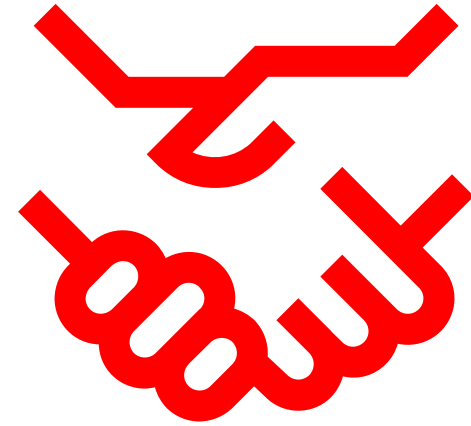




Congenital Cardiac Anesthesia Society

OR – ICU Handover Process

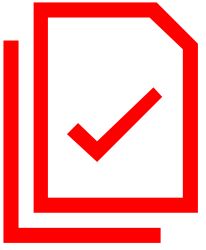
CCAS Quality & Safety Committee

March 15th, 2021

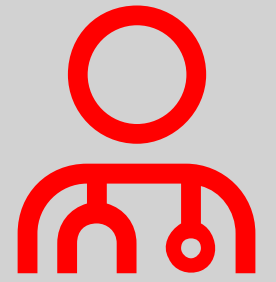
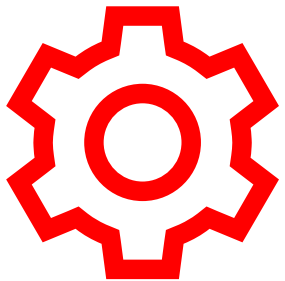
Handovers

Introduction

- The handover process for critically ill children admitted from the operating room (OR) to the intensive care unit (PICU) is prone to error.
- Potential causes include the following:
 - The handoff often takes place in a busy, distraction-rich environment
 - It involves the near simultaneous transfer of equipment and knowledge
 - Staff may have no prior knowledge of the patient's medical history and thus depend on this process for critical information
 - Patients are often clinically unstable during the immediate admission period, which limits time for reviewing the medical record



RECOMMENDATION

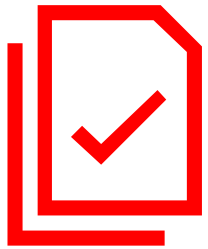


A multidisciplinary standardized handover process decreases errors and improves patient outcomes in the transfer of pediatric cardiac surgical patients from the OR to the ICU.



OR – ICU Handover

Evidence-Based Concepts for a Successful, Error-free Handoff

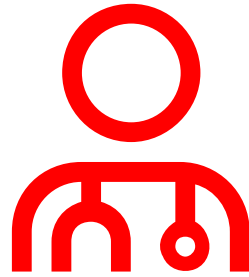


Content

Use standardized handoff tool

Include statement on anticipated patient course

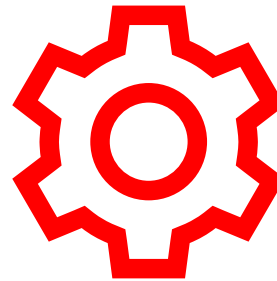
Assure opportunity for questions or clarifications



Personnel

Assure necessary personnel are in attendance for face-to-face handoff

Surgeon
Anesthesiologist
Intensivist
Nursing
Respiratory Therapist

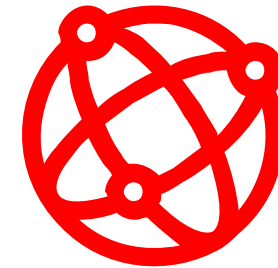


Process

Individual tasks known and assigned upon arrival in ICU

Airway & Ventilator
Monitors
IV pumps
Chest tubes

Standardized physical locations of equipment and team members



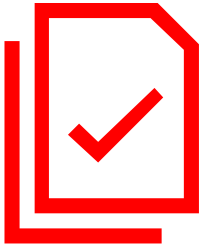
Environment

Identify handoff leader

Team members ready for handoff?

“Sterile cockpit”

Minimize interruptions
Avoid distractions



Handover Tool Example #1

THIS FORM IS NOT PART OF THE MEDICAL RECORD		
ANESTHESIA HANDOFF TEMPLATE		PATIENT LABEL
CV surgery to Pediatric ICU Handoff		
PATIENT DETAILS Name _____ Age _____ Wt _____ kg		
Pre-op Dx _____ Allergy _____ ☐ NKDA		
OPERATIVE COURSE		
Anesthesia Technique _____		ETT size _____
Operation Performed _____		ACCESS
Weaning from CPB & course _____		Type/Location _____
CPB time* _____ PA pressures _____		Size _____
Cross Clamp* _____ Arrhythmias _____ ☐ None		Placed by _____
Circ Arrest* _____		Type/Location _____
*Estimate - See Perfusion Record for actual time		Size _____
Post TEE/Echo findings _____		Placed by _____
Blood products given:		Bleeding issues _____ ☐ None
PRBC _____		Type/Location _____
Cell Saver _____		Size _____
Platelet _____		Placed by _____
FFP _____		Type/Location _____
Cryo _____		Size _____
Crystalloid _____ mL		Placed by _____
Ultrafiltrate _____ mL		Type/Location _____
UOP _____ mL		Size _____
UOP(bypass) _____ mL		Placed by _____
PRESENT STATUS HR _____ BP _____ MAP _____ CVP _____ Brain NIRS _____ Renal NIRS _____		
(Current Vitals on Transport)		
Current Rhythm _____ ☐ NSR		Ventilation Issues in OR _____ ☐ None
Pacing Wires: ☐ Atrial ☐ Ventricular ☐ None		FiO ₂ _____
Temporary Pacemaker setting _____		Plans for extubation: ☐ Wake & Wean
		☐ Leave Intubated
Medications/infusions		
Dopamine _____ mcg/kg/min		Nitric oxide _____ ppm Indication _____
Dobutamine _____ mcg/kg/min		Antibiotic doses _____
Milrinone _____ mcg/kg/min		Total opioid dose _____
Epinephrine _____ mcg/kg/min		Last opioid dose _____
Nicardipine _____ mcg/kg/min		☐ Post-op PCA written
Esmolol _____ mcg/kg/min		Last muscle relaxant dose _____ ☐ Reversed
☐ Amicar _____ 33_mg/kg/hr		Other Meds _____
		Last Hgb/Hct _____ Time _____
		Last ABG _____ Time _____
COMMENTS:		
Physician signature _____ Date _____ Time _____		

Joy BF, Elliott E, Hardy C, Sullivan C, Backer CL, Kane JM. Standardized multidisciplinary protocol improves handover of cardiac surgery patients to the intensive care unit. *Pediatr Crit Care Med.* 2011;12(3):304-308.



Handover Tool

Example #2

Handover Tool

Example #2

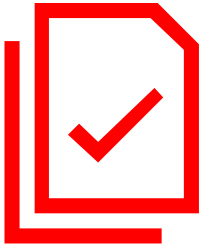
Handover Tool

Example #2

Handover Tool

Example #2

Zavalkoff SR, Razack SI, Lavoie J, Dancea AB. Handover after pediatric heart surgery: a simple tool improves information exchange. *Pediatr Crit Care Med*. 2011;12(3):309-313.



Handover Tool Example #3

CICU Handoff Form

Name: MR # Date:

Diagnosis: Procedure:

PMH:

Additional non-cardiac info:

Induction:

Premed: oral im iv Meds: Effect:

Induction technique: Inhalation iv induction with

Airway: Mask: easy need for oral airway

Intubation: easy cricoid stylet other:

ETT: oral nasal size @ leak

Complications: none or:

Lines: PIV# 1: PIV# 2: PIV# 3:

A-line: size Location:

CVL: size: antibiotic coated Location:

Complications/concerns:

Pre-Bypass Phase: no problems

Inotropic support: Dopamine Epinephrine Milrinone

Arrhythmia: SVT V-Fib other:

Bleeding: Blood given: whole blood ml PRBC ml

Ventilation problems: poor compliance secretions bronchospasm Other:

Post Bypass Period:

Hemodynamics:

Coming off:

Initial Inotropic support: Dopamine Epinephrine Milrinone

Filling pressures: CVP/RAP Difference? LAP:

Rhythm: NSR Junctional Heart Block Paced

Post op course in OR: stable improving deteriorating

Change in inotropic support:

Vasodilators: Nitroglycerine Nitroprusside Milrinone Esmolol

Filling pressures after chest closure: CVP/RA Difference? LAP:

Rhythm changes Paced: Rate Mode

Lactate SvO₂

Bleeding: significant minimal ongoing controlled

Platelets: concentrated non-concentrated Units: ____ ml

Cryo (pooled): ____ Units ____ ml

Cellsaver Blood: ____ Units ____ ml

PRBC: ____ Units ____ ml

Last Hct:

Available blood products: Cellsaver Cryo Platelets PRBC

Respiratory:

Initial: compliance pulmonary hemorrhage other problems:

Vent settings in OR: PIP PEEP MAP RR FiO₂

Last ABG: PaO₂ on FiO₂: etCO₂ PaCO₂ Gradient:

Electrolytes: Lactate K Ca Glucose Hemolytic urine

Transport: uneventful

Complicated by: Hypotension Hypertension Arrhythmia

Current status:

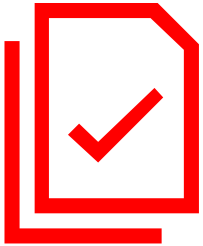
Drips: Dopamine Epinephrine Milrinone

Nitroglycerine Nitroprusside Esmolol

Sedation: Last dose: Morphine Fent. Midaz NMB

Propofol drip Dex-Drip

Vent settings: PiP PEEP MAP RR FiO₂



Handover Tool

Example #4

CVOR to CICU Handoff

Updated June 2015

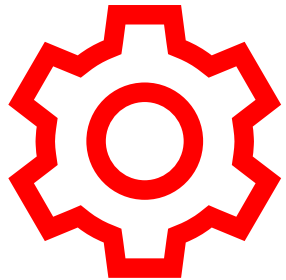
PRIOR TO LEAVING CVOR

- **Infusion Pump Check**
 - CICU Nurse Verification
 - Check programming
 - Pumps labeled, carrier fluid with date/time/initials
- **Pacemaker thresholds checked**
- **Organize, Label and Cap Lines**
- **Prepare for Transport**
 - Airway equipment
 - Pacemakers and cables
 - Medications
 - Transport monitor working and cables organized
 - Oxygen or blender available

ON ARRIVAL TO THE CICU

- **Park and brake the bed**
- **Ventilator**
 - Double check initial ventilator settings
 - Transfer to ventilator and verify bilateral breath sounds
- **Chest Tubes**
 - CICU nurse to attach to wall suction and check proper function
- **Monitoring**
 - Transfer brick to the monitor
 - Double check that all parameters are displayed
 - Zero all lines
- **Communication**
 - Surgeon gives report on procedure performed
 - Anesthesiologist gives report
 - Patient information: Name, age, weight, allergies, relevant H & P
 - Operative course
 - Anesthetic problems
 - ETT size and position
 - Line locations, size and any problems
 - Epidural if present – locations, medications used during the case, and infusion ordered
 - Times CPB, AoXC, DHCA
 - Weaning from CPB and any issues
 - ECHO findings post CPB
 - Pacemaker settings
 - Inotrope infusions
 - Blood products given and transferred with patient
 - Last antibiotic time
- **Question and Answer Opportunity**
 - One person speaks at a time
 - Discuss anticipated course for the patient
- **STAT Score and ICU Plan of Care**

Process Example #1



PEDIATRIC CARDIAC SURGERY HANDOVER

Assessment of ABC's on arrival to PCCU

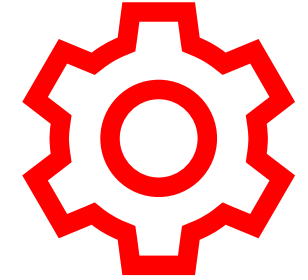
- ↓ ETT to ventilator
- ↓ Oxygenation and ventilation (BBS, adequate chest expansion, SaO₂ WNL)
- ↓ Monitor transfer
- ↓ Stable vital signs
- ↓ Chest tubes to suction

TIME OUT

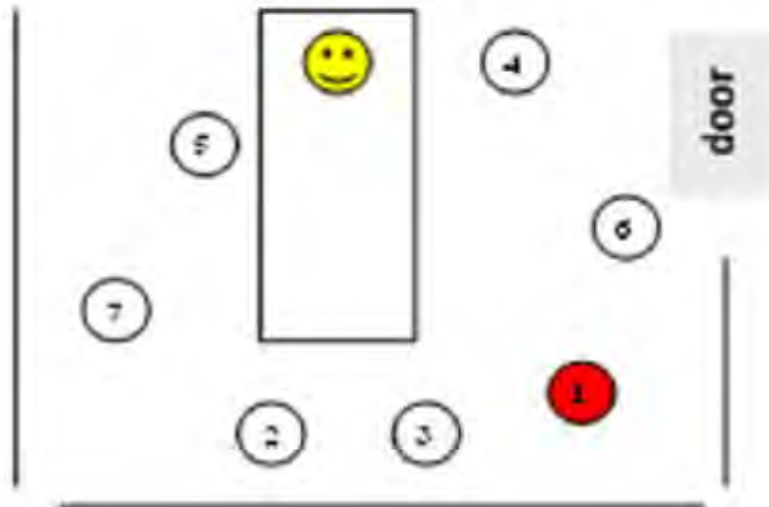
- | | |
|----------------------------|---|
| Patient Details: | <ul style="list-style-type: none"> ↓ Pt Initials ↓ Age ↓ weight ↓ Cardiac defect ↓ Background medical/ surgical problems |
| Pre-op. Details: | <ul style="list-style-type: none"> ↓ Elective/semi-elective/urgent case ↓ Red flags/critical labs in pre-operative period ↓ Allergies ↓ Known thrombosis of major blood vessels |
| Anesthesia Details: | <ul style="list-style-type: none"> ↓ Method of induction ↓ Endotracheal intubation ↓ Central venous line and arterial line placement ↓ Pre-existent lines in the patient ↓ Lines placed by the surgeon/cut-down |
| Surgery details: | <ul style="list-style-type: none"> ↓ Primary surgery undertaken ↓ Cardiopulmonary bypass time ↓ Cross clamp time ↓ TEE results |
| Post-surgery details: | <ul style="list-style-type: none"> ↓ Post-pump ACT ↓ ACT after Protamine ↓ Chest tube bleeding ↓ Blood products administered ↓ Blood products currently available ↓ Heart rate ↓ Heart rhythm ↓ Pacemaker ↓ Systemic blood pressure ↓ Intracardiac pressures: CVP / RA / LA / PA ↓ Transducer and push ports of CVL / RA lines ↓ Inotropes started after pump and current inotrope support ↓ Volume resuscitation ↓ Sedatives & last dose given @ time ↓ Labs: ↓ Hct ↓ lactate ↓ glucose ↓ O₂ Sats & PaO₂ |
| Specific concerns for PCCU | <ul style="list-style-type: none"> ↓ Details ↓ White board |

Process

Example #2



Standardized physical locations of equipment and team members



- 1 Team Leader- PICU Attending/Fellow
- 2 Anesthesia Attending & Resident
- 3 Surgeon
- 4 Respiratory Therapist
- 5 Primary RN
- 6 Circulating RN
- 7 Recording RN

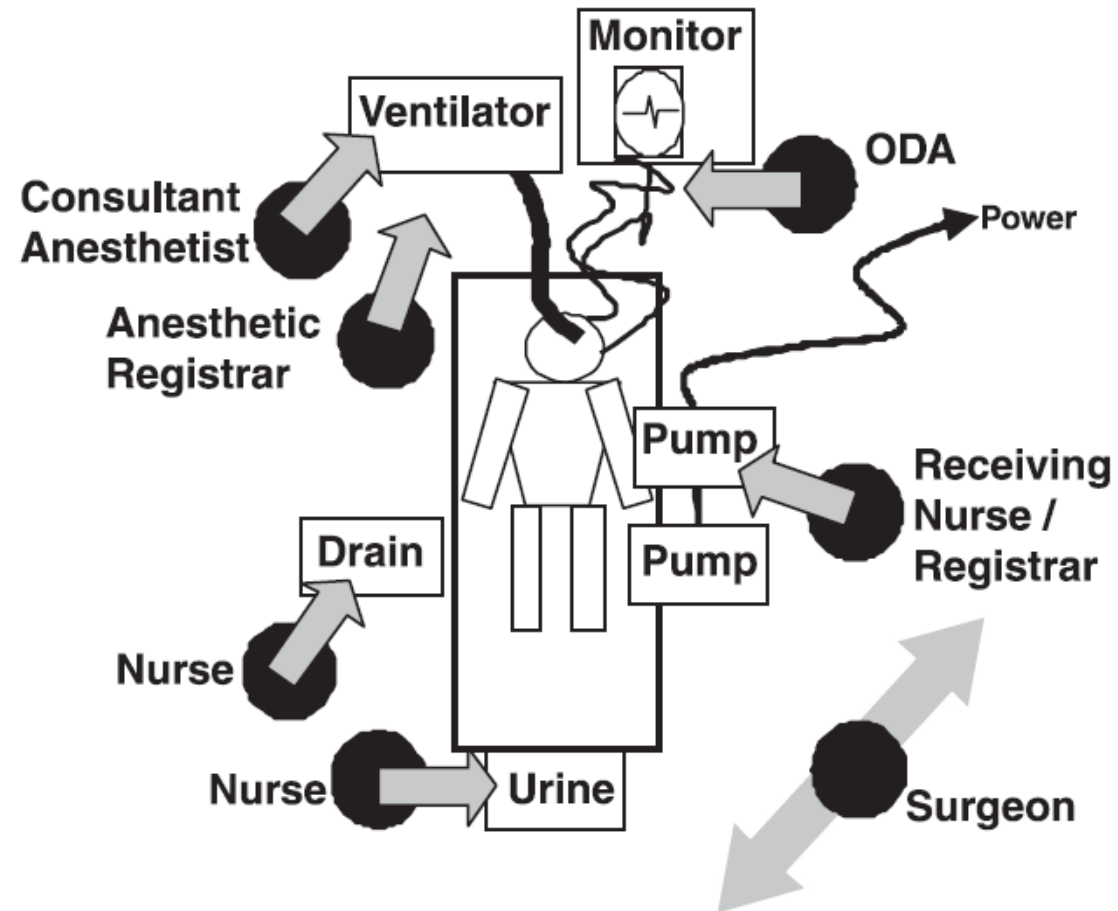
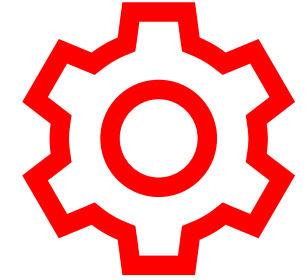
* Other team members enter room when huddle initiated or earlier as needed

Roles



Process Example #3

Standardized physical locations of equipment and team members





REFERENCES & SUMMARIES

Reference	Summary
Agarwal HS, Saville BR, Slayton JM, et al. Standardized postoperative handover process improves outcomes in the intensive care unit: a model for operational sustainability and improved team performance*. Crit Care Med. 2012;40(7):2109-2115.	Prospective observational study, single academic center: • Evaluation of communication studied for two time periods: verbal handover (700 pts) vs. structured handover (378 pts) • Found: • Improved information transfer • Decrease in specific complications: • Cardiopulmonary arrest (2.6% vs. 5.4%, mediastinal re-exploration (5.5% vs. 9%), metabolic acidosis (lactate >10, 2.6% vs. 6.7%) • Increase in early extubation within 24 hrs (50% vs. 43.2%)
Catchpole KR, de Leval MR, McEwan A, et al. Patient handover from surgery to intensive care: using Formula 1 pit-stop and aviation models to improve safety and quality. Paediatr Anaesth. 2007;17(5):470-478.	Prospective intervention study: • Measured the change in performance before (23 pts) and after (27 pts) the implementation of a new handover protocol • Developed with a Formula 1 racing team and aviation captains • Technical errors (5.42 to 3.15) and handover omissions reduced (2.09 to 1.07) • Handover time also reduced (10.8 min to 9.4 min)
Catchpole KR, Giddings AE, de Leval MR, et al. Identification of systems failures in successful paediatric cardiac surgery. <i>Ergonomics</i> . 2006;49(5-6):567-588.	Prospective direct observation study to identify types and sources of systems failures in pediatric cardiac surgery: • 366 failures observed in 24 successful operations, most common: • Coordination and communication problems • Equipment problems • Relaxed safety culture • Patient-related and perfusion-related problems • Longer and more risky operations were likely to generate a greater number of minor failures
Chen JG, Wright MC, Smith PB, Jagers J, Mistry KP. Adaptation of a postoperative handoff communication process for children with heart disease: a quantitative study. Am J Med Qual. 2011;26(5):380-386.	Cross-sectional quantitative follow-up study of postoperative handoff communication process 3 years after protocol was implemented: • 29 handoffs observed • Required content items averaged a 53% reporting rate • 2.3 environmental distractions per minute (mean) • Future handoff communication interventions should: • Reduce nonessential distractions and incorporate a discussion of the anticipated patient course • Include facilitator for sustainability
Chenault K, Moga MA, Shin M, et al. Sustainability of protocolized handover of pediatric cardiac surgery patients to the intensive care unit. Paediatr Anaesth. 2016;26(5):488-494.	Prospective direct observational study of 119 handovers: • 41 preintervention, 38 postintervention, 40 in sustainability phase (5 years after implementation) • Technical errors reduced in the sustainability phase • Verbal information omissions also reduced in the sustainability phase

Reference	Summary
Joy BF, Elliott E, Hardy C, Sullivan C, Backer CL, Kane JM. Standardized multidisciplinary protocol improves handover of cardiac surgery patients to the intensive care unit. <i>Pediatr Crit Care Med</i> . 2011;12(3):304-308.	Prospective interventional study of 79 handovers: • 41 preintervention, 38 postintervention • Technical errors per handover were reduced from 6.24 to 1.52 • Critical verbal handoff information omissions were reduced from 6.33 to 2.38 per handover • No change in duration of either the verbal handoff briefing or the overall handover process • Caregivers noted improvement in teamwork and handoff content received after the intervention
Mistry KP, Jagers J, Lodge AJ, et al. Using Six Sigma((R)) Methodology to Improve Handoff Communication in High-Risk Patients. In: Henriksen K, Battles JB, Keyes MA, Grady ML, eds. <i>Advances in Patient Safety: New Directions and Alternative Approaches</i> (Vol. 3: Performance and Tools). Rockville (MD)2008.	Prospective interventional study using Six Sigma methodology of 29 pre- and 142 post-intervention handoff events. • Standardized initiatives resulted in: • Reduced handoff turnaround time (15.3 min to 9.6 min) • Time to obtaining critical laboratory studies (13.0 min to 2.4 min) • Increase in chest radiographs completed (60 % vs. 94 %) • Percent of patients placed on cardio-respiratory monitoring (86 % vs. 99 % within unit standards)
Vergales J, Addison N, Vendittelli A, et al. Face-to-face handoff: improving transfer to the pediatric intensive care unit after cardiac surgery. <i>Am J Med Qual</i> . 2015;30(2):119-125.	Prospective interventional study of feasibility and reliability of implementation of a handoff system: • Formalized handoff tool • Focused process steps that occurred prior to patient arrival in the ICU • Emphasis on face-to-face communication at the conclusion of the handoff • Found Improvements in how various providers view the efficiency of handoff, the ease of asking questions at each step, and the overall capability to improve patient care regardless of overall surgical complexity
Zavalkoff SR, Razack SI, Lavoie J, Dancea AB. Handover after pediatric heart surgery: a simple tool improves information exchange. <i>Pediatr Crit Care Med</i> . 2011;12(3):309-313.	Prospective interventional study of 31 handovers: • 1-page tool was developed to guide the information transmitted by the surgeon and anesthesiologist to the pediatric intensive care unit team during handover of postcardiac surgery patients • Handover score (max 43 pts) improved (28.2 vs. 33.5) • Improvement in the medical and surgical info subscores • Use of the tool did not prolong handover duration (8.3 vs. 11.1 mins). • Trend toward more patients being free from high-risk events in (31.2% vs. 6.7%), but nonsignificant