

# Impact of Deferring Critically Ill Children Away from Their Designated Pediatric Critical Care Unit: A Population-Based Retrospective Cohort Study

## L'impact d'une réorientation des enfants gravement malades hors de leur unité de soins intensifs pédiatriques désignée : une étude de cohorte rétrospective

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TABLE 1. Description of PCCU transfers by deferral status

Characteristic	Transfer status		Total (n = 10,639)	p-value
	Deferred (n = 2,077)	Non-deferred (n = 8,562)		
<b>PATIENT CHARACTERISTICS</b>				
<b>Age at transport date (months) median (IQR)</b>	10 (1–78)	20 (1–107)	17 (1–103)	<0.001
<b>Male, n (%)</b>	1,194 (57.5)	4,933 (57.6)	6,127 (57.6)	0.92
<b>Rural, n (%)</b>	291 (14.0)	1,242 (14.5)	1,533 (14.4)	0.6
<b>Total acute care in previous six months, days, median (IQR)</b>	2 (0–6)	1 (0–3)	1 (0–3)	<0.001
<b>No hospitalizations in previous two years, n (%)</b>	769 (37.0)	4,527 (52.9)	5,296 (49.8)	<0.001
<b>Co-morbidities, n (%)</b>				
No co-morbidities	1,686 (81.2)	7,967 (93.1)	9,653 (90.7)	<0.001
Congenital cardiac malformation	318 (15.3)	399 (4.7)	717 (6.7)	<0.001
Heart failure	70 (3.4)	59 (0.7)	129 (1.2)	<0.001
Cerebral palsy	46 (2.2)	173 (2.0)	219 (2.1)	0.58
Chronic respiratory failure	11 (0.5)	15 (0.2)	26 (0.2)	0.003
Transplant history	9 (0.4)	6 (0.1)	15 (0.1)	<0.001
Malignancy	7 (0.3)	8 (0.1)	15 (0.1)	<0.001
Tracheostomy	≤5	6 (0.1)	≤10	0.1
Chronic renal failure	≤5	≤20	21 (0.2)	0.62
Chronic liver failure	≤5	0 (0.0%)	≤5	0.004
<b>Most responsible diagnosis of PCCU admission, n (%)</b>				<0.001
<b>Congenital malformations/genetic abnormalities</b>	494 (23.8)	1,512 (17.7)	2,006 (18.9)	

**TABLE 1.** Description of PCCU transfers by deferral status (cont'd)

Characteristic	Transfer status		Total (n = 10,639)	p-value
	Deferred (n = 2,077)	Non-deferred (n = 8,562)		
Respiratory	439 (21.1)	1,859 (21.7)	2,298 (21.6)	
Other	270 (13.0)	1,479 (17.3)	1,749 (16.4)	
Psychiatric/neurologic	213 (10.3)	1,095 (12.8)	1,308 (12.3)	
Perinatal complications	192 (9.2)	703 (8.2)	895 (8.4)	
Accidents/ingestions	177 (8.5)	882 (10.3)	1,059 (10.0)	
Acquired cardiac/circulatory	166 (8.0)	501 (5.9)	667 (6.3)	
Infection	74 (3.6)	332 (3.9)	406 (3.8)	
Hematology/oncology	52 (2.5)	199 (2.3)	251 (2.4)	
<b>TRANSFER CHARACTERISTICS</b>				
<b>Era</b>				
Pre-implementation period (2004–2009), n (%)	1,068 (51.4)	3,243 (37.9)	4,311 (40.5)	
Post-implementation period (2010–2014), n (%)	1,009 (48.6)	5,319 (62.1)	6,328 (59.5)	
<b>Distance from referral hospital to designated PCCU (km) median (IQR)</b>	32 (0–87)	40 (17–87)	40 (16–87)	<0.001
<b>Distance from referral hospital to admission PCCU (km) median (IQR)</b>	144 (67–240)	40 (17–87)	50 (21–105)	<0.001
<b>Origin in referral hospital, n (%)<sup>150</sup></b>				<0.001
Emergency department	559 (26.9)	3,725 (43.5)	4,284 (40.3)	
Ward or SDS	1,469 (70.7)	4,722 (55.2)	6,191 (58.2)	
<b>Time to definitive critical care, minutes, median (IQR)</b>	408 (309–565)	299 (227–406)	310 (234–427)	<0.001
<b>Time of admission, n (%)</b>				0.21
Daytime	698 (33.6)	2,751 (32.1)	3,449 (32.4)	
Evening	787 (37.9)	3,212 (37.5)	3,999 (37.6)	
Night	592 (28.5)	2,599 (30.4)	3,191 (30.0)	
<b>Season of admission, n(%)</b>				0.008
Winter	603 (29.0)	2,261 (26.4)	2,864 (26.9)	
Spring	505 (24.3)	2,139 (25.0)	2,644 (24.9)	
Summer	435 (20.9)	2,053 (24.0)	2,488 (23.4)	
Fall	534 (25.7)	2,109 (24.6)	2,643 (24.8)	

IQR = interquartile range; ED = emergency department; SDS = same-day surgery

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TABLE 2. Factors associated with deferrals

Outcome	Complete study period (2004–2016)		Post-implementation period (2010–2016)	
	OR (95th CI)	p-value	OR (95th CI)	p-value
<b>Age</b>	1.003 (0.99–1.02)	0.64	1.0 (0.98–1.02)	0.92
<b>Sex (female versus male)</b>	1.02 (0.91–1.14)	0.74	1.11 (0.94–1.3)	0.21
<b>ICU admission in previous year</b>	2.16 (1.92–2.44)	<0.0001	2.24 (1.88–2.66)	<0.0001
<b>Rural residence</b>	0.72 (0.61–0.85)	0.0001	0.68 (0.53–0.86)	0.002
<b>Distance (km)</b>				
Referral hospital to designated PCCU	1.0001 (1.0–1.0005)	0.54	1.0 (1.0–1.0003)	0.35
<b>Designated PCCU</b>				
B versus A	6.03 (4.91–7.41)	<0.0001	8.44 (6.31–11.28)	<0.0001
C versus A	2.95 (2.54–3.42)	<0.0001	3.08 (2.46–3.86)	<0.0001
D versus A	1.07 (0.89–1.3)	0.5	1.35 (1.05–1.75)	0.02
<b>Patient presented to their local hospital</b>	0.67 (0.57–0.77)	<0.0001	0.54 (0.44–0.67)	<0.0001
<b>Origin ED versus hospital</b>	0.59 (0.52–0.67)	<0.0001	0.6 (0.5–0.72)	<0.0001
<b>Time of day</b>				
Day versus evening	0.94 (0.84–1.07)	0.36	1.0 (0.84–1.18)	0.97
Night versus evening	0.89 (0.77–1.0)	0.06	0.85 (0.7–1.03)	0.09
<b>Season</b>				
Fall versus winter	0.95 (0.82–1.09)	0.46	1.15 (0.94–1.42)	0.18
Spring versus winter	0.88 (0.76–1.01)	0.07	0.84 (0.68–1.03)	0.1
Summer versus winter	0.8 (0.69–0.93)	0.003	0.77 (0.62–0.95)	0.01
<b>Acute care days</b>	1.0 (1.0–1.001)	0.33	1.0 (1.0–1.002)	0.64

**TABLE 2.** Factors associated with deferrals (cont'd)

Outcome	Complete study period (2004–2016)		Post-implementation period (2010–2016)	
	OR (95th CI)	p-value	OR (95th CI)	p-value
<b>Co-morbidities</b>				
Malignancy	1.24 (0.45–3.42)	0.68	0.42 (0.06–2.78)	0.37
Chronic respiratory failure	2.01 (0.56–7.23)	0.28	5.1 (1.16–22.38)	0.03
Congenital cardiac malformation	1.97 (1.61–2.41)	<0.0001	2.2 (1.66–2.91)	<0.0001
Heart failure	1.81 (1.14–2.88)	0.01	1.55 (0.79–3.04)	0.2
Transplant	2.73 (1.13–6.57)	0.03	4.04 (1.06–15.4)	0.04
<b>Most responsible diagnosis</b>				
Congenital malformations/genetic abnormalities	1.36 (0.98–1.89)	0.06	1.93 (1.18–3.14)	0.009
Respiratory	0.99 (0.72–1.36)	0.95	1.08 (0.67–1.74)	0.75
Other	1.05 (0.75–1.45)	0.79	1.07 (0.66–1.75)	0.79
Psychiatric/neurologic	1.08 (0.76–1.53)	0.67	1.08 (0.65–1.8)	0.76
Perinatal complications	1.36 (0.96–1.92)	0.09	1.25 (0.74–2.11)	0.41
Accidents/ingestions	1.04 (0.73–1.47)	0.83	0.86 (0.5–1.48)	0.59
Acquired cardiac/circulatory	1.17 (0.82–1.67)	0.39	1.36 (0.81–2.29)	0.25
Hematology/oncology	1.26 (0.82–1.94)	0.3	0.97 (0.5–1.87)	0.93

Abbreviations: OR = odds ratio; CI = confidence interval