



ADVANCES IN QUALITY & OUTCOMES:  
A Data Managers Meeting

SEPTEMBER 26-29, 2023 ■ VIRTUAL



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# CHLA Experience: Completing Procedure-Specific Factors

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I have nothing to disclose.



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# Procedure Specific Factors (PSF)

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## J2. PROCEDURE SPECIFIC FACTORS

### General Information Procedure Specific Factors

Procedure specific factors (PSFs) provide additional information about the primary procedure completed.

Complete the PSFs for the primary procedure of the operation only based on the patient's physiology at the time of OR entry.



# Procedure Specific Factors (PSF)

J2. PROCEDURE SPECIFIC FACTORS		
<i>If one of the following is the Primary procedure, specify whether the procedure specific factors apply</i>		
<i>If Primary Procedure = 100, 110, 120, 130, 5001, 5024, 5028, or 5016 ↓</i>		
VSD repair, Primary Closure (100)		
VSD repair, Patch (110)		
VSD repair, Device (120)		
VSD, Multiple, Repair (130)		
VSD repair, Patch + ASD repair, Primary closure (5001)		
VSD repair, Patch + PAPVC repair (5024)		
VSD repair, Patch + ASD repair, Patch + PAPVC repair (5028)		
VSD repair, Patch + Conduit reoperation (5016)		
	Apical VSD PSFApicalVSD (1365)	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Straddling AV valve PSFStradAVVal (1370)	<input type="checkbox"/> Yes <input type="checkbox"/> No
<i>If Primary Procedure = 390</i>		
TOF - AVC (AVSD) repair (390)		
	Major coronary crossing RVOT - Coronary anomaly restricting RVOT enlargement PSFMajCorRVOT (1375)	<input type="checkbox"/> Yes <input type="checkbox"/> No
	VSD, Multiple, Repair PSFVSDMultRep (1380)	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Restrictive VSD PSFRestrictVSD (1385)	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Hypoplastic branch pulmonary arteries (diminished pulmonary vascular bed) PSFHypoBrPulmArt (1390)	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Systemic AV Valve insufficiency grade 3 and 4 (Severe systemic AV Valve insufficiency) PSFAVRegurg34 (1395)	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Double orifice left atrioventricular valve PSFDoubOrif (1400)	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Single papillary muscle in the left ventricle and/or parachute left atrioventricular valve PSFSingPap (1405)	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Hypoplastic posterior mural leaflet PSFHypoPostMLeaf (1410)	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Atrioventricular septal defect with ventricular imbalance: dominant left ventricle, hypoplastic right ventricle PSFASDDomLeft (1415)	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Atrioventricular septal defect with ventricular imbalance: dominant right ventricle, hypoplastic left ventricle PSFASDDomRight (1420)	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Common atrioventricular valve with unbalanced commitment of valve to left ventricle PSFCAVLeft (1425)	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Common atrioventricular valve with unbalanced commitment of valve to right ventricle PSFCAVRight (1430)	<input type="checkbox"/> Yes <input type="checkbox"/> No



# Procedure Specific Factors (PSF)

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- 390 = TOF - AVC (AVSD) repair
- 350 = TOF repair, No ventriculotomy
- 5004 = TOF repair, No ventriculotomy + ASD repair, Primary closure
- 360 = TOF repair, Ventriculotomy, Nontransanular patch
- 370 = TOF repair, Ventriculotomy, Transanular patch
- 3330 = TOF repair, Ventriculotomy, Transanular patch, plus native valve reconstruction
- 3340 = TOF repair, Ventriculotomy, Transanular patch, with monocusp or other surgically fashioned RVOT valve
- 5018 = TOF repair, Ventriculotomy, Transanular patch + Vascular ring repair
- 380 = TOF repair, RV-PA conduit
- 400 = TOF - Absent pulmonary valve repair
- 2700 = 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])



# Procedure Specific Factors (PSF)

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- 2710 = Pulmonary atresia - VSD - MAPCA repair, Status post prior complete unifocalization (includes VSD closure + RV to PA connection [with or without conduit])
- 2720 = Pulmonary atresia - VSD - MAPCA repair, Status post prior incomplete unifocalization (includes completion of pulmonary unifocalization + VSD closure + RV to PA connection [with or without conduit])
- 420 = Pulmonary atresia - VSD (including TOF, PA) repair
- 5031 = Pulmonary atresia - VSD (including TOF, PA) repair + ASD repair, Primary closure + PDA closure, Surgical
- 170 = AVC (AVSD) repair, Complete (CAVSD)
- 3480 = AVC (AVSD) repair, Complete (CAVSD) + Arch repair
- 5027 = AVC (AVSD) repair, Complete (CAVSD) + Vascular ring repair
- 5034 = AVC (AVSD) repair, Complete (CAVSD) + Coarctation repair, End to end, Extended



# Procedure Specific Factors (PSF)

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- 1670 = Bidirectional cavopulmonary anastomosis (BDCPA) (bidirectional Glenn)
- 1680 = Glenn (unidirectional cavopulmonary anastomosis) (unidirectional Glenn)
- 1690 = Bilateral bidirectional cavopulmonary anastomosis (BBDCPA) (bilateral bidirectional Glenn)
- 1700 = HemiFontan
- 2330 = Superior Cavopulmonary anastomosis(es) (Glenn or HemiFontan) + Atrioventricular valvuloplasty
- 2130 = Superior Cavopulmonary anastomosis(es) + PA reconstruction
- 3160 = Kawashima operation (superior cavopulmonary connection in setting of interrupted IVC with azygous continuation)





# Procedure Specific Factors (PSF)

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- 950 = Fontan, Atrio-pulmonary connection
- 960 = Fontan, Atrio-ventricular connection
- 970 = Fontan, TCPC, Lateral tunnel, Fenestrated
- 980 = Fontan, TCPC, Lateral tunnel, Nonfenestrated
- 1000 = Fontan, TCPC, External conduit, Fenestrated
- 5010 = Fontan, TCPC, External conduit, Fenestrated + Pacemaker procedure
- 1010 = Fontan, TCPC, External conduit, Nonfenestrated
- 2780 = Fontan, TCPC, Intra/extracardiac conduit, Fenestrated
- 2790 = Fontan, TCPC, Intra/extracardiac conduit, Nonfenestrated
- 3310 = Fontan, TCPC, External conduit, hepatic veins to pulmonary artery, Fenestrated
- 3320 = Fontan, TCPC, External conduit, hepatic veins to pulmonary artery, Nonfenestrated
- 1030 = Fontan, Other
- 2340 = Fontan + Atrioventricular valvuloplasty
- 1025 = Fontan revision or conversion (Re-do Fontan)



# Procedure Specific Factors (PSF)

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- 1110 = Arterial switch operation (ASO)
- 1123 = Arterial switch procedure + Aortic arch repair
- 1120 = Arterial switch operation (ASO) and VSD repair
- 1125 = Arterial switch procedure and VSD repair + Aortic arch repair
- 230 = Truncus arteriosus repair
- 2220 = Truncus + Interrupted aortic arch repair (IAA) repair
- 870 = Norwood procedure
- 5012 = Norwood procedure + Valvuloplasty, Systemic Atrioventricular valve + Conduit placement, RV to PA or  
Norwood procedure + Valvuloplasty Systemic Atrioventricular valve + RV to PA shunt
- 2160 = Hybrid Approach "Stage 1", Application of RPA & LPA bands
- 2170 = Hybrid Approach "Stage 1", Stent placement in arterial duct (PDA)
- 2180 = Hybrid Approach "Stage 1", Stent placement in arterial duct (PDA) + application of RPA & LPA bands
- 465 = Ebstein's Repair
- 5030 = Ebstein's repair + PDA closure, Surgical



# Challenges

- Operative notes do not have all the data being collected
- Surgeons do not want to do extra work
- Data manager does not want to do extra work
- Fields need to be completed





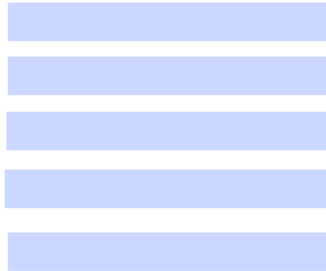
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## Next Steps

- Decide on best format
- Surgeon education
- Keep track of cases needing PSFs
- Develop workflow for distributing forms



# Paper Forms



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

Norwood procedure

Hybrid Approach "Stage 1", Application of RPA & LPA bands

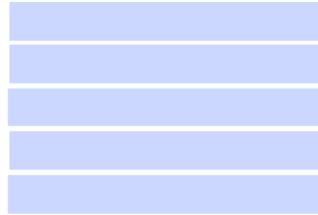
Hybrid Approach "Stage 1", Stent placement in arterial duct (PDA)

Hybrid Approach "Stage 1", Stent placement in arterial duct (PDA) + application of RPA & LPA bands

Source of pulmonary blood flow: Shunt - systemic artery-to-pulmonary artery	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Source of pulmonary blood flow: Shunt - ventricle-to-pulmonary artery	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Source of pulmonary blood flow: Superior caval vein-to-pulmonary artery	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Source of Pulmonary Blood Flow: Banded central PAs	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Ascending aorta < 2 mm	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Aortic atresia	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Aortic stenosis	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Mitral atresia	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Mitral stenosis	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Sinusoids	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Intact atrial septum	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Obstructed pulmonary venous return with severely restrictive ASD	<input type="checkbox"/> Yes	<input type="checkbox"/> No
AV Valve regurgitation grade 3 and 4 (Severe AV Valve regurgitation)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Aberrant right subclavian artery	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Ventricular dominance	<input type="checkbox"/> Left Ventricular dominance <input type="checkbox"/> Right Ventricular dominance <input type="checkbox"/> Balanced <input type="checkbox"/> Indeterminate Ventricular dominance	



# Paper Forms



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

<input type="checkbox"/> TOF - AVC (AVSD) repair		
Major coronary crossing RVOT - Coronary anomaly restricting RVOT enlargement		<input type="checkbox"/> Yes <input type="checkbox"/> No
VSD, Multiple, Repair		<input type="checkbox"/> Yes <input type="checkbox"/> No
Restrictive VSD		<input type="checkbox"/> Yes <input type="checkbox"/> No
Hypoplastic branch pulmonary arteries (diminished pulmonary vascular bed)		<input type="checkbox"/> Yes <input type="checkbox"/> No
AV Valve regurgitation grade 3 and 4 (Severe AV Valve regurgitation)		<input type="checkbox"/> Yes <input type="checkbox"/> No
Double orifice left atrioventricular valve		<input type="checkbox"/> Yes <input type="checkbox"/> No
Single papillary muscle in the left ventricle and/or parachute left atrioventricular valve		<input type="checkbox"/> Yes <input type="checkbox"/> No
Hypoplastic posterior mural leaflet		<input type="checkbox"/> Yes <input type="checkbox"/> No
Atrioventricular septal defect with ventricular imbalance: dominant left ventricle, hypoplastic right ventricle		<input type="checkbox"/> Yes <input type="checkbox"/> No
Atrioventricular septal defect with ventricular imbalance: dominant right ventricle, hypoplastic left ventricle		<input type="checkbox"/> Yes <input type="checkbox"/> No
Common atrioventricular valve with unbalanced commitment of valve to left ventricle		<input type="checkbox"/> Yes <input type="checkbox"/> No
Common atrioventricular valve with unbalanced commitment of valve to right ventricle		<input type="checkbox"/> Yes <input type="checkbox"/> No

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

<input type="checkbox"/> TOF repair, No ventriculotomy		
<input type="checkbox"/> TOF repair, Ventriculotomy, Nontransannular patch		
<input type="checkbox"/> TOF repair, Ventriculotomy, Transannular patch		
<input type="checkbox"/> TOF repair, RV-PA conduit		
<input type="checkbox"/> TOF - Absent pulmonary valve repair		
<input type="checkbox"/> 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])		
<input type="checkbox"/> Pulmonary atresia - VSD - MAPCA repair, Status post prior complete unifocalization (includes VSD closure + RV to PA connection [with or without conduit])		
<input type="checkbox"/> Pulmonary atresia - VSD - MAPCA repair, Status post prior incomplete unifocalization (includes completion of pulmonary unifocalization + VSD closure + RV to PA connection [with or without conduit])		
<input type="checkbox"/> Pulmonary atresia - VSD (including TOF, PA) repair		
Major coronary crossing RVOT - Coronary anomaly restricting RVOT enlargement		<input type="checkbox"/> Yes <input type="checkbox"/> No
VSD, Multiple, Repair		<input type="checkbox"/> Yes <input type="checkbox"/> No
Restrictive VSD		<input type="checkbox"/> Yes <input type="checkbox"/> No
Hypoplastic branch pulmonary arteries (diminished pulmonary vascular bed)		<input type="checkbox"/> Yes <input type="checkbox"/> No



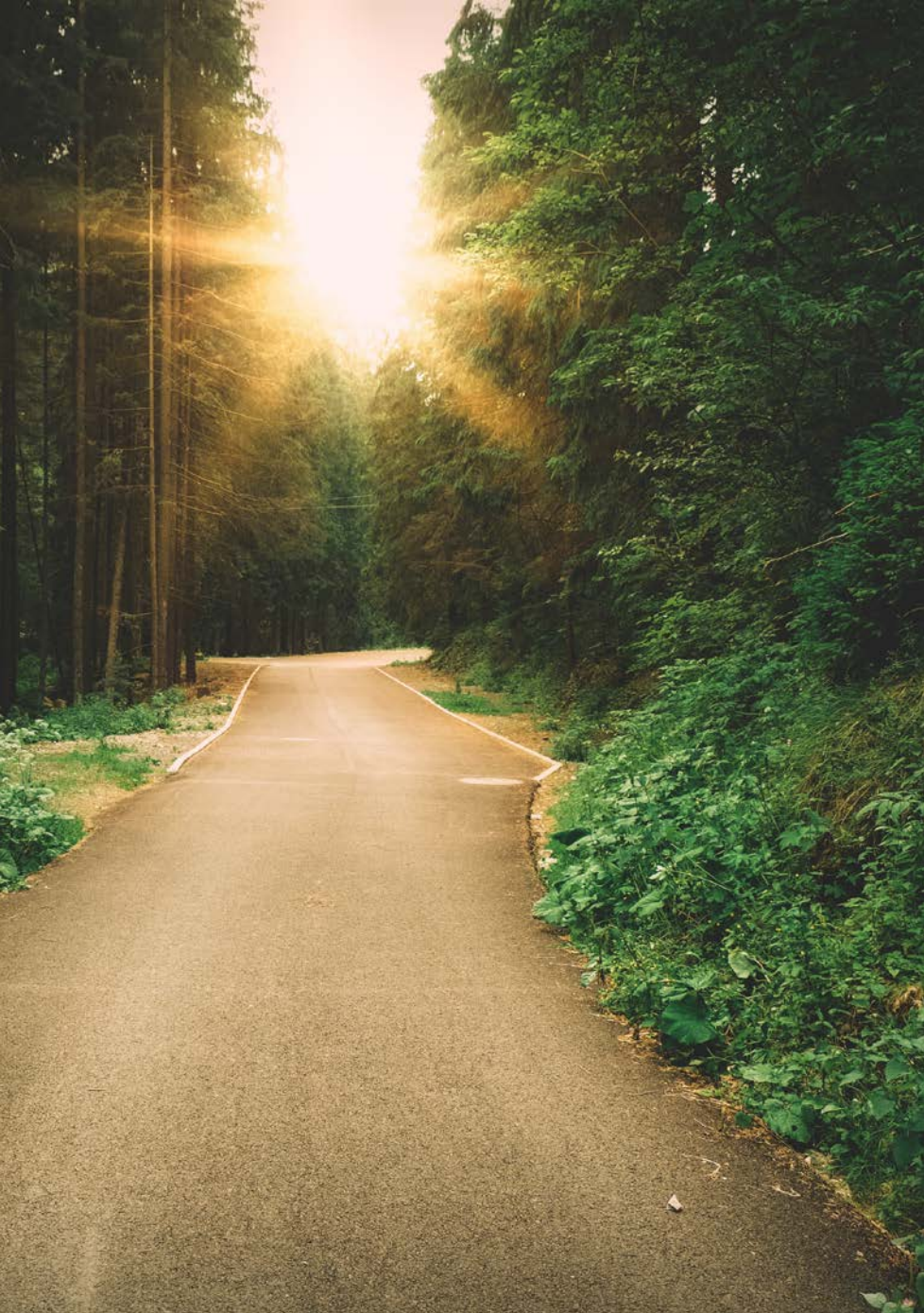


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# Challenges

- Surgeon completion
- Lost forms
- Pandemic and remote positions
- Takes a village and great communication





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## Path to Digitization

- Timeline: ~18mo (start of project - "Go Live")
- Meetings with STS Registry Team, Cerner team
- Surgeon involvement in form creation
- Surgeon education (creation job aid)





# Digital Forms

CT Surgery Procedure Specific Factor - ZZKIDS, DAMON

\*Performed on: 04/18/2022 1425

**Surgery Information**

Do Procedure Specific Factors Apply

Yes  No

**Procedure**

Arterial Switch, ASD

AVC

Ebstein's Repair

Fontan

Glenn

Norwood

TOF

Truncus



# Digital Forms

**Surgery Information**

Arterial Switch, ASD  
AVC  
Ebstein's Repair  
ECMO  
Fontan  
Glenn  
**Norwood**  
TOF  
Truncus  
VSD

**Do Procedure Specific Factors Apply**

Yes  No

**Procedure**

Arterial Switch, ASD

AVC

Ebstein's Repair

ECMO

Fontan

Glenn

**Norwood**

TOF

Truncus

VSD



## Procedure

- Norwood Procedure
- Norwood procedure + Valvuloplasty, Systemic AV valve + Conduit placement, RV to PA
- Hybrid Approach "Stage 1", Application of RPA & LPA bands
- Hybrid Approach "Stage 1", Stent placement in arterial duct (PDA)
- Hybrid Approach "Stage 1", Stent placement in arterial duct (PDA) + application of RPA & LPA bands

## Please select 1 Source of Pulmonary Blood Flow

Source of pulmonary blood flow

- Systemic artery-to-pulmonary
- Ventricle-to-pulmonary artery
- Superior caval vein-to-pulmonary artery
- Banded central pass

Ascending aorta < 2 mm

- Yes
- No

Aortic atresia

- Yes
- No

Aortic stenosis

- Yes
- No

Mitral atresia

- Yes
- No

Mitral stenosis

- Yes
- No

Sinusoids

- Yes
- No

Intact atrial septum

- Yes
- No

Obstructed pulmonary venous return with severely restrictive ASD

- Yes
- No

Systemic AV Valve insufficiency grade 3 and 4 (Severe systemic AV Valve insufficiency)

- Yes
- No

Aberrant right subclavian artery

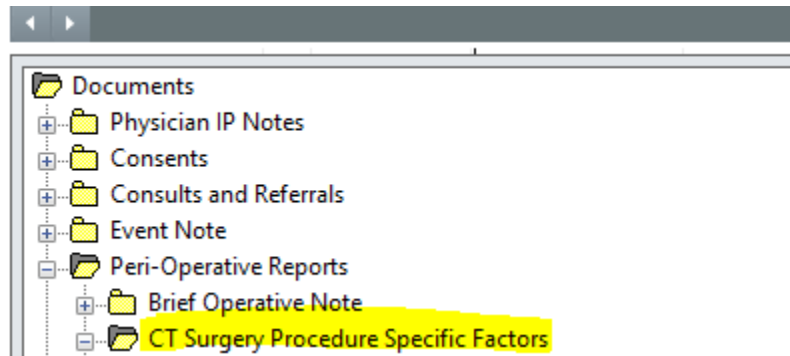
- Yes
- No

Ventricular dominance

- Left Ventricular dominance
- Right Ventricular dominance
- Balanced
- Indeterminate Ventricular morphology



# Digital Forms



## Surgery Information

*Do Procedure Specific Factors Apply:* Yes

*Procedure: Norwood:* Norwood

## Norwood

*Norwood Procedure:* Norwood Procedure

*Source of pulmonary blood flow:* Systemic artery-to-pulmonary

*Ascending aorta < 2 mm:* Yes

*Aortic atresia:* Yes

*Aortic stenosis:* No

*Mitral atresia:* No

*Mitral stenosis:* Yes

*Sinusoids:* No

*Intact atrial septum:* No

*Obstruct pulm venous return w/severe restrict ASD:* Yes

*AV Valve regurg gr 3 and 4 (Severe) - Norwood:* No

*Aberrant right subclavian artery:* No

*Ventricular dominance - Norwood:* Right Ventricular dominance



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# Project Updates

- Version 6.23.2 upgrade: form was updated to go live 7/1/23
- Added “ECMO” fields to PSF form
- Data automation (export to CardioAccess)
- Surgeon Wishlist (PSF data fields definitions)





Thank You!!

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