

SHOCK PROGRAM

**An institution-wide shock program improves
identification of shock & reduces mortality**



**KRITIKUS
FOUNDATION**

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Kritikus Foundation, a nonprofit organization dedicated to improve the care of seriously ill patients by bringing about change in the healthcare environment through protocol and program implementation, education of healthcare providers, and research in the acute care setting.

Shock is a syndrome manifested by inadequate tissue perfusion as a result of depleted intravascular volume, poor cardiac performance, or loss of peripheral vascular tone. Regardless of the etiology, the pathophysiology is similar and the sequelae are predictable. Inadequately or untimely treated shock results in multiorgan dysfunction and frequently multiorgan failure, long hospital stays, and high morbidity and mortality. If this syndrome is recognized sooner and aggressively treated with goal directed therapy improved outcomes can be achieved.

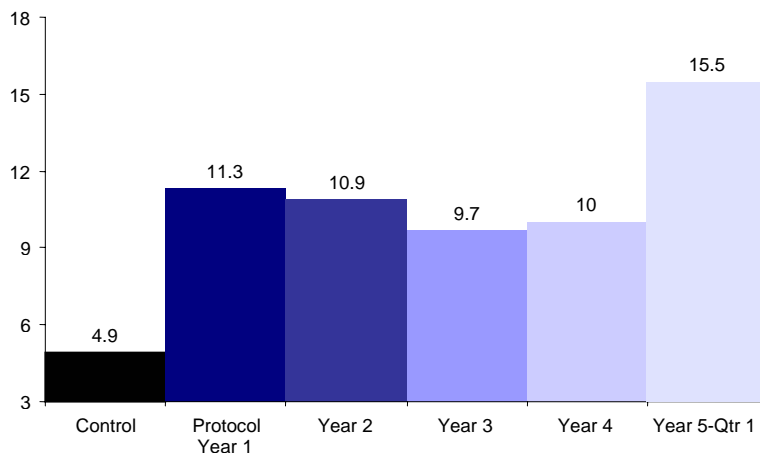
Implementation of a systems approach for early identification of patients in shock and empowerment of all health care providers to mobilize institutional resources for rapid treatment, will reduce morbidity and mortality and establish a new area of critical care excellence at your institution.

Redding Critical Care Medical Group in collaboration with Shasta Regional Medical Center and subsequently Kritikus Foundation developed the Shock Program to determine the effect of a community hospital wide program enabling nurses and paramedics to mobilize institutional resources for treatment of patients with shock. The Shock Program has increased the identification of patients in shock from 1/244 admissions to 1/95 admissions and has decreased hospital mortality, from 40.7% to 15.5%.

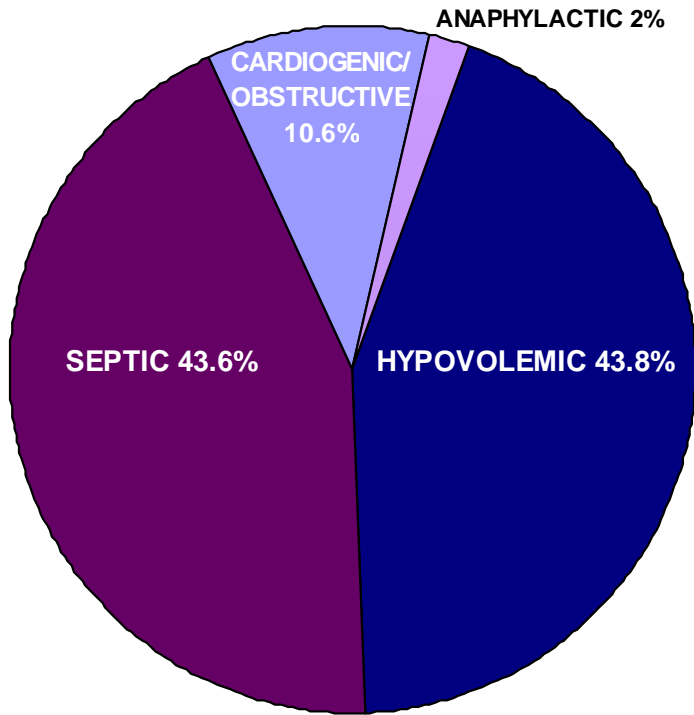
This is the first time that a comprehensive systems approach for the recognition and treatment of non-traumatic shock has been shown to be feasible and beneficial with reduced time to initiation of therapy, increased identification of patients in shock, discharged patients to a more desirable location, and reduced mortality.

Shock Program Results Control Group thru Protocol Group Years 1- 5 (Yr 5-Qtr 1 Only)

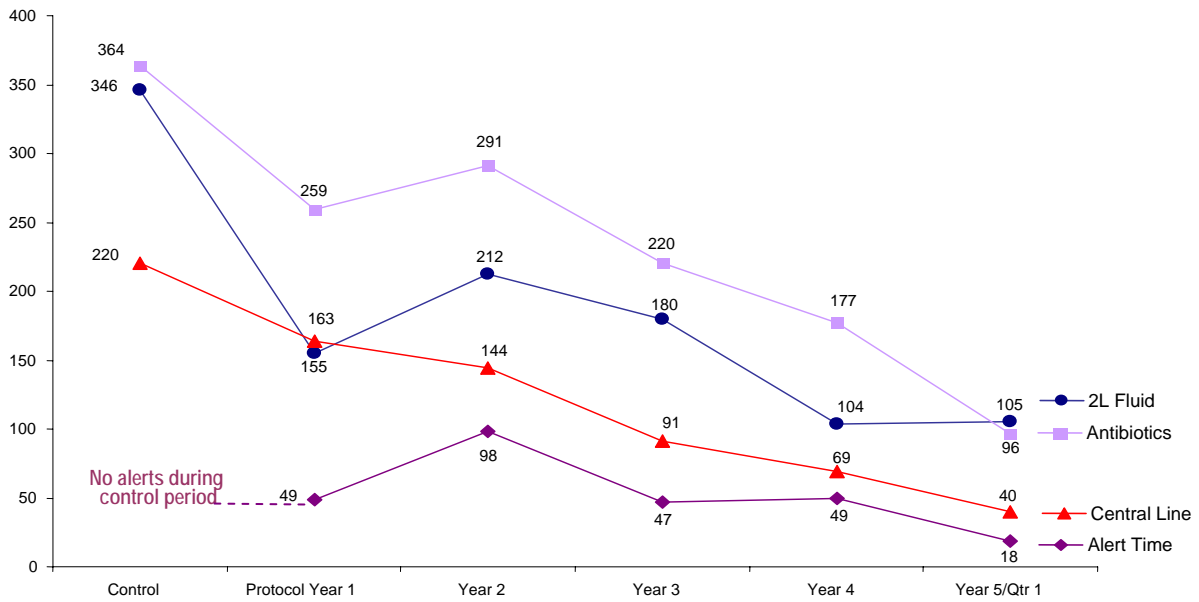
Number of Patients Identified in Shock per 1,000 Admissions



Mortality by Shock Type

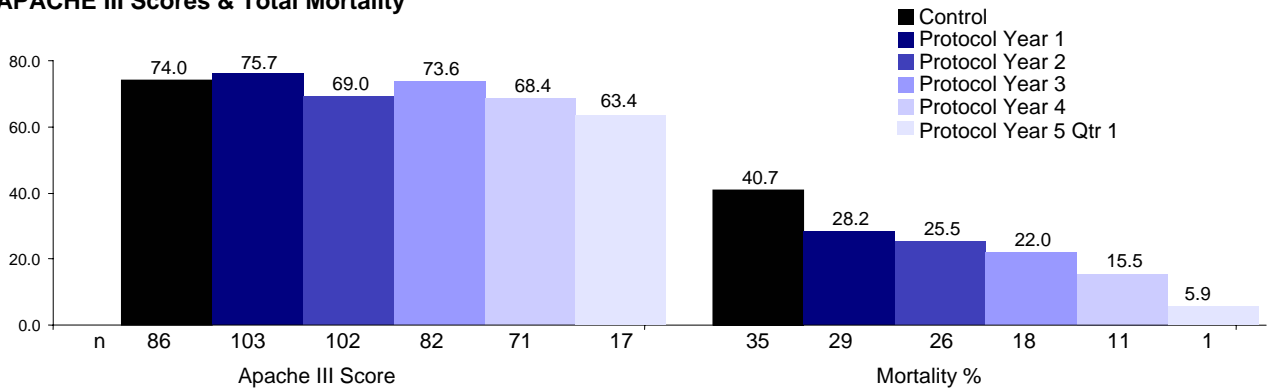


Mean Time to Treatment Intervals (reported in minutes)

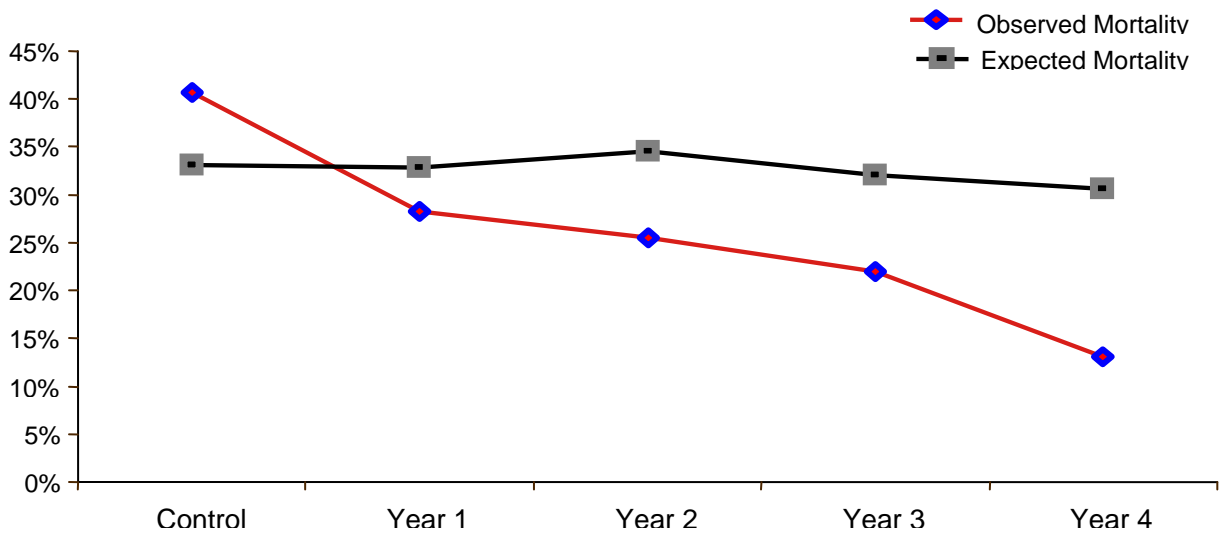


p < 0.05

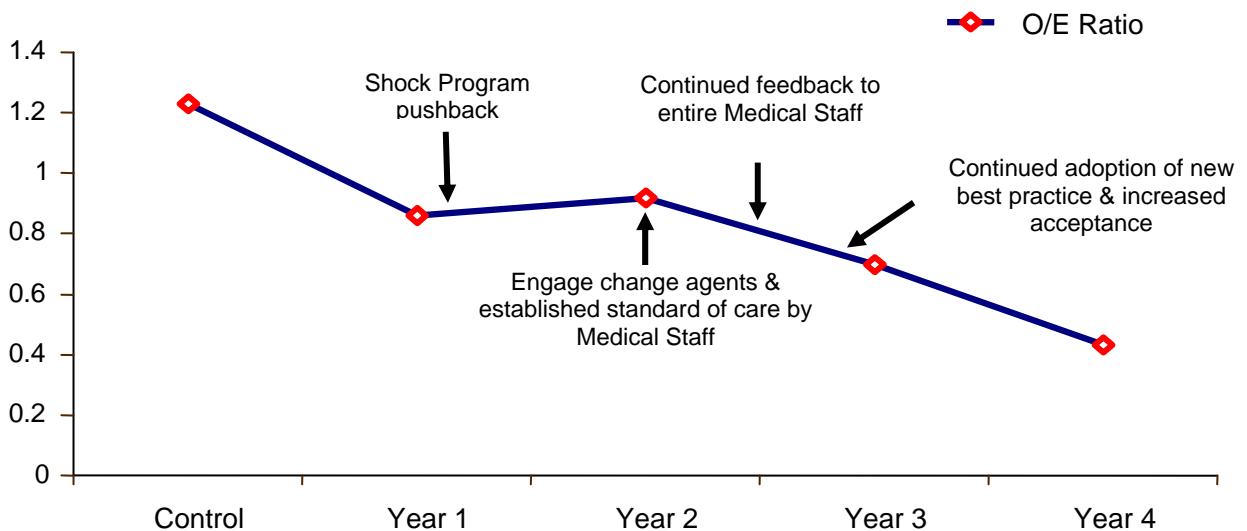
APACHE III Scores & Total Mortality



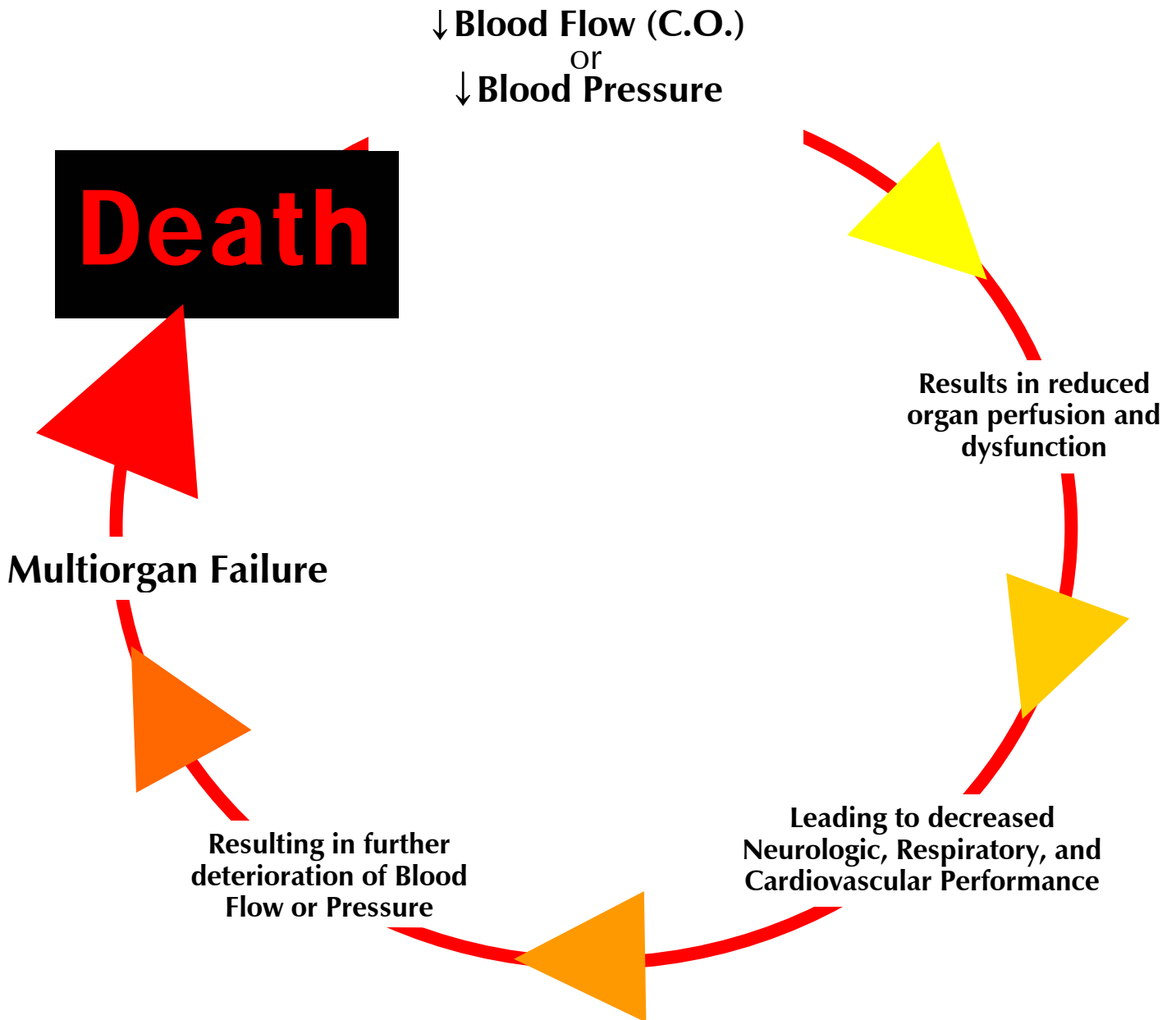
Shock Program O/E Outcomes



Shock Program O/E Mortality



UNTREATED SHOCK IS 100% FATAL



**EARLIER RECOGNITION AND
EARLY GOAL DIRECTED THERAPY
WILL INTERRUPT THE CYCLE**

NEED

In the community hospital setting, 24-hour in-house physician coverage is generally available only through the emergency department (ED). Significant alterations in vital signs or neurologic status in the field or hospital necessitate a call from the nurse to and a response from the ED, primary physician or consultant, delaying further assessment and treatment. A community-based program that educates all healthcare providers to rapidly identify and initiate treatment in life-threatening conditions, coupled with treatment protocols based upon best practice guidelines, may improve outcomes. This approach has been exemplified by cardiac arrest and trauma teams where non-physician personnel mobilize institutional resources and initiate frontline therapy. A significant group of at-risk patients who may benefit from a similar approach are patients in shock.

Shock is a syndrome of inadequate tissue perfusion. If it is not recognized and treated during a narrow window of opportunity, critical tissue hypoxia develops and initiates a cascade of events leading to multi-organ failure and death.^{1,2} The estimated mortality in cardiogenic shock with acute myocardial infarction ranges from 50-80%.³ In septic shock, mortality varies from 39-60 % and has not significantly improved in the past few decades.⁴ Even with major advances in the therapeutic armamentarium, septic shock alone has been estimated to claim at least 90,000 lives per year in the United States.^{5,6} Despite the high incidence and mortality of shock, a comprehensive systems-based approach to rapidly identify and treat shock has been slow to evolve.

A team approach to resuscitation of shock was first described in 1967.⁷ This concept re-emerged as the medical emergency team (MET), a group of physicians and nurses that can be activated by frontline non-physician providers to immediately evaluate and treat patients with significant alteration in vital signs or neurologic deterioration.^{8,9} This approach led to decreases in incidence of in-hospital cardiac arrest, bed occupancy of cardiac arrest survivors and overall in-hospital mortality.^{10,11} It is possible that a similar approach may prove especially beneficial to the subset of patients with shock whether in the hospital or in the field. In addition, early goal-directed hemodynamic therapy has been shown to reduce mortality in patients with high-risk surgery, trauma, severe sepsis and septic shock.^{1,12-15} Studies of goal-directed therapy initiated later in the course of critical illness, however, have yielded disappointing results.^{16,17} These observations suggest that resuscitation of shock is more likely to improve survival if instituted early in the disease process. However, appropriate resuscitation of shock is often hampered by lack of recognition of early shock and inadequate knowledge, experience and skills of health care providers, which results in avoidable delays in appropriate treatment and patient transfer to the intensive care unit (ICU).^{2,18-22} The above factors could potentially be remedied with a systems-based team approach incorporating staff education to enhance early recognition, empowerment of non-physicians to mobilize hospital resources, rapid protocol-directed therapy, early intensivist involvement and a dedicated shock bed to allow prompt transfer to the ICU.^{1,23-33}

Kritikus Foundation can assist you in developing such a program at your institution and evaluate its effect.

*For further information, remote or on-site education,
and program implementation at your site, please contact:*

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TYPES OF SHOCK

Hypovolemic Shock Low blood volume decreasing preload and cardiac output. Due to GI bleed, trauma, or severe dehydration.

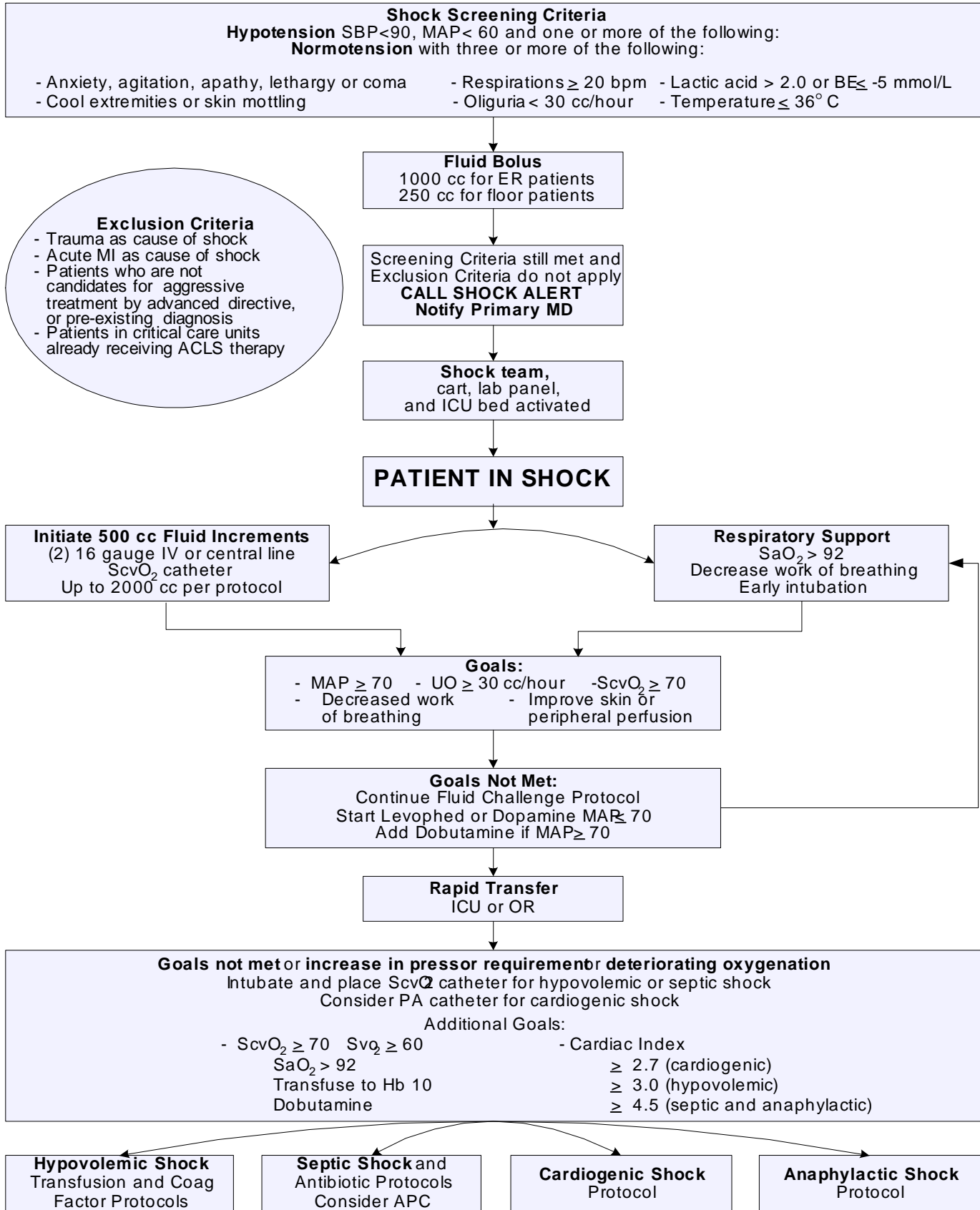
Septic or Distributive Shock Decrease in vascular tone and volume causing hypotension due to infection, pancreatitis, trauma or other sources of tissue injury.

Cardiogenic Shock Decrease cardiac function due to a significant muscle, valve or rhythm problem resulting in a major drop in cardiac output.

Obstructive Shock Obstruction of blood flow from the heart due to pulmonary embolism, cardiac tamponade or tension pneumothorax.

Anaphylactic Shock A form of distributive shock as a result of allergic reaction to drug or environmental agent frequently associated with bronchospasm.

SHOCK FLOW



Abstract

A multi-disciplinary community hospital program for early and rapid resuscitation of shock in non-trauma patients.

Sebat F, Johnson D, Musthafa AA, Watnik M, Moore S, Henry K, Saari M: A multidisciplinary community hospital program for early and rapid resuscitation of shock in nontrauma patients. *Chest* 2005; 127(5):1729-1743

Objective. To determine the effect of a community hospital-wide program enabling nurses and pre-hospital personnel to mobilize institutional resources for the treatment of patients with non-traumatic shock.

Design. Historically-controlled single-center study.

Setting. 180-bed community hospital.

Patients. Patients in shock who were candidates for aggressive therapy.

Interventions. From January 1998 to May 31, 2000, patients in shock received standard therapy (control group). During the month of June 2000, intensive education of all healthcare providers (pre-hospital personnel, nurses and physicians) took place. From July 1, 2000 through June 30, 2001, patients in shock (protocol group) were managed with a hospital-wide Shock Program. The program included early recognition of shock and initiation of therapy by non-physicians. Frontline personnel mobilized a Shock Team which used goal-directed resuscitation protocols, early intensivist involvement and rapid transfer to the intensive care unit where protocols specific to shock etiology were implemented.

Measurements and Main Results. Respectively, 86 and 103 patients were enrolled in the control and protocol groups. Baseline characteristics were similar. The protocol group had significant reduction in the times to interventions e.g. median times (hours: minutes): intensivist arrival 2:00/0:50 ($p < 0.002$); ICU/Operating Room admission 2:47/1:30 ($p < 0.002$); 2L fluid infused 3:52/1:45 ($p < 0.0001$); pulmonary artery catheter placement 3:50/2:10 ($p = 0.02$). Good outcomes (discharged to home or rehabilitation center) were more likely in the protocol group than in control ($p = 0.02$). Hospital mortality was 40.7% in the control and 28.2% in the protocol group ($p = 0.035$).

Conclusion. Similar to current practice in trauma or cardiac arrest, empowerment of non-physician providers to mobilize hospital resources for care of patients with shock is effective. A community hospital program incorporating education of providers, activation of a coordinated team response and early goal-directed therapy expedited appropriate treatment and was temporally associated with improved outcomes. Randomized multicenter trials are needed to further assess the Shock Program's impact on outcomes.

Shock Program Direct Costs	Web-cast Introduction	Program Introduction	Train the Trainer Including Implementation & Education Package	One Year QA Project Including Implementation & Education Package	Two Year Study Including Implementation Education & Study Package
	↓	↓	↓	↓	↓
Web-Based Conference \$595* <ul style="list-style-type: none"> Webcast PowerPoint presentation (\$300) Followed by time for questions and answers with physician via conference call Real-Time Web Conference \$830 <ul style="list-style-type: none"> On line PowerPoint presentation with physician presenting real time Time for questions and answers with physician via conference call 	■				
One Day On-site Program Introduction \$3,744** <ul style="list-style-type: none"> Physician presentation- PowerPoint Case studies Time for questions and answers and meeting with key personnel 		■	■	■	■
On-site Train the Trainer \$10,912** On-site, 24 hours Clinical Staff Education <ul style="list-style-type: none"> Orientation of program to medical, nursing and administration leadership Educational presentations to the medical and nursing staff 8 hours of training the Trainer Assist in formation of a Shock Team 1 mock shock alert 			■		
One Year - Shock Program QA Project \$25,344** On-site, 32 hours full shock education program by the Critical Care Faculty of Kritikus Foundation <ul style="list-style-type: none"> Orientation of program to medical, nursing and administration leadership On-site, 32 hours MD for education of physicians, RNs and emergency services On-site, 32 hours Critical Care Research Coordinator for education of RNs and emergency services 8 hours of training the Trainer Assist in formation of a shock team 4 mock shock alerts One year consultative support 				■	
Two Year - Shock Program & Study \$39,744** On-site, non consecutive 64 hours full shock education program by the Critical Care Faculty of Kritikus Foundation <ul style="list-style-type: none"> MD education RN education EMS education Shock Team education Flip cards Set up and implementation of a shock cart Assist in formation of the Shock Team using site personnel 6 mock shock alerts One year clinical resource support Orientation to protocols Train personnel in protocols Two year consultative support 					■
Implementation & Education Package \$6,250 <ul style="list-style-type: none"> Orientation & Education manuals Protocol posters for units throughout hospital Protocols Physician Orders Data Collection Tool PR Tools Education Tools & examination PowerPoint presentation 		■	■	■	■
Data Collection Tools \$2,160 <ul style="list-style-type: none"> Data base set-up, training and implementation Training in documentation and data collection tool 				■	■
Direct Cost	\$595 \$830	\$9,994	\$20,906	\$37,498	\$51,898

*Travel and lodging expenses are not included in these totals

* For Webcast only \$800

Shock Program Indirect Costs Based on a 200 bed hospital	Web-cast Introduction ↓	Program Introduction ↓	Train the Trainer Including Implementation & Education Package ↓	One Year QA Project Including Implementation & Education Package ↓	Two Year Study Including Implementation Education & Study Package ↓
Program Coordinator (Annual) \$33,600 - \$52,800 ½ FTE (\$35 - \$55/hr x 960/hrs) • Patient Screening (\$7,000 - \$11,000) • 150 each control/protocol) 300 pts x 4=1200 (yielding a 4:1 ratio) ÷ 6pts reviewed/hr = 200hr x \$35/hr - \$55/hr • Data Collection & QC \$6,562 - \$10,312 • 150 pts x1.25 hr x \$35.00 • 150 pts x1.25 hr x \$55.00 • Quality Assurance • Responding to Shock Alerts • Shock patient assessment				■	■ ■
Staff Education \$22,500 - \$33,750 (1.5 hrs x \$30 - \$45 x 500 nurses & EMS)				■	■
Physician Champion Annual \$0 - \$29,245 12.5 hrs/month x \$0- \$195 = \$0 - \$2,437 May be incorporated into existing physician director's responsibilities or additional new responsibilities					
Direct Cost	\$595 \$830	\$9,994	\$20,906	\$37,498	\$51,898
Indirect Cost			Determined by facility based on level of implementation	\$56,100 – \$86,550	\$89,700 – \$139,350
Total Cost	\$595 \$830	\$9,994	\$20,906	\$93,598 – \$124,048	\$141,598 – \$191,248

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