

# Waiting to Exhale: In-Operating Room Extubation After Pediatric Cardiac Surgery versus Early In-CICU Extubation



Solange Benjamin Bryant, MD  
Levine Children's Hospital



David Werho, MD  
Rady Children's Health



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Nationwide Children's



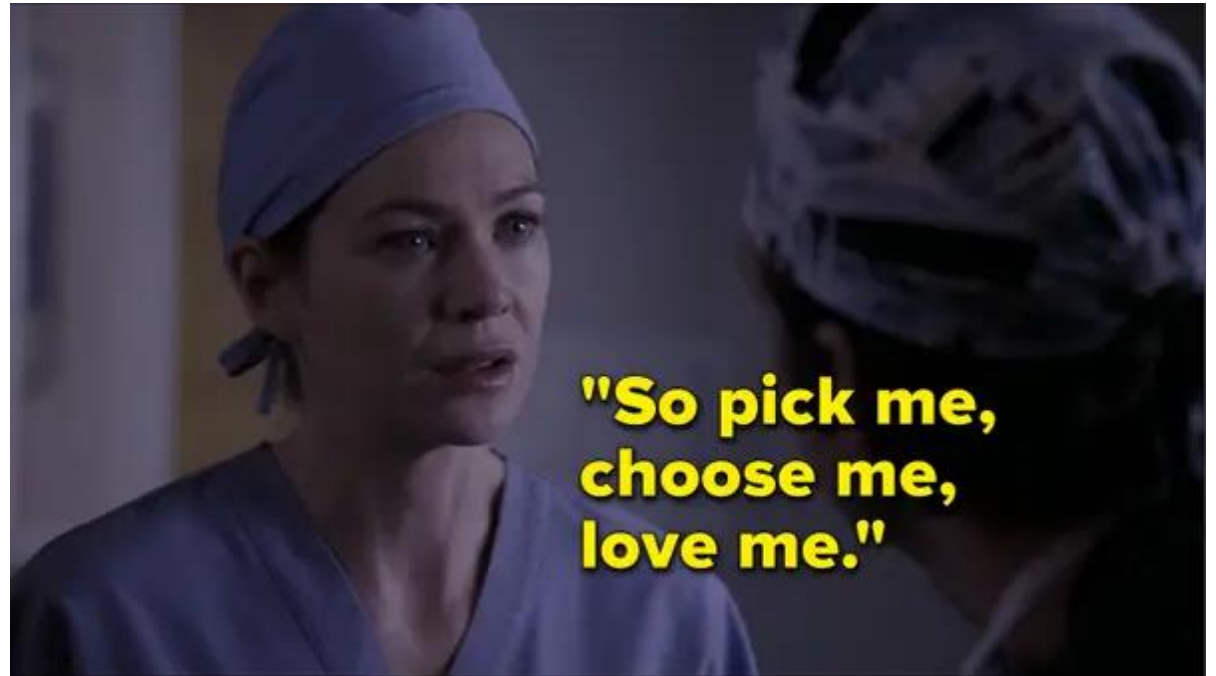
Ryan Wilkes, MD  
Levine Children's Hospital

# Agenda

Presentation	Speakers
Opening Statements	Moderators
The Right to be Considered for an in OR Extubation	Brittany Shutes
The Case for Delayed Postoperative Extubation	Ryan Wilkes
Closing Remarks	Moderators
Questions	

# How We Chose Centers

- High vs. Low In-OR Extubation Rates
  - Key Metric: Expected or Better O/E for Risk Adjusted LOV
  - Balancing Metric: Expected or Better Failed Extubation Rates

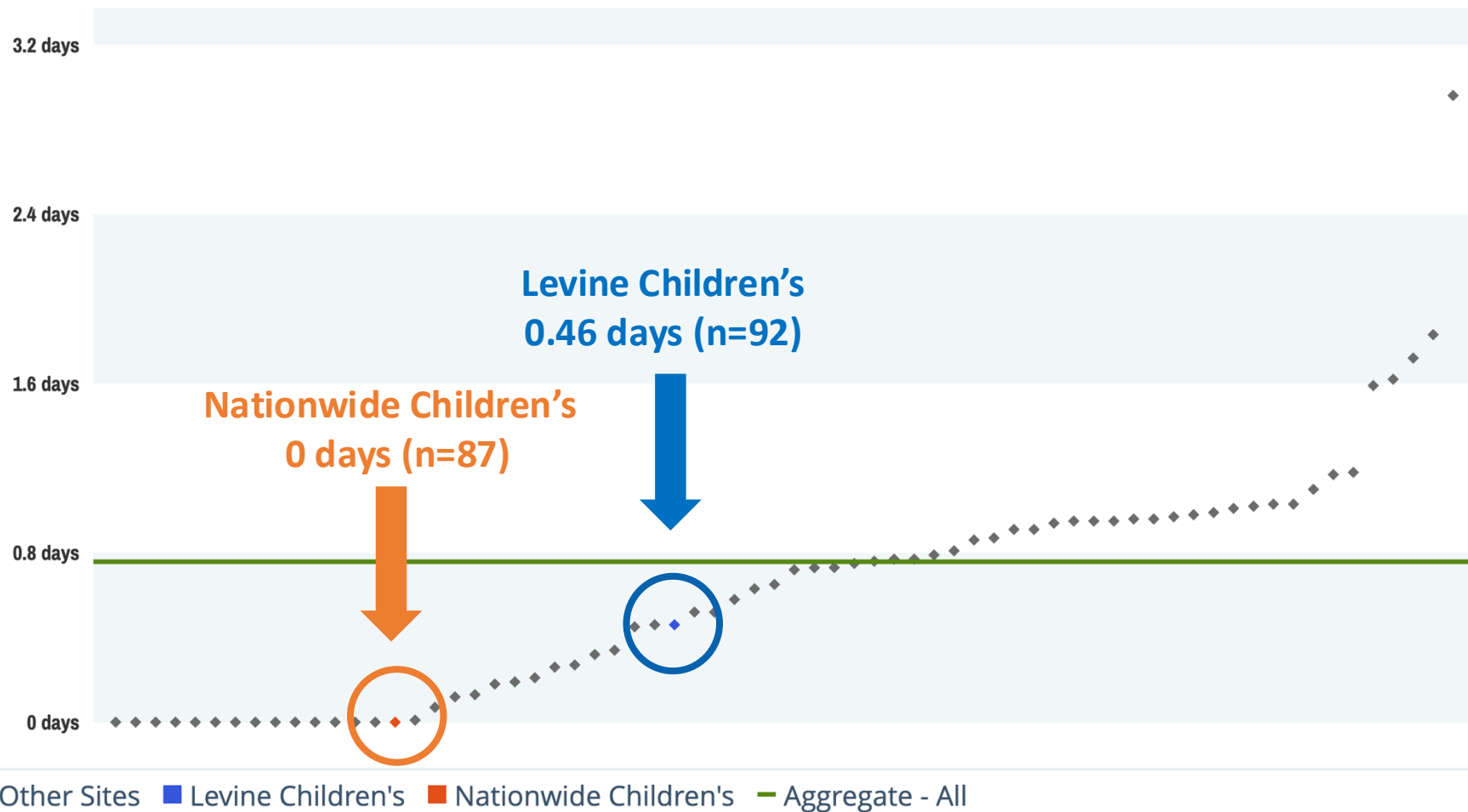


# Big Picture:

## Let's Compare a Few Benchmark Operations in Our Selected Centers

- Tetralogy of Fallot Repair
- Arterial Switch Operation
- Fontan Procedure
- Atrioventricular Canal Repair

# TOF Median Length of Ventilation (Version 3)



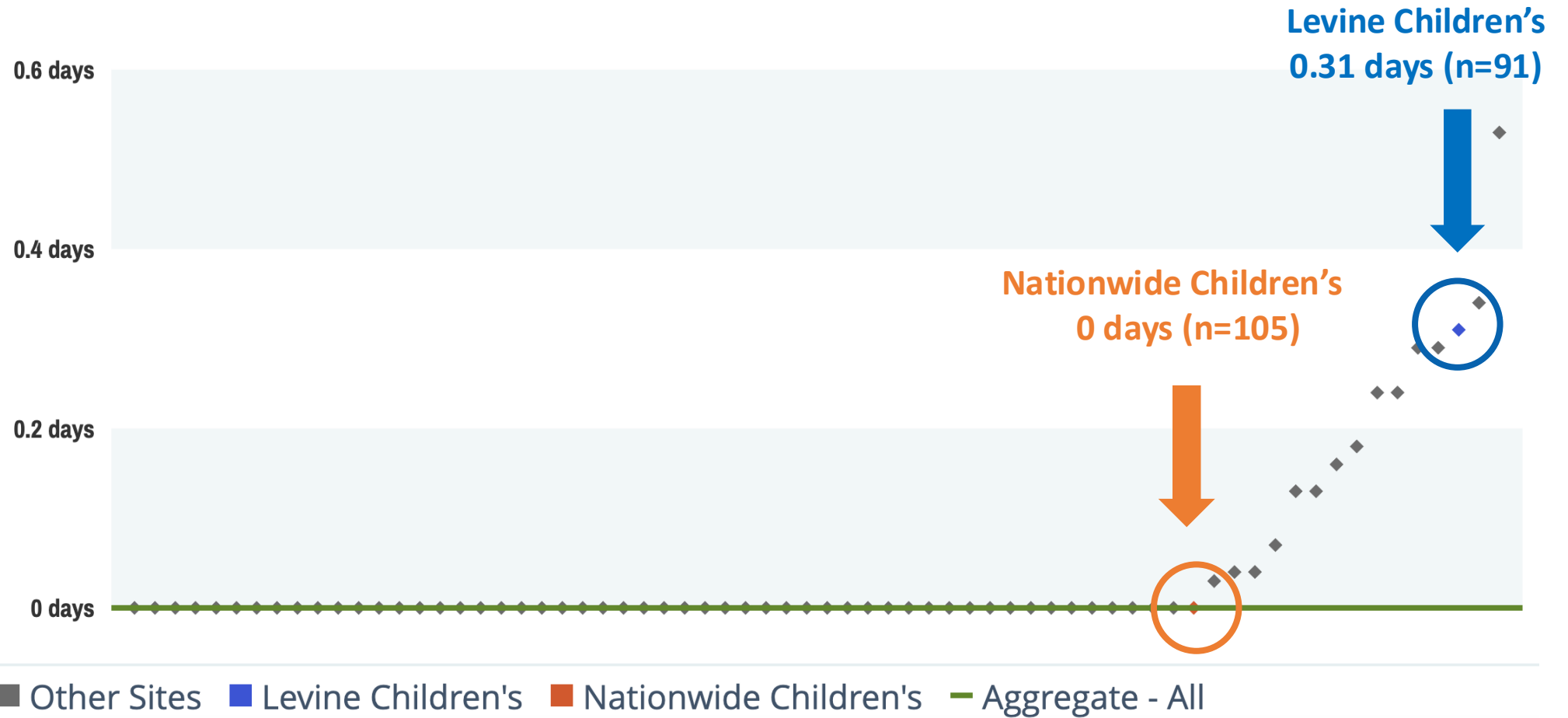
# Arterial Switch Median Length of Ventilation (Version 3)



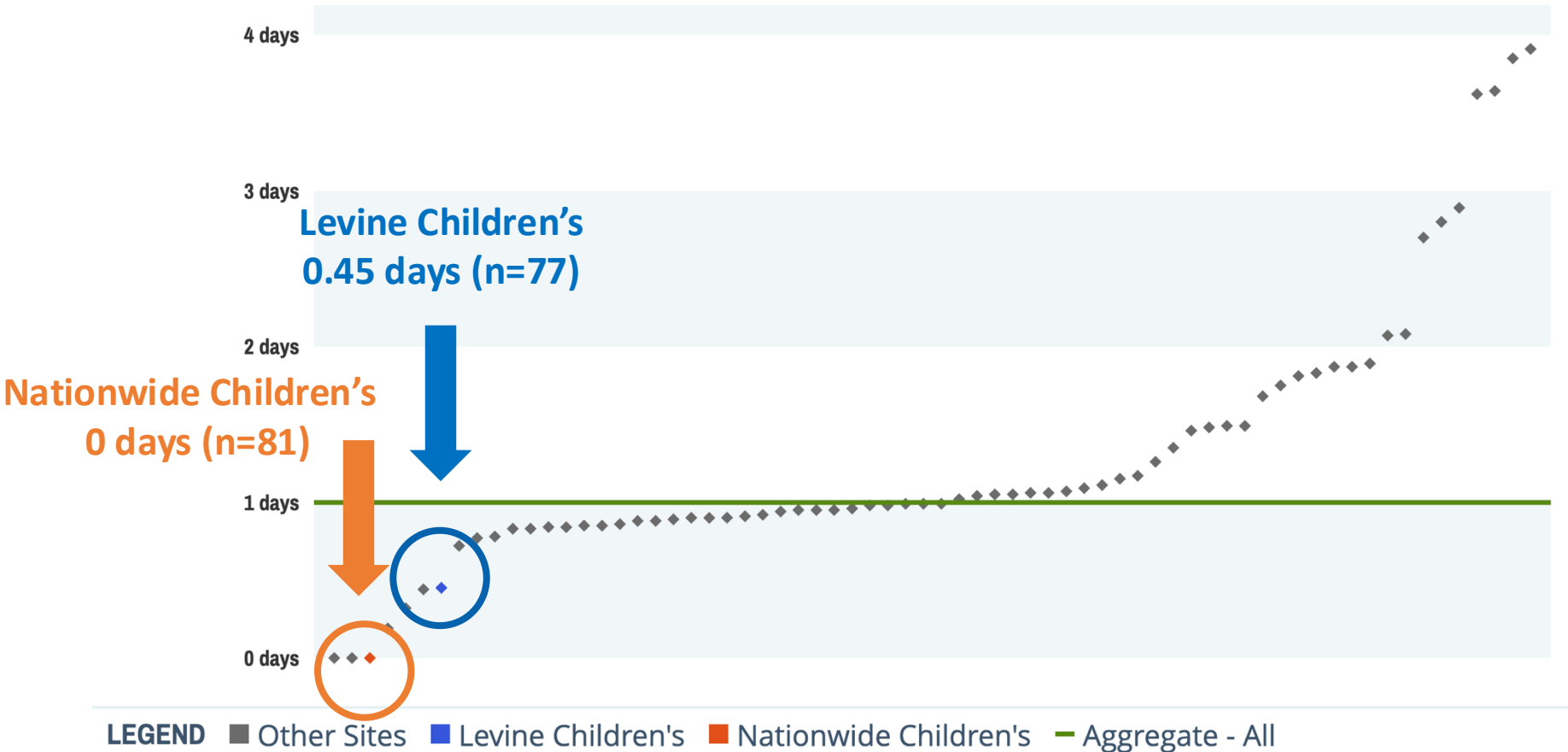
LEGEND ■ Other Sites ■ Levine Children's ■ Nationwide Children's — Aggregate - All



# Fontan Median Length of Ventilation (Version 3)



# AV Canal Median Length of Ventilation (Version 3)



# The 28<sup>th</sup> Amendment: The Right to be Considered for an in OR Extubation

Brittany Shutes MD MPH



**NATIONWIDE  
CHILDREN'S®**

*When your child needs a hospital, everything matter*





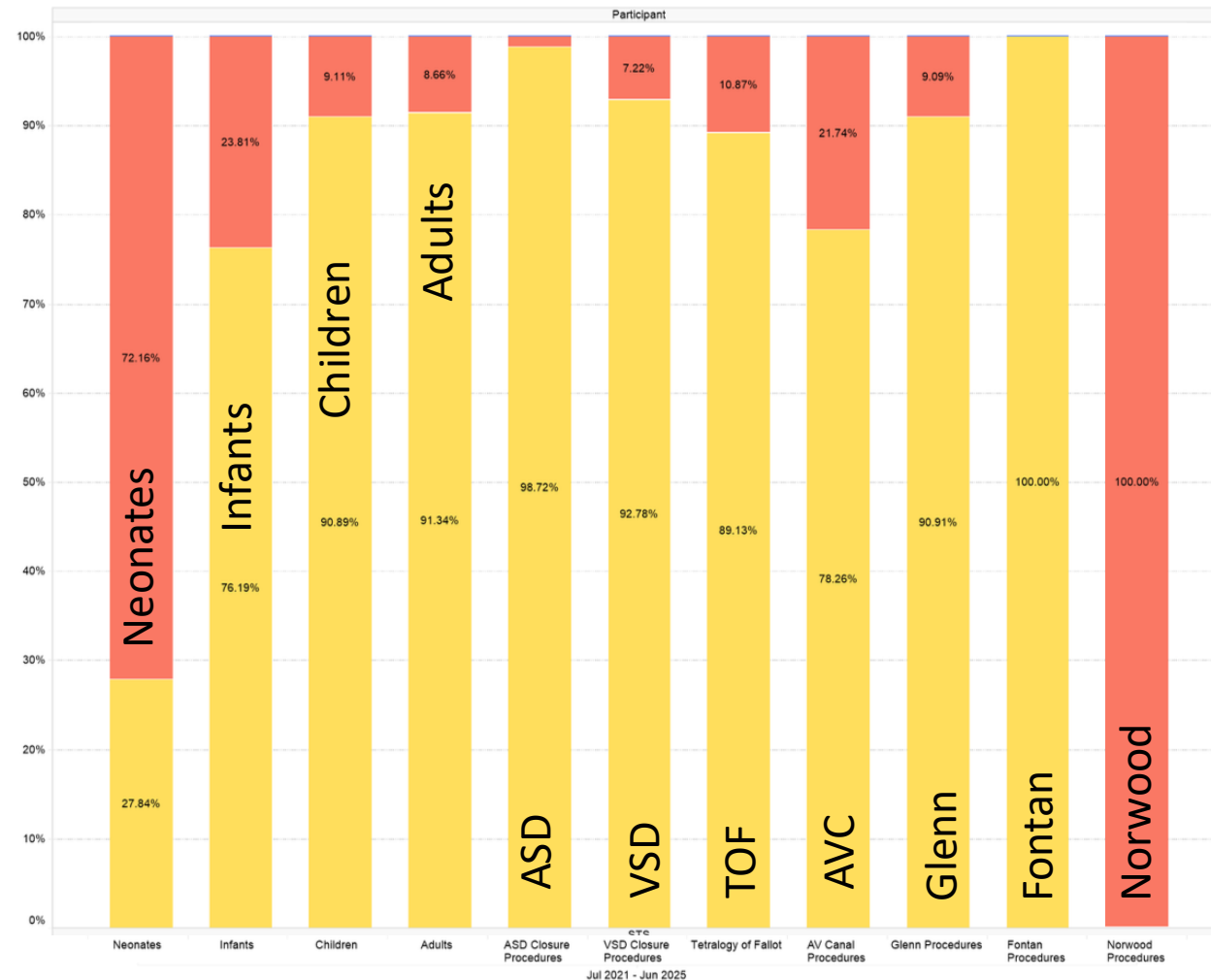
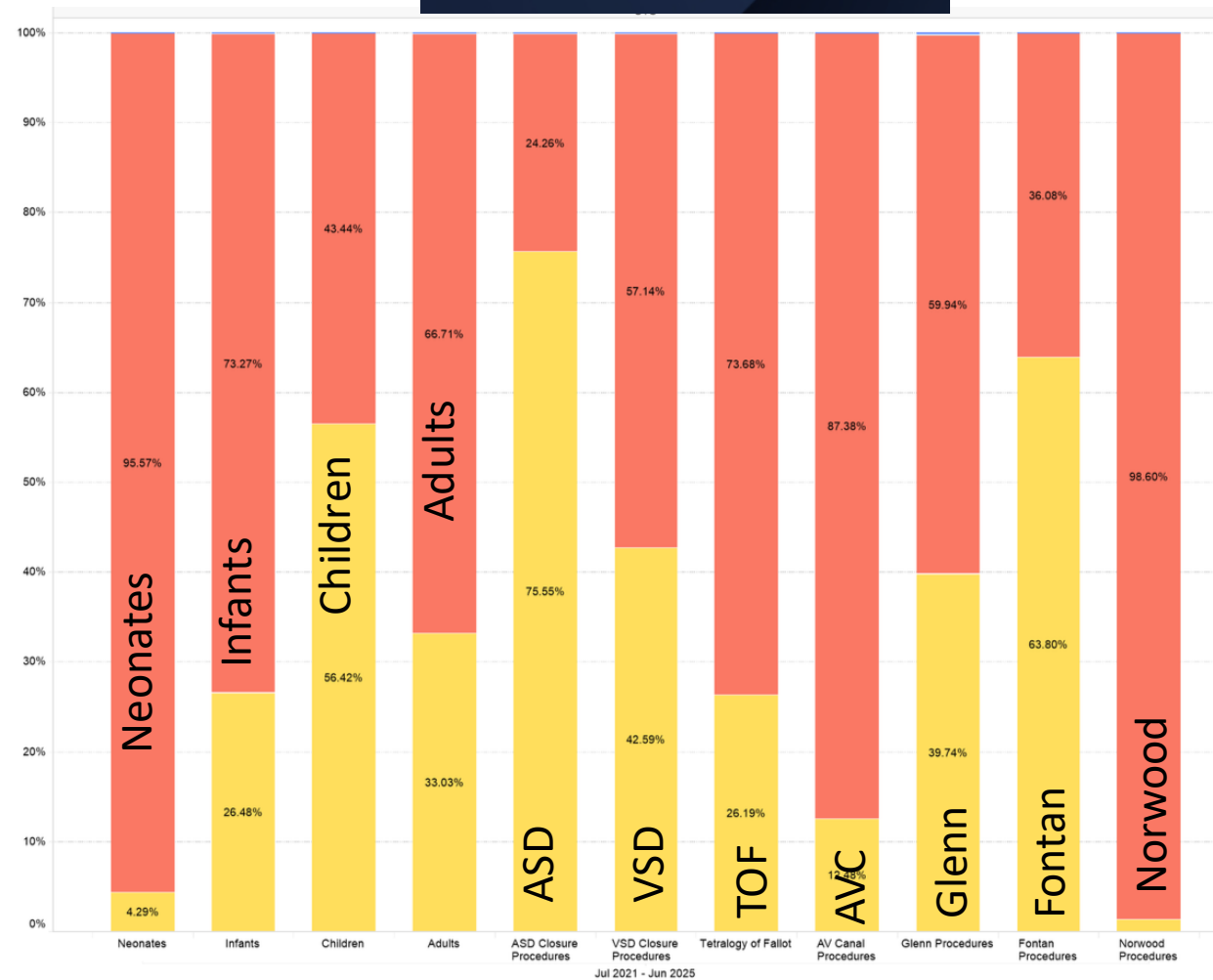
The Society  
of Thoracic  
Surgeons

Period Ending 06/30/2025



NATIONWIDE  
CHILDREN'S

When your child needs a hospital, everything matters  
Extubated in the OR



Intubated  
leaving OR



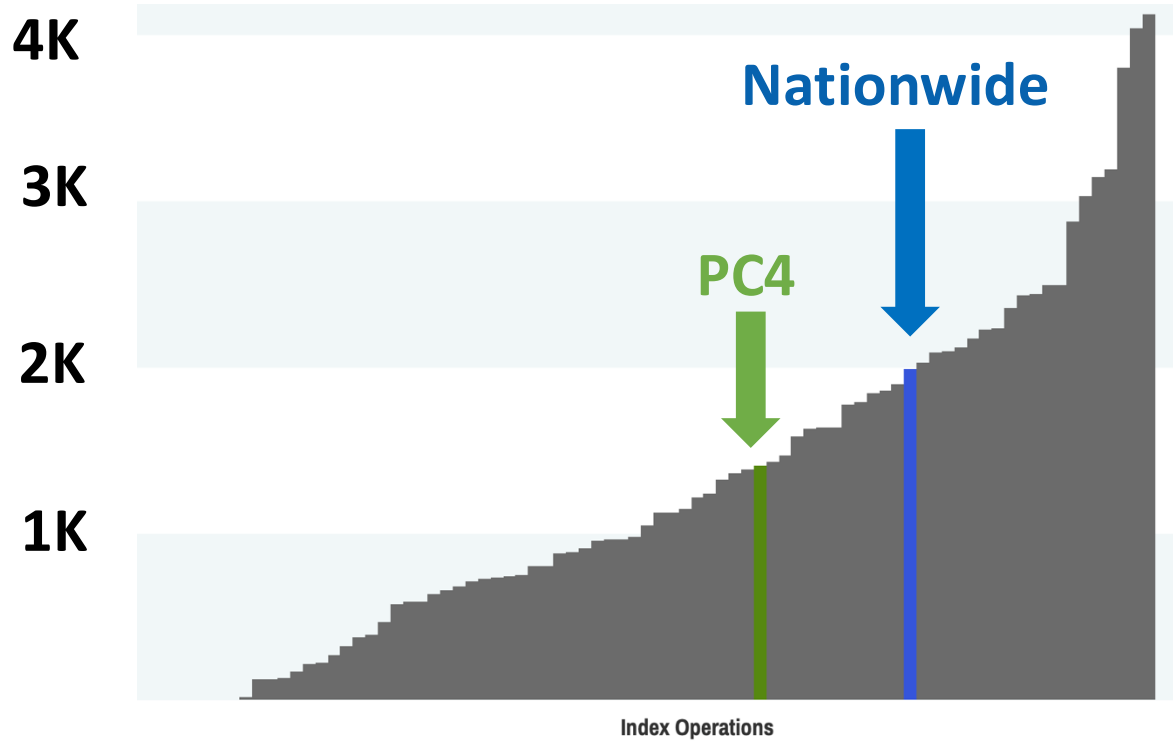
Extubated  
in OR



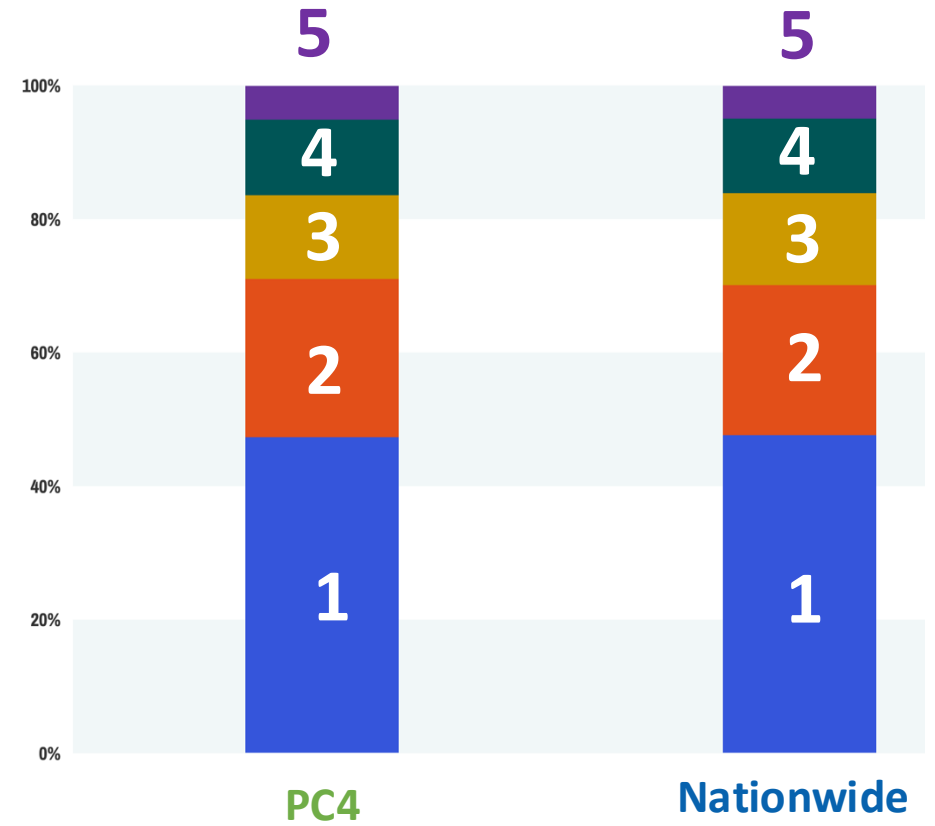
# Nationwide Children's Heart Center



## Total Index Operations (Version 3)



## STAT Category (Version 3)



**Version 3=**  
**Feb 2019-Present**



# Nationwide Children's Heart Center



- 5 Cardiothoracic Surgeons
  - 2 Cardiothoracic ORs and 1 on-unit procedure room
- 6 dedicated pediatric cardiac anesthesiologists
- 3 Cardiac Catheterization & 3 Electrophysiology Attendings
  - 2 Cath labs (1 is a hybrid suite)
- 20 bed CTICU, neonates birth to floor readiness
  - 2 Daytime/weekday teams = 1 attending and 1-2 frontline providers (NP, cardiac/ICU fellow)
- 375 surgical cases (300 index)/year= 7/week
- 640 CTICU encounters/year= 12/week
- “Hybrid Center” (4yrs= 35 HLHS, 3 Nor, 28 hybrid, 4 bands)

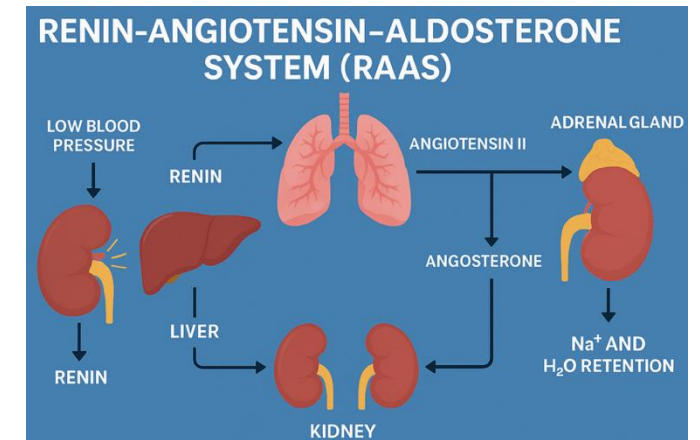
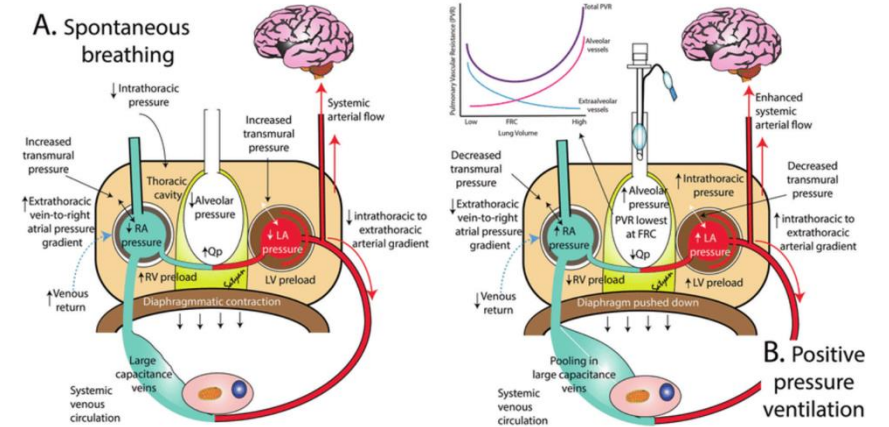
# Benefits of in OR extubation

- Physiologic benefits
- Avoidance of airway/pulmonary complications
- Reduced use of sedatives
- Reduced ICU and hospital LOS
- Parental and patient satisfaction
- ICU staffing implications – respiratory utilization



# Physiologic Benefits

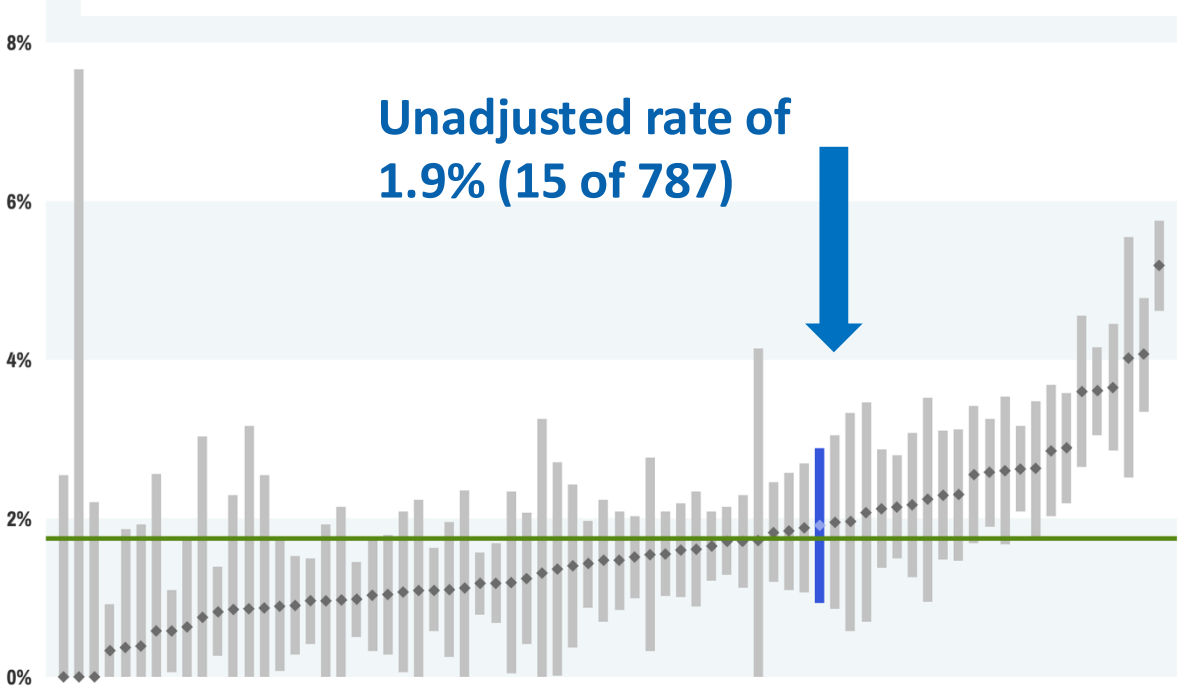
- Cardiopulmonary interactions
  - Increased venous return (increased Glenn/Fontan flow)
  - Decreased RV afterload, increased LV afterload
- Neurohormonal response
  - Decreased sympathetic tone
  - Suppression of the renin-angiotensin-aldosterone system
  - Reduced vasopressin release
  - Increased natriuretic peptide secretion
- Airway clearance



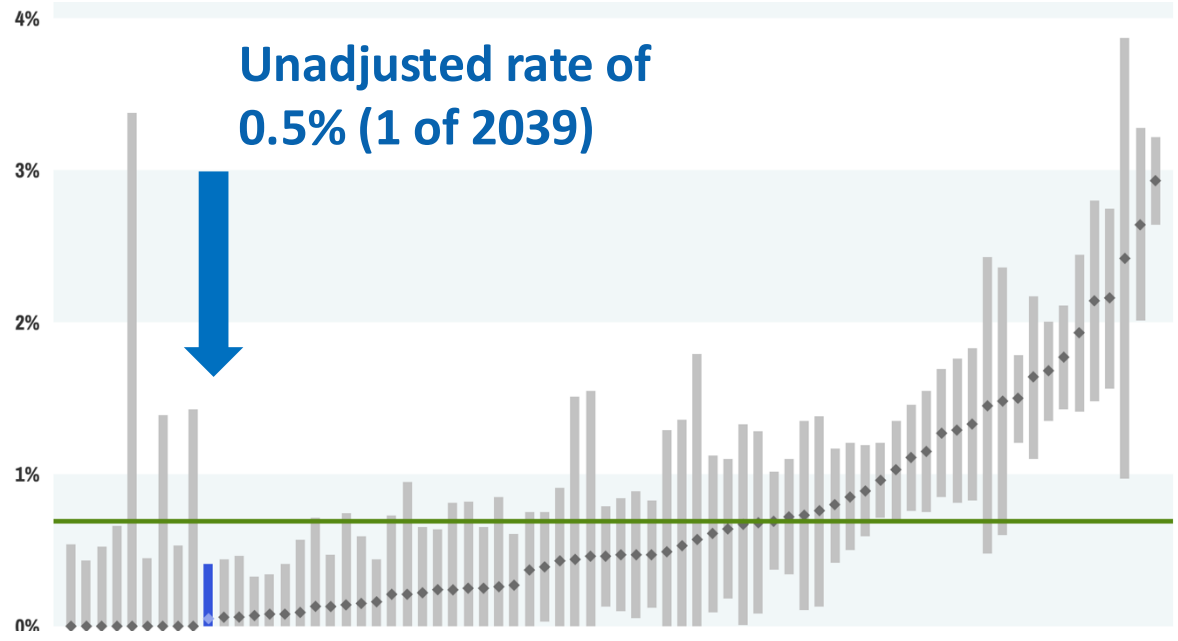
# Avoidance of airway and pulmonary complications



## Unplanned Extubation (Version 3)



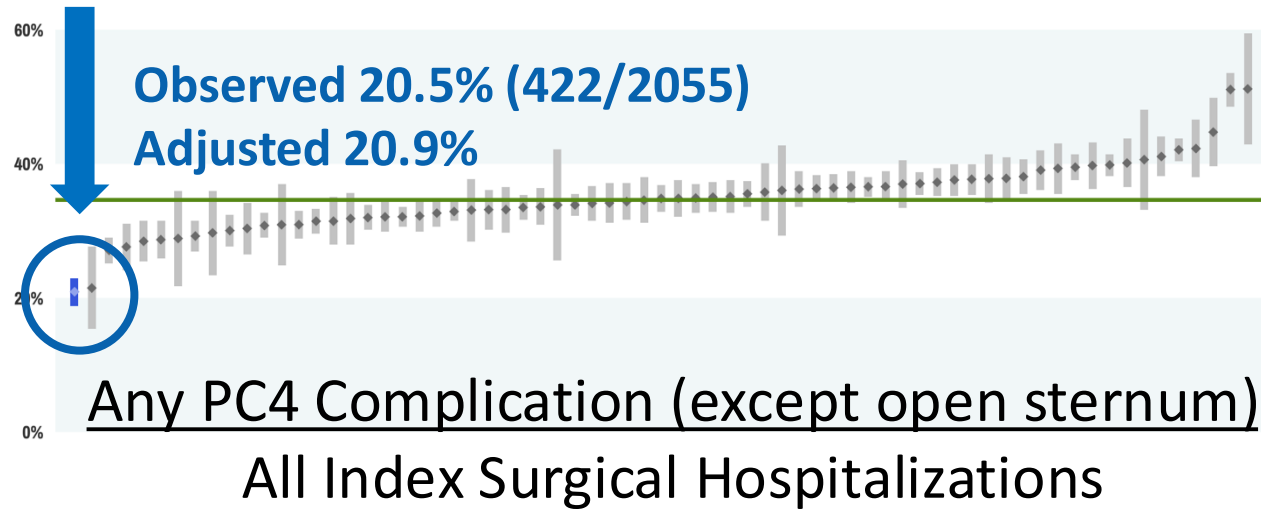
## Pneumonia VAP Post-OP (Version 3)



# Reduced Post-OP Complications/Narcotics



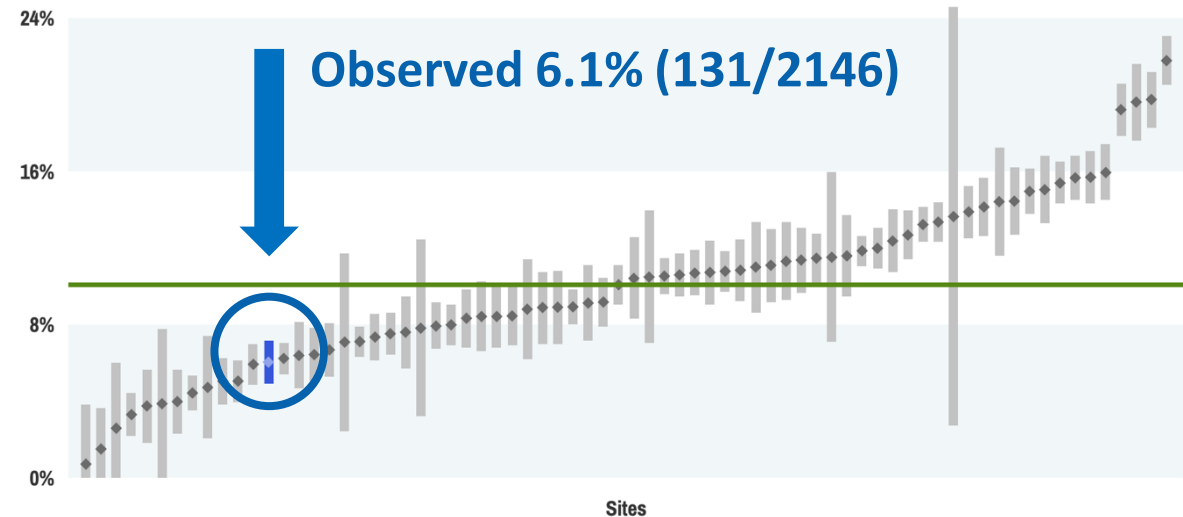
## Post-OP All Complications Adjusted (Version 3)



Adjusted for Pre-OP factors and STAT score:

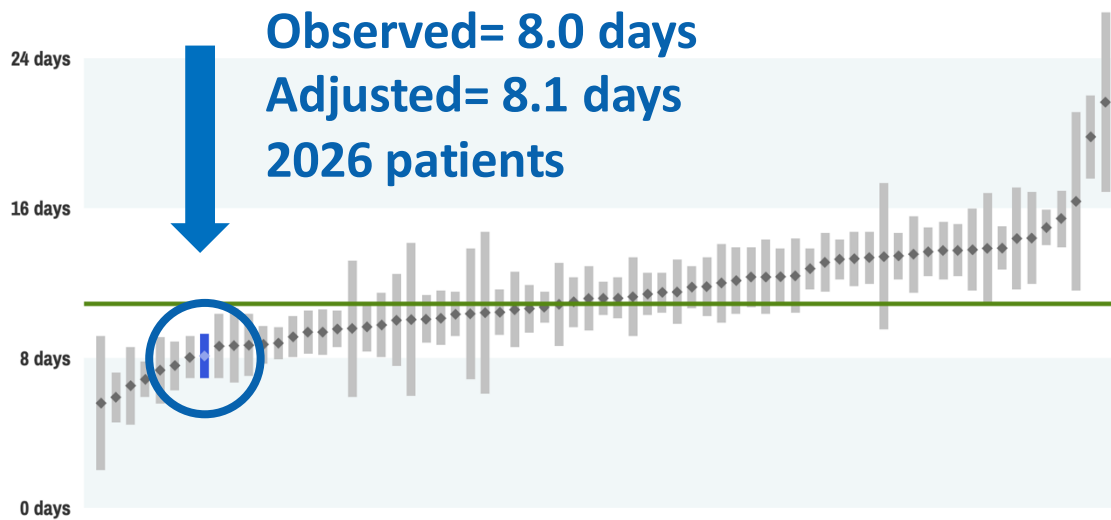
age, preoperative length of stay, previous cardiothoracic operations, chromosomal abnormality or identified syndrome, presence of an extracardiac anomaly, underweight status, vasoactive support at the time of surgery, high risk preoperative factors (e.g. shock, renal failure, stroke), other identified STS preoperative risk factors, preoperative mechanical ventilation, and STAT score

## Narcotic Dependence Requiring weaning, Surgical patients (Version 3)



# Reduced ICU LOS

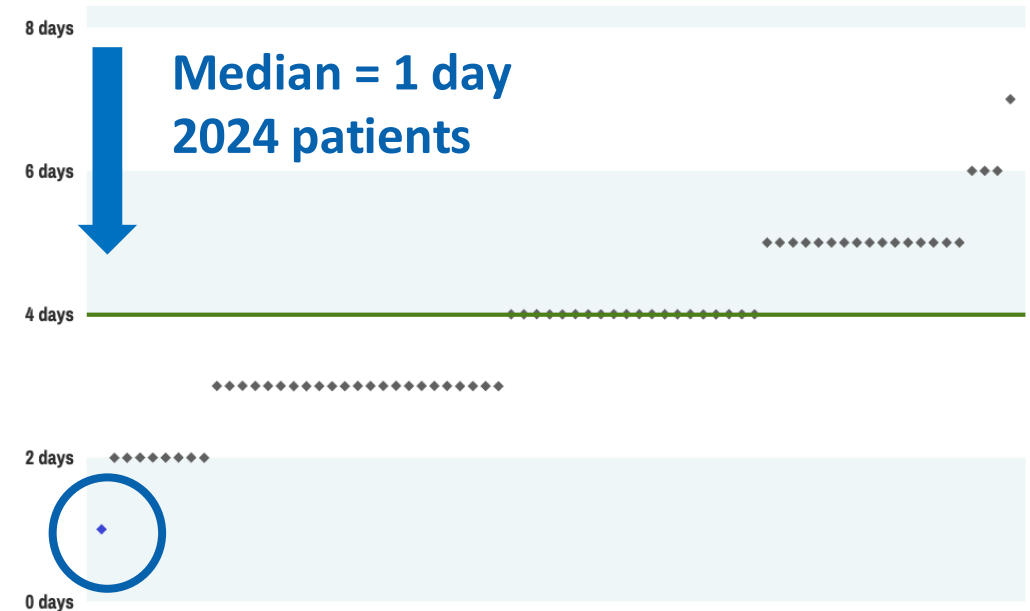
## Mean Adjusted Post-OP CICU LOS (Version 3)



Adjusted for Pre-OP factors and STAT score:

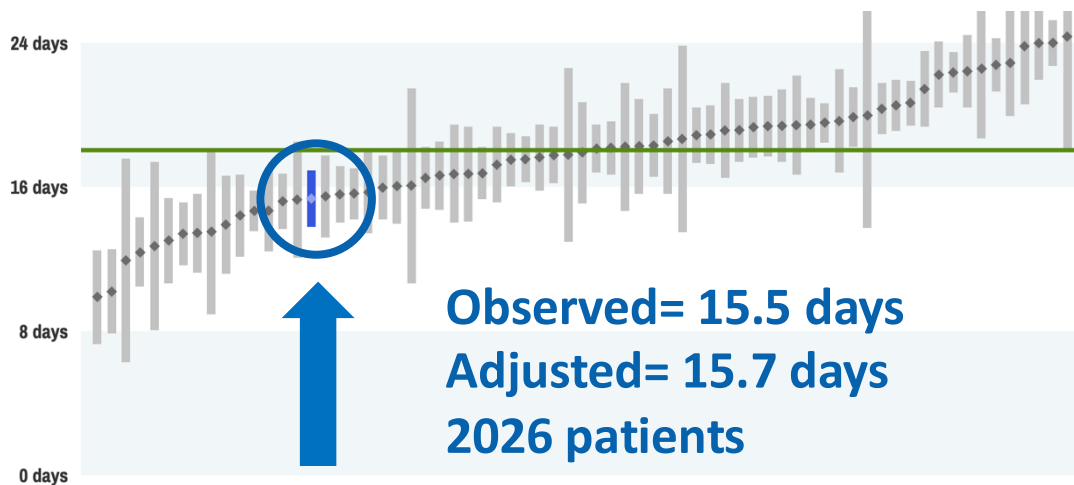
age, preoperative length of stay, previous cardiothoracic operations, chromosomal abnormality or identified syndrome, presence of an extracardiac anomaly, underweight status, vasoactive support at the time of surgery, high risk preoperative factors (e.g. shock, renal failure, stroke), other identified STS preoperative risk factors, preoperative mechanical ventilation, and STAT score

## Median Post-OP CICU LOS (Version 3)

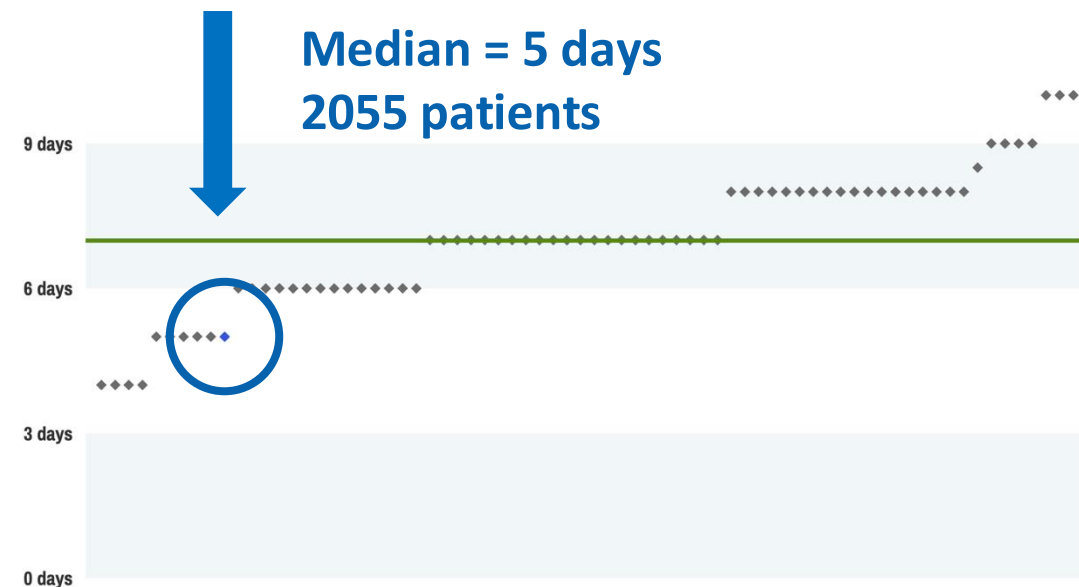


# Reduced Hospital LOS (unadj, adjusted)

## Adjusted Mean Surgical Hospital LOS (Version 3)



## Median Surgical Hospital LOS (Version 3)



Adjusted for Pre-OP factors and STAT score:

age, preoperative length of stay, previous cardiothoracic operations, chromosomal abnormality or identified syndrome, presence of an extracardiac anomaly, underweight status, vasoactive support at the time of surgery, high risk preoperative factors (e.g. shock, renal failure, stroke), other identified STS preoperative risk factors, preoperative mechanical ventilation, and STAT score

# The team approach to in OR extubation

## Surgeon



Can Yerebakan, MD  
Cardiothoracic Surgery



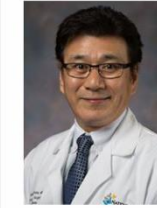
Sergio A. Carrillo Melendez, MD  
Cardiothoracic Surgery



Mark E. Galantowicz, MD  
Cardiothoracic Surgery



Patrick I. McConnell, MD, PhD  
Cardiothoracic Surgery



Toshiharu Shinoka, MD, PhD  
Cardiothoracic Surgery

## Perfusion



Daniel Gomez, BS, CCP, FPP  
Cardiothoracic Surgery



Dorothy A Holt, BS, CCP, FPP  
Cardiothoracic Surgery



Todd M Ratliff, BS, CCP, FPP  
Cardiothoracic Surgery



Jordan M Voss, BS, MPS, CCP, FPP  
Cardiothoracic Surgery

## Anesthesia



Kevin P. Spellman, MD  
Anesthesiology & Pain Medicine



Sarah Khan, MD  
Anesthesiology & Pain Medicine



Marco Corridore, MD  
Anesthesiology & Pain Medicine



Aymen N. Naguib, MD  
Anesthesiology & Pain Medicine



Christopher T. McKee, DO  
Anesthesiology & Pain Medicine



Peter D. Winch, MD, MBA  
Anesthesiology & Pain Medicine



Kristin M. Chenault, MD  
Anesthesiology & Pain Medicine

# Preoperative Evaluation and Patient Selection



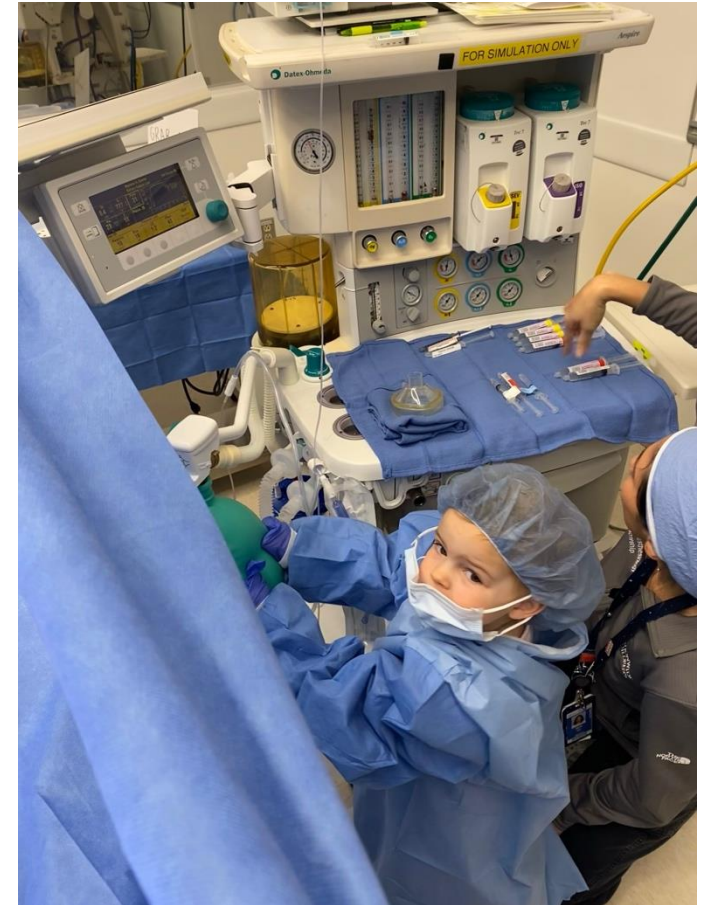
- Approach each patient as a possible candidate for OR extubation
- Preoperative Huddle for every case to discuss operative plan, CPB plan, transfusion plan, and potential for OR extubation with:
  - Surgeon
  - Perfusionists
  - Anesthesiologists



# Anesthetic Management



- Mask or IV induction of anesthesia
- Maintenance with isoflurane and rocuronium
- Dexmedetomidine infusion at 0.5mcg/kg/hr after induction and terminated after weaning from CPB
- Fentanyl 10-15 mcg/kg dosed prior to surgical incision
- Minimize maintenance IVF
- Load with milrinone on bypass and off on 0.25mcg/kg/min
  - Short RV-PA conduit cases and ASDs do not get routine milrinone
- IV acetaminophen 30 min prior to planned OTE
- Reversal of NMB with sugammadex
- Local anesthetic infiltration to the sternotomy incision or parasternal intercostal blocks



# Perfusion/Bleeding Management



- When possible, utilize acute normovolemic hemodilution (ANH)
- Modified ultrafiltration after weaning from CPB
- Use of a transfusion algorithm to minimize blood product transfusion (consider use of prothrombin complex concentrates when appropriate)
- Adequate surgical hemostasis
- Placement of a single mediastinal CT (most cases <1 year)

# ROTEM driven post-bypass hemostasis protocol

J Extra Corpor Technol 2023, 55, 60–69  
 © The Author(s), published by EDP Sciences, 2023  
<https://doi.org/10.1051/ject/2023017>

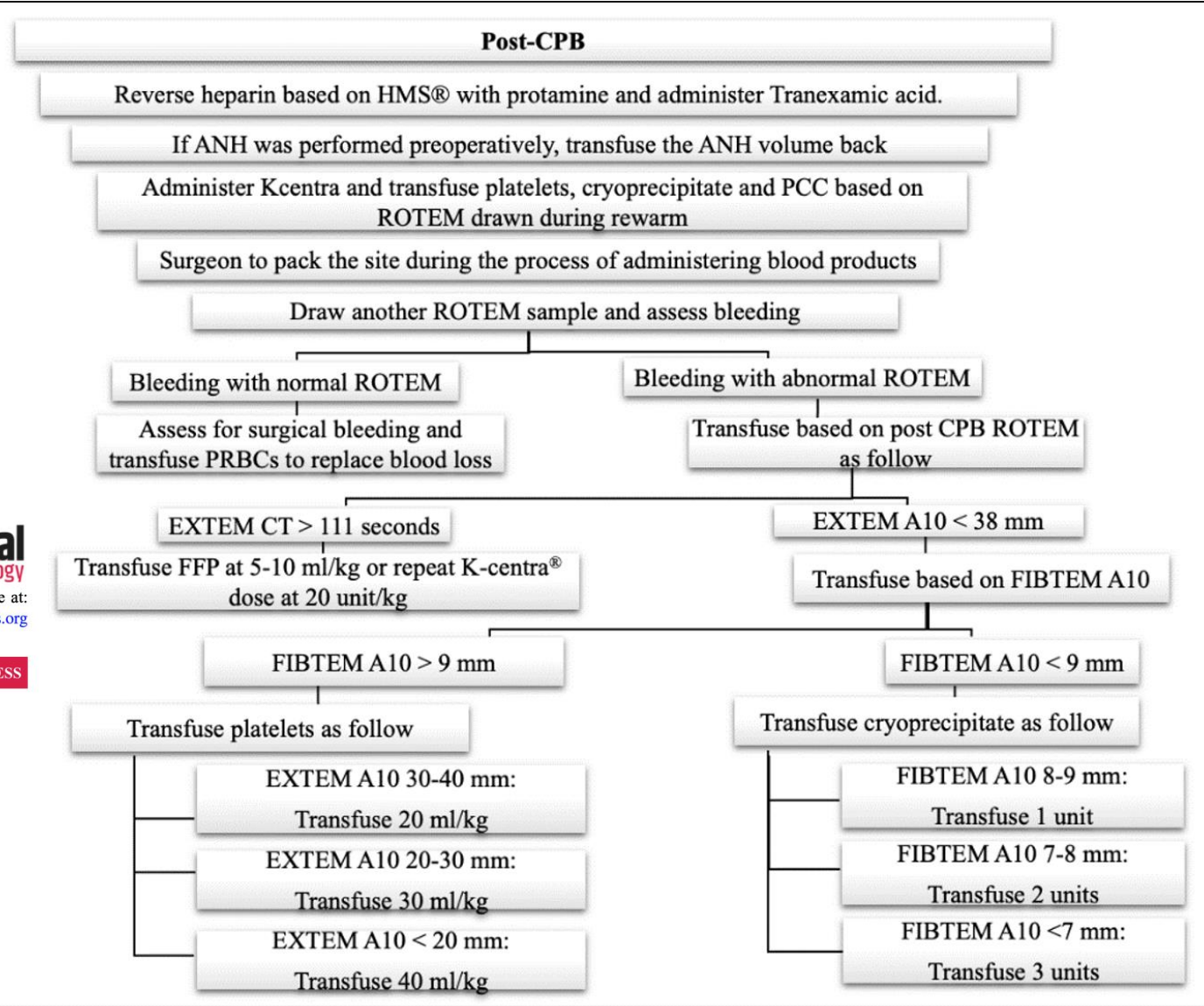
The Journal of  
**ExtraCorporal**  
 Technology  
 Available online at:  
[ject.edpsciences.org](http://ject.edpsciences.org)

ORIGINAL ARTICLE

OPEN ACCESS

## A ROTEM-guided algorithm aimed to reduce blood product utilization during neonatal and infant cardiac surgery

Ayemen N. Naguib (MD)<sup>1,\*</sup>, Sergio A. Carrillo (MD)<sup>2</sup>, Marco Corridore (MD)<sup>1</sup>,  
 Ameer M. Bigelow (MD, MS)<sup>3</sup>, Ashley Walczak (MBA, CCP)<sup>2</sup>, Nguyen K. Tram (PhD)<sup>1</sup>,  
 Diane Hersey (RN)<sup>2</sup>, Mark Galantowicz (MD)<sup>2</sup>, and Joseph D. Tobias (MD)<sup>1</sup>



# Intra-OP Extubation Criteria



- Absence of concerning arrhythmia
- No unexpected or significant TEE findings
- Achievement of hemostasis
- Maintaining stable hemodynamics after chest closure
- Trial of spontaneous ventilation with appropriate hemodynamics, saturations and arterial blood gas without rising lactate

# PON #0 ICU Management



- Arterial Blood Gases (q1hr x 4, q2hrs x 4, q4hrs) and somatic NIRS for early identification of metabolic compromise
- EtCO<sub>2</sub> by NC for continuous monitoring of respiratory compromise
- Adequate pain management
  - NCA (demand only) pump for narcotic management
  - Scheduled acetaminophen +/- ketorolac starting PON#0
- Strategy for delirium management
  - CAPD scoring, environmental controls, PRN Seroquel, precedex infusion (0.2-0.5)
- 2/3 maintenance for total IVF rate
  - Allow PO if hemodynamics permit 4hrs post OP (wean IVF)
  - Start Lasix 1mg/kg IV 6-12hrs post-OP



# POD#1 ICU → Floor Transition



- If 4am blood gas reassuring turn off milrinone
- Final blood gas at 8am
- Devices removed (CVL, A-line, CT, wires) after rounds (10-noon)
- Transition from NCA to scheduled/PRN enteral oxycodone
- IV to enteral acetaminophen, ketorolac to ibuprofen
- Transfer to floor by early afternoon with PIV only

# Risks/Costs of in OR extubation

- Anesthesia/OR time
  - Bleeding management
  - Emergence time
- Airway or respiratory decompensation in transport/early ICU arrival
  - Rare
  - Sedation & pain management
- Risk of respiratory failure and re-intubation secondary to cardiac processes
  - Residual lesions and hemodynamic instability
  - Early post-OP bleeding and resuscitation
  - Arrhythmia
  - Cardiac Arrest rate

# Early Surgical Extubation Failure

- 2025, we extubated 83.1% of patients who came to the OR and were intubated by anesthesia in the OR for the case (251/302 patients).
- 2 (2/251 = 0.8%) patients reintubated within 1 hour of arrival to ICU:
  - 1 for airway obstruction and hypoventilation
  - 1 for JET with respiratory distress
- 4 (4/251 = 1.6%) patients reintubated within 6 hours of arrival to the ICU:
  - Reasons included seizure/stroke, respiratory failure/apneic episodes, and agitation

# STS data for Reintubated for Respiratory Failure

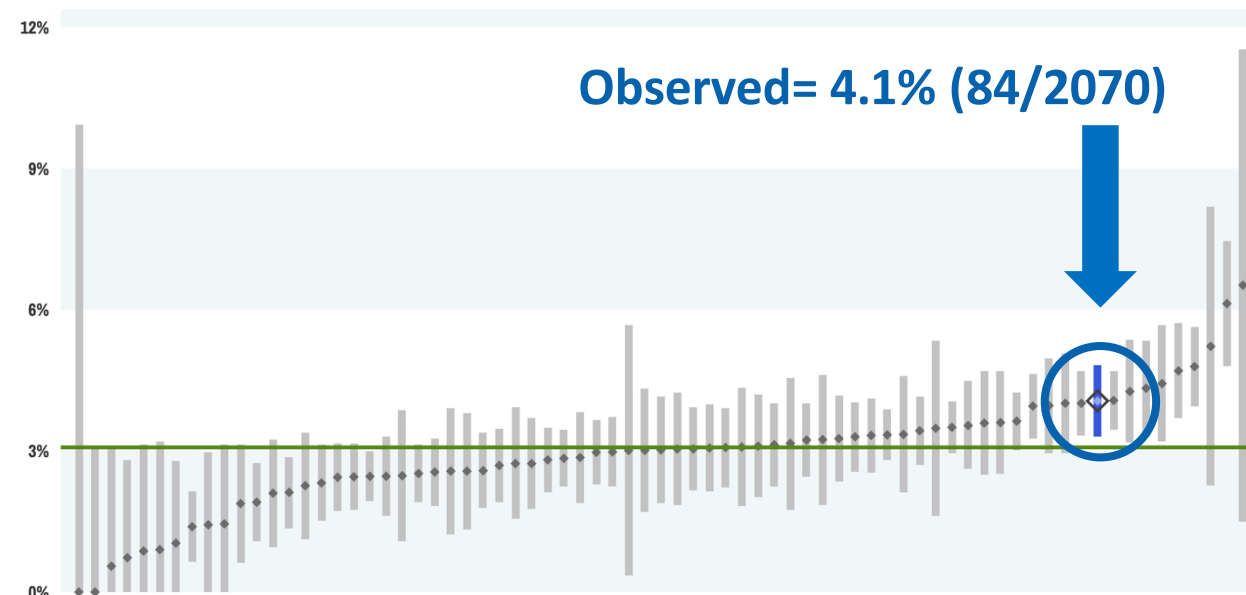


Lesion	Nationwide Children's			STS Average		
	All	Extubated in OR	Extubated after OR	All	Extubated in OR	Extubated after OR
Off Bypass Coarctation	5.9%	6.7%	0%	6.9%	3.7%	8.2%
VSD	2.1%	2.2%	0%	3.1%	2.0%	4.0%
TOF	4.4%	4.9%	0%	5.6%	4.5%	6%
AVC	15.2%	8.3%	40%	8.8%	7.3%	9%
ASO	6.9%	16.7%	4.4%	6.2%	5.9%	6.2%
Glenn	9%	10%	0%	7.7%	7.0%	8.1%
Fontan	2%	2%	0%	3.8%	3.6%	4.2%



# Post-OP Cardiac Arrest

## Cardiac Arrest in the CTICU Post-OP (Version 3)

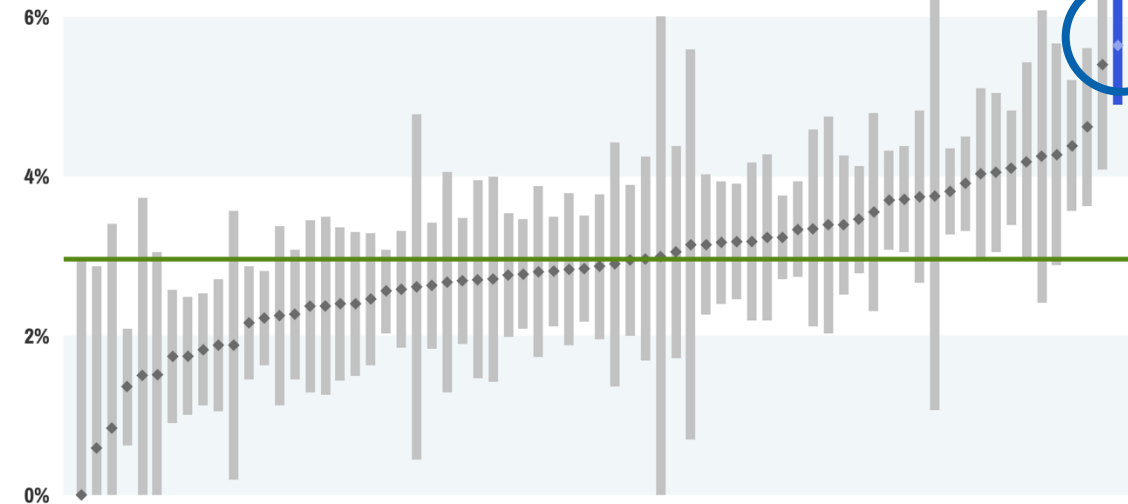


- Jan 2023- March 2026 we had 33 cardiac arrests that occurred within 1 day post-OP
- 15 (44%) were on HFNC or less respiratory support at the time of the arrest
  - 2 (13%) had no respiratory status change
  - 2 (13%) were escalated to NIPPV
  - 11 (73%) were intubated
  - 3 had “acute respiratory insufficiency (2) or airway compromise (1)” identified as contributing to the arrest
  - 8 (53%) ROSC, 7 (47%) ECMO

# Impact on Risk Adjustments- Post-Operative Cardiac Arrest (adjusted)

## Post-OP Cardiac Arrest (Version 3)

Observed= 3.83%, Expected 1.6% →  
Adjusted= 5.6% (78/2039)

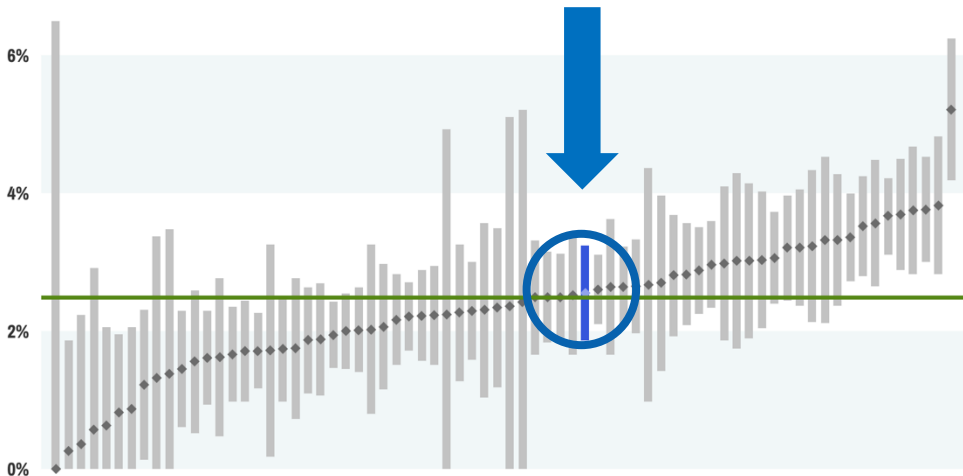


- Adjusted for Pre-OP factors and STAT score:
  - Leave the OR with open chest
- Maximum VIS in the first 2 postoperative hours
  - Mechanical ventilation at postop hour 2
    - ECMO in the first 2 hours postop
    - CT output >5cc/kg in first 2 hours

# Impact on Risk Adjustments- Surgical Mortality- Unadjusted

## Surgical In-Hospital Mortality (Version 3)

**Observed= 2.55% (52/2039)**

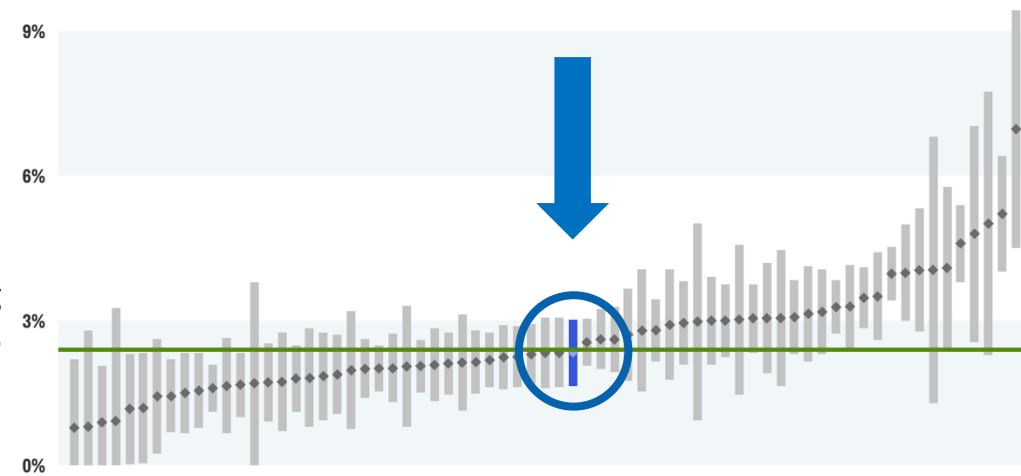


**Adjusted for Pre-OP factors and STAT score:**

Age (includes prematurity),  
 Weight-for-age z-score,  
 Chromosomal abnormality/Syndrome, Pre-operative mechanical circulatory support at time of surgery, Persistent shock at time of surgery, Preop mechanical ventilation during hospitalization, Any other STS prep risk factor (excluding "other"), STAT score

## Surgical In-Hospital Mortality Adjusted (Version 3)

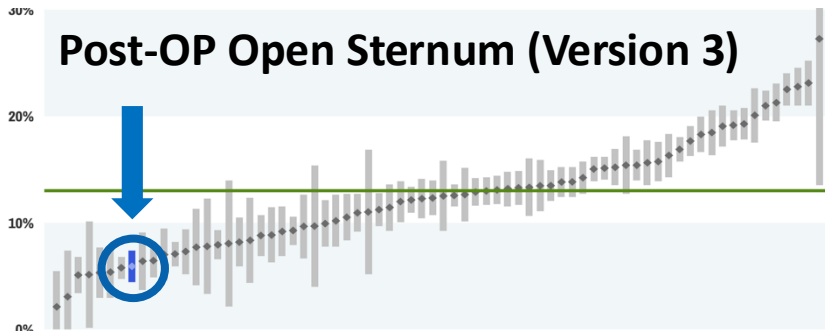
**Adjusted= 2.34% (52/2039)**



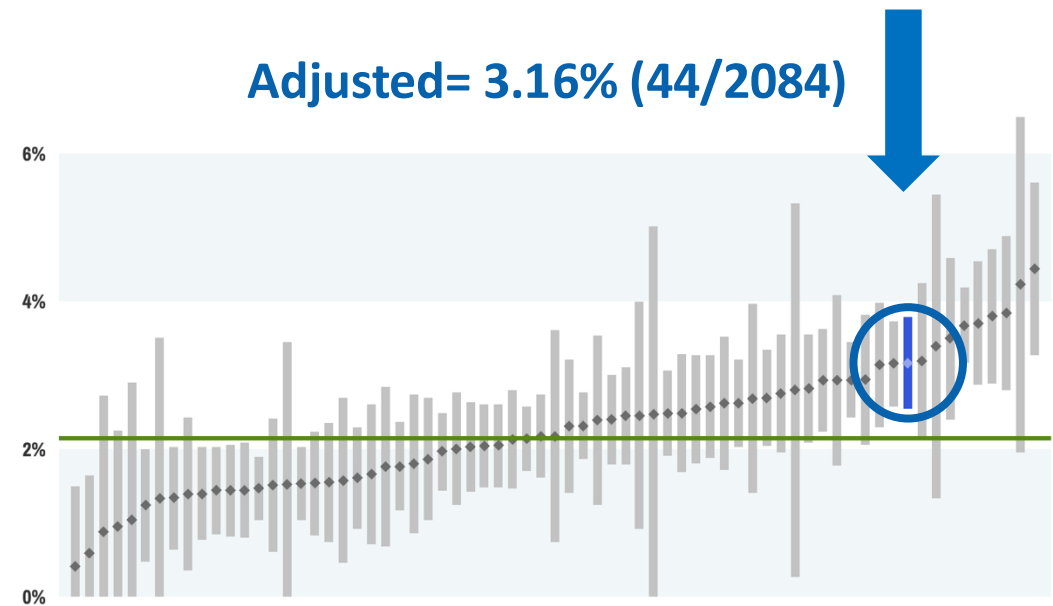
# Impact on Risk Adjustments- Surgical Mortality- CICU Risk Adjusted

- Adjust for a patient's severity of illness and the likelihood of mortality by accounting for factors present at the time the CICU assumes care:  
Adjusted for Pre-OP factors and STAT score:

- Leave the OR with open chest
- Maximum VIS in the first 2 postoperative hours
  - Mechanical ventilation at postop hour 2
  - ECMO in the first 2 hours postop



## Surgical In-Hospital Mortality CTICU Adjusted (Version 3)



# 25+ Years of experience to the approach



## Predictors of Successful Early Extubation Following Congenital Cardiac Surgery in Neonates and Infants

Peter D. Winch, M.D., M.B.A.<sup>a,\*</sup>, Lisa Nicholson, Ph.D.<sup>b</sup>, Janet Isaacs, C.R.N.A.<sup>c</sup>, Steven Spanos, M.D.<sup>d</sup>, Vincent Olshove, C.C.P.<sup>e</sup> and Aymen Naguib, M.D.<sup>c</sup>

<sup>a</sup> Nationwide Children's Hospital, Department of Anesthesiology, 700 Children's Drive, Columbus, OH 43205, United States

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<sup>d</sup> The Ohio State University, Department of Anesthesiology, United States

<sup>e</sup> Nationwide Children's Hospital, The Heart Center, United States

- 391 patients <1 year of age after congenital heart surgery on CPB published in 2009

**Background:** There is a paucity of literature discussing the predictive likelihood of successfully extubating neonates and infants in the operating room immediately following congenital cardiac surgery. Given the unknown consequences of anaesthetics on neurodevelopmental outcomes, minimising the exposure of this population to such agents may have long-term benefits.

**Methods:** Retrospective chart review of 391 patients less than 1 year of age.

**Results:** The probability of successfully extubating these patients was based on quantifiable, objective criteria. The relevant variables include age, weight, bypass time, lactate level and specific congenital anomaly.

**Conclusions:** The practice of immediate extubation of infants and neonates is achievable, safe and predicted based on specific patient variables. This practice will minimise the anaesthetic exposure of these especially young patients who may be at risk for long-term consequences related to anaesthetic exposure.

(Heart, Lung and Circulation 2009;18:271–276)

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Keywords. Congenital cardiac surgery; Extubation; Anaesthesia; Anaesthesiology

# A day in the Life of the Heart Center



Family and Friends Visit the  
Sim Center to better  
understand our work-life



# Slow Is Smooth, Smooth Is Fast: The Case For a Conservative Approach to Extubation

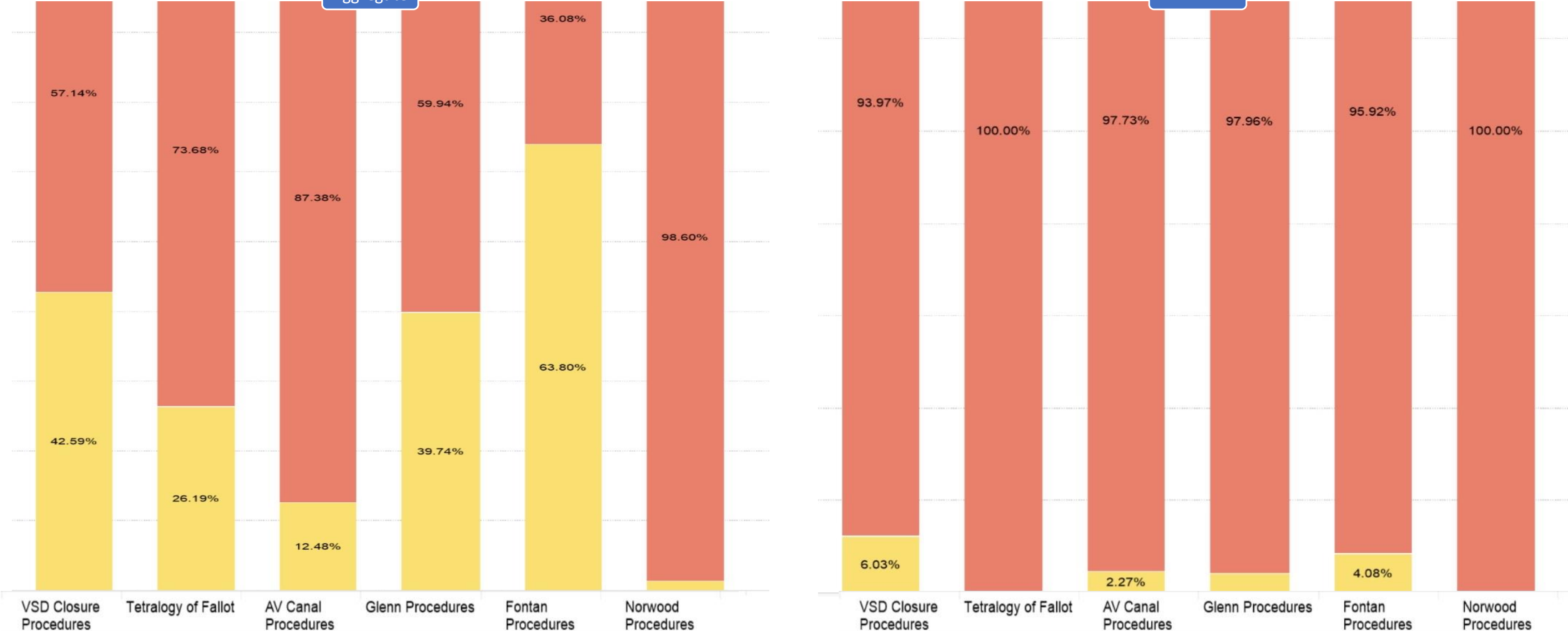
Ryan Wilkes, MD



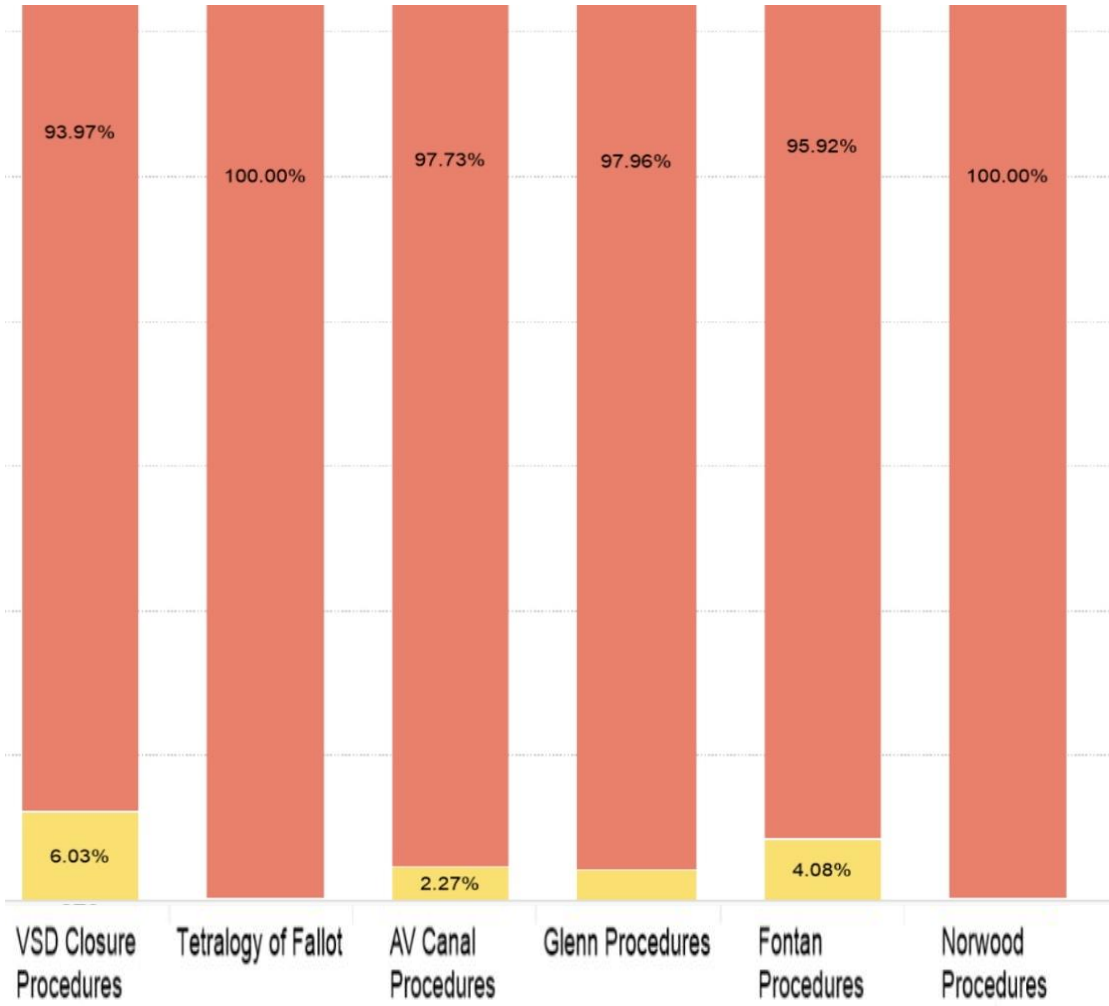
# LCH Extubation Practice vs STS

STS  
Aggregate

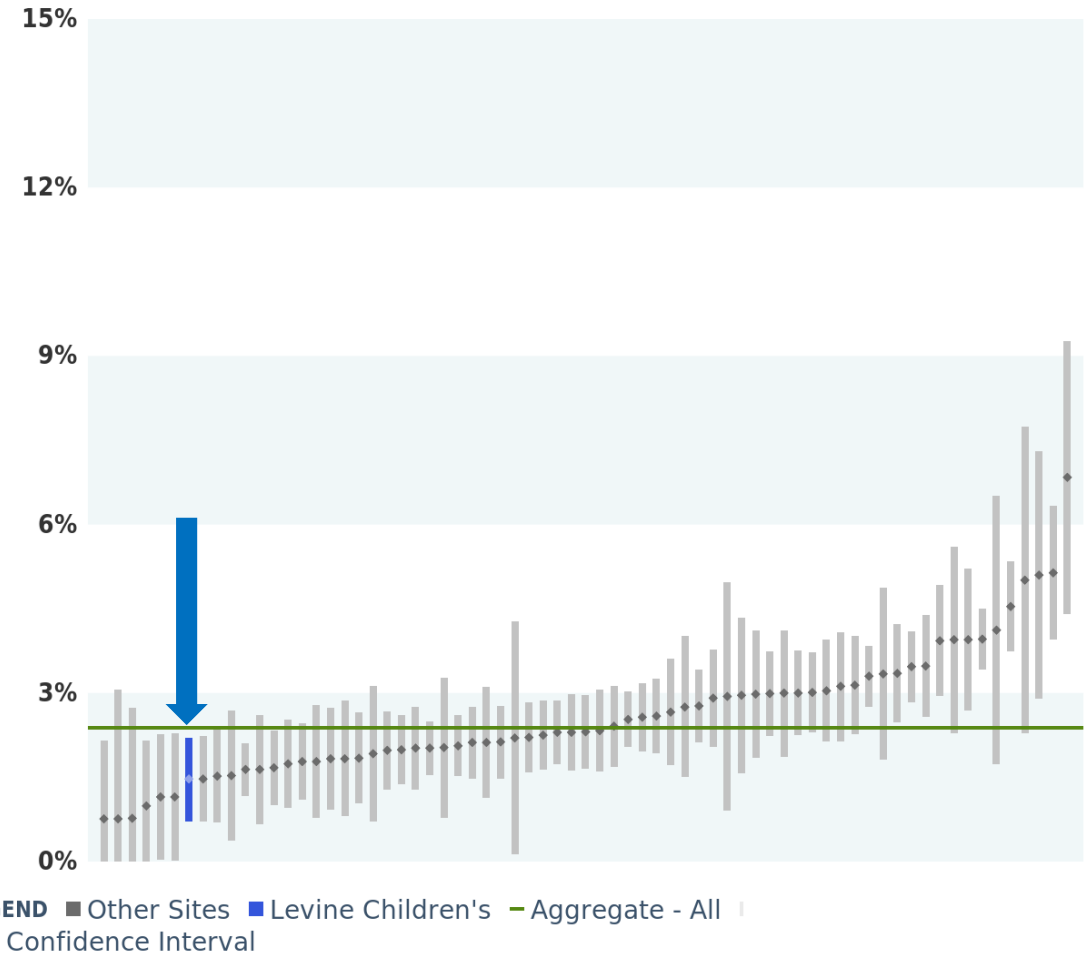
LCH



# STS Extubation Practice vs. PC4 RA Surgical Mortality

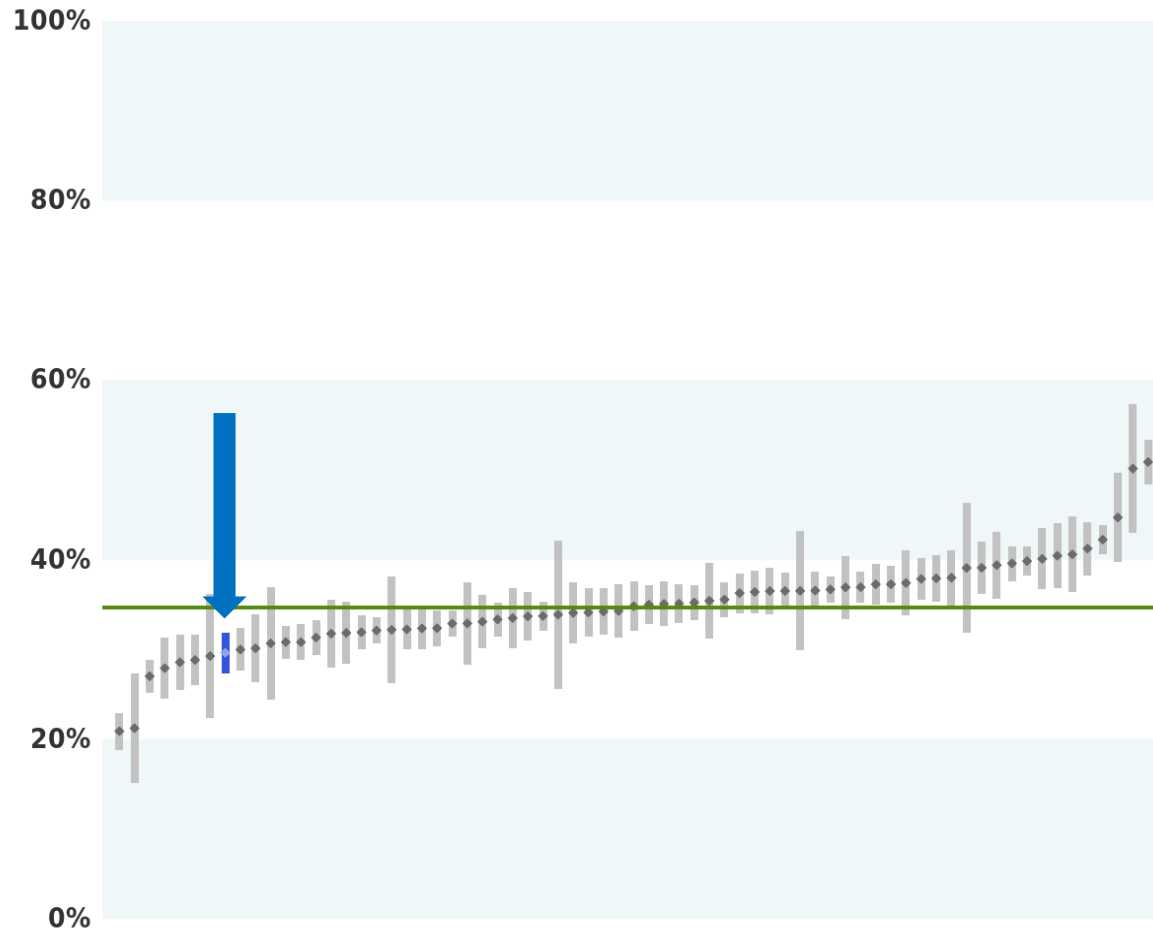


Surgical In-hospital Mortality  
Version 3

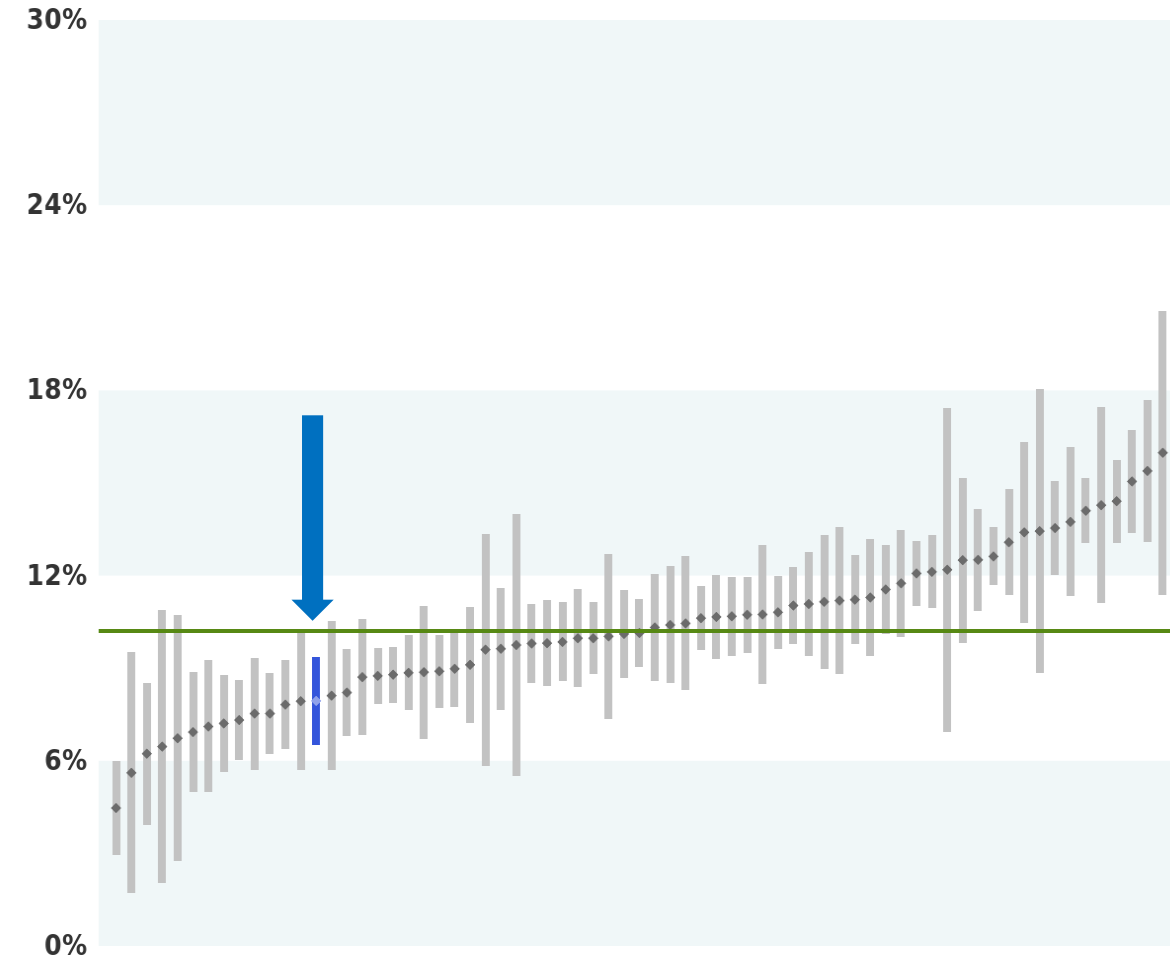


# PC4 Risk Adjusted Postoperative CICU Overall Complications and Major Complications

### Postoperative Overall Complication Version 3



### Postoperative Major Complication Version 3

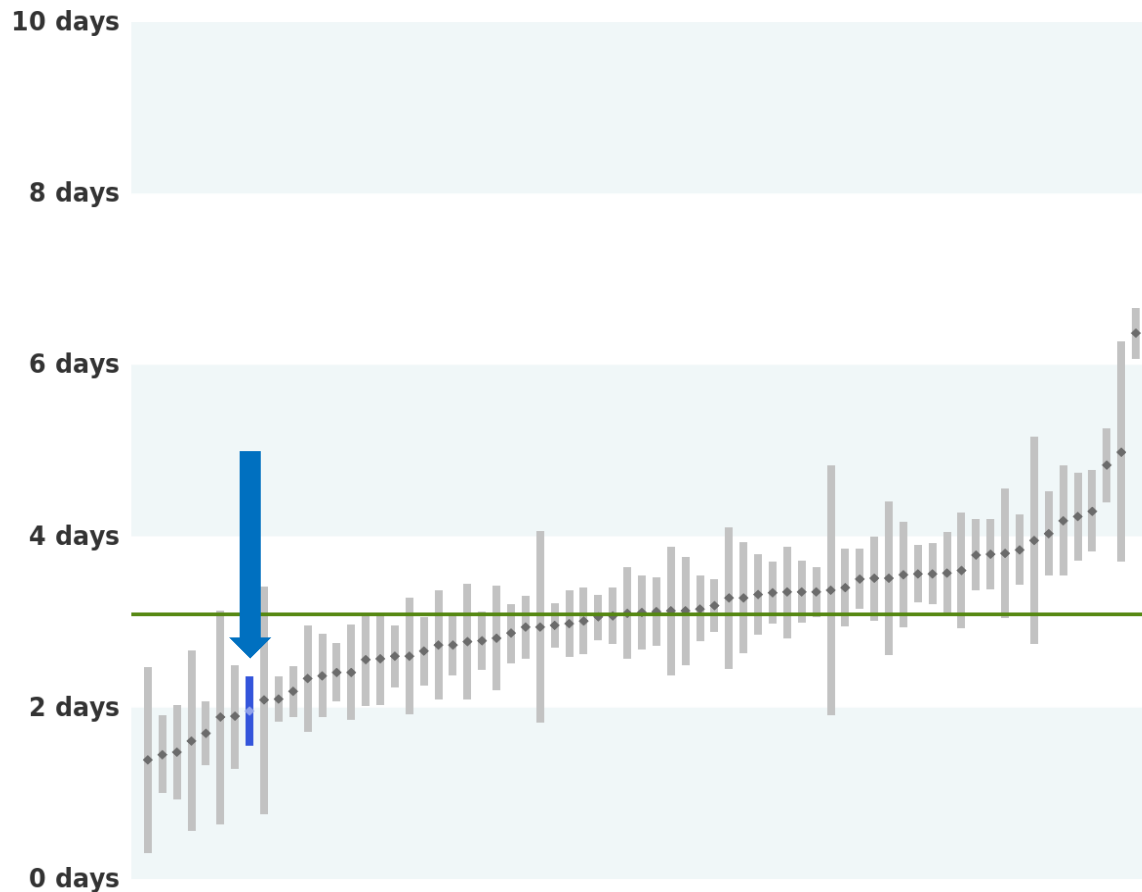


**LEGEND** ■ Other Sites ■ Levine Children's - Aggregate - All | 95% Confidence Interval

**LEGEND** ■ Other Sites ■ Levine Children's - Aggregate - All | 95% Confidence Interval

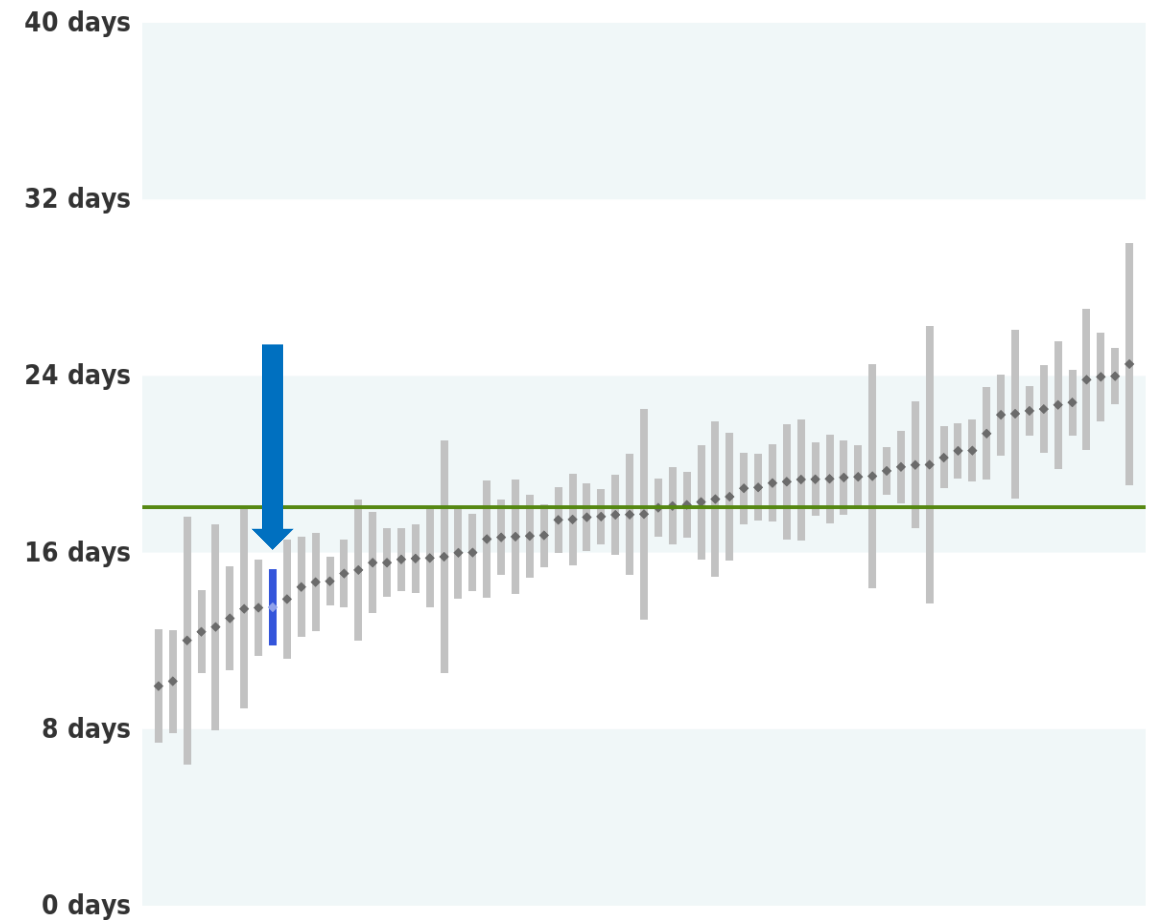
# PC4 Mean Risk Adjusted Postoperative Duration of Ventilation and Hospital LOS

### Postoperative Duration of Mechanical Ventilation Version 3



**LEGEND** ■ Other Sites ■ Levine Children's — Aggregate - All |  
95% Confidence Interval

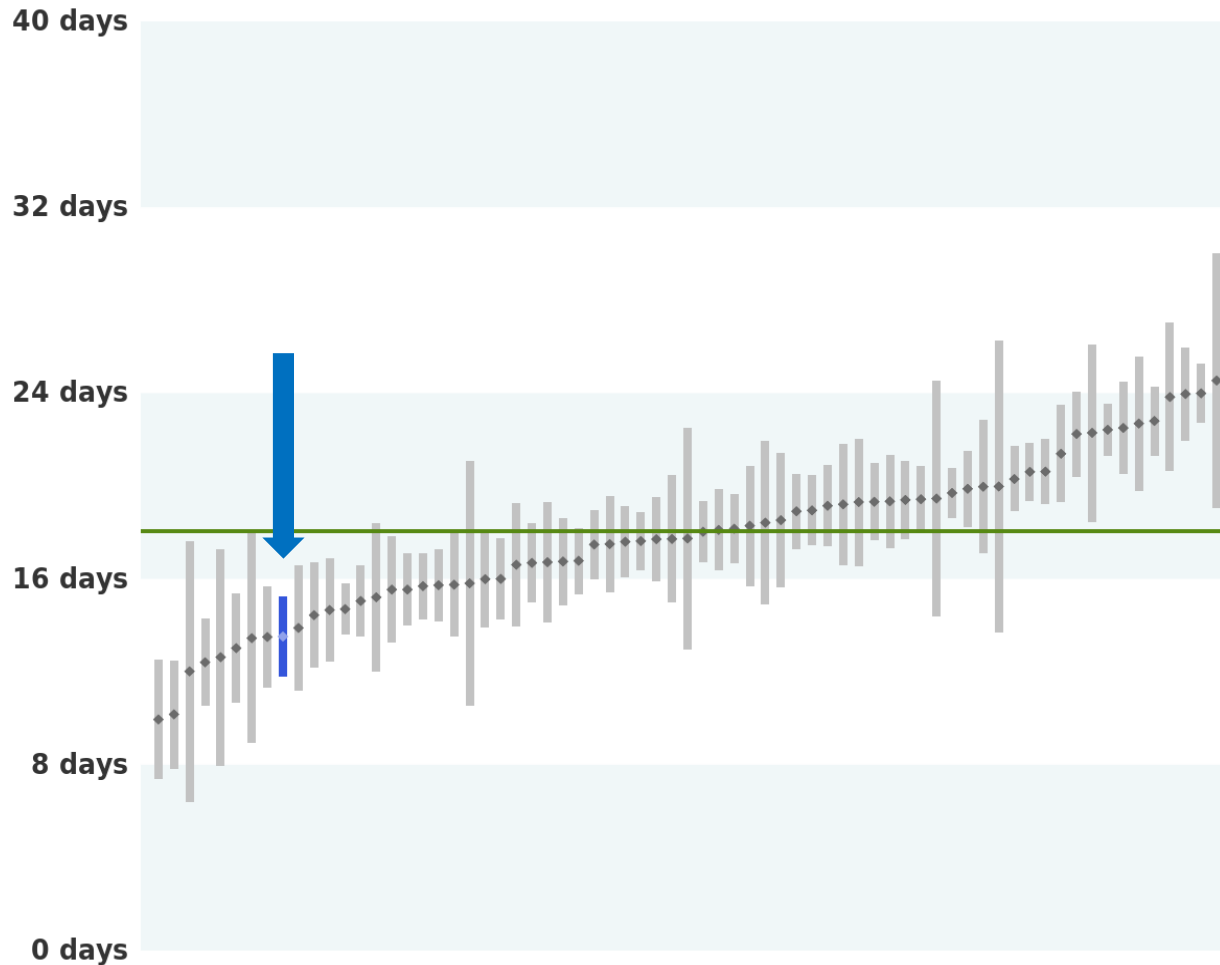
### Postoperative Hospital LOS Version 3



**LEGEND** ■ Other Sites ■ Levine Children's — Aggregate - All |  
95% Confidence Interval

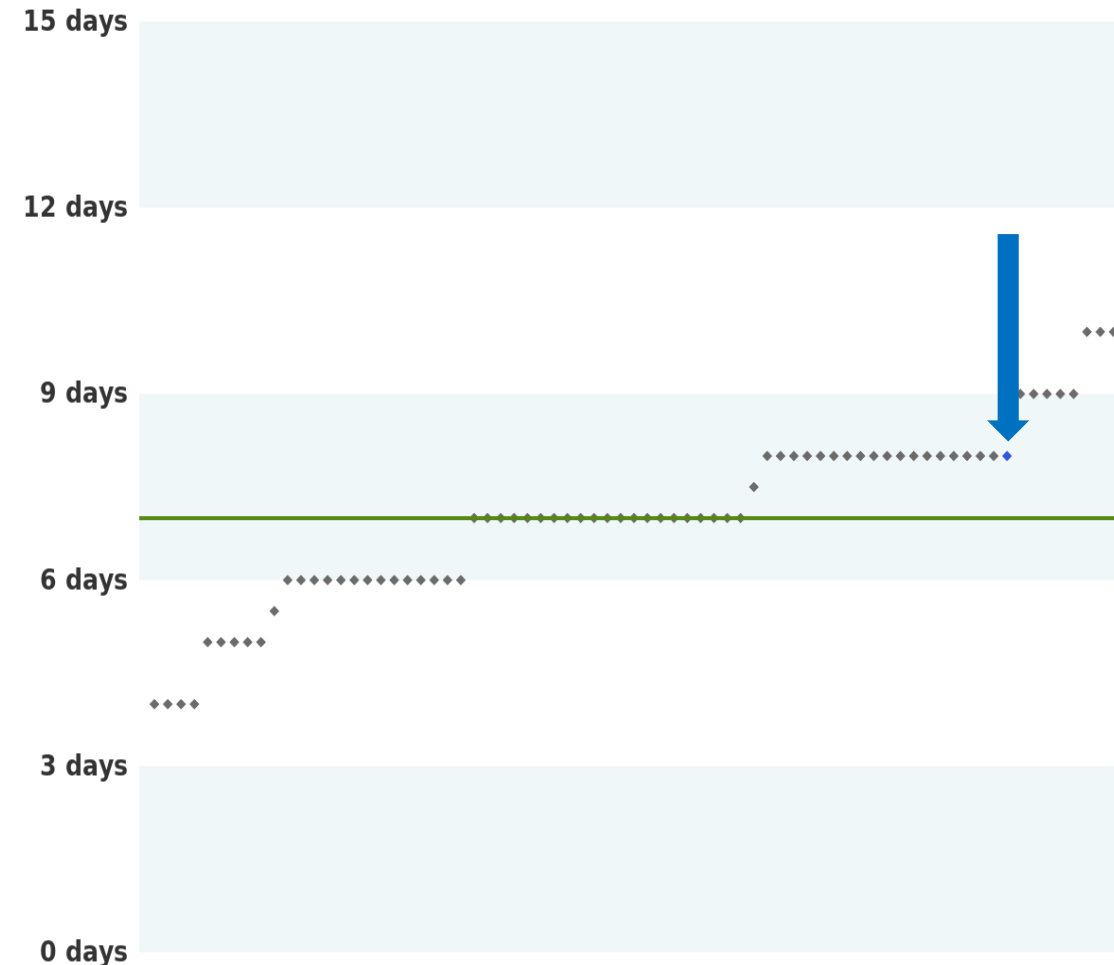
# PC4 Mean Risk Adjusted Postoperative Hosp LOS vs PC4 Non Risk Adjusted Median Hosp LOS

Postoperative Hospital LOS  
Version 3



LEGEND ■ Other Sites ■ Levine Children's ■ Aggregate - All  
95% Confidence Interval

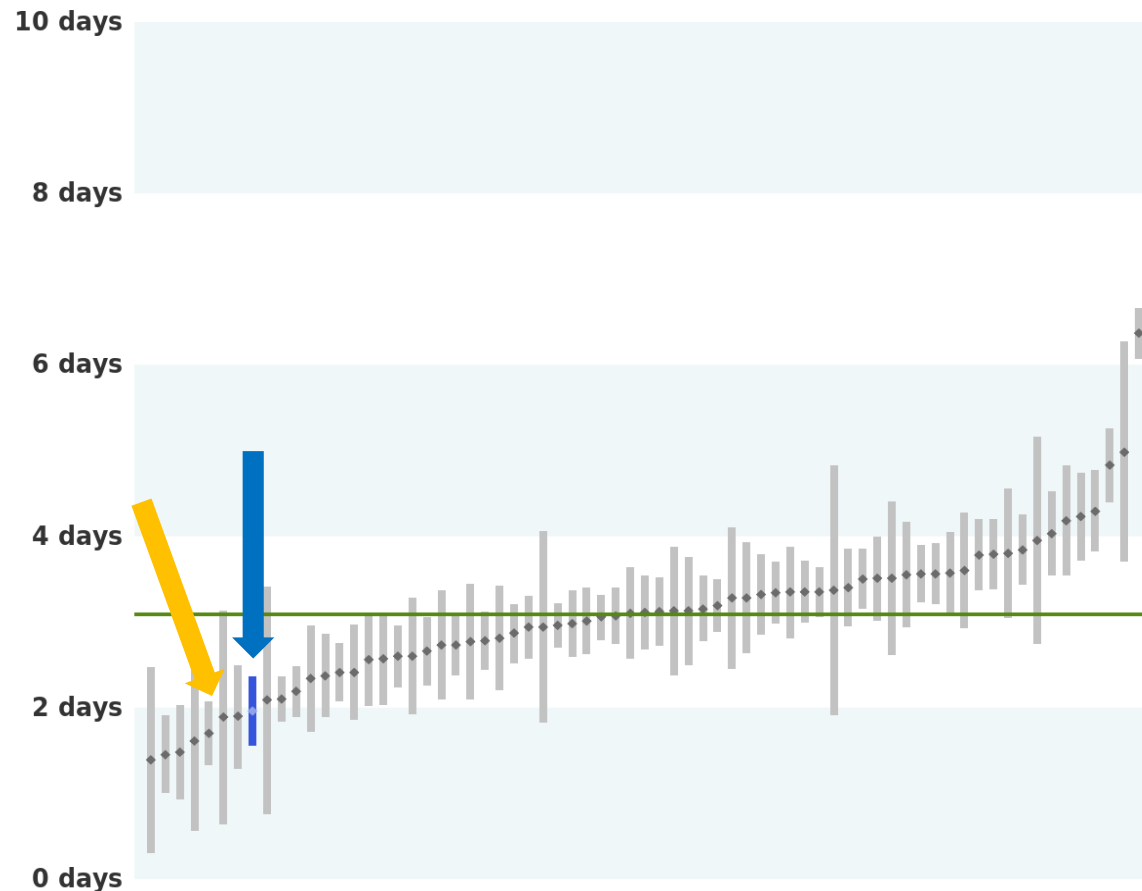
Resource Utilization (Medians) - Hospital LOS  
Version 3



LEGEND ■ Other Sites ■ Levine Children's ■ Aggregate - All

# PC4 Mean Risk Adjusted Postoperative Duration of Ventilation

Postoperative Duration of Mechanical Ventilation  
Version 3

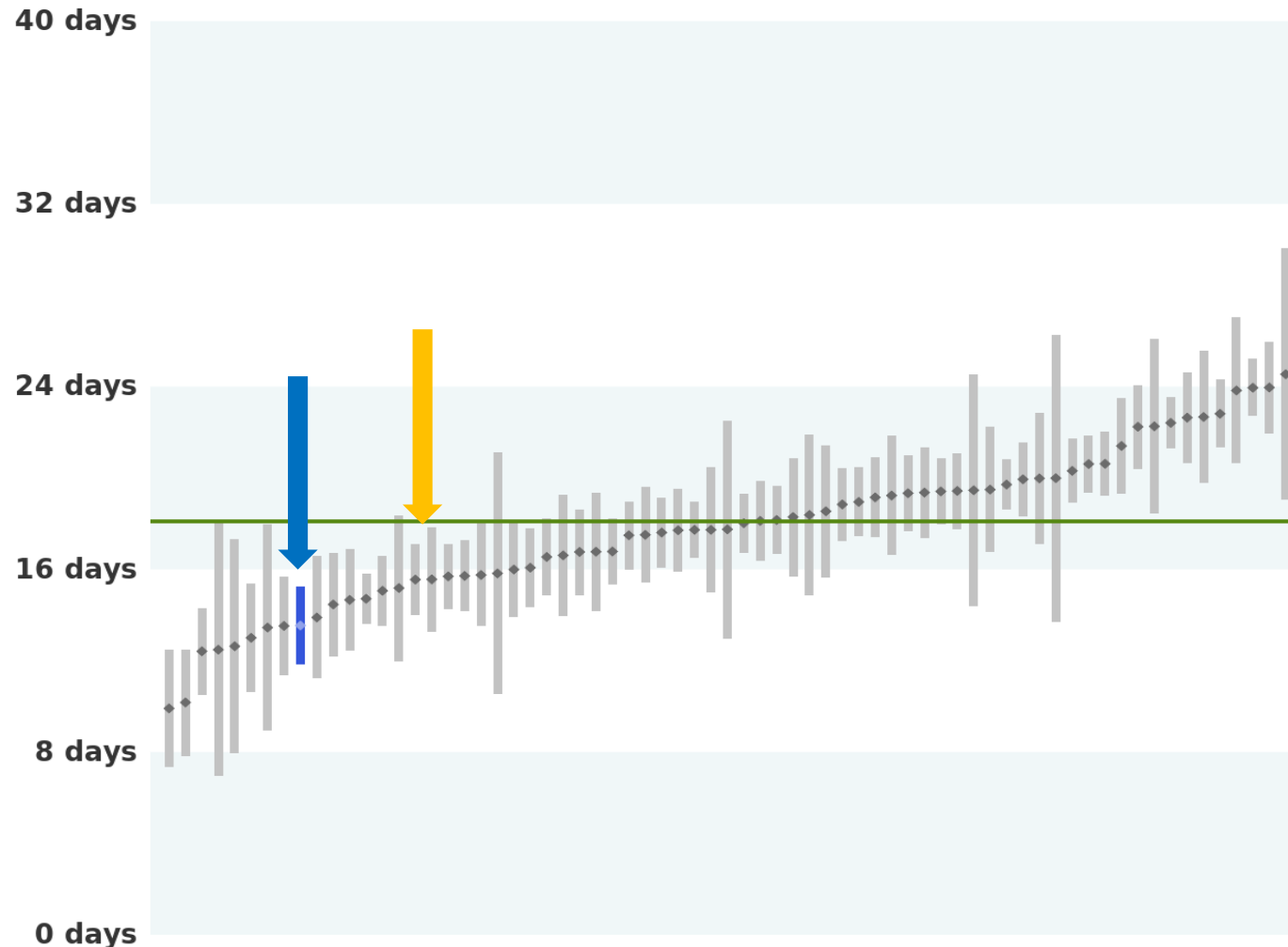


- Levine's Adjusted Duration of Ventilation = 1.97 days
- Nationwide's Adjusted Duration of Ventilation = 1.7
- Difference of 6.5 hours

LEGEND ■ Other Sites ■ Levine Children's — Aggregate - All  
95% Confidence Interval

# PC4 Mean Risk Adjusted Postoperative Hospital LOS

Postoperative Hospital LOS  
Version 3

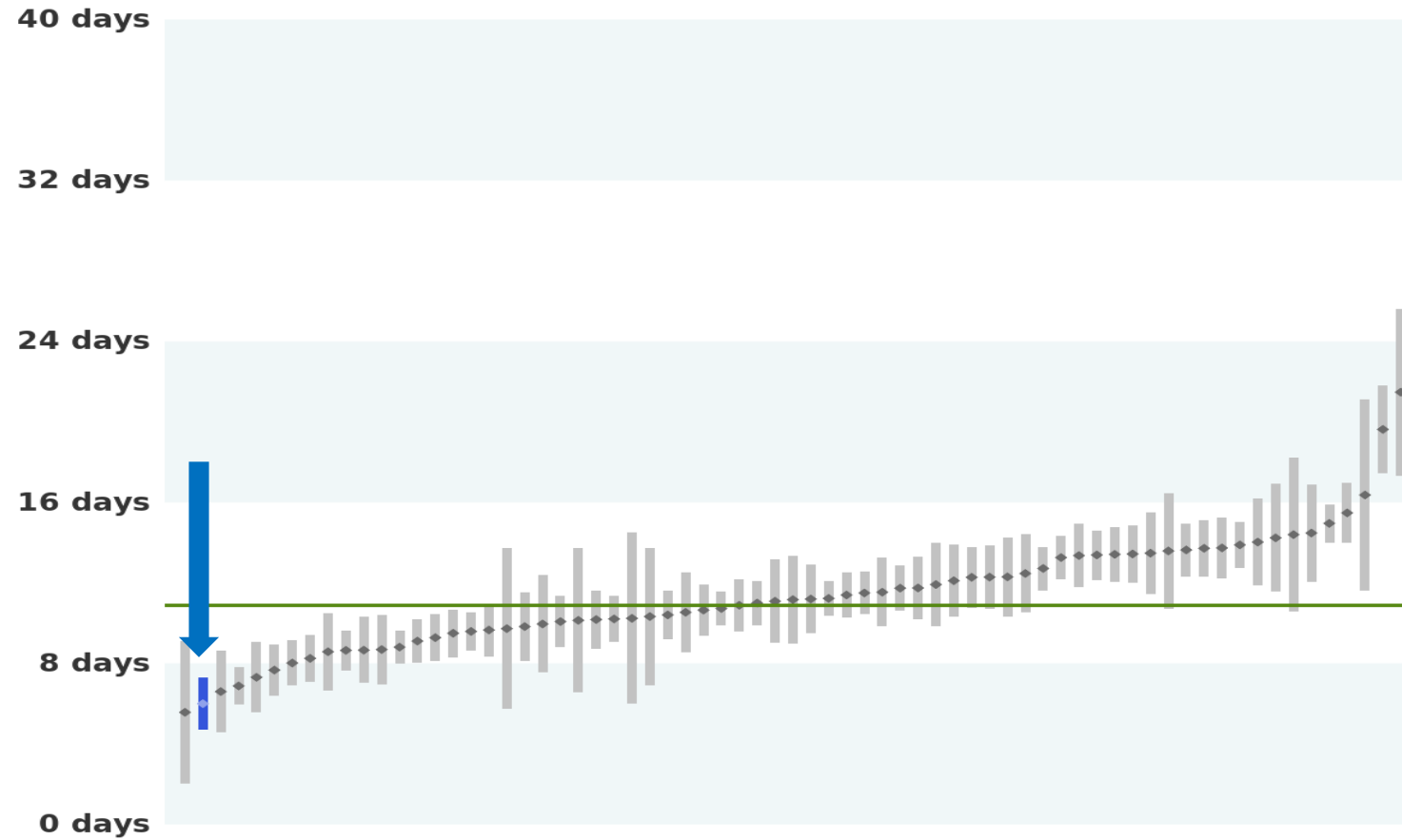


- Levine's Adjusted Postoperative Hospital LOS 13.5 days
- Nationwide's Adjusted Postoperative Hospital LOS 15.5 days
- Difference of 2 days

**LEGEND** ■ Other Sites ■ Levine Children's — Aggregate - All  
95% Confidence Interval

# PC4 Risk Adjusted Postoperative CICU LOS

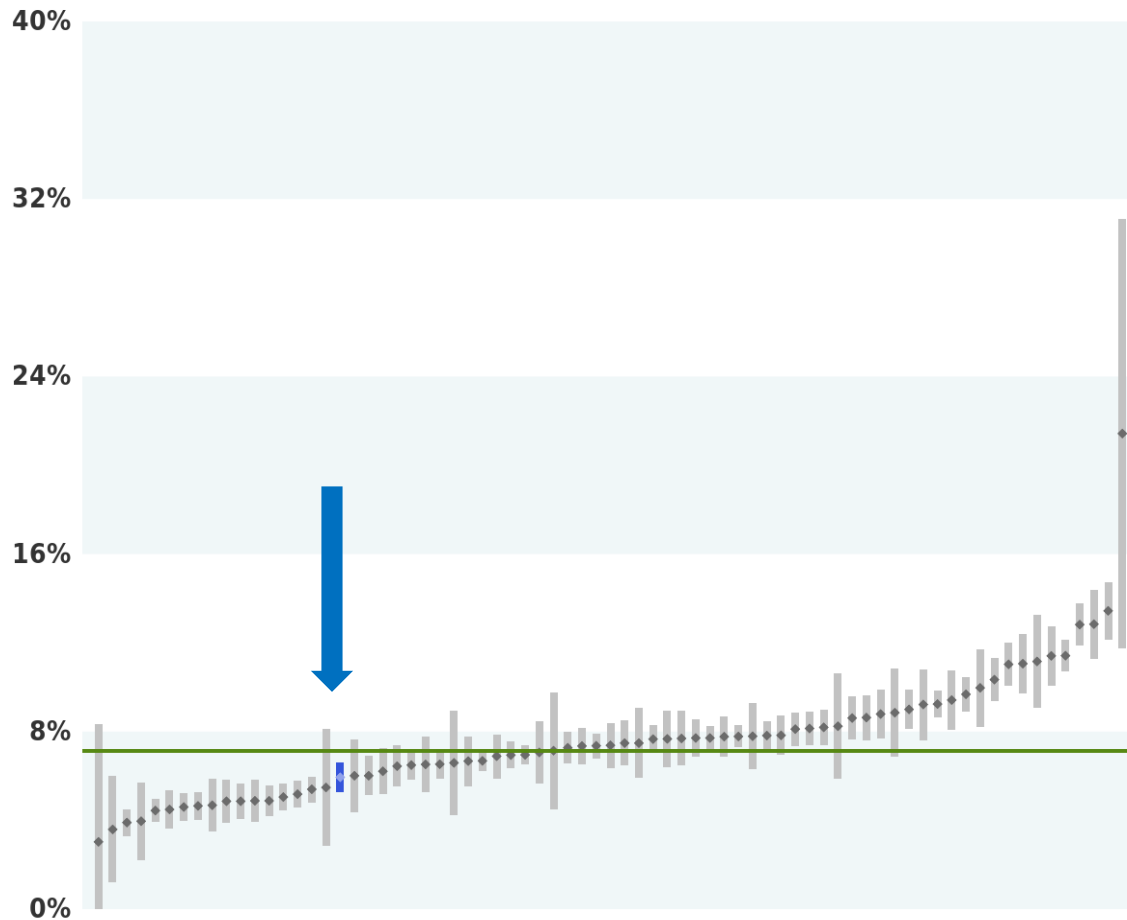
**Postop CICU LOS  
Version 3**



**LEGEND** ■ Other Sites ■ Levine Children's — Aggregate - All  
95% Confidence Interval

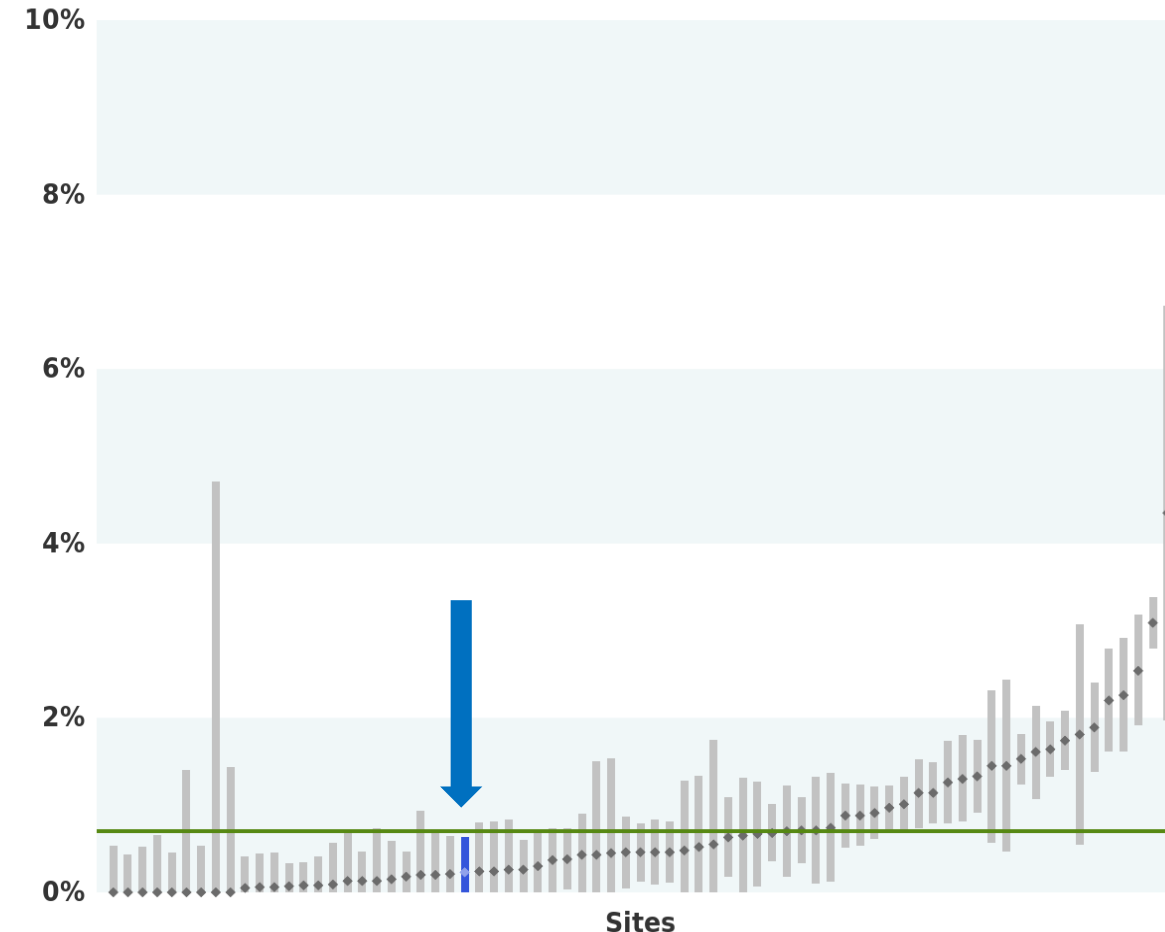
# Pulmonary Complications

Unplanned Care - Extubation Failure  
Version 3



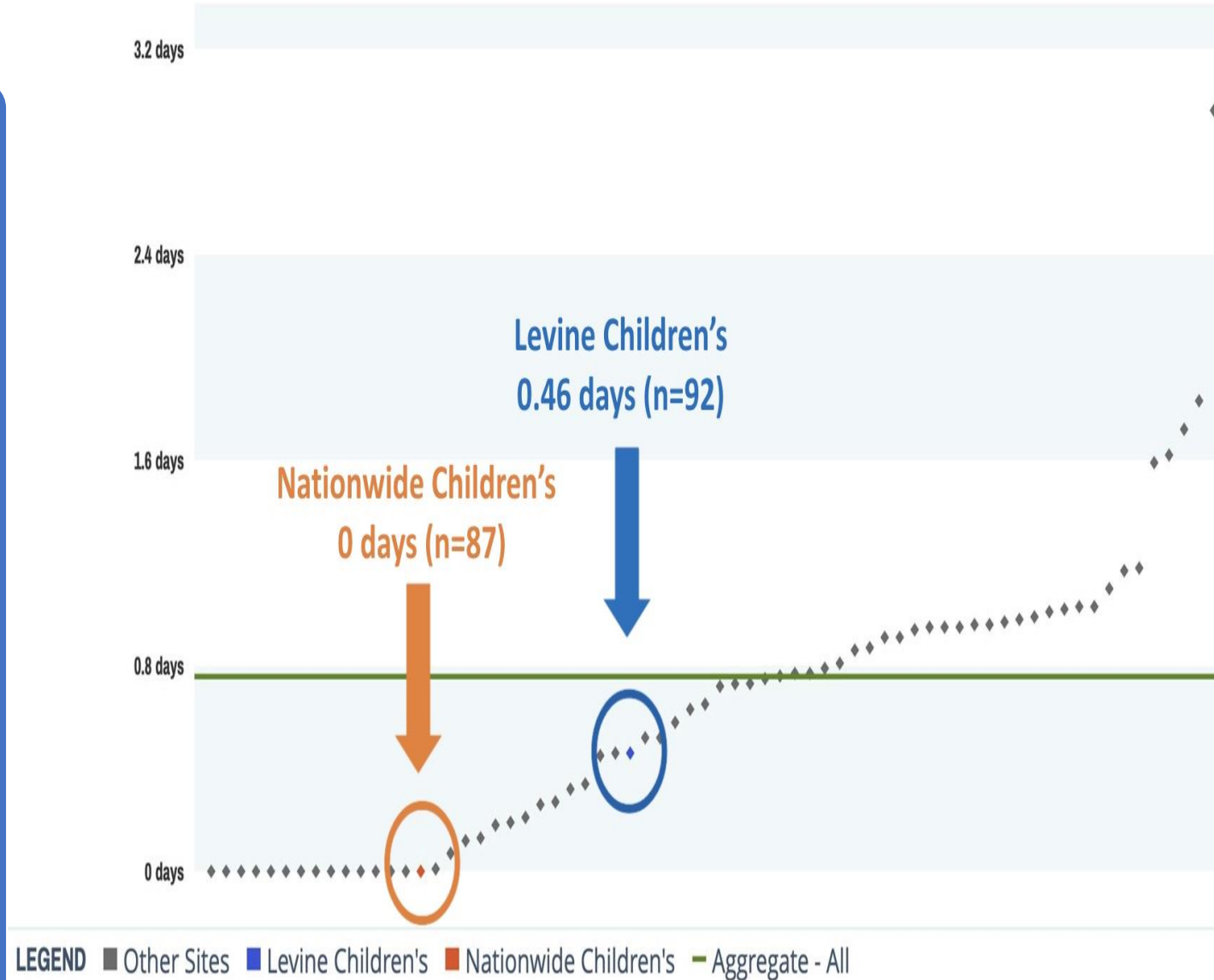
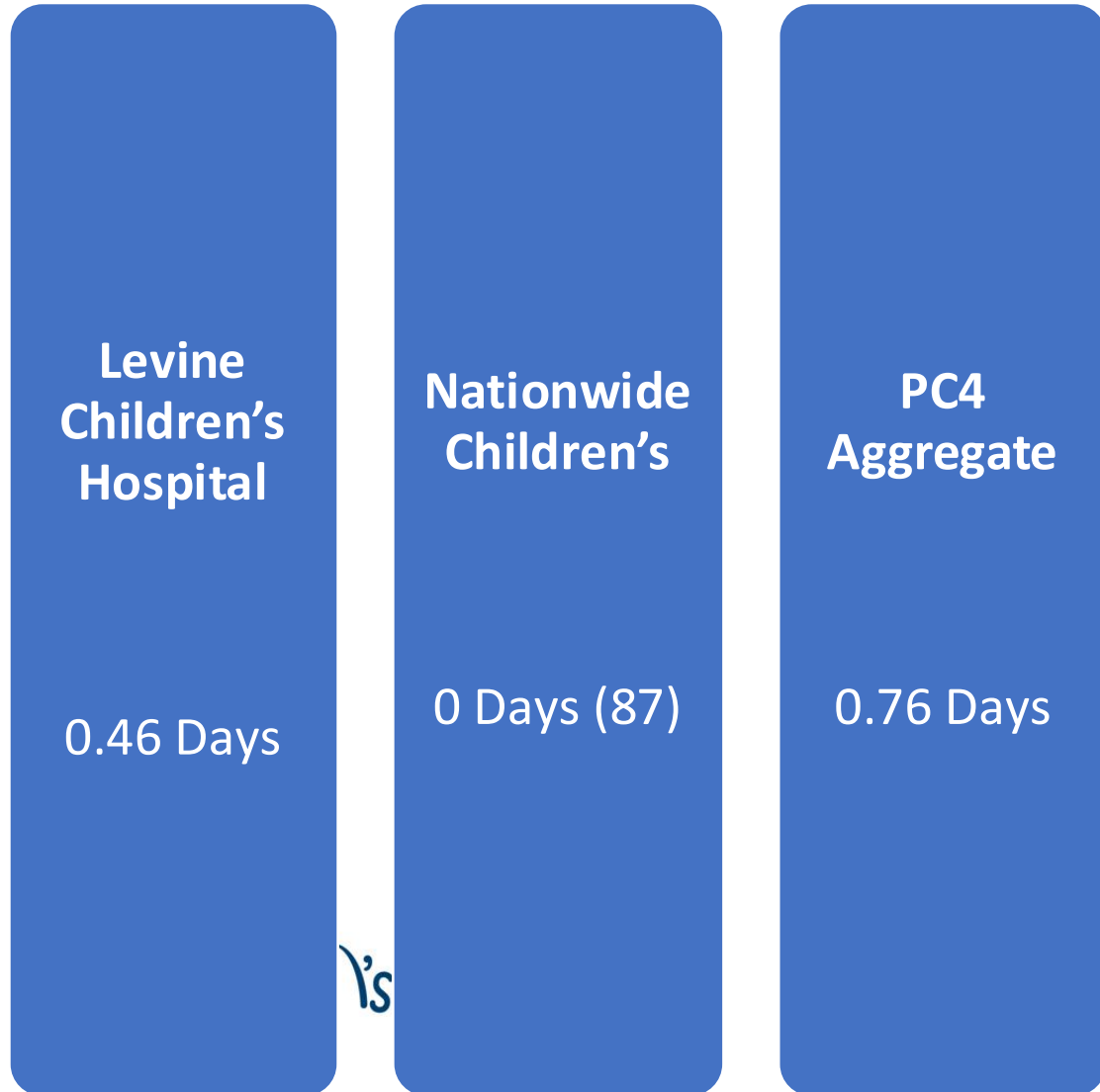
**LEGEND** ■ Other Sites ■ Levine Children's ■ Aggregate - All  
95% Confidence Interval

Postop Complications - Pneumonia VAP Postop  
Version 3



**LEGEND** ■ Other Sites ■ Levine Children's ■ Aggregate - All  
95% Confidence Interval

# TOF: Median Duration of Ventilation



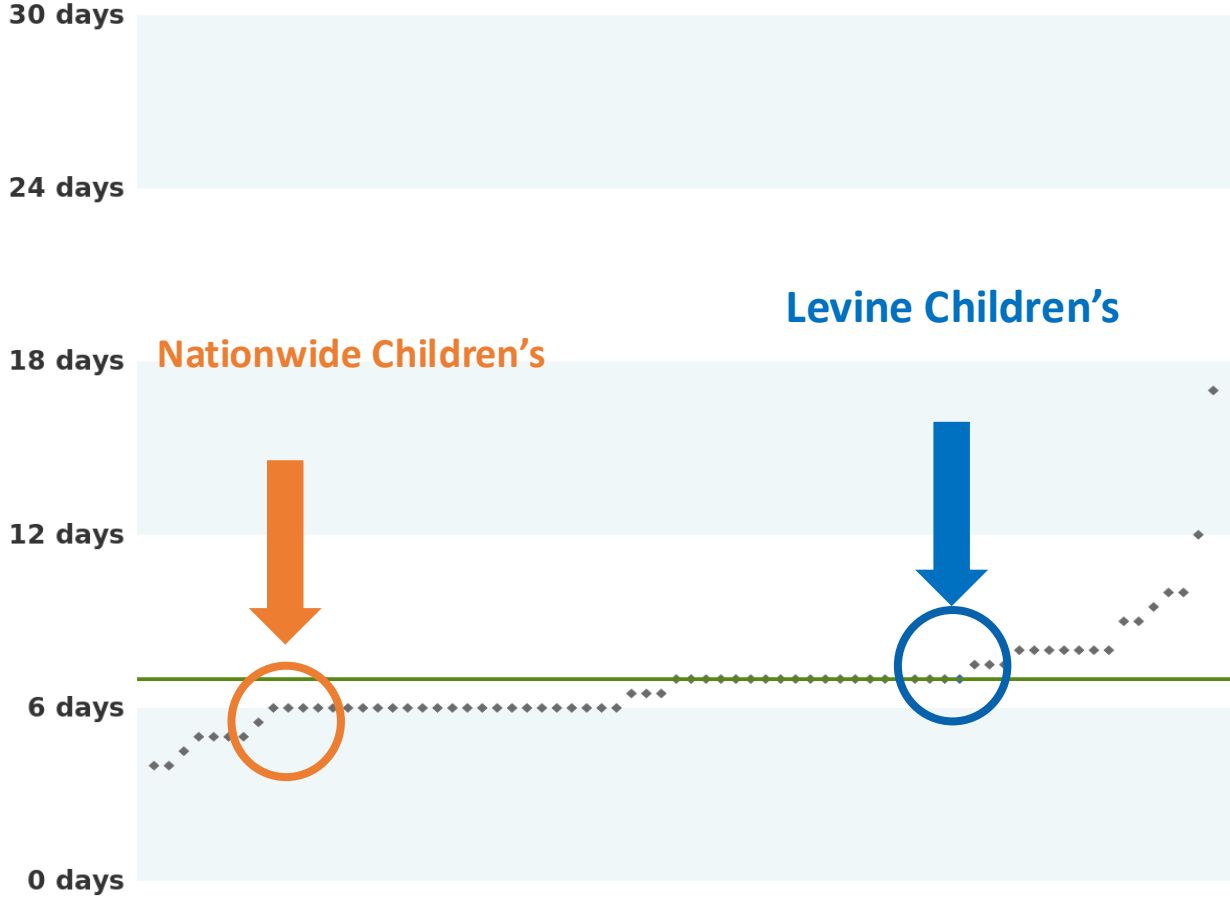
# TOF: Median Hospital LOS

Levine Children's Hospital  
7 days (92)

Nationwide Children's  
5

PC4 Aggregate  
7 (87)

Resource Utilization (Medians) - Hospital LOS  
TOF Repair, Version 3



LEGEND ■ Other Sites ■ Levine Children's ■ Aggregate - All

# STS TOF Postoperative LOS



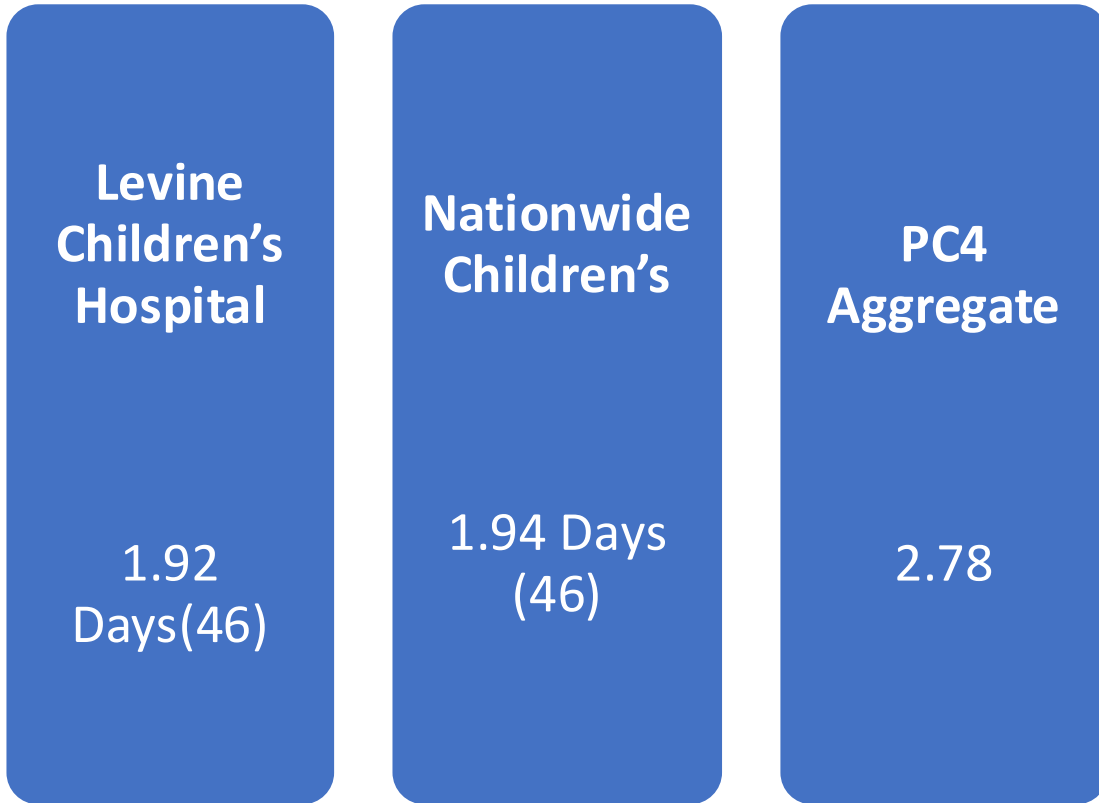
**STS National Database**<sup>™</sup>  
Trusted. Transformed. Real-Time.

Period Ending 06/30/2025

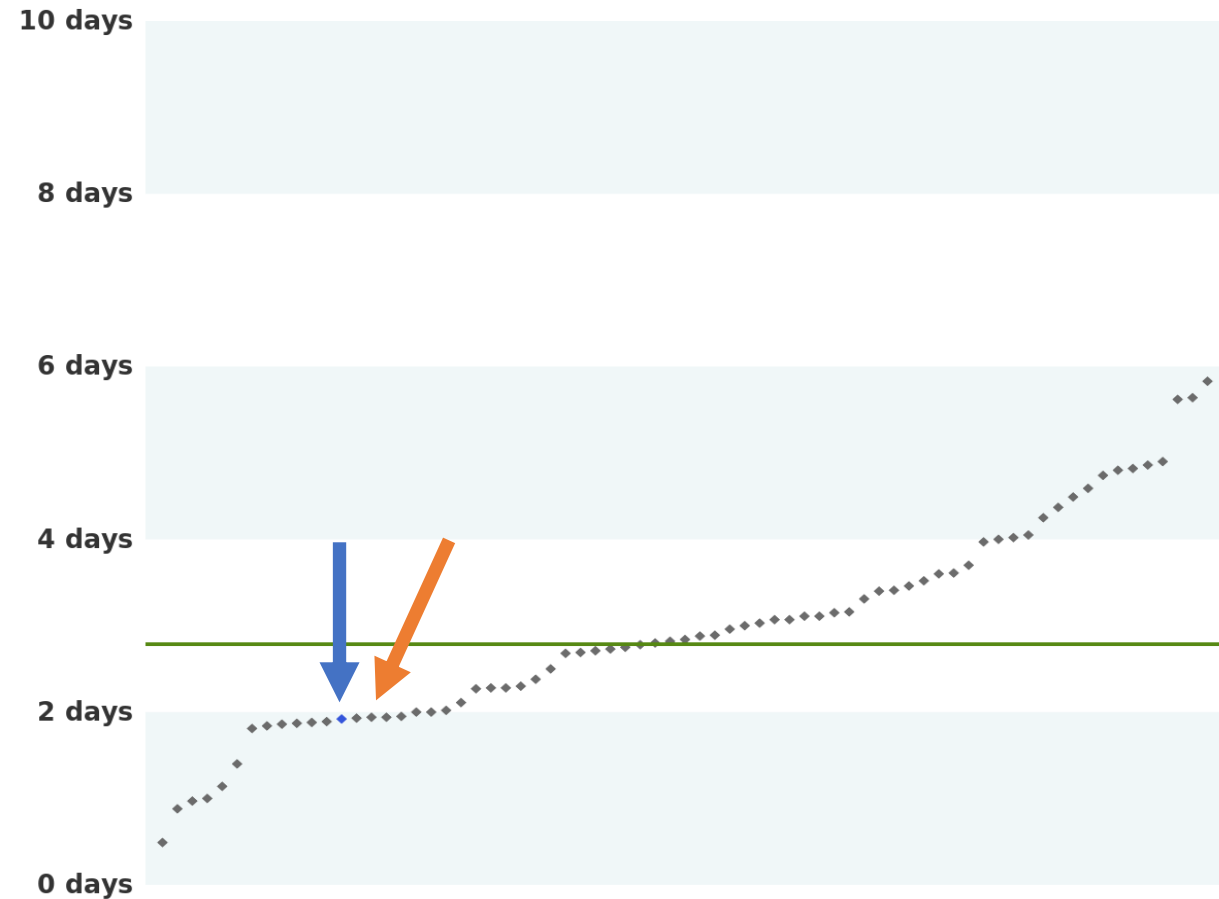
**TOF**

Mean (days)	<b>9.36</b>
Median (days)	<b>8</b>
Range (days)	<b>(3-38)</b>
Interquartile Range (days)	<b>(5-11)</b>
Aggregate (days)	<b>12.35</b>
Median (days)	<b>11.94</b>
Range (days)	<b>(4.29-33)</b>
Interquartile Range (days)	<b>(10.38-14.35)</b>

# Arterial Switch Operation: Median Duration of Ventilation



Resource Utilization (Medians) - Ventilation LOS  
Arterial Switch, Version 3



LEGEND ■ Other Sites ■ Levine Children's ■ Aggregate - All

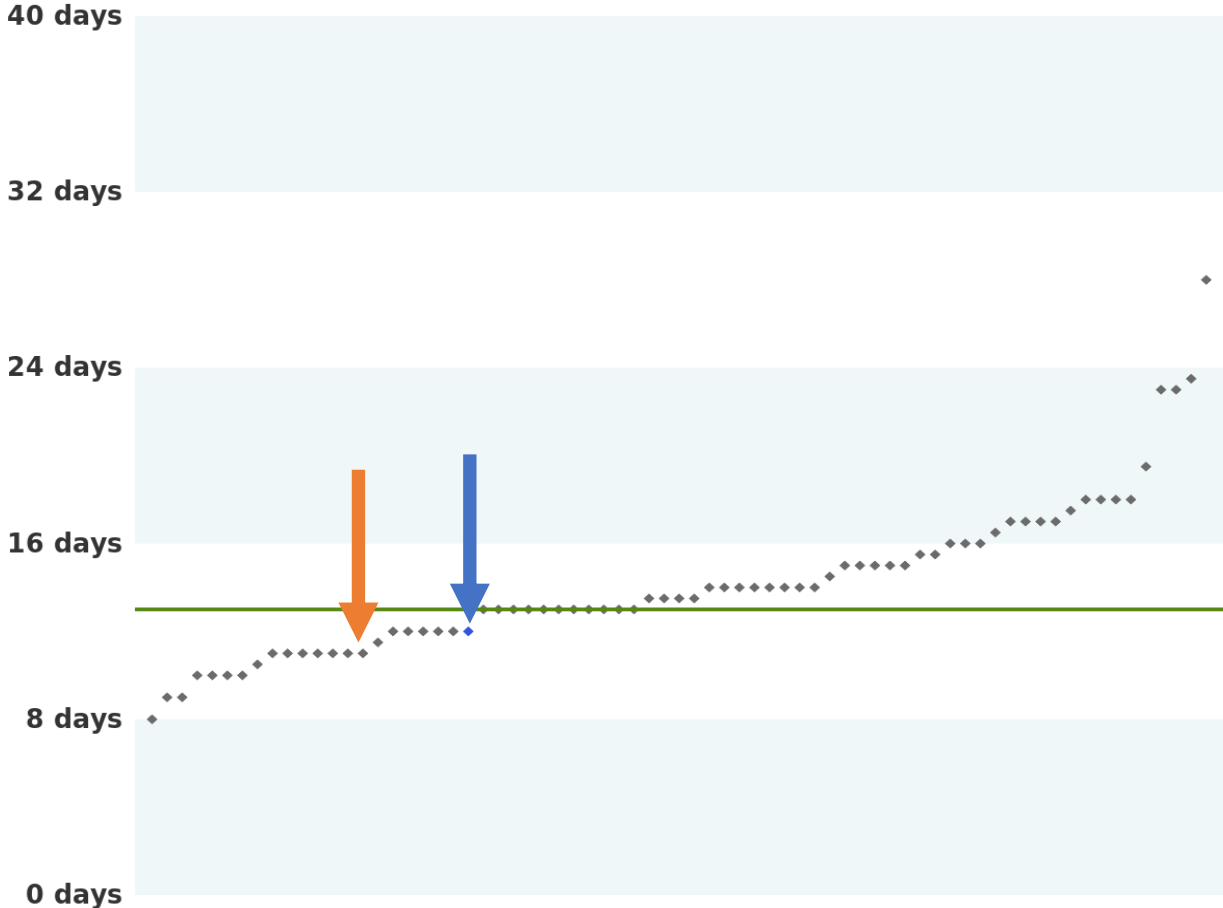
# Arterial Switch Operation: Median Hospital LOS

**Levine Children's Hospital**  
  
12 days (46)

**Nationwide Children's**  
  
11 days (46)

**PC4 Aggregate**  
  
13 days

Resource Utilization (Medians) - Hospital LOS  
Arterial Switch, Version 3



LEGEND ■ Other Sites ■ Levine Children's — Aggregate - All

# STS ASO Postoperative LOS

Period Ending 06/30/2025

## ASO

Mean (days)	<b>14.17</b>
Median (days)	<b>12</b>
Range (days)	<b>(6-41)</b>
Interquartile Range (days)	<b>(10-16.50)</b>
Aggregate (days)	<b>19.35</b>
Median (days)	<b>19.50</b>
Range (days)	<b>(9.83-45.63)</b>
Interquartile Range (days)	<b>(14.17-23.09)</b>

# AVC: Median Duration of Ventilation

**Levine Children's Hospital**

0.45 days (77)

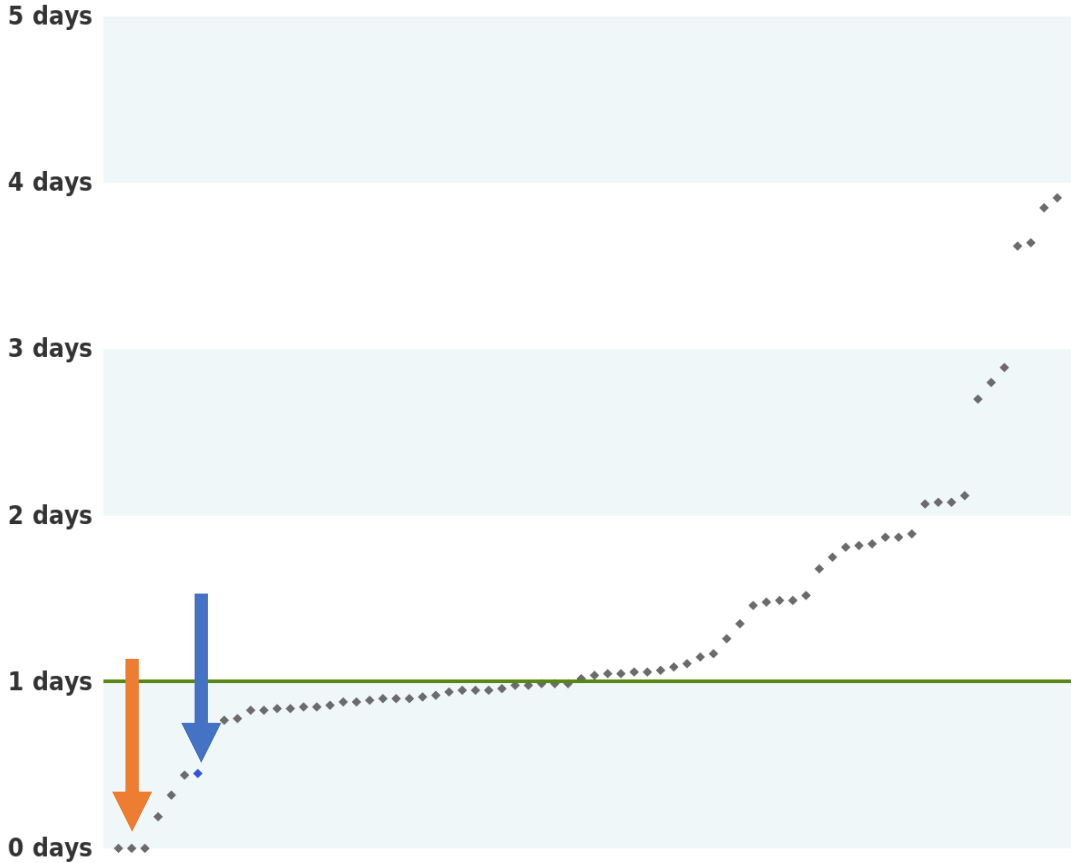
**Nationwide Children's**

0 days (81)

**PC4 Aggregate**

1 day

Resource Utilization (Medians) - Ventilation LOS  
AVC, Version 3



LEGEND ■ Other Sites ■ Levine Children's ■ Aggregate - All

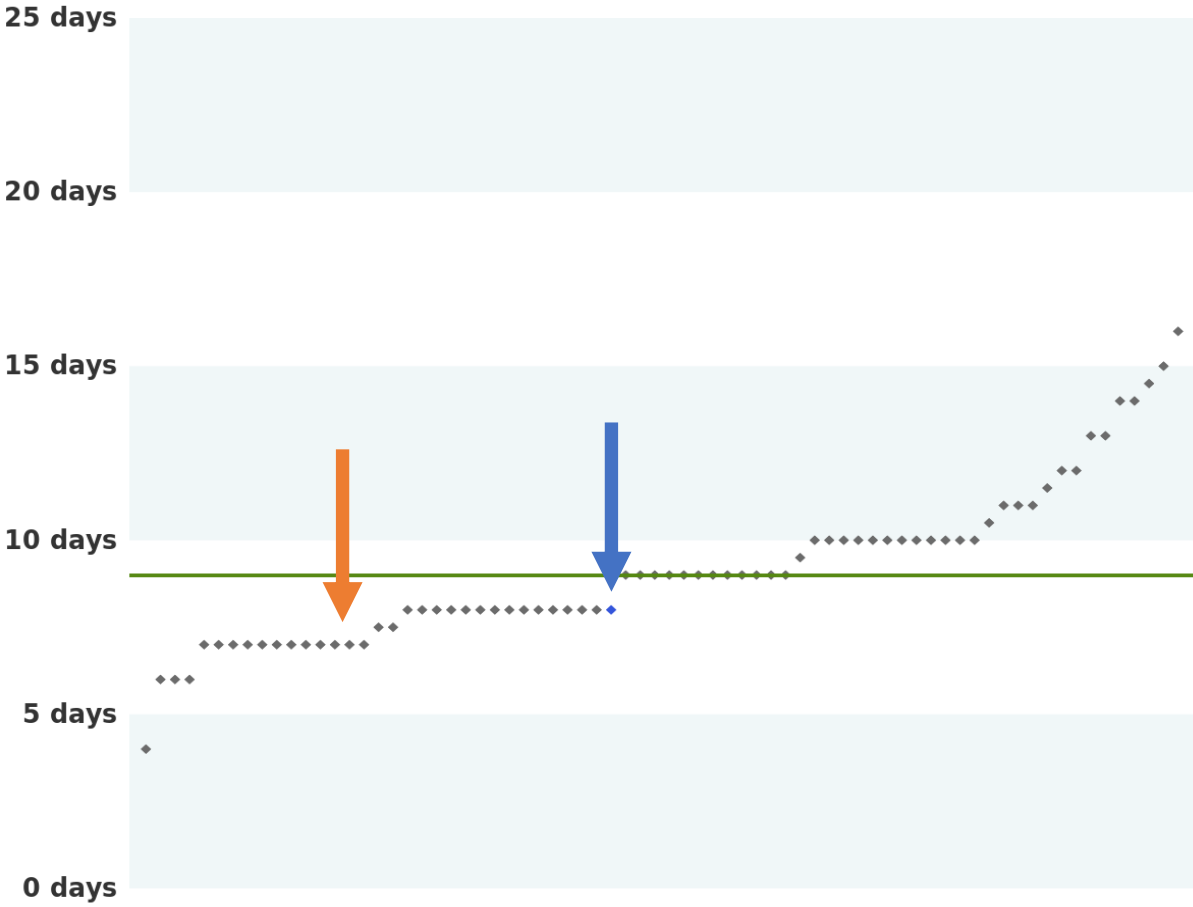
# AVC: Median Hosp LOS

Levine Children's Hospital  
8 days (77)

Nationwide Children's  
7 days (81)

PC4 Aggregate  
9 days

Resource Utilization (Medians) - Hospital LOS  
AVC, Version 3



LEGEND ■ Other Sites ■ Levine Children's ■ Aggregate - All

# STS AVC Postoperative LOS

Period Ending 06/30/2025

## AVC

Mean (days)	<b>11.82</b>
Median (days)	<b>7.50</b>
Range (days)	<b>(3-56)</b>
Interquartile Range (days)	<b>(5-14.25)</b>
Aggregate (days)	<b>17.96</b>
Median (days)	<b>16.75</b>
Range (days)	<b>(4-41.80)</b>
Interquartile Range (days)	<b>(13.76-22.72)</b>

# Fontan: Median Duration of Ventilation

Levine  
Children's  
Hospital

0.31 days  
(91)

Nationwide  
Children's

0 days (105)

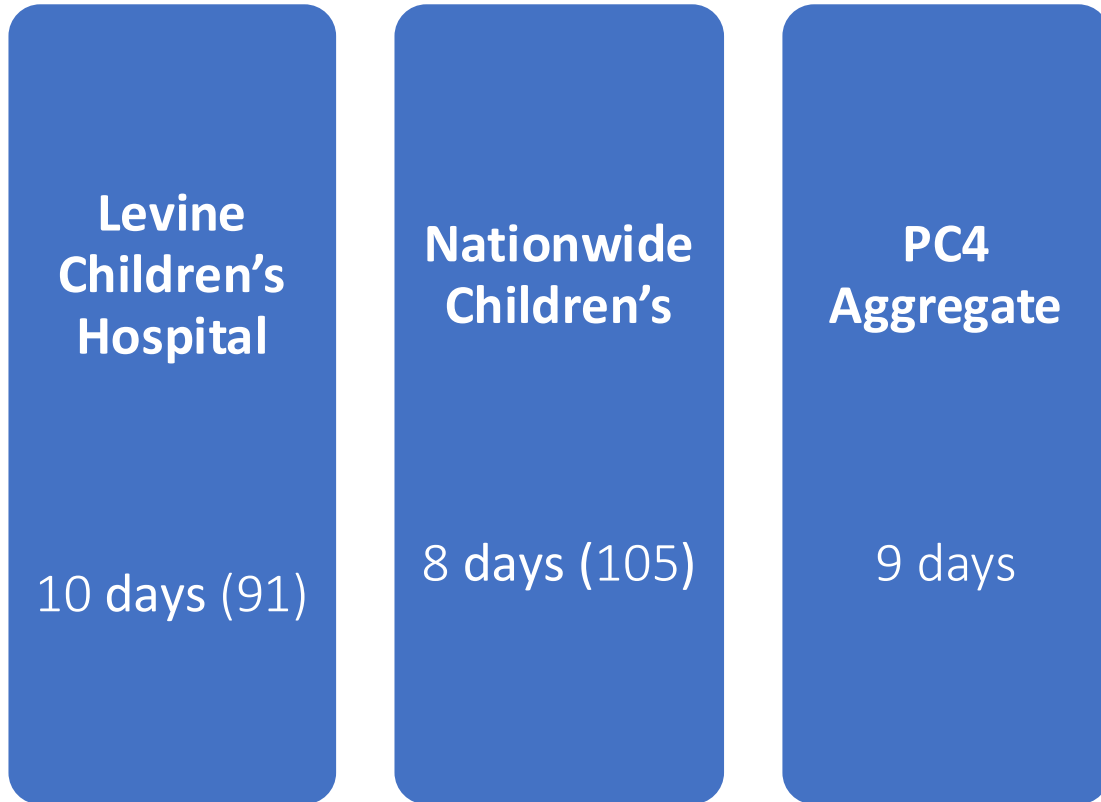
PC4  
Aggregate

0 day

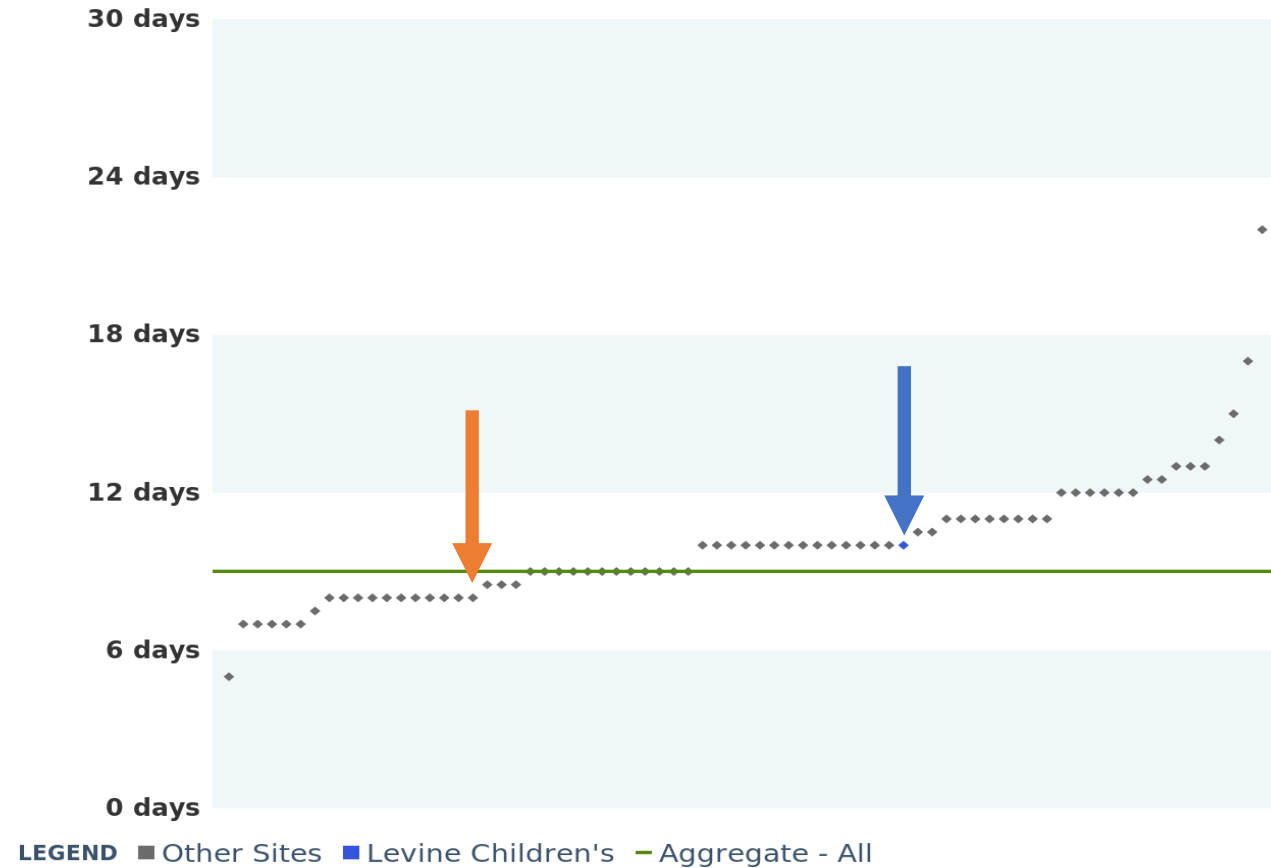
Resource Utilization (Medians) - Ventilation LOS  
Fontan, Version 3



# Fontan: Median Hosp LOS



Resource Utilization (Medians) - Hospital LOS  
Fontan, Version 3



# STS Fontan Postoperative LOS

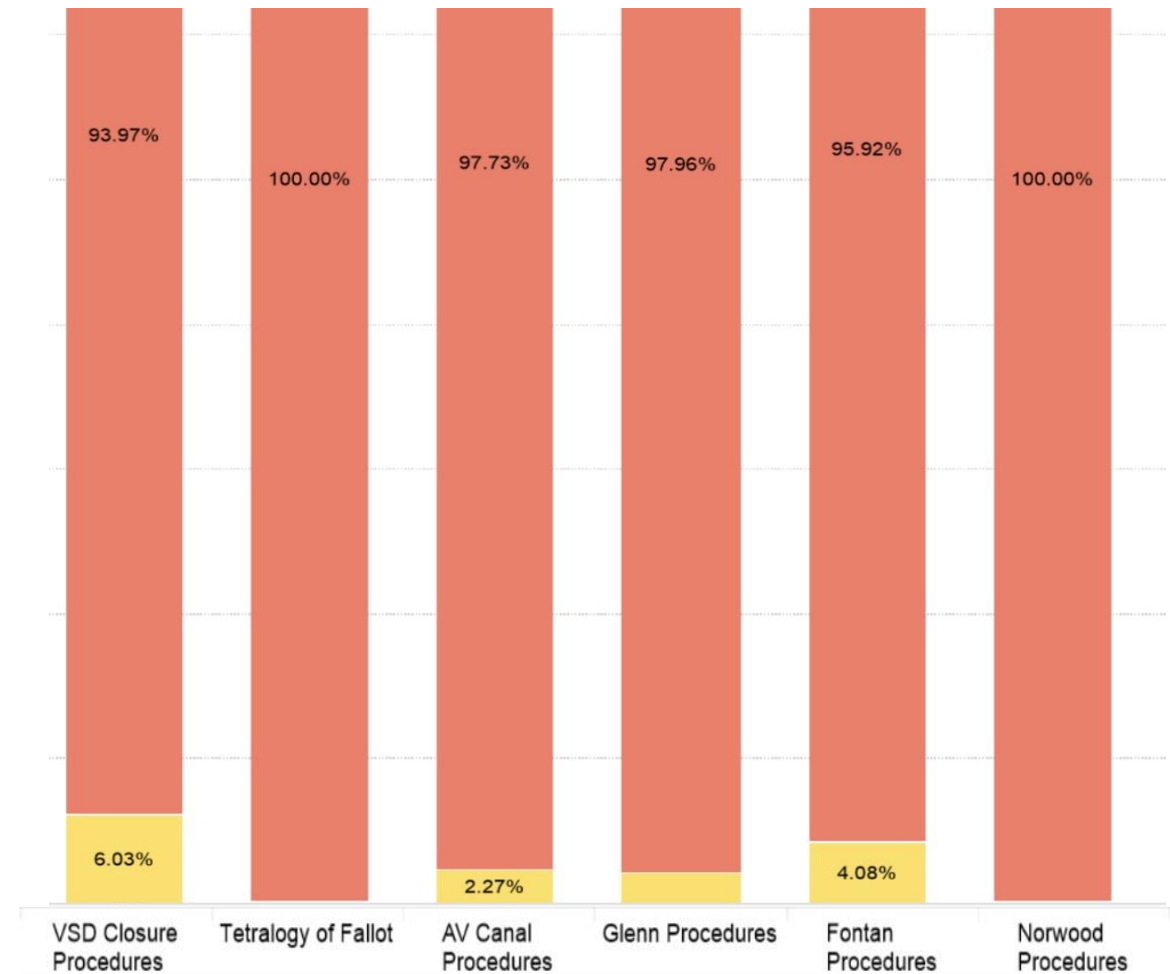
Period Ending 06/30/2025

## Fontan

Mean (days)	<b>15.02</b>
Median (days)	<b>11</b>
Range (days)	<b>(5-162)</b>
Interquartile Range (days)	<b>(9-15)</b>
Aggregate (days)	<b>13.85</b>
Median (days)	<b>13</b>
Range (days)	<b>(7-47.33)</b>
Interquartile Range (days)	<b>(11.22-15.78)</b>

# But Why Not Extubate in the OR?

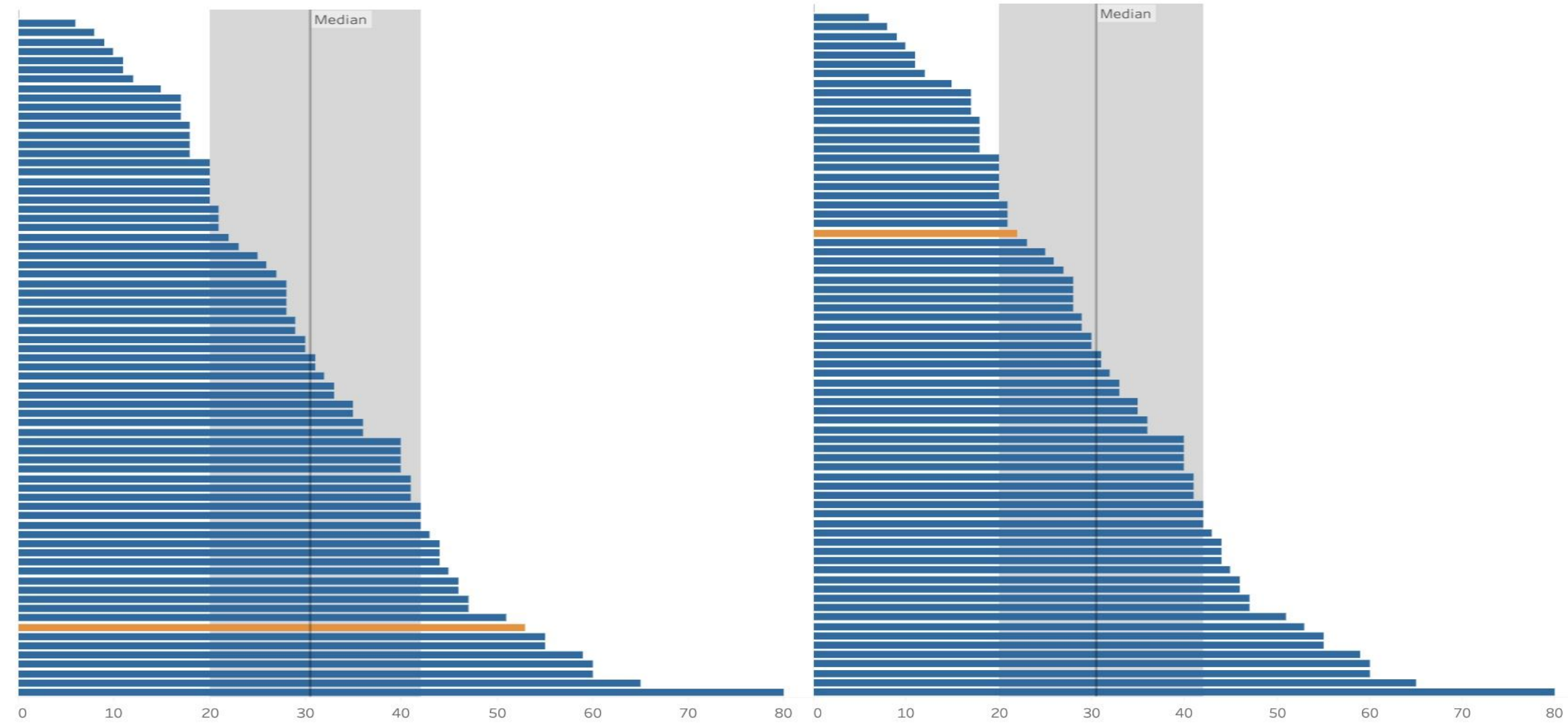
- The better staffed you are the better you can deal with an emergency
- The longer the ETT stays in the better the odds are that the patient will be intubated if an unexpected decompensation occurs
- The more poorly staffed you are, the less likely you are to risk dealing with an unexpected decompensation in a non intubated patient



# Percentage of RNs with less than 2 years of cardiac critical care experience

LCH

Nationwide



# Percentage of RNs with less than 2 years of cardiac critical care experience

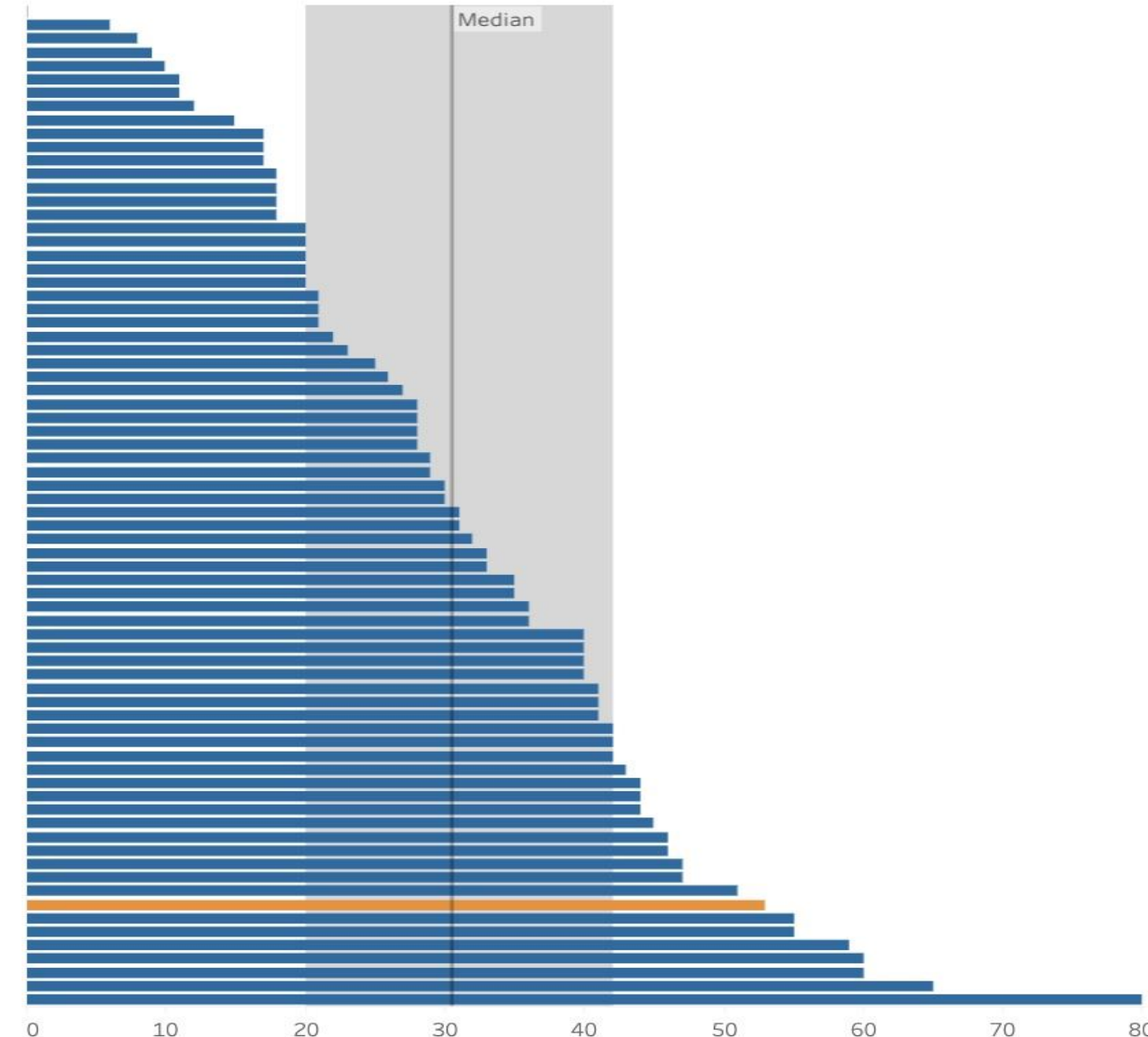
2023 The Society of Thoracic Surgeons, The American Association For Thoracic Surgery

## Recommendations for Centers Performing Pediatric Heart Surgery in the United States

Carl L. Backer, MD,<sup>1</sup> David M. Overman, MD,<sup>2</sup> Joseph A. Dearani, MD,<sup>3</sup> Jennifer C. Romano, MD, MS,<sup>4</sup> James S. Tweddell, MD,<sup>1</sup> S. Ram Kumar, MD, PhD,<sup>5</sup> Bradley S. Marino, MD, MPP, MSCE, MBA,<sup>6</sup> Emile A. Bacha, MD,<sup>7</sup> Robert D. B. Jaquiss, MD,<sup>8</sup> Ali N. Zaidi, MD,<sup>9</sup> Michelle Gurvitz, MD,<sup>10</sup> John M. Costello, MD, MPH,<sup>11</sup> Trudy A. Pierick, MSN, ARNP, CPNP-PC,<sup>12</sup> William J. Ravekes, MD,<sup>13</sup> James A. Reagor, MPS, CCP, FPP,<sup>14</sup> James D. St. Louis, MD,<sup>15</sup> James Spaeth, MD,<sup>16</sup> William T. Mahle, MD,<sup>17</sup> Andrew Y. Shin, MD,<sup>18</sup> Keila N. Lopez, MD, MPH,<sup>19</sup> Tara Karamlou, MD, MSc,<sup>20</sup> Karl F. Welke, MD, MS,<sup>21</sup> Roosevelt Bryant, MD,<sup>22</sup> S. Adil Husain, MD,<sup>23</sup> Jonathan M. Chen, MD,<sup>24</sup> Aditya Kaza, MD, MBA,<sup>25</sup> Winfield J. Wells, MD,<sup>5</sup> Andrew C. Glatz, MD, MSCE,<sup>26</sup> Mitchell I. Cohen, MD,<sup>27</sup> Doff B. McElhinney, MD,<sup>18</sup> David A. Parra, MD,<sup>28</sup> and Sara K. Pasquali, MD, MHS<sup>29</sup>

- Recommendation of at least 80% of nurses having at least 2 years of Peds Cardiac ICU experience.
- Levine's = 47%
- Nationwide = 78%

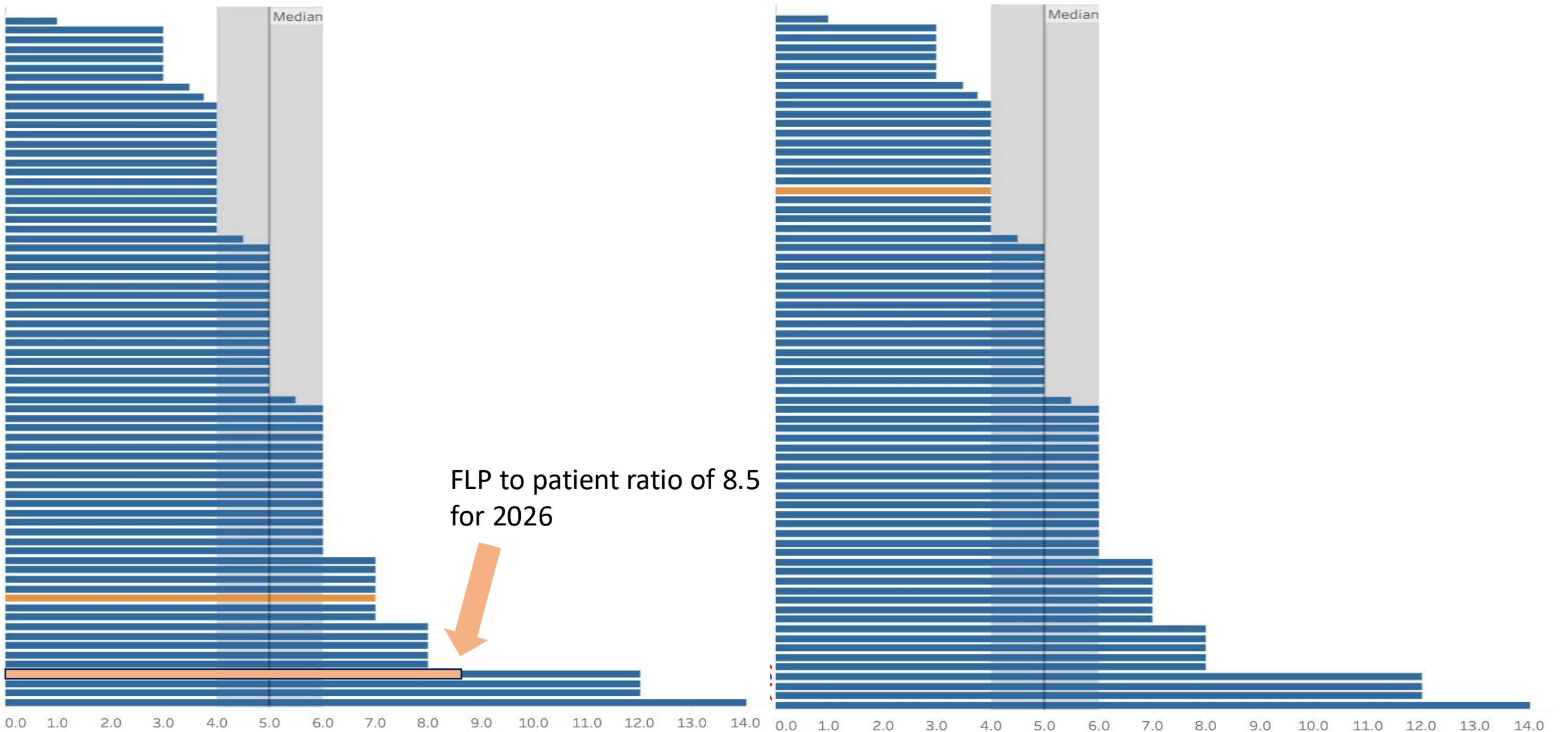
LCH



# Ratio of FLP to patients during typical weekday

LCH

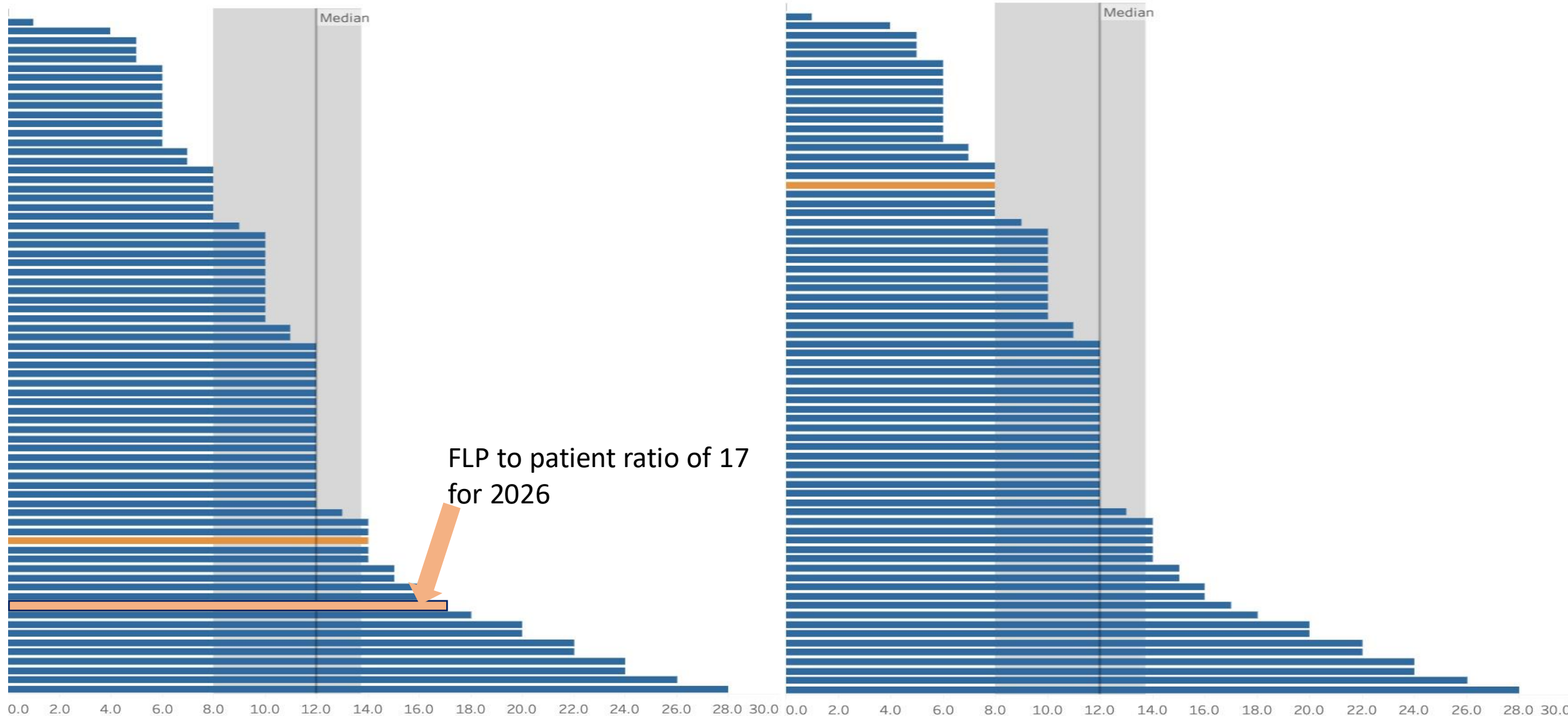
Nationwide



# Ratio of FLP to patients during typical weekday night

LCH

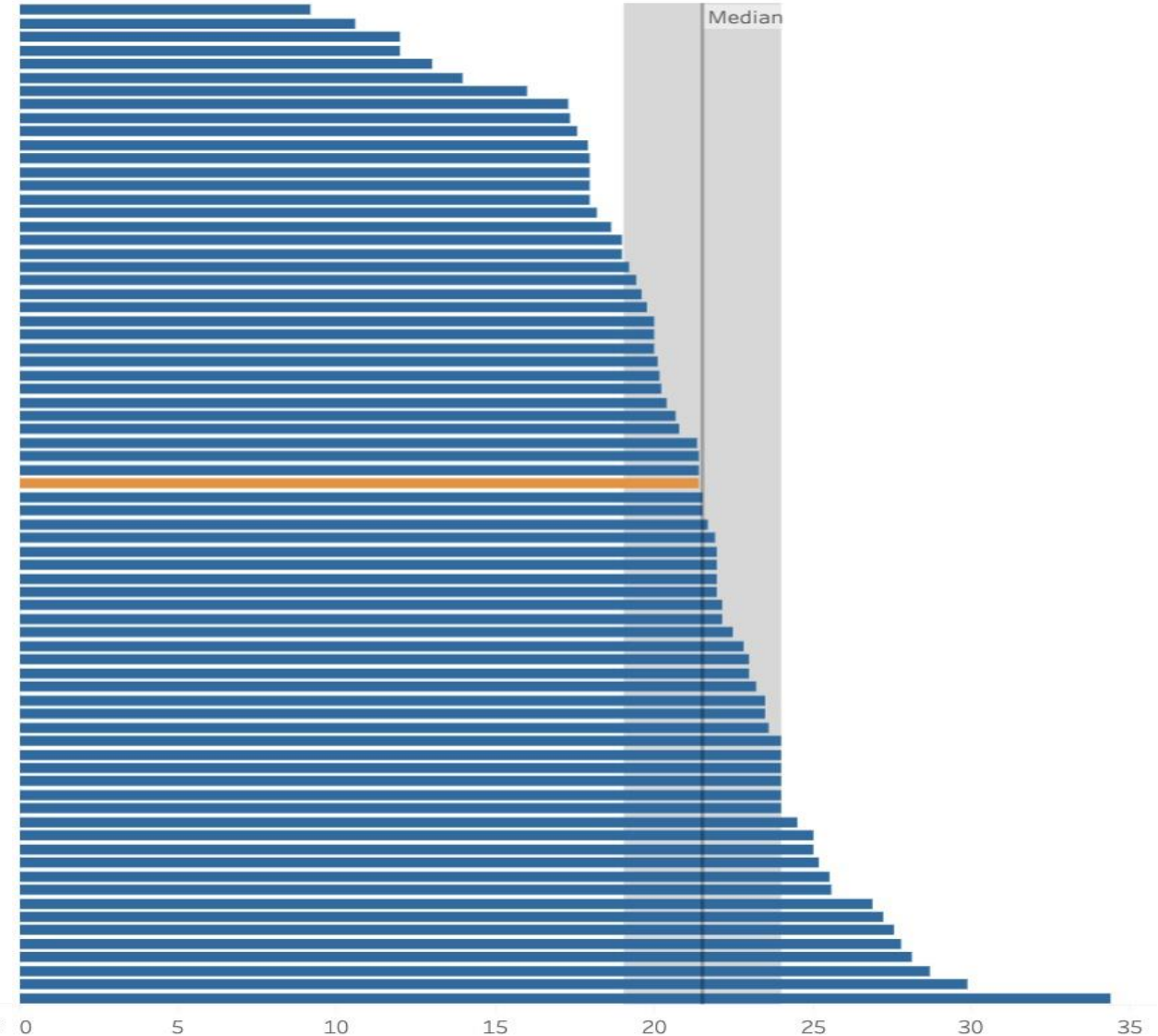
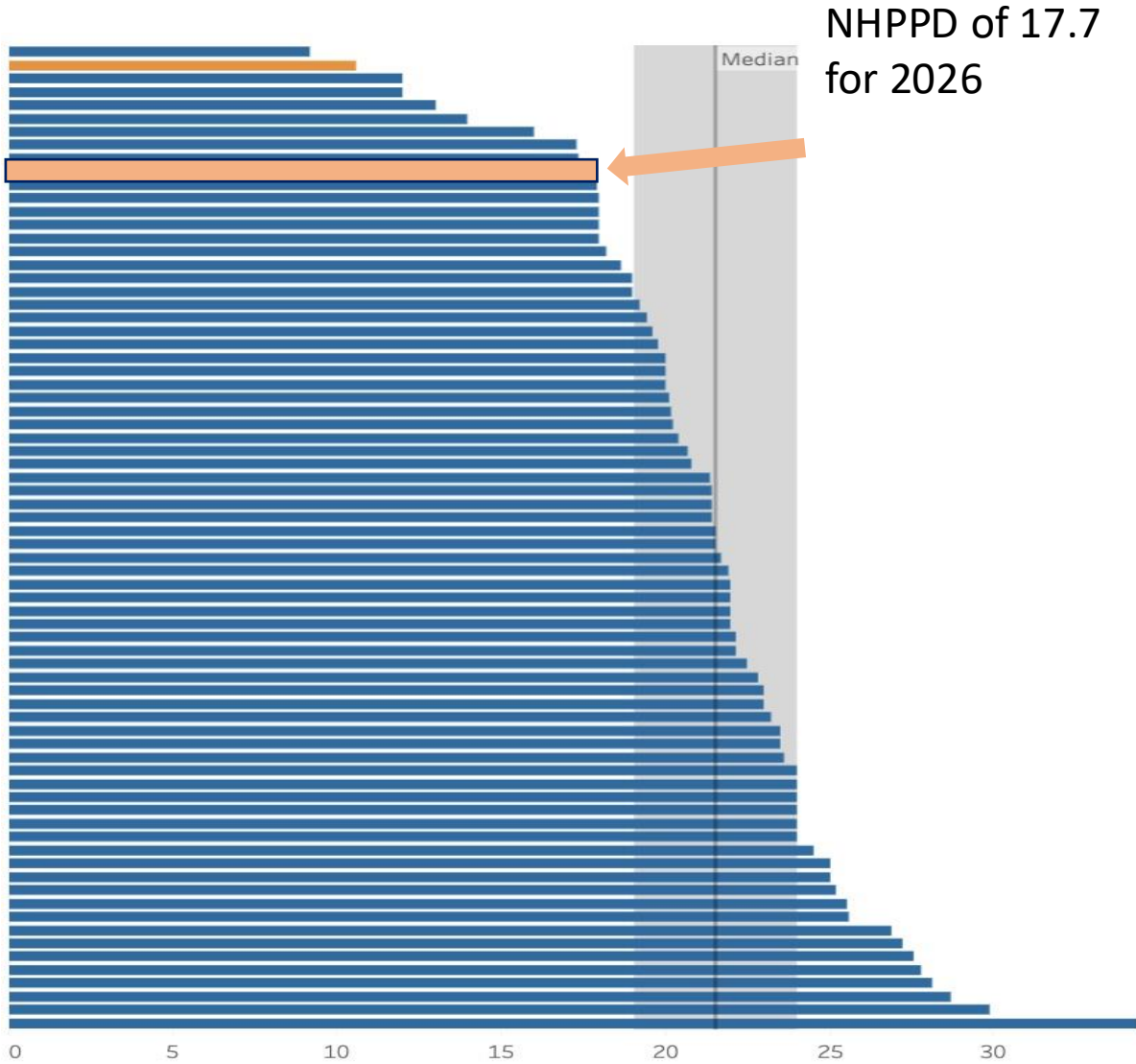
Nationwide



# RN hours of care per patient day (RNHPPD)

LCH

Nationwide



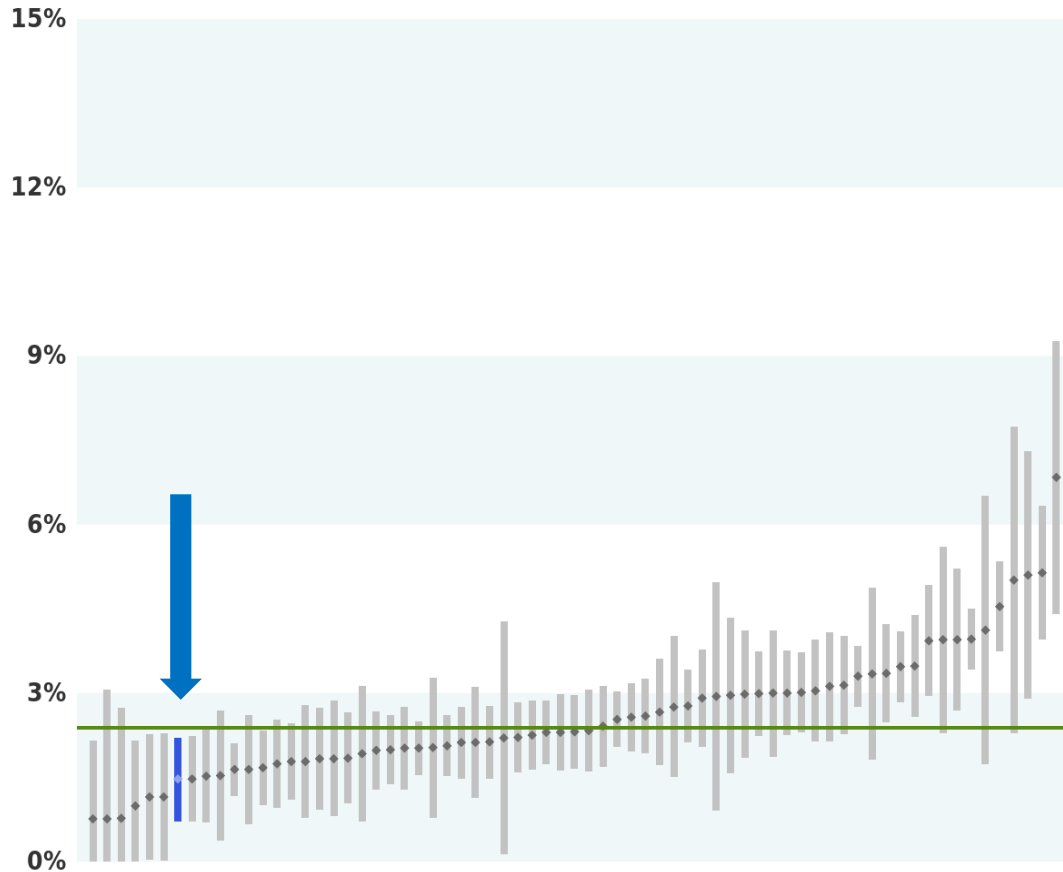
# Staffing-Respiratory Therapy

As of:		6/29/2025	7/6/2025	7/13/2025	7/20/2025	7/27/2025	8/3/2025	8/10/2025	8/17/2025	8/24/2025	8/31/2025	9/7/2025	9/14/2025	9/21/2025	9/28/2025	10/5/2025	10/12/2025	10/19/2025
RTs Filled & Functional	Total	43.5	43.5	43.5	44.4	44.4	44.4	44.4	46.2	46.2	46.2	46.2	48.9	48.9	48.9	48.9	51.6	51.6
	Target	69.7	69.7	69.7	69.7	69.7	69.7	69.7	69.7	69.7	69.7	69.7	69.7	69.7	69.7	69.7	69.7	69.7
	Travelers	3.6	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.0	0.0	0.0	0.0	0.0
	Gap	22.6	25.3	25.3	24.4	24.4	24.4	24.4	22.6	22.6	22.6	22.6	19.9	20.8	20.8	20.8	18.1	18.1

Operating at 68% goal staffing

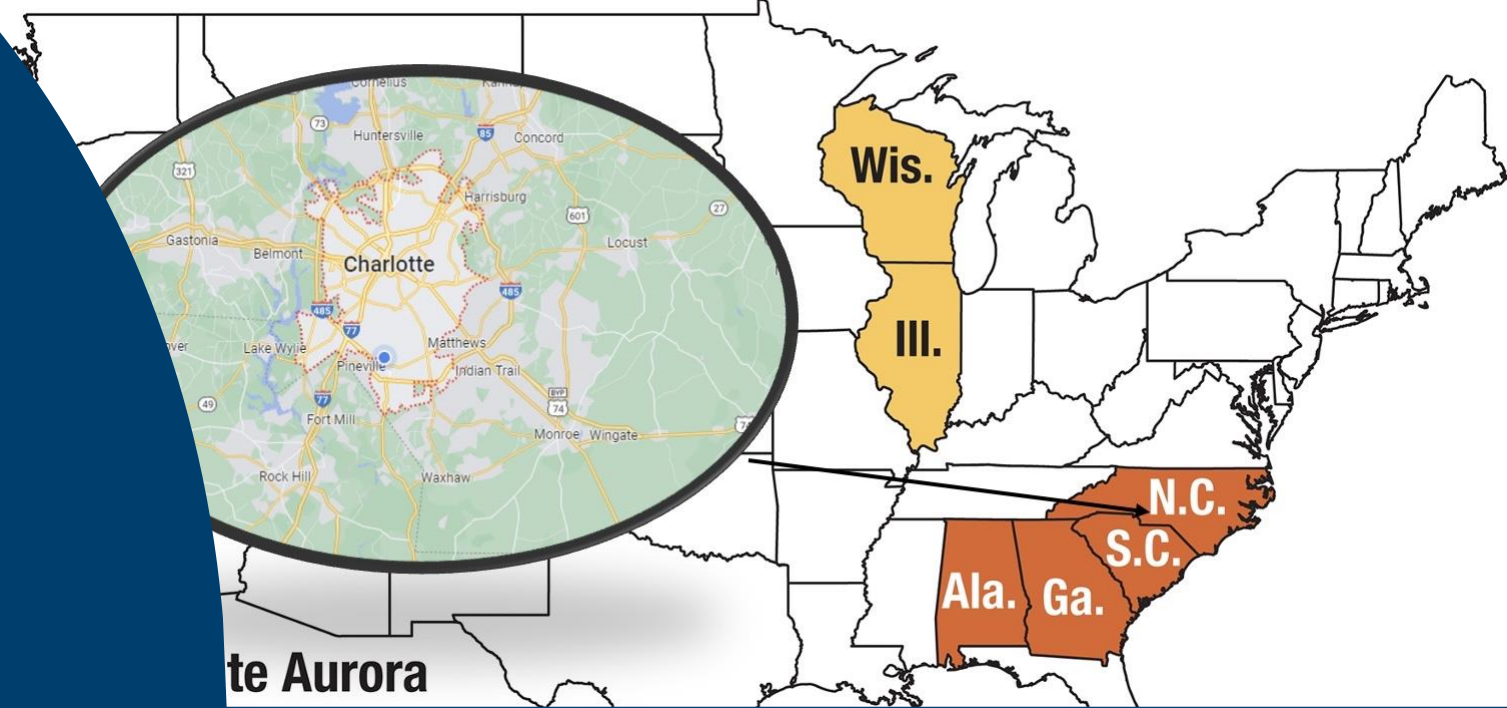
# Summary

**Surgical In-hospital Mortality**  
Version 3



**LEGEND** ■ Other Sites ■ Levine Children's ■ Aggregate - All  
95% Confidence Interval

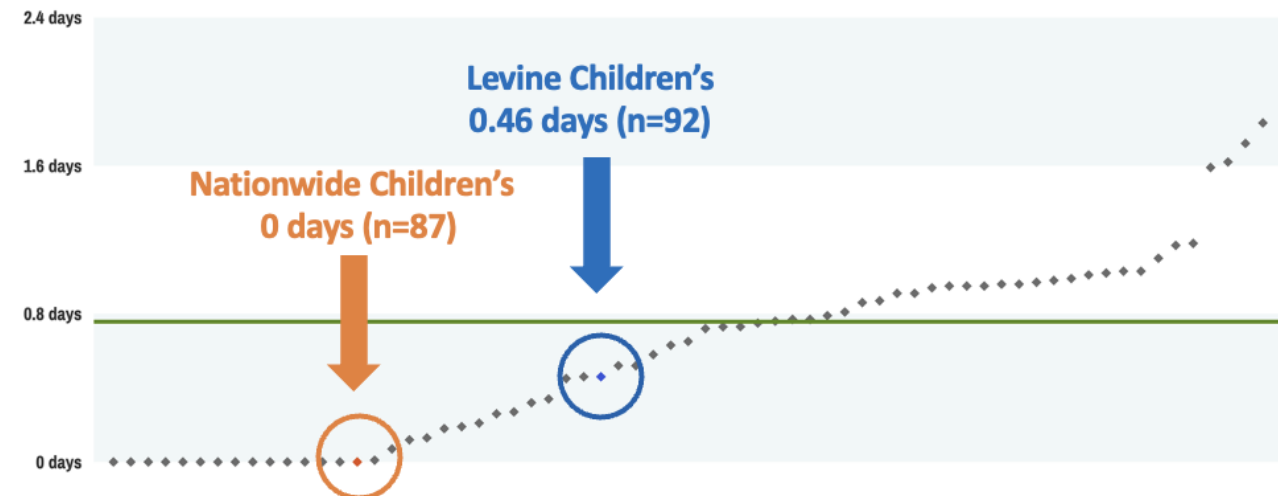
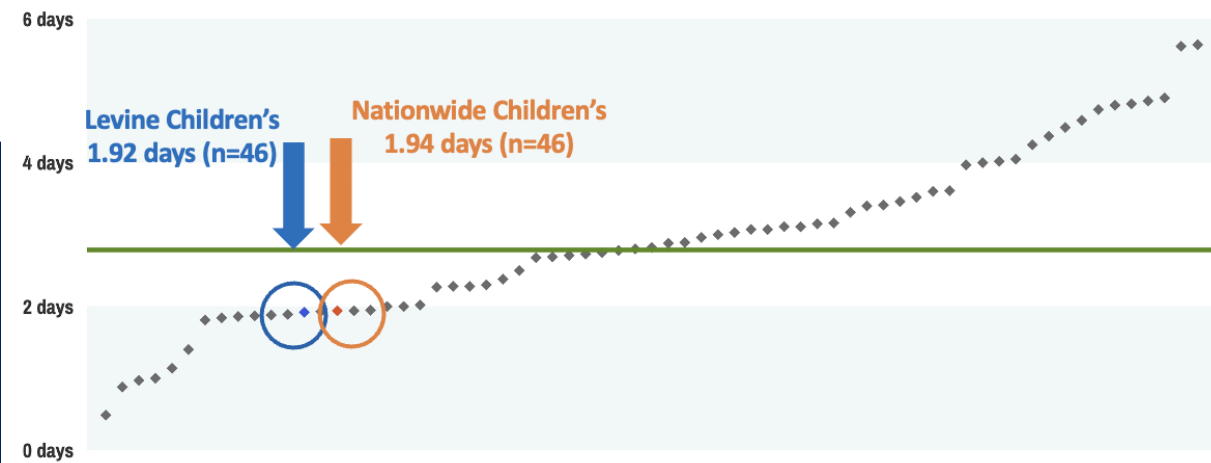
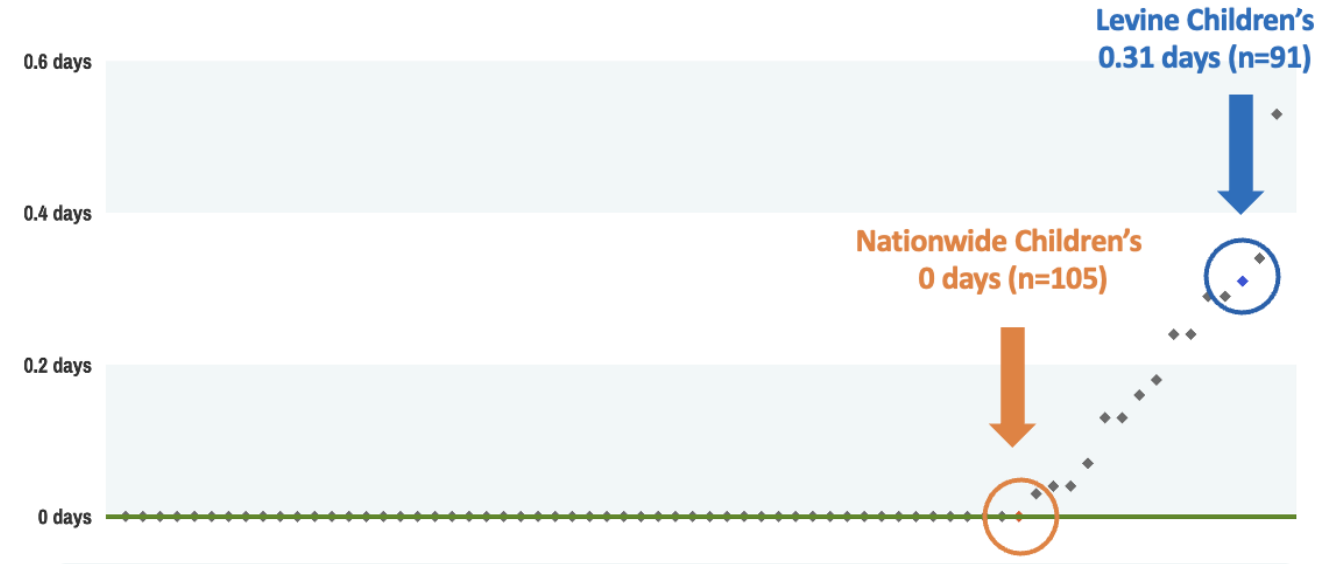
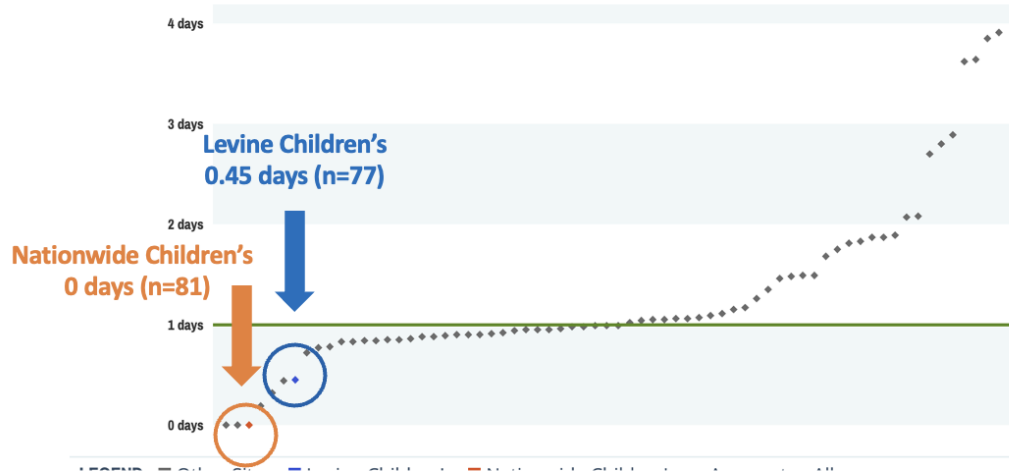
- In OR extubations can be safely done
- All programs have their own strengths versus weaknesses that must be considered
- A dunk and a lay-up are both worth two points



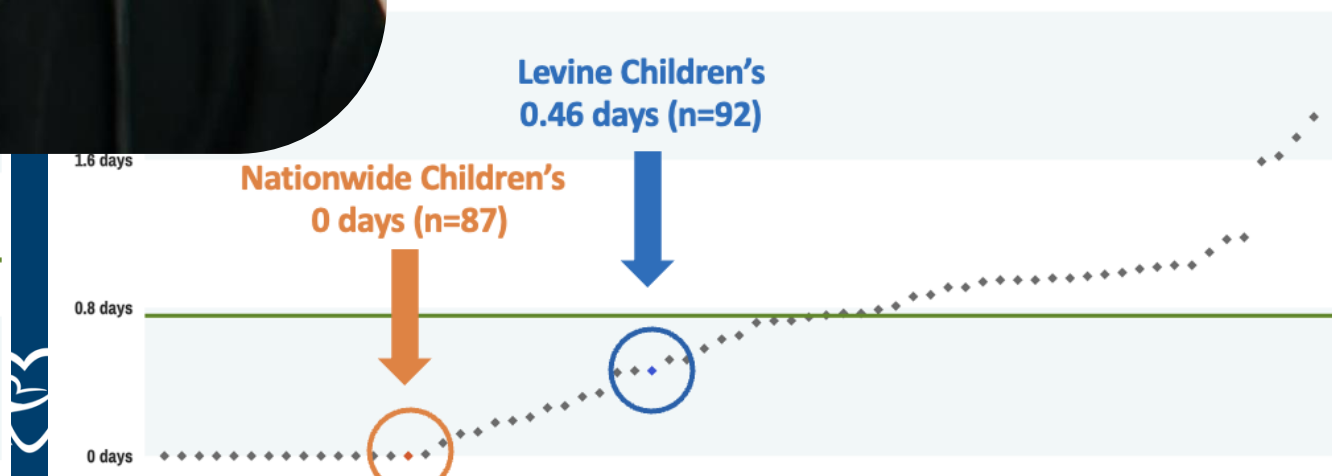
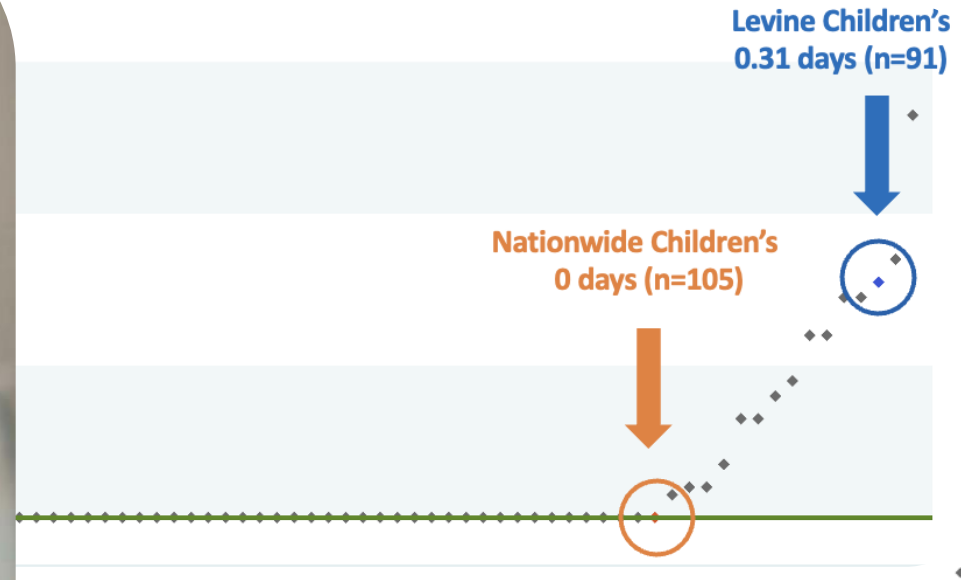
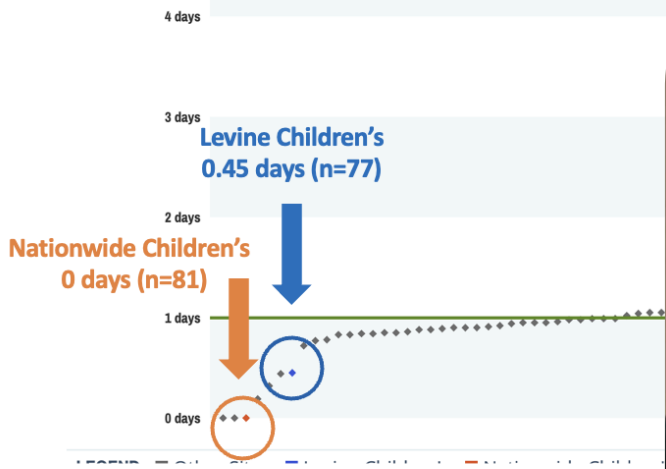
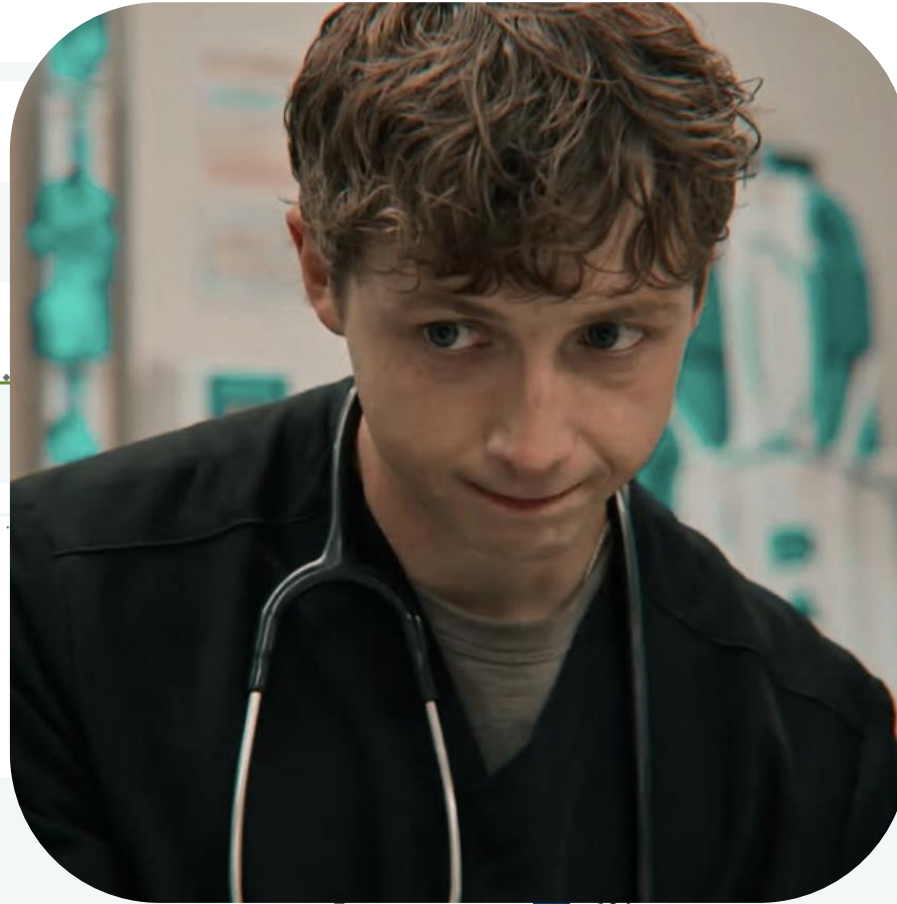
Thank You!



# Is It Clinically Significant?



# Is It Clinically Significant?



Thank You!  
Questions?