 billion in 2007 to 245 billion in 2012 and shows no signs of slowing down (Sun, 2017).

THE STAGGERING COSTS OF **DIABETES**



More than
30 MILLION
Americans
have diabetes



Health care costs for
Americans with
diabetes are
2.3X greater
than those without
diabetes



Diagnosed
diabetes
costs
America
**\$327
BILLION**
per year

Cost for CABG Procedures

❖ The average costs for patients 65–74 years of age, 75–84, and 85 plus were, \$10,778, \$16,389, and \$25,691, respectively ([12](#)).

❖ Our diabetic patients contributed to an estimated lifetime cost of ½ a billion for UCSDH alone.

ALIVE DIABETICS WITH CABG AS OF 2018



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Acknowledgements

- Dr. Amy Sitapati



Questions?