National Infusion Collaborative Clinical Meeting

Spring Clinical Meeting
March 26, 2025

Introductions

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

National Infusion Collaborative

Bainbridge Health

PURDUE UNIVERSITY

Regenstrief Center for Healthcare Engineering

Practitioner Community
Quarterly community meetings to engage in the latest data, practice trends, and peer discussions

Network Data
National infusion benchmarks and best-practice sharing to measure progress and support awareness of national trends

Supporting Research
Supporting new Research & Development to contribute to the evidence base and address unmet pharmacy needs

Introductions

Real-World Infusion Data to Understand Intravenous Smart Pump Medication Administration Practices

Stephen F. Eckel, PharmD, MHA – PI
Associate Professor and Associate Dean, UNC Eshelman School of Pharmacy

Karen K. Giuliano, PhD, RN – Co-I
Professor & Co-Director, Elaine Marieb Center for Nursing and Engineering Innovation

Lori Armistead, MA, PharmD – Co-I
Senior Research Associate,
UNC Eshelman School of Pharmacy

Daniel Degnan, PharmD, MS, CPPS, FASHP – Co-I
Clinical Associate Professor and Academic Success Coach, Purdue University College of Pharmacy

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Background

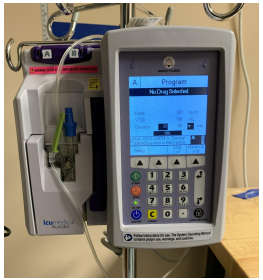
Linear Peristaltic

BD Alaris

Baxter Sigma*

BBraun

Cassette



ICU Medical Plum

Ivenix Infusion System

ICU Medical Plum Duo: 8.29.23

Project Overview

- Funded by the FDA in 2021 (contract number 75F40122C00023)
- Purpose: To describe the impact of IVSP programming alerts and operational alarms on nursing workflow

AIM 1

- Retrospective analysis of IV smart pump (IVSP) infusion, alarm, and alert data

AIM 2

- Prospective, observational study of 100 IV medication administrations in real-time

AIM 3

- Focus groups and interviews with critical care nurses and drug library managers

General Demographics – Aim 1

- The dataset contained IV smart pump (IVSP) infusion, alarm, and alert data collected from The National Infusion Collaborative throughout 2022 – 2023

Included Facilities	N	%
Health Systems	25	---
Hospital Facilities	107	---
Hospitals by Type		
Pediatric	22	20.6
Acute Care	65	60.7
Critical Access	12	11.2
Other	8	7.5
0-199 Beds	62	57.9
200-349 Beds	22	20.6
350-499 Beds	13	12.1
500+ Beds	10	9.3
Total	**107**	**100.0**

General Data Overview – Aim 1

	Aim 1
Number of infusions	62,184,362
Number of infusions with at least 1 alarm	18,765,998
Percent of infusions that had at least 1 alarm	**30.2%**
Number of alarms	65,876,195
Average number of alarms per infusion (for infusions with 1+ alarms)	**3.51**
Average number of alarms per infusion (overall)	1.06
Number of alerts	4,572,873
Total number of medications	495
Total number of ISMP High Alert Medications (HAMs)	191
Percent of medications that are ISMP High Alert	38.6%
Percent of infusions that involve HAMs	22.4%

General Alarm Data

- There were a total of **25** possible alarm types for the IV smart pump (IVSP) data evaluated in this study.
- The **4** most frequent alarms recorded in this dataset accounted for **81.8%** of all alarms; the **10** most frequent alarms accounted for **97.8%** of alarms.

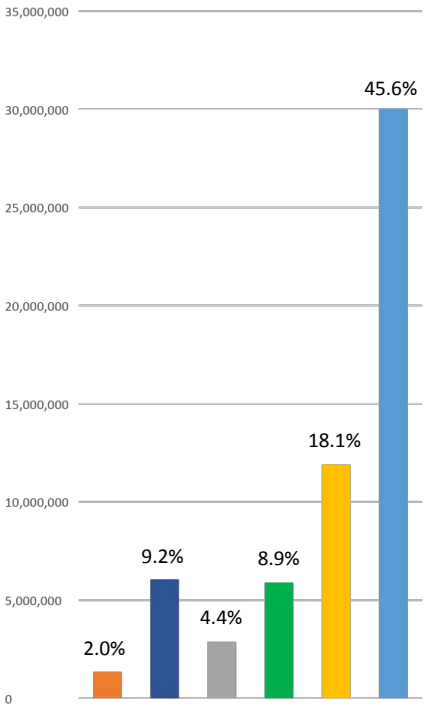
	Total Number 2022-23	Percent of Total
Patient Side Occlusion Alarm	30,023,591	45.6%
Bolus Air in Line Alarm	11,900,874	18.1%
Door Closed Alarm	6,058,109	9.2%
Safety Clamp Open / Close Door Alarm	5,892,829	8.9%
Patient Side Partial Occlusion Alarm	3,248,741	4.9%
Door Opened Alarm	2,873,509	4.4%
Bottle Side Occlusion Alarm	1,344,780	2.0%
Syringe Patient Pressure Alarm	1,206,152	1.8%
Flow Blocked Alarm	1,023,264	1.6%
Syringe Lever Alarm	870,067	1.3%
Top 10 Alarms	**64,442,916**	**97.8%**

81.8% of alarms

91.1% of alarms

97.8% of alarms

Alarm Types

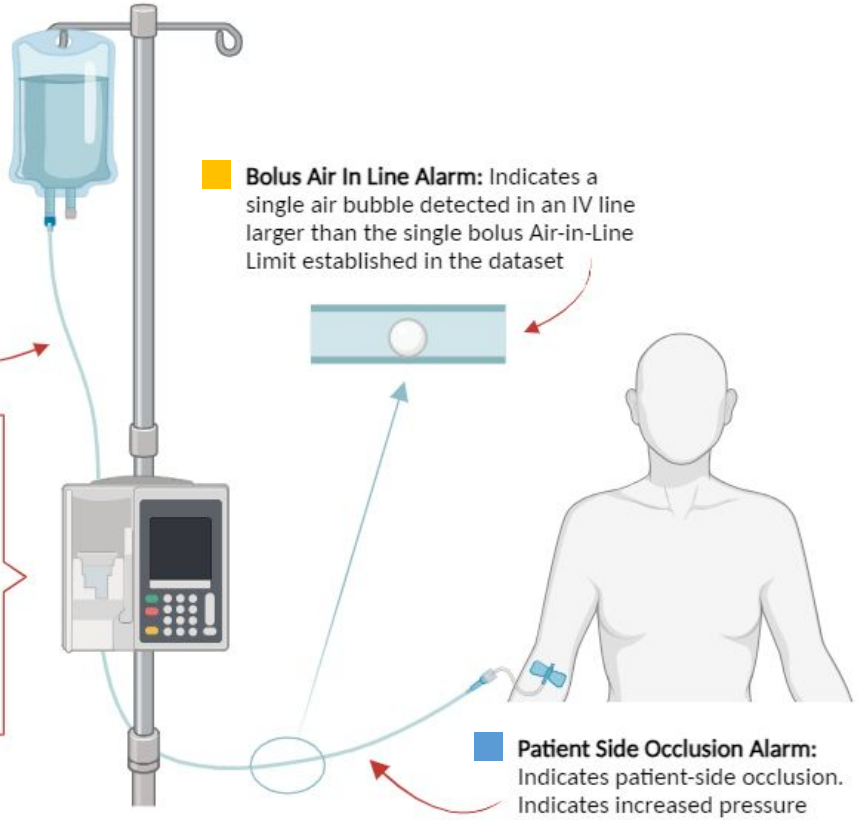


Bottle Side Occlusion Alarm: Indicates occlusion above the pump module.

Door Closed Alarm: Indicates pump door has been closed and infusion requires restart to continue.

Door Opened Alarm: Indicates pump door was opened during an active infusion.

Safety Clamp Open / Close Door Alarm: Indicates pump door is open and flow stop clamp is open.



Bolus Air In Line Alarm: Indicates a single air bubble detected in an IV line larger than the single bolus Air-in-Line Limit established in the dataset

Patient Side Occlusion Alarm: Indicates patient-side occlusion. Indicates increased pressure sensed while infusing.

Comparison with Previous Studies

	Vitoux, 2018	Waterson, 2019	Yu, 2021	UNC-UMass-Purdue, 2025
Study period	60 consecutive days	6428 days (2000-2017)	Up to one year	**2 years** (2022-2023)
Number of hospitals	29	1183 infusion pumps	4	**107**
Number of infusions	568,164	1,600,832	745,641	**62,184,362**
Number of alarms	987,240	2,211,457	NR	**65,876,195**
Percent of infusions with 1+ alarm	NR	NR	28.7%	**30.2%**
Number of alarms per infusion	1.74	1.39 (whole hospital)	NR	**1.06** (all infusions) **3.51** (infusions with alarms)
Alarm duration	average: 2:38 60% ≤ 1:08	mean, range: 12.2 – 58.7 s median, range: 7.5 – 17.5 s	8% ≥4:00 74.5% <1:00	NR
Common Alarm Types	Downstream occlusion (22.9%) Air in line (3.1%) Door open (2.4%) Upstream occlusion (0.03%)	Downstream occlusion (38.3%) Air in line, single bubble (4.9%) Upstream occlusion (3.9%) Door open (0.12%)	NR	Patient Side Occlusion Alarm (45.6%) Bolus Air in Line Alarm (18.1%) Door Opened Alarm (4.4%) Bottle Side Occlusion Alarm (2.0%)

Vitoux RR, et al. *Biomed Instrum Technol.* 2018;52(6):433-441; Waterson J, et al. *JMIR Hum Factors,* 2019;6(3):e14123; Yu D, et al. *Appl Clin Inform.* 2021;12:528-538.

Key Analyses

- Most common medications infused; medications with the most alarms and the most infusions with 1+ alarm
- Number and types of alarms and alerts by medication class, high alert medications (HAMs)
- Analyses based on
  - Infusion duration
  - Infusion type (primary vs secondary; continuous, fluid, intermittent, PCA)
  - Device type (LVP, PCA, syringe)
  - Patient type (adult vs pediatric)
- Alert response types

Medications Infused

High Alert Medications

Medication Name	Total # Infusions	Percent of Infusions	Total Primary	Total Secondary	Number of Infusions with 1+ Alarm	Percent of Infusions with 1+ Alarm	Total # Alarms
Custom Entry - IV fluid / TPN	18,721,685	30.1%	18,721,685	0	5,935,342	31.7%	24,416,107
Non-Compliant	8,168,318	13.1%	7,069,278	1,099,040	2,381,666	29.2%	8,380,785
Piperacillin/tazobactam	2,256,348	3.6%	990,561	1,265,787	691,320	30.6%	2,273,197
Propofol	1,920,407	3.1%	1,920,407	0	675,023	35.1%	1,834,115
Vancomycin	1,797,285	2.9%	1,038,915	758,370	570,868	31.8%	2,081,034
Potassium chloride	1,286,076	2.1%	789,484	496,592	333,696	25.9%	1,066,429
Magnesium sulfate	1,253,928	2.0%	753,460	500,468	457,350	36.5%	1,359,629
Cefepime	1,207,408	1.9%	661,407	546,001	299,345	24.8%	949,143
Dexmedetomidine	1,135,530	1.8%	1,135,527	3	235,644	20.8%	697,515
Acetaminophen	1,026,801	1.7%	622,554	404,247	174,340	17.0%	477,099
Ceftriaxone	971,458	1.6%	490,548	480,910	319,105	32.8%	895,435
Lipids 20%	941,565	1.5%	941,561	4	352,944	37.5%	1,379,716
Heparin	817,180	1.3%	817,179	1	295,935	36.2%	1,502,675
Metronidazole	803,372	1.3%	358,285	445,087	223,927	27.9%	630,765
Cefazolin	743,727	1.2%	345,620	398,107	156,433	21.0%	423,738
Norepinephrine	684,028	1.1%	684,028	0	166,047	24.3%	575,758

- The **top 50** medications infused *[excluding "non-compliant"]* – approximately the top 10% – accounted for **75.5%** of all infusions (n = 46,682,688) and **77.0%** (n = 50,706,337) of all alarms

Alarms

High Alert Medications

Medication Name	Total # Infusions	Percent of Infusions	Total Primary	Total Secondary	Number of Infusions with 1+ Alarm	Percent of Infusions with 1+ Alarm	Total # Alarms
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Non-Compliant	8,168,318	13.1%	7,069,278	1,099,040	2,381,666	29.2%	8,380,785
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Heparin	817,180	1.3%	817,179	1	295,935	36.2%	1,502,675
Lipids 20%	941,565	1.5%	941,561	4	352,944	37.5%	1,379,716
Magnesium sulfate	1,253,928	2.1%	753,460	500,468	457,350	36.5%	1,359,629
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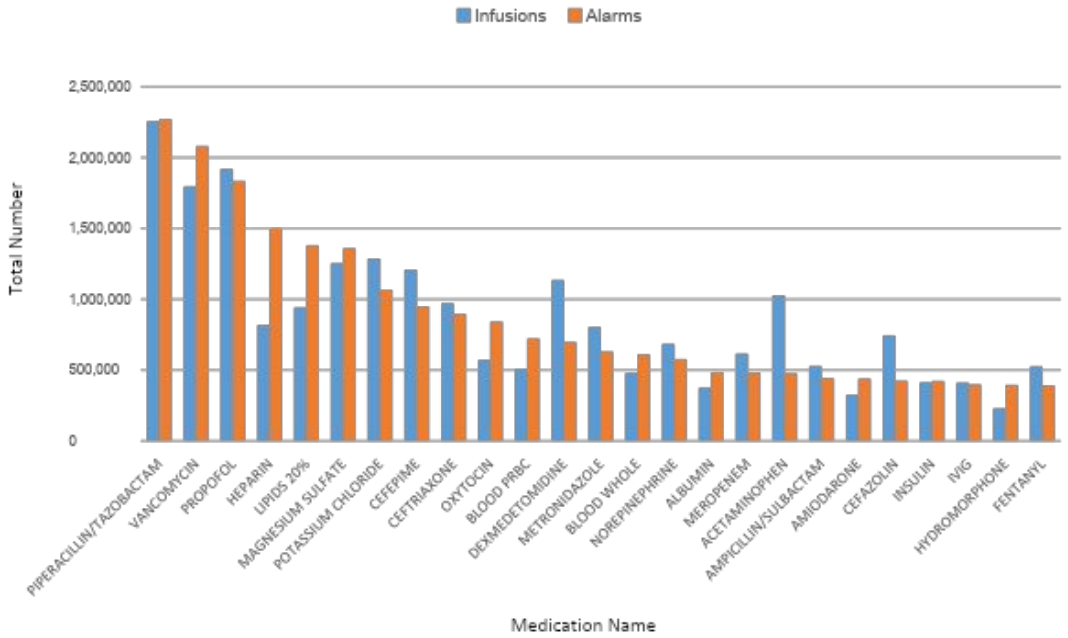
Cefepime	1,207,408	1.9%	661,407	546,001	299,345	24.8%	949,143
Ceftriaxone	971,458	1.6%	490,548	480,910	319,105	32.8%	895,435
Oxytocin	570,628	0.9%	570,620	8	220,183	38.6%	841,604
Blood PRBC	508,223	0.8%	508,223	0	202,769	39.9%	722,372
Dexmedetomidine	1,135,530	1.8%	1,135,527	3	235,644	20.8%	697,515
Metronidazole	803,372	1.3%	358,285	445,087	223,927	27.9%	630,765
Blood Whole	478,976	0.8%	478,976	0	162,462	33.9%	609,805
Norepinephrine	684,028	1.1%	684,028	0	166,047	24.3%	575,758

- The **top 50** medications with the most alarms *[excluding "non-compliant"]* accounted for **77.8%** of all alarms (n = 51,268,850)

Infusions vs Alarms

Number of Infusions and Number of Alarms per Medication – Top 25* most alarms



Of the top 25 medications with the greatest number of alarms, these had > 1 alarm per infusion:

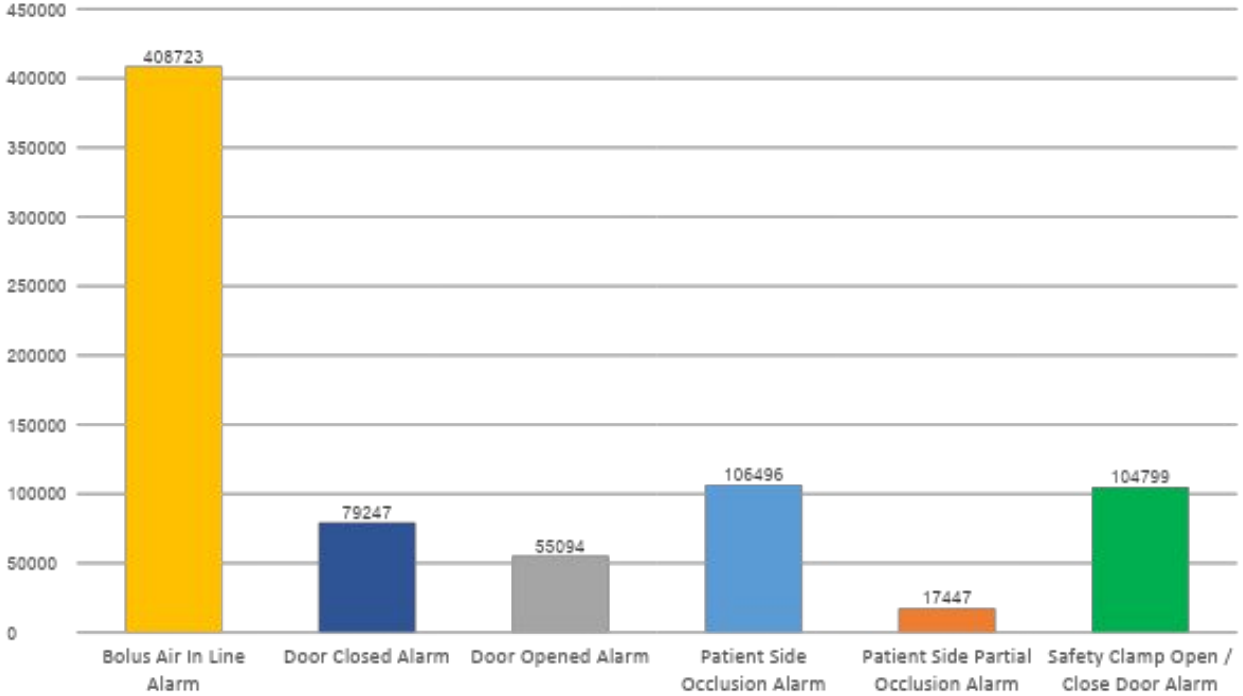
- Vancomycin
- Heparin
- Lipids 20%
- Magnesium sulfate
- Oxytocin
- Blood PRBC
- Blood whole
- Albumin
- Amiodarone
- Hydromorphone

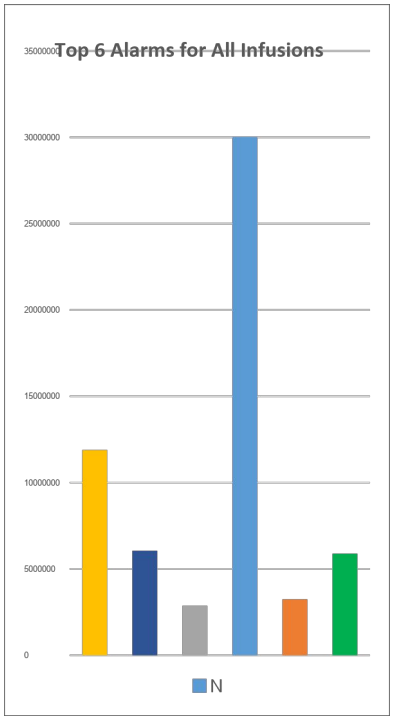
*Excluding "Custom Entry - IV Fluid/TPN" and "Non-Compliant" infusions

Alarms – High Alert Medications

Medication	Total # Infusions	Percent of Infusions	Total Primary	Total Secondary	Number of Infusions with 1+ Alarm	Percent of Infusions with 1+ Alarm	Total # Alarms
Belinostat	4	0.00%	4	0	4	100.0%	4
Ixabepilone	36	0.00%	36	0	30	83.3%	35
Blinatumomab	2,294	0.00%	2,294	0	1,885	82.2%	23,486
Ado trastuzumab emtansine	5,406	0.01%	5,266	140	4,276	79.1%	6,800
Margetuximab	50	0.00%	50	0	39	78.0%	70
Cetuximab	6,774	0.01%	6,702	72	5,217	77.0%	13,430
Fam-trastuzumab	5,694	0.01%	5,426	268	4,264	74.9%	7,955
Nivolumab/Relatlimab	558	0.00%	534	24	413	74.0%	823
Hydromorphone/Ketamine	67	0.00%	67	0	49	73.1%	149
Belantamab	271	0.00%	263	8	198	73.1%	308
Ramucirumab	2,005	0.00%	1,934	71	1,455	72.6%	2,710
Sacituzumab	5,612	0.01%	5,385	227	4,037	71.9%	8,762
Trastuzumab	37,158	0.06%	34,396	2,762	26,649	71.7%	56,151
Copanlisib	7	0.00%	7	0	5	71.4%	7
Amivantamab	525	0.00%	516	9	374	71.2%	756
Pertuzumab	17,017	0.03%	16,289	728	12,068	70.9%	23,481
Total for all HAMs	**14,217,907**	**22.9%**	---	**12,992,412**	**1,225,495**	**4,612,669**	**32.4%**

Alarm Profile for Monoclonal Antibodies





Alarm Profiles of Select Medications

Medication Name	Number of Infusions	Bolus Air In Line Alarm	Door Closed Alarm	Door Opened Alarm	Patient Side Occlusion Alarm	Patient Side Partial Occlusion Alarm	Safety Clamp Open/Close Door Alarm	TOTAL Number of Alarms (all types)	% that are Top 6 Alarms
BLINATUMOMAB	2,294	12,112	3,165	1,101	4,244	27	2,556	**23,486**	98.8%
HEPARIN	817,180	82,608	93,597	50,690	1,096,167	18,090	89,099	1,502,675	95.2%
HYDROMORPHONE/KETAMINE	67	0	0	10	1	**0**	0	149	**7.4%**
LIPIDS 20%	941,565	72,946	163,598	94,382	723,654	4,420	173,224	1,379,716	89.3%
OXYTOCIN	570,628	87,783	63,779	53,464	475,783	37,455	60,599	841,604	92.5%
VANCOMYCIN	1,797,285	453,354	183,579	793,98			67,230	2,081,034	94.4%
All Infusions	62,184,362	11,900,874	6,058,109	2,873,50			92,829	65,876,195	91.1%

35.6% - PCA Door Unlocked Alarm

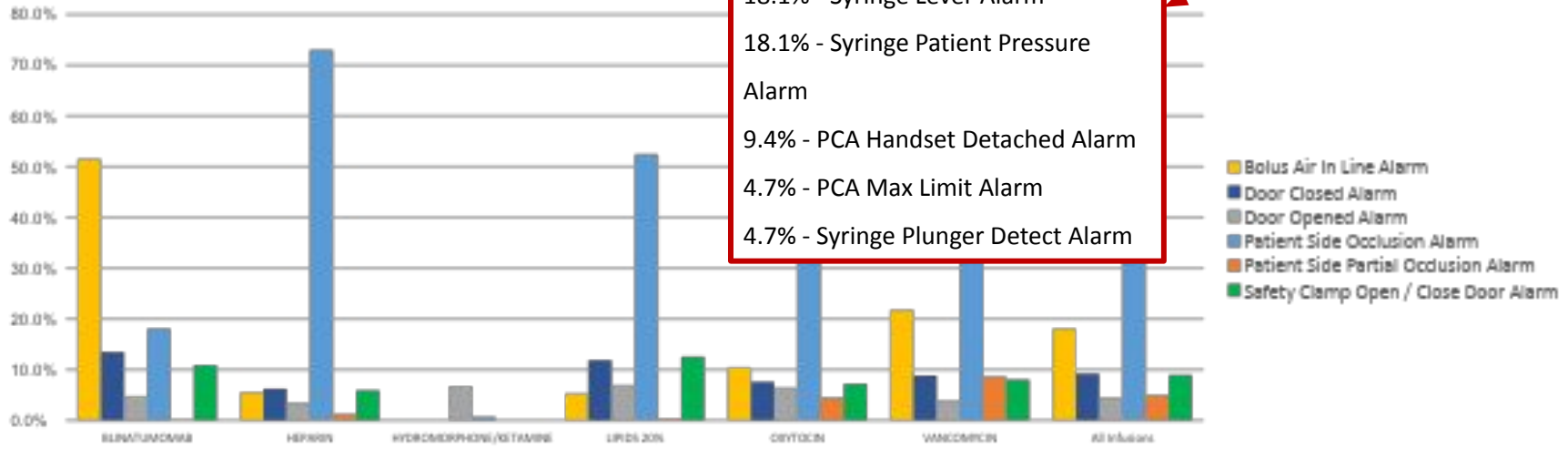
18.1% - Syringe Lever Alarm

18.1% - Syringe Patient Pressure Alarm

9.4% - PCA Handset Detached Alarm

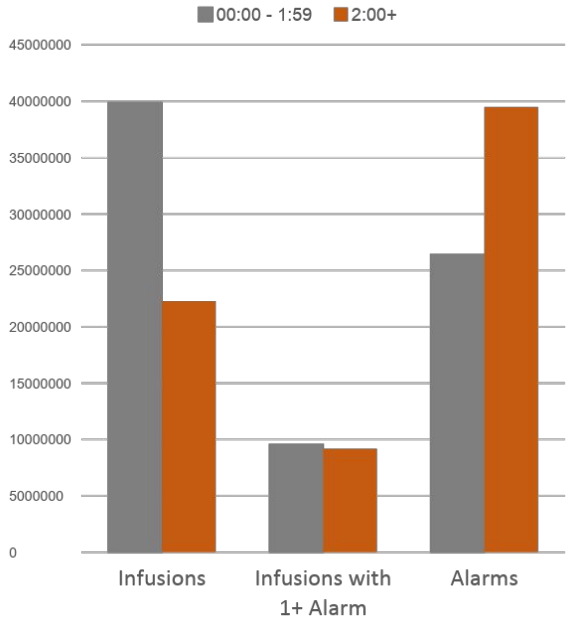
4.7% - PCA Max Limit Alarm

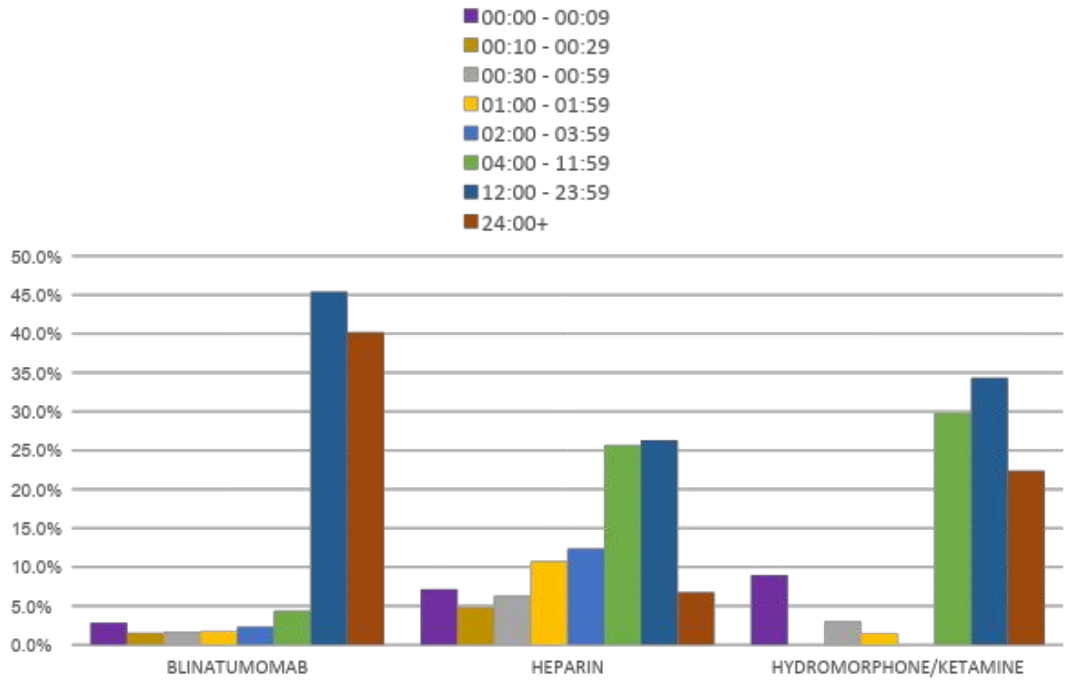
4.7% - Syringe Plunger Detect Alarm



Select Infusion Duration Profiles

Number of Infusions and Number of Alarms < 2 hours vs ≥ 2 hours of Infusion Duration





Infusion, Alarm, and Alert Data by Medication Class

Medication Class (AHFS)	Total # of Infusions	% of All Infusions	# of Primary Infusions	% of class that are Primary Infusions	# of Secondary Infusions	% of class that are Secondary Infusions	# of Infusions with 1+ Alarm	% of Class with 1+ Alarm	Total # of Alarms	% of Alarms	Total # of Alerts	% of Alerts
8:00 Anti-infective Agents	12,202,291	**19.6%**	6,312,184	**51.7%**	5,890,107	**48.3%**	3,421,515	28.0%	10,762,084	**16.3%**	800,213	**17.5%**
10:00 Antineoplastic Agents	1,263,388	2.0%	1,162,915	92.0%	100,473	8.0%	602,704	**47.7%**	1,346,675	2.0%	302,397	**6.6%**
12:00 Autonomic Drugs	2,573,256	4.1%	2,545,927	98.9%	27,329	1.1%	617,819	24.0%	1,928,042	2.9%	253,939	5.6%
16:00 Blood Derivatives	1,557,677	2.5%	1,496,807	96.1%	60,870	3.9%	588,058	**37.8%**	2,051,200	3.1%	181,719	4.0%
20:00 Blood Formation, Coagulation, and Thrombosis	1,400,477	2.3%	1,285,783	91.8%	114,694	8.2%	517,842	**37.0%**	2,143,545	3.3%	204,534	4.5%
24:00 Cardiovascular Drugs	1,227,158	2.0%	1,209,338	98.5%	17,820	1.5%	378,187	30.8%	1,407,791	2.1%	120,264	2.6%
28:00 Central Nervous System Agents	6,655,383	**10.7%**	5,488,881	82.5%	1,166,502	17.5%	1,978,602	29.7%	5,620,006	8.5%	1,261,197	**27.6%**
40:00 Electrolytic, Caloric, and Water Balance	2,549,848	4.1%	1,829,490	71.7%	720,358	28.3%	660,565	25.9%	2,130,959	3.2%	337,192	**7.4%**
44:00 Enzymes	42,292	0.1%	40,450	95.6%	1,842	4.4%	6,938	16.4%	18,005	0.0%	16,243	0.4%
56:00 Gastrointestinal Drugs	883,267	1.4%	775,907	87.8%	107,360	12.2%	209,598	23.7%	705,941	1.1%	100,154	2.2%
68:00 Hormones and Synthetic Substitutes	1,245,348	2.0%	1,123,565	90.2%	121,783	9.8%	266,604	21.4%	878,044	1.3%	174,668	3.8%
72:00 Local Anesthetics	32,077	0.1%	32,077	100.0%	0	0.0%	11,772	**36.7%**	25,972	0.0%	2,558	0.1%
80:00 Antitoxins, Immune Globulins, Toxoids, and Vaccines	413,774	0.7%	405,919	98.1%	7,855	1.9%	112,173	27.1%	401,547	0.6%	75,865	1.7%
88:00 Vitamins	239,536	0.4%	122,767	**51.3%**	116,769	**48.7%**	73,201	30.6%	219,930	0.3%	25,073	0.5%
90:00 Immunomodulatory Agents	552,602	0.9%	501,910	90.8%	50,692	9.2%	202,307	**36.6%**	550,143	0.8%	94,291	2.1%
91:00 Antidote Therapeutics	164,235	0.3%	127,346	77.5%	36,889	22.5%	50,868	31.0%	140,099	0.2%	43,086	0.9%
92:00 Miscellaneous Therapeutic Agents	64,940	0.1%	47,661	73.4%	17,279	26.6%	24,803	**38.2%**	53,178	0.1%	10,886	0.2%
CUSTOM ENTRY	19,263,464	**31.0%**	19,244,242	99.9%	19,222	0.1%	6,040,972	31.4%	24,790,331	**37.6%**	344,028	**7.5%**
NON-COMPLIANT	8,168,318	**13.1%**	7,069,278	86.5%	1,099,040	13.5%	2,381,666	29.2%	8,380,785	**12.7%**	0	0.0%
Other*	1,685,031	2.7%	1,667,155	98.9%	17,876	1.1%	619,804	**36.8%**	2,321,918	3.5%	224,562	4.9%
Total	**62,184,362**	**100.0%**	**52,489,602**	**84.4%**	**9,694,760**	**15.6%**	**18,765,998**	**30.2%**	**65,876,195**	**100.0%**	**4,572,873**	**100.0%**
8:12 Antibacterials	11,466,436	**18.4%**	5,895,919	**51.4%**	5,570,517	**48.6%**	3,223,535	28.1%	10,097,801	**15.3%**	698,027	**15.3%**
28:08.08 Opioid Agonists	1,089,077	1.8%	1,087,062	99.8%	2,015	0.2%	343,375	31.5%	1,031,722	1.6%	391,400	**8.6%**
HEPARIN	817,180	1.3%	817,179	100.0%	1	0.0%	295,935	36.2%	1,502,675	2.3%	103,693	2.3%
Monoclonal Antibodies	903,455	1.5%	842,816	93.3%	60,639	6.7%	374,561	**41.5%**	830,860	1.3%	173,951	**3.8%**

*Other = 4:00 Antihistamine Drugs; 26:00 Cellular and Gene Therapy; 36:00 Diagnostic Agents; 48:00 Respiratory Tract Agents; 52:00 Eye, Ear, Nose, and Throat Preparations; 64:00 Heavy Metal Antagonists; 76:00 Oxytocics; 84:00 Skin and Mucous Membrane Agents; 86:00 Smooth Muscle Relaxants, and Intravenous Nutritional Products.

Primary vs Secondary Infusions

	Total # of Infusions	Percent of All Infusions (%)	Total # of Infusions with 1+ Alarm	Percent of primary/ secondary infusions (%)	Total # of Alarms	Percent of All Alarms (%)
Primary	52,489,602	84.4	16,845,322	32.1	59,307,309	90.0
Secondary	9,694,760	15.6	1,920,676	19.8	6,568,886	10.0
Total	**62,184,362**	**100.0**	**18,7625,998**	**30.2**	**65,876,195**	**100.0**

- Anti-infective agents (including antibacterials) and vitamins were each administered approximately 50% of the time as primary infusions and 50% of the time as secondary infusions (51.7% primary/48.3% secondary and 51.3%/48.7%, respectively)
- All other medication classes were administered predominately via primary infusions (≥ 71.1% primary infusions vs secondary)

Infusion Duration

Infusion Duration	Number of Infusions	Number of Infusions with 1+ Alarm	Number of Alarms	% of Alarms	Alarms per Hour
00:00 - 00:09	8,053,395	1,311,613	4,169,874	6.3	50,038,488
00:10 - 00:29	8,748,640	2,009,935	4,796,897	7.3	14,759,683
00:30 - 00:59	11,191,585	2,945,645	7,739,530	11.7	10,435,321
01:00 - 01:59	11,906,390	3,295,296	9,693,404	14.7	6,498,371
02:00 - 03:59	8,629,917	2,664,636	8,895,749	13.5	2,965,250
04:00 - 11:59	9,227,239	3,877,058	16,404,697	24.9	2,050,587
12:00 - 23:59	3,251,520	1,841,026	9,662,582	14.7	536,810
24:00+	1,175,676	820,789	4,513,462	6.9	188,061
Total	**62,184,362**	**18,765,998**	**65,876,195**	**100.0**	---

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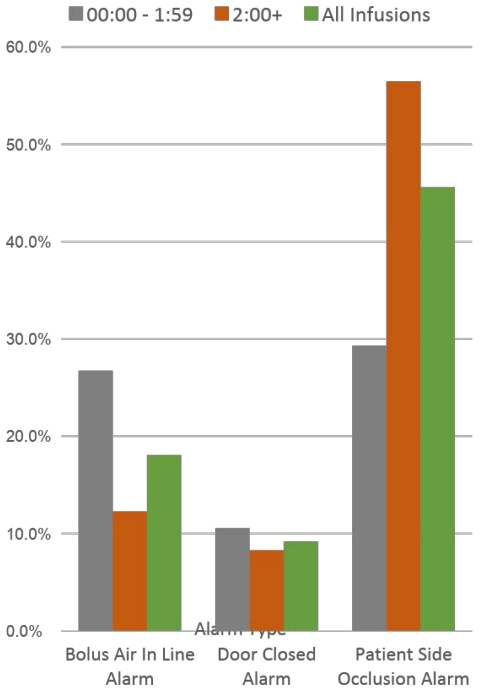
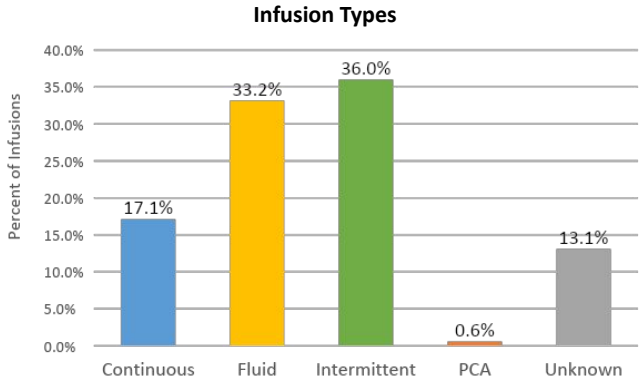


Infusion Types / Device Types

	Infusion Type						
Infusion Device Type	**Continuous**	**Fluid**	**Intermittent**	**PCA**	**Unknown**	**Total**	**% of Total**
LVP	9,158,414	19,806,616	17,552,476		7,005,757	53,523,263	**86.1**
PCA				362,365		362,365	**0.6**
Syringe	1,494,726	823,489	4,830,638		1,129,009	8,277,862	**13.3**
Unknown	2,268	5,818	4,835	2,022	5,929	20,872	**0.03**
Total	**10,655,408**	**20,635,923**	**22,387,949**	**364,387**	**8,140,695**	**62,184,362**	**100.0**



Adult vs Pediatric Infusions

	Number of Infusions	Percent of Infusions	Number of Infusions with 1+ Alarm	Percent of Infusions with 1+ Alarm
Adult Hospitals	48,384,673	77.8	15,455,297	31.9
Pediatric Hospitals	13,799,689	22.2	3,310,701	24.0
Total Adult Patients	40,199,919	64.6	13,651,682	34.0
Total Pediatric Patients	21,984,443	35.4	5,114,316	23.3
Total	**62,184,362**	**100.0**	**18,765,998**	**30.2**

- Approximately 65% of all infusions (n = 40,199,919) were administered to adult patients, approximately 35% to pediatric patients (n = 21,984,443)
- Of the infusions given to adult patients, 34.0% (n = 13,651,682) had at least 1 alarm. Of the infusions given to pediatric patients, 23.3% (n = 5,114,316) had at least 1 alarm.

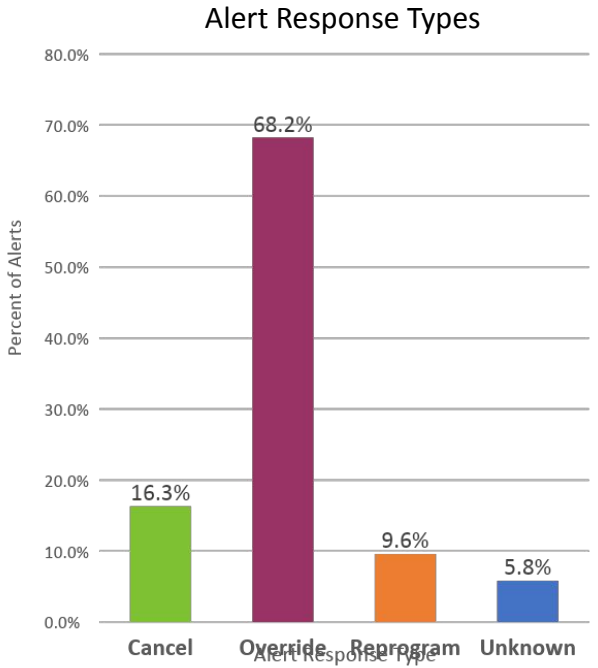
Adult vs Pediatric Infusions

	Number of Infusions	Percent of Infusions	Number of Infusions with 1+ Alarm	Percent of Infusions with 1+ Alarm
Adult Hospitals	48,384,673	77.8	15,455,297	31.9
Adult Patients	*40,039,132*	*64.4*	*13,609,951*	*34.0*
Pediatric Patients	*8,345,541*	*13.4*	*1,845,346*	*22.1*
Pediatric Hospitals	13,799,689	22.2	3,310,701	24.0
Adult Patients	*160,787*	*0.3*	*41,731*	*26.0*
Pediatric Patients	*13,638,902*	*21.9*	*3,268,970*	*24.0*
Total	**62,184,362**	**100.0**	**18,765,998**	**30.2**
Total Adult Patients	40,199,919	64.6	13,651,682	34.0
Total Pediatric Patients	21,984,443	35.4	5,114,316	23.3

- Approximately 65% of all infusions (n = 40,199,919) were administered to adult patients, approximately 35% to pediatric patients (n = 21,984,443)
- Of the infusions given to adult patients, 34.0% (n = 13,651,682) had at least 1 alarm. Of the infusions given to pediatric patients, 23.3% (n = 5,114,316) had at least 1 alarm.

Number and Types of Alerts

Alert Type	Number of Alerts	Percentage of Alerts
Concentration	338,925	7.4
Dose	2,084,629	45.6
Duration	1,581,183	34.6
Rate	568,136	12.4
Total	**4,572,873**	**100.0**



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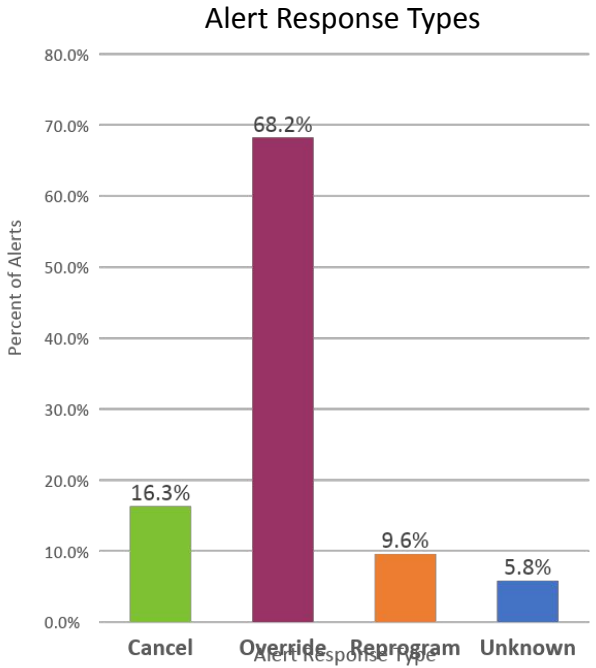
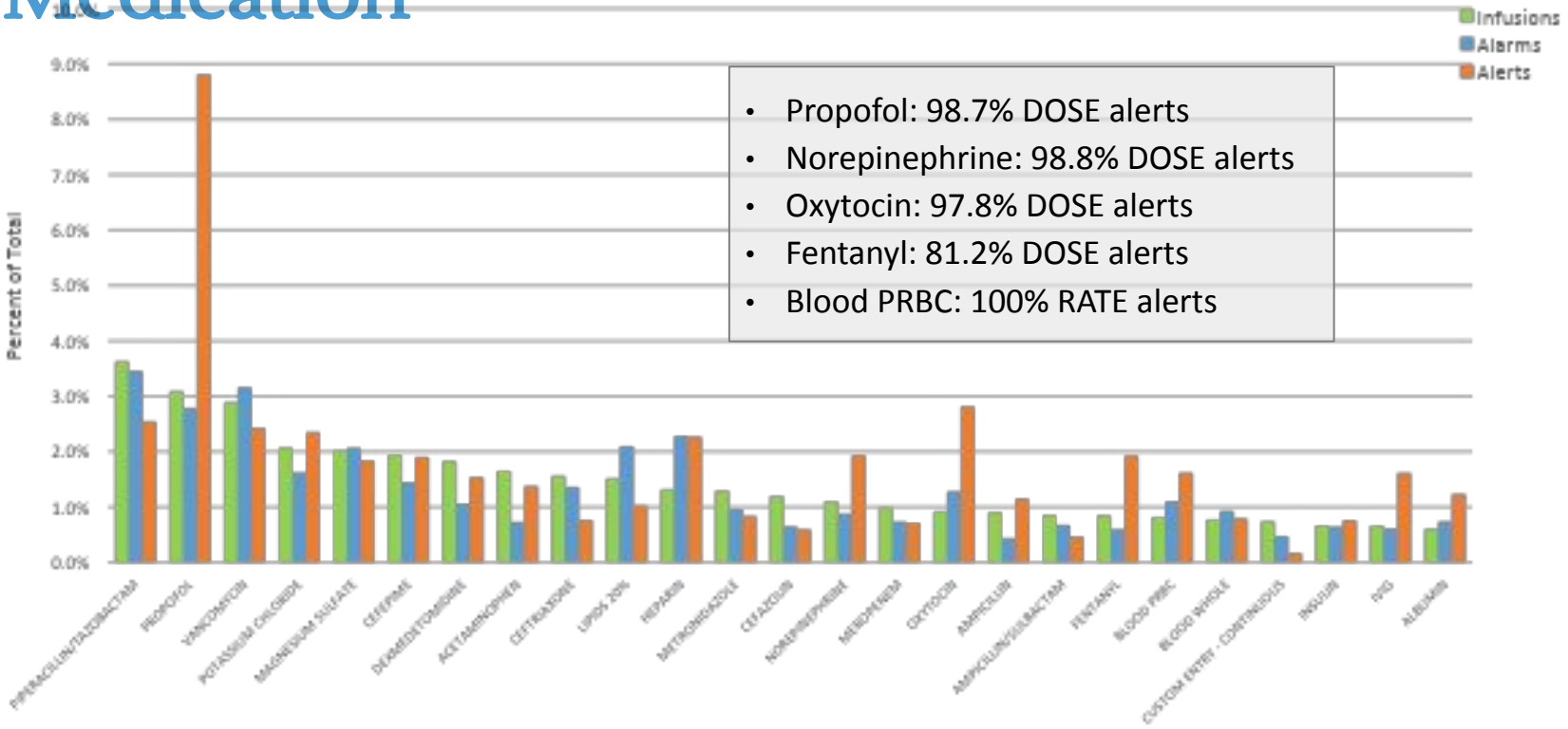
Duration	1,581,183	34.6
Rate	568,136	12.4
Total	**4,572,873**	**100.0**

Patient Type	Number of Alerts	Percent of Alerts
Adult	2,611,954	57.1
Pediatric	1,960,919	42.9
Total	4,572,873	100.0



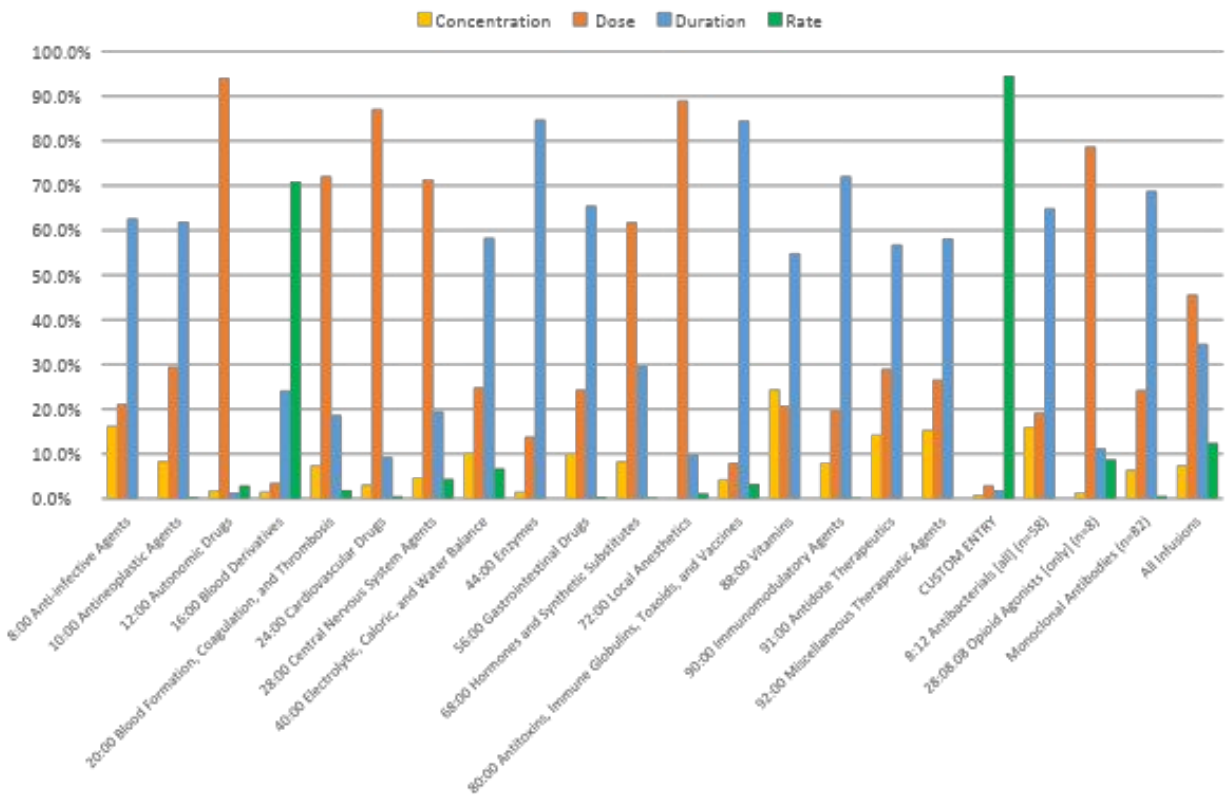
Infusions, Alarms, and Alerts by Medication



- Propofol: 98.7% DOSE alerts
- Norepinephrine: 98.8% DOSE alerts
- Oxytocin: 97.8% DOSE alerts
- Fentanyl: 81.2% DOSE alerts
- Blood PRBC: 100% RATE alerts

Alert Types by Medication Class

- CNS agents and monoclonal antibodies have a relatively high number of alerts per infusion
  - CNS agents: primarily DOSE alerts
  - MAbs: primarily DURATION alerts
- Blood Derivatives and Custom Entry: primarily RATE alerts
- All others: primarily DOSE or DURATION alerts



Aim 2 Results

- Data were collected on **100** medication infusion observations / medication administration activities
- All observations were performed in two hospital units in Baystate Health from 2/2024 to 5/2024

Measurement	N (SD)	Median (Range)
Total number of activities with alarms/alerts	25	---
Total number of alarms/alerts	34	---
Average number of alarms/alerts per activity with an alarm/alert	1.36	---
How often an alarm/alert sounded, in min	1.67 (1.09)	1.52 (0.10 – 4.54)
Average number of audible alerts per min	1.28 (1.97)	0.66 (0.22 – 10.00)
Average duration of alarms/alerts, in sec	**17.9** (13.9)	14.0 (2 – 55)
Total number of activities with interruptions	44	---
Total number of interruptions	54	---
Average number of interruptions per activity with an interruption	1.23	---
Average length of interruptions, in seconds	**28.0** (21.9)	22.0 (4 – 90)
Average duration of medication administration activity, in sec	**73.0** (81.8)	46.0 (3 – 545)

Our Next Steps

- Complete Aim 3 to better understand the impact of and potential solutions to unnecessary IVSP alarms and alerts
  - Interviews with drug library managers (currently underway)
  - Focus groups with critical care nurses (April – May 2025)
- Present findings at meetings and conferences
  - INS Annual Meeting (April 2025)
  - ASHP Summer Meeting (June 2025)
- Submit manuscripts for publication

Thank You.

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UMassAmherst | Elaine Marieb Center for Nursing and Engineering Innovation

PURDUE UNIVERSITY | Department of Pharmacy Practice

Questions?

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

National Infusion Collaborative

State of Infusion Report

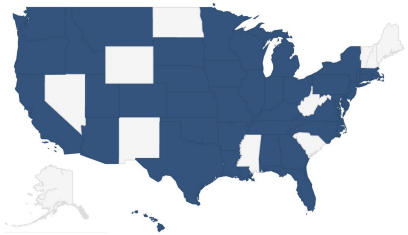
National Infusion Collaborative

Infusion Metric Trends

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

National Infusion Collaborative

9/1/24 - 11/30/24



>500
Hospitals

69,000
Infusion Pumps

>14 million
Infusion Records

> 900,000
Alerts

National Infusion Collaborative

Key Performance Indicators

	Compliance	Alert Rate	Override Rate
12/1/24 – 2/28/24	88.8%	6.6%	67%