

Relationship of Institutional Case Volume and Complexity to the STS Star Rating

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Note: All data shown is publically reported and available

Objective

- Evaluate the impact of institutional variation in surgical volume and case mix complexity on the Society of Thoracic Surgeons (STS) Star Rating.
 - ***The Society of Thoracic Surgeons*** is an international organization that represents cardiothoracic surgeons, researchers and other health care professionals who are part of the cardiothoracic surgery team.
 - ***STS Star Rating*** is a system developed to provide parents with a measure of institutional performance using risk adjusted outcomes.

Background

Public Reporting Goals

- Provide transparency
- Accountability
- Educate health care consumers
- Reduce costs
- Improve patient care

Background

Why is there confusion surrounding public reporting?

- Multiple reporting options
- Simple to complex methodologies
- Lack of standardization

Public Reporting Comparisons

Hospital	Total Cases	STS Star Rating	USNWR Top Ten Hospitals	USNWR Top Ten Cardiac	Parent Magazine Top Ten	Healthcare Administration	Leapfrog Honor Roll
Texas Children's Hospital	2646	★★★★					
Phoenix Children's Hospital	1589	★★★★					
Children's Hospital of Wisconsin	1389	★★★★					
Children's Hospital of Pittsburgh of UPMC	1292	★★★★					
Ann & Robert H. Lurie Children's Hospital of Chicago	1229	★★★★					
Advocate Children's Hospital	1218	★★★★					
MUSC Children's Hospital	1155	★★★★					
Le Bonheur Children's Hospital for Children, TN	1037	★★★★					
UF Health Shands Children's Gainesville	811	★★★★					
Penn State Hershey Children's Hospital	593	★★★★					
Boston Children's Hospital	3782	★★					
Children's Hospital of Philadelphia	2525	★★					
New York-Presbyterian Morgan Stanley-Komansky Children's Hospital	2345	★★					
Children's Hospital of Los Angeles	2283	★★					
University of Michigan C.S. Mott Children's Hospital, Ann Arbor	2008	★★					
Lucile Packard Children's Hospital of Stanford, Palo Alto, CA	1883	★★					
Children's Hospital Colorado, Aurora	1617	★★					
Seattle Children's Hospital	1384	★★					
Cincinnati Children's Hospital Medical Center	1305	★★					
Rady Children's Hospital	1143	★★					
Johns Hopkins Children's Center	822	★★					
Cleveland Clinic Children's Hospital	601	★★					
Arnold Palmer Hospital for Children, FL	490	★★					
Florida Hospital for Children, FL	361	★★					
St. Christopher's Hospital of Children, PA	301	★★					
Nationwide Children's Hospital, Columbus, Ohio	1408	★					
Children's National Health System, DC		DNR					
Joe DiMaggio Children's Hospital, FL		DNR					
Loma Linda University Children's Hospital, CA		DNR					
Monroe Carell Jr. Children's Hospital at Vanderbilt, TN		DNR					

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STS Public Reporting Framework

- Voluntary reporting of surgical outcomes
- Risk adjusted outcomes
- Star ratings
- Benchmark comparisons

STS Risk Adjustment




Patient Variables
Prematurity (neonates and infants)
Any non-cardiac congenital anatomic abnormality
Any chromosomal abnormality or syndrome
Preoperative Risk Factors <ul style="list-style-type: none">Preoperative/Preprocedural mechanical circulatory support (IABP, VAD, ECMO or CPS)Shock, Persistent at time of surgeryMechanical ventilation to treat cardiorespiratory failureRenal failure requiring dialysis and/or Renal dysfunctionPreoperative neurological deficitAny other preoperative risk factor (eg: infant of diabetic mother, IUGR and FTT)
Operative Variables
Age at surgery
Weight (neonates and infants) at surgery
Prior cardiothoracic operation
Primary procedure

Adjustment for Case Complexity

- STS STAT Mortality Categories

Data version 3.22 Procedure	Procedure	STAT Mortality Score	STAT Mortality Category
30	ASD repair, Patch	0.1	1
190	AVC (AVSD) repair, Partial (Incomplete) (PAVSD)	0.1	1
740	Ross procedure	0.4	2
820	LV to aorta tunnel repair	0.4	2
150	Ventricular septal fenestration	0.8	3
170	AVC (AVSD) repair, Complete (CAVSD)	0.8	3
1280	Aortic arch repair	1.4	4
1650	PA debanding	1.4	4
870	Norwood procedure	4	5
**2220	Truncus + IAA Repair	5	5

STS Star Rating Methodology

- Observed to Expected Ratios (O/E)
 - Observed deaths: # reported in your data
 - Expected deaths: statistical estimation deaths expected given patient risk factors
- 3 Star Rating 
 - O/E Ratio Significantly Less than 1
 - Better than Expected
- 2 Star Rating 
 - O/E Ratio Not Different than 1
 - As Expected
- 1 Star Rating 
 - O/E Ratio Significantly Greater than 1
 - Worse than Expected

WARNING!

The Star Rating reflects an institution's performance according to their specific case-mix and does not imply similar performance with a different mix or greater case complexity

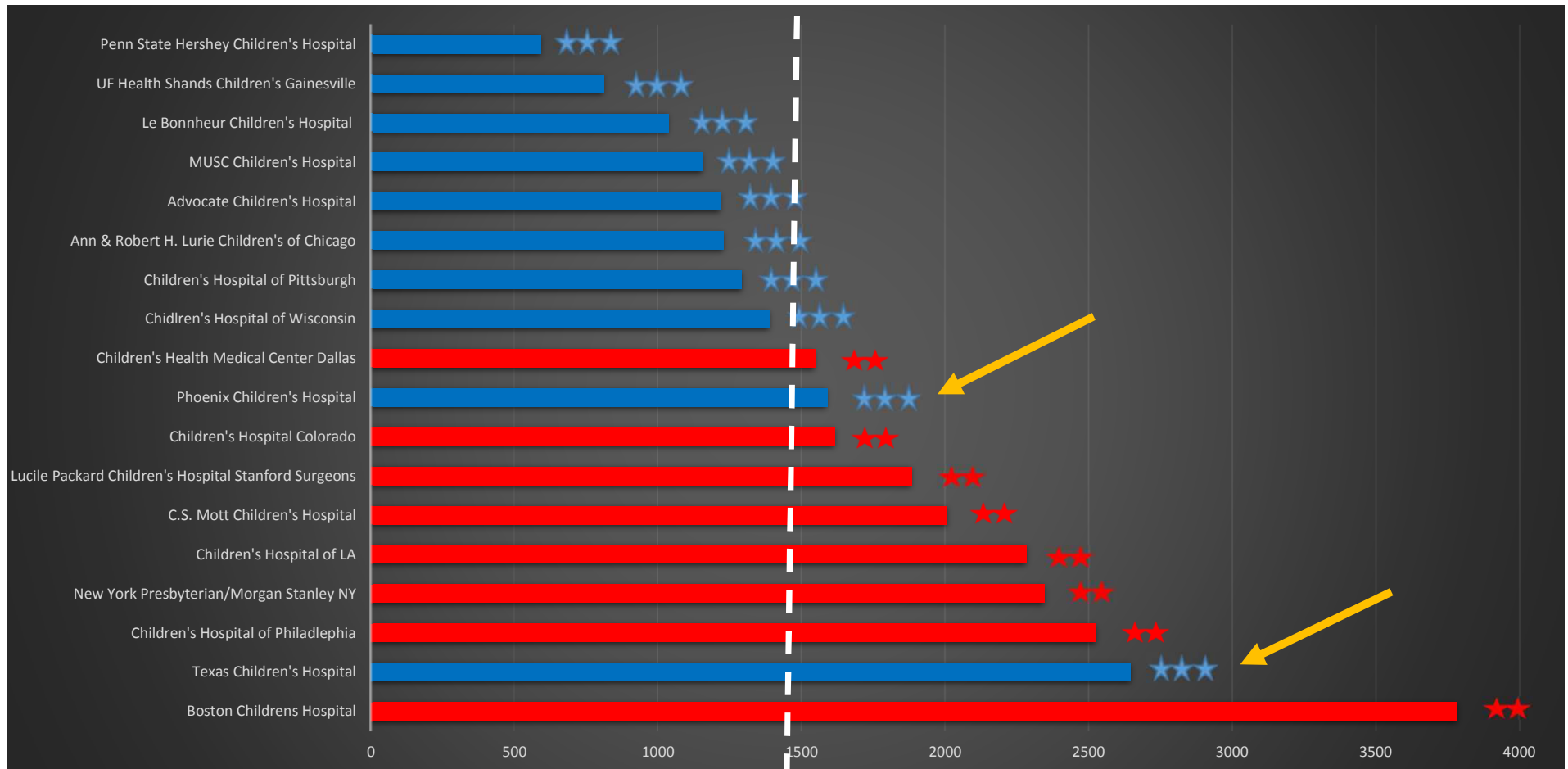
Methods

- Data downloaded from the STS Congenital Heart Surgery Public Heart Surgery Public Reporting website.
 - <http://publicreporting.sts.org/chsd>

STS Public Report Summary 1/1/13 – 12/31/16			
Star Rating	# of Participants	# of Programs	% of Programs with Star Rating
No Star Rating	13	11%	XX
1 Star	18	16%	17%
2 Star	74	64%	72%
3 Star	11	9%	11%
Total	116	100%	100%

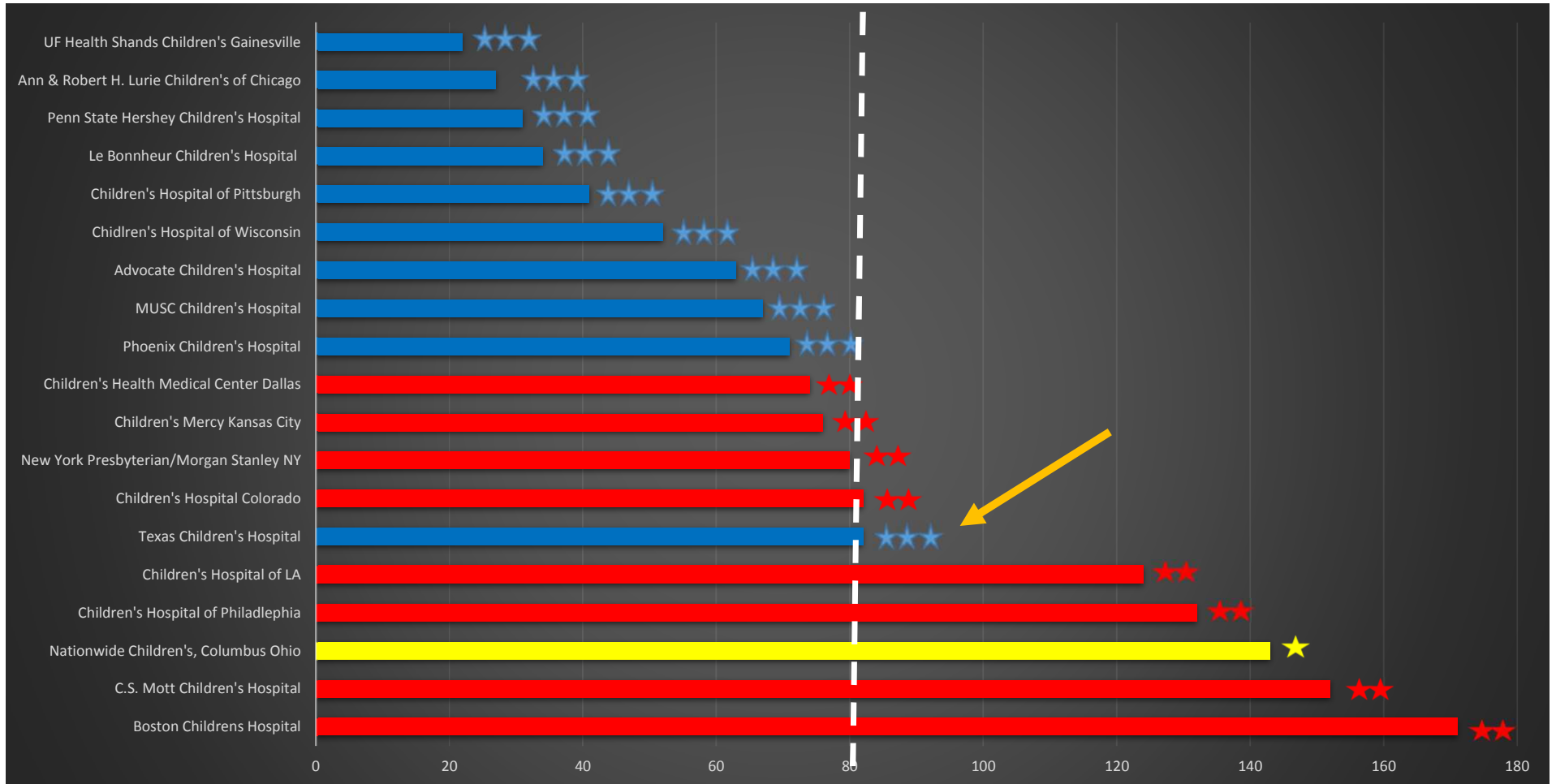
- Timeframe: 1/1/2013 – 12/31/2016

Overall Case Volume 1/1/13-12/31/16



STAT 5 Volume

1/1/13 – 12/31/16



Conclusions

- There is a relationship between case volume and complexity and the Star Rating.
- The majority of three star programs performed fewer cases and especially fewer high complexity cases compared to the high volume centers.
- The majority of centers performing a large number of high complexity cases are STS 2 Star centers.
- These findings must be considered when using the Star Rating System to assess institutional performance.