
National Infusion Collaborative Clinical Meeting

Spring Clinical Meeting
March 20, 2024

Meeting Logistics and Introductions



Kim S. Walker, PharmD, MPH
Sr. Pharmacy Specialist Analytics & Integration
Yale New Haven Health



Jennifer Kunkel, PharmD, BCPS, BCCCP
Medication Safety Pharmacist
Jefferson Health



Jessica O'Sullivan, PharmD, BCPS, PMP
Sr. Clinical Informatics Pharmacist
Jefferson Health



Joanne Hatfield, PharmD, BCPS
Director - Clinical Solutions
Bainbridge Health



Sean O'Neill, PharmD
Chief Clinical Officer
Bainbridge Health

Navigating Zoom

Q&A Box and Chat Box: For any questions or comments throughout the presentation

Raise Hand: For the open mic discussion, please press “Raise Hand” if you wish to speak

Post-Meeting Survey: Following today's meeting, please let us know how we can improve going forward

Agenda



National Infusion Collaborative Infusion Trends

Joanne Hatfield, PharmD, BCPS
Director - Clinical Solutions
Bainbridge Health

Collaboration and Integration of a Multi-Hospital Health System Infusion Drug Library

Jennifer Kunkel, PharmD, BCPS, BCCCP
Medication Safety Pharmacist
Jefferson Health

Jessica O'Sullivan, PharmD, BCPS, PMP
Sr. Clinical Informatics Pharmacist
Jefferson Health

Novel Applications of Infusion Pump Data

Kim S. Walker, PharmD, MPH
Sr. Pharmacy Specialist Analytics & Integration
Yale New Haven Health

National Infusion Collaborative Survey

Open Mic / Q&A

A short horizontal bar with a blue segment on the left and a green segment on the right.

National Infusion Collaborative

Infusion Metric Trends

Joanne Hatfield, PharmD, BCPS
Director - Clinical Solutions
Bainbridge Health

National Infusion Collaborative



Membership

- Bainbridge Health users (pharmacy and nursing leaders)
- Infusion pump industry partners
- Bainbridge Health clinical solutions team



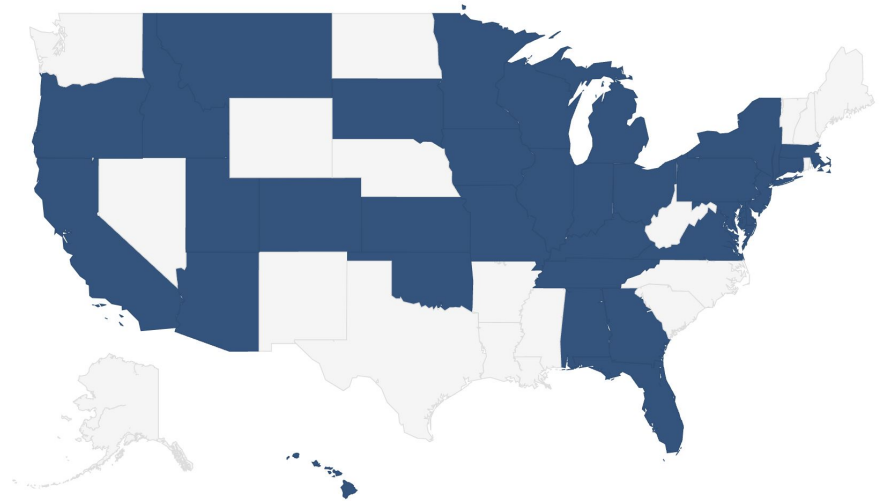
Meetings

- Quarterly webinars
- Future in person conference
- National Infusion Collaborative Archives



Goals

- Promote collaboration and provide insight into infusion practices across the country
- Provide an environment to share experiences and challenges with managing smart infusion pumps



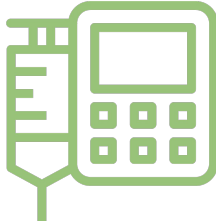
National Infusion Collaborative



>300
Hospitals



>300 million
Infusion Records



>40,000
Infusion Pumps



> 2 million
Alerts

National Infusion Collaborative



Key Performance Indicators

Compliance

Alert Rate

Override Rate

12/1/23 – 2/29/24

86.9%

6.8%

65%

Collaboration and Integration of a Multi-Hospital Health System infusion Drug Library

**Jennifer Kunkel, PharmD, BCPS, BCCCP
Medication Safety Officer**

**Jessica O'Sullivan, PharmD, BCPS
Clinical Informatics Specialist**



Who are we?



- Jefferson Health is an 18 hospital health system in Southeastern PA and South Jersey
- Encompasses multiple different types of hospitals including University teaching and community

Background

- New IV pumps purchased for health system

- Preliminary discussions

- **Goal:**

Create new health system IV pump library with plans for interoperability

Scope

12 Hospitals



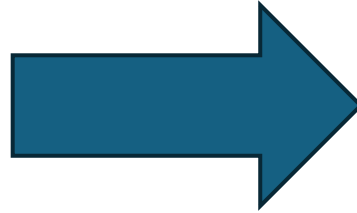
6 Libraries



53 Care Areas



9300 Line Items



1 Library

Overall Timeline

**Prior to
2022**
Select
Pump
Vendor

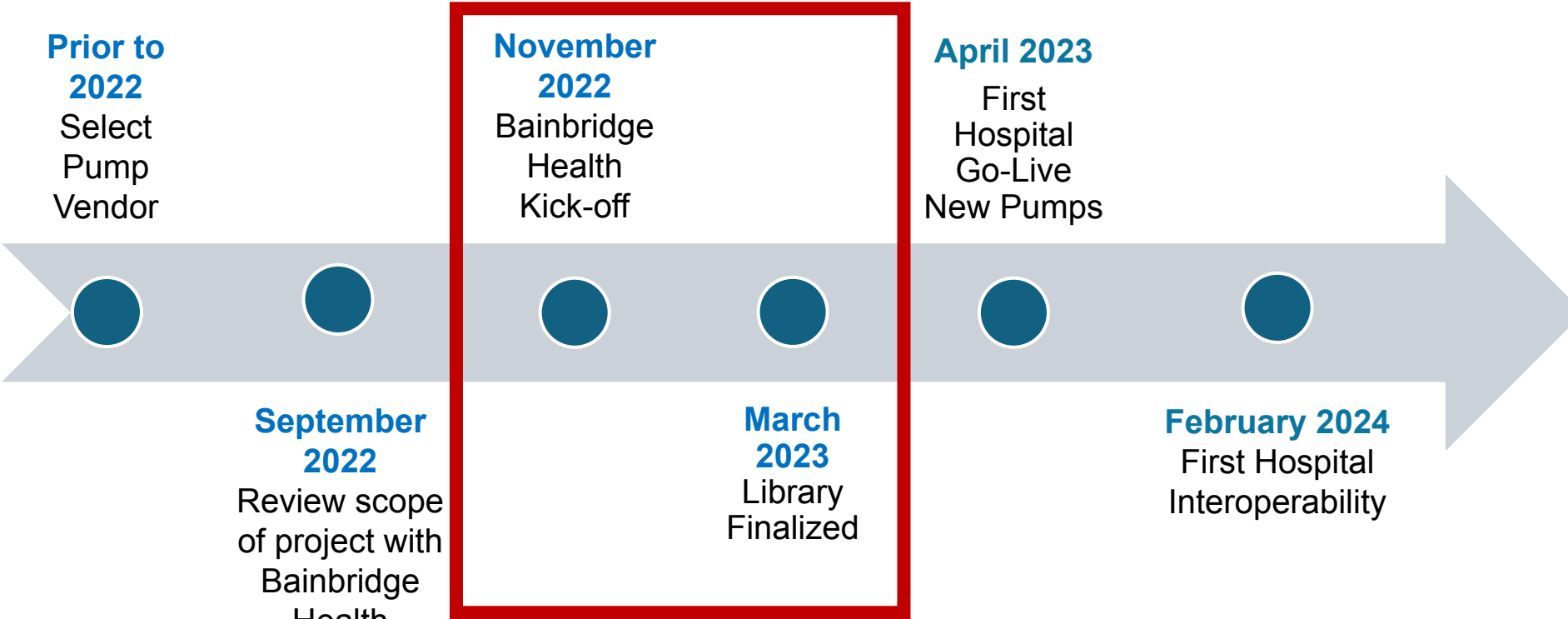
**September
2022**
Review scope
of project with
Bainbridge
Health

**November
2022**
Bainbridge
Health
Kick-off

**March
2023**
Library
Finalized

April 2023
First
Hospital
Go-Live
New Pumps

February 2024
First Hospital
Interoperability



Who was involved?

- **Pharmacy**

- Medication Safety
- Informatics

- **Nursing**

- Informatics
- Professional Development

Integration of Libraries

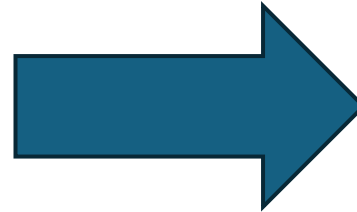
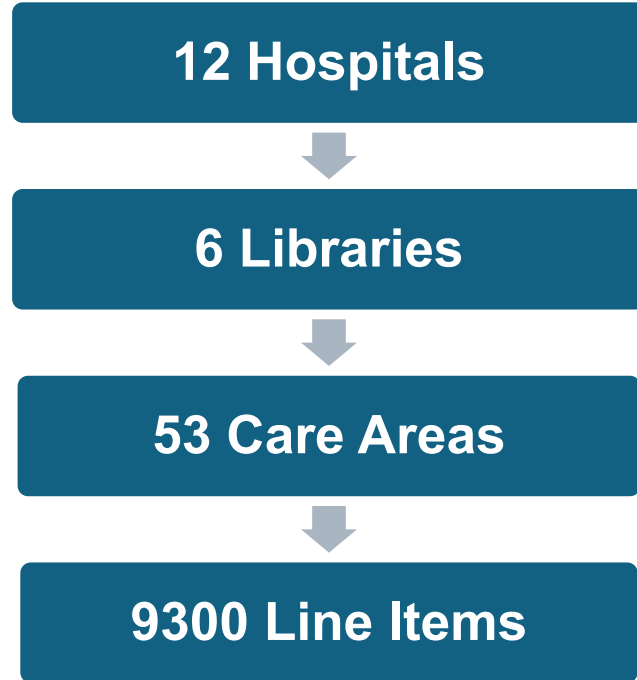
- Selection of care areas (pharmacy)
- Determination of medications to go into each library with limits (pharmacy/nursing)
- **Two meetings per week**
 - Bainbridge
 - Health system representatives

Drug Name	Therapy / Modifier	Care Area	Concentration						Dose						
			Fixed Concentration	Standard Concentration	Lower Hard Limit	Lower Soft Limit	Upper Soft Limit	Upper Hard Limit	Dose Units	Lower Hard Limit	Lower Soft Limit	Default Dose	Upper Soft Limit	Upper Hard Limit	VTBI (mL)
Alteplase	Vascular occlusion	Critical Care Intermed/Stepdown Telemetry	50 mg/200 mL 10 mg/500 mL	0.25 mg/mL 0.02 mg/mL					mg/hr		0.25		2	9	200 500
Alteplase	Vascular occlusion	Intermed/Stepdown Telemetry	--	-- mg/mL		0.01	0.3		mg/hr		0.25		2	9	--
Alteplase	STEMI 30 min	Critical Care	--	1 mg/mL		0.9	1.1		mL/hr		60			100	--
Alteplase	STEMI 60 min	Critical Care	--	1 mg/mL		0.9	1.1		mL/hr		20			35	--
Alteplase	PE	Critical Care	100 mg/100 mL	1 mg/mL					mg/hr		50	50		50	100
Alteplase	Stroke	Critical Care	--	1 mg/mL		0.9	1.1		mg/hr		30			81	--

Technical Build Considerations

- Proposed library entries cross-referenced with EHR build to ensure:
 - Dose mode aligns with EHR order units
 - Concentration, dose, and time limits align with EHR order defaults
 - Medications with bolus built in library have associated EHR orders for bolus from the bag
 - All concentrations in EHR are accounted for in the drug library and remove any concentrations not built in EHR
- Alignment completed at the time of drug library build allowed for a smooth transition into EHR integration project

Outcome



Current and Next Steps

Interoperability

National Infusion Collaborative

Novel Applications of Infusion Data

Kim S. Walker, PharmD, MPH
Sr. Pharmacy Specialist: Analytics & Integration

March 20th, 2024

Objectives

Overview of YNHHS pump fleet

Novel applications

- Safety event evaluation
- Diversion detection / investigation
- Medication Use Evaluations / Drug Use Reviews

Technical Requirements

YNHHS Infusion Pump Overview



6 different pump technologies



5 delivery network hospitals and clinics



Wireless connectivity

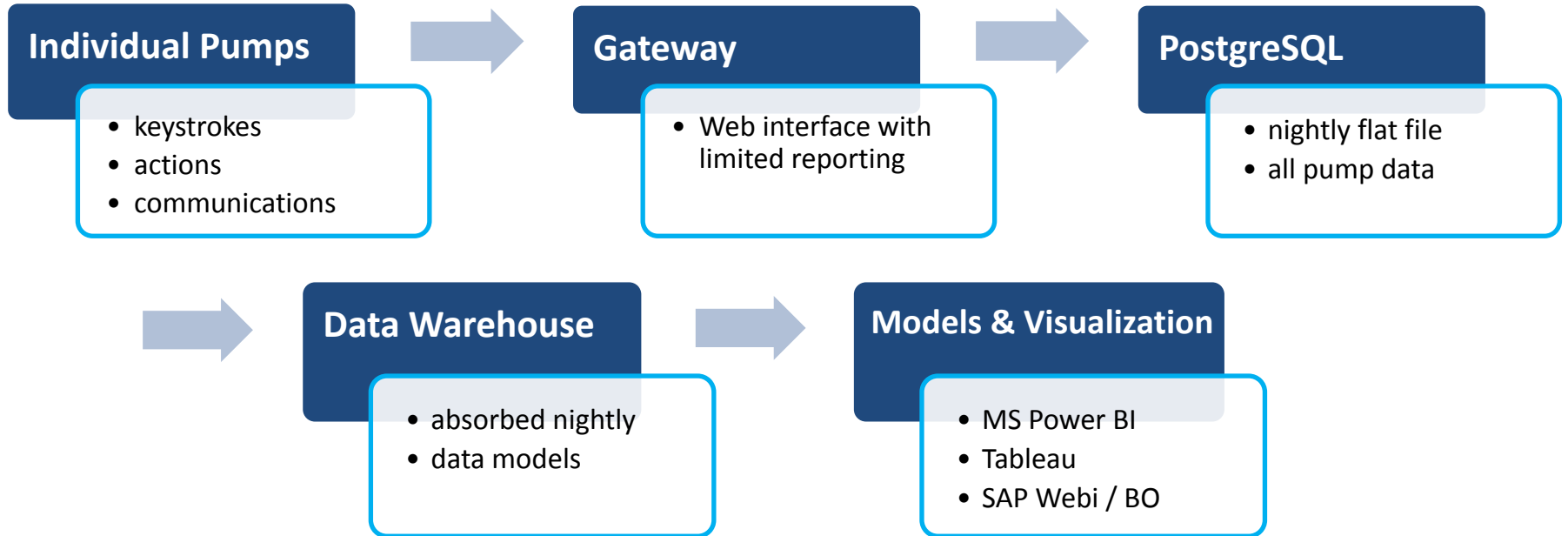
Large Volume
Pediatric Oncology
Syringe



Large Volume

Baxter Spectrum IQ v9
5800 pumps
Interoperable with EHR
(Epic)

Big Data



~ 100,000 infusions per month | 1 billion pieces of data per day

Novel Applications: Safety Events



RL Solutions and SAFER



Device category for pumps



Workflow to bring events with a pump to a small workgroup



Epic Willow
Epic ClinDoc
Pharmacy
Clinical Engineering



Frequently required detailed pump logs to investigate



Historically direct interrogation
Data request after Postgres implementation
Workgroup piloting direct access via Power BI

Novel Applications: Safety Events

Baxter Pump ID

3531711

Start and End Date

2/29/2024

3/1/2024

Pump ID	Care Area	Drug	Action Time	Action	Dose	Dose Units	Rate (mL/hr)	Volume Infused (mL)	Volume Remaining (mL)	Dose (kg)
3531711	Anesthesia - Adult	DOPamine	2/29/2024 7:36:18 AM	Exited sleep mode	1.00	mcg/kg/min	0.00	12.00	222.00	
3531711		DOPamine	2/29/2024 7:36:20 AM	Infusion Complete	1.00	mcg/kg/min	0.00	12.00	222.00	
3531711	Anesthesia - Adult	DOPamine	2/29/2024 7:36:20 AM	Clamp inserted; Door opened	1.00	mcg/kg/min	0.00	12.00	222.00	
3531711	Anesthesia - Adult	DOPamine	2/29/2024 7:36:20 AM	Load Set prompt	1.00	mcg/kg/min	0.00	12.00	222.00	
3531711	Anesthesia - Adult	DOPamine	2/29/2024 7:36:21 AM	Tube guide 2 loaded	1.00	mcg/kg/min	0.00	0.00	222.00	
3531711	Anesthesia - Adult	DOPamine	2/29/2024 7:36:22 AM	Tube guide 3-4 loaded	1.00	mcg/kg/min	0.00	0.00	222.00	
3531711	Anesthesia - Adult	DOPamine	2/29/2024 7:36:24 AM	Door closed	1.00	mcg/kg/min	0.00	0.00	222.00	
3531711	Anesthesia - Adult	DOPamine	2/29/2024 7:36:25 AM	Tube Stat: loaded	1.00	mcg/kg/min	0.00	0.00	222.00	
3531711	Anesthesia - Adult	DOPamine	2/29/2024 7:38:26 AM	Inactivity alarm	1.00	mcg/kg/min	0.00	0.00	222.00	
3531711	Anesthesia - Adult	DOPamine	2/29/2024 7:38:30 AM	Inactivity Clr'd	1.00	mcg/kg/min	0.00	0.00	222.00	
3531711	Anesthesia - Adult	DOPamine	2/29/2024 7:40:31 AM	Inactivity alarm	1.00	mcg/kg/min	0.00	0.00	222.00	
3531711	Anesthesia - Adult	DOPamine	2/29/2024 7:40:32 AM	Inactivity Clr'd	1.00	mcg/kg/min	0.00	0.00	222.00	
3531711	Anesthesia - Adult	DOPamine	2/29/2024 7:40:48 AM	Infusion Complete	1.00	mcg/kg/min	0.00	0.00	222.00	
3531711	Anesthesia - Adult		2/29/2024 7:40:48 AM	New Patient: Yes; - program cleared	0.00		0.00	0.00	0.00	
3531711	Critical Care -Adult		2/29/2024 7:40:51 AM	Critical Care -Adult	0.00		0.00	0.00	0.00	
3531711	Critical Care -Adult		2/29/2024 7:41:25 AM	Infusion order validated	0.00		0.00	0.00	0.00	
3531711	Critical Care -Adult		2/29/2024 7:41:32 AM	Infusion Order Accepted	0.00		0.00	0.00	0.00	
3531711	Critical Care -Adult	bumetanide (Infusion)	2/29/2024 7:41:34 AM	AP 1Touch Accept	0.00	mg/hr	0.00	0.00	100.00	
3531711	Critical Care -Adult	bumetanide (Infusion)	2/29/2024 7:41:37 AM	Pump RUN	0.00	mg/hr	2.00			
3531711	Critical Care -Adult	bumetanide (Infusion)	2/29/2024 7:41:37 AM	Pump RUN	0.00	mg/hr	2.00			
3531711	Critical Care -Adult	bumetanide (Infusion)	2/29/2024 7:41:37 AM	Pump RUN	0.00	mg/hr	2.00	0.00	100.00	
3531711	Critical Care -Adult	bumetanide (Infusion)	2/29/2024 7:41:38 AM	Flow confirmation; - confirmed.	0.00	mg/hr	2.00	0.00	100.00	

Novel Applications: Drug Diversion

Diversion investigation of fentanyl

- EHR ↔ ADC reconciliation inconclusive
- High suspicion due to reports of odd behavior

Aware of previous discovery of MAR manipulation to mask a safety event

Pump data is a source of truth

- initially only had access to gateway reports
- diversion clearly identified and confirmed

Initial discovery of pump/eMAR manipulation for drug diversion

- multiple mechanisms identified since

Novel Applications: Drug Diversion

Significant challenge to explain the timelines

Vial 2*		ADS Dispense			
MAR Action:	New Bag	Rate/Dose Change	New Bag	Rate/Dose Change	Rate/Dose Change
Time Start	2/13/22 7:58 PM	2/14/22 12:23 AM	2/14/22 12:50 AM	2/14/22 2:45 AM	2/14/22 4:18 AM
Time End	2/14/22 12:23 AM	2/14/22 12:50 AM	2/14/22 2:45 AM	2/14/22 4:18 AM	2/14/22 8:26 AM
Rate (mL/hr)	5.12	5.76	5.76	5.12	1.00
Run Time (h)	4.4	0.4	1.9	1.5	4.1
Volume Infused (mL)	22.58	25.18	36.28	44.19	48.32

YNHHS implemented Power BI and the Postgres feed eight months after the initial case investigation of diversion of an infusion with eMAR manipulation.

Novel Applications: Drug Diversion



Novel Applications: MUE / DUR

eMAR administration data is routinely used to conduct Medication Use Evaluations / Drug Use Reviews (MUE/DUR)

Found in safety event and drug diversion cases that eMAR documentation almost always varied from infusion pump data

Conducted pilot of eMAR accuracy after advising a heparin MUE to focus on time to therapeutic range

Initial objective was to determine the duration and dose of infusion to achieve therapeutic range in obesity class III

Compared eMAR derived data to infusion data from the pumps

Reconciled eMAR and infusion pump data for 25 heparin infusion starts in Class III obesity

Novel Applications: MUE / DUR

Preliminary Findings: eMAR variance vs infusion pump



81%

+/- 10 MINUTES



33%

+/- 30 MINUTES



7.2%

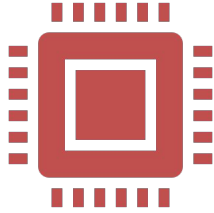
+/- 60 MINUTES

Poll Question: Interoperability

True or False:

Infusion pump interoperability with the EHR is required for the applications reviewed today?

Technical Requirements



Required

- Pump wireless connectivity to a gateway or server
- Capability to map pump location
- Tool(s) to organize, summarize, visualize the data



Optional

- Infrastructure to receive and process large amounts of raw data
- Pump ↔ EHR interoperability
- Automation

Looking Ahead

Automation

- Global and continuous alignment of pump and eMAR data
- Signals for protocol compliance
- Outcomes analysis

Application of generative AI

- Workflow optimization
- Documentation studies for automation
- Faster time to diversion detection

Thank You!

- Aligns with the goals of the NIC to provide an environment to share experiences and challenges.
- The aggregated results will be presented on the following NIC meeting. No individual results will be shared.
- 2024 Q1 topic: **Infusion pump device evaluations and transitions**
 - Survey link will be sent at the conclusion of this meeting
 - Responses requested by April 5th, 2024



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Questions?

Navigating Zoom

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