Tetralogy of Fallot Case Study

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Disclosures

I have nothing to disclose

Patient History

- Patient was born at OSH @ 29 1/7 weeks to a 32 y.o. G2P1 mother via spontaneous vaginal delivery. BW 1244 grams, length 35 cm, HC 28cm. Adequate prenatal care and maternal temp 102.7 noted, GBS unknown, no other pregnancy related complications.

- Apgars 6/6/7. Required CPAP and transferred to CHOC NICU, intubated for cryosurf administration x 1, transitioned to NIPPV; on no inotropic support. ECHO done noted TOF with valvar & subvalvar PS and a small PDA

- 2 vessel cord noted

Question #1

What would you code as pre-operative ventilatory support based on this history?(PreOpFactor 850)

1. (470) Invasive Mechanical ventilation to treat cardiorespiratory failure
2. (600) Non-Invasive respiratory support to treat cardiorespiratory failure
3. Both
4. None

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Poll: What would you code as pre-operative ventilatory support based on this history?(PreOpFactor 850)

Answer #1

1. (600) Non-Invasive respiratory support to treat cardiorespiratory failure

- (470) Invasive Mechanical ventilation to treat cardiorespiratory failure
  This patient was supported with mechanical ventilation only for the purpose of administering the Cryosurf, not due to respiratory failure.

Course of Care

- Patient spent 12 weeks in the NICU with a course including sepsis (DOL 5), hyperbilirubinemia, ROP Stg 1, IVH grade 1, anemia of prematurity, hydrocele, left club foot, talipes equinovarus, sacral dimple, and feeding difficulties.

Question #2

Which of the following would you code as preoperative factors given the 12 week NICU course?

1. Sepsis (380)
2. Coagulation disorder, Hypocoagulable state not secondary to medication (intrinsic hypocoagulable state) (350)
3. Other preoperative factors (777) Hydrocele, left club foot, talipes equinovarus, & sacral dimple.
4. None of the above

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Poll: Which of the following would you code as preoperative factors given the 12 week NICU course?

Answer #2
4. None of the above

- (380 Sepsis)- Code this factor if the patient has signs of sepsis within 48 hours of OR Entry Date and Time.
- (350) Coagulation disorder- Code this factor if the patient has evidence of a coagulopathy at the time OR Entry Date and Time
- Other preoperative factors (777) Hydrocele, left club foot, talipes equinovarus, & sacral dimple. Non Cardiac Congenital Abnormalities

Surgery

- Surgical Findings/Procedure

During induction; the patient experienced laryngospasm progressing to cardiac arrest requiring compressions & epinephrine.. The patient was stabilized and intubated. The duct was dissected out and tied. An incision was now made on the RV outflow, carried across the hypoplastic valve and out onto the LPA. This relieved all subvalvar, valvar and supravalvar obstruction. Through this incision, we could see the VSD, a patch was lowered in position, the sutures tied, the VSD appeared well closed with this. A transannular patch was now fashioned of CardioCel in an egg shape. This was sutured in the PA and on the RV. Once this was completed, the left side of the heart was carefully deaired, the cross-clamp was released and the PFO was left behind as a pop-off. The right atrium was closed. The patient was warmed and weaned from bypass on milrinone, calcium, epinephrine, dopamine and nitric oxide. The entire wound was then inspected for hemostasis and when it was felt to be adequate, closure undertaken. The sternum was left open per plan due to the prematurity of the patient.

Question # 3
How would you capture the cardiac arrest in the operating room?

1. (30) Unexpected cardiac arrest, Timing = Cardiac arrest (MI) during or following procedure (Perioperative/Periprocedural = Intraoperative/Intraprocedural and/or Postoperative/Postprocedural)
2. (430) Anesthesia-related complication
3. (200) Cardio-pulmonary resuscitation *as a pre-operative factor*

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Poll: How would you capture the cardiac arrest in the operating room?

Answer # 3
2. (430) Anesthesia-related complication

- Anesthesia-related complication independent of surgical procedure (e.g., cardiac arrest during induction or failed intubation).

- If collecting Anesthesia Data also code:
  - (280) Cardiac Arrest related to anesthesia care
  - (450) Laryngospasm requiring medication An uncontrolled/involuntary spasm of vocal cords REQUIRING MEDICATION to treat (i.e. NOT positive pressure alone)

Question # 4
What is the Primary Procedure?

1. PDA closure, Surgical (1330). STAT 2

2. TOF repair, No ventriculotomy (350). STAT 1

3. TOF repair, Ventriculotomy, Nontransannular patch (360). STAT 1

4. TOF repair, Ventriculotomy, Transannular patch (370). STAT 2

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Poll: What is the Primary Procedure?

Answer #4

4. TOF repair, Ventriculotomy, Transannular patch (370).

- Tetralogy of Fallot repair (assumes VSD closure and relief of pulmonary stenosis at one or more levels), with use of a ventriculotomy incision and placement of a trans-pulmonary annulus patch. If the main pulmonary artery incision is extended proximally through the pulmonary annulus, this must be considered "transannular" and thus a ventricular incision, though the length of the incision onto the ventricle itself may be minimal.

Reference

STS Congenital Heart Surgery Database Data Specifications Version 3.41 p. 136
http://www.sts.org/sites/default/files/documents/CongenitalDataSpecsV3_41.pdf

PSF Primary Procedure Rule

- **If a multiple procedure operation includes as a component procedure any one of the following procedures** (which are the procedures listed onthe Data Collection Form in the section titled "PROCEDURE SPECIFIC FACTORS", exclusive of the three VSD repair procedures), *then that procedure will be designated as the Primary Procedure for the operation*. In the event that two such procedures are included as component procedures of a multiple procedure operation, then the eligible procedure with the highest STAT Score will be designated as the Primary Procedure for that operation:
- TOF - AVC (AVSD) repair
- TOF repair, No ventriculotomy
- TOF repair, Ventriculotomy, Nontransanular patch
- TOF repair, Ventriculotomy, Transanular patch
- TOF repair, RV-PA conduit
- TOF - Absent pulmonary valve repair

Reference

Spring 2019 Harvest Report: e2. Determination of the Primary Procedure of an Operation and Classification of Multiple-Procedure Operations

Procedure Specific Factors

If one of the following is the Primary procedure, specify whether the procedure specific factors apply

- ☐ TOF repair, No ventriculotomy
- ☐ TOF repair, Ventriculotomy, Nontransanular patch
- ☐ TOF repair, Ventriculotomy, Transanular patch
- ☐ TOF repair, RV-PA conduit
- ☐ TOF - Absent pulmonary valve repair
- ☐ Pulmonary atresia - VSD - MAPCA repair, Complete single stage repair (1-stage that includes bilateral pulmonary unifocalization + VSD closure + RV to PA connection [with or without conduit])
- ☐ Pulmonary atresia - VSD - MAPCA repair, Status post prior complete unifocalization (includes VSD closure + RV to PA connection [with or without conduit])
- ☐ Pulmonary atresia - VSD - MAPCA repair, Status post prior incomplete unifocalizarion (includes completion of pulmonary unifocalization + VSD closure + RV to PA connection [with or without conduit])
- ☐ Pulmonary atresia - VSD (including TOF, PA) repair

Major coronary crossing RVOT - Coronary anomaly restricting RVOT enlargement	☐ Yes	☐ No
VSD, Multiple, Repair	☐ Yes	☐ No
Restrictive VSD	☐ Yes	☐ No
Hypoplastic branch pulmonary arteries (diminished pulmonary vascular bed)	☐ Yes	☐ No

Reference
The Society of Thoracic Surgeons Congenital Heart Surgery Database
Data Collection Form Version 3.3
July 1, 2015
Retrieved from http://www.sts.org/sites/default/files/documents/CongenitalDCF_v3_3_Annotated.pdf

Post Surgical Course

- Patient experienced JET after weaning off bypass, returned to ICU overdrive pacing at atrial rate of 175 bpm.
- POD #1- JET resolved, oliguric
- POD #2- Chest Closure, iNO weaned off. Remains on Epi & milrinone, vasopressin started after chest closure. Oliguria continues, BUN increasing (22 to 30) Creatinine stable (0.3).
- POD #3- BUN up to 49 & Cr increased to 0.8. Remains on vasoactives (milrinone decreased d/t AKI). Ascites noted on ultrasound.
- POD #4- BUN/Cr unchanged. Ascites continues, parents refused PD.
- POD #5- Epi & vasopressin weaned off, ascites improving, UOP increasing. Pleural Effusion noted.
- POD #7- Pigtail placed to drain pleural effusion
- POD #10- Extubated to HFNC
- POD #17- GTT placement due to ongoing high need (90%) gavage feeds
- POD #28- Transitioned to home nasal cannula 1/8 liter

Question # 5
Which of the following postoperative complications should be coded?

1. Cardiac failure, severe dysfunction (384), Multi-System, Organ Failure (MSOF)= Multi-Organ Dysfunction Syndrome (MODS) (370), Arrhythmia, necessitating temporary pacemaker (75) , Renal failure-acute renal failure, Acute renal failure requiring temporary dialysis with the need for dialysis not present at hospital discharge (223), Unplanned non-cardiac reoperation during the postoperative or postprocedural time period (26), Sternum left open, Planned (102), Postoperative/Postprocedural respiratory insufficiency requiring mechanical ventilatory support > 7 days (150), Pleural effusion requiring drainage (200), Postoperative/Postprocedural respiratory insufficiency requiring mechanical ventilatory support > 7 days (150). Anesthesia-related complication Anesthesia-related complication independent of surgical procedure (430).

2. Cardiac failure resulting in low cardiac output (384), Multi-System, Organ Failure (MSOF)= Multi-Organ Dysfunction Syndrome (MODS)(370), Arrhythmia, necessitating temporary pacemaker (75), Unplanned non-cardiac reoperation during the postoperative or postprocedural time period (26), Sternum left open, Planned (102), Postoperative/Postprocedural respiratory insufficiency requiring mechanical ventilatory support > 7 days (150), Pleural effusion requiring drainage (200), Postoperative/Postprocedural respiratory insufficiency requiring mechanical ventilatory support > 7 days (150). Anesthesia-related complication Anesthesia-related complication independent of surgical procedure (430).

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Poll: Which of the following postoperative complications should be coded?

Answer # 5
1

- Cardiac failure, severe dysfunction (384)
- Multi-System, Organ Failure (MSOF)= Multi-Organ Dysfunction Syndrome (MODS) (370)
- Arrhythmia, necessitating temporary pacemaker (75)
- Renal failure-acute renal failure, Acute renal failure requiring temporary dialysis with the need for dialysis not present at hospital discharge (223)
- Unplanned non-cardiac reoperation during the postoperative or postprocedural time period (26)
- Sternum left open, Planned (102)
- Postoperative/Postprocedural respiratory insufficiency requiring mechanical ventilatory support > 7 days (150)
- Pleural effusion requiring drainage (200)
- Anesthesia-related complication Anesthesia-related complication independent of surgical procedure (e.g., cardiac arrest during induction or failed intubation)(430).

Benchmark Operation Inclusion

Table: Ten Benchmark Operation Groups

Procedure Type	Abbreviation	STS-CHSDB Primary Procedure Codes
1. VSD repair	VSD	110 = VSD repair, Patch
2. TOF repair	TOF	350 = TOF repair, No ventriculotomy 360 = TOF repair, Ventriculotomy, Nontransanular patch 370 = TOF repair, Ventriculotomy, Transanular patch
3. Complete atrioventricular canal repair	AVC	170 = AVC (AVSD) repair, Complete (CAVSD)

Table 18 & 19 in the feedback report include the 10 benchmark operation groups. In Table 18 of this (Spring 2019) Feedback Report, the relevant inclusion factors are ONLY the procedure codes in the above table.)

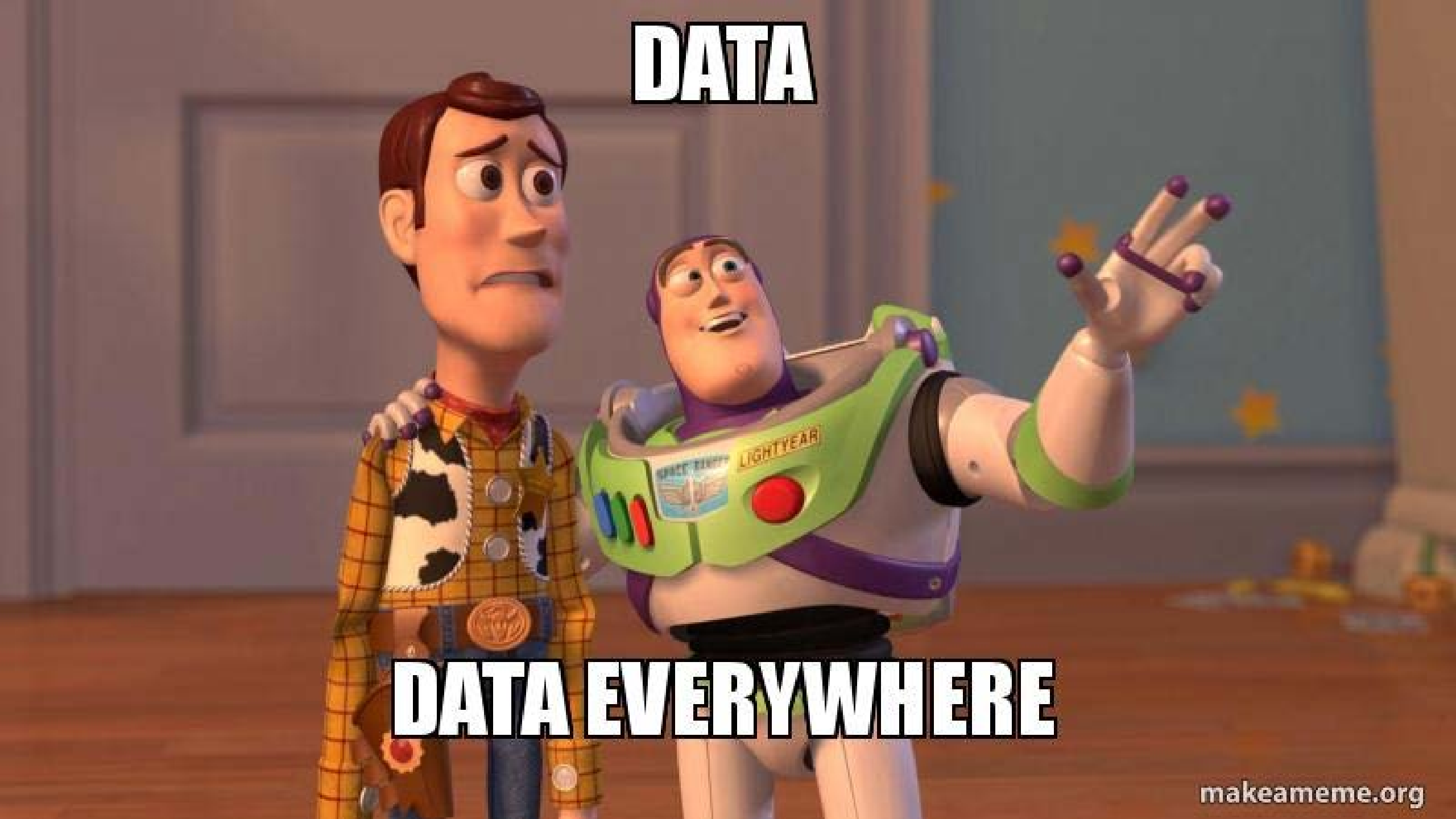
Lesion Specific Inclusion

Table 1. Required Primary Diagnosis and Procedure Lists for Inclusion in Lesion-Specific Sections*

Lesion	Primary Diagnosis	Primary Procedure
Tetralogy of Fallot (TOF) Palliation	TOF, Pulmonary stenosis	S-P, MBTS
		S-P, Central
Tetralogy of Fallot (TOF) Repair	TOF, Pulmonary stenosis	TOF repair, No ventriculotomy
		TOF repair, Ventriculotomy, Nontransannular patch
		TOF repair, Ventriculotomy, Transannular patch
		TOF repair, RV-PA conduit

Case Inclusion

Specific inclusionary and exclusionary criteria must be met for operations to be included in each of the nine lesion specific tables of the report. Table 1 at the end of this interpretation guide provides the full list of allowable primary procedures and primary diagnoses for each lesion. In order for a procedure to be included in a given lesion table, the primary diagnosis and primary procedure must have both come from the allowable list.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