ICEMA
MEDICAL ADVISORY COMMITTEE

MEETING NOTICE

October 23, 2014
1300 - 1500

ICEMA
Training Rooms A & B
1425 South "D" Street
San Bernardino, CA 92408

ICEMA
1425 South "D" Street
San Bernardino, CA 92415-0060
(909) 388-5811 FAX (909) 388-5850

AGENDA

ICEMA
MEDICAL ADVISORY COMMITTEE

October 23, 2014

1300 - 1500

Purpose: Information Sharing

Meeting Facilitator: Todd Sallenbach

Timekeeper: Danielle Ogaz

Record Keeper: Danielle Ogaz

AGENDA ITEM		PERSON(S)	DISCUSSION/ACTION	TIME
I.	Welcome/Introductions	Todd Sallenbach		1300 - 1301
II.	Approval of Minutes	All	Discussion	1301 - 1303
III.	Discussion/Action Items			
	A. Standing EMS System Updates			1303 - 1320
	1. Review of Action Items 2. Trauma Program 3. STEMI Program: STEMI Data 4. Stroke Program: Stroke Data 5. STEMI/Stroke Center Regulations 6. CQI Report Update 7. SAC Update • Fentanyl Addition to Basic Scope 8. Literature Review/Update • Dextrose 10% in the Treatment of Out-of-Hospital Hypoglycemia • Effect of Out-of Hospital Noninvasive Positive-Pressure Support Ventilation in Adult Patients With Severe Respiratory Distress: A Systematic Review and Meta-analysis • "No Diversion": A Qualitative Study of Emergency Medicine Leaders in Boston, MA, and the Effects of a Statewide	1. Todd Sallenbach 2. Chris Yoshida-McMath 3. Chris Yoshida-McMath 4. Chris Yoshida-McMath 5. Reza Vaezazizi 6. Todd Sallenbach 7. Todd Sallenbach 8. Reza Vaezazizi	1. Discussion/Action 2. Discussion 3. Discussion 4. Discussion 5. Discussion 6. Discussion 7. Discussion 8. Discussion	

	Diversion Ban Policy • Two Cheers for Regulation			
	B. EMS Trends			1320 - 1330
	1. TXA Study Update 2. Paramedicine Step I Research Update 3. Art of Resuscitation	1. Reza Vaezazizi/Michael Neeki 2. Michael Neeki 3. Reza Vaezazizi	1. Discussion 2. Discussion 3. Discussion	
	C. Active Shooter	RCFD	Discussion	1330 - 1400
	D. Continuous Quality Improvement			1400 - 1410
	1. ICEMA CQI Plan Review - MAC/SAC Task Force	1. Ron Holk	1. Discussion/Action	
	E. Procainamide	Kevin Parkes	Discussion	1410 - 1415
	F. Membership Review	Ron Holk	Discussion/Action	1415 - 1420
	G. Protocol Survey Results	Ron Holk	Discussion	1420 - 1425
	H. Protocol Review	All	Discussion/Action	1425 - 1455
	1. 7010 - BLS/LALS/ALS Standard Drug & Equipment List 2. 7020 - EMS Aircraft Standard Drug & Equipment List 3. 7040 - Medication Standard Orders 4. 8020 - Critical Care Interfacility Transport 5. 9130 - Procedures for EMS Monitoring of Multiple Patients (San Bernardino County Only) 6. 6070 - Cardiovascular ST Elevation Myocardial Infarction Receiving Center Criteria and Destination Policy 7. 6100 - Neurovascular Stroke Receiving Center and Destination Policy 8. 8120 - Continuation of Care (San Bernardino County Only) 9. 11110 - Stroke Treatment - Adult 10. 15020 - Trauma - Pediatric (Less than 15 years of age)			
IV.	Public Comment	All	Discussion	1455 - 1456
V.	Round Table/Announcements	All	Discussion	1456 - 1457
VI.	Future Agenda Items	All	Discussion	1457 - 1458
VII.	Next Meeting Date: December 18, 2014	All	Discussion	1458 - 1500
VIII.	Adjournment	Todd Sallenbach	Action	1500

MINUTES

MEDICAL ADVISORY COMMITTEE

August 28, 2014

1300 to 1500

AGENDA ITEM		DISCUSSION/FOLLOW UP	RESPONSIBLE PERSON(S)
I.	WELCOME/INTRODUCTIONS	Meeting called to order at 1302.	Todd Sallenbach
II.	APPROVAL OF MINUTES	The June 26, 2014, minutes were approved. Motion to approve. MSC: Michael Neeki/Phong Nguyen APPROVED Ayes: Lance Brown, Sam Chua, Susie Moss, Michael Neeki, Phong Nguyen Leslie Parham, Kevin Parkes, Joy Peters, Todd Sallenbach, Andrea Thorp, Joanna Yang	
III.	DISCUSSION ITEMS		
	A. Standing EMS System Updates		
	1. Review of Action Items	Nothing to report.	Todd Sallenbach
	2. Trauma Program	Modifications to the verbiage on pediatric axial spinal immobilization in the pediatric trauma protocol are in process. Protocol will be sent out in the next public comment period. TXA study will be presented to the EMDAC Scope of Practice Committee in September. The next TSAC/TAC meeting will be October 29, 2014; the HERT incident will be reviewed during the meeting. Trauma program managers are working on a system-wide re-education of the continuation of trauma care usage and criteria.	Chris Yoshida-McMath
	3. STEMI Program: STEMI Data	The STEMI Committee has decided to conclude the STEMI EGG review. The next STEMI meeting is December 4, 2014, at ICEMA.	Chris Yoshida-McMath

	4. Stroke Program: Stroke Data	The Stroke Committee endorsed a single tiered system. Kaiser Ontario and Fontana are close to becoming an ICEMA designated NSRC. The next Stroke meeting is November 18, 2014, at ICEMA.	Chris Yoshida-McMath
	5. STEMI/Stroke Center Regulations	No new updates.	Reza Vaezazizi
	6. Drug Shortage Update	No new updates.	Reza Vaezazizi
	7. CQI Report Update	No new updates.	Todd Sallenbach
	8. SAC Update	The SAC meeting on August 13, 2014, lacked a quorum. SAC members had concerns regarding only having D10. MAC will address concerns during review of the public comments at the October meeting. SAC agreed to a joint task force with MAC to review the ICEMA CQI Plan.	Todd Sallenbach
	9. Literature Review		Reza Vaezazizi
	• Comparison of Success Rates Between Two Video Laryngoscope Systems Used in a Prehospital Clinical Trial	Synopsis of article presented by Dr. Vaezazizi. Full article distributed with agenda packet.	
	• Airways In Out-of-Hospital Cardiac Arrest: Systematic Review And Meta-Analysis	Synopsis of article presented by Dr. Vaezazizi. Full article distributed with agenda packet.	
	• Implementation of a Titrated Oxygen Protocol in the Out-of-Hospital Setting	Synopsis of article presented by Dr. Vaezazizi. Full article distributed with agenda packet.	
	• Manual vs. Integrated Automatic Load-Distributing Band CPR with Equal Survival After Out-of-Hospital Cardiac Arrest. The Randomized CIRC Trial.	Synopsis of article presented by Dr. Vaezazizi. Full article distributed with agenda packet.	
	B. EMS Trends		
	1. Fentanyl Addition to Basic Scope	MAC requested that SAC provide input on the logistics of the transition timeframe.	Reza Vaezazizi
	2. TXA Study Update	The TXA Study will be presented to the State in September 2014 for approval.	Reza Vaezazizi/ Michael Neeki
	3. Paramedicine Step I Research Update	Goal is to begin study in November 2014 with a sample size of 2,000 patients.	Michael Neeki

	C. Bylaws Review		Ron Holk
	1. Election of Chair & Co-Chair	Beginning in 2015 Chair - Phong Nguyen Co-Chair - Michael Neeki Motion to endorse. MSC: Lance Brown/Sam Chua APPROVED Ayes: Lance Brown, Sam Chua, Susie Moss, Michael Neeki, Phong Nguyen Leslie Parham, Kevin Parkes, Joy Peters, Todd Sallenbach, Andrea Thorp, Joanna Yang	
	D. Continuous Quality Improvement		Ron Holk
	1. ICEMA CQI Plan Review - MAC/SAC Task Force	MAC to provide names for the MAC/SAC task Force to Ron Holk for October MAC meeting. Motion to endorse joint task force. MSC: Leslie Parham/Susie Moss APPROVED Ayes: Lance Brown, Sam Chua, Susie Moss, Michael Neeki, Phong Nguyen Leslie Parham, Kevin Parkes, Joy Peters, Todd Sallenbach, Andrea Thorp, Joanna Yang	
	E. Procainamide	Tabled until October 23, 2014.	Kevin Parkes
	F. End Title CO2: Standard or Optional Drug and Equipment List	Item will be revisited in 6 months. Motion to endorse. MSC: Michael Neeki/Phong Nguyen APPROVED Ayes: Lance Brown, Sam Chua, Susie Moss, Michael Neeki, Phong Nguyen Leslie Parham, Kevin Parkes, Joy Peters, Todd Sallenbach, Andrea Thorp, Joanna Yang	Todd Sallenbach
	G. Review of Condensed Protocol Process	The committee supports getting input from field personnel and review of condensed protocols.	Ron Holk
	H. Specialty Care: Remove Requirement for Recorded Line	MAC endorsed Specialty Program's recommendation to remove requirement for a recorded line. Motion to endorse. MSC: Phong Nguyen/Michael Neeki APPROVED Ayes: Lance Brown, Sam Chua, Susie Moss, Michael Neeki,	

		Phong Nguyen Leslie Parham, Kevin Parkes, Joy Peters, Todd Sallenbach, Andrea Thorp, Joanna Yang	
	I. Protocol Review		
	1. 7010 - BLS/LALS/ALS Standard Drug & Equipment List	Tabled until October 23, 2014.	
	2. 7020 - EMS Aircraft Standard Drug & Equipment List	Tabled until October 23, 2014.	
	3. 7040 - Medication Standard Orders	Tabled until October 23, 2014.	
	4. 8020 - Critical Care Interfacility Transport	Tabled until October 23, 2014.	
	5. 9130 (DRAFT) - Procedures for EMS Monitoring of Multiple Patients (San Bernardino County Only)	Tabled until October 23, 2014.	
IV.	PUBLIC COMMENT	None	All
V.	ROUND TABLE/ ANNOUNCEMENTS	None	All
VI.	FUTURE AGENDA ITEMS	None	Danielle Ogaz
VII.	NEXT MEETING:	October 23, 2014	
VIII.	ADJOURNMENT	The meeting adjourned at 1453.	Todd Sallenbach

Attendees:

NAME	MAC POSITION	EMS AGENCY STAFF	POSITION
☐ VACANT ☐ Jeff Grange - LLUMC	Trauma Hospital Physicians (2)	☒ Reza Vaezazizi, MD	Medical Director
☒ Phong Nyugen - RDCH ☒ Todd Sallenbach - HDMC (Chair)	Non-Trauma Base Physician s (2)	☐ Tom Lynch	EMS Administrator
☐ Aaron Rubin - Kaiser	Non-Base Hospital Physician	☐ Denice Wicker-Stiles	Assist. Administrator
☒ Michael Neeki - Rialto FD	Public Transport Medical Director	☐ George Stone	Program Coordinator
☒ Sam Chua - AMR	Private Transport Medical Director	☒ Ron Holk	EMS Nurse Specialist
☐ Debbie Bervel - SB City FD	Fire Department Medical Director	☒ Chris Yoshida-McMath	EMS Nurse Specialist
☒ Joy Peters - ARMC	EMS Nurses	☒ Danielle Ogaz	EMS Specialist
☐ Joe Powell - Rialto FD	EMS Officers		
☒ Leslie Parham	Public Transport Medical Rep (Paramedic/RN)		
☒ Susie Moss	Private Transport Medical Rep (Paramedic/RN)		
☒ Lance Brown	Specialty Center Medical Director		
☒ Joanna Yang - LLUMC	Specialty Center Coordinator		
☐ Troy Pennington	Private Air Transport Medical Director		
☐ Stephen Patterson - Sheriff's Air Rescue	Public Air Transport Medical Director		
☐ Micheal Guirguis - SB Comm Center	PSAP Medical Director		
☐ Andrew Stevens	Inyo County Representative		
☐ Rosemary Sachs	Mono County Representative		
☒ Kevin Parkes	SAC Liaison		
☒ Andrea Thorp	Pediatric Critical Care Physician		

GUESTS	AGENCY
Alan Bodor	SB County ISD
Patti Eickholt	SACH
Terrance Flores	AMR
Lisa Higuchi	AMR
Heather Kunts	LLUMC
Christopher Linke	AMR
Pam Martinez	Ontario FD
Sara Morning	Redlands Hospital
V. Osterman	
Henry Perez	Colton FD
Shawn Reynolds	LLUMC
Cindy Strebel	Running Springs FD
Bob Tyson	Redlands FD
Terry Welsh	Redlands FD

BRIEF REPORT

Dextrose 10% in the Treatment of Out-of-Hospital Hypoglycemia

Matthew V. Kiefer, MD;[1] H. Gene Hern, MD, MS;[1,2] Harrison J. Alter, MD, MS;[1] Joseph B. Barger, MD[2]

1. Alameda County Medical Center, Highland Hospital, Department of Emergency Medicine, Oakland, California USA
2. Contra Costa County Emergency Medical Services, Martinez, California USA

Correspondence:
Matthew V. Kiefer, MD
Alameda County Medical Center
Highland Hospital
Department of Emergency Medicine
1411 East 31st Street
Oakland, CA 94602 USA
E-mail: mvkiefer@gmail.com

Conflicts of interest: The authors report no conflicts of interest.

Keywords: altered mental status; glucose; hyperglycemia; hypoglycemia

Abbreviations:
D50: 50% dextrose solution
D10: 10% dextrose solution
EMS: Emergency Medical Services
IQR: interquartile range

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Abstract

Introduction: Prehospital first responders historically have treated hypoglycemia in the field with an IV bolus of 50 mL of 50% dextrose solution (D50). The California Contra Costa County Emergency Medical Services (EMS) system recently adopted a protocol of IV 10% dextrose solution (D10), due to frequent shortages and relatively high cost of D50. The feasibility, safety, and efficacy of this approach are reported using the experience of this EMS system.

Methods: Over the course of 18 weeks, paramedics treated 239 hypoglycemic patients with D10 and recorded patient demographics and clinical outcomes. Of these, 203 patients were treated with 100 mL of D10 initially upon EMS arrival, and full data on response to treatment was available on 164 of the 203 patients. The 164 patients' capillary glucose response to initial infusion of 100 mL of D10 was calculated and a linear regression line fit between elapsed time and difference between initial and repeat glucose values. Feasibility, safety, and the need for repeat glucose infusions were examined.

Results: The study cohort included 102 men and 62 women with a median age of 68 years. The median initial field blood glucose was 38 mg/dL, with a subsequent blood glucose median of 98 mg/dL. The median time to second glucose testing was eight minutes after beginning the 100 mL D10 infusion. Of 164 patients, 29 (18%) required an additional dose of IV D10 solution due to persistent or recurrent hypoglycemia, and one patient required a third dose. There were no reported adverse events or deaths related to D10 administration. Linear regression analysis of elapsed time and difference between initial and repeat glucose values showed near-zero correlation.

Conclusions: In addition to practical reasons of cost and availability, theoretical risks of using 50 mL of D50 in the out-of-hospital setting include extravasation injury, direct toxic effects of hypertonic dextrose, and potential neurotoxic effects of hyperglycemia. The results of one local EMS system over an 18-week period demonstrate the feasibility, safety, and efficacy of using 100 mL of D10 as an alternative. Additionally, the linear regression line of repeat glucose measurements suggests that there may be little or no short-term decay in blood glucose values after D10 administration.

Kiefer MV, Hern HG, Alter HJ, Barger JB. Dextrose 10% in the treatment of out-of-hospital hypoglycemia. *Prehosp Disaster Med.* 2014;29(2):190-194.

Introduction

Prehospital first responders and other medical personnel historically have treated patients with hypoglycemia with 50% dextrose solution (D50). The D50 is a hypertonic solution of glucose available in prefilled syringes containing 25 grams of glucose in 50 mL of water. Although individual protocols vary, in patients unable to take oral glucose, it is often given as a bolus after initial patient assessment, glucometer confirmation of hypoglycemia, and obtainment of intravenous access.

There are several reasons, both practical and theoretical, that treating hypoglycemia with a bolus of D50, despite long tradition, may not be the right choice. First, there is a nationwide shortage of D50 in the United States, which has affected the ability of Emergency Medical Services (EMS) systems to stock adequate supplies of the solution. It also is relatively more expensive than other glucose-containing solutions. Prefilled 50 mL syringes of D50 are available to the California Contra Costa County EMS system at a cost of $5.58 each, versus $1.62 for a 250 mL bag of 10% dextrose solution (D10), from which a 100 mL aliquot is initially infused. In addition, D50 is more viscous than other

intravenous fluids and often requires two hands to administer, preventing paramedics from doing other tasks such as electrocardiograms or neurological assessments, during its administration.

Theoretical reasons to avoid D50 include the potential greater risk of extravasation injury, potential supratherapeutic dosing of glucose causing hyperglycemia, and direct toxic effects of hypertonic dextrose itself.[1,2] Animal models have demonstrated the toxic effect of glucose infusions in the settings of cardiac arrest and stroke.[2] Experimental data suggests that hyperglycemia is neurotoxic to patients in the setting of acute illness.[1,3] Although no data has linked the use of D50 in the prehospital setting to adverse outcomes, using a lower concentration in a greater total volume of solution might help to mitigate some of the potential risks of D50.

Further, despite its long use, there is little data to support D50 as a given standard. Review of prior literature reveals only one trial comparing D50 to D10 for the treatment of hypoglycemia.[4] In a trial of 51 adult hypoglycemic patients with altered mental status treated by paramedics from a large United Kingdom ambulance service, patients were randomized to receive 5 gram (50 mL) intravenous aliquots of D10 or 5 gram (10 mL) intravenous aliquots of D50 to a maximum dose of 25 grams. There was no statistical difference in the main outcome of time to regain normal consciousness, leading researchers to conclude that their D10 protocol was safe and effective. The D10 group received less total glucose and had lower post-treatment glucose levels in the study.

Beginning January 1, 2013, the California Contra Costa County EMS system began using 100 mL of intravenous D10 as its primary intravenous agent to treat hypoglycemia, and collected 18 weeks of clinical and demographic data as part of ongoing quality control measures examining this approach. Previously, D50 had been the first-line intravenous dextrose agent in this system. The decision was made largely due to frequent shortages of D50 and the relative lower cost of D10, as well as the theoretical benefit of not using D50. As a part of the protocol change, and in coordination with study investigators, demographic and clinical data on patients who received D10 in the field were collected prospectively by EMS personal. The goal of this study was to present and analyze the data collected on patients who were hypoglycemic on EMS arrival and received intravenous D10 as their initial treatment, and to position these results in the context of the relevant literature on this approach.

Methods

This study was observational and quantitative using prestudy defined indicators. Study investigators were involved in the design of the EMS system's D10 protocol, and EMS personnel in the field recorded study data prospectively during patient encounters. Analysis was focused on patients: (1) who were older than age 18; (2) who displayed symptoms of hypoglycemia on the clinical judgment of paramedics; (3) whose level of consciousness and ability to cooperate did not allow administration of oral glucose; (4) whose blood sugar was below 70 mg/dL as evaluated in the field; and (5) in whom intravenous access could be obtained. Of the 239 patients who were administered D10 by EMS personnel in the 18 weeks of data collection, 203 met these criteria (Figure 1). The remaining 36 patients were excluded by the following criteria: 29 patients received oral glucose initially by paramedics; three patients received intramuscular glucagon; and four patients were euglycemic or hyperglycemic on EMS arrival.

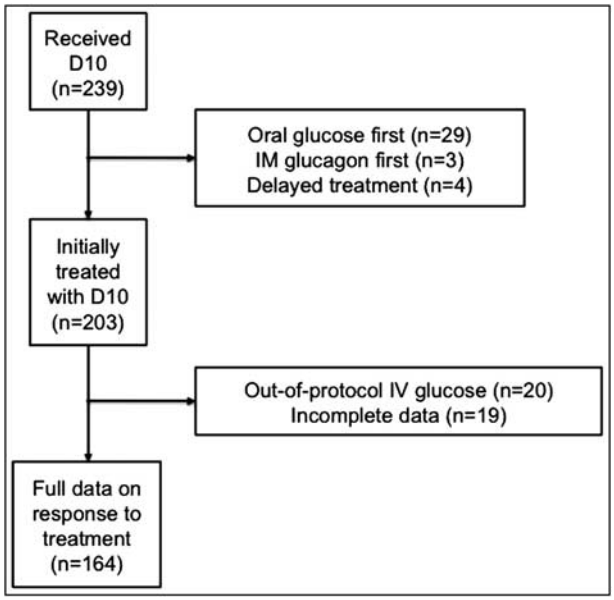

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Figure 1. Patient Selection
Abbreviations: D10, 10% dextrose solution; IM, intramuscularly.

Of the 203 patients who met criteria, 20 patients received out-of-protocol IV glucose, for example, in aliquots greater or less than 100 mL. Another 19 patients had incomplete data on response to D10, most commonly because of hospital arrival before repeat glucose value could be obtained. The remaining 164 patients received initial treatment with 100 mL of IV D10 and had repeat glucose measurements recorded.

The outcomes measured included the blood glucose response to initial infusion of 100 mL of D10 as well as repeat infusions if necessary. Given that the point-of-care blood glucose machines used by EMS personnel do not read glucose values lower than 20-25 mg/dL (depending on the machine) and instead indicate "Low," a glucose value of 20 mg/dL was assumed when comparing relative glucose values for values of "Low" in this analysis. A linear regression line was fit between elapsed time and difference between glucose value on EMS arrival and subsequent recheck after infusion of initial 100 mL of D10. Emergency Medical Services personnel also were instructed to record any adverse events pertaining to glucose administration.

Data analysis was performed using Microsoft Excel (Version 12.3.6, Microsoft Corporation, Redmond, Washington USA). The Institutional Review Board of the Alameda Health System—Highland Hospital approved the study as exempt from review.

Results

The study cohort of 164 patients included 102 men and 62 women with a median age of 68 years and an interquartile range (IQR) of 55 years-80 years (Table 1). The median initial field blood glucose was 38 mg/dL (IQR = 28 mg/dL-47 mg/dL), with subsequent blood glucose median of 98 mg/dL (IQR = 70 mg/dL-135 mg/dL). Elapsed time after D10 administration before recheck was not uniform, with a median time to recheck of eight minutes (IQR = 5 minutes-12 minutes). Of 164 patients, 29 (18%) received an additional dose of intravenous D10 solution in the field due to

No. of patients	164	
Male	102	62.2%
Female	62	37.8%
Age (years)		
Median	68	
Mean	66	
25% Quartile	55	
75% Quartile	80	
Initial Blood Glucose (mg/dL)		
Median	38	
Mean	38	
25% Quartile	28	
75% Quartile	47	
Repeat Blood Glucose after D10 (mg/dL)		
Median	98	
Mean	106	
25% Quartile	70	
75% Quartile	135	
Change in Blood Glucose after D10 (mg/dL)		
Median	59	
Mean	67	
25% Quartile	32	
75% Quartile	95	
Time to Repeat Blood Glucose (minutes)		
Median	8	
Mean	9	
25% Quartile	5	
75% Quartile	12	
Patients Requiring 2nd Bolus of IV Glucose (n)	29	17.7%
Patients Requiring 3rd Bolus of IV Glucose (n)	1	0.6%

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Table 1. Patient Demographics and Results in Study Cohort
Abbreviation: D10, 10% dextrose solution.

persistent or recurrent hypoglycemia, and one patient required a third dose.

Of the 164 patients analyzed, median change in glucose after D10 administration was 59 mg/dL (IQR = 32 mg/dL-95 mg/dL) (Figure 2). Three patients had a drop in blood glucose after D10 administration: one patient had a drop of 1 mg/dL; one patient had a drop of 10 mg/dL; and one patient had a drop of 19 mg/dL. The patient with the drop of 19 mg/dL had an insulin pump infusing that was not removed by EMS personnel during D10 infusion. The remaining 161 had an elevation of their blood glucose on recheck (maximum rise to 325 mg/dL). Linear regression analysis of elapsed time and difference between initial and repeat glucose values after D10 showed near-zero correlation, which suggested that serum glucose had minimal decay over the study interval. Figure 2 shows the line of best fit for change in blood glucose after administration of D10.

There were no reported adverse events related to glucose infusion. Two patients who received intravenous D10 were pronounced dead in the field during the period of study. On review of records by investigators, both patients were unresponsive or in cardiac arrest prior to arrival of EMS personnel, and their deaths were unrelated to dextrose administration.

Discussion

Glucose control in critically-ill patients remains challenging. While not frequently studied in the prehospital setting, evidence on the optimal glucose range in the inpatient setting remains controversial.[3] Hypoglycemia has known neurologic adverse effects in critically-ill patients;[5] however, both in animal and patient studies, hyperglycemia also has been shown to negatively affect neurologic outcomes.[1,3,6] Extrapolating inpatient data to the prehospital setting is problematic for multiple reasons. These include the relatively few monitoring resources and therapeutic interventions available in the prehospital setting, the short duration of time that patients are under EMS care, and the relatively low acuity of patients encountered in the prehospital setting[7] compared with the intensive care unit.

Despite limitations of existing data and its relevance to the prehospital setting, the optimal treatment of prehospital hypoglycemia should have several features. First, a prehospital treatment regimen must effectively raise the blood glucose. Second, it must be feasible for prehospital care providers to implement. Third, it must be efficient across at least three dimensions: cost, time, and effort. And finally, it must be safe for patients. The current practice of utilizing D50 in the treatment of acute hypoglycemia has shown efficacy, feasibility, and safety in the limited trial data available.[4,7–9] Several authors, however, have raised concerns regarding the potential of D50 to cause harm, despite lack of direct evidence.[2,10,11] In theory, using smaller aliquots of glucose might mitigate concerns regarding the risk of hyperglycemia and a more dilute solution might mitigate risks regarding extravasation injury. The only clinical trial to date comparing D50 to D10 showed no difference in the primary outcome of time to return to Glasgow Coma Scale of 15; however, there were no safety differences identified.[4]

Reported study data demonstrates that utilizing D10 as the primary intravenous treatment for hypoglycemia is efficacious, with all but three patients demonstrating an increase in their blood glucose after D10 administration. Although a patient-centered outcome such as time to return to normal mental status was not measured, previous trial data shows correlation between increase in serum glucose and return to normal mental status.[4,8,9] Of the study patients, only 29 out of 164 (18%) received a second bolus of D10 in the field; however, some patients who only received one dose of D10 may have received additional dextrose on arrival to hospital, and relative comparison to D50 is not known. No complaints or concerns were noted by paramedics in the field in terms of ease of D10 use and how it compares with

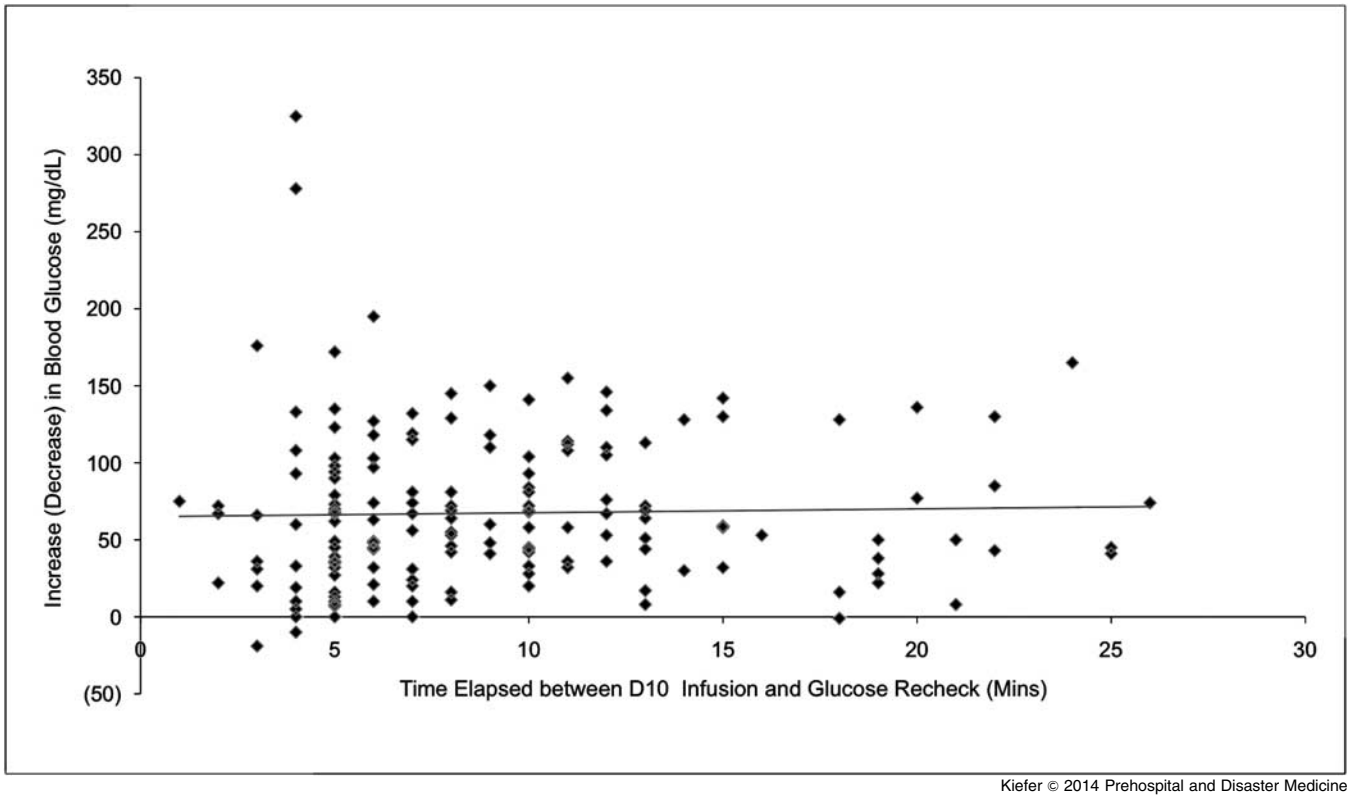

Figure 2. Change in Blood Glucose after 100 mL of D10. Each point on this graph represents a unique patient (n = 164). The y axis of this graph represents the absolute change in blood glucose in mg/dL between the initial value obtained by EMS personnel and the subsequent value obtained after D10 infusion. A positive value indicates that the patient's blood glucose increased and a negative value indicates that the patient's blood glucose decreased. The x axis represents time in minutes that transpired between the initial value obtained by EMS personnel and the subsequent value after D10 infusion for the patient. Each point therefore represents an absolute change in blood glucose during a given time. A line of best fit was applied to these data points using linear regression. The flat slope suggests that there may be little or no short-term decay in blood glucose values after D10 administration.
Abbreviations: D10, 10% dextrose solution; EMS, Emergency Medical Services.

D50. Some providers did note that D10 is easier to infuse, owing to its lower viscosity than D50. Economic or resource utilization analysis is not available. The data shows that D10 administration is safe, with no adverse events related to administration in this small series.

The linear regression fit line of repeat blood glucose measurement against elapsed time suggests that there may be little or no short-term decay in blood glucose values after D10 administration. Previous analysis of D50 in healthy volunteers shows that D50 reliably increases serum glucose over the first five minutes after administration; however, by 30 minutes, blood glucose levels consistently approach pretreatment levels.[12] All of the glucose recheck times were before 30 minutes, allowing that the lack of short-term decay might not have continued if longer-term data were available on study patients. Alternatively, D10 may elicit a less aggressive insulin response than D50 and may paradoxically have a slower decay than D50 from the blood stream. Reported data are inadequate to test this hypothesis and this remains a question for future study.

Limitations

In this study, a case series without any control group is presented, so conclusions are observational. Long-term follow-up after the prehospital setting was not available and economic analysis is not reported. The regression analysis, a simple fit line, is limited and not controlled for associated and possibly influential covariates. In addition, while there were no reported adverse outcomes related to D10 administration and all patients became euglycemic eventually, it is not clear if there were delays to euglycemia in the reported group compared to D50. Finally, in those patients who did require a second, or even a third, dose of D10, it is not possible to ascertain if there were longer-term unfavorable outcomes because of the protocol change.

Conclusions

In addition to practical reasons of cost, availability, and ease of use, theoretical risks of using D50 in the out-of-hospital setting include extravasation injury, direct toxic effects of hypertonic dextrose, and potential neurotoxic effects. The experience of one local EMS system over an 18-week period demonstrates that D10 is a safe, effective, and feasible alternative to D50 in the acute prehospital management of hypoglycemia.

Acknowledgements

The authors would like to thank all of the paramedics who treated patients in the field during the course of this study.

References

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Effect of Out-of-Hospital Noninvasive Positive-Pressure Support Ventilation in Adult Patients With Severe Respiratory Distress: A Systematic Review and Meta-analysis

Sameer Mal, MD, FRCPC*; Shelley McLeod, MSc; Alla Iansavichene, BSc, MLIS; Adam Dukelow, MD, FRCPC; Michael Lewell, MD, FRCPC

*Corresponding Author. E-mail: jmal@uwo.ca.

Study objective: Noninvasive positive-pressure ventilation (NIPPV) is increasingly being used by emergency medical services (EMS) for treatment of patients in respiratory distress. The primary objective of this systematic review is to determine whether out-of-hospital NIPPV for treatment of adults with severe respiratory distress reduces inhospital mortality compared with "standard" therapy. Secondary objectives are to examine the need for invasive ventilation, hospital and ICU length of stay, and complications.

Methods: Electronic searches of MEDLINE, EMBASE, Cochrane Central Register of Controlled Trials, and Cumulative Index to Nursing and Allied Health Literature were conducted and reference lists of relevant articles hand searched. Randomized controlled trials comparing out-of-hospital NIPPV with standard therapy in adults (aged ≥16 years) with severe respiratory distress published in English were included. Two reviewers independently screened abstracts, assessed quality of the studies, and extracted data. Data were pooled with random-effects models and reported as risk ratios (RRs) with 95% confidence intervals (CIs) and number needed to treat (NNT).

Results: Seven randomized controlled trials were included, with a combined total of 632 patients; 313 in the standard therapy group and 319 in the NIPPV group. In patients treated with NIPPV, the pooled estimate showed a reduction in both inhospital mortality (RR 0.58; 95% CI 0.35 to 0.95; NNT=18) and need for invasive ventilation (RR 0.37; 95% CI 0.24 to 0.58; NNT=8). There was no difference in ICU or hospital length of stay.

Conclusion: Out-of-hospital administration of NIPPV appears to be an effective therapy for adult patients with severe respiratory distress. [Ann Emerg Med. 2014;63:600-607.]

Please see page 601 for the Editor's Capsule Summary of this article.

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INTRODUCTION

Severe dyspnea is a common presenting complaint to emergency medical services (EMS) providers. Dyspnea can result from a variety of conditions, including acute cardiogenic pulmonary edema, acute exacerbation of chronic obstructive pulmonary disease, acute asthma exacerbation, and pneumonia. Out-of-hospital treatment of patients in severe respiratory distress presents unique challenges. These patients often require positive-pressure ventilation, but may have factors that make invasive ventilation by intubation or insertion of a supraglottic airway device difficult. Examples of such factors include intact airway reflexes, environmental challenges, and intubation's being a low-frequency skill for most paramedics.[1-3] Additionally, "standard" out-of-hospital therapy for severe dyspnea is diverse, depending on the region of the world, ranging from simple supplemental oxygen therapy to diuretic and ionotropic infusions. The approaches currently used are varied and lack evidence to support any particular practice patterns.

Inhospital treatment of acute cardiogenic pulmonary edema and acute exacerbation of chronic obstructive pulmonary disease with noninvasive positive-pressure ventilation (NIPPV), which includes continuous and bilevel pressure modalities, has been studied extensively.[4-9] A recent Cochrane review of 21 studies involving 1,071 adult patients with acute cardiogenic pulmonary edema reported significantly reduced inhospital mortality (risk ratio [RR] 0.6; 95% confidence interval [CI] 0.45 to 0.84) and intubation (RR 0.53; 95% CI 0.34 to 0.83) when NIPPV was compared with standard medical care.[4] A second Cochrane review of 14 studies involving 758 patients with acute exacerbation of chronic obstructive pulmonary

Editor's Capsule Summary

What is already known on this topic

Out-of-hospital providers have few options for treating severe respiratory distress.

What question this study addressed

Does out-of-hospital noninvasive positive-pressure ventilation (NIPPV) reduce mortality?

What this study adds to our knowledge

In this meta-analysis of 7 randomized controlled trials including 632 adults, NIPPV was associated with reduced mortality and a reduced need for intubation.

How this is relevant to clinical practice

This meta-analysis supports the expanded use of out-of-hospital NIPPV for severe respiratory distress in adults.

disease on the use of NIPPV showed similarly impressive results, with reductions in hospital mortality (RR 0.52; 95% CI 0.35 to 0.76) and need for intubation (RR 0.41; 95% CI 0.33 to 0.53).[7]

A number of commercial systems are available that allow NIPPV to be administered out-of-hospital relatively easily without large ventilators.[10-13] NIPPV is increasingly being used by EMS providers for the treatment of severe respiratory distress in the out-of-hospital setting.[14-23] The primary objective of our systematic review was to determine whether out-of-hospital–administered NIPPV for the treatment of adults (aged ≥16 years) with severe respiratory distress reduces inhospital mortality compared with standard therapy. Our secondary objectives included hospital length of stay, ICU length of stay, need for invasive ventilation, and complications arising from the use of NIPPV.

MATERIALS AND METHODS

The systematic literature searches were conducted in MEDLINE (1946 to December 2012), EMBASE Classic and EMBASE (1947 to week 48, 2012), Cumulative Index to Nursing and Allied Health Literature (1982 to December 2012), and Cochrane Central Register of Controlled Trials (December 2012) by a research librarian with formal training in electronic literature searching.

Only randomized controlled trials comparing the use of out-of-hospital NIPPV with standard therapy in adults (aged ≥16 years) in severe respiratory distress with a suspected diagnosis of acute cardiogenic pulmonary edema, acute exacerbation of chronic obstructive pulmonary disease, acute asthma exacerbation, or pneumonia were included in this review.

A sensitive search strategy (Appendix E1, available online at http://www.annemergmed.com) included a combination of subject headings and free text words using various spelling and endings, such as but not limited to the following terms: "out-of-hospital," "pre-hospital," "emergency medical services," "paramedic," "emergency care," "continuous positive airway pressure," "CPAP," "nCPAP," "bilevel positive airway pressure," "BIPAP," "non-invasive ventilation," "NIV," "non-invasive positive pressure ventilation," "NIPPV," "NPPV," "positive pressure ventilation," "non-invasive mechanical ventilation," "pulmonary edema," "oedema," "chronic obstructive pulmonary disease," "COPD," "heart failure," "asthma," "respiratory insufficiency," and "respiratory distress."

Because NIPPV is a general term for a variety of noninvasive modalities with various terminologies, studies that reported the use of continuous positive airway pressure (CPAP), noninvasive CPAP, bilevel positive airway pressure (BiPAP), biphasic positive airway pressure, biphasic CPAP, bilevel noninvasive pressure support ventilation, and noninvasive pressure support ventilation were included.

The searches were restricted to studies published in the English language. An optimized hedges filter and keywords were used to refine search results to randomized controlled trials and systematic reviews published on the topic. The search strategies were modified for each database with prespecified terms, search filters, and fields. Reference lists of retrieved studies were hand searched for relevant citations, and the regulatory Web site clinicaltrials.gov was also searched to identify ongoing or unpublished trials. Two authors independently screened the search output to identify potentially eligible trials, the full texts of which were retrieved and assessed for inclusion (Figure 1). Individual study authors were contacted to retrieve additional information and clarification when needed.

Outcome Measures

Our primary outcome of interest was inhospital mortality. Our secondary outcomes included ICU length of stay, hospital length of stay, need for invasive ventilation, and complications arising from the use of NIPPV.

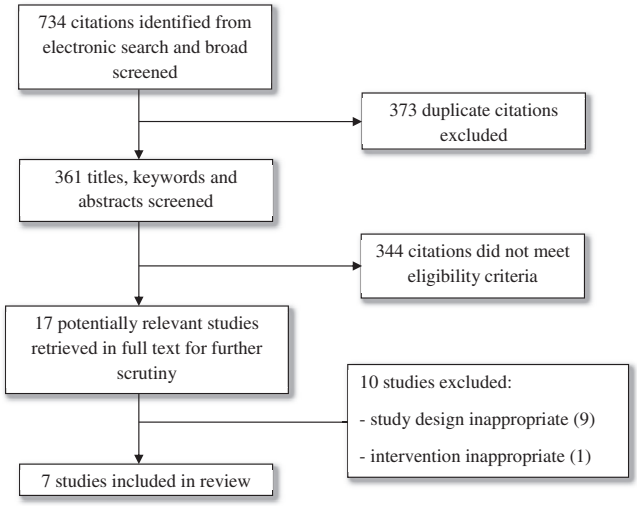

Figure 1. Flow diagram of included studies.

Data Collection and Processing

Using a standardized data collection form, 2 authors independently extracted data on age and sex of participants, sample size, condition being treated, type of NIPPV device, duration and dose of therapy, type of comparator, and outcome data. Two authors independently assessed risk of bias of the included trials by using the Cochrane Collaboration's tool for assessing risk of bias, as described in section 8.5 of the *Cochrane Handbook for Systematic Reviews of Interventions*.[24] Discrepancies in quality assessment scores were resolved by discussion. The following domains were assessed as having a low, unclear (uncertain), or high risk of bias: sequence generation, allocation concealment, blinding of participants/personnel, blinding of outcomes assessment, incomplete outcome data, and selective outcome reporting.

Primary Data Analysis

Individual study results were combined with Review Manager 5.0.18 (Nordic Cochrane Centre, Copenhagen, Denmark). Where appropriate, data were pooled with random-effects models to account for both within-study and between-study heterogeneity and reported as RRs with 95% CIs. RRs were computed such that a value less than 1 indicated that out-of-hospital treatment with NIPPV was better than standard therapy. The number needed to treat (NNT) was calculated to help interpret the clinical significance of the results. Statistical significance was defined as $P<.05$ or 95% CI of the RR that excluded unity. ICU and hospital length of stay could not be pooled because of the inconsistent reporting of mean values, so these outcomes have been reported descriptively.

Statistical heterogeneity was assessed with both a χ^2 test and the I^2 statistic, which describes the percentage of variability in the effect estimates that is due to underlying differences between the studies rather than chance.[25] I^2 values of greater than or equal to 75% indicated substantial heterogeneity. To explain possible heterogeneity, a priori subgroup analyses were planned to investigate type and severity of disease, type of NIPPV device and dose or duration of therapy, and differences in standard therapy.

RESULTS

Our search strategy yielded 734 potentially relevant clinical citations from multiple databases. After elimination of duplicate citations and reports that did not satisfy the selection criteria, 17 full-text articles were retrieved (Figure 1). After screening for eligibility, 7 randomized controlled trials were included in the review, with a combined total of 632 patients, 313 in the standard therapy group and 319 in the NIPPV group.[14-20] The extent of agreement between reviewers during final selection of included studies was assessed with Cohen's κ statistic. There was perfect agreement between the reviewers ($\kappa=1.0$) for selection of included trials.

Six of the included trials used a CPAP device and 1 trial used a BiPAP device (Table 1). Six studies included patients with suspected acute cardiogenic pulmonary edema (n=522), 3 studies included patients with suspected acute exacerbation of chronic obstructive pulmonary disease (n=81), 2 trials included patients with suspected pneumonia (n=19), and 1 study included patients with severe asthma (n=10). The authors of the studies who reported median values for ICU and hospital length of stay were contacted to retrieve original data so means could be calculated and potentially pooled. Two authors provided additional information and clarification. However, ICU and hospital length of stay could not be pooled because of insufficient data, so these outcomes have been reported descriptively (Table 2).

Overall, 5 studies (71.4%) were judged to be of low risk of bias with respect to random sequence generation and 2 (28.6%) were unclear owing to lack of information (Table 3). Allocation

Table 1. Characteristics of included trials.

Trial	Type of Disease	NIPPV Device, Dose, cm H_2O	Standard Care	Outcomes	STD n	TX n
Plaisance (2007) France[16]	ACPE	CPAP, 7.5	Diuretics, NTG, CCB, ionotropes, O_2	**DCS**, **ABG**, ETT, death	61	63
Frontin (2011) France[15]	ACPE	CPAP, 10	Diuretics, nitrates, O_2	**Vitals**, ETT, death, ICU LOS, hospital LOS	62	60
Schmidbauer (2011) Germany[17]	AECOPD	CPAP, unclear	O_2	DCS, ETT, ICU LOS, RR, O_2	18	18
Thompson (2008) Canada[18]	Severe resp distress	CPAP, 10	Diuretics, NTG, morphine, bronchodilators, O_2	**ETT**, death, ICU LOS, hospital LOS	35	36
Weitz (2007) Germany[19]	ACPE	BiPAP, 12.5/5	Diuretics, NTG, morphine, O_2	**O_2** sat	13	10
Ducros (2011) France[14]	ACPE	CPAP, 7.5–10	Diuretics, nitrates, ionotropes, O_2	**Death**, **ETT**, ICU LOS, med doses, BNP/TnI	100	107
Roessler (2012) Germany[20]	ACPE, AECOPD, pneumonia	CPAP, 5–20	Bronchodilators, dexamethasone, opiates, Lasix, O_2	**Effectiveness of treatment**, 90-day survival, 28-day survival, SpO_2, RR, ICU LOS, hospital LOS	25	24

STD, standard; *TX*, treatment; *ACPE*, acute cardiogenic pulmonary edema; *CPAP*, continuous positive airway pressure; *NTG*, nitroglycerin; *CCB*, calcium channel blocker; *DCS*, dyspnea clinical score; *ABG*, arterial blood gas; *ETT*, endotracheal intubation; *LOS*, length of stay; *AECOPD*, acute exacerbation of chronic obstructive pulmonary disease; *ICU*, intensive care unit; *RR*, respiratory rate; *BiPAP*, bi-level positive airway pressure; *BNP*, brain natriuretic peptide; *TnI*, Troponin-I; *SpO_2*, blood oxygen saturation.
Bold indicates primary outcome.

Table 2. Hospital and ICU LOS as reported by included trials.

	Hospital LOS			ICU LOS		
Trial	**Standard Care**	**NIPPV**	***P* Value**	**Standard Care**	**NIPPV**	***P* Value**
Frontin (2011)[15]	Median 6 days (IQR 2,9)	Median 6 days (IQR 3, 8)	.50	Median 8.2 h (IQR 5.3, 14.5)	Median 8 h (IQR 5.2, 12.5)	.27
Schmidbauer (2011)[17]	Median 7.7 days (IQR 3.1, 14.6)	Median 2.5 days (IQR 1.0, 5.5)	.02	Median 13 h (IQR 7, 20)	Median 8 h (IQR 3, 14)	.16
Thompson (2008)[18]	Median 9 days	Median 7 days	nr	Median 3 days	Median 6.5 days	nr
Weitz (2007)[19]	Mean (SD) 12.5 (1.8) days	Mean (SD) 8.2 (2.3) days	nr	Mean (SD) 2.3 (0.6) days	Mean (SD) 1.7 (0.5) days	nr
Ducros (2011)[14]	nr	nr	nr	Median 2 days (IQR 1, 3)	Median 2 days (IQR 1, 3)	.67
Roessler (2012)[20]	Mean (SD) 17.4 (18) days	Mean (SD) 13.9 (14.4) days	.50	Mean (SD) 3.7 (6.4) days	Mean (SD) 1.3 (2.6) days	.03

IQR, Interquartile range; *nr*, not reported.

was adequately concealed in 5 studies (71.4%) and unclear in 2 (28.6%), once again because of insufficient information for judgment. There was no blinding of participants or personnel performed in any of the included trials because sham NIPPV therapy is extremely difficult and expensive to administer. There was minimal loss to follow-up because 4 studies (57.1%) had complete follow-up and 3 studies (42.9%) reported a rate of loss to follow-up ranging from 2.8% to 3.9%, for a total of 8 of 632 patients (1.2%) in the data set. Overall, 5 of the studies (71.4%) were judged to be of relatively low risk of bias and 2 (28.6%) were judged unclear. The 2 studies that were unclear included a total of 59 (9.3%) patients.

Data on inhospital mortality were available for all 7 included trials, involving a total of 632 patients, 313 in the standard therapy group and 319 in the NIPPV group. There was a significant reduction in inhospital morality with the use of out-of-hospital NIPPV (RR 0.58; 95% CI 0.35 to 0.95; NNT 18), with no statistical heterogeneity among the studies (Figure 2; Table 4). Six of the included trials reported the outcome of need for invasive ventilation (Table 1). The pooled estimate showed a significant reduction of need for invasive ventilation with the use of out-of-hospital NIPPV (RR 0.37; 95% CI 0.24 to 0.58; NNT 8), with no statistical heterogeneity between the studies (Figure 3; Table 4). ICU and hospital length of stay could not be pooled because of inconsistent reporting of means (Table 2). Five of the included trials reported complication rates.[14-16,19,20] Three studies reported no complications with NIPPV.[16,19,20] In the 2 studies that reported complications, 3 patients (1.0%) receiving NIPPV experienced emesis.[14,15] No other complications were reported.

LIMITATIONS

As with any meta-analysis, the conclusions can only be as strong as the quality and consistency of trials that are included. There are a few important differences that existed between the studies included in this review.

Although our meta-analysis did not demonstrate statistically significant heterogeneity across the 7 studies included in the analysis, there is a significant amount of clinical heterogeneity warranting further discussion. The majority (>97%) of patients included in our review had subsequent diagnoses of acute cardiogenic pulmonary edema, acute exacerbation of chronic obstructive pulmonary disease, or asthma. There was 1 study

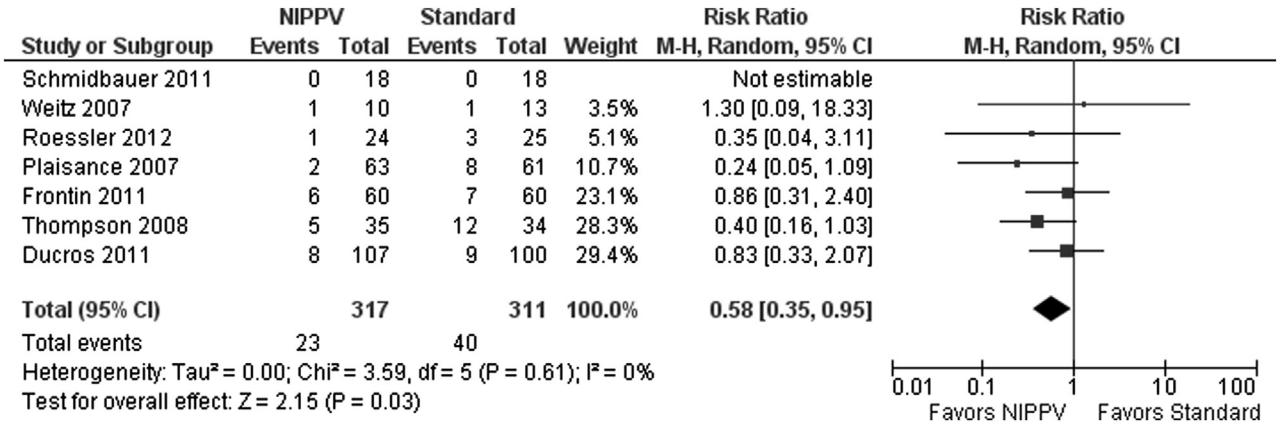

Figure 2. The use of NIPPV compared with standard therapy for inhospital mortality.

Table 3. Risk of bias summary for included trials.

Trial	Random Sequence Generation	Allocation Concealment	Blinding of Pts/Personnel	Blinding of Outcome Assessment	Lost to Follow-up (%)	Free of Selective Outcome Reporting
Plaisance (2007)[16]	Yes	Yes	No	No	0	Yes
Frontin (2011)[15]	Yes	Yes	No	No	0	Yes
Schmidbauer (2011)[17]	Yes	Yes	No	No	0	Unclear
Thompson (2008)[18]	Yes	Yes	No	No	2.8	Yes
Weitz (2007)[19]	Unclear	Unclear	No	No	0	Unclear
Ducros (2011)[14]	Unclear	Unclear	No	No	2.9	Yes
Roessler (2012)[20]	Yes	Yes	No	No	3.4	Yes
Summary score	Low risk of bias	Low risk of bias	High risk of bias	High risk of bias	Low risk of bias	Low risk of bias

that enrolled patients with broader inclusion criteria of "severe respiratory distress," which included patients with subsequent diagnoses of pneumonia and acute coronary syndrome.[18] Although the underlying disease may have been different, the inclusion criteria in each randomized controlled trial were similar because patients were required to present with hypoxic respiratory failure (SpO_2 <90%) and tachypnea. EMS providers are often faced with this clinical situation in which patients' conditions are deteriorating and require urgent intervention, but a diagnosis may not be immediately evident without ancillary testing. It appears that patients with undifferentiated dyspnea can be treated effectively with NIPPV, with a low likelihood of harm, given the right clinical situation and absence of obvious contraindications. A priori, we planned to perform subgroup analyses; however, the number of patients in each of the clinical subgroups was too small to generate appropriate and meaningful analyses.

Within each of the included randomized controlled trials, the definition of standard therapy differed, as did the level of training of the most responsible EMS provider. Six of the studies took place in Europe, where it is common to find physicians on ambulances, and 1 took place in Canada with advanced care paramedics (Table 1). The presence of a qualified anesthesiologist or emergency physician is an important consideration because their level of experience and training would affect the decision to intubate a patient in extremis compared with that of a paramedic. Also, in countries where paramedics function under strict medical directives, intubation may not be an option in certain scenarios; thus, the results of our meta-analysis may not be reproducible in these settings.

Additionally, the definitions of standard therapy were broad, ranging from simple oxygen administration to diuretic and inotrope infusions (Table 1). Even when NIPPV was compared with the most aggressive out-of-hospital therapy, significant reductions were found in the need for invasive ventilation.[14,16] Considering these results and the investment necessary to develop protocols and train EMS providers to administer and monitor advanced intravenous medications, EMS agencies may better use their resources to train those same providers to administer NIPPV. In some regions of the world, NIPPV is already being administered safely by primary (basic) care paramedics.[26]

There was no standard modality for administering positive-pressure ventilation across the 7 randomized controlled trials included in this review (Table 1). Six of the 7 included trials used CPAP in the treatment arm of the study[14-18,20] and 1 used BiPAP.[19] Four different commercial NIPPV systems were used to generate positive pressure, including an external pressure regulator (WhisperFlow,[14,18] Downflow[16]), turbulent flow valve (Boussignac[15]), and portable ventilator (Oxylog 3000[17,19,20]).

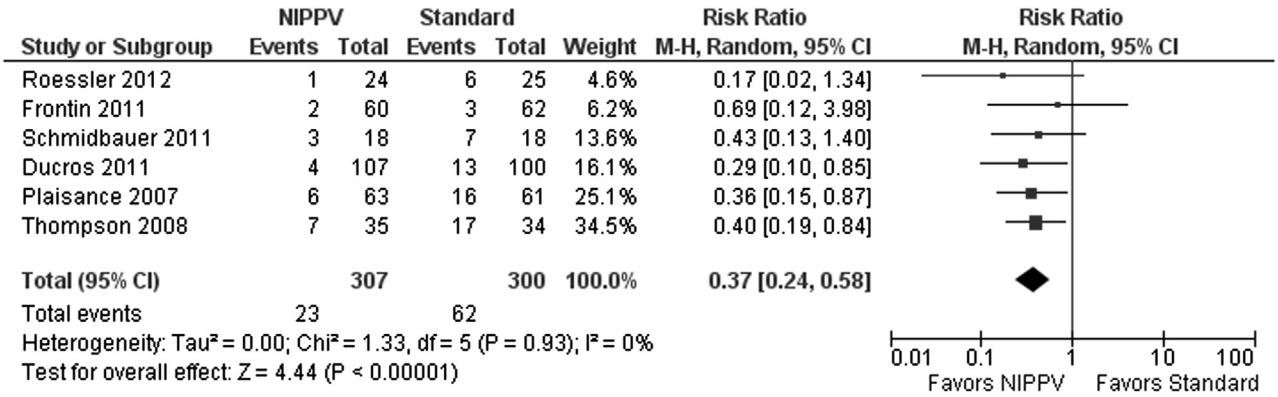

Figure 3. The use of NIPPV compared with standard therapy for need for invasive ventilation.

Table 4. Summary of findings.*

Outcomes	No. of Participants (Studies)	Quality of the Evidence (GRADE)	NNT (95% CI)	Relative Effect (95% CI)	Anticipated Absolute Effects: Risk With Standard Therapy	Anticipated Absolute Effects: Risk Difference With NIPPV (95% CI)
Inhospital mortality	628 (7)	⊕⊕⊕⊖ Moderate† because of inconsistency	18 (9.7–109.2)	RR 0.58 (0.35–0.95)	129/1,000	54 fewer per 1,000 (from 6 fewer to 84 fewer)
Intubation	607 (6)	⊕⊕⊕⊕ High	8 (5.4–12.9)	RR 0.37 (0.24–0.58)	207/1,000	130 fewer per 1,000 (from 87 fewer to 157 fewer)

*The basis for the assumed risk (eg, the median control group risk across studies) is provided in footnotes. The corresponding risk (and its 95% CI) is based on the assumed risk in the comparison group and the relative effect of the intervention (and its 95% CI). GRADE Working Group grades of evidence: High quality: Further research is very unlikely to change our confidence in the estimate of effect. Moderate quality: Further research is likely to have an important influence on our confidence in the estimate of effect and may change the estimate. Low quality: Further research is very likely to have an important influence on our confidence in the estimate of effect and is likely to change the estimate. Very low quality: We are very uncertain about the estimate.
†Although the CIs overlapped, 1 of 7 (Weitz) favored standard therapy.

Although analysis is beyond the scope of this review, each system has its strengths and weaknesses with respect to ease of paramedic use, cost, maximum therapy length because of oxygen requirements, and compatibility with existing hospital hardware.[27] Each of these points must be taken into consideration before an EMS system invests in any one particular unit.

Similar to the use of NIPPV in the hospital setting, there is no accepted standard dose for the initiation or length of therapy with NIPPV. The CPAP doses reported in the included trials ranged from 5 to 20 cm H_2O, and the one study in which BiPAP was used reported a dose of 12.5/5 cm H_2O (Table 1). Additionally, the length of out-of-hospital therapy ranged from 30 to 60 minutes. It is unclear from the current out-of-hospital evidence whether there is a minimum length of therapy required for benefit or, conversely, a maximum length after which there would be risk of harm.

Although we derived our search strategy to be comprehensive and thorough, it is possible that trials of out-of-hospital NIPPV with negative or inconclusive results were excluded from our review. This publication bias, or "file-drawer problem," refers to the tendency for negative or inconclusive results to remain unpublished by their authors. The pooled estimates presented in this review are based on published trials and may not be truly representative of all valid studies undertaken.

DISCUSSION

The results of this systematic review and meta-analysis suggest that the use of out-of-hospital NIPPV reduces the risk of inhospital mortality and need for invasive ventilation compared with standard therapy for the treatment of adult patients with severe respiratory distress. The use of out-of-hospital NIPPV in patients presenting with undifferentiated dyspnea does not appear to increase complication rates.

Acute cardiogenic pulmonary edema and acute exacerbation of chronic obstructive pulmonary disease are associated with substantial worldwide patient morbidity and mortality; thus, it is important to administer effective therapies as early as possible.[28,29] Previous inhospital meta-analyses demonstrate that the use of NIPPV in patients with acute cardiogenic pulmonary edema significantly reduces both hospital mortality (NNT=14) and need for mechanical ventilation (NNT=8), with no appreciable increase in complications such as intolerance of therapy or myocardial infarction.[4] A similar benefit is reported for patients with acute exacerbation of chronic obstructive pulmonary disease, in which inhospital treatment using NIPPV reduces the risk of mortality (NNT=10) and need for mechanical ventilation (NNT=4) compared with standard therapy.[7] Our results are consistent with the previously published inhospital data and demonstrate that NIPPV is a safe and effective therapy for patients in severe respiratory distress when administered in the out-of-hospital setting.

With respect to the treatment of patients with severe asthma exacerbation, NIPPV has traditionally been a contraindicated therapy because there are concerns of increasing airway pressures and subsequent barotrauma.[30] However, a few small studies of inhospital patients, including 1 randomized controlled trial, have examined its use for patients with status asthmaticus, and the limited evidence suggests that NIPPV may be benefical.[31-34] In our out-of-hospital systematic review, there was only 1 trial that included asthma patients (n=10), and the authors did not report any occurrence of pneumothoraces or worsening dyspnea.[18] Although additional inhospital and out-of-hospital randomized controlled trials evaluating the use of NIPPV in severe asthma are needed, specifically examining out-of-hospital safety, there may be a subset of patients who benefit from its early application.

Although a number of narrative and systematic reviews[27,35,36] have been previously published examining the use of out-of-hospital NIPPV for the treatment of adults in respiratory distress, to our knowledge none have included a meta-analysis of results pertaining to only high-quality randomized controlled trials. Simpson and Bendall[35] and Williams et al[36] published extensive reviews of the evidence for out-of-hospital use of NIPPV for patients with pulmonary edema. Simpson and Bendall[35] summarized the results of 12 primary studies documenting the use of NIPPV, either CPAP or BiPAP, for out-of-hospital management of acute cardiogenic pulmonary edema. The authors concluded that administration of NIPPV appears to be a safe and feasible therapy resulting in faster improvement in physiologic status and may decrease the need for intubation compared with delayed NIPPV administration in the emergency department.

However, the majority of articles included in the review were noncomparative descriptive studies. Only 3 were randomized controlled trials, and none addressed inhospital mortality as a primary outcome measure.[35]

In a recent systematic review by Williams et al,[36] CPAP therapy in the out-of-hospital environment was found to be beneficial to patients with acute pulmonary edema. It was also shown to improve patient vital signs during out-of-hospital transport and reduce rates of intubation and short-term mortality. However, only patients with acute pulmonary edema were included in the review.

In a thorough and comprehensive review on NIPPV, Daily and Wang[27] concluded that NIPPV is a feasible out-of-hospital therapeutic option for acute dyspnea. Although the majority of studies included in their review focused on patients with acute pulmonary edema, studies suggesting that NIPPV may prove useful with other reversible disease processes such as chronic obstructive pulmonary disease or asthma exacerbations were also included. The authors did not attempt a meta-analysis.

Future research about the out-of-hospital administration of NIPPV for severe respiratory distress should aim to delineate its safety and efficacy profile in expanded disease processes such as asthma and pneumonia. Also, current literature is available only for EMS systems using NIPPV with advanced care paramedics or ambulances with physician assistance. There are no published randomized controlled trials of NIPPV's being used by basic/primary care paramedics, to our knowledge. Last, no studies have been conducted in the out-of-hospital setting to evaluate its use in the pediatric population; therefore, no recommendations can be made for this age group.

Out-of-hospital administration of NIPPV appears to be an effective therapy for adult patients with severe respiratory distress. When EMS providers are faced with a patient presenting with undifferentiated dyspnea who is likely to require intubation, a trial of out-of-hospital NIPPV appears to be an effective and safe therapy that may decrease need for invasive ventilation and mortality, given there are no contraindications to its use. In light of this evidence, it is reasonable to consider NIPPV for the treatment of adults with severe respiratory distress in the out-of-hospital setting. EMS agencies and individual out-of-hospital care providers should incorporate NIPPV into the treatment of severe respiratory distress if feasible.

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Author affiliations: From the Division of Emergency Medicine, Department of Medicine, Schulich School of Medicine and Dentistry, University of Western Ontario, London, Ontario, Canada (Mal, McLeod, Dukelow, Lewell); and the London Health Sciences Centre, London, Ontario, Canada (Mal, McLeod, Iansavichene, Dukelow, Lewell).

Author contributions: SM, SM, AD, and ML conceived the study idea and designed the study protocol. AI performed the literature search. SM and SM independently screened the titles and abstracts, assessed the quality of the studies, and independently extracted data. SM and SM performed the statistical analysis. SM and SM drafted the study manuscript and all authors contributed substantially to its revision. The primary author SM takes responsibility for the paper as a whole.

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APPENDIX E1.

OVID MEDLINE 1946 TO DECEMBER 2012.

1. exp Emergency Medical Services/ or Emergency Medical Technicians/
2. (emergenc$ or emergicent$ or ems).af.
3. (prehospital$ or pre-hospital$ or ambulance$ or out-of-hospital$ or paramedic$ or para medic$ or para-medic$).tw.
4. ((patient$ adj transport$) or (mobile adj2 unit$)).tw.
5. or/1-4
6. exp Respiration, Artificial/ or exp Ventilators, Mechanical/ or Positive-Pressure Respiration/
7. (pressure$ and (positive$ or end-expiratory$ or bilevel or bi-level or biphasic or BIPAP)).tw.
8. ((positive-pressure$ or positive pressure$) and (ventilation$ or respiration$)).tw.
9. (ventilat$ adj5 (NIV or NPPV or NIPPV or NPSV or NIPSV or non invasive or noninvasive or non-invasive or cpap or ncpap or aprv or peep or ipap or airway pressure$ or mechanical$ or artificial$ or assisted$ or pulmonary$)).tw.
10. (NIV or NPPV or NIPPV or NPSV or NIPSV or non invasive or noninvasive or non-invasive or cpap or ncpap or aprv or peep or ipap or airway pressure$ or mechanical$ or artificial$ or assisted$ or pulmonary$).ab. /freq=2 and ventilat$.tw.
11. ventilat$.ab. /freq=2 and (NIV or NPPV or NIPPV or NPSV or NIPSV or non invasive or noninvasive or non-invasive or cpap or ncpap or aprv or peep or ipap or airway pressure$ or mechanical$ or artificial$ or assisted$ or pulmonary$).mp.
12. ventilat$.ti. and (NIV or NPPV or NIPPV or NPSV or NIPSV or non invasive or noninvasive or non-invasive or cpap or ncpap or aprv or peep or ipap or airway pressure$ or mechanical$ or artificial$ or assisted$ or pulmonary$).tw.
13. ((non-invasive or non invasive) and (positive-pressure$ or positive pressure$)).tw.
14. (respiration$ adj2 (artificial$ or assisted$)).tw.
15. or/6-14
16. Pulmonary Edema/ or Pulmonary Disease, Chronic Obstructive/ or exp Bronchitis, Chronic/ or exp Pulmonary Emphysema/ or exp Asthma/ or Respiratory Sounds/ or Bronchial Spasm/ or exp Bronchoconstriction/ or Bronchial Hyperreactivity/ or Respiratory Hypersensitivity/
17. exp Heart Failure/ or exp Myocardial Infarction/ or Ventricular Dysfunction, Left/ or exp Respiratory Insufficiency/ or Respiratory Distress Syndrome, Adult/
18. (heart failure$ or respiratory distress or wet lung).tw.
19. ((lung$ or respirat$ or pulmonary$ or airway$ or airflow$) and (chronic$ adj2 obstruct$)).tw.
20. (edema$ or oedema$ or asthma$ or bronchiti$ or emphysema$ or copd or coad or cobd or wheez$ or bronchospas$ or bronchoconstrict$ or (bronch$ adj2 spasm$) or (bronch$ adj2 constrict$)).tw.
21. or/16-20
22. 5 and 15 and 21
23. limit 22 to english language
24. 23 not (Animal/ not (Human/ and Animal/))
25. 24 not (letter not randomized controlled trial).pt.
26. 24 not (news not randomized controlled trial).pt.
27. 25 or 26
28. limit 27 to (case reports or editorial)
29. 27 not 28
30. random$.tw.
31. 29 and 30
32. limit 29 to "therapy (best balance of sensitivity and specificity)"
33. 31 or 32
34. limit 33 to review
35. 33 not 34
36. meta analysis.mp,pt. or MEDLINE.tw. or systematic review.tw.
37. 29 and 36
38. 35 or 37

"No Diversion": A Qualitative Study of Emergency Medicine Leaders in Boston, MA, and the Effects of a Statewide Diversion Ban Policy

Shannon D. O'Keefe, MD; Salma Bibi, MPH; Julia E. Rubin-Smith, MSPH; James Feldman, MD, MPH*

*Corresponding Author. E-mail: jfeldma@bu.edu.

Study objective: We examine the attitudes of emergency department (ED) key informants about the perceived effects of a statewide ban on ambulance diversion on patients, providers, and working relationships in a large urban emergency medical system.

Methods: We performed a qualitative study to examine the effects of a diversion ban on Boston area hospitals. Key informants at each site completed semistructured interviews that explored relevant domains pre- and postban. Interviews were deidentified, transcribed, coded, and analyzed with grounded theory for emerging themes. We identified important themes focused on patient safety, quality of care, and relationships before and after implementation of the diversion ban.

Results: Nine of 9 eligible sites participated. Eighteen interviews were completed: 7 MD ED directors, 2 MD designees, and 9 registered nurse leaders. Although most participants had negative opinions about diversion, some had considered diversion a useful procedure. Key themes associated with diversion were adverse effects on patient care quality, patient satisfaction, and a source of conflict among ED staff and with emergency medical services (EMS). All key informants described some positive effect of the ban, including those who reported that the ban had no direct effect on their individual hospital. Although the period preceding the ban was reported to be a source of apprehension about its effects, most key informants believed the ban had improved quality of care and relationships between hospital staff and EMS.

Conclusion: Key informants considered the diversion ban to have had a favorable effect on emergency medical care in Boston. These results may inform the discussion in other states considering a diversion ban. [Ann Emerg Med. 2014;63:589-597.]

Please see page 590 for the Editor's Capsule Summary of this article.

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SEE EDITORIAL, P. 598.

INTRODUCTION

Background

Since its initiation in the early 1980s, ambulance diversion has been used with increasing frequency nationwide. The American Hospital Association indicated that half of all hospitals and almost 70% of urban hospitals used ambulance diversion in 2004.[1] Emergency departments (EDs) in Boston, MA, mirrored this nationwide trend, collectively spending 2,855 hours on diversion in 2007 (a 6-fold increase in the number of hours spent on diversion in 1997).[2] During a 2-hour period, only trauma patients, those who refused to be diverted, and those deemed too unstable to divert were delivered by ambulance while "on diversion." The rules governing diversion in Boston have been described.[3,4]

A coalition developed a series of initiatives to address ambulance diversion and ED crowding in Massachusetts, beginning in the 1990s. In 2002, all hospitals were required to submit a plan with a "Code Help" policy that included procedures to deal with ED diversion and crowding (Appendix E1, available online at http://www.annemergmed.com). After limited results from years of effort, emergency physicians and the Massachusetts Department of Public Health pursued an initiative to end ambulance diversion statewide.

On January 1, 2009, the Massachusetts Department of Public Health initiated a directive effectively banning the practice of ambulance diversion, making it the first state in the country to enact such a policy. Although some areas of Massachusetts had implemented a voluntary ban on ambulance diversion before the statewide policy, and the city of Boston conducted a 2-week experiment prohibiting ambulance

Editor's Capsule Summary

What is already known on this topic

Hospitals often consider emergency department (ED) diversion to manage demand/resource mismatch, but some regions limit that ability because of concerns about overall patient safety.

What question this study addressed

What happens to care and interactions when a region limits ED diversions?

What this study adds to our knowledge

Using a structured, qualitative study design with key personnel from 9 Boston EDs, the authors noted that participants perceived improvements in care, safety, and emergency medical services to ED interactions after institution of a diversion limitation policy. Despite some antecedent fears, no consistent themes of site or patient harm were voiced.

How this is relevant to clinical practice

Key personnel at these hospitals believe that limiting ED diversion improved care without harm to hospitals or patients.

diversion in 2006,[3] before the ban, diversion had remained a common practice.

Importance

Several recent studies suggest that not only is the practice of ambulance diversion not useful in alleviating the crowded conditions it was intended to mitigate but also it adversely affects patients with time-sensitive needs such as acute myocardial infarction and trauma.[5,6] The Institute of Medicine suggested that ambulance diversion "should be eliminated except in the most extreme circumstances, such as a community mass-casualty event."[7]

To our knowledge, ours is the first study that investigates the attitudes and beliefs surrounding this landmark event.

Goals of This Investigation

We examined the attitudes of ED leaders about the perceived effects of ambulance diversion and the ban on patients, providers, and key relationships (hospital staff, hospitals, and emergency medical services [EMS]).

MATERIALS AND METHODS

Study Design

This is a qualitative study guided by the principles of grounded theory, using key informant interviews to explore how ED leadership (MD, RN) viewed ambulance diversion and the ban. We developed a semistructured interview guide that included questions about ambulance diversion, preparation for the ban, and the expected effects of the diversion ban (Appendix E2, available online at http://www.annemergmed.com). The interview guide was piloted for content and comprehension. The Boston University Medical Center institutional review board approved the protocol and all participants provided written informed consent.

Setting

We studied a single large metropolitan area in Massachusetts. Eligible sites were selected from among the members of the Conference of Boston Teaching Hospitals, which is a coalition of 14 Boston-area teaching hospitals that represents the largest emergency services system of care in Massachusetts and the region in which ambulance diversion was most prevalent before the ban. All hospitals in Boston that receive 911 transports are teaching hospitals and were included (Table 1).

Selection of Participants and Data Collection and Processing

ED directors/chairs and ED nurse managers were eligible for the study. Selected key informants were allowed to designate an alternate individual who had participated in the implementation of the ban in a leadership role. We conducted interviews in person between February and May of 2011.

Primary Data Analysis

Interviews were transcribed, coded, and analyzed with NVivo (version 9.2).[8] All identifying data were redacted from the transcripts. Thematic content analysis consistent with grounded theory was used to identify key themes.[9] The constant comparative method was used to generate theory from the data

Table 1. Study site characteristics 2009.*

Out-of-Hospital Care Provider:Boston Emergency Medical Services	
Catchment area	45.7 square miles
Population	589,000 residents
	1,000,000 daytime
911 calls	100,000/year
Responses	140,000/year
Transports	78,000
911 Receiving hospitals	**Outpatient ED volume 2009**†
Beth Israel Medical Center East Campus	27,901
Boston Medical Center	106,937
Brigham and Women's	37,517
Caritas Carney	24,453
Children's	48,889
Faulkner	20,289
Massachusetts General Hospital	63,414
Tufts Medical Center	32,336
Caritas St. Elizabeth's	21,176

*Region: City of Boston.
†Bureau of Health Care Safety and Quality, Massachusetts Department of Public Health.

and to ensure that the thematic analysis represented all perspectives[9] (Appendix E3, available online at http://www.annemergmed.com). We organized our analysis into periods: diversion, preparing for the ban, and after the diversion ban.

RESULTS

We conducted a total of 18 interviews (9 MD and 9 RN leaders) with all eligible sites participating. One site did not have an RN leader at the ban, and one site indicated that 2 RN leaders had served in leadership roles during the implementation of the diversion ban. Seven of the MD leaders were physician directors, whereas 2 were designees. We analyzed key informants' observations about the attitudes of other members of their institutions toward diversion and the ban (eg, hospital administration, members of the medical staff) and the key informant's own recommendations for other systems or states that might consider implementing a diversion ban policy.

We developed a conceptual model that organized the key informants' observations and experiences with ambulance diversion and attitudes toward the effect of the ban by time periods (Figure). The model captures the construct that key informants' opinions about the effects of the ban were framed by his/her experiences with diversion and preparation for the ban on patients, safety and inter and intra-hospital relationships and that the ban also affected these domains. A more complex model (Figure E1, available online at http://www.annemergmed.com) captures the complex web of relationships (ED, hospital, EMS, inter-hospital etc) linked by thematic coding. Illustrative quotes for each major theme that was identified for each of these periods are presented in Table 2, whereas more complete quotations that supported the thematic coding and detailed recommendations for other states considering a ban are in Appendix E4, available online at http://www.annemergmed.com.

Two participants reported that their site had never gone on diversion unless there was a "code black" (site disaster). A minority of key informants reported positive attitudes toward the use of diversion, indicating that period when an ED was on

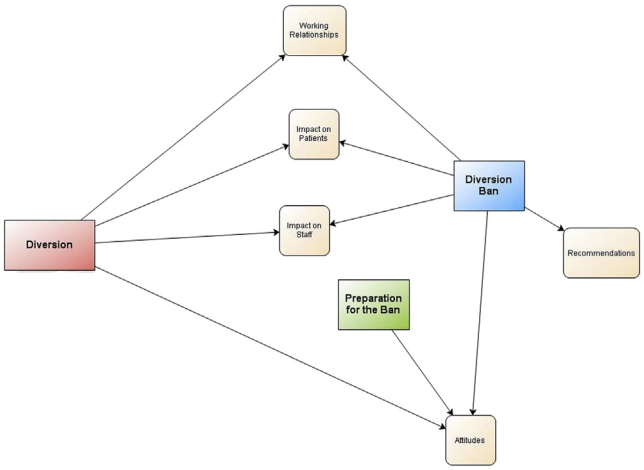

Figure. Model of overarching themes.

diversion could function as a safety valve in the setting of an influx of high-acuity patients. However, the majority of key informants indicated that ambulance diversion was not considered to be an effective strategy for managing crowded conditions in the ED. We identified several major themes that indicated that key informants thought diversion adversely affected patients, was a source of conflict among many emergency care providers, contributed to provider dissatisfaction and turnover, and was used mainly as a "psychological crutch."

Participants vividly captured the conflict that ambulance diversion caused, particularly between ED providers and EMS staff, between emergency physicians and nurses, and between hospitals. Some informants indicated that ED staff viewed not going on diversion as a "badge of honor" and exemplary of their hard work, whereas others perceived going on diversion as a "failure." The most commonly recognized disagreement occurred between physicians and nurses in the ED, surrounding the decision of when to go on diversion. Both RN and MD leaders identified the ED nurses as more frequently requesting diversion, whereas the physicians viewed going on diversion as less favorable. Key informants also noted a sense of anger and frustration from ED staff when EMS would bring a patient to an ED that was on diversion, and that was sometimes communicated to EMS providers through unpleasant interactions such as "glares and the daggers," resulting in "the poor patient sitting on the stretcher not really sure, should I be happy to be here or not?" Many key informants noted that there was an interaction between hospitals within the city that was described as a form of "gamesmanship," in which requesting diversion was "like a pawn" placed to prevent one site from being overwhelmed or to force other institutions to have to come off diversion. Multiple key informants commented about their perception of use patterns and that there tended to be certain hospitals that used diversion more frequently than others (Table 2).

One of the major observations about key informants' attitudes toward diversion was that they did not consider it to be an effective strategy. It was more of a "psychological crutch" that was used during periods of crowding, though it had little effect on patient flow. They commented that during times of heavy volume in the ED, some staff would begin asking to go on diversion because they believed it would give them time to regroup and break the cycle of ambulance arrivals. Paradoxically, most participants believed that it prevented the arrival of only a very narrow subset of patients during the 2-hour period that each hospital was allotted. Yet many reported calling diversion in times of crowded conditions because there was a sense that it was the only thing that was left to do to try to improve the situation or reassure stressed staff that everything had been done to try to ameliorate the situation (see Appendix E4, available online at http://www.annemergmed.com).

Despite its widespread use, the majority of participants thought that the use of diversion was demoralizing and that turning away patients fundamentally opposed the principles of emergency care: "to take care of anybody who comes through the door." Key informants indicated that this caused higher staff turnover, low morale, and dissatisfaction among all providers,

Table 2. Summary of major themes within the 3 distinct periods: diversion, prediversion ban, diversion ban.

Factor	Explanation	Exemplary quote
Diversion period		
Low provider morale/guilt	Providers felt bad about inability to provide quality care and having to turn patients away	They hated it. They hated going on diversion. I mean I think the mentality of any emergency department is that your doors are open—you want to take care of anybody who comes through the door, and the fact that you would shut your doors and turn people away is just abhorred by everybody. It's a tragedy. It's a travesty. It's terrible.
Provider turnover	Low morale contributed to significant staff turnover, and diversion was sometimes used to try to alleviate	If you torture your nurses sufficiently, then they leave. If your nurses leave, your problem exacerbates. Frankly, the long-term effect was protecting nurses so they stayed at their posts…so their morale wasn't totally destroyed.
Psychological crutch	Diversion not actually effective at alleviating crowding but thought to be a last-ditch effort; effects were mostly psychological	It would sort of give people that sense that, OK, we were on diversion, we've done all we can…but it didn't really have a tremendous impact other than sort of psychologically.
Breather	Sense that going on diversion gave people a chance to catch up	It's giving us a break. They feel a relief that we've got a break for an hour and we can catch up. I think that was the biggest part of the mentality of diversion.
Stress	Other hospitals going on diversion caused increased stress because people knew it would be getting busy	It would increase your stress. It would increase your anxiety. You know, you would just begin to feel that tension because you knew what was going to happen. You knew that you'd be running around.
Conflict	Disagreement and arguments on many levels arising from decisions surrounding diversion (ED staff, EMS, administration)	[There was] animosity between the ED staff and EMS, which didn't need to happen. The patient coming through, and the glares and the daggers of "don't you know we're on diversion?" And the poor patient sitting on the stretcher not really sure, should I be happy to be here or not?
Dissatisfaction	Patients did not like ending up at the wrong medical home or advocating heavily to be taken to an ED that was on diversion	Well, I think that diversion, even having it happen in just a personal sense, is very disconcerting. People worry about whether they'll get the right records if they can't go to the hospital they're used to. I think they're worried about time, if they had to go out of their way, whether they needed it or not.... So I think diversion is certainly a dissatisfier from the patient's point of view.
Safety	Adverse outcomes associated with diversion	I remember one case. It was a patient at…one of our community centers. He was having an acute MI. They called an ambulance and said, "We are going to send to you [name redacted]," and they said "Oh, [it] is on diversion," and he said, "I don't care. I am going to walk out of here." He drove in his car to the parking lot and came into triage and said, "I am having an acute MI and here is my EKG." That is a true story.
Wrong medical home	Patients (particularly with complex medical histories) who ended up at a different facility than where their medical records and physicians were	I mean from the patients who may be known patients to other facilities or other institutions that needed to come here simply because their hospital couldn't take them, it was definitely a dissatisfier. Their level of comfort was very different, their providers aren't here…and they're already in an emergent situation so their anxiety level is already up. It made for a worse experience because they…didn't want to come here. And the same for probably our patients who were sent to other institutions, and I think medical records [are] a huge part of that. Especially if people were coming in without family, or were unable to give their full histories or medications…that was just a very scary thing for people to go through.

Table 2. Continued.

Factor	Explanation	Exemplary quote
Not effective	Idea that diversion was really just a temporary solution for the real issues of boarding and crowding and affected only a narrow subset of patient arrivals to the ED	We all knew that boarding was really the issue, that ambulance diversion was really just a Band-Aid, just a symptom of the underlying problem.
Gamesmanship	Hospitals would frequently ask for diversion to protect themselves from becoming too busy or to make other hospitals come off diversion	It was gamesmanship. I think other hospitals would go on diversion to prevent the influx of patients they might get if they were open, or basically as a chess game in a lot of instances. You were putting a pawn out to protect your institution from getting bombarded with patients.
Lack of staffing control	Diversion made patient flow within the city unpredictable, and it was difficult to have adequate physician and nursing staffing to manage the influx	When other hospitals were going on divert, it would impact us because we would start getting boluses of patients. So our best efforts to manage flow and capacity weren't within our normal controls.... [It] would impact us greatly with staffing numbers and staffing patterns.
Lack of support from hospital administration	Hospital administrators did not like diversion; however, they frequently took little ownership of ED crowding as a hospital issue	I think, perversely, having diversion sort of allowed the rest of the hospital to believe that they didn't really have to solve the overcrowding problem because they said, "Well, just go on diversion. If we're at 105% capacity, the ED just goes on diversion and that will solve the problem."
Prediversion ban period		
Feared loss of safety valve	Fears that already crowded EDs would be overwhelmed by patients seeking care but would be unable to "turn off the faucet"	But, you know, [there was] just that thought that you couldn't do it anymore, unless there was a code black, unless there was an internal disaster. That was just an anxiety-provoking thing, you know: what were we going to do with these patients; we can't go on diversion; oh my God, we're really overwhelmed.
Feared loss of volume	Fears that EDs that depended on volume getting diverted from other hospitals would lose volume when diversion stopped	I mean for us I think we weren't using it [ambulance diversion] that much, and we were benefiting from it from a volume perspective, so I think for us…the only reason we were nervous about it going away was because it meant a drop in volume for us. I have colleagues at other institutions in the city, and I know their fear was more overcrowding than they were already experiencing.
Diversion ban period		
Improved patient satisfaction	Patients experienced greater satisfaction when diversion was no longer an option	It's nice to have the right patient to the right facilities: a patient whose care is followed at [X hospital] to have them be able to come to [X hospital]. There were times that it made absolutely no sense. So you'd be diverting, and an [X hospital] patient would come to [Y hospital] and a [Y hospital] patient would go to [X hospital], and you're, like, why couldn't we just match them correctly? That's just the right thing to do for the patient. Patients who were aware of diversion have commented that…it's nice not to have to worry about that.
Less distraction	Decisions of whether to go on diversion took up a significant amount of provider time that is now dedicated to patient care	Staff focus on what's happening in the moment as opposed to worrying about when we are going on diversion…shouldn't we be on diversion, are we going on, are we on yet…; that really didn't do anything. We're really more looking at what we do and we need to do now to care for the patients that are here and needed care. So it's more immediate…. [I]t was a distraction.
Improved working relationships	Conflict over diversion was no longer present, and there was an improved sense of collaboration between ED staff, hospital staff, administrators, and EMS	So I think in some ways it has built greater partnerships, and I think with EMS…. I think we're all working better as a community and I'm not sure if you'll hear that from other people you interview, but it feels that way to us, and especially with EMS.

Table 2. Continued.

Factor	Explanation	Exemplary quote
Staffing control	No diversion minimized the unexpected surges of patients, and appropriate volume-based staffing patterns could be more easily identified	One of the things we did from an operations standpoint is just adjusting our staffing levels and really building formulas, and looking at acuity, and looking at the positions we would need, and spacing our staffing.
Hospital ownership of flow	Hospitals recognized that ambulance diversion was not only about volume in the ED and took a more proactive role in improving flow throughout the hospital	It sort of got the rest of the hospital and administration thinking about hospital capacity issues in broader terms than "Let's just go on diversion, turn off the spigot, and that will solve the problem."
No wrong medical home	Patients were less frequently separated from their medical home	It's made a difference for those patients who were circling, looking for a place to land, or landing in the place that wasn't the best for them, you know absolutely; those things are a thing of the past.
Improved interhospital communication	Hospitals identified the need to collaborate among themselves rather than "game" the system	Well, there's not the resentment and blame from hospital to hospital.
"Right thing to do"	The prevailing sense that the ambulance diversion was a favorable policy change	I also think that the abolishment of diversion is good for patients. There is no doubt about it.
Fears not realized	Despite many initial fears of poor outcomes and volume changes associated with the ban, no one actually felt that any of these came to fruition	People I think were a little panicked, like, "We can't go on diversion?" And it's actually so much better.
Recommendations		
Early planning	Important to start planning for a diversion ban early and get all the appropriate people involved from the start	It [diversion ban] will come. And I don't think it's a bad thing. But I do think it's a bad thing if you haven't prepared for it.
Code Help	Most hospitals prepared for the ban by developing Code Help policies to help decompress in situations in which the ED is reaching critical capacity	Work on a Code Help, practice it, and have hospital administration schooled on it so that when this does go into effect, they know that they can't just leave the patients in the ED.
Address underlying issues	Banning ambulance diversion is not a panacea; the underlying issues still exist, and it is important to address those in conjunction with a diversion ban	Ambulance diversion is really just a symptom of the underlying problem of crowding and so [you have] to think about that. OK, so ambulance diversion goes away, but what are you doing about crowding?

although they unanimously thought that the nursing staff was more severely affected. They noted that staff members frequently felt guilty that they were unable to provide quality care for all patients arriving to the ED, and there was a substantial amount of stress among staff because of their perceived inability to provide the standard of care they believed they should be able to provide and because of the tension and anxiety that arose when other hospitals would begin diversion.

Participants also reported that ambulance diversion negatively affected patients in a variety of ways, including satisfaction, safety, and the overall quality of their medical care. The majority of key informants believed that ambulance diversion negatively affected patient satisfaction. Though many key informants commented about crowded conditions in the ED and the effect on patients, the most salient theme to emerge related to diversion is the construct that we called the "wrong medical home." These patients, usually with complex medical issues, multiple physicians, test results, and documentation at one institution, would be brought to a different facility, causing numerous downstream effects on the patient, their families, and providers. Patients underwent additional testing and had longer waits as providers sought outside records, all while in a foreign setting and anxiety-provoking situation. Additionally, patients and their families were unfamiliar with the hospital, and logistics including parking and transportation were more complicated.

Another concern key informants thought contributed to patient dissatisfaction was the need for patients to advocate for themselves if they wanted to go to their home hospital despite its being on diversion. Most patients were not aware that they could demand transport to a specific hospital; however, patients who were aware were put in an awkward situation of having to be adamant. Multiple key informants commented that this was essentially a "no-win" situation for them.

There was some disagreement among key informants about the extent to which diversion itself affected safety as opposed to the complicating factors surrounding ED crowding. It was difficult to separate these issues because they frequently coexisted in the same ED. Some key informants thought that diversion itself did not have any effect on patient safety, indicating that the same problems that led to diversion (eg, boarding, increased nursing and physician to patient ratios, crowded conditions within the ED) also led to adverse outcomes. Others identified that there was a perceived lack of patient safety or that the care was undesirable as a direct result of ambulance diversion, though they had no specific examples of poor patient outcomes. However, one key informant described a case in which a patient

drove to the ED from a community health center with an acute myocardial infarction to circumvent diversion and arrived in triage and said "I am having an acute MI [myocardial infarction]." Other key informants thought that the length of time associated with increased transport time could ultimately affect patient safety, although they believed that in Boston the proximity of hospitals limited this phenomenon. Some key informants reported that the quality of patient care suffered as a result of both diversion and ED crowding. Key informants also believed that the amount of time dedicated to the decision of when to pursue diversion distracted providers from patient care and that the discussion about going on diversion "could kind of take precedent over just getting patients in and caring for them."

Ultimately, key informants reported that diversion was simply an ineffective method of managing volume. Multiple key informants commented that although some staff and administrators viewed it as a panacea to deal with crowded EDs, it really functioned more as a "Band-Aid" for the real problems of boarding and other ED output bottlenecks.

Several of the key informants described their response to the policy initiative to end ambulance diversion in terms of core values and beliefs about emergency medical care. Multiple participants stated with the same phrase that the ban was the "right thing to do," whereas others indicated that there was a consensus about the ban as appropriate to implement as a public health policy within the city of Boston.

The overriding theme was key informants' apprehension about the ban's unpredictable effects on ED volume and patient safety. Reported concerns ranged from the potential effect on patient volume (gaining or losing at their site) to loss of a safety valve when things get really "crazy" (Table 2). Many hospitals were able to reference their experiences with the 2-week diversion ban trial as a way to mitigate these fears, and most key informants also reported substantial hospital leadership involvement as they prepared for this policy change. Some key informants reported playing a major role as advocates within their institution in support of the policy.

All of the key informants reported favorable aspects of the ban at the ED, institutional, or citywide level, including the key informants who had reported that their institution had never diverted ambulances unless there was a code black situation.

Most of the participants discussed the effects of the ban on patient care quality, satisfaction, or safety. Most reported that the ban had led to improvements in these domains, although several reported that it had no effect within their own departments. Among those who indicated that the ban had improved patient care quality, safety, or satisfaction, several noted that it had effectively ended the problem of patients being cared for in the "wrong medical home." One key informant noted that "it's much less common now to be taking care of a patient who really should be at another hospital."

Several participants reported that the ban had also improved patient care quality and satisfaction within their ED and that the perceived improvements were either because ED staff or the hospital appeared to be more focused on patient care quality after the ban was implemented, eliminating a "distraction" in which staff were more focused on diversion than caring for the patients in the ED. Others reported that institutional changes such as implementation of procedures for periods of high volume that were associated with the ban had contributed to improvements in patient care quality or safety.

Several key informants did not think that the ban had affected patient care quality or safety within their departments. One noted that the ban was coincidental to moving to a larger facility, whereas another reported that procedures unrelated to the ban, such as modifications in screening procedures, had more directly affected patient satisfaction, length of stay, and the left without being seen rate.

Multiple participants commented on the effect of the ban on the ED or hospital staff. As noted previously, one indicated that the ban removed diversion as a distraction and undesired focus of attention for ED staff. Some reported that the ban had affected inpatient hospital staff directly by "pushing the limits" of the floor in a way that had not happened before the ban. Several of the participants reported that there was no perceived effect of the ban directly on staff and that the major problem of caring for boarding patients remained. Participants indicated that the ED staff either positively viewed the diversion ban because it was associated with a perceived increase in the volume at their site or just adapted to the new policy, stating that ED staff "really didn't think about it; if you asked them, they probably didn't even know we were on no diversion."

Key informants reported that the ban positively affected many different relationships and alleviated much of the conflict noted before the ban. Among the most prevalent comments were the reported effects of the ban on interactions with out-of-hospital providers, the relationship between hospital administration and ED leadership, and the relationships between hospitals and among physicians and nurses within the ED.

Most of the participants who described an effect of the ban on ED-EMS relationships at their institution indicated that it had either eliminated or modified the antagonism toward EMS providers that was associated with ambulance diversion. Several stated that the ban had ended a hostile reception for out-of-hospital patients and providers. One participant who had characterized the response to EMS arrival with a patient when their institution was on diversion as "staring daggers" reported that after implementation of the ban, "that doesn't exist anymore, and just taking diversion away has kind of leveled the flow of patients," whereas another stated that "now I think it's much more the sense that we're on the same page…." Several participants also commented that the diversion ban served as a catalyst to cultivate a more positive relationship with out-of-hospital providers in a competitive health care marketplace.

Several of the key informants reported that the diversion ban had eliminated a source of conflict among ED staff. One key informant noted that the "biggest impact no diversion has had has been probably on the collegial relationships among the staff…. [T]he fact that it [diversion] wasn't there was almost like a relief; it was kind of like, great…they can do their work and not be at each other's throats."

All of the participants who commented on the effects of the ban on relationships between hospitals reported that it had improved these relationships and the functioning of the system in terms of its delivery of emergency medical care. Key informants reported that the ban had created a closer partnership between institutions and eliminated "resentment and blame" from hospital to hospital. One participant reported that the ban had ended a domino-like effect of diversion and patient surge.

A few of the participants discussed the effects of the ban on other relationships with state agencies or with the community served by their ED. Two participants reported that they had made specific efforts to have increased communication with their communities. One reported working to build relationships with physicians and community referrals, whereas another commented that because of his experience with high-acuity events that had stressed his capacity and diversion was not an option that "there is a lot of communication that goes out prior to the events so we know it's going to happen."

Despite initial trepidation about the ban, most informants noted that their initial fears of significant volume fluctuations and adverse outcomes had not been realized, mostly because of operational changes made at individual hospitals in anticipation of the ban. Some hospitals used the mandated Code Help policy as a platform for alternative resource allocation to help decompress the ED in times of critical capacity. Others opened "surge pods" or adjusted their staffing models to accommodate flow of patients (Appendix E4, available online at http://www.annemergmed.com).

Implementing some variant of Code Help policies mandated for every hospital and putting in place strategies to handle the volume, specifically, adjusting staffing levels, emerged as the 2 most common themes in months leading up to the diversion ban. Across most key informants, these strategies were not only deemed successful but also were recommended for other states considering implementing a similar policy.

LIMITATIONS

We chose ED leaders because we believed they would be the most knowledgeable and would be able to provide the most global perspective on the ban; however, it is unknown whether physicians and nurses not in leadership positions would have different opinions. Funding and practical considerations precluded an evaluation of other important constituents. The sampling timeframe and the post hoc experience with the effects of the ban could have affected respondents' attitudes about the ban and introduced hindsight bias, depending on when key informants were interviewed and whether the ban had been a policy failure (or disaster). The validity of our conceptual model that describes the complex web of effects of ambulance diversion within and between hospitals should be validated in other EMS systems. Finally, this study was conducted in a region that includes 9 receiving hospitals, including 4 Level I trauma centers (2009). These results may not be generalizable to other regions or states.

DISCUSSION

The first statewide ambulance diversion ban that was implemented in Massachusetts affords a unique opportunity to examine the effects of a major health care policy change on the delivery of emergency medical care. The benefits of eliminating ambulance diversion have been postulated in previous research,[10,11] as well as in policy statements and position papers from governing bodies in emergency medicine and beyond; however, to our knowledge no study has evaluated the outcomes of such a large-scale ambulance diversion ban.

Preliminary statewide data[12] and subsequent regional studies have suggested that the ambulance diversion ban in Massachusetts was not associated with adverse effects and may have been perceived by emergency care providers favorably. Burke et al[13] determined that the ban did not affect ED length of stay and EMS offloading times in Boston, and Rathlev et al[14] reported that the statewide ban was not associated with significant changes in throughput measures in Western Massachusetts. A small anonymous Web-based survey 1 year after the diversion ban of members of EMS committees and participants (physicians, nurses, and administrators) from a single hospital site found that only 12% of participants did not view the ban favorably.[15]

We used a qualitative approach to gain unique insight into the use of diversion and the effect of the ban on the emergency medical system in the largest metropolitan region in the state. This method allowed a more comprehensive evaluation of the experience that cannot be captured by quantitative analyses and may be able to provide a construct for exploration in other systems in which diversion is still practiced.[16]

Ultimately, we found that all ED leaders interviewed supported the ban, even those who believed that diversion had occasionally been useful. Most notably, the ban was reported to be a catalyst for improved working relationships between the ED and hospital staff, hospital administrators, and EMS, as well as positively affecting patient satisfaction and decreasing conflict. The most salient effect on patients was that they no longer regularly end up at the wrong medical home, and this improved their satisfaction and quality of care. Though all supported the ban, most noted that it is not a panacea, and the underlying issues of boarding and crowding still exist.

Perhaps our most important findings were the creation of a conceptual model indicating that ambulance diversion was associated with a complex web of interactions in the ED, within and between hospitals and other providers, and that emergency medicine leaders reported that a diversion ban did not cause adverse outcomes. We identified areas of potential adverse effects of ambulance diversion that have not previously been studied that should be examined in systems in which ambulance diversion is still practiced. Among these potential harms are the adverse effects associated with delivering patients to the wrong medical home and whether ambulance diversion is a source of relationship conflicts in other systems. A systematic review also noted the lack of data about the effects of diversion on many important outcomes.[17]

ED leadership in Boston indicated that a statewide ban on ambulance diversion has improved many aspects of emergency medical care within their own hospital and in the delivery of emergency medical care. The ban brought to an end a practice that most leaders regarded as ineffective and which served as a source of conflict between and among many of the members of the health care delivery system. These results may inform other emergency medical systems that consider implementing a ban on ambulance diversion.

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Supervising editor: Donald M. Yealy, MD

Author affiliations: From the Division of Emergency Medicine, Harborview Hospital, University of Washington School of Medicine, Seattle, WA (O'Keefe); the University of California Berkeley School of Public Health, Berkeley, CA (Bibi); Ben-Gurion University of the Negev, Israel (Rubin-Smith); and the Department of Emergency Medicine, Boston Medical Center, Boston University School of Medicine, Boston, MA (Feldman).

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APPENDIX E1.

Koh H, Hollander R. Massachusetts Department of Public Health Letter 12/18/2002 implementing Saturation/Gridlock and Code Help policy. Massachusetts Department of Public Health Circular Letter DHCQ 08-07-494, "Changes to Ambulance Diversion Policy."

APPENDIX E2.

"No diversion" key informant interview protocol.

WELCOME/PREAMBLE

Thank you for agreeing to participate in this interview. My name is _____; I am a researcher at Boston Medical Center and am working with the Massachusetts Department of Public Health on this study.

The purpose of this research project is to better understand the effect of the statewide "no diversion" policy implemented on January 1, 2009. By speaking to members of ED leadership, we hope to learn more about staff perceptions of the effects of the diversion ban. You were selected to participate today because you serve a leadership role in the ED at [insert name of hospital]. We are interested in learning about your thoughts and opinions, so there are no right or wrong answers to the questions I will ask you. As we discussed in the consent, only I and the transcriptionist will be able to see what you have said in today's interview. Please feel comfortable talking about your thoughts, opinions, and experiences openly because your responses will be kept confidential.

INTERVIEW

I'd like to talk a bit about what working in the ED at [insert name of hospital] was like before the diversion ban.

1) Tell me about your experience working at the [insert name of hospital] ED before January 1, 2009.
   a. Probe on patient care quality, safety, efficiency, crowding
   b. If participant brings up crowding or inefficiency: What do you think were the causes of the crowding/inefficiency? How did you handle these problems before the diversion ban? What solutions were the most effective? The least effective?
2) Talk to me about your experiences with ambulance diversion at [insert name of hospital] before the diversion ban was implemented.
   a. Probe on diversion's effect (if any) on patients
   b. Was the hospital administration (specifically senior management) aware of the practice of ambulance diversion? [If participant mentions any problems related to diversion: Were they aware of the conditions in the ED that you have described?]
3) Ambulance diversion has historically been used as a tool to deal with ED crowding. How useful a tool do you think that diversion was at your hospital?

Now I'd like to talk a bit about what working in the ED at [insert name of hospital] has been like since the diversion ban started.

4) Hospitals in Massachusetts took many different approaches to preparing for the implementation of the diversion ban. Can you tell me about what [insert name of hospital] did in response to the directive from DPH to end ambulance diversion?
   a. Probe on institutional action: conversations with clinical and nonclinical staff, formal meetings, policy changes, etc.
5) Tell me more about your own response to the directive [in addition to the institutional response].
   a. Probe on actions taken by participant: conversations with clinical and nonclinical staff, formal meetings, policy changes, etc.
6) How do you feel your response or the response of [insert name of hospital] to the directive compares with the actions taken by other hospitals/ED leadership in Massachusetts?
7) Tell me about your experience working in the ED since the diversion ban.
   a. Probe on patient care quality, safety, efficiency, crowding
8) Do you think that anything has changed since the directive? Tell me more about that.
   a. Probe on effects on staff, patients, patient safety
9) If you had it to do over again, how would you respond to the diversion ban?

CLOSING

10) What would you say to other states that are considering implementing a similar diversion ban?
11) What would you tell ED administrators in other states about your experience with no diversion? What advice would you give them in preparing for a diversion ban?
12) Are there any other things important to your experience before or after the diversion ban that I haven't asked you about? Please feel free to tell me about any additional thoughts or ideas you have.

Thank you so much for helping us with this pivotal health services research study!

Please feel free to contact me at any time if you have questions about the research or if you have additional comments that were not brought up during this interview.

Before we publish any results from this study, we'd like to share our preliminary findings with those of you who took the time to share your opinions with us. Would you like a copy of this preliminary report? [If yes, get e-mail address]

APPENDIX E3.

Detailed coding methods.

The development of the coding was a stepwise process. Two transcripts were randomly selected, reviewed, and coded by 3 members of the research team to ensure consistency of thematic coding and develop a coding scheme and coding dictionary. The coding of remaining interviews was carried out independently by 2 research team members. These were then reviewed as a group for

accuracy and consistency. The research team met to discuss findings and developed a conceptual model that encompassed initial categories and provided insight into major themes.

Consistent with grounded theory and the constant comparative method, codes were refined and additional thematic categories were created during the course of the analysis. To ensure reliability, coding discrepancies were discussed by the team until agreement on appropriate coding was reached. In the final phase of data analysis, categories were reduced to major themes through ongoing discussion between researchers, reviewing coding, recoding, and rereading all transcripts as necessary. In addition, the research team met with experts in qualitative methods to review the thematic structure and coding process. Interrater reliability was established for the coding frame by running a coding comparison query in NVivo.

APPENDIX E4.

Detailed transcripts supporting thematic coding.

DIVERSION

Attitudes of ED and Hospital Staff

Breather:

"It's giving us a break. They feel a relief that we've got a break for an hour and we can catch up. I think that was the biggest part of the mentality of diversion."

Only thing that was left to do to try to improve the situation:

"I think they felt like diversion was, like, you had pulled the cord and you acknowledged it was unsafe, so somehow or other you had done everything you could do…and now you just had to deal with the MASH mentality, but you could live with yourself because you had done everything you could do…. [N]obody ever felt like it did anything. So divert was sort of a last point of control they felt we would have. To me that was what it was for the nurses."

"It would sort of give people that sense that, OK, we were on diversion, we've done all we can…but it didn't really have a tremendous impact other than sort of psychologically."

Demoralizing, opposed the principles of emergency care:

"They hated it. They hated going on diversion. I mean, I think the mentality of any emergency department is that your doors are open—you want to take care of anybody who comes through the door, and the fact that you would shut your doors and turn people away is just abhorred by everybody. It's a tragedy. It's a travesty. It's terrible."

Anxiety when other hospitals would start to go on diversion:

"It would increase your stress. It would increase your anxiety. You know, you would just begin to feel that tension because you knew what was going to happen. You knew that you'd be running around."

Attitudes of Hospital Administration

Administrators were averse to diversion because of immediate and delayed financial losses, as the patient who was diverted and initially:

"They didn't want to be turning patients away…so they're looking at it as 'Well, we've got all these beds upstairs that we want to fill, so we don't want to be going on diversion and turning patients away.' And I think too, they were afraid that if you turn a patient away who's a regular at [this hospital] and they end up at a different hospital, they may not return to this hospital for their care because now they've gone somewhere else, and now they've got a new set of doctors over at that new facility who they're going to follow up with, so the next time they get sick, instead of coming here, they're going to go over there. So from that perspective, from a business perspective, that was how they were looking at it, I'm sure."

Mixed messages:

"I think people saw it as an ED issue, and so here the ED is diverting patients, but in many ways it was a throughput issue in the hospital. So those staff people who were involved with the throughput issues didn't have a sense of urgency of fixing the ED problem. They wouldn't even maybe know this was happening."

Another key informant (KI) (large hospital):

"I think, perversely, having diversion sort of allowed the rest of the hospital to believe that they didn't really have to solve the overcrowding problem because they said, 'Well, just go on diversion. If we're at 105% capacity, the ED just goes on diversion and that will solve the problem.'"

Effect on Patients

Negatively affected patient satisfaction, wrong medical home:

"I mean, from the patients who may be known patients to other facilities or other institutions that needed to come here simply because their hospital couldn't take them, it was definitely a dissatisfier. Their level of comfort was very different, their providers aren't here…and they're already in an emergent situation so their anxiety level is already up. It made for a worse experience because they…didn't want to come here. And the same for probably our patients who were sent to other institutions, and I think medical records [are] a huge part of that. Especially if people were coming in without family, or were unable to give their full histories or medications…that was just a very scary thing for people to go through."

Adverse effect on safety:

"I remember one case. It was a patient at…one of our community centers. He was having an acute MI. They called an ambulance and said, 'We are going to send to you [name redacted],' and they said 'Oh, [it] is on diversion,' and he said, 'I don't care. I am going to walk out of here.'

He drove in his car to the parking lot and came into triage and said, 'I am having an acute MI and here is my EKG.' That is a true story."

Time dedicated to the decision of when to pursue diversion distracted providers from patient care:

"There were times where the discussion of whether you would or wouldn't [go on diversion] could kind of take precedent over just getting patients in and caring for them."

Effect on Working Relationships

ED-RN conflict about diversion:

"[B]efore we had the diversion ban, there was a lot of anxiety about when we should go on diversion or shouldn't go on diversion. It was occasionally a source of conflict between the doctors and the nurses. Occasionally, it would rise up to involve the administrator on call. It was something that people devoted a lot of energy to figuring out when they should be on diversion or not, and it was something that was sort of ever present…. It was always in the back of your mind—when are we on diversion? And not only that, but when are the other hospitals on diversion? It was sort of a continual, ever-present issue."

ED-EMS conflict:

"[T]he animosity between the ED staff and EMS…didn't need to happen. The patient coming through, and the glares and the daggers of 'Don't you know we're on diversion?' And the poor patient sitting on the stretcher not really sure, should I be happy to be here or not?"

Effect on EDs

Created unexpected peak volumes that were undesirable:

"When other hospitals were going on divert, it would impact us because we would start getting boluses of patients. So our best efforts to manage flow and capacity weren't within our normal controls.... [I]t would impact us greatly with staffing numbers and staffing patterns."

Not effective for root cause:

"We all knew that boarding was really the issue, that ambulance diversion was really just a Band-Aid, just a symptom of the underlying problem."

Effect on Interhospital Relationships

Interhospital conflict:

"It was gamesmanship. I think other hospitals would go on diversion to prevent the influx of patients they might get if they were open, or basically as a chess game in a lot of instances. You were putting a pawn out to protect your institution from getting bombarded with patients."

Positive Effect of Diversion

[The 2-hour period really did relieve some of the chaos, and functioned more as] a safety valve:

"Oh, I think [diversion] helped. I mean…unlike other institutions that I think had a lower threshold, we didn't go on diversion unless it was truly overwhelming. And, yeah, back then it did help. There's no question that even a couple of hours of breathing room allowed you to, maybe, not see as many new sick patients, take care of the ones you had, go do the administrative things you needed to get the patients upstairs—so, you know, it definitely helped. Was it the solution? Of course not…but it definitely helped."

Preparation for the Ban

Fear about gaining or losing volume:

"I mean, for us I think we weren't using it [ambulance diversion] that much, and we were benefiting from it from a volume perspective, so I think for us…the only reason we were nervous about it going away was because it meant a drop in volume for us. I have colleagues at other institutions in the city, and I know their fear was more overcrowding than they were already experiencing."

Overwhelmed:

"But, you know, [there was] just that thought that you couldn't do it anymore, unless there was a code black, unless there was an internal disaster. That was just an anxiety-provoking thing, you know: what were we going to do with these patients; we can't go on diversion; oh my God, we're really overwhelmed."

DIVERSION BAN

Attitudes Toward the Diversion Ban

"Right thing to do" and a consensus about the ban as appropriate to implement as a public health policy within the city of Boston:

"In the city itself, I think a majority of the people felt like we should do it."

Another participant indicated this:

"I also think that the abolishment of diversion is good for patients. There is no doubt about it."

Attitudes of ED and Hospital Staff

ED staff either positively viewed the ban or just adapted to the new policy:

"[T]he staff were excited to see volume, and its job security…."

Another KI:

"They [ED staff] really didn't think about it. They really didn't know about it; if you asked them, they probably didn't even know we were on no diversion."

No consistent impression about the perceived attitudes of hospital staff toward the ban:

"… there was more feeling around it in the emergency department because the staff lived with it than really on the floors…. I don't think they [hospital staff] really appreciated, you know, what this change would mean."

"But I know our physicians who have done a lot to have on-call systems and programs; they would do anything not to have diversions, so this was a great thing for them…."

Another KI:

"For the rest of the hospital, it was a bigger deal. It was sort of an educational opportunity, to let them know what diversion was and what it wasn't. So as much as letting people know that diversion no longer exists, it was letting people know that diversion wasn't all that anyway."

Attitudes of Hospital Administration

Differing attitudes toward the ban:

"And who do you think was most unhappy about that? Hospital administration…. We did everything right. But they don't like it. It affects their bottom line."

Another KI indicated:

"[I]t was an opportunity, actually, for improvement across the board anyway, and it just kind of brought it to light for people…. [T]he workings of admissions, and volume, and stuff are very important so they [hospital administration] never want to seem like they couldn't take a patient…."

EFFECT OF THE BAN

Effect on Patients

Eliminated the problem of the wrong medical home:

"[I]t's made a difference for those patients who were circling, looking for a place to land, or landing in the place that wasn't the best for them, you know, absolutely; those things are a thing of the past."

"It's nice to have the right patient to the right facilities: a patient whose care is followed at [X hospital] to have them be able to come to [X hospital]. There were times that it made absolutely no sense. So you'd be diverting, and an [X hospital] patient would come to [Y hospital] and a [Y hospital] patient would go to [X hospital], and you're like why couldn't we just match them correctly? That's just the right thing to do for the patient. Patients who were aware of diversion have commented that…it's nice not to have to worry about that."

"[I]t's much less common now to be taking care of a patient who really should be at another hospital."

Improved patient care quality and satisfaction within their ED either because ED staff or the hospital appeared to be more focused on patient care quality after the ban was implemented:

"Staff focus on what's happening in the moment as opposed to worrying about when we are going on diversion…shouldn't we be on diversion, are we going on, are we on yet…; that really didn't do anything. We're really more looking at what we do and we need to do now to care for the patients that are here and needed care. So it's more immediate…. [I]t was a distraction."

Institutional changes such as implementation of procedures for periods of high volume contributed to improvements in patient care quality or safety:

"It's really drawn attention to the fact that it's not OK to leave patients in an emergency room, and it really is…. [W]e need to do better as an organization to make this happen…. [I]t really engages the entire medical center. It's a commitment from everybody for the patient, and that's what we should have always been doing. So we're happy there's no diversion…."

"[U]ntil the no diversion policy, it was, you admitted patients to the emergency department, made it so the emergency department was no longer operational, made it so that patient satisfaction was down. You could blame the ED for their poor patient satisfaction…."

Several KIs did not believe that the ban had affected patient care quality or safety within their departments:

"[T]his is part of a moving target. As we have implemented our screening process, we've got immediate results from that. We've got a decrease in length of stay and improvement in patient satisfaction, and decrease walkout rate, patients not being seen…. We got all that pretty immediately."

Effect on Staff

The ban removed diversion as a distraction:

"[T]he floor staff felt that there never was an option to say no, and it was going to [cause] more work…. I think in some ways…it meant pushing the limits of the floor in a way we've never done before…."

Another KI reported:

"to be brutally honest…it's about the same. The issue for us continues to be the boarders."

EFFECT ON WORKING RELATIONSHIPS

ED-EMS Relationships

Eliminated or modified the antagonism toward EMS:

"That piece of it is gone. It wasn't either the staff's fault or EMS's fault or the patient, but [the trend was] to kind of

blame somebody for what was happening…. [T]hat doesn't exist anymore, and just taking diversion away has kind of leveled the flow of patients."

Another stated this:

"I think it's better. There was always—this would happen almost every day if you were on diversion and an ambulance came—that the ambulance would get dirty looks: Why are you here, we're on diversion…. [A]nd now I think it's much more the sense that we're on the same page…."

One interviewee summarized it thus:

"So I think in some ways it has built greater partnerships, and I think with EMS…I think we're all working better as a community and I'm not sure if you'll hear that from other people you interview, but it feels that way to us, and especially with EMS."

A catalyst to cultivate a more positive relationship with out-of-hospital providers in a competitive health care marketplace:

"[B]ecause we're in a city with so many options within a couple of miles, there really is a choice on where the patients are brought if they don't have a desired [destination]. EMS does have a choice in where they bring people, and the closest hospital is the first bet, but when you're right across the street from very competitive institutions, we wanted that choice to be us. So we did a lot of work with partnering with EMS…."

Others described working to build relationships with EMS by developing lounges for EMS providers and having staff "ride-along" experiences to "cultivate a relationship with EMS."

ED Leadership and Hospital Administration Relationships

Relationship with hospital administration:

"[I]t sort of got the rest of the hospital and administration thinking about hospital capacity issues in broader terms than 'Let's just go on diversion, turn off the spigot, and that will solve the problem.'"

"I think that they have come to see emergency management, surge, this whole thing in a different light than what was originally intended, so I think this has helped."

Made their role as ED leaders more difficult:

"It's made it a little more difficult because before, when it was ambulance diversion, it was this kind of outside entity that we could use…. Now that this outside kind of thing called ambulance diversion is gone, it's more about us…. [I]t's more personal…, it's about our flow, it's about our infrastructure, it's about our operations, and it's about our priorities. It's not some outside thing; it is all inside."

Interhospital Relationships

Improved these relationships and the functioning of the system:

"And there's a close partnership now with institutions, which I think existed but I think exists stronger now where we may know what's going on at [X hospital]."

Other KI:

"Well, there's not the resentment and blame from hospital to hospital."

Ended a domino-like effect of diversion and patient surge:

"Starting with [hospital X] going on diversion, which would bump up [hospital X's] patients, then they would go on diversion, and some of the outlying hospitals, we would get it. So, again, we would be kind of down the line, and we would get hit with a lot of patients, and that which I've actually seen a decrease in since no diversion."

ED Staff Relationships (physician-nurse)

Ended ED physician-nurse conflict:

"And I think the, probably to me the biggest impact no diversion has had has been probably on the collegial relationships among the staff, because when you could divert people would be saying, like, you know, 'We don't have anyplace to put that intubated patient; you should divert,' and the doctor was trying to be macho, and he'd say, like, 'No, I'm too embarrassed. We're going to, you know, stay open,' and then people would be calling, like, me or the chief at home, saying, 'We have like 65 patients more than the monitored beds and so-and-so-won't make the call.'[I]t was all of this back-and-forth stuff, so the fact that it wasn't there was almost like a relief. It was kind of, like, great…they can do their work and not be at each other's throats."

Other Relationships

Efforts of Massachusetts Department of Public Health to end ED boarding after the implementation of the diversion ban:

"[T]hat would have a huge impact on the way we would have to respond to something like that…across the hospital."

Significant effect on hospitals and their financial feasibility:

"[I]f a line was drawn in the sand…"

Increased communication with their communities:

"…where it was more of a 'Just say yes; just say yes to everybody and the rest will come.'"

Another KI:

"[N]ow when we have these events, we're better prepared for them and there is a lot of communication that goes out prior to the events so we know it's going to happen; we know what the plan will be if it does happen and what nursing can do, what the physicians can do."

Outcomes of Initial Fears

Anticipation of the ban:

"The only thing we really changed is, we sort of had, instead of diversion we developed this code yellow policy, which was really 3 stages. Um, one, kind of the precode yellow, saying, we're going to be really in trouble if there's not more intensified efforts to get people discharged, move people out of the ICUs, to be more efficient. And then the second level's, the real level's, is that we developed a policy where we could bring into the command center in 5 to 10 minutes almost every senior person in the hospital. And they had to come. And to discuss, all right, what are we going to do to be able to handle these beds, to move patients? And then the third level, which we've really never gone to, to my recollection, is the highest level of code yellow is, OK, every bed is full, we're not going to be able to move people, we have got to open up more areas."

"One of the things we did from an operations standpoint is just adjusting our staffing levels and really building formulas, and looking at acuity, and looking at the positions we would need, and spacing our staffing."

"[W]e did change physician coverage of the medical boarders. So now the medical doctors, inpatient doctors, have to cover their boarders in the ED, so the ED doc would be free to see the increased volume from, um, from the no divert. And that has worked out well."

"We opened up a surge pod. It's a pod that we've had…get bigger and smaller as hospital capacity has changed over time…. I think the surge pod was probably the most tangible and most direct response just in terms of when it happened and how we were able to mobilize the administration around that need…."

RECOMMENDATIONS FOR OTHER STATES

Early Planning

"It [diversion ban] will come. And I don't think it's a bad thing. But I do think it's a bad thing if you haven't prepared for it."

Using a trial period and getting the "right people" on board, including internal leadership, EMS, and other hospitals:

"I wished we came together as chiefs and directors of our departments and talked about this. You know we all knew it was coming for a year. I think people reached out to those relationships they had built, but I think it would have been great to have a forum where hospitals could come together to talk about what…they [were] worried about. Or how…they solved these problems. Really more information sharing…"

Another KI:

"[I]f your senior management is not bought in, then you're not going to succeed."

Code Help

"Code Help" as an effective strategy:

"Work on a Code Help, practice it, and have hospital administration schooled on it, so that when this does go into effect, they know that they can't just leave the patients in the ED…."

"For us...I mean the code Help, if they had something like that implemented, that would definitely help."

"I think that making sure each hospital has a plan in place before the diversion is probably the best, and that they feel comfortable, that they've drilled it a few times… [for] leeway. [W]e're going to stop diversion as of the end of this year. You need to have a plan in place by September so you can drill it a few times between now and then…."

Address Underlying Issues

Find a solution to the problem of boarding or ED crowding:

"[A]mbulance diversion is really just a symptom of the underlying problem of crowding…so…think about that. OK, so ambulance diversion goes away, but what are you doing about crowding...?"

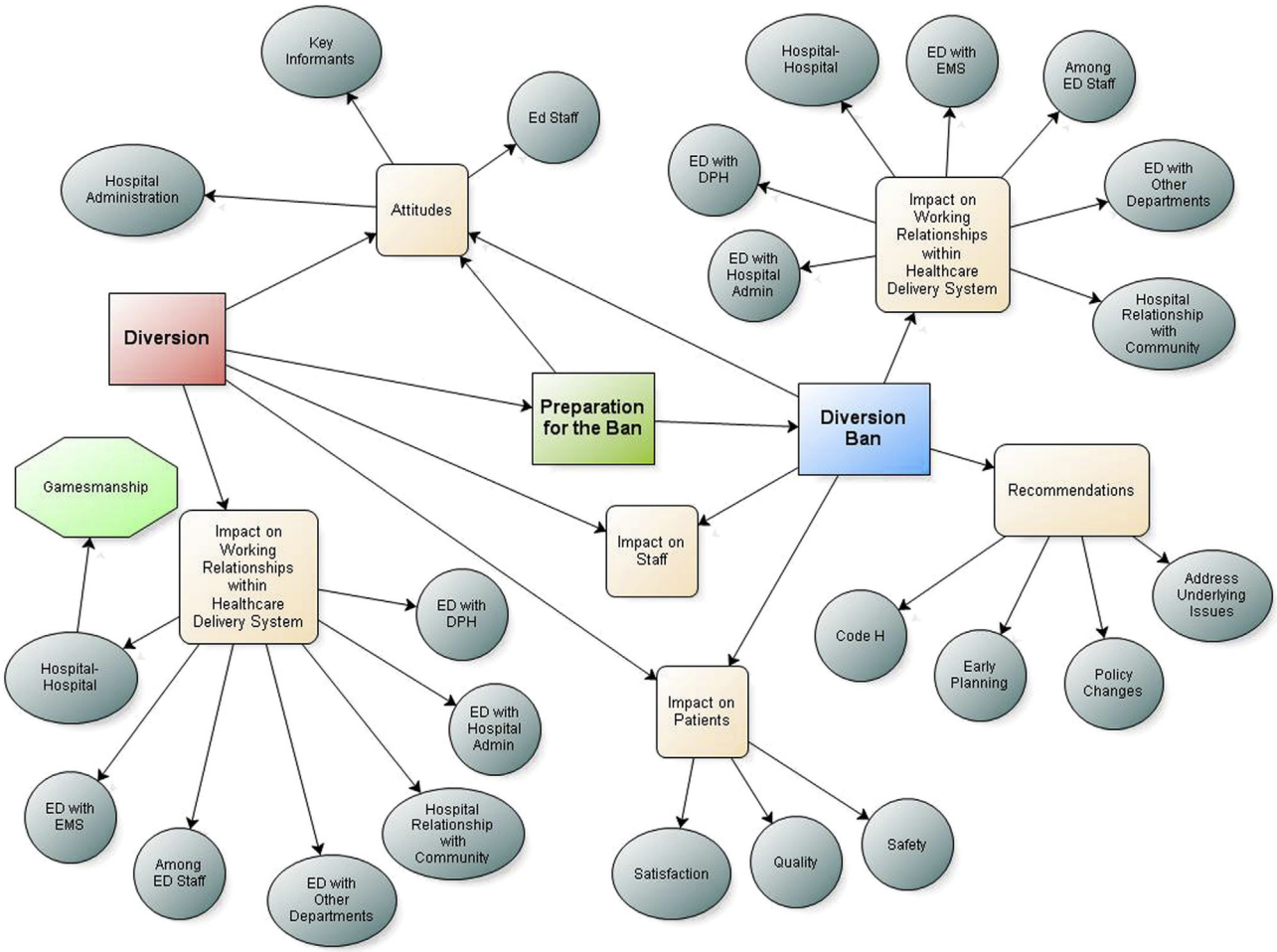

Figure E1. Detailed conceptual model.

Two Cheers for Regulation

Robert L. Wears, MD, PhD*

*Corresponding Author. E-mail: wears@ufl.edu or r.wears@imperial.ac.uk.

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Emergency physicians often regard regulation as nettlesome at best, an attitude stemming from the high value physicians have traditionally placed on individual discretion.[1,2] This is amplified in the United States, resonating with the mythos of rugged individualism. Regulators and other supervisory bodies have helped foster this dismissive attitude by their occasional ham-handed proclamations (eg, the various iterations of time standards for antibiotics and blood cultures in pneumonia[3,4]) or by the cascade of ultraconservative interpretations of existing regulations due to fear of exposure, embarrassment, and punishment (eg, Health Insurance Portability and Accountability Act I). Many emergency physicians may have experienced the paradox of health systems inspectors walking down an emergency department (ED) hallway filled with patients on stretchers and later citing the department for coffee-drinking in the work area. More commonly, well-intended regulations often seem ineffective[5] or counterproductive[6-8] or require elaborate and sometimes intrusive mechanisms for enforcement.[9-11]

Thus, it is refreshing to see in this issue of *Annals* an example of regulation that works, and one that all the involved parties eventually valued. O'Keefe et al[12] report on the attitudes of medical and nursing ED leaders in Boston toward a 2009 statewide ban on ambulance diversion; despite initial misgivings, most respondents viewed the ban favorably and believed it had improved both the quality of care and relationships between ED and emergency medical services (EMS) workers.

This success naturally raises the question of why regulation worked in this case when it seems to perform so poorly in others. Can we learn from this episode what conditions make regulation successful? Three factors jointly contributed to the success of regulation here: the structure of the problem, the nature of potential violations, and the distribution of power among the involved parties.

The diversion problem shares features with a classic problem in game theory known as the Prisoners' Dilemma. This problem illustrates how 2 parties might reasonably decide not to cooperate, even though it is in their best interests to do so.[13] Imagine 2 prisoners complicit in some crime. They are unable to communicate with each other, and each is offered the same deal: if they both confess, they will both get 2 years; if one implicates the other, the betrayer will go free and the betrayed will get 10 years; if they both keep quiet, they will serve only 6 months. In this situation, "ratting out" your partner is more rewarding than keeping silent, but because the offer is made to both, each will likely choose this seemingly logical strategy. The result is that both end up worse off than if they had cooperated. Of course, the diversion situation is not the one-time problem outlined above in that the parties (hospitals) repeatedly face the same question. However, an iterated Prisoners' Dilemma (in which the parties repeatedly face the cooperation-versus-defection question) shows that it often results in a stable regime of "tit-for-tat" revenge-taking, which seems reminiscent of the diversion experience.[14] The structure of a Prisoners' Dilemma problem suggests that if the parties are somehow prevented (perhaps by regulation) from pursuing their individual short-term advantages, all will do better in the long run.

But a simplistic regulatory approach in this setting—banning betrayal or a self-interested choice in isolation—is unlikely to be generally sufficient without some system of surveillance, monitoring, and punishment. Actual examples of the Prisoners' Dilemma, such as performance-enhancing drugs in sports[15] or the Cold War arms race,[16] show that regulation alone is not a sufficient solution to that type of problem. But in the diversion problem, the regulatory ban is self-effecting in that violations are obvious, unambiguous, and widely visible to other stakeholders.

The final factor is the new distribution of power under the ban; EMS crews can unilaterally enforce the ban without depending on the cooperation or good will of others by ignoring diversion requests. They also gain immediate and direct benefits from that enforcement. Thus, the ban on diversion succeeded because it was self-efficacious, was self-enforcing, and left all parties better off than they otherwise would have been. The self-reinforcing Prisoners' Dilemma cycle of tit for tat evaporates and all move on to a new, stable regime.[17]

Regulations have many problems: they shift responsibility and accountability from organizational leaders to front-line workers[18]; they shift power to a technocratic elite[19]; they provide the appearance of action for external audiences, whether effective or not[20]; they provide the comforting illusion of control against a radically contingent, fraught, and dangerous world[21]; and their use of measures sets in motion a train of events that undermines the validity of those measures.[22] It is simplistic to let the

problems of regulation make it into an ever-present evil or to allow the safety and quality problems of clinical work to make it a panacea for all problems. The Boston experience demonstrates that regulation judiciously used is valuable and essential in a variety of circumstances. The trick will be to understand better when and where and how much to regulate.

Supervising editor: Donald M. Yealy, MD

Author affiliations: From the Department of Emergency Medicine, University of Florida, Jacksonville, FL; and the Clinical Safety Research Unit, Imperial College London, London, UK.

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Kevin Parkes, MD	SAC Liaison	x	x	x	x			
Phong Nguyen, MD	Non-Trauma Base Physician		x	x	x			
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ADULT RESPIRATORY EMERGENCIES

CHRONIC OBSTRUCTIVE PULMONARY DISEASE

I. FIELD ASSESSMENT/TREATMENT INDICATORS

Symptoms of chronic pulmonary disease, wheezing, cough, pursed lip breathing, decreased breath sounds, accessory muscle use, anxiety, ALOC or cyanosis.

II. BLS INTERVENTIONS

- Reduce anxiety, allow patient to assume position of comfort.
- Administer oxygen as clinically indicated, obtain O_2 saturation on room air, or on home oxygen if possible.

III. LIMITED ALS (LALS) INTERVENTIONS

- Maintain airway with appropriate adjuncts, including advanced airway if indicated. Obtain O_2 saturation on room air or on home oxygen if possible.
- Nebulized Albuterol per ICEMA Reference #7040 - Medication - Standard Orders.

IV. ALS INTERVENTIONS

- Maintain airway with appropriate adjuncts, including advanced airway if indicated. Obtain O_2 saturation on room air or on home oxygen if possible.
- Albuterol with Atrovent per ICEMA Reference #7040 - Medication - Standard Orders.
- Place patient on Continuous Positive Airway Pressure (CPAP), refer to ICEMA Reference #10190 - ICEMA Approved Skills.
- Consider advanced airway, refer to ICEMA Reference #10190 - ICEMA Approved Skills.
- Base hospital physician may order additional medications or interventions as indicated by patient condition.

V. REFERENCES

Number	Name
7040	Medication - Standard Orders
10190	ICEMA Approved Skills

ACUTE ASTHMA/BRONCHOSPASM/ALLERGIC REACTION/ANAPHYLAXIS

I. FIELD ASSESSMENT/TREATMENT INDICATORS

History of prior attacks, possible toxic inhalation or allergic reaction, associated with wheezing, diminished breath sounds or cough.

II. BLS INTERVENTIONS

- Reduce anxiety, allow patient to assume position of comfort.
- Administer oxygen as clinically indicated, humidified oxygen preferred.

III. LIMITED ALS (LALS) INTERVENTIONS

- Maintain airway with appropriate adjuncts, obtain O_2 saturation on room air if possible.
- Nebulized Albuterol per ICEMA Reference #7040 - Medication - Standard Orders.
- For signs of inadequate tissue perfusion, initiate IV bolus of 300 cc NS. If signs of inadequate tissue perfusion persist may repeat fluid bolus one (1) time.
- If no response to Albuterol, administer Epinephrine per ICEMA Reference #7040 - Medication - Standard Orders. Contact base hospital for patients with a history of coronary artery disease, history of hypertension or over 40 years of age prior to administration of Epinephrine.
- May repeat Epinephrine, per ICEMA Reference #7040 - Medication - Standard Orders, after 15 minutes one (1) time.
- Base hospital physician may order additional medications or interventions as indicated by patient condition.

IV. ALS INTERVENTIONS

- Maintain airway with appropriate adjuncts, obtain O_2 saturation on room air if possible.

- Albuterol, with Atrovent per ICEMA Reference #7040 - Medication - Standard Orders.

- For signs of inadequate tissue perfusion, initiate IV bolus of 300 cc NS. If signs of inadequate tissue perfusion persist may repeat fluid bolus until signs of improved tissue perfusion.

- Place patient on Continuous Positive Airway Pressure (CPAP), refer to ICEMA Reference #10190 - ICEMA Approved Skills.

- If no response to Albuterol, administer Epinephrine per ICEMA Reference #7040 - Medication - Standard Orders. Contact base hospital for patients with a history of coronary artery disease, history of hypertension or over 40 years of age prior to administration of Epinephrine.

- May repeat Epinephrine per ICEMA Reference #7040 - Medication - Standard Orders after 15 minutes one (1) time.

- For suspected allergic reaction, consider Diphenhydramine per ICEMA Reference #7040 - Medication - Standard Orders.

- For persistent severe anaphylactic shock, administer Epinephrine per ICEMA Reference #7040 - Medication - Standard Orders.

- Consider advanced airway, refer ICEMA Reference #10190 - ICEMA Approved Skills.

- Base hospital physician may order additional medications or interventions as indicated by patient condition.

V. REFERENCES

Number	Name
7040	Medication - Standard Orders
10190	ICEMA Approved Skills

ACUTE PULMONARY EDEMA/CHF

I. FIELD ASSESSMENT/TREATMENT INDICATORS

History of cardiac disease, including CHF, and may present with rales, occasional wheezes, jugular venous distention and/or peripheral edema.

II. BLS INTERVENTIONS

- Reduce anxiety, allow patient to assume position of comfort.

- Administer oxygen as clinically indicated. For pulmonary edema with high altitude as a suspected etiology, descend to a lower altitude and administer high flow oxygen with a non re-breather mask.

- Be prepared to support ventilations as clinically indicated.

III. LIMITED ALS (LALS) INTERVENTIONS

- Maintain airway with appropriate adjuncts, obtain O_2 saturation on room air if possible.

- Nitroglycerine per ICEMA Reference #7040 - Medication - Standard Orders. Do not use or discontinue NTG in presence of hypotension (SBP <100).

- Albuterol per ICEMA Reference #7040 - Medication - Standard Orders, if nitro is not working.

IV. ALS INTERVENTIONS

- Maintain airway with appropriate adjuncts, obtain O_2 saturation on room air if possible.

- Nitroglycerine per ICEMA Reference #7040 - Medication - Standard Orders.

- Place patient on Continuous Positive Airway Pressure (CPAP), refer to ICEMA Reference #10190 - ICEMA Approved Skills.

- Consider advanced airway, refer to ICEMA Reference #10190 - ICEMA Approved Skills.

- Base hospital physician may order additional medications or interventions as indicated by patient condition.

- In radio communication failure (RCF), the following medications may be utilized:

  - Dopamine per ICEMA Reference #7040 - Medication - Standard Orders.

  - Albuterol with Atrovent per ICEMA Reference #7040 - Medication - Standard Orders after patient condition has stabilized.

V. REFERENCES

Number	Name
7040	Medication - Standard Orders
10190	ICEMA Approved Skills

ADULT RESPIRATORY EMERGENCIES

CHRONIC OBSTRUCTIVE PULMONARY DISEASE

FIELD ASSESSMENT/TREATMENT INDICATORS

Symptoms of chronic pulmonary disease, wheezing, cough, pursed lip breathing, decreased breath sounds, accessory muscle use, anxiety, ALOC or cyanosis.

LIMITED ALS (LALS) INTERVENTIONS

- BLS Interventions
- Albuterol
- CPAP
- Airway management within scope

ALS INTERVENTIONS

- LALS Interventions
- Albuterol with Atrovent
- Endotracheal Intubation

ACUTE ASTHMA/BRONCHOSPASM/ALLERGIC REACTION/ANAPHYLAXIS

FIELD ASSESSMENT/TREATMENT INDICATORS

History of prior attacks, possible toxic inhalation or allergic reaction, associated with wheezing, diminished breath sounds or cough.

LIMITED ALS (LALS) INTERVENTIONS

- BLS Interventions
- Albuterol
- Inadequate tissue perfusion - IV bolus of 300 cc NS. May repeat once
- If no response to Albuterol, administer Epinephrine may repeat
- CPAP

ALS INTERVENTIONS

- LALS Interventions
- Albuterol, with Atrovent
- Possible allergic reaction, Diphenhydramine
- Severe anaphylactic shock, administer Epinephrine IV

ACUTE PULMONARY EDEMA/CHF

FIELD ASSESSMENT/TREATMENT INDICATORS

History of cardiac disease, including CHF, and may present with rales, occasional wheezes, jugular venous distention and/or peripheral edema.

LIMITED ALS (LALS) INTERVENTIONS

- BLS Interventions
- Nitroglycerine
- Albuterol
- CPAP

ALS INTERVENTIONS

- LALS Interventions
- Albuterol with Atrovent
- Radio communication failure (RCF), the following medications may be utilized:
    - Dopamine

REFERENCES

Number	Name
7040	Medication - Standard Orders
10190	ICEMA Approved Skills

ADULT RESPIRATORY EMERGENCIES

Provider Level	EMT	A-EMT	EMT-P
Scope of Practice	✓	✓	✓

Chronic Obstructive Pulmonary Disease

- Maintain Airway
- Oxygen

Treatment Indicators

- Wheezing
- Cough
- Pursed lip breathing
- Decreased breath sounds
- Accessory muscle use
- Anxiety
- Altered Level of Consciousness
- Cyanosis

- Airway Adjuncts as indicated within scope
- Albuterol
- CPAP

- Albuterol + Atrovent
- Advanced Airway as indicated

Acute Asthma Bronchospasm

Congestive Heart Failure Acute Pulmonary Edema

Inadequate Tissue Perfusion
IV bolus 300 cc NS (repeat)
No response to Albuterol
- Epinephrine

- Nitroglycerine

CAUTION
- **Rt Ventricular Infarction**
  Contact Base Hospital

Advanced Airway as indicated

Communication Failure
- Dopamine

Suspected Allergic Reaction
- Diphenhydramine

Documentation

- Chief Complaint/Provider Impression
- Assessment findings
- Treatment/Vital Signs
- Medications/Procedures

Contact Medical Control for treatment assistance

Transport

PROTOCOLS/POLICIES FOR 30-DAY COMMENT FORM

ICEMA Reference #s: 7010, 7020, 7040, 8020, 9130 (NEW)

DEADLINE TO SUBMIT COMMENTS: August 20, 2014, at 5:00 pm

PROTOCOL #	AGENCY	COMMENT	RESPONSE
7010 - BLS/LALS/ALS Standard Drug & Equipment List	AMR Rancho	Dextrose 25% 2.5 gm preload should either be removed with the addition of D10, or changed to an optional item during the transitional period. As written all three would be required.	Once MAC endorses D10% and establishes a transition date, EMS providers may continue to carry D50, D25 and/or D10 until their current stock of D50% and D25% have been depleted. During the transition period, EMS providers may carry reduced quantities of each as they reduce their quantities of D50 and D25 provided a minimum of 50 gm is available in combination of all concentrations. After the transition date, only D10% will be required. ICEMA will add a notation to the Drug and Equipment List noting the transition period and the allowances for carrying reduced quantities of D50 and D25.
	AMR Rancho	Dextrose 50% 25 gm preload should either be removed with the addition of D10, or changed to an optional item during the transitional period. As written all three would be required.	Once MAC endorses D10% and establishes a transition date, EMS providers may continue to carry D50, D25 and/or D10 until their current stock of D50% and D25% have been depleted. During the transition period, EMS providers may carry reduced quantities of each as they reduce their quantities of D50 and D25 provided a minimum of 75 gm is available in combination of all concentrations. After the transition date, only D10% will be required. ICEMA will add a notation to the Drug and Equipment List noting the transition period and the allowances for carrying reduced quantities of D50 and D25.
	AMR Rancho	Morphine Sulfate - vials of 10 mg should be either removed with the addition of Fentanyl or made optional during the transitional period. (in #7040 you can give either or, but 7010 shows both mandatory).As written both are required.	Once MAC endorses Fentanyl and the final date is set for the transition, ICEMA will allow one or the other narcotic to be carried but not both at the same time. A transition period for the change to Fentanyl will be established by MAC. ICEMA will add an asterisk (*) under Controlled

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PROTOCOL #	AGENCY	COMMENT	RESPONSE
7010 - BLS/LALS/ALS Standard Drug & Equipment List (continued)			Substance Medications - *EMS providers must stock either Fentanyl or Morphine but not both. Add a double asterisk (**) under Controlled Substances Medications - EMS providers must transition to Fentanyl by (date). The date will be determined by MAC.
	AMR Rancho	End Title CO2 Device - Pediatric and Adult should be listed as an optional item, not mandatory with the recent change to make Capnography a requirement within the region.	ETC02 is still considered a mandatory item for ALS providers unless a waiver is issued. MAC will consider this item at a future meeting.
	Colton FD	Dextrose 10%, Dextrose 25% and Dextrose 50% are all listed as required medications on standard drug and equipment list. Is this necessary to carry a minimum of 2 for each concentration of dextrose? The Colton Fire Department feels there are certain patient care situations where it might be beneficial to have the ability to push D50 (full arrest) and would like to have the ability to carry D50 as an option.	Once MAC endorses D10% and establishes a transition date, EMS providers may continue to carry D50, D25 and/or D10 until their current stock of D50% and D25% have been depleted. During the transition period, EMS providers may carry reduced quantities of each as they reduce their quantities of D50 and D25 provided a minimum of 50 gm is available in combination of all concentrations. After the transition date, only D10% will be required. ICEMA will add a notation to the Drug and Equipment List noting the transition period and the allowances for carrying reduced quantities of D50 and D25. The use of Dextrose 10% will be sufficient in these cases. With a large bore IV the time it takes to administer 250 ml will be sufficient. ICEMA will add a notation to the Drug and Equipment List noting the transition period.
	Colton FD	Is it required to carry both Fentanyl and MS? Currently, they are both listed as required on standard drug and equipment list. The Colton Fire Department has no issue in the change to Fentanyl from MS as long as there is a changeover period for	Once MAC endorses Fentanyl and the final date is set for the transition, ICEMA will allow one or the other narcotic to be carried but not both at the same time. A transition period for the change to Fentanyl will be established by MAC.

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PROTOCOL #	AGENCY	COMMENT	RESPONSE
7010 - BLS/LALS/ALS Standard Drug & Equipment List (continued)		training and budgeting.	ICEMA will add an asterisk (*) under Controlled Substance Medications - *EMS providers must stock either Fentanyl or Morphine but not both. Add a double asterisk (**) under Controlled Substances Medications - EMS providers must transition to Fentanyl by (date). The date will be determined by MAC.
	Ontario Airport FD	Page 3, Wall mounted suction device- BLS transport only. Non-transports cannot have those. Suggest a footnote stating such.	ICEMA will add footnote noting BLS transport only.
	Ontario Airport FD	Page 4, BP Cuffs. One of each or???	ICEMA will clarify one of each.
	Ontario Airport FD	Page 5. AED pads. Two adults? One adult one pediatric?	ICEMA will clarify one adult and one pediatric.
	Ontario Airport FD	Page 6. Does non-transport need ankle and wrist restraints? Bed pans or urinals?	Non-transport providers are required to carry restraints. Non-transport providers are not required to carry bedpans or urinals.
	Ontario Airport FD	Page 6. Non-transports do not carry gurneys, pillow case, sheets or gurney straps	Agree - Not required for non-transport providers.
	Ontario FD	Dextrose 10%, Dextrose 25% and Dextrose 50% are all listed as required medications on standard drug and equipment list. Is this necessary to carry a minimum of 2 for each concentration of dextrose? The Ontario Fire Department feels there are certain patient care situations in which it might be beneficial to have the ability to push D50 (full arrest) and would like to have the ability to carry D50 as an optional item.	Once MAC endorses D10% and establishes a transition date, EMS providers may continue to carry D50, D25 and/or D10 until their current stock of D50% and D25% have been depleted. During the transition period, EMS providers may carry reduced quantities of each as they reduce their quantities of D50 and D25 provided a minimum of 50 gm is available in combination of all concentrations. After the transition date, only D10% will be required. ICEMA will add a notation to the Drug and Equipment List noting the transition period and the allowances for carrying reduced quantities of D50 and D25. The use of Dextrose 10% will be sufficient in these cases. With a large bore IV the time it

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7010 - BLS/LALS/ALS Standard Drug & Equipment List (continued)			takes to administer 250 ml will be sufficient. ICEMA will add a notation to the Drug and Equipment List noting the transition period.
	Ontario FD	Is it required to carry both Fentanyl and Morphine Sulfate? Right now, they are both listed as required on standard drug and equipment list. The Ontario Fire Department has no issue in the change to Fentanyl from Morphine as long as there is a transitionary period for training and budget.	Once MAC endorses Fentanyl and the final date is set for the transition, ICEMA will allow one or the other narcotic to be carried but not both at the same time. A transition period for the change to Fentanyl will be established by MAC. ICEMA will add an asterisk (*) under Controlled Substance Medications - *EMS providers must stock either Fentanyl or Morphine but not both. Add a double asterisk (**) under Controlled Substances Medications - EMS providers must transition to Fentanyl by (date). The date will be determined by MAC.
	Rancho Cucamonga FD	Dextrose 10%, Dextrose 25% and Dextrose 50% are all listed as required medications on standard drug and equipment list. Is this necessary to carry a minimum of 2 for each concentration of dextrose? RCFD likes the ability to carry D10 and D50, but is it still necessary to carry D25 if we carry the other 2? We definitely support having the option to carry D50 and /or D10 since there are scenarios that either may be the preferred choice.	Once MAC endorses D10% and establishes a transition date, EMS providers may continue to carry D50, D25 and/or D10 until their current stock of D50% and D25% have been depleted. During the transition period, EMS providers may carry reduced quantities of each as they reduce their quantities of D50 and D25 provided a minimum of 50 gm is available in combination of all concentrations. After the transition date, only D10% will be required. ICEMA will add a notation to the Drug and Equipment List noting the transition period and the allowances for carrying reduced quantities of D50 and D25. The use of Dextrose 10% will be sufficient in these cases. With a large bore IV the time it takes to administer 250 ml will be sufficient.

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PROTOCOL #	AGENCY	COMMENT	RESPONSE
7010 - BLS/LALS/ALS Standard Drug & Equipment List (continued)			ICEMA will add a notation to the Drug and Equipment List noting the transition period.
	Rancho Cucamonga FD	RCFD will support whichever or both medications (fentanyl and MS), however we would like to see unified training implementation for fentanyl since it is new to the medics in this county. Is it required to carry both or does each agency have a choice as to which they carry?	Once MAC endorses Fentanyl and the final date is set for the transition, ICEMA will allow one or the other narcotic to be carried but not both at the same time. A transition period for the change to Fentanyl will be established by MAC. Fentanyl is part of the EMT-P Scope of Practice. ICEMA agrees that a unified training is appropriate and providers are encouraged to develop the training and share among EMS providers. ICEMA will add an asterisk (*) under Controlled Substance Medications - *EMS providers must stock either Fentanyl or Morphine but not both. Add a double asterisk (**) under Controlled Substances Medications - EMS providers must transition to Fentanyl by (date). The date will be determined by MAC.
	Redlands FD	We thought we were going only to Fentanyl? Morphine and Fentanyl are both listed on the required drug and equipment list.	Once MAC endorses Fentanyl and the final date is set for the transition, ICEMA will allow one or the other narcotic to be carried but not both at the same time. A transition period for the change to Fentanyl will be established by MAC. ICEMA will add an asterisk (*) under Controlled Substance Medications - *EMS providers must stock either Fentanyl or Morphine but not both. Add a double asterisk (**) under Controlled Substances Medications - EMS providers must transition to Fentanyl by (date). The date will be determined by MAC.

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7010 - BLS/LALS/ALS Standard Drug & Equipment List (continued)	Redlands FD	Are we still carrying D10, D25 and D50? They are all on the required standard drug list.	Once MAC endorses D10% and establishes a transition date, EMS providers may continue to carry D50, D25 and/or D10 until their current stock of D50% and D25% have been depleted. During the transition period, EMS providers may carry reduced quantities of each as they reduce their quantities of D50 and D25 provided a minimum of 50 gm is available in combination of all concentrations. After the transition date, only D10% will be required. ICEMA will add a notation to the Drug and Equipment List noting the transition period and the allowances for carrying reduced quantities of D50 and D25.
	Upland FD	Will Fentanyl be a replacement or an addition to the Controlled Substances? Suggest addition OR, a transition period.	Once MAC endorses Fentanyl and the final date is set for the transition, ICEMA will allow one or the other narcotic to be carried but not both at the same time. A transition period for the change to Fentanyl will be established by MAC. ICEMA will add an asterisk (*) under Controlled Substance Medications - *EMS providers must stock either Fentanyl or Morphine but not both. Add a double asterisk (**) under Controlled Substances Medications - EMS providers must transition to Fentanyl by (date). The date will be determined by MAC.
7020 - EMS Aircraft Standard Drug & Equipment List	Fort Irwin FD	Can we word the protocol to say that Either Morphine or Fentanyl and D10 or D50 & D25 are acceptable so that we don't have to carry all of them at once? This will allow us to use what we have and replace with the new items once expired or used up.	Once MAC endorses D10% and establishes a transition date, EMS providers may continue to carry D50, D25 and/or D10 until their current stock of D50% and D25% have been depleted. During the transition period, EMS providers may carry reduced quantities of each as they reduce their quantities of D50 and D25 provided a minimum of 50 gm is available in combination of

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PROTOCOL #	AGENCY	COMMENT	RESPONSE
7020 - EMS Aircraft Standard Drug & Equipment List (continued)			all concentrations. After the transition date, only D10% will be required. ICEMA will add a notation to the Drug and Equipment List noting the transition period and the allowances for carrying reduced quantities of D50 and D25. Once MAC endorses Fentanyl and the final date is set for the transition, ICEMA will allow one or the other narcotic to be carried but not both at the same time. A transition period for the change to Fentanyl will be established by MAC. ICEMA will add an asterisk (*) under Controlled Substance Medications - *EMS providers must stock either Fentanyl or Morphine but not both. Add a double asterisk (**) under Controlled Substances Medications - EMS providers must transition to Fentanyl by (date). The date will be determined by MAC.
	Upland FD Air Ops and SB Sheriff Air Medics	General comment: Specifying the concentration that we are required to carry makes it difficult in light of frequent medication shortages. Occasionally we carry different concentrations because it's the only concentration available from our suppliers. $MgSO_4$ is a prime example. We are currently unable to obtain 10 gm vials, and are carrying 5 gm vials. Rather than having to file an exception every time this occurs, why not maintain the current system of mandating the minimum amount and allow flexibility in the manner we carry it?	ICEMA has moved away from mandating specific concentrations and containers as long as the quantity is available to appropriately treat the patient. It is acceptable to carry two 5 gm vials to meet the requirement of 10 gm for $MgSO_4$. The only mandated amounts are narcotics with a maximum amount allowed.
	Upland FD Air Ops and SB Sheriff Air Medics	Adenosine- Why specify 6 mg vs 12 mg? Now required to carry two different strengths of the same medication.	The amounts required equal the doses normally administered. The requirement to carry both 6 mg and 12 mg is to reduce medication errors and to ensure that the 12 mg dose can be administered rapid IV push.

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7020 - EMS Aircraft Standard Drug & Equipment List (continued)	Upland FD Air Ops and SB Sheriff Air Medics	Adrenaline (Epinephrine) - It appears all concentrations of Epinephrine have been removed, as there are strikes through each line with the medication.	Adrenaline has not been removed; but was retitled and listed as Epinephrine.
	Upland FD Air Ops and SB Sheriff Air Medics	Albuterol- Infrequently utilized in the HEMS environment. Suggest decreasing to 3 doses, as this is the maximum number of doses allowed per patient	Agree - ICEMA will reduce the amount required for HEMS only.
	Upland FD Air Ops and SB Sheriff Air Medics	D10NS- This is a reasonable approach, and we appreciate the consideration of adding 10% Dextrose. What was the rationale for utilizing D10NS and not D10W? We prefer not to administer the additional sodium to these patients. In light of ongoing drug shortages, would you consider changing the verbage to D10W or D10NS? Additionally, there are logistic issues with the volume necessary to administer 25 grams in D10 versus a short IV push of D50. Suggest keeping one as optional.	ICEMA will change to D10W instead of D10 NS. Drug shortages can be handled through the normal waiver process. The regular waiver process can be used when shortages do occur. Current studies dispute this concern. The use of Dextrose 10% will be sufficient in these cases. With a large bore IV the time it takes to administer 250 ml will be sufficient.
	Upland FD Air Ops and SB Sheriff Air Medics	Dextrose 25% & 50%- So providers are now required to carry three different concentrations of Dextrose? Rather than limiting abilities versus mandating all three, strongly suggest maintaining a D10 *OR* D50. Another approach would be to mandate the number of grams required to be carried, and allow the providers to choose which method. For instance, mandate we carry 50 grams of dextrose in water. That would allow some flexibility that would work around anticipated drug shortages.	Once MAC endorses D10% and establishes a transition date, EMS providers may continue to carry D50, D25 and/or D10 until their current stock of D50% and D25% have been depleted. During the transition period, EMS providers may carry reduced quantities of each as they reduce their quantities of D50 and D25 provided a minimum of 50 grams is available in combination of all concentrations. After the transition date, only D10% will be required. ICEMA will add a notation to the Drug and Equipment list noting the transition period and the allowances for carrying reduced quantities of D50 and D25. The use of Dextrose 10% will be sufficient in

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7020 - EMS Aircraft Standard Drug & Equipment List (continued)			these cases. With a large bore IV the time it takes to administer 250 ml will be sufficient. ICEMA will add a notation to the Drug and Equipment List noting the transition period.
	Upland FD Air Ops and SB Sheriff Air Medics	Ipratopium Bormide-Suggest decreasing to three doses to match Albuterol comment above	Agree - ICEMA will reduce the amount required for HEMS only.
	Upland FD Air Ops and SB Sheriff Air Medics	Lidocaine viscous bottle- Suggest changing “bottle” to “dose.” Bottles are considerably larger than actually necessary for one patient, and must be disposed after opening. Tubes of viscous lidocaine are more user friendly, economical, and require less space.	Agree - ICEMA will change to dose with MAC endorsement.
	Upland FD Air Ops and SB Sheriff Air Medics	Nalaxone- Suggest deleting “needleless” as it is not specified in any other medication.	Agree - ICEMA will change by deleting needless with MAC endorsement.
	Upland FD Air Ops and SB Sheriff Air Medics	Normal Saline 500 mL and/or 1000 mL 4 liters of fluid seems excessive in light of decreased fluid administration. This adds significant weight and space concerns. Because of aircraft fueling necessity, it is rare that a provider would experience enough back-to-back calls to run out of NS without returning to quarters to refuel and restock. Typically the ground providers have initiated fluids, and additional fluids are not needed with every patient. Providers may elect to carry additional fluid, if desired. Suggest 2 liters.	Agree - ICEMA will change to 2 liters with MAC endorsement.
	Upland FD Air Ops and SB Sheriff Air Medics	ETT 4.0 to 5.5- Suggest deleting specification of uncuffed, as research is suggesting cuffed tubes in this population.	Pediatric cuffed ET tubes are a specialty program. The use of cuffed ET tubes for pediatric patients has not been approved for system-wide usage.

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7020 - EMS Aircraft Standard Drug & Equipment List (continued)	Upland FD Air Ops and SB Sheriff Air Medics	Small volume nebulizer-suggest decreasing number to one. Very infrequent usage in the HEMS environment. Highly unlikely to have back-to-back patients requiring breathing treatments that do not already have one initiated by ground providers.	Agree - ICEMA will change by reducing nebulizer to 1 with MAC endorsement.
	Upland FD Air Ops and SB Sheriff Air Medics	Yankauers- Brand name. Suggest changing to Rigid Tonsil Tip suction.	Agree - ICEMA will change by removing Yankeuers and changing to Rigid Tonsil Tip Suction device.
	Upland FD Air Ops and SB Sheriff Air Medics	IO Needles-Manual - Suggest moving to Optional Equipment to clarify necessity to carry	It is stated as optional equipment.
	Upland FD Air Ops and SB Sheriff Air Medics	Macrodrip Administration set-Suggest deleting 10 drops/mL as some providers might prefer to carry 15 or 20 drops/mL sets	Agree - ICEMA will change by deleting specific drops/ml with MAC endorsement.
	Upland FD Air Ops and SB Sheriff Air Medics	Syringes-Suggest moving 60 mL Cath tip to separate line, as it is not compatible with needles	Agree - ICEMA will change by moving 60 ml cath tip to a separate line with MAC endorsement.
	Upland FD Air Ops and SB Sheriff Air Medics	Optional Equipment-Suggest moving to below Dressing Materials to clarify there is more required equipment.	Agree - ICEMA will change with MAC endorsement.
	Upland FD Air Ops and SB Sheriff Air Medics	D5W- Why include this? It doesn't fit into any protocols	It is optional, for mixing Dopamine if premix not available.
	Upland FD Air Ops and SB Sheriff Air Medics	Cervical Collars & Head Immobilizing device- Suggest changing to one of each. We are decreasing the number of patients being placed in spinal protection, and most are already in protection by ground providers.	Agree - ICEMA will change by reducing cervical collars and head immobilizing devices to one each with MAC endorsement.
	Upland FD Air Ops and SB Sheriff Air Medics	Short extrication device - Suggest deleting. Current research shows that these devices are more harmful than previously thought. The likelihood of a HEMS unit utilizing an extrication device is highly improbable, as ground providers have advanced beyond this stage	Agree - ICEMA will change by deleting short extrication device with MAC endorsement.

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		when transferring care to the helicopter crew	
7020 - EMS Aircraft Standard Drug & Equipment List (continued)	Upland FD/Reach	Epinephrine is not on the list of medications. We suggest putting Epi back on the list. Suggest: consider making KED optional for air ambulance. Suggest: consider King airways OR, equivalent back up airway device. (Flight nurses with LMA in their skill set)	Adrenaline has not been removed; but was retitled and listed as Epinephrine. KED will be moved to optional. The Drug and Equipment List is for EMT-Ps, and LMA or other airways are not in their scope of practice.
7040 - Medication - Standard Orders	AMR Rancho	Dextrose - Adult (LALS) and Dextrose Adult (ALS) should follow the same format as the Dextrose - Pediatric (LALS, ALS) since the dose is the same.	ICEMA will change for consistency.
	AMR Rancho	D10 dosing should be consistent. The Pediatric dose is noted as a weight based calculation, vs the adult dose which is fluid based. I would suggest a dose of 5ml/kg vs 0.5 g/kg to maintain consistency with a volume based dose.	No change. Adult dosing is not weight based.
	AMR Rancho	Should Atrovent be single or multiple dose?	One time only. No repeat doses. ICEMA will clarify by adding Nebulized, one dose only, may be mixed with Albuterol.
	Colton FD	Dextrose - Adult (ALS) Is there a dose range in regards to IV administration of D10%? At what rate do we administer D10 (gtts/min)? Do you administer the entire amount on all patients?	It is titrated to effect. Recheck blood sugar when symptoms resolve. This should be part of the education.
	Colton FD	Epinephrine (1:1000)-Adult (ALS) The administration route of Epi has changed and is not listed in red. Can we change it so that it stands out?	This is an educational issue; this change was done in the last protocol review.
	Colton FD	Epinephrine (1:1000)-Pediatric (ALS) In the adult dose you list the indications for administration of epinephrine as *Acute Asthma, Bronchospasm, Allergic Reaction, and Anaphylaxis.* In the pediatric you only list *Allergic Reactions.* Aren't the indications the same for both pediatric and adults?	ICEMA will change adult and pediatric to read: Severe Bronchospasm, asthma attack pending respiratory failure, anaphylactic shock/severe allergic reaction.

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7040 - Medication - Standard Orders (continued)	Colton FD	Fentanyl-Adult (ALS) You state that Fentanyl may be used in place of Morphine? Is this available now or will we have the ability to carry either or?	Once MAC endorses Fentanyl and the final date is set for the transition, ICEMA will allow one or the other narcotic to be carried but not both at the same time. A transition period for the change to Fentanyl will be established by MAC.
	Colton FD	Morphine-Adult (ALS) You state that MS may be used in the place of Fentanyl. Is this available now or will we have the ability to carry either or?	Once MAC endorses Fentanyl and the final date is set for the transition, ICEMA will allow one or the other narcotic to be carried but not both at the same time. A transition period for the change to Fentanyl will be established by MAC. ICEMA will add an asterisk (*) under Controlled Substance Medications - *EMS providers must stock either Fentanyl or Morphine but not both. Add a double asterisk (**) under Controlled Substances Medications - EMS providers must transition to Fentanyl by (date). The date will be determined by MAC.
	Fort Irwin FD	Same as above. Instead of striking out D25/D50, change to either D10 or D25/50 to allow us to use up what we have.	Once MAC endorses D10% and establishes a transition date, EMS providers may continue to carry D50, D25 and/or D10 until their current stock of D50% and D25% have been depleted. During the transition period, EMS providers may carry reduced quantities of each as they reduce their quantities of D50 and D25 provided a minimum of 50 gm is available in combination of all concentrations. After the transition date, only D10% will be required. ICEMA will add a notation to the Drug and Equipment List noting the transition period and the allowances for carrying reduced quantities of D50 and D25.
	ICEMA	Use of “May be used in place of Morphine” and “May be used in place of Fentanyl” is not necessary.	Agree - ICEMA will remove reference. ICEMA will add an asterisk (*) under Controlled Substance Medications - *EMS providers must

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7040 - Medication - Standard Orders (continued)			stock either Fentanyl or Morphine but not both. Add a double asterisk (**) under Controlled Substances Medications - EMS providers must transition to Fentanyl by (date). The date will be determined by MAC.
	ICEMA	Lidocaine is listed incorrectly. Doses are confusing. The repeat dose for VT/VF and Refractory are the same. The repeat dose for VT/VF and the Refractory VF dose may cause Lidocaine Toxicity. Review AHA guidelines. Range for infusion is inconsistent, suggest change to 2 mg/min	ICEMA will delete VF/VT. ICEMA will change Lidocaine to: • Initial dose: 1.5 mg/kg IV/IO, • May administer an additional 0.75 mg/kg IV push, repeat once in five (5) to ten (10) minutes for refractory VF ICEMA will change infusion rate to 2 mg/min and remove reference to mcg/kg/min to be consistent with V-Tach, Wide Complex.
	Mammoth Hospital MICNs	All medications should include the name, dosage, route(s), time interval between doses, increments, max dose, and concentration, if indicated.	In most cases, the medications include the name, route, dose, indication and max dose. Other elements may be listed in the protocol. ICEMA will review and include additional elements as indicated in future protocol revisions.
	Mammoth Hospital MICNs	Epi for adult anaphylactic shock - what is the time interval between each 0.1mg SIVP dose	ICEMA will add time interval of five (5) minutes to dose.
	Mammoth Hospital MICNs	Fentanyl -Peds, is there a specific age range to administer? For the “IV” dose, include the IO route?	ICEMA will add IO as a route for all IV medications with dosing the same for both (except Adenosine).
	Mammoth Hospital MICNs	Ipratropium, Magnesium, Lidocaine indicate route for each entry to be consistent	Agree - ICEMA will change indicating route for clarification.
	Mammoth Hospital MICNs	Morphine - Adult - ALS…the first entry of 2mg IV q3min, max 10mg is for chest pain but no caption like isolated extremity/burns.	The initial entry is for the treatment of pain, other entries are exceptions to the standard dose.
	Mammoth Hospital MICNs	Morphine-Peds: no caption for the first entry	The initial entry is for the treatment of pain, other entries are exceptions to the standard dose.
	Mammoth Hospital MICNs	Shouldn’t isolated extremity trauma be included with the burns or is the first entry isolated extremity	The initial entry is for the treatment of pain, other entries are exceptions to the standard dose.

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7040 - Medication - Standard Orders (continued)		trauma? Need to have time intervals between each dose. Morphine IM dose "titrated for pain relief" - if more than one IM dose can be given what is the time interval for a repeat dose? For IV route, include IO.	
	Mammoth Hospital MICNs	Atropine for organophosphate poisoning: what is the time interval between each 2mg dose IVP?	Agree - ICEMA will make the necessary addition regarding timing for clarification.
	Mammoth Hospital MICNs	Dextrose Peds: can 5cc/kg be added to the dosing?	ICEMA will add (5 ml/kg IV/IO) following the gm dose.
	Mammoth Hospital MICNs	Dextrose Adult: 250cc D10 bag infused—what about a Diabetic CHF patient with wet lungs?	In the setting of symptomatic hypoglycemia, the 250 cc volume of D10% is not a concern.
	Mammoth Hospital MICNs	PTC, will it be the medics' discretion as to whether a patient receives MS or Fentanyl? Our ED typically does not use Fentanyl for CP cardiac patients. Will MS at some point be taken out of the protocols altogether if Fentanyl is primarily used?	Once MAC endorses Fentanyl and the final date is set for the transition, ICEMA will allow one or the other narcotic to be carried but not both at the same time. A transition period for the change to Fentanyl will be established by MAC.
	Mammoth Hospital MICNs	Lidocaine 2% for IO insertion-Is this a one-time dose?	Yes, one time dose for pain associated with IO insertion.
	Mammoth Hospital MICNs	Narcan-Peds-ALS/LALS: Why not combine LALS and ALS, it's the same? Do not exceed 0.5mg for the 1day-8yo.	ICEMA will combine LALS and ALS. Dose is 0.1 mg/kg with a maximum dose of 10 mg.
	Mammoth Hospital MICNs	Can it be repeated? Time interval between doses?	ICEMA will add the time and repetition rate for clarification.
	Mammoth Hospital MICNs	Routes of administration should be consistent IV/IO/IN.	ICEMA will make consistent by adding IV/IO/IN when appropriate.
	Ontario FD	Dextrose-Adult (ALS): Is there a dose range in regards to IV administration of D10%? At what rate do we administer the medication (gtts/min)? Do you administer the entire amount on all patients?	D10% is titrated to effect and relief of symptoms. Use of D10% will require education by the EMS provider.
	Ontario FD	Epinephrine (1:1000)-Adult (ALS) The administration route of Epinephrine is changed and not listed in red. Can we please document this change in red so that it stands out.	This is an educational issue and was previously changed in an earlier protocol update.
	Ontario FD	Epinephrine (1:1000)-Pediatric (ALS) In the adult dose you list the indications for	ICEMA will change adult and pediatric to read: Severe Bronchospasm, asthma attack pending

PROTOCOLS/POLICIES FOR 30-DAY COMMENT FORM

ICEMA Reference #s: 7010, 7020, 7040, 8020, 9130 (NEW)

DEADLINE TO SUBMIT COMMENTS: August 20, 2014, at 5:00 pm

PROTOCOL #	AGENCY	COMMENT	RESPONSE
7040 - Medication - Standard Orders (continued)		administration of epinephrine as *Acute Asthma, Bronchospasm, Allergic Reaction, Anaphylaxis.* Yet in the pediatric you only list *Allergic Reactions.* Shouldn't the indications be the same for both pediatric and adults?	respiratory failure, anaphylactic shock/severe allergic reaction.
	Ontario FD	Fentanyl-Adult (ALS) You state that Fentanyl may be used in place of Morphine? Is this available now? Will we have the ability to carry either or?	ICEMA will remove reference to "May be used in place of…". Once MAC endorses Fentanyl and the final date is set for the transition, ICEMA will allow one or the other narcotic to be carried but not both at the same time. A transition period for the change to Fentanyl will be established by MAC.
	Ontario FD	Morphine-Adult (ALS) You state that Morphine may be used in the place of Fentanyl. Is this available now? Will we have the ability to carry either or?	ICEMA will remove reference to "May be used in place of…". Once MAC endorses Fentanyl and the final date is set for the transition, ICEMA will allow one or the other narcotic to be carried but not both at the same time. A transition period for the change to Fentanyl will be established by MAC.
	Rancho Cucamonga FD	Epinephrine (1:1000)-Pediatric (ALS) Adult dose lists indications for administration of epinephrine as Acute Asthma, Bronchospasm, Allergic Reaction, Anaphylaxis. Pediatric only lists Allergic Reactions. Should they be the same?	ICEMA will change adult and pediatric to read: Severe Bronchospasm, asthma attack pending respiratory failure, anaphylactic shock/severe allergic reaction.
	San Antonio Community Hospital	MSO - The first section of the morphine reference is ambiguous. It's confusing because the other sections of morphine refer to treatment: example - isolated extremity, pacing, burns in the pediatric section. It reads that the medics can give morphine "whenever" for any pain is that true? Needs to be more specific. Maybe a "pain protocol" could help this issue, to treat patients with back pain, kidney stones etc. Chest pain should be added.	Medicating for pain with morphine is protocol driven. Morphine may not be administered for any pain, the protocols are specific.

PROTOCOLS/POLICIES FOR 30-DAY COMMENT FORM

ICEMA Reference #s: 7010, 7020, 7040, 8020, 9130 (NEW)

DEADLINE TO SUBMIT COMMENTS: August 20, 2014, at 5:00 pm

PROTOCOL #	AGENCY	COMMENT	RESPONSE
7040 - Medication - Standard Orders (continued)	San Antonio Community Hospital	MSO - Midazolam - needs clarification, especially in pediatric dose. It is confusing should be simple. It says max 3 doses - various routes - not to exceed adult dosage so no more than 2.5 or 5 mg. The dosage should coordinate with weight, like the Broslow tape. REMS has a nice tool for midazolam for pediatric dosages - simple to read. Attached is a copy of highlighted concerns regarding MSO and a copy of REMS calculation chart.	Total dose is dependent on the route administered. ICEMA will remove adult dose limitations from the pediatric IV/IO seizure dose. Dose is weight dependent and limited to three times not to exceed 2.5 or 5.0 mg depending on route.
	San Antonio Community Hospital	Dextrose 10% and D50 - would it be difficult for EMS providers to carry both?	The use of Dextrose 10% will be sufficient in situations where D50 would have been used. The same amount of Dextrose will be administered over only a slightly longer time.
	Upland FD Air Ops and SB Sheriff Air Medics	Dextrose Adult and Pediatric- Suggest changing to D10% W or NS. Also please consider keeping different concentrations to accommodate drug shortages and different situations (ex: Full arrest)	ICEMA will change to D10W. The use of Dextrose 10% will be sufficient in these cases.
	Upland FD Air Ops and SB Sheriff Air Medics	Dopamine- Change language in the adult dose to match that in the pediatric dose. “to maintain signs of adequate tissue perfusion” is more clinically appropriate than an arbitrary SBP	ICEMA will change for consistency.
	Upland FD Air Ops and SB Sheriff Air Medics	Fentanyl- Suggest increasing max dosage in burn patient. Clarify language in pediatric dose (single dose not to exceed adult dose of 50 mcg), and increase max dosage. Big teenagers may require large, more frequent doses.	Dosage will be determined by MAC.
	Upland FD Air Ops and SB Sheriff Air Medics	Ipratroprium- suggest changing to 0.25 mg nebulized to match language of albuterol	ICEMA will change for consistency.
	Upland FD Air Ops and SB Sheriff Air Medics	Lidocaine-intubation - “for suspected brain injury” suggest changing to suspected increased ICP.	ICEMA will change for consistency.

PROTOCOLS/POLICIES FOR 30-DAY COMMENT FORM

ICEMA Reference #s: 7010, 7020, 7040, 8020, 9130 (NEW)

DEADLINE TO SUBMIT COMMENTS: August 20, 2014, at 5:00 pm

PROTOCOL #	AGENCY	COMMENT	RESPONSE
7040 - Medication - Standard Orders (continued)	Upland FD Air Ops and SB Sheriff Air Medics	Lidocaine- Refractory v-fib- Which is it? Three doses or 3 mg? Three doses = 2.25mg/kg	ICEMA will change Lidocaine to: • Initial dose: 1.5 mg/kg IV/IO • May administer an additional 0.75 mg/kg IV push, repeat once in five (5) to ten (10) minutes for refractory VF ICEMA will change infusion rate to 2 mg/min and remove reference to mcg/kg/min to be consistent with V-Tach, Wide Complex.
	Upland FD Air Ops and SB Sheriff Air Medics	Lidocaine- VF/VT infusion- suggest utilizing one or the other. Depending on the patients weight, 1-4 mg/min may not be 30 - 50 mcg/kg/min. 50 kg vs 150 kg, for instance is 1.5 vs 4.5 mg/min. This also does not match the next line of 2 mg/min.	ICEMA will change infusion rate for VT/VF to 2 mg/min and remove reference to mcg/kg/min to be consistent with V-Tach, Wide Complex.
	Upland FD	Dextrose-Adult (ALS) Administer to affect	Agree - Will require education by the EMS provider.
	Upland FD	Epinephrine-Pediatric (ALS) use same indications as adult	The concentration of Epinephrine is different for treatment of pediatrics and that is why it is divided into different sections.
	Upland FD	Fentanyl-Pediatric-suggest maximum dose of IM/IN 1 mcg/kg not to exceed 100 mcg. 200 mcg seems excessive. If necessary add “Not to exceed adult dose”	Maximum dose is appropriate for pediatric patients that may be large enough to warrant the adult dose. The language is consistent for both adult and pediatric.
	Upland FD	We are in favor of carrying both Morphine and Fentanyl. Suggest language that states must choose one or the other medication per patient. Also suggest that if allowed to carry both, we decrease the mandatory minimum of MS from 60 mg to 40 mgs on each unit. Perhaps clarify usage of morphine and Fentanyl in 7040 using indications. (we recognize these are training issues as well)	Once MAC endorses Fentanyl and the final date is set for the transition, ICEMA will allow one or the other narcotic to be carried but not both at the same time. A transition period for the change to Fentanyl will be established by MAC. EMS Provider medical directors present at MAC were opposed to allowing both.
	Upland FD	Suggest training modules specific to the changes be created and taught prior to protocols being implemented. Hospital personnel are familiar with Fentanyl however, pre-hospital personnel are not	Fentanyl is part of the EMT-P scope of practice. ICEMA agrees that education by the EMS provider will be required. Education is a responsibility of the EMS provider

PROTOCOLS/POLICIES FOR 30-DAY COMMENT FORM

ICEMA Reference #s: 7010, 7020, 7040, 8020, 9130 (NEW)

DEADLINE TO SUBMIT COMMENTS: August 20, 2014, at 5:00 pm

PROTOCOL #	AGENCY	COMMENT	RESPONSE
7040 - Medication - Standard Orders (continued)		familiar with the drug, it's effects, side effects, half-life etc.	and they are encouraged to develop training and share with other EMS providers.
8020 - Critical Care Interfacility Transport		No comments received.	
9130 (DRAFT) - Procedures for EMS Monitoring of Multiple Patients (San Bernardino County Only)	Loma Linda University Medical Center	Under Procedure IV bullet point 5, can we add that during monitoring any changes and /or deterioration should be communicated to the appropriate hospital personnel (I know that this should be done automatically but we have had some cases that personnel of the hospital were not notified)?	Bullet 7 states "If patient's condition deteriorates, the EMS field personnel will notify ED staff immediately and transfer care to the hospital."
	Redlands Community Hospital	Bullet 2: Patients must be stable and not require any additional medications… What is the decision regarding cardiac monitoring? I think there should be a statement regarding cardiac monitoring here. Bullet 4: Patients may be on a cot. I am assuming that the cot referred to is a regular disaster cot, one without wheels. This should probably not be in the policy as cots do not have wheels and is a fire code violation. Hospitals can not violate fire code.	There is no intent to change requirements for patient monitoring. The EMS field personnel will need to determine whether patients require continuous cardiac monitoring. Patients requiring continuous cardiac monitoring should have their own dedicated EMS field personnel and/or be transferred to the care of the hospital. Patient may be placed on spare EMS gurneys or other appropriate devices that will allow adequate monitoring. It is not ICEMA's intent to violate any regulations or codes.
	Hospital Association of Southern California (HASC)	As proposed, HASC and San Bernardino County hospitals have serious policy and practical concerns with 9130. Those concerns include (as paraphrased from HASC's letter, dated August 19, 2014, below): • Lack of involvement of hospitals in activation the procedure. The procedure "may be activated only by the ALS transport provider and their supervisor in consultation with the EMS crews in the hospital"	• ICEMA is responsible to ensure the integrity of the EMS System and the adequate number of ambulances to respond to emergencies. Hospitals have full control over whether the procedures are used by accepting and transferring patients from the EMS gurney to the hospital as soon as the patients arrive.

PROTOCOLS/POLICIES FOR 30-DAY COMMENT FORM

ICEMA Reference #s: 7010, 7020, 7040, 8020, 9130 (NEW)

DEADLINE TO SUBMIT COMMENTS: August 20, 2014, at 5:00 pm

PROTOCOL #	AGENCY	COMMENT	RESPONSE
9130 (DRAFT) - Procedures for EMS Monitoring of Multiple Patients (San Bernardino County Only) (continued)		• Lack of substantiation or rationale for a 25 minute threshold for activation of this policy. What is the basis for this timeframe? Local hospitals understand that turnaround time is a priority for the EMS providers and the communities we serve. We are uncertain that the institution of what appears to be an arbitrary threshold for activating this policy is in the public's interest.	• The 25 minutes is the allowance that ICEMA subtracts when computing bed delay time. This timeframe is a long standing policy established through committee input and is considered an acceptable time allowance for providing patient report and offloading the patient to the hospital gurney.
		• Lack of clarity as to the qualifications of EMS crews to monitor multiple patients. The policy does not define nor limit the number of patients that an EMS crew member may oversee. It also does not set forth the qualifications or certifications of crewmembers overseeing the patients.	• EMT-Ps are licensed by the State of California to provide care while at the scene of a medical emergency or during transport, or during interfacility transfer. An EMT-P may perform any activity identified in the scope of practice as described in the California Code of Regulations, Title 22, Division 9. There is no stipulation for the maximum number of patients that an EMT-P may care for. EMT-Ps have specific training for treating multiple patients at the scene of multi-casualty incidents.
		• Hospitals have specific nurse patient ratios as required by law. We are uncertain as to an equivalent ratio for this policy.	• Hospital nurse to patient ratios do not apply to EMT-Ps. There is no equivalent ratio for EMT-Ps.
		• Absence of clarity as to the acuity of the patients being tended to by EMS crew members. This is important so that there is a match of the severity of a patients' condition with the qualifications of an EMS crew member to respond to patient's needs.	• The procedures states that "the patients must be stable and require no additional medications or procedures while being monitored by an EMS crew or until transferred to a hospital gurney under hospital care."

PROTOCOLS/POLICIES FOR 30-DAY COMMENT FORM

ICEMA Reference #s: 7010, 7020, 7040, 8020, 9130 (NEW)

DEADLINE TO SUBMIT COMMENTS: August 20, 2014, at 5:00 pm

PROTOCOL #	AGENCY	COMMENT	RESPONSE
9130 - Procedures for EMS Monitoring of Multiple Patients (San Bernardino County Only) (continued)		• Apparent lack of review by CDPH. Since the EMS crews will be operating in hospital emergency departments, CDPH may have input as to the qualifications and provider to patient ratios that must be applied to ensure safe patient care as well as additional concerns with this approach.	• Under current California Code of Regulations, Title 22, regulations, only a local EMS agency (LEMSA) and its medical director are able to establish policies and protocols regarding management of patients by EMS field personnel. CDPH is not the licensing or oversight agency for EMS field personnel. However, ICEMA is always appreciative of advisory input.
		• Potential shifts in liability exposure. Under this policy, the EMS providers, ICEMA and in turn the County might likely be assuming additional malpractice liability even if the policy could be tightened as alluded to above. Additionally, potentially places the hospital in a risk management situation, as any patient on their property is the responsibility of the facility. What type of indemnification will ICEMA offer for patients not properly monitored? There may be other legal aspects that need to be considered in this proposed policy.	• ICEMA believes that the entire responsibility and liability associated with the care of any EMS patient is shifted to the hospital, its staff and its physicians once the EMS crew arrives at the hospital. This is regardless of any time the EMS crew spends waiting to offload. Further, it is ICEMA's belief that extended bed delay in the hospitals potentially shifts liability exposure from hospitals to the EMS crew.

BLS/LALS/ALS STANDARD DRUG & EQUIPMENT LIST

Each ambulance and first responder unit shall be equipped with the following functional equipment and supplies. **This list represents mandatory items with minimum quantities** excluding narcotics, which must be kept within the range indicated. All expiration dates must be current. All packaging of drugs or equipment must be intact. No open products or torn packaging may be used.

All ALS (transport and non-transport) and BLS transport vehicles shall be inspected annually.

MEDICATIONS/SOLUTIONS

Exchanged Medications/Solutions	BLS	LALS	ALS Non-Transport	ALS Transport
Adenosine (Adenocard) 6mg			1	1
Adenosine (Adenocard) 12mg			2	2
Albuterol Aerosolized Solution (Proventil) - unit dose 2.5mg		4 doses	4 doses	4 doses
Albuterol MDI with spacer		Specialty programs only 1	Specialty programs only 1	Specialty programs only 1
Aspirin, chewable - 81mg tablet		2	1 bottle	1 bottle
Atropine 1 mg preload			2	2
Calcium Chloride 1gm preload			1	1
Dextrose 10% in 250ml NS		2	2	2
Dextrose 25% 2.5gm preload			2	2
Dextrose 50% 25gm preload		2	2	2
Diphenhydramine (Benadryl) 50mg			1	1
Dopamine 400mg			1	1
Epinephrine 1:1000 1mg		2	2	2
Epinephrine 1:10,000 1 mg preload			3	3
Glucagon 1mg		1	1	1
Glucose paste	1 tube	1 tube	1 tube	1 tube
Ipratropium Bromide Inhalation Solution (Atrovent) unit dose 0.5mg			4	4
Irrigating Saline and/or Sterile Water (1000cc)	2	1	1	2
Lidocaine 100mg			3	3
Lidocaine 1gm or 1 bag pre-mixed 1gm/250cc D5W			1	1
Lidocaine 2% (Viscous) bottle			1	1
Magnesium Sulfate 10 gm			1	1
Naloxone (Narcan) 2 mg preload (needle less)		2	2	2
Nitroglycerine - Spray 0.4 mg metered dose and/or			1	2

Exchanged Medications/Solutions	BLS	LALS	ALS Non-Transport	ALS Transport
tablets (tablets to be discarded 90 days after opening)		2		
Normal Saline for Injection (10 cc)		2	2	2
Normal Saline 100 cc			1	2
Normal Saline 250 cc			1	1
Normal Saline 500 ml and/or 1000 ml		2000 ml	3000 ml	6000 ml
Ondansetron (Zofran) 4 mg Oral Disintegrating Tablets (ODT)			4	4
Ondansetron (Zofran) 4 mg IM/ IV			4	4
Phenylephrine HCL - 0.5 mg per metered dose			1 bottle	1 bottle
Procainamide 1 gm			1	2
Sodium Bicarbonate 50 mEq preload			2	2
Verapamil 5 mg			3	3

CONTROLLED SUBSTANCE MEDICATIONS

Non-Exchange Controlled Substance Medications MUST BE DOUBLE LOCKED	BLS	LALS	ALS Non-Transport	ALS Transport
Fentanyl			200-400 mcg	200-400 mcg
Midazolam			20-40mg	20-40mg
Morphine Sulfate -vials of 10 mg			20-60mg	30-60mg

AIRWAY/SUCTION EQUIPMENT

Exchanged Airway/Suction Equipment	BLS	LALS	ALS Non-Transport	ALS Transport
BAAM Device			1	2
CPAP circuits - all manufacture's available sizes			1 each	2 each
End Title CO2 device - Pediatric and Adult (may be integrated into bag)			1 each	1 each
Endotracheal Tubes cuffed - 6.0 and/or 6.5, 7.0 and/or 7.5 and 8.0 and/or 8.5 with stylet			2 each	2 each
Endotracheal Tubes, uncuffed - 2.5, 3.0, 3.5 with stylet			2 each	2 each
Endotracheal Tubes, uncuffed - 4.0 or 4.5, 5.0 or 5.5 with stylet			2 each	2 each
ET Tube holders - pediatric and adult		1 each	1 each	2 each
King LTS-D Adult: Size 3 (yellow) Size 4 (red) Size 5 (purple)	SPECIALTY PROGRAMS ONLY 2 each	1 each	1 each	2 each
King Ped: 12-25 kg: Size 2 (green) 25-35 kg: Size 2.5 (orange)	SPECIALTY PROGRAMS ONLY 2 each	1 each	1 each	2 each
Mask - Adult & Pediatric non-rebreather oxygen mask	2 each	2 each	2 each	2 each

Exchanged Airway/Suction Equipment	BLS	LALS	ALS Non-Transport	ALS Transport
Mask - Infant Simple Mask	1	1	1	1
Nasal cannulas - pediatric and adult	2 each	2 each	2 each	2 each
Naso/Orogastric feeding tubes - 5fr or 6fr, and 8fr			1 each	1 each
Naso/Orogastric tubes - 10fr or 12fr, 14fr, 16fr or 18fr			1 each	1 each
Nasopharyngeal Airways - (infant, child, and adult)	1 each	1 each	1 each	1 each
Needle Cricothyrotomy Device - Pediatric and adult or Needles for procedure 10, 12, 14 and/or 16 gauge			1 each 2 each	1 each 2 each
One way flutter valve with adapter or equivalent			1	1
Oropharyngeal Airways - (infant, child, and adult)	1 each	1 each	1 each	1 each
Small volume nebulizer with universal cuff adaptor		2	2	2
Suction Canister	1		1	1
Suction catheters - 6fr, 8fr or 10fr, 12fr or 14fr	1 each		1 each	1 each
Ventilation Bags - Infant 250 ml Pediatric 500 ml (or equivalent) Adult	 1 1 1	 1 1 1	 1 1 1	 1 1 1
Water soluble lubricating jelly		1	1	1
Yankauers tonsil tip	1		1	1

Non-Exchange Airway/Suction Equipment	BLS	LALS	ALS Non-Transport	ALS Transport
Ambulance oxygen source -10 L /min for 20 minutes	1			1
Flashlight/penlight	1	1	1	1
Laryngeal blades - #0, #1, #2, #3, #4 curved and/or straight			1 each	1 each
Laryngoscope handle with batteries - or 2 disposable handles			1	1
Magill Forceps - Pediatric and Adult			1 each	1 each
Manual powered suction device		1		
Portable oxygen with regulator - 10 L /min for 20 minutes	1	1	1	1
Portable suction device (battery operated)	1		1	1
Pulse Oximetry device	(SEE OPTIONAL EQUIPMENT SECTION, PG. 5)	1	1	1
Stethoscope	1	1	1	1
Wall mount suction device	1			1

IV/NEEDLES/SYRINGES/MONITORING EQUIPMENT

Exchanged IV/Needles/Syringes/Monitor Equipment	BLS	LALS	ALS Non-Transport	ALS Transport
Conductive medium or Pacer/Defibrillation pads			2 each	2 each
Disposable Tourniquets		2	2	2
ECG electrodes			20	20
EZ-IO Needles and Driver 15 mm, 25 mm, and 45 mm			2 each 1 each	2 each 1 each
Glucose monitoring device with compatible strips and OSHA approved single use lancets		1	1	1
3-way stopcock with extension tubing			2	2
IV Catheters - sizes 14, 16, 18, 20, 22, 24		2 each	2 each	2 each
Macrodrip Administration Set (10 drops /cc) Microdrip Administration Set (60 drops /cc)		3 1	3 1	3 2
Mucosal Atomizer Device (MAD) for nasal administration of medication		2	2	4
Pressure Infusion Bag (disposable)		1	1	1
Razors		1	2	2
Safety Needles - 20 or 21gauge and 23 or 25 gauge		2 each	2 each	2 each
Saline Lock Large Bore Tubing Needless		2	2	2
Sterile IV dressing		2	2	2
Syringes w/wo safety needles - 1 cc, 3 cc, 10 cc catheter tip		2 each		
Syringes w/wo safety needles - 1 cc, 3 cc, 10 cc, 20 cc, 60 cc catheter tip			2 each	2 each

Non-Exchange IV/Needles/Syringes/Monitor Equipment	BLS	LALS	ALS Non-Transport	ALS Transport
12-lead ECG Monitor and Defibrillator with TCP and printout			1	1
Blood pressure cuff - large adult or thigh cuff, adult, child and infant	1	1	1	1
Capnography monitor and supplies, may be integrated in the cardiac monitor			1	1
Needle disposal system (OSHA approved)		1	1	1
Thermometer - Mercury Free with covers	1	1	1	1

OPTIONAL EQUIPMENT/MEDICATIONS

Non-Exchange Optional Equipment/Medications	BLS	LALS	ALS Non-Transport	ALS Transport
AED/defib pads	2	2		
Ammonia Inhalants			2	2

Non-Exchange Optional Equipment/Medications	BLS	LALS	ALS Non-Transport	ALS Transport
Automatic CPR device (FDA approved)	1	1	1	1
Automatic ventilator (ICEMA approved)			1	1
Backboard padding	1	1	1	1
Buretrol			1	1
Chemistry profile tubes			3	3
CyanoKit (Specialty Program Only)			1	1
EMS Tourniquet	1		1	1
Endotracheal Tubes, cuffed - 2.5, 3.0, 3.5 with stylet			Specialty programs only	Specialty programs only
Endotracheal Tubes, cuffed - 4.0 or 4.5, 5.0 or 5.5 with stylet			Specialty programs only	Specialty programs only
Gum Elastic intubation stylet			2	2
Hemostatic Dressings *	1	1	1	1
IO Needles - Manual, Adult and Pediatric, Optional		Pediatric sizes only or EZ-IO needles and drivers	1 each	1 each
IV infusion pump			1	1
IV warming device		1	1	1
Manual IV Flow Rate Control Device			1	1
Manual powered suction device	1	1	1	1
Multi-lumen peripheral catheter			2	2
Needle Thoracostomy Kit (prepackaged)			2	2
Pitocin			20 units	20 units
Pulse Oximetry device	1			
Translaryngeal Jet Ventilation Device			1	1
Vacutainer			1	1

* Hemostatic Dressings

- Quick Clot®, Z-Medica®
  - Quick Clot®, Combat Gauze® LE
  - Quick Clot®, EMS Rolled Gauze, 4x4 Dressing, TraumaPad®
- Celox®
  - Celox® Gauze, Z-Fold Hemostatic Gauze
  - Celox® Rapid, Hemostatic Z-Fold Gauze

Note:

- The above products are “packaged” in various forms (i.e., Z-fold, rolled gauze, trauma pads, 4”x4”pads) and are authorized provided they are comprised of the approved product.
- Hemostatic Celox Granules, or granules delivered in an applicator, are not authorized.

DRESSING MATERIALS/OTHER EQUIPMENT/SUPPLIES

Exchanged Dressing Materials/Other Equipment/Supplies	BLS	LALS	ALS Non-Transport	ALS Transport
Adhesive tape - 1 inch	2	2	2	2
Air occlusive dressing	1	1	1	1
Ankle & wrist restraints, soft ties acceptable	1		0	1
Antiseptic swabs/wipes		10	10	10
Bedpan or fracture pan Urinal	1 1			1 1
Cervical Collars - Rigid Pediatric & Adult all sizes or Cervical Collars - Adjustable Adult & Pediatric	2 each 2 each	2 each 2 each	2 each 2 each	2 each 2 each
Cold Packs	2	2	2	2
Emesis basin or disposable bags & covered waste container	1	1	1	1
Head immobilization device	2	2	2	2
OB Kit	1	1	1	1
Pneumatic or rigid splints capable of splinting all extremities	4	2	2	4
Provodine/Iodine swabs/wipes or antiseptic equivalent		4	10	10
Roller bandages - 4 inch	6	3	3	6
Sterile bandage compress or equivalent	6	2	2	6
Sterile gauze pads - 4x4 inch	4	4	4	4
Sterile Sheet for Burns	2	2	2	2
Universal Dressing 10x30 inches	2	2	2	2

Non-Exchange Dressing Materials/Other Equipment/Supplies	BLS	LALS	ALS Non-Transport	ALS Transport
800 MHz Radio		1	1	1
Ambulance gurney	1			1
Bandage Shears	1	1	1	1
Blood Borne Pathogen Protective Equipment - (nonporous gloves, goggles face masks & gowns meeting OSHA Standards)	2	1	2	2
Drinkable water in secured plastic container or equivalent	1 gallon			1 gallon
Long board with restraint straps	1	1	1	1
Pediatric immobilization board	1	1	1	1
Pillow, pillow case, sheets & blanket	1 set			1 set
Short extrication device	1	1	1	1
Straps to secure patient to gurney	1 set			1 set
Traction splint	1	1	1	1
Triage Tags - CAL Chiefs or ICEMA approved	20	20	20	20

EMS AIRCRAFT STANDARD DRUG & EQUIPMENT LIST

Each Aircraft shall be equipped with the following functional equipment and supplies. This list represents mandatory items with minimum quantities, to exclude narcotics, which must be kept within the range indicated. All expiration dates must be current. All packaging of drugs or equipment must be intact. No open products or torn packaging may be used.

MEDICATIONS/SOLUTIONS	AMOUNT
Adenosine (Adenocard) 6 mg	1~~30 mg~~
Adenosine (Adenocard) 12 mg~~Adrenaline (Epinephrine) 1:1,000~~	2~~2 mg~~
~~Adrenaline (Epinephrine) 1:10,000~~	3 mg
Albuterol Aerosolized Solution (Proventil) - unit dose 2.5 mg	4 doses
Aspirin, chewable - 81 mg tablet	1 bottle
Atropine 1 mg preload	2 ~~3 mg~~
Calcium Chloride 1 gm preload	1~~1 gm~~
Dextrose 10% in 250ml NS	2
Dextrose 25% 2.5 gm preload	2 ~~5 gm~~
Dextrose 50% 25 gm preload	2 ~~50 gm~~
Diphenhydramine (Benadryl) 50 mg	1 ~~50 mg~~
Dopamine 400 mg	1
Glucagon 1 mg	1 ~~1 mg~~
Glucopaste	1 tube
~~Intropin (Dopamine)~~	~~200 mg~~
Ipratropium Bromide Inhalation Solution (Atrovent) unit dose 0.5 mg	4
Lidocaine 100 mg	3~~300 mg~~
Lidocaine 1 gm or 1 bag pre-mixed 1 gm/250 cc D5W	1 gm
Lidocaine 2% (Viscous) bottle	1 ~~2~~
Magnesium Sulfate 10 gms	1~~10 gms~~
Naloxone (Narcan) 2 mg preload (needleless)	2 ~~4 mg~~
Nitroglycerin - Spray 0.4 mg metered dose and/or tablets (tablets to be discarded 90 days after opening.)	1
Normal Saline for Injection (10 cc)	2
Normal Saline 250 ml	1
Normal Saline 500 ml and/or 1000 ml	4000 ml
Ondansetron (Zofran) 4 mg Oral Disintegrating Tablets (ODT)	4
Ondansetron (Zofran) 4 mg IM/ IV	4
Phenylephrine HCL - 0.5 mg per metered dose	1 bottle
Procainamide 1 gm	1 ~~1 gm~~
Sodium Bicarbonate 50 mEq preload	2 ~~100 mEq~~
Verapamil 5 mg ~~(Isoptin)~~	3 ~~15 mg~~

CONTROLLED SUBSTANCE MEDICATIONS-MUST BE DOUBLE LOCKED	AMOUNT
Fentanyl	200-400 mcg
Midazolam	20-40 mg
Morphine Sulfate - vials 10 mg	20-60 mg

AIRWAY/SUCTION EQUIPMENT	AMOUNT
Aircraft Oxygen source -10 L /min for 20 minutes	1
BAAM Device	1
C-PAP circuits - all manufacture's available sizes	1 each
End-title CO2 device - pediatric and adult (may be integrated into bag)	1 each
Endotracheal tubes, uncuffed - 2.5, 3.0, 3.5 with stylet	2 each
Endotracheal Tubes, uncuffed - 4.0 or 4.5, 5.0 or 5.5 with stylet	2 each
Endotracheal Tubes cuffed - 6.0 and/or 6.5, 7.0 and/or 7.5 and 8.0 and/or 8.5 with stylet	2 each
ET Tube holders - pediatric and adult	1 each
Flashlight/penlight	1
King LTS-D Adult: Size 3 (yellow) Size 4 (red) Size 5 (purple)	1 each
King Ped: 12-25 kg: Size 2 (green) 25-35 kg: Size 2.5 (orange)	1 each
Laryngoscope handle with batteries - or 2 disposable handles	1
Laryngeal blades - #0, #1, #2, #3, #4 curved and/or straight	1 each
Magill Forceps - Pediatric and Adult	1 each
Nasal Cannulas - infant, pediatric and adult	2 each
Naso/Orogastric tubes - 10fr or 12fr, 14fr, 16fr or 18fr	1 each
Naso/Orogastric feeding tubes - 5fr or 6fr, and 8fr	1 each
Nasopharyngeal Airways - infant, child, and adult	1 each
Needle Cricothyrotomy Device (Approved) - Pediatric and adult *or* Needles for procedure 10, 12, 14 and/or16 gauge	1 each 2 each
Non Re-Breather O_2 Mask - Pediatric and Adult, Infant Simple Mask	2 each
One way flutter valve with adapter or equivalent	1
Oropharyngeal Airways - infant, child, and adult	1 each
Portable Oxygen with regulator - 10 L /min for 20 minutes	1
Portable suction device (battery operated) *and/or* Wall mount suction device	1 each
Pulse Oximetry device	1
Small volume nebulizer with universal cuff adaptor	2
Stethoscope	1
Suction catheters - 6fr, 8fr or 10fr, 12fr or 14fr	1 each
Ventilation Bags - Infant 250 ml, Pediatric 500 ml and Adult 1 L	1 each
Water soluble lubricating jelly	1
Yankauers tonsil tip	1

IV/NEEDLES/SYRINGES/MONITORING EQUIPMENT	AMOUNT
12-Lead ECG Monitor and Defibrillator with TCP and printout	1
800 MHz Radio	1
Blood pressure cuff - large adult or thigh cuff, adult, child and infant	1 set
Capnography monitor and supplies, may be integrated in the cardiac monitor	1
Conductive medium *or* Adult and Pediatric Pacer/Defibrillation pads	2 each
ECG - Pediatric and Adult	20 patches
EZ IO Needles and Driver 15 mm, 25 mm, and 45 mm	2 each 1 each
3-way stopcock with extension tubing	2
IO Needles - Manual, Adult and Pediatric, Optional	1 each
IV Catheters - sizes 14, 16, 18, 20, 22, 24	2 each
Glucose monitoring device	1
Macrodrip Administration Set (10 drops/ml) Microdrip Administration Set (60 drops/ml)	3 1
Mucosal Atomizer Device (MAD) for nasal administration of medication	4
Needle disposal system (OSHA approved)	1
Pressure infusion bag	1
Safety Needles - 20 or 21 gauge and 23 or 25 gauge	2 each
Saline Lock	2
Syringes w/wo safety needles - 1 ml, 3 ml, 10 ml, 20 ml, 60 ml catheter tip	2 each
Thermometer - Mercury free with covers	1

OPTIONAL EQUIPMENT/MEDICATIONS	Amount
Ammonia Inhalants	2
Automatic ventilator (Approved)	1
Backboard padding	1
BLS AED/defib pads	1
Chemistry profile tubes	3
CyanoKit (Specialty Program Only)	Specialty programs only
D5W in bag	1
Endotracheal tubes, cuffed - 2.5, 3.0, 3.5 with stylet	Specialty programs only
Endotracheal Tubes, cuffed - 4.0 or 4.5, 5.0 or 5.5 with stylet	Specialty programs only
Hemostatic Dressing *	1
IV infusion pump	1
IV warming device	1
Manual powered suction device	1
Medical Tourniquet	1
Needle Thoracostomy Kit (prepackaged)	2
Pitocin	2
Translaryngeal Jet Ventilation Device	1
Vacutainer	1

* Hemostatic Dressings

- Quick Clot®, Z-Medica®
  - Quick Clot®, Combat Gauze® LE
  - Quick Clot®, EMS Rolled Gauze, 4x4 Dressing, TraumaPad®
- Celox®
  - Celox® Gauze, Z-Fold Hemostatic Gauze
  - Celox® Rapid, Hemostatic Z-Fold Gauze

Note:

- The above products are "packaged" in various forms (i.e., Z-fold, rolled gauze, trauma pads, and 4"x4" pads) and are authorized provided they are comprised of the approved product.
- Hemostatic Celox Granules, or granules delivered in an applicator, are not authorized.

DRESSING MATERIALS/OTHER EQUIPMENT SUPPLIES	AMOUNT
Adhesive tape - 1 inch	2
Air occlusive dressing	1
Aircraft stretcher or litter system with approved FAA straps that allows for Axial Spinal Immobilization	1
Ankle & wrist restraints, soft ties acceptable	1
Antiseptic swabs/wipes	
Bandage Shears	1
Blanket or sheet	2
Blood Borne Pathogen Protective Equipment - (nonporous gloves, goggles face masks & gowns meeting OSHA Standards)	2
Cervical Collars - Rigid Pediatric & Adult all sizes *or* Cervical Collars - Adjustable Adult & Pediatric	2 each 2 each
Emesis basin or disposable bags & covered waste container	1
Head immobilization device	2
OB Kit	1
Pediatric immobilization board	1
Pneumatic or rigid splints capable of splinting all extremities	4
Provodine/Iodine swabs/wipes or antiseptic equivalent	
Roller bandages - 4 inch	3
Short extrication device	1
Sterile bandage compress or equivalent	6
Sterile gauze pads - 4x4 inch	4
Sterile Sheet for Burns	2
Traction splint	1
Universal Dressing 10x30 inches	2

MEDICATION - STANDARD ORDERS

Adenosine (Adenocard) - Adult (ALS)

Stable narrow-complex SVT or Wide complex tachycardia:

Adenosine, 6 mg rapid IVP followed immediately by 20 cc NS bolus, and
Adenosine, 12 mg rapid IVP followed immediately by 20 cc NS bolus if patient does not convert. May repeat one (1) time.

Reference #s 7010, 7020, 11050

Albuterol Aerosolized Solution (Proventil) - Adult (LALS, ALS)

Albuterol nebulized, 2.5 mg, may repeat two (2) times.

Reference #s 6090, 7010, 7020, 11010, 11100, 14030

Albuterol Metered-Dose Inhaler (MDI) (Proventil) - Specialty Programs Only Adult (LALS, ALS)

Albuterol MDI, four (4) puffs every ten (10) minutes for continued shortness of breath and wheezing.

Reference #s 6090, 6110, Sheriff's Search and Rescue

Albuterol - Pediatric (LALS, ALS)

Albuterol nebulized, 2.5 mg, may repeat two (2) times.

Reference #s 7010, 7020, 14010, 14030, and 14070

Aspirin, chewable (LALS, ALS)

Aspirin, 325 mg PO chewed (one (1) adult non-enteric coated aspirin) or four (4) chewable 81 mg aspirin.

Reference #s 2020, 6090, 6110, 7010, 7020, 11060

Atropine (ALS)

Atropine, 0.5 mg IVP. May repeat every five (5) minutes up to a maximum of 3 mg or 0.04 mg/kg.

Organophosphate poisoning:

Atropine, 2 mg IVP, repeat at 2 mg increments if patient remains symptomatic.

Reference #s 6090, 6110, 7010, 7020, 11040, 12020, 13010

Calcium Chloride (ALS)

Calcium Channel Blocker Poisonings:

Calcium Chloride, 1 gm (10 cc of a 10% solution), base hospital order only.

Reference #s 2020, 7010, 7020, 13010

Dextrose - Adult (LALS)

~~Dextrose 50% 25 gm IV of 50%~~
Dextrose 10%/250 cc NS IV Bolus

Reference #s 2020, 6090, 6110, 7010, 7020, 8010, 11050, 11070, 11080, 13020, 13030

Dextrose - Adult (ALS)

~~Dextrose 50% 25 gm IV/IO of 50%~~
Dextrose 10%/250 cc NS IV Bolus

Reference #s 2020, 6090, 6110, 7010, 7020, 8010, 11050, 11070, 11080, 13020, 13030

Dextrose - Pediatric (LALS, ALS)

~~For neonates (0 - 4 weeks), if blood glucose < 35 mg/dL:~~
~~Dextrose 25% (0.25 gm/ml) Diluted 1:1, give 0.5 gm/kg (4 ml/kg) IV/IO~~

~~For patient < 10 kg and > 4 weeks, if blood glucose < 60 mg/dL:~~
~~Dextrose 25% (0.25 gm/ml), give 0.5 gm/kg (2 ml/kg) IV/IO~~

~~For patient > 10 kg and < 25kg, if glucose less than 60 mg/dL:~~
~~Dextrose 50% (0.5 gm/mL) Diluted 1:1, give 0.5 gm/kg (2 ml/kg) IV/IO~~

~~For patient > 25 kg, if glucose less than 80 mg/dL:~~
~~Dextrose 50% (0.5 gm/mL) Diluted 1:1, give 0.5 gm/kg (2 ml/kg) IV/IO~~
Dextrose 10%/250 cc (25 g) 0.5 g/kg IV/IO

Reference #s 2020, 7010, 7020, 13020, 13030, 14040, 14050, 14060

Diphenhydramine - Adult (ALS)

Diphenhydramine, 25 mg IV/IO
Diphenhydramine, 50 mg IM

Reference #s 6090, 6110, 7010, 7020, 11010, 13010

Diphenhydramine - Pediatric (ALS)

Diphenhydramine, 1 mg/kg slow IV/IO, not to exceed adult dose of 25 mg, or
Diphenhydramine, 2 mg/kg IM not to exceed adult dose of 50 mg IM

Reference #s 7010, 7020, 14030

Dopamine - Adult (ALS)

Dopamine, infusion of 400 mg in 250 ml of NS, titrated between 5 - 20 mcg/kg/min to sustain a systolic blood pressure greater than 90 mmHG for signs of inadequate tissue perfusion/shock.

Reference #s 7010, 7020, 8010, 8040, 10140, 11070, 11090, 14080

Dopamine - Pediatric (ALS)

Post resuscitation continued signs of inadequate tissue perfusion:

9 to 14 years	Dopamine, 400 mg in 250 ml of NS to infuse at 5 - 20 mcg/kg/min IV titrated to maintain signs of adequate tissue perfusion.

Reference #s 7010, 7020, 14040

Epinephrine (1:1000) - Adult (LALS, ALS)

Acute Asthma, Bronchospasm, Allergic reaction, Anaphylaxis:
Epinephrine, 0.3 mg IM

Epinephrine (1:10,000) - Adult (ALS)

For Persistent severe anaphylactic shock:
Epinephrine (1:10,000), 0.1 mg slow IVP. May repeat as needed to total dosage of 0.5 mg.

Cardiac Arrest, Asystole, PEA:
Epinephrine, 1 mg IV/IO

Reference #s 2020, 6090, 6110, 7010, 7020, 11010, 11070, 12020

Epinephrine (1:1000) - Pediatric (LALS, ALS)

Allergic Reactions:

Epinephrine, 0.01 mg/kg IM not to exceed adult dosage of 0.3 mg.

Reference #s 2020, 6090, 7010, 7020, 11010, 14010, 14030

Epinephrine (1:10,000) - Pediatric (ALS)

Anaphylactic Shock (no palpable radial pulse and depressed level of consciousness):

Epinephrine (1:10,000), 0.01 mg/kg IV/IO, no more than 0.1 mg per dose. May repeat to a maximum of 0.5 mg.

Cardiac Arrest:

1 day to 8 years	Epinephrine (1:10,000), 0.01 mg/kg IV/IO (do not exceed adult dosage)
9 to 14 years	Epinephrine (1:10,000), 1.0 mg IV/IO

Newborn Care:

Epinephrine (1: 10,000), 0.01mg/kg IV/IO if heart rate is less than 60 after one (1) minute after evaluating airway for hypoxia and assessing body temperature for hypothermia.

Epinephrine (1:10,000), 0.005 mg/kg IV/IO every ten (10) minutes for persistent hypotension as a base hospital order or in radio communication failure.

Post resuscitation continued signs of inadequate tissue perfusion:

1 day to 8 years	Epinephrine (1:10,000), 0.5 mcg/kg/min IV drip

Reference #s 2020, 7010, 7020, 14030, 14040, 14090

Fentanyl - Adult (ALS) May be used in place of Morphine

Fentanyl, 50 mcg slow IVP over one (1) minute. May repeat every five (5) minutes until a maximum dose of 200 mcg is administered.

Fentanyl, 100 mcg IM/IN. May repeat 50 mcg every ten (10) minutes until a maximum dose of 200 mcg is administered.

Isolated Extremity Trauma, Burns:

Fentanyl, 50 mcg slow IV push over one (1) minute. May repeat in five (5) minutes, not to exceed 200 mcg IV, **or**

Fentanyl, 100 mcg IM/IN. May repeat 50 mcg every ten (10) minutes, not to exceed 200 mcg.

Pacing, synchronized cardioversion:

Fentanyl, 50 mcg slow IVP over one (1) minute. May repeat in five (5) minutes titrated to pain, not to exceed 200 mcg.

Fentanyl, 100 mcg IN. May repeat 50 mcg every ten (10) minutes titrated to pain, not to exceed 200 mcg.

Fentanyl - Pediatric (ALS) May be used in place of Morphine

Fentanyl, 0.5 mcg/kg slow IVP over one (1) minute. May repeat in five minutes titrated to in, not to exceed 100 mcg.

Fentanyl, 1,mcg/kg IM/IN, may repeat every ten minutes titrated to pain not to exceed 200 mcg.

Reference #s 2020, 6090, 6110, 7010, 7020, 7030, 9120, 10110 10120, 11060, 11100, 13030, 15010

Glucose - Oral - Adult (BLS, LALS, ALS)

Glucose - Oral, one (1) tube for patients with an intact gag reflex and hypoglycemia.

Reference #s 7010, 7020, 11080, 11090, 11110, 13020

Glucose - Oral - Pediatric (BLS, LALS, ALS)

Glucose - Oral, one (1) tube for patients with an intact gag reflex and hypoglycemia.

Reference #s 7010, 7020, 14050, 14060

Glucagon - Adult (LALS, ALS)

Glucagon, 1 mg IM/SC/IN, if unable to establish IV. May administer ~~give~~ one (1) time only.

Betablocker Poisoning:

Glucagon, 1 mg IVP (base hospital order only)

Reference #s 6090, 6110, 7010, 7020, 11080, 13010, 13030

Glucagon - Pediatric (LALS, ALS)

Glucagon, 0.025 mg/kg IM/IN, if unable to start an IV. May be repeated one (1) time after twenty (20) minutes for a combined maximum dose of 1 mg.

Reference #s 7010, 7020, 13030, 14050, 14060

Ipratropium Bromide Inhalation Solution (Atrovent) - Adult (ALS) use with Albuterol

Atrovent, 0.5 mg

Reference #s 7010, 7020, 11010, 11100

Ipratropium Bromide Metered-Dose Inhaler (MDI) (Atrovent) - Specialty Programs Only Adult (ALS) use with Albuterol

Atrovent MDI, four (4) puffs every ten (10) minutes for continued shortness of breath and wheezing.

Reference #s 6090, 6110, 7010, 7020

Ipratropium Bromide Inhalation Solution (Atrovent) - Pediatric (ALS) use with Albuterol

1 day to 12 months	Atrovent, 0.25 mg
1 year to 14 years	Atrovent, 0.5 mg

Reference #s 7010, 7020, 14010, 14030, 14070

Lidocaine - Adult (ALS)

Intubation, King Airway, NG/OG, for suspected brain injury:
Lidocaine, 1.5 mg/kg IV

VT/VF:
Lidocaine, 1.5 mg/kg
Repeat 0.75 mg/kg every five (5) to ten (10) minutes; maximum total dose of 3 mg/kg.

Refractory VF:
Lidocaine, 0.75 mg/kg IV, repeat in five (5) to ten (10) minutes; maximum three (3) doses or total of 3 mg/kg.

VT/VF Infusion:
Lidocaine, 1 - 4 mg/min (30 - 50 mcg/kg/min)

V-Tach, Wide Complex Tachycardias:
Lidocaine, 1 mg/kg slow IV, repeat at 0.5 mg/kg every ten (10) minutes until maximum dose of 3 mg/kg administered~~given~~.

Initiate infusion of Lidocaine 2 mg/min.

Reference #s 2020, 6090, 7010, 7020, 8010, 8040, 10030, 10080, 11050, 11070, 15010

Lidocaine - Pediatric (ALS)

Intubation, King Airway, NG/OG, for suspected brain injury:
Lidocaine, 1.5 mg/kg IV

Cardiac Arrest:

1 day to 8 years	Lidocaine, 1.0 mg/kg IV/IO
9 to 14 years	Lidocaine, 1.0 mg/kg IV/IO

May repeat Lidocaine at 0.5 mg/kg after five (5) minutes up to total of 3.0 mg/kg.

Reference #s 2020, 7010, 7020, 14040

Lidocaine 2%

Pain associated with IO insertion:
Lidocaine 2%, 0.5 mg/kg slow IO push not to exceed 50 mg total.

Reference #s 2020, 7010, 7020, 10140

Magnesium Sulfate (ALS)

Polymorphic Ventricular Tachycardia:
Magnesium Sulfate, 2 gm in 100 ml of NS over five (5) minutes for polymorphic VT if prolonged QT is observed during sinus rhythm post-cardioversion.

Eclampsia (Seizure/Tonic/Clonic Activity):
Magnesium Sulfate, 4 gm diluted with 20 ml NS, IV/IO slow IV push over three (3) to four (4) minutes.

Magnesium Sulfate, 2 gm in 100 cc of NS at 30 cc per hour IV/IO to prevent continued seizures.

Reference #s 2020, 7010, 7020, 8010, 14080

Midazolam - Adult (ALS)

Seizure:
Midazolam, 2.5 mg IN/IV/IO. May repeat in five (5) minutes for continued seizure activity, or

Midazolam, 5 mg IM. May repeat in ten (10) minutes for continued seizure activity.

Assess patient for medication related reduced respiratory rate or hypotension.

Maximum of three (3) doses using any combination of IM/IN/IV/IO may be administeredgiven for continued seizure activity. Contact base hospital for additional orders and to discuss further treatment options.

Pacing, synchronized cardioversion:

Midazolam, 2 mg slow IV push IV/IN

Reference #s 6090, 6110, 7010, 7020, 10110, 10120, 11080, 13020, 14080

Midazolam - Pediatric (ALS)

Seizures:

Midazolam, 0.1 mg/kg IV/IO with maximum dose 2.5 mg. May repeat Midazolam in five (5) minutes. Do not to exceed adult dosage, or

Midazolam, 0.2 mg/kg IM/IN with maximum dose of 5 mg. May repeat Midazolam in ten (10) minutes for continued seizure. Do not to exceed adult dosage. IN dosage of Midazolam is doubled due to decreased surface area of nasal mucosa resulting in decreased absorption of medication.

Assess patient for medication related reduced respiratory rate or hypotension.

Maximum of three (3) doses using any combination of IM/IN/IV/IO may be administeredgiven for continued seizure activity. Contact base hospital for additional orders and to discuss further treatment options.

Reference #s 7010, 7020, 14060

Morphine Sulfate - Adult (ALS) May be used in place of Fentanyl

Morphine Sulfate, 2 mg IV. May repeat in 2 mg increments every three (3) minutes, not to exceed 10 mg IV.

Isolated Extremity Trauma, Burns:

Morphine Sulfate, 5 mg IV. May repeat every five (5) minutes to a maximum of 20 mg for adequate tissue perfusion, or

Morphine Sulfate, 10 mg IM.

Pacing, synchronized cardioversion:

Morphine Sulfate, 2 mg IV. May repeat in 2 mg increments every three (3) minutes, titrated to pain, not to exceed 10 mg IV.

Reference #s 2020, 6090, 6110, 7010, 7020, 7030, 9120, 10110 10120, 11060, 11100, 13030, 15010

Morphine ~~Sulfate~~ - Pediatric (ALS)

Morphine ~~Sulfate~~, 0.1 mg/kg IV not to exceed 2 mg increments, for a total of 5 mg, or
Morphine ~~Sulfate~~, 0.2 mg/kg IM for a total of 10 mg IM, titrated for pain relief

Burns:
Morphine ~~Sulfate~~, 0.1 mg/kg IV not to exceed 5 mg increments, for a total of 20 mg, or

Morphine ~~Sulfate~~, 0.2 mg/kg IM for a total of 10 mg IM, titrated for pain relief

Reference #s 2020, 7010, 7020, 7030, 14070, 15020

Naloxone (Narcan) - Adult (LALS, ALS)

Resolution of respiratory depression related to suspected narcotic overdose:
Naloxone, 0.5 mg IV/IM/IN may repeat Naloxone 0.5 mg IV/IM/IN every two (2) to three (3) minutes if needed.

Do not exceed 10 mg of Naloxone total regardless of route administered~~given~~.

Reference #s 6110, 7010, 7020, 11070, 11080

Naloxone (Narcan) - Pediatric (LALS)

Resolution of respiratory depression related to suspected narcotic overdose:

1 day to 8 years	Naloxone, 0.1 mg/kg IV/IO
9 to 14 years	Naloxone, 0.5 mg IV

Do not exceed the adult dosage of 10 mg IV/IM/IN.

Reference #s 7010, 7020, 14040, 14050

Naloxone (Narcan) - Pediatric (ALS)

Resolution of respiratory depression related to suspected narcotic overdose:

1 day to 8 years	Naloxone, 0.1 mg/kg IV/IO
9 to 14 years	Naloxone, 0.5 mg IV/IO

Do not exceed the adult dosage of 10 mg IV/IM/IN.

Reference #s 7010, 7020, 14040, 14050

Nitroglycerin (LALS, ALS)

Nitroglycerin, 0.4 mg sublingual/transmucosal

One (1) every three (3) minutes as needed. May be repeated as long as patient continues to have signs of adequate tissue perfusion. **If a Right Ventricular Infarction is suspected, the use of nitrates requires base hospital contact.**

Nitroglycerin is contraindicated if there are signs of inadequate tissue perfusion or if sexual enhancement medications have been utilized within the past forty-eight (48) hours.

Reference #s 6090, 6110, 7010, 7020, 11010, 11060

Ondansetron (Zofran) - Patients four (4) years old to Adult (ALS)

Nausea/Vomiting:

Ondansetron, 4 mg slow IV/ODT

All patients four (4) to eight (8) years old: may administer~~give~~ a total of 4 mgs of Ondansetron prior to base hospital contact.

All patients nine (9) and older: may administer~~give~~ Ondansetron 4 mg and may repeat twice, at ten (10) minute intervals, for a total of 12 mgs prior to base hospital contact.

May be used as prophylactic treatment of nausea and vomiting associated with narcotic administration.

Reference #s 6110, 7010, 7020, 9120, 10100, 15010, 15020

Phenylephrine HCL (ALS)

Phenylephrine, 0.5 mg metered dose may be repeated once prior to additional attempt

Reference #s 7010, 7020, 10050

Procainamide (ALS)

SVT, V-Tach or Wide Complex Tachycardias:

Procainamide, 20 mg/min IV; may repeat until arrhythmia suppressed, symptomatic hypotension, QRS widens by more than 50% or maximum dose of 17 mg/kg administer~~given~~. If arrhythmia suppressed, begin infusion of 2 mg/min.

Reference #s 7010, 7020, 8010, 8040, 11050

Sodium Bicarbonate (ALS)

Tricyclic Poisoning:

Sodium Bicarbonate, 1 mEq/kg IVP

Reference #s 2020, 7010, 7020, 13010

Verapamil (ALS)

SVT if adenosine is ineffective:

Verapamil, 5 mg slow IV over three (3) minutes, may repeat every fifteen (15) minutes to a total dose of 20 mg.

Reference #s 7010, 7020, 11050

~~NURSE STAFFED UNITS~~CRITICAL CARE INTERFACILITY TRANSPORT ~~GUIDELINES~~

I. PURPOSE

To establish criteria for the approval of Critical Care Transport (CCT) providers including nurse staffed Advanced Life Support (ALS) Interfacility Transport/CCT unit operation within San Bernardino, Inyo or Mono Counties. ~~To state the requirements for nurse staffed ALS Interfacility transport units meeting all local, county, ICEMA and State requirements.~~

~~**AUTHORITY**~~
~~Title 22, Division 2.5, Sections 1797.52, 1797.178, 1798.170, and 1798.172 of the California Health and Safety Code.~~

II. PROGRAM APPROVAL

1. Requests for approval must be made in writing sixty (60) days prior to the anticipated starting date of service ~~to the Executive Director of ICEMA and include:~~. The request must include:

   a. Proposed identification and location of the nurse-staffed unit.

   b. All procedures and protocols.

   c. Documentation of qualifications for the Medical Director.

   d. Documentation of qualifications for the Nurse~~ing~~ Coordinator.

   e. Continuous Quality Improvement Plan. ~~Quality assurance plan.~~

   f. Agreement to comply with all ICEMA policies and procedures for transport of critical patients.

2. ICEMA will notify the applicant in a timely manner, if any further documentation is needed. ~~ICEMA will notify the applicant in writing within ten (10) working days following receipt of request for approval if any further documentation is needed.~~

3. The applicant shall be notified in writing of approval or denial of the program. ~~The applicant shall be notified in writing within thirty (30) days of receipt of complete package of the approval or denial of the program.~~

~~**REQUIREMENTS FOR REGISTERED NURSE PERSONNEL**~~

~~1. RN currently licensed to practice in the State of California.~~

~~2. At the provider's option, an RN may be employed by the ambulance provider or be a contract employee.~~

~~3. Current BLS, ACLS and PALS certification from the American Heart Association or equivalent.~~

~~4. A minimum of two (2) years experience in an ICU or ED in the previous three (3) years, prior to employment with the ambulance provider~~

~~5. Successful completion of an in-house orientation program related to ICEMA protocols, procedures and Endotracheal Intubation training~~

~~6. Certification in any of the following is desirable but not required: Certified Emergency Nurse (CEN); Critical Care Registered Nurse (CCRN); Mobile Intensive Care Nurse (MICN).~~

~~7. Documentation of continuing education requirement:~~

~~a. Minimum of ninety-six (96) hours of ICU or ED experience per year.~~

~~b. Minimum of two (2) successful Endotracheal Intubations every two (2) years.~~

~~c. Maintain current California State RN license, BLS, ACLS and PALS certification.~~

III. EQUIPMENT

~~In addition to the items required by California Administrative Code, Title XIII,~~ The EMS provider shall provide, at a minimum, the following equipment:

1. ALS e~~E~~quipment per ICEMA~~Protocol~~ Reference #7010 - BLS/LALS/ALS ~~& BLS~~ Standard Drug & Equipment List~~. for ALS Transport.~~

~~2. Cardiac monitor **with external pacemaker.**~~

~~3. Infusion pump(s).~~

~~4.~~2. Back-up power source.

IV. MEDICAL DIRECTOR

1. Medical Director: A full or part-time physician licensed in the State of California and qualified by training and experience with practice, within the

last five (5) years, ~~experience~~ in emergency or acute critical care medicine~~, within the last five (5) years,~~. The ICEMA Medical Director must approve the candidate for medical director. The duties of the medical director shall include but not be limited to:

a. Sign and approve, in advance, all medical protocols to be followed by the registered nurses (RN) ~~RN~~ at the ALS level.

b. Ensure the ongoing training of all nurse staff ~~medical personnel~~ involved.

c. Ensure the quality of patient transfers being conducted by the provider, including familiarity with SB612 and COBRA laws.

d. Ensure that continuous quality improvement/assurance outcome audits are ~~being~~ conducted.

V. NURSE~~ING~~ COORDINATOR

1~~2~~. ~~Nursing~~ Nurse Coordinator: A full or part-time RN employed as a Nurse~~ing~~ Coordinator qualified by training and/or experience in emergency or acute critical care medicine, within the last five (5) years, in emergency or acute critical care nursing. The duties of the Nurse~~ing~~ Coordinator shall include but not be limited to:

a. Sign and approve, in advance, all nursing procedures to be followed by the RN at the ALS level.

b. Provide ongoing training to all CCT personnel~~of all medical personnel~~ ~~involved.~~

c. Ensure quality of patient transfers through ~~being conducted by the provider~~ continuous quality improvement/assurance outcome audits~~by conducting patient care audits~~.

VI. PROCEDURES/PROTOCOLS

1. Each ~~company~~ CCT provider ~~providing~~ utilizing nurse staffed ALS units shall develop and maintain procedures for the hiring and training of nursing personnel.

2. Each provider must develop a manual to include the following:

a. Malpractice insurance coverage.

b. Identity and accessibility of the ~~Physician~~ Medical Director and Nurse ~~Nursing~~ Coordinator.

c. Vehicle inventory lists.

d. Copies of all related interfacility transfer paperwork.

e. Statement of responsibility of the sending physician for the patient during transfer and in accordance with COBRA and SB612 laws.

f. Guidelines for change in patient destination due to patient condition.

g. Protocols (Standing Orders) based on ACLS, PALS and/or NALS guidelines.

3. Procedures and protocols shall be subject to review by ICEMA.

VII. CONTINUOUS QUALITY IMPROVEMENTQUALITY ASSURANCE

1. Submit to ICEMA a continuous quality improvement (CQI) plan, quarterly and annual reports to ICEMA. Submit to ICEMA a quality improvement plan and submit quarterly reports to ICEMA.

2. All transports resulting in poor patient outcome shall be reviewed in a timely manner following the occurrence.

3. Periodic staff conferences on audits and outcomes are required in order to improve or revise protocols.

4. Records of all these activities shall be kept by the provider and be made available for inspection and audit by ICEMA.

5. ICEMA shall perform periodic on-site audits of records to ensure compliance with this policy.

6. Non-compliance with ICEMA policies and/or protocols may lead to suspension or revocation of ICEMA approval of the EMS provider's CCT program. Non-compliance with this policy may cause ICEMA to suspend or revoke approval of a nurse-staffed ALS interfacility transport unit.

EMS AIR AMBULANCE STAFFING

Provider shall staff all responding critical care transports with at least (2) ICEMA ALS accredited//authorized personnel serving as the Medical Crew. Personnel shall receive designation from ICEMA after receiving training as specified and approved by ICEMA.

Training shall include, but not be limited to:

a. EMS system and communications procedures.

~~b. The prehospital care system(s) within which they operate including local medical and procedural protocols.~~

~~c. Use of onboard medical equipment.~~

~~d. Continuing education as required by their licensure or certification.~~

~~Registered nurses (RN) must be authorized by ICEMA as Mobil Intensive Care Nurse – Flight (MICN-CCT) personnel per ICEMA Reference # *** - Critical Care Transport Nurse Authorization, in addition to any additionally required training that an EMS aircraft CCT provider may require.~~

~~4. Paramedics must be accreditatedaccredited by ICEMA as an Emergency Medical Technician-Paramedic (EMT-P) per ICEMA Reference # 1040 – RequriementsRequirements For EMT-P Accreditation in addition to any additionally required training that the CCT provider may require.~~

PROCEDURES FOR EMS MONITORING OF MULTIPLE PATIENTS

(San Bernardino County Only)

I. PURPOSE

Establish procedures that will allow the monitoring of multiple patients by EMS providers while waiting to offload patients in hospitals during extended ambulance offload delay intervals. To maintain sufficient resources to respond to additional emergency calls.

II. DEFINITIONS

Ambulance Transport: Transport of a patient from the prehospital EMS system by emergency ambulance to an approved EMS receiving hospital.

Advanced Life Support (ALS) Ambulance Transport Providers: Ambulance that transports ALS patients from the prehospital EMS system to an approved EMS receiving hospital.

Ambulance Patient Offload Time Interval Standard: In the ICEMA region, the established ambulance patient offload time interval standard is twenty-five (25) minutes.

Ambulance Arrival at the ED: The time the ambulance stops at the location outside the hospital emergency department (ED) where the patient is unloaded from the ambulance.

A**mbulance Patient Offload Time**: The actual time that the patient is physically removed from the ambulance gurney to the hospital equipment and the hospital representative signs the electronic patient care report (ePCR) receiving the patient.

Ambulance Patient Offload Delay Interval: The resulting period of time produced when the ambulance patient offload time interval exceeds the established ambulance patient offload time interval standard.

III. POLICY

All ALS ambulance transport providers are authorized to assign multiple patients to be monitored by a single EMS crew during periods of delayed ambulance patient offload time intervals that impact the ability of the EMS provider to respond to additional calls. These procedures may be activated only by the ALS transport provider and their designated supervisor in consultation with the EMS crews in the hospital.

DRAFT

IV. PROCEDURE

- One (1) EMS crew (paramedic and EMT) may monitor only the number of patients determined to be safe by the supervisor and the EMS crew.

- Patients must be stable and require no additional medications or procedures while being monitored by an EMS crew or until transferred to a hospital gurney under hospital care.

- Patients must be in the same vicinity of the hospital and within sight of the assigned EMS crew at all times and the EMS crew may not be split up.

- Patients may be on an ambulance or hospital gurney, surge bed, cot, or on chairs that allows appropriate monitoring and patient safety.

- Patient vital signs, condition and changes must be monitored and documented every thirty (30) minutes.

- An EMS crew may continue to monitor multiple patients until all patients have been transferred to hospital care. Additional patients may be assigned to an EMS crew at the discretion of the supervisor provided all of these procedures continue to be met.

- If patient's condition deteriorates, the EMS crew will notify ED staff immediately and transfer care to the hospital.

- ALS transport provider supervisors will check crews monitoring multiple patients regularly and assist with monitoring patients as required.

- The transport provider must notify the ICEMA EMS Duty Officer (EMSDO) by e-mail whenever this process occurs. The notification must include the name of the hospital, the number of units and the duration of the offload delay for each unit where an EMS crew will be caring for multiple patients.

V. REQUIRED DOCUMENTATION

- Documentation will be maintained on each patient via the ePCR.

- Patient care information will be transferred to the monitoring EMS crew via electronic transfer to maintain continuity of documentation.

- EMS providers using paper patient care reports (01As) will leave a completed green sheet with the EMS crew monitoring the patient**.**

DRAFT

POLICIES/PROTOCOLS FOR 30-DAY COMMENT FORM

ICEMA Reference #s: 6070, 6100, 8120, 11110, 15020

DEADLINE TO SUBMIT COMMENTS: October 9, 2014 at 5:00 pm

PROTOCOL #	AGENCY	COMMENT	RESPONSE
6070 - Cardiovascular ST Elevation Myocardial Infarction Receiving Centers Criteria and Destination Policy		No comments received.	
6100 - Neurovascular Stroke Receiving Centers Criteria and Destination Policy		No comments received.	
8120 – Continuation of Care		No comments received.	
11110 - Stroke Treatment - Adult		No comments received.	
15020 - Trauma - Pediatric (Less than 15 years of age)		No comments received.	

CARDIOVASCULAR ST ELEVATION MYOCARDIAL INFARCTION ~~"STEMI"~~ RECEIVING CENTERS CRITERIA AND DESTINATION POLICY

I. PURPOSE

A Cardiovascular ST Elevation Myocardial Infarction (STEMI) Receiving Center (SRC) will be the preferred destination for patients who access the 9-1-1 system meeting defined criteria and show evidence of a ~~ST-elevation myocardial infarction~~STEMI on a 12-lead electrocardiogram (ECG). These patients will benefit from rapid interventions via cardiac catheterization interventions.

II. DEFINITIONS

~~1. **STEMI** - ST Elevation Myocardial Infarction.~~

~~2. **PCI** - Percutaneous Coronary Intervention.~~

~~3.~~ **STEMI Receiving Center (SRC)** - A licensed general acute care hospital~~Facilities~~ that has~~ve~~ emergency interventional cardiac catheterization capabilities.

~~4.~~ **STEMI Referring Hospital (SRH)** - A licensed general acute care hospital~~Facilities~~ that does not have emergency interventional cardiac catheterization capabilities.

~~5.~~ **STEMI Base ~~Station~~ Hospital** - A licensed general acute care hospital ~~Facilities~~ that has~~ve~~ emergency interventional cardiac catheterization capabilities that also function as a ~~B~~base hospital~~station~~.

~~6. **CQI** - Continuous Quality Improvement.~~

~~7. **EMS** - Emergency Medical Services.~~

~~8. **CE** - Continuous Medical Education.~~

III. POLICY

The following requirements must be met for a hospital to be designated as a ~~Cardiovascular STEMI Receiving Center~~SRC by ICEMA:

- ~~1.~~ An ICEMA approved ~~paramedic~~ receiving hospital which is a full service acute care hospital~~facility~~.
- ~~2.~~ Licensure as a Cardiac Catheterization Laboratory.

- 3. Intra-aortic balloon pump capability.
- 4. Cardiovascular surgical services permit.
- 5. An alert/Ccommunication system for notification of incoming STEMI patients, available twenty-four (24) hours per day, seven (7) days per week (i.e., in-house paging system).
- 6. Provide continuing education (CE) opportunities twice per year for emergency medical services (EMS) field personnel in areas of 12-lead ECG acquisition and interpretation, as well as assessment and management of STEMI patients.

IV. STAFFING REQUIREMENTS

The hospital will have the following positions designated and filled prior to becoming a SRC:

- 1. Medical Directors

  The hospital shall designate two (2) physicians as co-directors of its SRC program. One (1) physician shall be a board certified interventional cardiologist with active Percutaneous Coronary Intervention (PCI) privileges. The co-director shall be a board certified emergency medicine physician with active privileges to practice in the emergency department.

- 2. Nursing CoordinatorDirector

  The hospital shall designate a SRC Nursing CoordinatorDirector who is trained or certified in Critical Care nursing.

- 3. On-Call Physician Consultants and Staff

  A daily roster of the following on-call physician consultants and staff that must be promptly available within thirty (30) minutes of notification.

  - a. Cardiologist with percutaneous coronary intervention (PCI) privileges.
  - b. Cardiovascular Surgeon.
  - c. Cardiac Catheterization Laboratory Team.
  - d. Intra-aortic balloon pump nurse or technologist.

- 4. Emergency Department Liaison Nurse

The non-base hospital shall designate an SRC Emergency Department Liaison Nurse who has a minimum of two (2) years emergency department experience to facilitate communication and education between the cath lab, emergency department and prehospital personnel.

V. INTERNAL HOSPITAL POLICIES

The hospital shall develop internal policies for the following situations:

- ~~1.~~ Fibrinolytic therapy protocol to be used only in unforeseen circumstances when PCI of a STEMI patient is not possible.

- ~~2.~~ Acknowledgement that STEMI patients may **only** be diverted during the times ~~Diversion of STEMI patients **only** during times~~ of Internal Disaster in accordance to ICEMA Reference ~~protocol~~ #8060 - Requests for Hospital Diversion Policy (applies to physical plant breakdown threatening significant patient services or immediate patient safety issues, i.e., bomb threat, earthquake damage, hazardous material or safety and security of the hospital~~facility~~.) A written notification describing the event must be submitted to ICEMA within twenty-four (24) hours.

- ~~3.~~ Prompt acceptance of STEMI patients from other SRHs ~~STEMI referral centers~~ that do not have PCI capability. STEMI diversion is not permitted except for internal disaster. Refer to ICEMA Reference #8120 - Continuation of Care (San Bernardino County Only). However, STEMI base hospitals are allowed to facilitate redirecting of STEMI patients to nearby SRCs when the closest SRC is over-capacity to avoid prolonged door to intervention time. SRC and base hospitals shall ensure physician to physician contact when redirecting patients. ~~Refer to ICEMA Policy Reference #8040, Interfacility Transfer of STEMI Patient.~~

- ~~4.~~ Cath Lab Team activation policy which requires immediate activation of the team upon EMS notification when there is documented STEMI patient en route to the STEMI center, based on machine algorithm interpretation.

VI. DATA COLLECTION

All required data elements shall be collected and entered in an ICEMA approved STEMI registry on a regular basis and submitted to ICEMA for review.

VII. CONTINUOUS QUALITY IMPROVEMENT PROGRAM (CQI)

SRC shall develop an on-going CQI program which monitors all aspect of treatment and management of suspected STEMI ~~cardiac~~ patients and identify areas needing improvement. The program must, at a minimum, monitor the following parameters:

- ~~1.~~ Morbidity and mortality related to procedural complications.

- ~~2.~~ Detail review of cases requiring emergent rescue Coronary Artery Bypass Graph (CABG).

- ~~3.~~ Tracking of door-to-dilation time and adherence to minimum performance standards set by this policy.

- Detailed review of cases requiring redirection of EMS STEMI patients to other SRCs as a result of SRC over capacity and prolonged delay of door-to-intervention time.

- Active participation in each ICEMA STEMI CQI committee and STEMI regional peer review process. This will include a review of selected medical records as determined by CQI indicators and presentation of details to peer review committee for adjudication.

VIII. PERFORMANCE STANDARD

~~In accordance with D2B: An Alliance for Quality guidelines,~~ SRCs must achieve and maintain a door-to-balloon (D2B) time of less than or equal to ninety (90) minutes in 75% of primary PCI patients with a STEMI, in accordance with D2B: An Alliance for Quality Guidelines. If this standard is not achieved, the SRC may be required to submit an improvement plan to ICEMA addressing the deficiency with steps being taken to remedy the problems.

IX. DESIGNATION

- ~~1.~~ The ~~Cardiovascular STEMI Receiving Center~~SRC applicant shall be designated after satisfactory review of written documentation and an initial site survey by ICEMA or its designees and completion of an agreement between the hospital and ICEMA.

- ~~2.~~ Documentation of current accreditation from The Society of Chest Pain Centers as "Chest Pain Center with PCI" shall be accepted in lieu of a formal site visit by ICEMA.

- ~~3.~~ Initial designation as a SRC shall be in accordance with terms outlined in the agreement. ~~for a period of two (2) years. Thereafter, re-designation shall occur every four (4) years, contingent upon satisfactory review.~~

- ~~4.~~ Failure to comply with the agreement, criteria and performance standards outlined in this policy may result in probation, suspension or rescission of SRC designation.

X. PATIENT DESTINATION

- ~~1.~~ The ~~STEMI base station~~SRC should be considered as the destination of choice if all of the following criteria are met:

  - ~~a.~~ Identified STEMI patients based on machine interpretation of field 12-lead ECG, verified by ~~paramedics~~ EMT-Ps and approved by a base ~~station~~ hospital physician.

  - ~~b.~~ Total transport time to the base ~~station~~ hospital SRC is thirty (30) minutes or less. Base hospital physician may override this requirement and authorize transport to the SRC with transport time of greater than thirty (30) minutes.

  - ~~c.~~ STEMI base ~~station~~ hospital contact is **mandatory** for all patients identified as possible STEMI patient. The STEMI base ~~Station~~ hospital confirms a SRC as the destination.

  - ~~d.~~ The STEMI base ~~station~~ hospital is the only authority that can direct a patient to a SRC. The destination may be changed at SRC base hospital discretion.

  - ~~e.~~ The STEMI base ~~station~~hospital, if different from the SRC, will notify the SRC of patient's pending arrival as soon as possible, to allow timely activation of Cardiac Cath Lab Team at the SRC.

  - ~~f.~~ If the patient chooses to bypass the recommended ~~system STEMI center~~SRC, EMS field personnel must obtain an AMA and notify the STEMI base hospital~~station~~.

- ~~2.~~ The following factors should be considered with regards to choice of destination for STEMI patients. STEMI Base ~~Station~~ hospital contact and consultation is mandatory in these and similar situations:

  - ~~a.~~ Patients with unmanageable airway, unstable cardiopulmonary condition, or in cardiopulmonary arrest should be transported to the closest receiving hospital.

  - ~~b.~~ Patients with malignant ventricular fibrillation, ventricular tachycardia, second degree type II heart block and third degree heart blocks should be considered for transport to the closest receiving hospital.

  - ~~c.~~ Patients with obvious contraindication to thrombolytic therapy should be strongly considered for transport to the closest SRC.

- ~~d.~~ Patients with hemodynamic instability as exhibited by blood pressure less than 90 systolic and/or signs of inadequate tissue perfusion should be transported to the closest receiving hospital.

- ~~e.~~ Patients with *sustained* ROSC should be strongly considered for transport to the closest SRC. STEMI base hospital contact must be made.

XI. REFERENCE PROTOCOLS

Number	Name
~~8040~~	~~Interfacility Transfer of STEMI Patient~~
8060	~~San Bernardino County~~ Requests for Hospital Diversion Policy (San Bernardino County Only)
8120	Continuation of Care (San Bernardino County Only)

NEUROVASCULAR STROKE ~~"NSRC"~~ RECEIVING CENTERS CRITERIA AND DESTINATION POLICY

(San Bernardino County Only)

I. PURPOSE

To provide developing guidelines to rapidly transport stroke patients who access the 9-1-1 system to a designated Neurovascular Stroke Receiving Center (NSRC) when indicated. Patients transported to NSRC will benefit from rapid assessment, intervention and treatment at a dedicated stroke specialty center. Patients will meet the defined criteria for triage as an acute ischemic or hemorrhagic cerebral vascular event.

II. DEFINITIONS

Interventional Neuroradiologic Capabilities: A licensed general acute care hospital~~Facilities~~ with qualified interventional radiologists and/or neurosurgeons able to administer inter-arterial tissue plasminogen activator and/or perform mechanical clot retrieval.

mLAPSS: Modified Los Angeles County Prehospital Stroke Screening Scale.

Neurovascular Stroke Base Station~~(s)~~: A licensed general acute care hospital~~Facilities~~ that has~~ve~~ TJC or HFAP Primary Stroke Center accreditation ~~that also function as a~~and designated as a base hospital ~~Paramedic Base Station~~.

Neurovascular Stroke Receiving Centers (NSRC): A twenty-four (24) hours per day, seven (7) days per week licensed general acute care hospital that has successfully completed and maintains The Joint Commission (TJC) or Healthcare Facilities Accreditation Program (HFAP) accreditation as a Primary Stroke Center and enters into an agreement with ICEMA, ~~ICEMA designated Level I or Level II receiving hospital~~ for patients triaged as having a cerebral vascular event requiring hospitalization for treatment, evaluation and/or management of this event.

Neurovascular Stroke Referral Hospital~~(s)~~ (NSRH): A licensed ~~G~~general acute care hospital~~s~~ that refers possible stroke patients to NSRC.

~~**NSRC Level I (NSRC-I)**: A twenty-four (24) hours per day, seven (7) days per week acute care hospital that has successfully completed and maintains The Joint Commission (TJC) or Healthcare Facilities Accreditation Program (HFAP) accreditation as a Primary Stroke Center, **has interventional neuroradiologic and neurosurgical capabilities** and enters into a memorandum of understanding with ICEMA relative to being a Stroke Center.~~

~~**NSRC Level II (NSRC-II)**: A twenty-four (24) hours per day, seven (7) days per week acute care hospital that has successfully completed and maintains The Joint~~

~~Commission (TJC) or Healthcare Facilities Accreditation Program (HFAP) accreditation as a Primary Stroke Center and enters into a memorandum of understanding with ICEMA relative to being a Stroke Center.~~

III. POLICY

The following requirements must be met for a hospital to be an ICEMA designated NSRC~~ I or NSRC II~~:

- An ICEMA approved ~~paramedic~~ receiving hospital which is a full service acute care hospital~~facility~~.
- Accreditation as a Primary Stroke Center by TJC or HFAP and proof of re-accreditation every two (2) years.
- An ~~facility~~ alert/communication system for notification of incoming stroke patients, available twenty-four (24) hours per day, seven (7) days per week (i.e., in-house paging system).
- Provide continuous education (CE) opportunities twice per year for NSRC, NSRH and emergency medical services (EMS) field personnel in areas of pathophysiology, assessment, triage and management for stroke patients and report annually to ICEMA.
- Lead public stroke education efforts at the appropriate educational level and report annually to ICEMA.

IV. STAFFING REQUIREMENTS

The hospital will have the following positions filled prior to becoming a NSRC~~ I or NSRC II~~:

- Medical Directors

  The hospital shall designate two (2) physicians with hospital privileges as co-directors of its NSRC program. One (1) physician shall be board certified or board eligible by the American Board of Medical Specialties or American Osteopathic Association, neurology or neurosurgery board. The co-director shall be a board certified or board eligible emergency medicine physician.

- Nursing Coordinator

  The hospital shall designate a NSRC Nursing Coordinator who has experience in critical care or emergency nursing, and ~~who~~ has advanced education in stroke physiology or at least has two (2) years~~'~~ dedicated stroke

patient management experience. Certification in critical care or emergency nursing is preferred.

- On-Call Physicians Specialists/Consultants

A daily roster of the following on-call physician consultants and staff must be promptly available within thirty (30) minutes of notification of "Stroke Alert" twenty-four (24) hours per day, seven (7) days per week.

- Radiologist experienced in neuroradiologic interpretations.
- On-call Neurologist and /or tele-neurology services available twenty-four (24) hours per day; seven (7) days per week.
- ~~Additional requirements for:~~If neurosurgical services are not available in-house, the hospital must have a rapid transfer agreement in place with a hospital that provides this service. The agreement must be on file with the ICEMA. NSRCs must promptly accept rapid transfer requests from NSRCs. Additionally, the hospital must have a rapid transport agreement in place with an ICEMA permitted transport provider for that EOA.

~~NSRC I~~
~~• Interventional neuroradiologist or Interventional vascular neurosurgeon and an angiogram suite available twenty-four (24) hours per day; seven (7) days per week.~~ ~~• Neurosurgeon available twenty-four (24) hours per day; seven (7) days per week.~~

~~NSRC II:~~
~~• If neurosurgical services are not available in-house, the facility must have a rapid transfer agreement in place with a facility that provides this service. The agreement must be on file with the ICEMA. NSRC Is must promptly accept rapid transfer requests from NSRC IIs. Additionally, the facility must have a rapid transport agreement in place with an ICEMA permitted transport agency for that EOA.~~

V. INTERNAL HOSPITAL POLICIES

The hospital shall develop internal policies for the following situations:

- Stroke Team alert response policy upon EMS notification of a "Stroke Alert".

- Rapid assessment of stroke patient by Emergency and Neurology Teams.

- Prioritization of ancillary services including laboratory and pharmacy with notification of "Stroke Alert".

- Arrangement for priority bed availability in Acute Stroke Unit or Intensive Care Unit (ICU) for "Stroke Alert" patients.

- Acknowledge~~s~~ment that stroke patients may **only** be diverted during the times of Internal Disaster in accordance to ICEMA Reference #8060 - Requests for Hospital Diversion Policy~~,~~ (applies to physical plant breakdown threatening significant patient services or immediate patient safety issues, i.e., bomb threat, earthquake damage, hazardous material or safety and security of the hospital~~facility~~.) A written notification describing the event must be submitted to ICEMA within twenty-four (24) hours.

- ~~Additional requirements for:~~Emergent thrombolytic and tele-neurology (if waiver is approved) protocol to be used by Neurology, Emergency, Pharmacy and Critical Care Teams.

- Readiness of diagnostic computed tomography (CT) and magnetic resonance imaging (MRI), upon notification of Stroke Team.

~~NSRC-I~~
~~• Emergent thrombolytic and mechanical therapy protocol to be used by Neurology, Emergency, Pharmacy, Interventional and Critical Care teams.~~ ~~• Maintaining readiness of diagnostic computed tomography (CT), magnetic resonance imaging (MRI) and therapeutic resources such as an interventional suite upon notification of Stroke Team.~~ ~~• Prompt acceptance of stroke patients from any NSRH as well as referral from NSRC-II to NSRC-I when interventional skills are required.~~

~~NSRC-II~~
~~• Emergent thrombolytic and tele-neurology (if waiver is approved) protocol to be used by Neurology, Emergency, Pharmacy and Critical Care teams.~~ ~~• Maintaining readiness of diagnostic computed tomography (CT) and magnetic resonance imaging (MRI), upon notification of Stroke Team.~~

VI. DATA COLLECTION

Data will be reported to the ICEMA Medical Director on a monthly basis using an ICEMA approved registry.

VII. CONTINUOUS QUALITY IMPROVEMENT PROGRAM

NSRC shall develop an on-going CQI program which monitors all aspects of treatment and management of stroke patients and identify~~ies~~ areas needing improvement. The program must, ~~A~~at a minimum, ~~the program will~~ monitor the following parameters:

- Morbidity and mortality related to procedural complications.

- Tracking door-to-intervention times and adherence to minimum performance standards.

  ICEMA will determine current performance indicators. Any specific or additional performance indicators will be determined in collaboration with the Stroke CQI Committee.

- Active participation in ICEMA Stroke CQI Committee activities.

VIII. PERFORMANCE STANDARDS

Compliance with the American Stroke Association Performance Measures as a Primary Stroke Center.

IX. DESIGNATION

- The NSRC applicant shall be designated by ICEMA after satisfactory review of written documentation, a potential site survey and completion of an agreement between the hospital and ICEMA.

- Documentation of current accreditation as a Primary Stroke Center by TJC or HFAP shall be accepted in lieu of a formal site visit by ICEMA. ~~NSRC I shall submit Primary Stroke Center accreditation as well as supplemental documentation verifying neurovascular interventional service capabilities~~.

- Initial designation as a NSRC shall be in accordance with terms outlined in the agreement.~~for a period of two (2) years. Thereafter, redesignation shall occur every two (2) years contingent upon satisfactory review.~~

- Failure to comply with the agreement, criteria and performance standards outlined in this policy may result in probation, suspension or rescission of the NSRC designation.

X. PATIENT DESTINATION

- The NSRC should be considered as the destination of choice if all of the following criteria are met:

  - Stroke patients eligible for transport to NSRC (suspected~~identified~~ stroke patients) will be identified using the mLAPSS triage criteria.

  - Identified acute stroke patients with "last seen normal" time plus transport time equaling greater than twelve (12) hours, or if "last seen normal" time is unknown, transport to the closest ~~paramedic~~ receiving hospital.

  - ~~Identified stroke patients with "last seen normal" time plus transport time between three (3) to twelve (12) hours will be transported to NSRC I.~~

  - Identified stroke patients with "last seen normal" time ~~plus transport~~ less than twelve (12) hours, or a "wake-up stroke" ~~time less than (3) hours will be~~ ~~transported~~ transport- to ~~any~~ closest NSRC ~~I or NSRC-II~~.

  - NSRC ~~Base~~ base ~~Station~~ hospital contact is **mandatory** for all patients identified as a possible stroke patient.

  - The NSRC ~~Base~~ base ~~Station~~ hospital is the only authority that can direct a patient to a NSRC. The destination may be changed at NSRC base ~~station~~ hospital discretion.

  - The NSRC b~~B~~ase ~~Station~~hospital, if different from the NSRC will notify the NSRC of the patient's pending arrival as soon as possible, to allow timely notification of Stroke Team.

  - ~~Air transport may be considered if ground transport is greater than thirty (30) minutes.~~

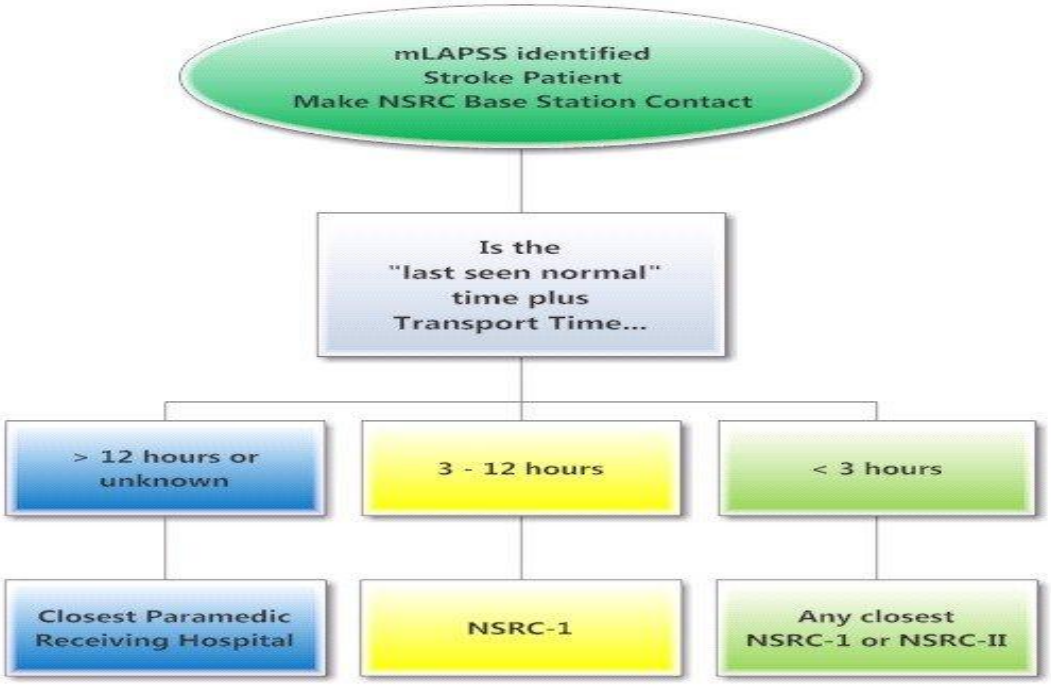
- The following factors should be considered in determining choice of destination for acute stroke patients. NSRC ~~Base~~ base ~~Station~~ hospital contact and consultation is mandatory in these situations:

  - Patients with unmanageable airway, unstable cardiopulmonary condition, or in cardiopulmonary arrest should be transported to the closest ~~paramedic~~ receiving hospital.

  - Patients with obvious contraindication to thrombolytic therapy should be strongly considered for transport to closest NSRC ~~I~~.

- Patients with hemodynamic instability and exhibiting signs of inadequate tissue perfusion should be transported to the closest ~~paramedic~~ receiving hospital.

~~XI. STROKE PATIENT DESTINATION DECISION TREE~~



CONTINUATION OF CARE

(San Bernardino County Only)

I. PURPOSE

To develop a system that ensures the rapid transport of patients at the time of symptom onset or injury, to receiving the most appropriate definitive care. This system of care consists of public safety answering point (PSAP) providers, EMS providers, referral hospitals (RH), Specialty Care Centers (Trauma, Cardiovascular ST Elevation Myocardial Infarction (STEMI) or Stroke), ICEMA and EMS leaders combining their efforts to achieve this goal.

This policy shall only be used for:

- Rapid transport of Trauma, STEMI and Stroke patients from RH to Specialty Care Center.
- Specialty Care Center to Specialty Care Center when higher level of care is required.
- EMS providers transporting unstable patients requiring transport to a Specialty Care Center to stop at any closest ~~paramedic~~ receiving hospital for airway stabilization, and continue on to a Specialty Care Center.

It is not to be used for any other form of interfacility transfer of patients.

~~II. AUTHORITY~~

~~California Health and Safety Code, Division 2.5, 1797.204~~
~~California Code of Regulations, Title 22~~

II~~I~~. DEFINITIONS

Neurovascular Stroke Receiving Centers (NSRC): A licensed general acute care hospital designated by ICEMA's Governing Board as a NSRC.

Referral Hospital (RH): Any licensed general acute care hospital that is not an ICEMA designated TC, SRC or NSRC.

Specialty Care Center: ICEMA designated Trauma, STEMI or Stroke Center.

STEMI Receiving Centers (SRC): A licensed general acute care hospital designated by ICEMA's Governing Board as STEMI Receiving Center with emergency interventional cardiac catheterization capabilities.

Trauma Center (TC): A licensed general acute care hospital designated by ICEMA's Governing Board as a trauma hospital in accordance with State laws, regulations and ICEMA policies.

III~~V~~. INCLUSION CRITERIA

- Any patient meeting ICEMA Trauma Triage Criteria, (refer to ICEMA Reference #15030 - Trauma Triage Criteria and Destination Policy) arriving at a non-trauma hospital by EMS or non-EMS transport.

- Any patient with a positive STEMI ~~ST elevation MI~~ requiring EMS transport to a SRC (refer to ICEMA Reference #6070 - Cardiovascular ST Elevation Myocardial Infarction ~~"STEMI"~~ Receiving Centers Criteria and Destination Policy)~~)~~.

- Any patient with a positive mLAPSS or stroke scale requiring EMS transport to a ~~the~~ NSRC (refer to ICEMA Reference #6100 - Neurovascular Stroke Receiving Centers Criteria and Destination Policy).

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IV. INITIAL TREATMENT GOALS AT RH

- Initiate resuscitative measures within the capabilities of the facility.

- Ensure patient stabilization is adequate for subsequent transport.

- Do not delay transport by initiating any diagnostic procedures that do not have direct impact on immediate resuscitative measures.

  - TIMELINES

    < 30 minutes at RH (door-in/door-out).
    < 30 minutes to complete ALS~~paramedic~~ continuation of care transport.
    < 30 minutes door~~-~~-to~~-~~-intervention at ~~RC~~ Specialty Care Center.

- RH shall contact the appropriate Specialty Care Center ED physician directly without calling for an inpatient bed assignment. Refer to Section IV - ~~attachment~~ SRH-SRC Buddy System Table.

- EMS providers shall make Specialty Care Center ~~Base Station~~base hospital contact.

- The Specialty Care Centers shall accept all referred trauma, stroke and STEMI patients unless they are on Internal Disaster as defined in ICEMA Reference #8060 - Requests for Hospital Diversion Policy (San Bernardino County Only).

- The Specialty Care Center ED physician is the accepting physician at the Specialty Care Center and will activate the internal Trauma, STEMI, or Stroke Team according to internal TC, SRC or NSRC policies or protocols.

- RH ED physician will determine the appropriate mode of transportation for the patient. ~~If ground transportation is > 30 minutes consider the use of an air ambulance. Requests for air ambulance shall be made to 9-1-1 and normal dispatching procedures will be followed; however, the air ambulance Continuation of Care patient will be transported to the Specialty Care Center identified by the RH.~~

- Simultaneously call 9-1-1 and utilize the following script to dispatch:

  "This is a Continuation of Care run from ____hospital to ____Trauma, STEMI or Stroke Center"

  Dispatchers will only dispatch transporting paramedic units without any fire apparatus.

- RH must send all medical records, test results, radiologic evaluations to the Specialty Care Center. DO NOT DELAY TRANSPORT - these documents may be FAXED to the Specialty Care Center.

V~~I~~. SPECIAL CONSIDERATIONS

- If the patient has arrived at the RH via EMS field personnel, the RH ED physician may request that the transporting team remain ~~with patient~~ and immediately transport the patient~~them~~ once minimal stabilization is done at the RH.

- EMT-Ps may only transport patients on Dopamine, Lidocaine and Procainamide drips. Heparin and Integrillin drips are not within the ~~paramedic~~ EMT-P scope of practice and require a "critical care transport" nurse to be in attendance. Unless medically necessary, avoid using medication drips that are outside of the ~~paramedic~~ EMT-P scope of practice to avoid any delays in transferring of patients.

- The RH may consider sending one of its nurses with the transporting ~~paramedic~~ ALS unit if deemed necessary due to the patient's condition or scope of practice.

- Nurse staffed ALS~~critical care (ground or air) transport~~ units (ground or air) maybe used; but may create a delay due to availability. Requests for a~~of~~ nurse staffed ~~critical care~~ALS ~~transport~~ unit~~s~~ must be made directly to the Critical Care ~~t~~Transport~~er agency~~ (CCT) provider by landline.

- Specialty Care Center diversion is not permitted except for internal disaster. However, Specialty Care Center base hospitals are allowed to facilitate

redirecting of EMS patients to nearby SRCs, NSRCs or TCs when the closest Specialty Care Center is over capacity to avoid prolonged door-to-intervention times. Specialty Care Center base hospitals shall ensure physician to physician contact when redirecting patients.

VII. SPECIALTY CARE CENTER - REFERRAL HOSPITAL BUDDY SYSTEM TABLE

NEUROVASCULAR STROKE RECEIVING CENTERS (NSRC)	NEUROVASCULAR STROKE REFERRAL HOSPITALS (NSRH)
Arrowhead Regional Medical Center	• Barstow Community Hospital • Community Hospital of San Bernardino • Desert Valley Hospital • Kaiser Fontana Medical Center • St. Bernardine Medical Center • St. Mary Medical Center
Desert Regional Medical Center	• Colorado River Medical Center • Hi-Desert Medical Center
Loma Linda University Medical Center	• Bear Valley Community Hospital • J.L. Pettis VA Hospital (Loma Linda VA) • Mountains Community Hospital • St. Mary Medical Center • Victor Valley Global Medical Center • Weed Army Community Hospital at Fort Irwin
Pomona Valley Hospital Medical Center	• Chino Valley Medical Center • Montclair Hospital Medical Center
Redlands Community Hospital	• Bear Valley Community Hospital • Community Hospital of San Bernardino • St. Bernardine Medical Center
San Antonio Community Hospital	• Chino Valley Medical Center • Kaiser Ontario Medical Center • Montclair Hospital Medical Center
STEMI RECEIVING CENTER (SRC)	STEMI REFERRAL HOSPITAL (SRH)
Desert Valley Hospital	• Barstow Community Hospital • Victor Valley Global Medical Center • Weed Army Community Hospital at Fort Irwin
Loma Linda University Medical Center	• Arrowhead Regional Medical Center • Bear Valley Community Hospital • J. L. Pettis VA Hospital (Loma Linda VA) • Redlands Community Hospital
Pomona Valley Hospital Medical Center	• Chino Valley Medical Center • Montclair Hospital Medical Center
San Antonio Community Hospital	• Chino Valley Medical Center • Kaiser Ontario Medical Center • Montclair Hospital Medical Center
St. Bernardine Medical Center	• Colorado River Medical Center • Community Hospital of San Bernardino • Kaiser Fontana Medical Center • Mountains Community Hospital
St. Mary Medical Center	• Barstow Community Hospital • Bear Valley Community Hospital • Hi-Desert Medical Center • Robert E. Bush Naval Hospital-29 Palms • Victor Valley Global Medical Center

VIII. REFERENCES

Number	**Name**
6070	Cardiovascular ST Elevation Myocardial Infarction ~~"STEMI"~~ Receiving Centers Criteria and Destination Policy
6100	Neurovascular Stroke Receiving Centers ~~"NSRC"~~ Criteria and Destination Policy
8060	Requests for Hospital Diversion Policy (San Bernardino County Only)
15030	Trauma Triage Criteria and Destination Policy

STROKE TREATMENT - ADULT

I. FIELD ASSESSMENT/TREATMENT INDICATORS

Patient exhibiting signs/symptoms of a possible stroke. These signs may include: speech disturbances, altered level of consciousness, parasthesias, new onset seizures, dizziness unilateral weakness and visual disturbances.

II. LIMITED ALS (LALS)/ALS INTERVENTIONS

- Vascular access.
- Obtain blood glucose.
- **Modified Los Angeles County Prehospital Stroke Screen (mLAPSS)**: A screening tool used by EMS field personnel~~prehospital care providers~~ to assist in identifying patients who may be having a stroke.

mLAPSS Criteria: The patient is ***mLAPSS positive***, if "yes" on Criteria #1 - 5 *and* exhibits unilateral weakness on Criteria #6.

mLAPSS Criteria	**Yes**	**No**	
1. Age over 40 years?			
2. No prior history of seizure disorder?			
3. New onset of neurologic symptoms in last 24 hours?			
4. Patient was ambulatory at baseline prior to event?			
5. Blood glucose between 60 and 400?			
6. Exam (*look for obvious asymmetry):*	Normal-Bilaterally	Right	Left
• Facial Smile/Grimace	☐	☐ Droop ☐ Normal	☐ Droop ☐ Normal
• Grip	☐	☐ Weak Grip ☐ Normal	☐ Weak Grip ☐ Normal
	☐	☐ No Grip ☐ Normal	☐ No Grip ☐ Normal
• Arm Weakness	☐	☐ Drifts Down ☐ Normal	☐ Drifts Down ☐ Normal
		☐ Falls Down Rapidly ☐ Normal	☐ Falls Down Rapidly ☐ Normal

- Ask when "last seen normal" or without stroke symptoms. ~~Refer to Section V - Stroke Patient Destination Decision Tree below.~~

- If "last seen normal" plus transport time is greater than twelve (12) hours, transport to the closest receiving hospital.

- If "last seen normal" plus transport time is less than twelve (12) hours, or a "wake-up stroke", transport to closest NSRC.

  - ~~No history of seizures or epilepsy.~~

  - ~~Age greater than or equal to 40. If less than 40, with suspected stroke, continue mLAPSS assessment, make NSRC base hospital contact for destination.~~
  - ~~At baseline, patient is not wheelchair bound or bedridden.~~

  - ~~Blood glucose between 60 - 400 mg/dl.~~

  - ~~Motor Exam: Examine for obvious asymmetry unilateral weakness (exam is positive, if one (1) or more of the following are present).~~
    - ~~Facial smile/Grimace asymmetry~~
    - ~~Grip asymmetry~~
    - ~~Arm strength asymmetry~~

- In San Bernardino County, if Stroke Scale is positive, initiate "Stroke Alert", contact NSRC base hospital and transport immediately.

- If mLAPSS negative and stroke is still suspected, contact NSRC base hospital.

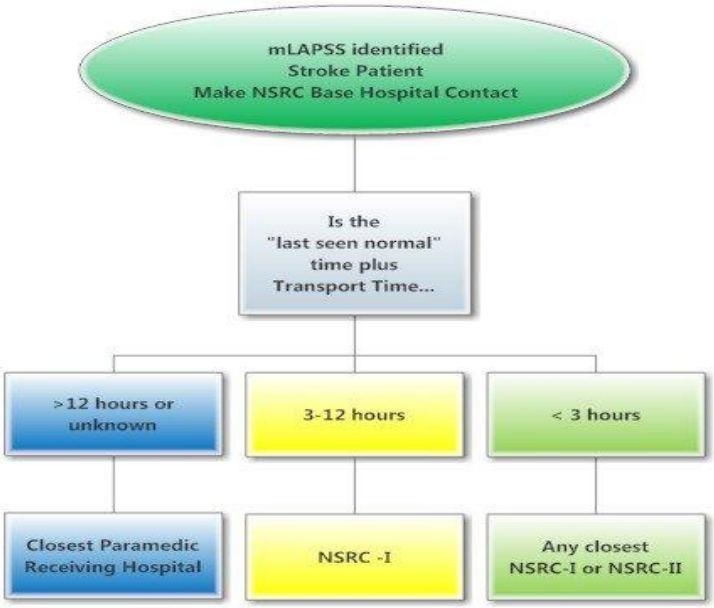
- Obtain and document on scene family phone number.

- Consider 12-lead ECG (ALS only).

- **Thrombolytic Assessment**: If time is available, and the patient or family can provide the information, assess the patient using the criteria listed below and report to ED personnel:

Thrombolytic Assessment Criteria	**Yes**	**No**
Onset greater than 4 hours?	~~Yes~~	~~No~~
History of recent bleeding?	~~Yes~~	~~No~~
Use of anticoagulant?	~~Yes~~	~~No~~
Major surgery or serious trauma in the previous fourteen (14) days?	~~Yes~~	~~No~~
Sustained systolic blood pressure above 185 mm Hg?	~~Yes~~	~~No~~
Recent stroke or intracranial hemorrhage?	~~Yes~~	~~No~~

~~V. STROKE PATIENT DESTINATION DECISION TREE~~



III. REFERENCE

Number	Name
11080	Altered Level of Consciousness/Seizures - Adult

TRAUMA - PEDIATRIC
(Less than 15 years of age)

Any critical trauma patient (CTP) requires effective communication and rapid transportation to the closest trauma center. If not contacted at scene, the receiving trauma center must be notified as soon as possible in order to activate the trauma team.

~~In~~ Inyo and Mono Counties do not have trauma center designations and the assigned base hospital should be contacted for determination of appropriate destination.

I. FIELD ASSESSMENT/TREATMENT INDICATORS

Refer to ICEMA Reference #15030 - Trauma Triage Criteria and Destination Policy.

II. BLS INTERVENTIONS

- Ensure thorough initial assessment.
- Ensure patient airway, protecting cervical spine.
- ~~Axial spinal stabilization as appropriate.~~
- Oxygen and/or ventilate as needed, O_2 saturation (if BLS equipped).
- Keep patient warm and reassure.
- For a traumatic full arrest, an AED may be utilized, if indicated.
- Transport to ALS intercept or to the closest receiving hospital.

A. Manage Special Considerations

- **Axial Spinal Immobilization**: Using age appropriate assessments, if the patient meet(s) any of the following indicators using the acronym (NSAID):

  N-euro Deficit(s) present?
  S-pinal Tenderness present?
  A-ltered Mental Status?
  I-ntoxication?
  D-istracting Injury?

  - Consider maintaining spinal alignment on the gurney, or using spinal axial immobilization on an awake, alert and cooperative patient, without the use of a rigid spine board.

- Penetrating trauma without any NSAID indicators are not candidates for spinal immobilization using spine board.

- **Axial Spinal Immobilization with use of Rigid Spine Board:** If the use of a rigid, spine board is indicated, and the level of the patient's head is greater than that of the torso, use approved pediatric spine board with a head drop or arrange padding on the board so that the ears line up with the shoulders and keep the entire lower spine and pelvis in line with the cervical spine and parallel to the board.

- **Abdominal Trauma**: Cover eviscerated organs with saline dampened gauze. Do not attempt to replace organs into the abdominal cavity.

- **Amputations**: Control bleeding. Rinse amputated part gently with sterile irrigation saline to remove loose debris/gross contamination. Place amputated part in dry, sterile gauze and in a plastic bag surrounded by ice (if available). Prevent direct contact with ice. Document in the narrative who the amputated part was given to.

  Partial amputation: Splint in anatomic position and elevate the extremity.

- **Blunt Chest Trauma**: If a wound is present, cover it with an occlusive dressing. If the patient's ventilations are being assisted, dress wound loosely, (do not seal). Continuously re-evaluate patient for the development of tension pneumothorax.

- **Flail Chest**: Stabilize chest, observe for tension pneumothorax. Consider assisted ventilations.

- **Fractures:** Immobilize above and below the injury. Apply splint to injury in position found except:

  - **Femur**: Apply traction splint if indicated.

  - **Grossly angulated long bone with distal neurovascular compromise:** Apply gentle unidirectional traction to improve circulation.

  - **Check and document distal pulse before and after positioning**.

- **Genital Injuries**: Cover genitalia with saline soaked gauze. If necessary, apply direct pressure to control bleeding. Treat amputations the same as extremity amputations.

- **Head and Neck Trauma**: Place brain injured patients in reverse Trendelenburg (elevate the head of the backboard 15 - 20 degrees), if the patient exhibits no signs of shock.

  - **Eye**: Whenever possible protect an injured eye with a rigid dressing, cup or eye shield. Do not attempt to replace a partially torn globe - stabilize it in place with sterile saline soaked gauze. Cover uninjured eye.

  - **Avulsed Tooth**: Collect teeth, place in moist, sterile saline gauze and place in a plastic bag.

- **Impaled Object**: Immobilize and leave in place. Remove object if it interferes with CPR, or if the object is impaled in the face, cheek or neck and is compromising ventilations.

- **Traumatic Arrest**: CPR if indicated. May utilize an AED if indicated.

- **Determination of Death on Scene**: Refer to ICEMA Reference #12010 - Determination of Death on Scene.

III. LIMITED ALS (LALS) INTERVENTIONS

- Advanced airway (as indicated).

  - Unmanageable Airway: Transport to the closest most appropriate receiving hospital when the patient requires an advance airway. An adequate airway cannot be maintained with a BVM device.

- Apply AED.

- IV Access (warm IV fluids when available).

  - *Unstable:* Vital signs (age appropriate) and/or signs of inadequate tissue perfusion, start 2nd IV access.

    Administer 20ml/kg NS bolus IV. May repeat once.

  - *Stable*: Vital signs (age appropriate) and/or signs of adequate tissue perfusion.

    <u>Maintain</u> IV NS rate at TKO.

- Transport to appropriate hospital. Pediatric patients identified as CTP will be transported to a pediatric trauma hospital when there is less than a 20 minute difference in transport time to the pediatric trauma hospital versus the closes trauma hospital.

A. Manage Special Considerations

- **Axial Spinal Immobilization**: LALS personnel should remove axial spinal immobilization devices from patients placed in full axial spinal immobilization precautions by first responders and BLS personnel if the patient does not meet any of the following indicators while considering age-appropriate assessments when using the acronym (NSAID):

  N-euro Deficit(s) present?
  S-pinal Tenderness present?
  A-ltered Mental Status?
  I-ntoxication?
  D-istracting Injury?

  - Consider maintaining spinal alignment on the gurney, or using spinal axial immobilization on an awake, alert and cooperative patient, without the use of a rigid spine board.

  - Penetrating trauma without any NSAID indicators are not candidates for spinal immobilization using long board.

- **Axial Spinal Immobilization with use of Rigid Spine Board:** If the use of a rigid, spine board is indicated, and the level of the patient's head is greater than that of the torso, use approved pediatric spine board with a head drop or arrange padding on the board so that the ears line up with the shoulders and keep the entire lower spine and pelvis in line with the cervical spine and parallel to the board.

- **Fractures**

  - **Isolated Extremity Trauma**: Trauma without multisystem mechanism. Extremity trauma is defined as those cases of injury where the limb itself and/or the appendicular skeleton (shoulder or pelvic girdle) may be injured, e.g., dislocated shoulder, hip fracture or dislocation.

  - Administer IV NS 250 ml bolus one (1) time.

- **Impaled Object**: Remove object upon trauma base hospital physician order, if indicated.

- **Traumatic Arrest**: Continue CPR as appropriate.

  - Apply AED and follow the instructions.

- **Determination of Death on Scene**: Refer to ICEMA Reference #12010 - Determination of Death on Scene.

  - *Severe Blunt Force Trauma Arrest*: If indicated, transport to the closest receiving hospital.

  - *Penetrating Trauma Arrest*: If indicated, transport to the closest receiving hospital.

- If the patient does not meet the "Obvious Death Criteria" in ICEMA Reference #12010 - Determination of Death on Scene, contact the Trauma base hospital for determination of death on scene for those patients who suffer a traumatic cardiac arrest in the setting of penetrating trauma, and no reported vital signs (palpable pulse and/or spontaneous respirations) during the EMS encounter with the patient.

- Resuscitation efforts on a penetrating traumatic arrest victim are not to be terminated without trauma base hospital contact.

- **Precautions and Comments**:

  - Electrical injuries that result in cardiac arrest shall be treated as medical arrests.

  - Confirm low blood sugar in children and treat as indicated with altered level of consciousness.

  - Suspect child maltreatment when physical findings are inconsistent with the history. Remember reporting requirements for suspected child maltreatment.

  - **Unsafe scene may warrant transport despite low potential for survival**.

  - Whenever possible, consider minimal disturbance of a potential crime scene.

- **Base Hospital Orders**: May order additional fluid boluses.

IV. ALS INTERVENTIONS

- Advanced airway (as indicated).

  - Unmanageable Airway: If an adequate airway cannot be maintained with a BVM device; **<u>and</u>** the paramedic is unable to intubate or perform a successful needle cricothyrotomy (if indicated), **<u>then</u>**

transport to the closest receiving hospital and follow ICEMA Reference #8100 - Continuation of Trauma Care.

- Monitor ECG.

- IV/IO Access (Warm IV fluids when available).

  - *Unstable:* Vital signs (age appropriate) and/or signs of inadequate tissue perfusion, start 2nd IV access.

    Administer 20ml/kg NS bolus IV/IO, may repeat once.

  - *Stable*: Vital signs (age appropriate) and/or signs of adequate tissue perfusion.

    Maintain IV NS rate at TKO.

- Transport to Trauma Center: Pediatric patients identified as CTP will be transported to a pediatric trauma hospital when there is less than a 20 minute difference in transport time to the pediatric trauma hospital versus the closest trauma hospital.

- Insert nasogastric/orogastric tube as indicated

A. Manage Special Considerations

- **Axial Spinal Immobilization**: ALS personnel should remove axial spinal immobilization devices from patients placed in full axial spinal immobilization precautions by first responders and BLS personnel if the patient does not meet any of the following indicators while considering age-appropriate assessments when using the acronym (NSAID):

  N-euro Deficit(s) present?
  S-pinal Tenderness present?
  A-ltered Mental Status?
  I-ntoxication?
  D-istracting Injury?

  - Consider maintaining spinal alignment on the gurney, or using spinal axial immobilization on an awake, alert and cooperative patient, without the use of a rigid spine board.

  - Penetrating trauma without any NSAID indicators are not candidates for spinal immobilization using long board.

- **Axial Spinal Immobilization with use of Rigid Spine Board:** If the use of a rigid, spine board is indicated, and the level of the patient's head is greater than that of the torso, use approved pediatric spine board with a head drop or arrange padding on the board so that the ears line up with the shoulders and keep the entire lower spine and pelvis in line with the cervical spine and parallel to the board.

- **Blunt Chest Trauma:** Perform needle thoracostomy for chest trauma with symptomatic respiratory distress.

- **Fractures**

  - **Isolated Extremity Trauma**: Trauma without multisystem mechanism. Extremity trauma is defined as those cases of injury where the limb itself and/or the appendicular skeleton (shoulder or pelvic girdle) may be injured - e.g. dislocated shoulder, hip fracture or dislocation.

  - **Pain Relief**:
    - Morphine or Fentanyl per ICEMA Reference #7040 - Medication - Standard Orders.
    - For patients four (4) years old and older, consider Ondansetron per ICEMA Reference #7040 - Medication - Standard Orders.
    - Patients in high altitudes should be hydrated with IV NS prior to IV pain relief to reduce the incidents of nausea, vomiting, and transient hypotension, which are side effects associated with administering IV Morphine. Administer 20ml/kg NS bolus IV/IO one time.

- **Head and Neck Trauma**: Immediately prior to intubation, consider prophylactic Lidocaine per ICEMA Reference #7040 - Medication - Standard Orders for suspected head/brain injury.

- **Base Hospital Orders**: When considering Nasotracheal intubation ($\geq$15 years of age) and significant facial trauma, trauma to the face or nose and/or possible basilar skull fracture are present, Trauma base hospital contact is required.

- **Impaled Object**: Remove object upon Trauma base hospital physician order, if indicated.

- **Traumatic Arrest**: Continue CPR as appropriate.

  - Treat per ICEMA Reference #14040 - Cardiac Arrest - Pediatric.

- **Determination of Death on Scene**: Refer to ICEMA Reference #12010 - Determination of Death on Scene.

  - *Severe Blunt Force Trauma Arrest*: If indicated, transport to the closest receiving hospital.

  - *Penetrating Trauma Arrest*: If indicated, transport to the closest receiving hospital.

- If the patient does not meet the "Obvious Death Criteria" in ICEMA Reference #12010 - Determination of Death on Scene, contact the Trauma base hospital for determination of death on scene for those patients who suffer a traumatic cardiac arrest in the setting of penetrating trauma with documented asystole in at least two (2) leads, and no reported vital signs (palpable pulse and/or spontaneous respirations) during the EMS encounter with the patient.

- Resuscitation efforts on a penetrating traumatic arrest victim are not to be terminated without Trauma base hospital contact.

- **Precautions and Comments**:

  - Electrical injuries that result in cardiac arrest shall be treated as medical arrests.

  - Confirm low blood sugar in children and treat as indicated with altered level of consciousness.

  - Suspect child maltreatment when physical findings are inconsistent with the history. Remember reporting requirements for suspected child maltreatment.

  - **Unsafe scene may warrant transport despite low potential for survival**.

  - Whenever possible, consider minimal disturbance of a potential crime scene.

- **Base Hospital Orders**: May order additional medications and/or fluid boluses.

V. REFERENCES

Number	**Name**
7040	Medication - Standard Orders
10160	~~Axial Spinal Stabilization~~
12010	Determination of Death on Scene
14040	Cardiac Arrest - Pediatric
15030	Trauma Triage Criteria and Destination Policy