Data Science Committee Meeting

April 2024
Co-chairs: Joyce Lee, Marina Basina

Agenda

- Introductions- Dr. Lee and Dr. Basina

- In Patient data request discussion- Dr. Plante

- T2D Data Specification discussion- Dr. Zupa

- Patient Questionnaire Introduction- Dr Lee

Welcome To Our New DSC Co-Chairs

Dr. Ryan McDonough from Childrens Mercy

Dr. Nirali Shah, Icahn School of Mt. Sinai Adult

"My role as Chief Medical Information Officer has given me a unique opportunity to leverage informatics approaches to ensure highly reliable and quality data. Expanding to chair this committee would allow me to share that expertise with the group more readily."

"Through comprehensive data analysis, we would seek to identify patterns, uncover novel insights, and contribute to cutting-edge research in the field. Additionally, fostering interdisciplinary collaborations, promoting data-sharing initiatives, and advancing digital health technologies would be integral to the committee's vision."

Type 1 Diabetes Mapping Updates

- 35 centers fully mapped (from 34 centers in Q1)

- 4 in validation phase

- Data completeness scorecards

  - Scorecards will be distributed in Q2

Type 2 Diabetes Mapping Update

- 3 centers fully mapped

- 2 centers still in the mapping process

Enhancing Inpatient T1D Care Quality using Glucometrics and Performance measures

Deb Plante, MD

Director, Inpatient Glycemic Team

Clinical Professor of Internal Medicine, Endocrinology, Diabetes and metabolism

Objectives

- Utilize SHM benchmarking (or new NHSN) standardized data collection to compare T1D care performance against national standards, identifying areas for improvement and sharing best practices
  - UCD SHM Fall Benchmarking
  - eCQMs/NHSN

- Diabetes Technology Integration
  - Track/incorporate diabetes technology, CGM, and insulin pumps (AID systems) to optimize glucose management during hospitalization and monitor the impact on patient outcomes.

- DKA Management
  - Monitor metrics such as time to resolution, rebound hyperglycemia, use of protocols (including SQ for mild to moderate DKA)

- Other Inpatient Data specifications
  - UCD versus outside patient, LOS, 30-day readmission rate to assess transition of care

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Glucometrics Non-Critical Care (Fall 2023)
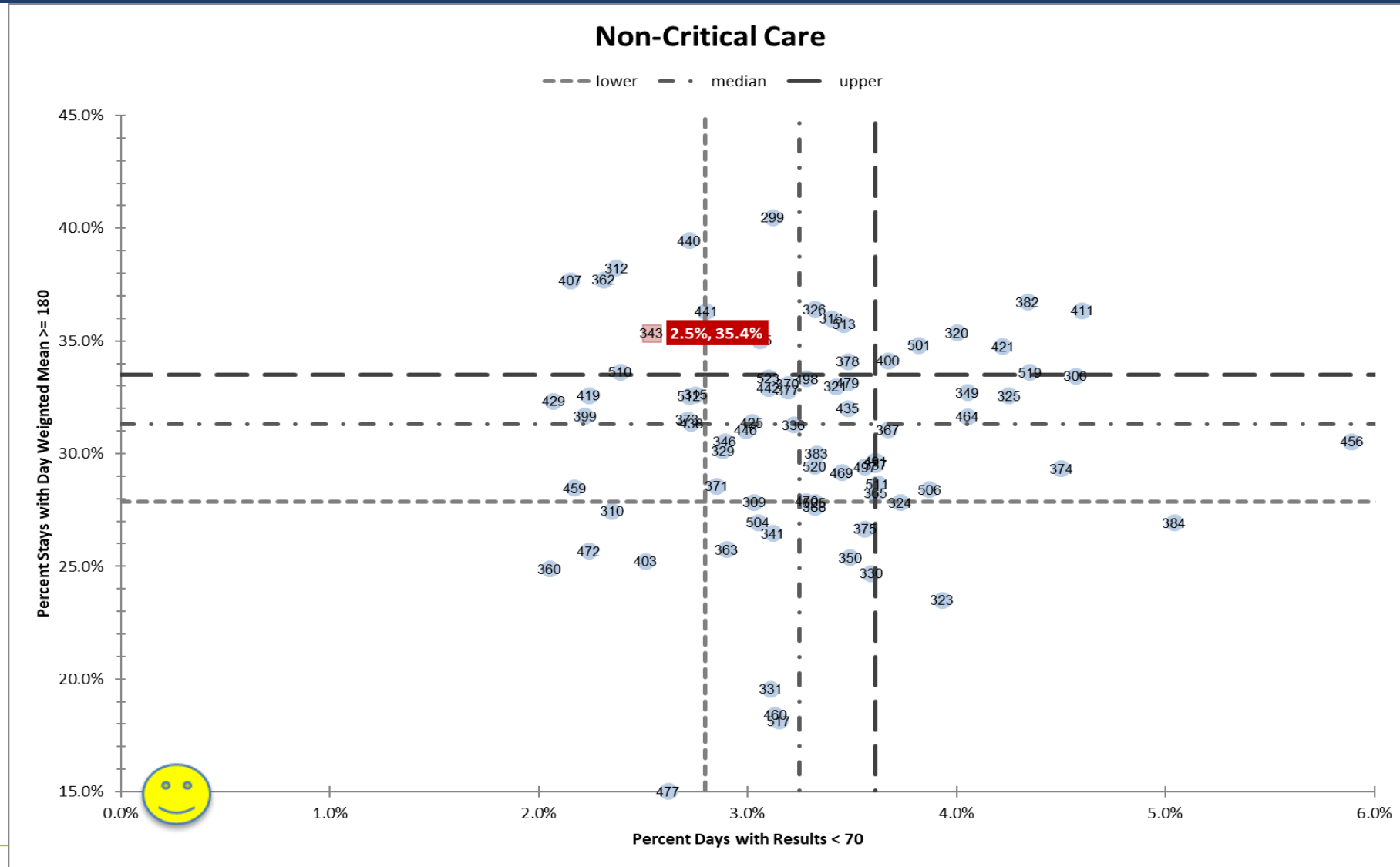
Glucometrics Critical Care (Fall 2023)
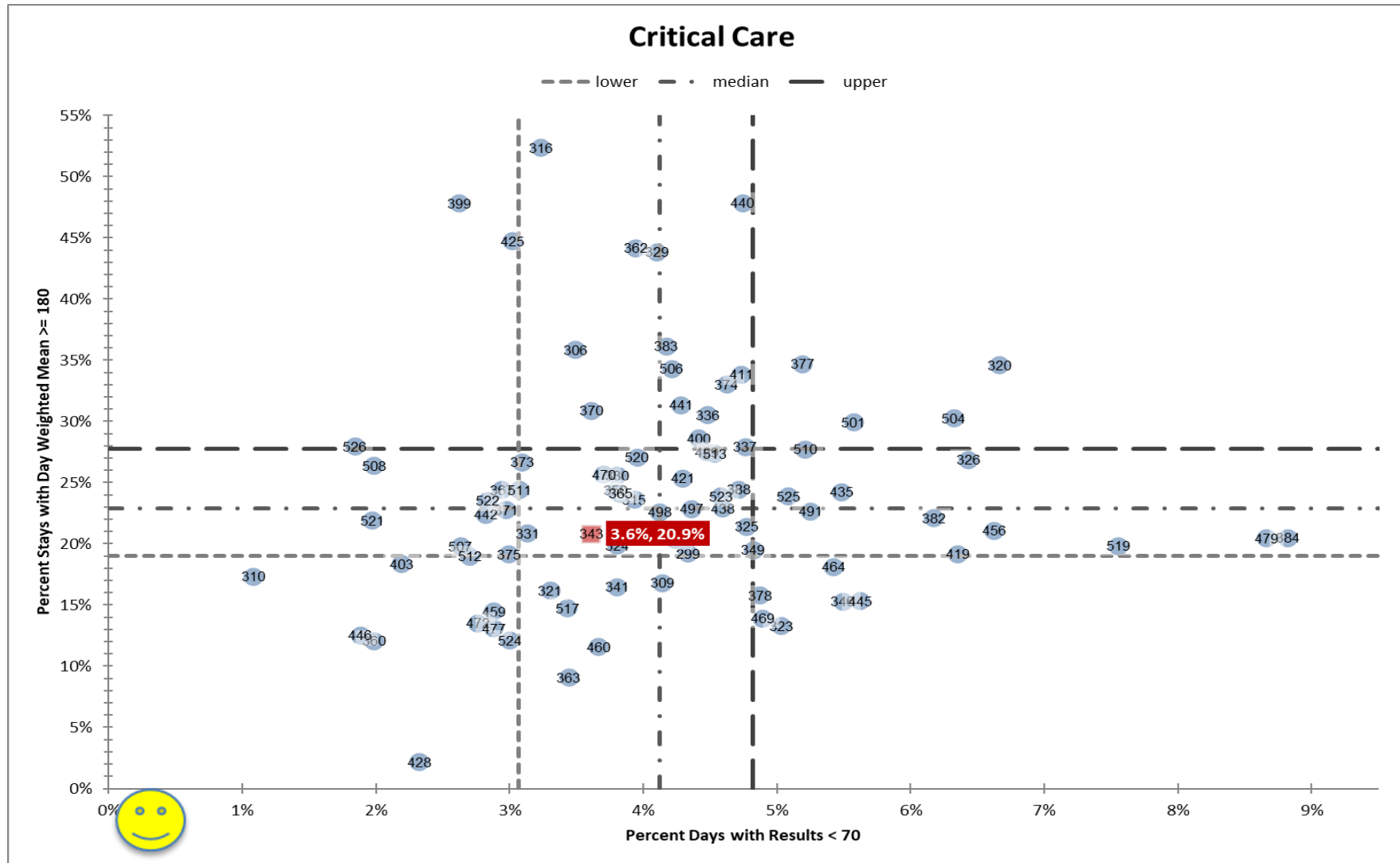
Hyperglycemia

Glycemic Exposure, Glycemic Control, and Safety Parameters

		Patient - Stay	Patient - Day
Day weighted mean glucose	Hospital	154.37	152.4
	Top Decile	≤ 143.4	≤ 143.4
	Top Quartile	≤ 148.8	≤ 148.4
	Mean	154.5	154.0
	Median	153.0	152.935
	Range	123.19 - 189.09	123.19 - 195.79
Percent stays or days with uncontrolled hyperglycemia (mean glucose ≥ 180 mg/dL)	Hospital	22.2%	20.7%
	Top Decile	≤ 13.5%	≤ 15.2%
	Top Quartile	≤ 18.0%	≤ 18.7%
	Mean	23.5%	23.4%
	Median	22.1%	22.6%
	Range	0.0% - 47.8%	0.0% - 58.6%
Percent Readings per Stay in Range (71 - 179 mg/dL)	Hospital	75.1%	
	Top Decile	≥ 82.5%	
	Top Quartile	≥ 77.9%	
	Mean	74.2%	
	Median	74.7%	
	Range	54.2% - 100.0%	
Percent of days with severe uncontrolled hyperglycemia (>299 mg/dL)	Hospital		5.7%
	Top Decile		≤ 4.0%
	Top Quartile		≤ 5.6%
	Mean		7.7%
	Median		7.0%
	Range		0.0% - 28.6%

Hypoglycemia

Percent of stays or days with hypoglycemia (<70 mg/dL)	Hospital	13.9%	3.7%
	Top Decile	≤ 08.9%	≤ 2.6%
	Top Quartile	≤ 11.2%	≤ 3.3%
	Mean	14.2%	4.4%
	Median	13.9%	4.3%
	Range	0.0% - 27.8%	0.0% - 8.3%
Percent of stays or days with severe hypoglycemia (<54 mg/dL)	Hospital	4.3%	0.9%
	Top Decile	≤ 2.5%	≤ 0.6%
	Top Quartile	≤ 3.6%	≤ 0.9%
	Mean	5.3%	1.4%
	Median	5.0%	1.3%
	Range	0.0% - 15.6%	0.0% - 4.2%
Percent of stays or days with severe hypoglycemia (<40 mg/dL)	Hospital	1.5%	0.3%
	Top Decile	≤ 0.0%	≤ 0.0%
	Top Quartile	≤ 0.9%	≤ 0.2%
	Mean	1.9%	0.5%
	Median	1.7%	0.4%
	Range	0.0% - 6.1%	0.0% - 1.7%

Hypoglycemia Management Parameters

Time (minutes) between glucose < 70 mg/dL and next documented reading	Hospital	51.16
	Top Decile	≤ 29.8
	Top Quartile	≤ 40.4
	Mean	53.3
	Median	51.185
	Range	0 - 175.48
Time (minutes) between glucose < 70 mg/dL and documented resolution of hypoglycemia	Hospital	58.34
	Top Decile	≤ 35.4
	Top Quartile	≤ 45.4
	Mean	60.6
	Median	58.375
	Range	0 - 187.49
Percent of hypoglycemic events with next reading documented within 30 minutes	Hospital	39.8%
	Top Decile	≥ 66.9%
	Top Quartile	≥ 56.1%
	Mean	43.4%
	Median	41.8%
	Range	0.0% - 100.0%

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Inpatient Quality Reporting Program:
2 New eCQM (electronic clinical quality metrics)

Severe hypoglycemia:

- % patient stays BG<40mg/dL within 24 hours of administration of insulin/anti-hyperglycemic agent

Severe hyperglycemia:

- % hospital days with one or more BG>300mg/dL, excluding the first 24-hour period after admission

Nursing Hypoglycemia Dashboard

- To align with TJC recommendations, we are developing a nursing hypoglycemia dashboard to track rates of hypoglycemia, nursing management, and documentation.
  - This tool will help us identify and implement quality improvement measures with the goal of inpatient hypoglycemia prevention and reduction.

		University of California Davis		
		Patient-Stays		Patient-Days	
Glycemic Exposure	Number (count)	2509		13981	
	Mean (mg/dL)	151.07		149.3	
	Median (mg/dL)	143.39		141.5	
Glycemic Control	Percent Day Weighted Mean ≥ 180	19.01%		18.14%	
	Readings In Range (Stay-weighted)	77.57		(n/a)	
Safety	Count With Glucose < 40	44	1.75%	50	0.36%
	Count With Glucose < 54	126	5.02%	153	1.09%
	Count With Glucose < 70	386	15.38%	554	3.96%
	Count With Glucose ≥ 300	467	18.61%	718	5.14%
	Count Of Hypoglycemic Patients with a recurrent hypoglycemic day	106	27.46%	(n/a)	
		Totals			
Hypoglycemic Management	Count of Hypoglycemic events	742			
	Mean time between Glucose < 70 and next documented Glucose	51.21 min			
	Median time between Glucose < 70 and next documented Glucose	37.00 min			
	Mean time between Glucose < 70 and documented resolution of Hypoglycemia	60.41 min			
	Median time between Glucose < 70 and documented resolution of Hypoglycemia	42.00 min			
	Count Glucose < 70 and next Documented Glucose within 15 mins	30		4.04%	
	Count Glucose < 70 and next Documented Glucose within 30 mins	260		35.04%	

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What is a co-managed insulin protocol?

Co-Managed Consult Note

ICU pharmacists will co-manage medication orders and lab tests associated with SQ insulin therapy and IV to SQ transition.

Implementation through an embedded order within insulin infusion order-sets.

Access restricted exclusively to ICU pharmacists.

Adding Insulin Pumps to the EMR

MDCC Redesign of Glycemic Management in the ED

- Monthly design meetings
- Patient Flag Triage
  - Insulin pump
  - T1DM
  - BG >349 mg/dL
- Inservice Education
- Insulin Pump Workflows
- Ambulatory Follow-up

☑ POC Glucose Q4H x3 (Diabetic Protocol)

☑ POC GLUCOSE Q4H

Routine, EVERY 4 HOURS, First occurrence today at 1055, Last occurrence today at 1855, For 3 occurrences

BestPractice Advisory - Doe, Stockbridge Wm

⚠ This patient has high risk diabetes or a glucose over 350. Please order glucose checks every 4 hours when the patient is in the ED.

Please ask the patient if they have an insulin pump and add implant below if not documented.

| Order | Do Not Order | ⮐ POC GLUCOSE Q4H X 3 |

⮐ Implants Activity

Dismiss Reason

| Defer for 30 | Not Primary Team | Already ordered | Inappropriate alert |

✔ Accept   Cancel

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Optimizing Inpatient Diabetes Care

- Glucometrics for T1D (and T2D): focus on most impactful
  - Blood glucose targets
  - Frequency of hypoglycemic and hyperglycemic events
  - Glycemic variability

- Diabetes Technology Utilization: track usage of insulin pumps (AID systems), Continuous glucose monitors (CGM)during hospital stays to evaluate impact on glycemic control

- DKA: monitoring incidence and resolution metrics to assess effectiveness of management protocols

- LOS and Readmission Rates: Efficiency of protocols and effectiveness of transitional care strategies post-discharge (MVP)

- Specialist Involvement: Identifying patients seen by specialized diabetes care teams or endocrinologists
  - Impact of specialized care on outcomes

Conclusion:

Tracking and analyzing these meaningful inpatient glucometrics and performance indicators are essential for optimizing type 1 diabetes care quality, ensuring patient safety, and driving continuous improvement initiatives.

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T2D Data Specifications Discussion

Patients/Providers/Encounters

T1DX:(James, Nicole, Ann)
Clinic Collaborators: Lily Chao (CHLA), Kai Jones (WUSTL), Sean Delacey (Lurie), Shylaja Srinivasan (UCSF)

Patients and Encounters
Variables to be discussed from current Data Spec:

Patient File:

- **Gender**: Gender- (technically, sex) of the respective patient
- **Education** Level: Variables include no High school, High school Graduate, College Graduate, Post Graduate Degree, Unknown
- **Language**: English, Spanish, Chinese, Vietnamese, French, German, Arabic, Other, Unknown

Provider File:

- **Provider_type**: Type of provider - Physician-, Options Include: Doctor of Osteopathic Medicine,Physician Assistant, Nurse Practitioner,Registered Nurse,Registered Dietician,Exercise Physiologist, Psychologist, Social Worker, Certified Diabetes Educator, Pharmacist, Optometrist,Podiatrist, Physical therapist, Occupational therapist, Other person

Encounter File:

- **Class: Outpatient**- An encounter during which the patient is not hospitalized overnight.
- **Status/Status Reason** - The status of the encounter record. Encounters should start with a status of planned and then diverge from there to their final status. Reason for the current status; the actor scopes the reason. For instance, an actor of patient and reason is illness would imply the patient was too sick while an actor of provider and reason of illness would imply the provider was sick. Likely exclusively used for canceled or rescheduled encounters.

Proposed elements for T2D Data Spec:

Patient File :

- **Gender**: suggestion was made to separate gender to also include sexual identity
- **Education Level**: potentially add option for some high school and some college
- **Language**: add commonly used languages like korean, Armenian, Russian, Samoan, tagalog
  Language : Also allow for a distinction between patient and family members language spoken (psychosocial) patients vs caregivers preferred language.

Provider File:

- **Provider_type**: include multiple specialties under physician (separate rows for each credential) and consider including specialty category.

Encounter File

- **Class: Outpatient**: suggestion to include outpatient specialties, as T2D patients typically see other specialists compared to T1D. List of potential specialists: Cardiology, pulm - for sleep apnea, / sleep medicine, Gastroenterology, Cardiothoracic surgery, vascular surgery, ophthalmology, mental health , psychiatry, social work / case management , primary, internal medicine, general medicine, family medicine
- **Status**: identify barriers related to status canceled (example transportation related)
  for **status_reason** on current data spec.

Observations/Conditions/Medications

T1DX:(Emma Ospelt, Trevon Wright)
Clinic Collaborators: Talia Hitt (John Hopkins), Margaret Zupa (UPMC), Monica Bianco (Lurie), Carla Demeterco Berggren (Rady)

Observations, Conditions, Medications Variables from current Data Spec

Observations
- **Social-history**
- **Vital-Signs**
- **Survey**
- **Interpretation**

Conditions
- No changes made

Medications
- **Drug_Name**
- **Drug_Class**

Proposed elements to T2D Data Spec

Observations:
- **Social-history**: Add Activity Level Per Day/Week.
- **Vital-sign**: Add Waist Circumference
- **Survey**: Add ASQ Suicide Screening, Substance Use, Beverage and Diet Intake, Sleep Screening, Second Hand Smoke, Medical Literacy, Screen Time, Vaping.
- Suggested Removal from dataspec included: Thyroperoxidase Ab [Units/volume] in Serum or Plasma LOINC 8099-4, Thyroglobulin Ab [Units/ volume] in Serum or Plasma, LOINC 8098-6, Tissue transglutaminase IgA Ab [Units/volume] in Serum LOINC 31017-7, Tissue transglutaminase IgG Ab [Units/volume] in Serum LOINC 32998-7 , IgA [Mass/volume] in Serum or Plasma 2458-8 , Endomysium Ab [Units/ volume] in Serum LOINC 13092-2 and Interpretation

Conditions
- *No changes-already capturing all problems & diagnoses*

Medications
- **Drug_name** and **sub_class** has been expanded to include many commonly prescribed drugs for T2D
- Additions to **drug_classes** include: Sulfonylureas, Meglitinides, SGLT-2 inhibitors, Non-sulfonylureas (biguanides), Thiazolidinediones, Alpha-glucosidase inhibitors, GLP-1/GIP analogs, etc.
- Sample of added **drug_names** includes: Glucotrol, Januvia, Jardiance, Ozempic, etc

T1D Exchange

Diabetes
Disease, Insulin, Monitoring, Glucose

Clinic Collaborators: Alyssa Roberts (Seattle), Francesco Vendrame (Miami), Sonya Haw (Grady), Marina Basina (Stanford), Mark Clements (CMH)

Diabetes file
Variables to be discussed from current Data Spec

- **Diabetes Disease** tab - **Vaccination dates**, **Exam dates**, **DKA** info, and **Insecurities**

- **Diabetes Insulin** tab - **Daily Injections, Insulin Regimen, Insulin Pump Delivery, Insulin Pump Company/Model**, and **Insulin Pen model**

- **Diabetes Monitoring** tab - **CGM Model**

- **Diabetes Glucose** tab - **BGM Model**

Proposed Elements to T2D Dataspec

- **Diabetes Disease** tab - Suggestions to remove: **flu_dt**, **dental_exam_dt**, **dka_scrub_bicarb**, **dka_blood_ph**, **transportation_insecurity**, **housing_insecurity**.

- **Diabetes Disease** tab - Updated language for **DKA** and **Severe Hypoglycemia** descriptions.

- **Diabetes Insulin** tab - Suggestions to add: **mixed_basal_bolus_ins_daily_inj variable**, **inhaled insulin** for ins_regimen, **manual mode** for ins_pump_delivery, addition of **CeQur** and **V-Go** for ins_pump_company. Addition of **CeQur Simplicity** and **VGo All-In-One** for Insulin_pump_Model and updates to the ins_pen_model list.

- **Diabetes Insulin** tab - Suggestions to remove: **predictive/low_glucose_suspend** and **close_loop** from ins_pump_delivery.

- **Diabetes Monitoring** tab - Suggestions to add cgm_model **G7** (for Dexcom), **Freestyle Libre 3** and **Freestyle Libre 3 Pro** (for Abbot)

- **Diabetes Glucose** tab - Updated list for **bgm_model**.

Patient Questionnaire Introduction