Outcomes Following the Development and Implementation of a Multi-component, Multidisciplinary Cardiogenic Shock Program

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BACKGROUND

Cardiogenic shock is associated with significant morbidity and mortality, necessitating a multidisciplinary approach to achieve optimal outcomes

AIMS

This single-center study aimed to evaluate the impact of the development and implementation of a multi-component, multi-disciplinary cardiogenic shock program on clinical outcomes

METHODS

Before initiation of shock program:
1. No standardized or protocolized decision making
2. No regular meetings to discuss adverse events
3. Not all stakeholders represented in decision making
4. No data tracking

After initiation of shock program:
1. Infrastructure with core leadership group
2. Monthly meetings with core leadership to discuss adverse events and review aggregate data
3. Implementation of a shock paging system
4. Creation of a data tracking mechanism
5. Appointment of tMCS/shock nursing coordinators for protocol development, education, data tracking
6. Development of a temporary MCS quality scorecard
7. Transitioning Impella patients to a stepdown unit for bed optimization

Patient outcomes were compared between the inaugural year and the subsequent year of the shock program. Primary outcomes included 30-day and 1-year survival. Secondary outcomes included new stroke and new dialysis requirement at discharge.

RESULTS

Table 1. Demographic characteristics of shock call patients

	Overall N=143	Inaugural year N=56	Second year N=87	p-value
Age, Mean (SD)	54.5 (15.8)	54.0 (16.5)	54.8 (15.3)	0.7715
Gender, n (%)				0.1947
Female	42 (29.4%)	13 (23.2%)	29 (33.3%)	
Male	101 (70.6%)	43 (76.8%)	58 (66.7%)	
Location when shock call initiated, n (%)				0.2189
MUSC	73 (51.1%)	25 (44.6%)	48 (55.2%)	
OSH	70 (48.9%)	31 (55.4%)	39 (44.8%)	
Shock Score, n (%)				0.0003
A-B	18 (12.6%)	15 (26.8%)	3 (3.5%)	
C	59 (41.3%)	19 (33.9%)	40 (46.0%)	
D	37 (25.9%)	15 (26.8%)	22 (25.3%)	
E	29 (20.3%)	7 (12.5%)	22 (25.3%)	
Shock etiology, n (%)				0.3933
Arrhythmia	20 (14.0%)	8 (14.3%)	12 (13.8%)	
Decompensated HF	48 (33.6%)	18 (32.1%)	30 (34.5%)	
Ischemic	36 (25.2%)	18 (32.1%)	18 (20.7%)	
Other	39 (27.3%)	12 (21.4%)	27 (31.0%)	

Table 2. Unadjusted primary and secondary outcomes of shock call patients compared by era

	Overall	Inaugural year	Second year	p-value
1 year survival, n (%)	74/139 (53.2%)	27/56 (48.2%)	47/83 (56.6%)	0.3296
30 days survival, n (%)	91 (63.6%)	30 (53.6%)	61 (70.1%)	0.0447
New stroke at discharge, n (%)	6/96 (6.3%)	3/34 (8.8%)	3/62 (4.8%)	0.6624
New dialysis at discharge, n (%)	13/96 (13.5%)	5/34 (14.7%)	8/62 (12.9%)	0.8050

Table 3. Multivariable cox regression analysis for 30-day and 1-year mortality

|	30-day mortality		1-year mortality	
	Hazard Ratio (95% CI)	P value	Hazard Ratio (95% CI)	P value
Era: 2nd year (ref. inaugural year)	0.429 (0.232-0.791)	0.0068	0.612 (0.354-1.059)	0.0794
Male sex	1.194 (0.607-2.349)	0.6078	0.965 (0.53-1.757)	0.9084
Age	1.032(1.0091-1.056)	0.0072	1.033(1.012-1.055)	0.0018
At MUSC at time of shock call	0.58 (0.326-1.032)	0.0678	0.578 (0.347-0.964)	0.0358
SCAI Shock Score (ref. E)				
A-B	0.096 (0.023-0.408)	0.0015	0.162 (0.046-0.573)	0.0048
C	0.29 (0.117-0.719)	0.0076	0.601 (0.283-1.278)	0.1859
D	1.001 (0.474-2.112)	0.9984	1.518 (0.763-3.02)	0.234
MCS usage	0.63 (0.274-1.327)	0.2086	0.56 (0.266-1.177)	0.1258
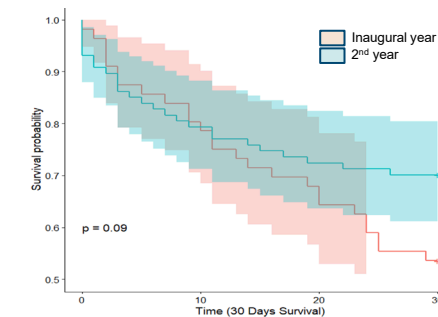
Figure 1. Kaplan-Meier 30-day survival among shock call patients in the inaugural and 2nd year of the shock call program
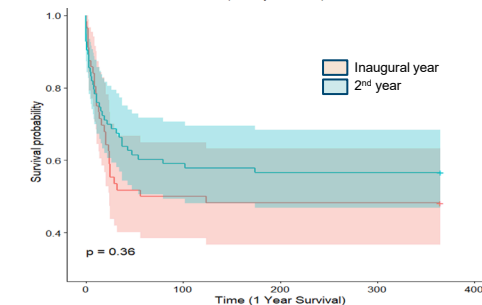

Figure 2. Kaplan-Meier 1-year survival among shock call patients in the inaugural and 2nd year of the shock call program

CONCLUSIONS

30-day survival improved from 53.6% to 70.1% in the second year after initiation of the shock call program compared to the inaugural year despite treating an overall sicker patient population by shock score.

Younger age, lower shock scores, and not requiring transfer from an OSH were associated with lower risk of 30-day and 1-year mortality in shock call patients.

Implementation of a multi-component multidisciplinary shock program facilitates a systematic approach to cardiogenic shock and is associated with improved hospital culture and collaboration and excellent outcomes in a challenging patient subset.

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