Ultra-Fast-Track Minimally Invasive Congenital Heart Surgery

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Background / Objective

- Rising popularity of minimally invasive surgical techniques (MIS) for congenital low-risk lesions[1,2]
- Institutional experience with an ultra-fast-track pathway (UFTP) for pediatric congenital patients undergoing MIS
- Focus on early outcomes, reduction of length of stay and of healthcare-associated costs

Methods

- Retrospective, single-center study (April 2018 – April 2026)
- Inclusion criteria: All patients (age <18 yrs) with ASD or SVD/PAPVD undergoing MIS via a right vertical mini-thoracotomy[1,2]
- Comparison of UFTP (**Fig.1**) vs. standard pathway patients (**Fig. 2**)
- Calculation of hospital inpatient costs using the Ontario Hospital per diem rates for CCCU, PACU, and cardiac inpatient ward, excluding OR-specific costs (**Table 1**)

Table 1) Average inpatient costs in Ontario, CA [3]	
Cardiac ward (day)	approx. 4600 CAD
Cardiac intensive care (day)	approx. 8500 CAD
PACU (hour)	approx. 1100 CAD

Fig. 1)

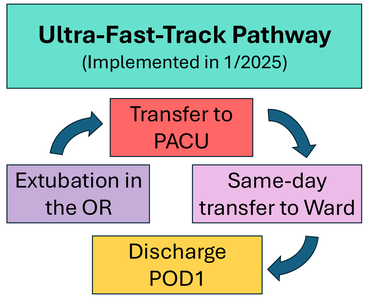


Fig. 2)

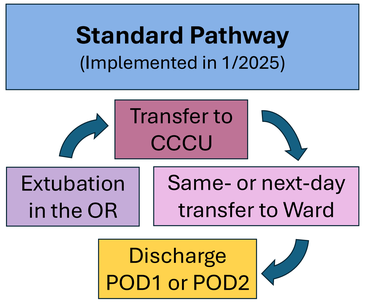
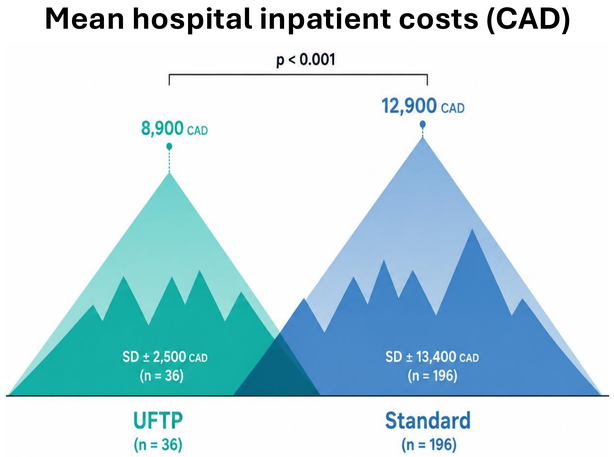


Table 2) Patients characteristics & Outcomes			
	UFTP (n = 36)	**Standard (n = 196)**	**P Value**
Age (years)	6.1 ± 3.6	8.0 ± 4.5	**.007**
CPB time (min)	42 ± 15	51 ± 27	n.s.
Aortic cross clamp time (min)	25 ± 22	28 ± 20	n.s.
Length of CCCU stay (days)	/	0.5 ± 0.8	
Length of PACU stay (hours)	1.4 ± 0.8	/	
Length of hospital stay (days)	**1.6 ± 0.6**	**2.4 ± 0.9**	**<.001**
Readmission to CCCU - n (%)	0	0	n.s.
Adverse events - n (%)	0	1 (0.5)	n.s.
Conversion – n (%)	0	1 (0.5)	n.s.
Surgical revision – n (%)	0	2 (1.0)	n.s.
Mean inpatient costs (CAD)	**8.900 ± 2.500**	**12.900 ± 13.400**	**<.001**
Minimum inpatient costs (CAD)	5.240	6.500	
Maximum inpatient costs (CAD)	15.340	60.200	

Fig. 3)



Results

- 36 UFTP and 196 standard pathway patients were identified (**Table 2**)
- UFTP patients had a mean stay at PACU of ~ 1.5 – 2 hours, and a mean hospital stay of 1.6 days
- Following UFTP, no admission to CCCU, and no adverse events were observed
- UFTP was associated with significantly shorter hospital stay and lower inpatient costs compared to the standard pathway
- Cost saving with UFTP ~ 4000 CAD per patient (31% lower costs compared to Standard, **Fig. 3**)

Conclusions

Congenital low-risk cardiac surgery can be **safely** ultra-fast-tracked, avoiding intensive care and reducing the **total length of stay to a single day**

A postoperative pathway without intensive care **decreases inpatient costs significantly** and might improve patient flow

Additional benefits might be the **reduction of patient & caregiver anxiety** by avoiding admission to the intensive care unit

UFTP offers opportunities to improve **patient recovery** and **patient satisfaction**, while efficiently utilizing healthcare resources

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References: 1) Haller et al., J Thorac Cardiovasc Surg. 2026 Apr;171(4):997-1004. 2) Haller et al., Eur J Cardiothorac Surg. 2024 Feb 1;65(2):ezae053. 3) Ontario Hospital Interprovincial per diem rates for inpatient services in Canadian Dollar (CAD), Homepage: Ontario.ca

Abbreviation: ASD - atrial septal defect; SVD/PAVPD - sinus venous defect with partial anomalous venous pulmonary drainage; PACU – Post-anesthesia care unit, CCCU – Cardiac critical care unit, POD – postoperative day , CPB – cardiopulmonary bypass, CAD – Canadian Dollar