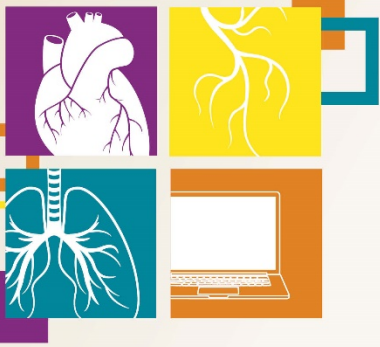




ADVANCES IN QUALITY & OUTCOMES:
A Data Managers Meeting

Anesthesia and the STS CHSD

David F. Vener, M.D.

Professor of Anesthesiology

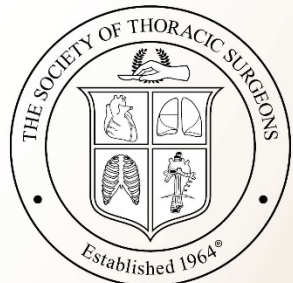
Baylor College of Medicine

Department of Anesthesiology, Perioperative and Pain Medicine

Associate Division Chief, Pediatric Cardiac Anesthesia

Texas Children's Hospital

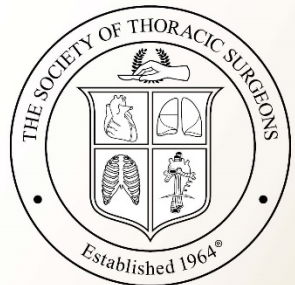
Houston, TX





Disclosures:

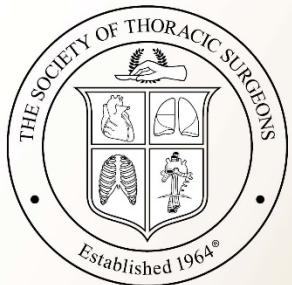
- No Financial Conflicts of Interest
- I serve on the following committees that develop and utilize this data:
 - Congenital Cardiac Anesthesia Society Board of Directors
 - STS Congenital Heart Surgery Database Committee
 - US News and World Report Pediatric Cardiology and Cardiac Surgery Working Group

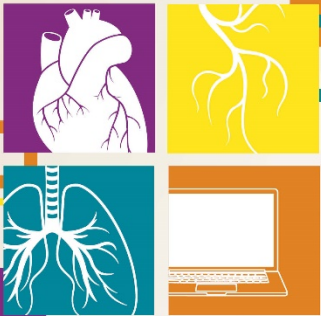




Anesthesia Changes in v3.41

- Mild changes
 - PO premed now is PO/GT
 - Ketamine infusion on post-operative drug listing
 - Some drugs are now “absolute” values rather than per kg
 - Pro-coagulents and Anti-Fibrinolytics in particular
- Moderate changes
 - Within the anesthesia there are now extra fields concerning ATIII and coagulation monitoring. I would strongly recommend working with your anesthesia group to determine if they want to be a part of the Hemostasis Interest Group of the CCAS

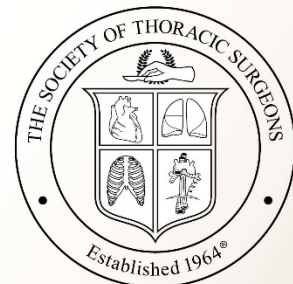




ADVANCES IN QUALITY & OUTCOMES: A Data Managers Meeting

CCAS HIG related questions

Was AT III measured preoperatively? ☐ Yes ☐ No		
Were any of the following labs checked during CPB?		
Fibrinogen	☐ Yes ☐ No	If yes → value: _____ mg/dL (range 25 – 1000)
Platelet Count	☐ Yes ☐ No	If yes → value: _____ $10^3/\mu\text{L}$
TEG on CPB	☐ Yes ☐ No	
TEG – FF on CPB	☐ Yes ☐ No	
ROTEM on CPB	☐ Yes ☐ No	
FIBTEM on CPB	☐ Yes ☐ No	
SONOCLOT on CPB	☐ Yes ☐ No	
Were any of the following labs checked in the Operating Room after CPB completed?		
Fibrinogen	☐ Yes ☐ No	If yes → FINAL value: _____ mg/dL (range 25 – 1000)
Platelet Count	☐ Yes ☐ No	If yes → FINAL value: _____ $10^3/\mu\text{L}$
TEG after CPB	☐ Yes ☐ No	
TEG – FF after CPB	☐ Yes ☐ No	
ROTEM after CPB	☐ Yes ☐ No	
FIBTEM after CPB	☐ Yes ☐ No	
SONOCLOT after CPB	☐ Yes ☐ No	

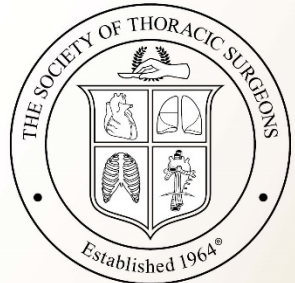




Blood Changes in v3.41

- Major Change

- Blood products are now recorded in volume (mL) and no longer in Units
 - This was done due to the inconsistency of the volume of units and the nature of the large variability in patient sizes.
- In the Perfusion Section the Blood Prime volumes for PRBC, FFP and Whole Blood are listed
 - These volumes and any additional blood products given on bypass are included in the blood products listed intraoperatively



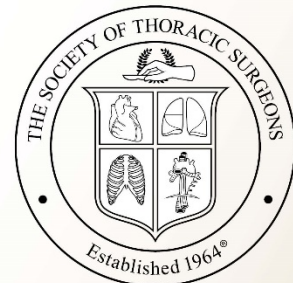


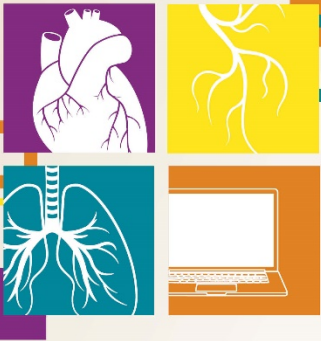
ADVANCES IN QUALITY & OUTCOMES: A Data Managers Meeting

99% of the time the answer will be Unfractionated Heparin; only exceptions will likely be VAD patients

Anticoagulant Used? ☐ Yes ☐ No ☐ Unknown			
(If Yes →) Unfractionated Heparin ☐ Yes ☐ No		Argatroban ☐ Yes ☐ No	
Bivalirudin ☐ Yes ☐ No		Other ☐ Yes ☐ No	
Blood and Blood Related Products (Including CPB Blood Prime Units)			
Blood Type: ☐ A ☐ B ☐ O ☐ AB ☐ Unknown		Rh: ☐ Positive ☐ Negative ☐ Unknown	
Autologous Transfusion: ☐ Yes ☐ No		Cell Saver/Cell Salvage _____ mL	
Transfusion of Non-Autologous Blood Products Initiated Before Leaving OR: ☐ Yes ☐ No ☐ Patient/family refused			
(If Yes →)	Packed Red Blood Cells _____ mL (0-10000)	Fresh Frozen Plasma _____ mL (0-10000)	
	Fresh Plasma _____ mL (0-10000)		
	Platelets _____ mL (0-10000)	Cryoprecipitate _____ mL (0-10000)	
	Fresh Whole Blood _____ mL (0-10000)	Whole Blood _____ mL (0-10000)	

Note that blood is now listed in mL transfused; Transfusion before leaving OR INCLUDES blood put into bypass circuit during the case (both prime and additional volumes).





Example:

- Pre-pump

- PRBC 50 cc

- Perfusion

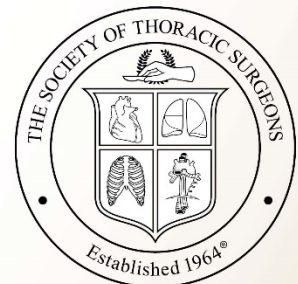
- Pump Prime – PRBC 250 cc, FFP 125 cc
 - Additional blood given on bypass PRBC 250 cc, FFP 225 cc

- Post-pump

- Plateletpheresis 50 cc
 - Cryoprecipitate 30 cc

Intraop Transfusion

PRBC – 550 cc (50+250+250)
FFP - 350 cc (125 + 225)
Plateletpheresis – 50cc
Cryoprecipitate – 30 cc





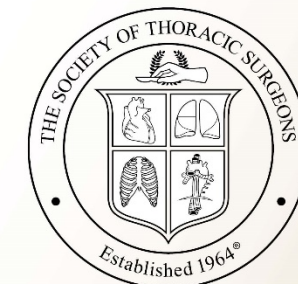
ADVANCES IN QUALITY & OUTCOMES: A Data Managers Meeting

FWIW

At TCH we use a simple form from perfusion to facilitate communication between the perfusion team and the anesthesia team recording blood products administered on bypass. We then put this information into EPIC to facilitate later harvest of accurate data.

Anesthesia Scoreboard		
		
Weight	0	Kg
Height	0	cm
BSA	0.00	m ²
Bypass		min
X Clamp		min
ACP		min
Circ Arrest		min
Low Temp		Celsius
 Blood Products Used 		
PRBC		ml
FFP		ml
Cell Saver		mL
RBC Prime		FFP Prime

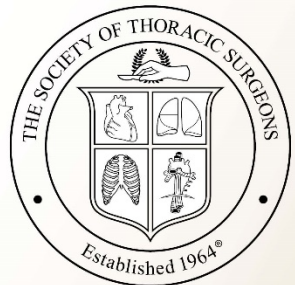
FFP Vol (Non-BPAM) mL	292							307 mL	307 mL
Plateletpheresis Vol ... mL	30	30	30		10			100 mL	100 mL
RBC Vol (Non-BPAM) mL	514							549 mL	549 mL





How have we used Anesthesia Data in the Last Year?

- Tracking Extubation Data
 - Frequency of “In OR” extubation
 - Time to extubation if not Intubated
- Tracking Time from Anesthesia Start to Anesthesia Ready
- Blood product and pro-coagulant utilization
- Case mix distribution among faculty



How are we doing at TCH?

What are some of the important metrics?

- **Adverse Event Monitoring**
- **Early Extubation**
 - Prolonged intubation leads to the risk of greater complications and can prolong ICU stay
 - Positive Pressure Ventilation is not a normal physiologic state; for certain pathologies (ie SV post-Glenn or Fontan), the physiologic benefit of negative inspiratory efforts needs to be balanced against the benefits of PPV
- **Usage of Newer Technologies and Medications**
 - Ultrasound-guided arterial, central and peripheral venous access
 - Widespread usage of Dexmedetomidine

Anesthesia Adverse Events: 2015 - 2018

	<u>TCH</u>	<u>STS</u>
No Reported Anesthesia Event	2,535 (93.5%)	(80.0%)
<i>Missing</i>	32 (1.2%)	(17.5%)
Most Common Events:		
Unexpected Difficult Intubation	17 (0.6%)	(0.3%)
Stridor / Sub-glottis Stenosis	10 (0.4%)	(0.1%)
Oral / Nasal Injury Bleeding	10 (0.4%)	(0.1%)
Hemoptysis	11 (0.4%)	(0.0%)
Protamine Reaction	9 (0.3%)	(0.1%)
Intravenous Infiltration	9 (0.3%)	(0.1%)
Cardiac Arrest Related to Anesthesia	6 (0.2%)	(0.1%)
Anaphylaxis/Anaphylactoid Reaction	6 (0.2%)	(0.0%)

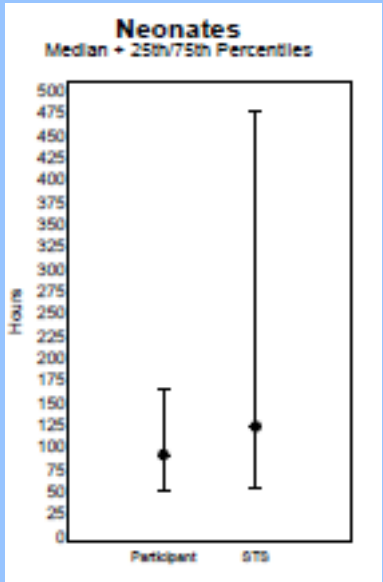
Extubation

Extubated in OR		TCH Last 4 years	STS Last 4 years
	Yes	870 (32.9%)	16,194 (25.4%)
	No	1,762 (66.6%)	47,080 (73.9%)
	<i>Missing</i>	13 (0.5%)	397 (0.6%)

Reintubated after Initial Extubation		TCH Last 4 years	STS Last 4 years
	Yes	208 (7.9%)	9,611 (15.1%)
	No	2,356 (89.1%)	53,352 (83.8%)
	<i>Missing</i>	81 (3.1%)	708 (1.1%)

Time to Final Extubation if NOT Extubated in OR

Overall	TCH	STS
0 – 6 Hours	8.0%	15.8%
6 – 24 Hours	38.1%	24.7%
> 24 Hours	52.7%	54.3%



Neonates	TCH	STS
0 – 6 Hours	0.7%	1.8%
6 – 24 Hours	11.9%	8.1%
> 24 Hours	86.7%	86.8%

TCH 2010 - 2018

ASD n=254 Extubated in OR 85.1%
 Fontan n=301 Extubated in OR 88.7%
 VSD n=534 Extubated in OR 35%
 BDG n=197 Extubated in OR 6.1%
 TOF n=293 Extubated in OR 12.3%

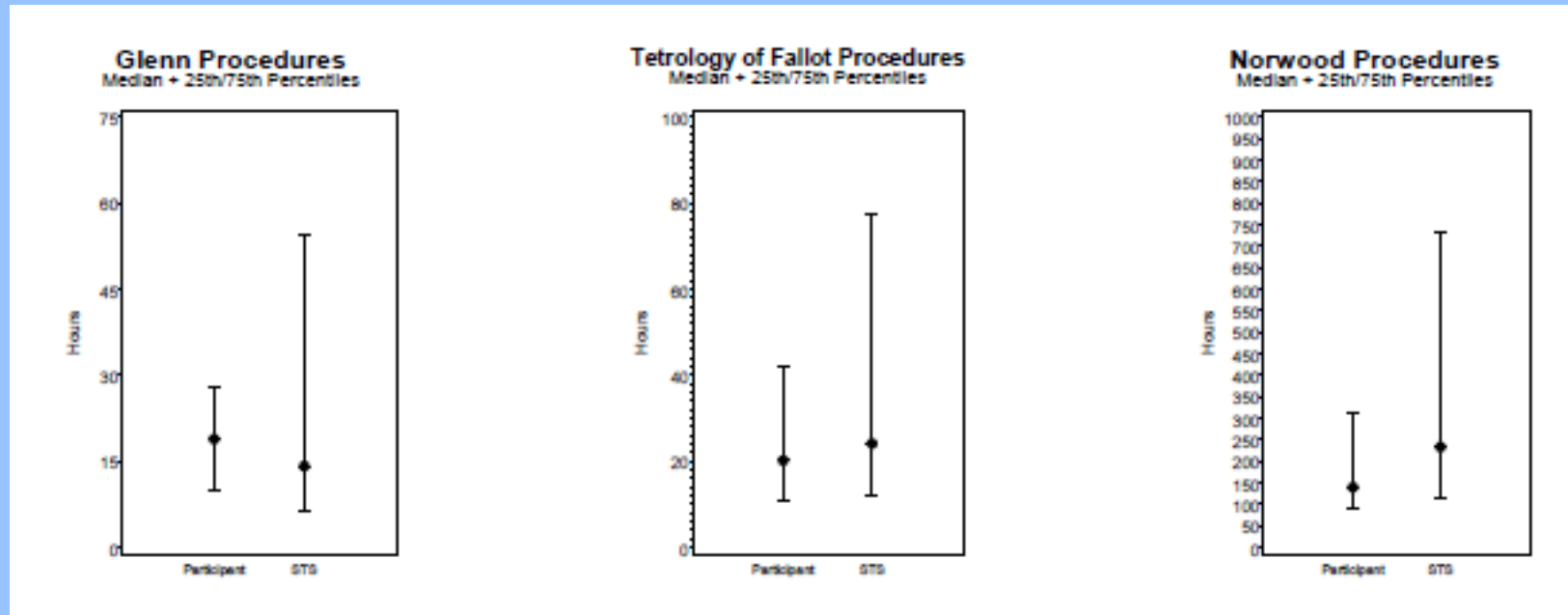
Coarct n=173 Extubated in OR 18.5%

Procedure	Extubated in OR N (%)	Time (hours) from skin closure to initial extubation among patients NOT extubated in OR*
ASD N= 3,648	1,830 (50.2)	3.7 (1.1, 6.8)
Fontan N= 3,830	1,685 (44.0)	6.9 (3, 18)
VSD N= 6,066	1,531 (25.2)	13.7 (5.8, 25.9)
Glenn/Hemi-Fontan N= 4,151	952 (22.9)	11.4 (4.9, 23.8)
TOF N= 4,126	705 (17.1)	22.3 (10.2, 48.3)
AVC N= 2,858	259 (9.1)	25.2 (16.8, 70.1)
Truncus N= 542	16 (3.0)	114.6 (69.1, 169.1)
ASO N= 1,595	47 (2.9)	67 (40, 108.5)
ASO + VSD N= 754	15 (2.0)	81.3 (44, 137.7)
Norwood N= 2,695	23 (0.9)	141.4 (92.4, 239.7)
Off-Bypass Coarctation N= 4,886	870 (17.8)	23.8 (11.6, 58.1)

*Values expressed as percentage or median (Q1, Q3).

Vener D, Abassi R, Brown M, Greene N, Guzzetta N, Jacobs J, Latham G, Mossad E, et al. The CCAS – STS Cardiac Anesthesia Database Collaboration. W Jnl Ped Cong Ht Surg *accepted in press*

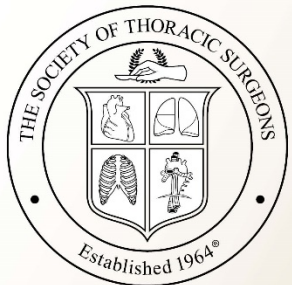
Specific Surgical Repairs if NOT Extubated in OR





Controversies in Anesthesia Data

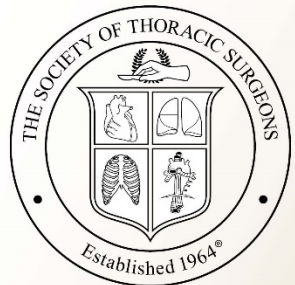
- “Extubation” Data
 - We have yet to come up with a suitable mechanism for capturing patients who may have multiple intubation episodes over a long hospitalization.
 - My PERSONAL approach has been to tie the recorded intubation to a specific surgery
 - If a patient is intubated for a given procedure and then successfully extubated for > 48 hours prior to needing re-intubation then I record those times. Example: Norwood – intubated until POD #5 and then extubated. Stays in hospital 4 months during which may be reintubated several times for procedures such as G-tube or PICC line placement for short periods of time. Finally undergoes a Glenn procedure. I would then record a new intubation event for the Glenn and the time of extubation related to the Glenn.
 - According to the STS definitions, the intubation for the Norwood would be the initial intubation and the extubation for the Glenn would be the time of “final” extubation for the Norwood. Doesn’t reflect reality.





Controversies in Blood Data

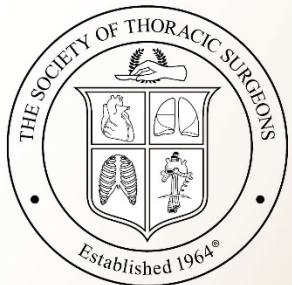
- See “Extubation”
 - If it is a return to the OR I start a new blood section rather than as a continuation of the initial case

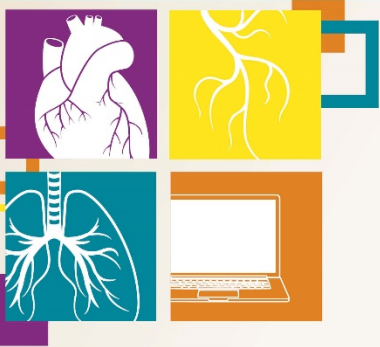




ADVANCES IN QUALITY & OUTCOMES:
A Data Managers Meeting

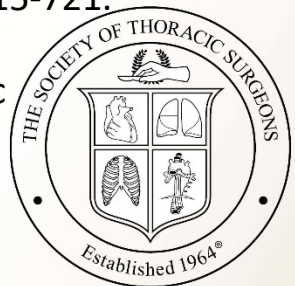
- “Without data, you’re just another person with an opinion” – J. Edward Deming
- Remember however, “Without an opinion, you’re just another person with data”
 - We are not just collecting this data to sit on it
 - It plays an important role in ongoing patient care





Publications to Date

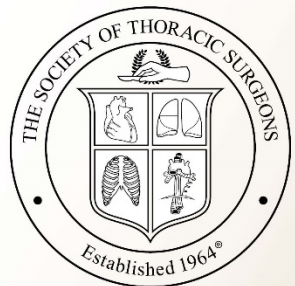
- Greene, N, Jooste EH, Thibault DP, Wallace AS, Wang A, Vener DF, Matsouaka RA, Jacobs ML, Jacobs JP, Hill KD, Ames WA, A Study of Practice Behavior for Endotracheal Intubation for Children with Congenital Heart Disease Undergoing Surgery: Impact of Endotracheal Intubation Site on Perioperative Outcomes. *Anes Analg* ePub Sep 5, 2018. PMID: 30198928.
- Kartha VM, Jacobs JP, Vener D, Hill K, Goldenberg NA, Pasquali SK, Meza JM, O'Brien SM, Feng L, Chiswell K, Eghtesady P, Badhwar V, Rehman M, Jacobs ML, National Benchmarks for Proportions of Patients Receiving Blood Transfusions during Pediatric and Congenital Heart Surgery: An analysis of the Society of Thoracic Surgeons (STS) Congenital Heart Surgery Database. *Ann Thorac Surg* 2018 Oct; 106(4): 1197-1203. PMID: 29902465.
- Vener DF, Pasquali S, Mossad EB. Anesthesia and Databases: Pediatric Cardiac Disease as a Role Model. *Anes Analg* 2017; Vol 124(2): 572 -581. PMID: 28099323.
- Vener DF, Gaies M, Jacobs JP, Pasquali SK. Clinical Databases and Registries in Congenital and Pediatric Cardiac Surgery, Cardiology, Critical Care and Anesthesiology Worldwide. *World J Ped Cong Ht Sgy* 2017; Vol 8(1): 77-87. PMID: 28033081
- Schwartz LI, Twite M, Gulack B, Hill K, Kim S, Vener DF: The perioperative use of dexmedetomidine in pediatric patients with congenital heart disease: an analysis from the CCAS-STs Congenital Heart Disease Database. *Anes Analg* 2016; 123 (3): 715-721. PMID: 27167685.
- Vener DF, Guzzetta N, Jacobs J, Williams G: Development and Implementation of a New Data Registry in Congenital Cardiac Anesthesia. *Annals of Thoracic Surgery* 2012; 94: 2159-2165. PMID: 23176940.





Pending Publications (Submitted)

- Ross F, et al. Seattle Children's Hospital.
 - Associations Between Anthropometric Indices and Outcomes of Congenital Heart Operations in Infants and Young Children: An Analysis of Data from the Society of Thoracic Surgeons Database
- Vener DF, et al. CCAS Database Committee
 - The Congenital Cardiac Anesthesia Society – Society of Thoracic Surgeons Cardiac Anesthesia Database Collaboration





ADVANCES IN QUALITY & OUTCOMES:
A Data Managers Meeting

Questions?

- I can always be reached by email or text if you or your team have any questions:
 - David Vener, MD
vener@bcm.edu
832-362-8174



THANK YOU FOR ALL YOUR SUPPORT!

