

Continued Surgical Review Meetings: a Multidisciplinary Clinical Model for Quality Control and Surgical Mentoring

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Introduction

Mortality rates are considered a limited indicator of quality in congenital cardiac surgery. Smooth generational changes among surgeons often necessitate prolonged mentoring.

We aim at introducing a new review model to improve quality and learn from adverse events, by using a continuously updated database and implementing changes in the practice when appropriate. The method will show how to develop surgical skill through improved feedback.

This model will be used to monitor the mentoring system in use at UHS

Methods

All surgical procedures performed by three surgeons between Jan 2010 and June 2011 were reviewed every fortnight at scheduled MDT Meetings. Complications and adverse events (AEs) were discussed for each event. Procedures were categorized as “mentored”, when performed by a junior consultant, and “non-mentored” when performed by senior surgeons. The junior surgeon was mentored through an increasingly difficult range of operations during the three semesters (Fig 2)

Risk category 1 Mortality 0.4%	Risk category 2 Mortality 3.8%	Risk category 3 Mortality 8.5%	Risk category 4 Mortality 19.4%
<p>Atrial septal defect surgery (including atrial septal defect secundum, sinus venosus atrial septal defect, patent foramen ovale)</p> <p>Aortic valve</p> <p>Patent ductus arteriosus surgery at age >10</p> <p>Coarctation repair at age >30</p> <p>Partially anomalous pulmonary venous connection surgery</p>	<p>Aortic valvotomy or valvuloplasty at age >30</p> <p>Subaortic stenosis resection</p> <p>Pulmonary valvotomy or valvuloplasty</p> <p>Pulmonary valve replacement</p> <p>Right ventricular infundibulotomy</p> <p>Pulmonary artery tract augmentation</p> <p>Repair of coronary artery fistula</p> <p>Atrial septal defect and ventricular septal defect repair</p> <p>Atrial septal defect primium repair</p> <p>Ventricular septal defect repair</p> <p>Ventricular septal defect closure and pulmonary valvotomy or infundibular resection</p> <p>Ventricular septal defect closure and pulmonary artery band removal</p> <p>Repair of unspecified septal defect</p> <p>Total repair of tetralogy of Fallot</p> <p>Repair of total anomalous pulmonary veins at age >30</p> <p>Glomus tumor</p> <p>Vascular ring surgery</p> <p>Repair of aortic-pulmonary window</p> <p>Coarctation repair at age >30</p> <p>Repair of pulmonary artery stenosis</p> <p>Transsection of pulmonary artery</p> <p>Common arterial closure</p> <p>Left ventricle to right atrial shunt repair</p>	<p>Aortic valve replacement</p> <p>Risk procedure</p> <p>Left ventricular outflow tract patch</p> <p>Ventriculomyotomy</p> <p>Aorticoplasty</p> <p>Mitral valvotomy or valvuloplasty</p> <p>Mitral valve replacement</p> <p>Valvectomy of tricuspid valve</p> <p>Tricuspid valvotomy or valvuloplasty</p> <p>Tricuspid valve replacement</p> <p>Tricuspid valve replacement for Ebstein anomaly at age >30</p> <p>Repair of anomalous coronary artery without intrapulmonary tunnel</p> <p>Repair of anomalous coronary artery with intrapulmonary tunnel (Takayashi)</p> <p>Closure of umbilical valve, aortic or pulmonary</p> <p>Right ventricle to pulmonary artery conduit</p> <p>Left ventricle to pulmonary artery conduit</p> <p>Repair of double-outlet right ventricle with or without repair of right ventricular obstruction</p> <p>Foster procedure</p> <p>Repair of transitional or complete aortopulmonary conduit with or without valve replacement</p> <p>Pulmonary artery banding</p> <p>Repair of tetralogy of Fallot with pulmonary atresia</p> <p>Repair of cor triatriatum</p> <p>Systemic to pulmonary artery shunt</p> <p>Atrial switch operation</p> <p>Atrial switch operation</p> <p>Reimplantation of anomalous pulmonary artery</p> <p>Anomalous</p> <p>Repair of coarctation and ventricular septal defect closure</p> <p>Excision of intracardiac tumor</p>	<p>Aortic valvotomy or valvuloplasty at age >30</p> <p>Konno procedure</p> <p>Repair of complete anomaly (single ventricle) by ventricular septal defect enlargement</p> <p>Repair of total anomalous pulmonary veins at age <30</p> <p>Atrial septectomy</p> <p>Repair of total anomalous pulmonary veins at age <30</p> <p>Mitral valvotomy or valvuloplasty</p> <p>Mitral valve replacement</p> <p>Valvectomy of tricuspid valve</p> <p>Tricuspid valvotomy or valvuloplasty</p> <p>Tricuspid valve replacement</p> <p>Tricuspid valve replacement for Ebstein anomaly at age >30</p> <p>Atrial switch operation with repair of subpulmonary stenosis</p> <p>Atrial switch operation with ventricular septal defect closure</p> <p>Atrial switch operation with repair of subpulmonary stenosis</p> <p>Atrial switch operation with ventricular septal defect closure</p> <p>Atrial switch operation with repair of subpulmonary stenosis</p> <p>Repair of tricuspid atresia</p> <p>Repair of hypoplastic or interrupted arch without ventricular septal defect closure</p> <p>Repair of hypoplastic or interrupted aortic arch without ventricular septal defect closure</p> <p>Transcatheter arch graft</p> <p>Uncalcification for tetralogy of Fallot and pulmonary atresia</p> <p>Double switch</p>

Fig 1

Mentoring was exercised in case-selection, surgical assistance or both. The average numbers of AEs/Operation classified by group (mentored vs non-mentored) were compared in each semester with ANOVA analysis and post-hoc Game-Howell test.

	Research	Audit	Clinical Review
Object	Adverse Events	Specific Aspect of Practice	Adverse Events Complications
Method	Scientific Analysis	Measure against SoC	Self Assessment
Players	Researchers	Clinicians/Nurses	Clinicians
Costs	High	Moderate	Low
Time costs	High	High	Moderate
Circulation	“Top to Bottom” Widespread	Horizontal Trust / Widespread	“Bottom to Top” Widespread
Clinical Effect	Unclear	High	High
Education Effect	Only by reading	Circulation/Reading	Participation
Timing of effect	Delayed	Delayed Contemporary	Contemporary

Fig 2

Results

In the 18 months period 38 meetings were held and a total of 729 CCAD-eligible consecutive congenital cardiac operations and related interventions were reviewed.

Overall mortality rates were 1%, 2.8% and 2.3% in semester 1, 2 and 3, respectively

Overall incidence of near misses were 0.05/Op, 0.06/Op and 0.06/Op, respectively

The mentored activity had a lower number of AEs in semester 1 and 2, but a high number in semester 3 when more difficult cases were undertaken. The incidence of AEs in the non-mentored activity remained higher but constant, even when the junior surgeon performed most of his operations independently (semester 3) (Fig 3 and 4).

Non Mentored	2010-I	2010-II	2011-I
Procedures	125	137	192
Failures (all)	96 (0.76/Op)	45 (0.32/Op)	52 (0.27%)
Near Misses	7 (0.056/Op)	8 (0.058/Op)	n/a

Mentored*	2010-I	2010-II	2011-I
Procedures	86	99	12
Failures (all)	34 (0.39/Op)	25 (0.25/Op)	15 (1.15/Op)
Near Misses	5 (0.058/Op)	7 (0.070/Op)	n/a

Fig 3

Fig 4

Mentored	2010-I	2010-II	2011-I
2010-I	34 (0.39/Op)		34 (0.39/Op)
2010-II		25 (0.25/Op)	15 (1.15/Op)
	n.s.		p 0.001

Non Mentored	2010-I	2010-II	2011-I
2010-I	96 (0.76/Op)		96 (0.76/Op)
2010-II		45 (0.32/Op)	52 (0.27/Op)
	p 0.001		p 0.001

	Non Mentored	Mentored	p
I Semester 2010	96 (0.76/Op)	34 (0.39/Op)	p 0.001
II Semester 2010	45 (0.32/Op)	25 (0.25/Op)	n.s
I Semester 2011	52 (0.27/Op)	15 (1.15/Op)	p 0.001

Mentored vs Non-Mentored - AEs

Fig 1 RACHS-1 based distribution of surgeries by increasing complexity.
 Fig 2 Comparison between surgical review meeting and other quality control method
 Fig 3 Number of all AEs, grouped per semester in the mentored and non-mentored activity
 Fig 4 Comparison of number of AEs per operation between the mentored and non-mentored activity and between the beginning and the end of the study period

Conclusions

- This multi-themed quality improvement activity provides training and development initiatives.
- It is multi-dimensional, promoting immediate interventions when required, owned and managed by clinicians (“those doing the work”).
- It provides a highly transparent prospective process .
- It is backed up with peer-reviewed (i.e. M&M meeting) and systematically collected evidence.
- A successful integration of surgeons still in a learning curve is achievable with constant monitor