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A cost reducing ECMO model: a single institutional experience.

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A Cost Reducing ECMO Model: A Single Institution Experience En Yaw Hong, Suzanne Wallace, Amy Tropea, Jaime Byrne, Hitoshi Hirose, Harrison T. Pitcher, Nicholas C. Cavarocchi From Thomas Jefferson University Hospital, Philadelphia, PA, USA

Introduction

- Shortage of ECMO specialists.
- ELSO to form new guidelines:
- Board certified nurses who have at least one year of critical care experience can be trained as ECMO specialists
- ECMO program expansion
- Financial concerns were reported.
- However, the financial concerns were not weighed against the long-term cost benefit of training nurses as ECMO specialists.

Objective

We aim to describe our experiences in implementing a new cost-reducing ECMO model in an ICU setting involving multidisciplinary providers (registered nurses, midlevel providers and intensivists) as ECMO specialists.

Competency

CRITICAL BEHAVIOR

1. Reviews and follows Nursing Procedure-Care of the Patient with Adult Extracorporeal Membrane Oxygenation ECMO

- 1. States location, purpose, indications and contraindications of use.
- 2. Identifies resources to troubleshoot
- 3. Describes the process of percutaneous cannulation and ECMO start up
- 4. Describes the difference between V-V and V-A ECMO

ECMO PUMP/CART

- 1. States location of the ECMO cart
- 2. States contents of the ECMO cart
- 3. Identifies that the ECMO cart has had a daily check completed by perfusionist
- 4. Identifies the on/off power switch
- 5. Identifies the battery indicator
- 6. Identifies the display screen
- 7. Identifies the pump and oxygenator
- 8. Identifies the flow sensor

ECMO CIRCUIT

1. States location of backup circuit and states procedures for obtaining replacement/back-up equipment

2. Demonstrates the appropriate technique in assessing the ECMO circuit and keeps circuit visible

3. Performs daily cannula site care per nursing procedure

Methods	
(Implementing the program)	
Group I	•
 New technology: 	•
ECMO circuit	
Oximetry	•
The education platform:	
Didactic sessions	•
Hands-on sessions Degular expressions	
Regular competency tests Compotency checklist	·
Competency checklist	
Groun II	•
 Allocation of dedicated space 	
 Development of algorithms 	
 Recruitment of new specialists 	
Role of new specialists.	De
 Continuous bedside perfusion 	
monitoring.	
 Assess the ECMO circuit 	
 Assist the perfusionist in initiating 	N
ECMO	pa
 No changes in nursing ratio (1:1 	
nurse to patient ratio)	A
 PRN Perfusionists' services 	
checklist	M
PATIENT CARE	
1. Performs a thorough patient assessment, (respiratory, neurological, cannula site, and vital signs) and the interpretation of the assessment	B
2. Discuss the interpretation of clinical signs and symptoms appropriately and communicates with physicians	D of
Demonstrates or describes the relationship of the ECMO blood flow to oxygen delivery and oxygen consumption	
4. Reviews the relationship of sweep gas and carbon dioxide removal	
5. Evaluates the interpretation of the patient arterial blood gas and the	S
appropriate response with sweep 6. Documents on ECMO flowsheet	
7. Identifies the correct interventions for laboratory values	
8. Maintains hourly I/O record status	
TROUBLESHOOTING	
1. States procedures for protecting patient when equipment fails	Di
2. Demonstrates the ability to clamp the line and move pump to back up	Ca
3. Demonstrates hand cranking of the pump	
4. Performs the various interventions in the management of hemorrhage (Ex: cannulae site IV sites GL etc.)	Ν/
5 Discuss possible complications and amorganay according	IVI
device failure, bleeding, lower limb ischemia, decreased flow, chatter, arrhthymia, decreased cerebral oximetry or SVO2.	

Metho	ds

(Calculating for cost benefit)

Retrospective study Patients: N= 74 Group I n=28, Group II n=46 Study period: July 2010 - December 2012

- Demographic factors standardized.
- **Primary endpoint**: total hospital cost incurred by ECMO patients.
- Secondary endpoint: safety issues and mortality.

Results

emographics Group II value Group I lo. of 28 46 atients 44±15 49±14 0.183 ge 14 (50%) 26 (57%) 0.636 **lales** 27.9 ± 7.7 31.5 ± 8.6 MI 0.077 uration 8.2 ± 5.5 d 8.1 ± 6.9 d 0.971 ECMO

afety management issue

	Group I	Group II	p value
islodged			
annula	0%	2.10%	0.622
ortality	12 (42%)	27 (59%)	0.233

Cost

Group ECMO year

Fee pe up

Fee pe

Total spend progra

Group ECMO secon

Fee pe retain Fee pe

Total spend progra

ECM



Results

details of Group I vs Group I			
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p I D cost first	Cost	Annual Frequenc y	Total cost
er ECMO set	\$834	35	\$29,190
er hour	\$101	5880	\$593,880
hospital I for ECMO am			\$623,070
p II D cost nd year			
er monthly er	\$19,5 00	12	\$234,000
er hour	\$104	657	\$68,328
hospital I for ECMO am			\$302,328
) savings			\$291,552

Conclusion

We demonstrated that the ICU run ECMO model decreases hospital cost by reducing the cost of continuous bedside perfusion support with no loss in safety and outcomes.

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