

## CRAMS Scale: Field Triage of Trauma Victims

*A simple 10-point scale was devised for the purpose of determining which trauma patients should go to a trauma center. The acronym "CRAMS" represents the five components measured: Circulation, Respiration, Abdomen, Motor, and Speech. The results of field triage were compared to final emergency department (ED) disposition. Those patients who died in the ED and those who went directly to the operating room (OR) for general surgery or neurosurgery were defined as major trauma. Of 12 patients defined as major trauma by ED disposition, 11 were defined as major trauma (CRAMS  $\leq$  8) in the field (sensitivity, 92%). This was compared to 8 defined as major trauma by Champion's Trauma Score. Of 313 defined as minor trauma by ED disposition (discharged home), 307 were defined as minor trauma (CRAMS  $\geq$  9) in the field (specificity, 98%). The CRAMS scale provides an effective net for major trauma while ensuring that minor trauma is not unnecessarily diverted to a trauma center. [Gormican SP: CRAMS scale: Field triage of trauma victims. *Ann Emerg Med* 11:132-135, March 1982.]*

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### INTRODUCTION

In order for trauma regionalization to be effective, there must be a simple and reliable means of separating trauma patients into categories of major trauma or minor trauma in the prehospital setting. A number of systems for scoring trauma patients have been devised and tested.<sup>1-4</sup> Baker's Injury Severity Score<sup>5</sup> is useful in predicting outcome and assessing quality of care, but is not applicable to field use. Champion's Trauma Score<sup>6</sup> is applicable to field use but is relatively complex.

A simple scale that is numerically similar to the Apgar score was devised for field triage. The acronym "CRAMS" represents the five components measured: Circulation, Respiration, Abdomen, Motor, and Speech. Up to two points are given to each category depending on whether the component is normal (2), mildly abnormal (1), or severely abnormal (0). The scale is simple to memorize and easy to use (Table 1).

All permutations of the CRAMS scale were analyzed. Scores of 9 or 10 were defined as minor trauma, and 8 or less as major trauma. Disposition from the emergency department (ED) was defined as minor when the patient was discharged home, and major when the patient died in the ED or went directly to the operating room (OR) for general surgery or neurosurgery. This study was undertaken to determine whether the CRAMS scale could accurately discriminate between major trauma and minor trauma.

### METHODS

All paramedic runs involving trauma over a four-month period at Scripps Base Station were included in the study. A CRAMS score was tabulated at the time of the run or immediately after by the mobile intensive care nurse or base station physician. Once the disposition from the ED was determined, it was recorded according to one of five possible categories: 1) home, 2) admitted without initial surgery, 3) admitted directly to the OR for other than general surgery or neurosurgery, 4) admitted directly to the OR for general surgery or neurosurgery, or 5) died in the ED. If the patient was transferred to another hospital, the disposition there was recorded. Excluded were

patients who signed AMAs in the field or who were dead at the scene, and seven cases for which ED dispositions were not available.

Champion's Trauma Score was tabulated for all patients with a hospital categorization of major trauma, ie, those who went directly to the OR for general surgery or neurosurgery and those who died in the ED.

**RESULTS**

There were 500 paramedic trauma transports out of a total of 1,723 paramedic runs. The ED dispositions associated with each CRAMS score are listed (Table 2). Of the 500 patients studied, 61 (12%) were defined as major trauma and 439 (88%) were defined as minor trauma by the CRAMS scale. The 500 patients were categorized in the hospital as follows: minor trauma (discharged home), 313 (62.6%); intermediate trauma (admitted without initial surgery or went to the OR for other than general surgery or neurosurgery), 175 (35%); and major trauma (went to the OR for general surgery or neurosurgery or died in the ED), 12 (2.4%) (Table 3).

**TABLE 1. Field categorization of trauma — CRAMS scale**

Components	Score
Circulation	
Normal capillary refill and BP > 100	2
Delayed capillary refill or 85 < BP < 100	1
No capillary refill or BP < 85	0
Respirations	
Normal	2
Abnormal (labored or shallow)	1
Absent	0
Abdomen	
Abdomen and thorax nontender	2
Abdomen or thorax tender	1
Abdomen rigid or flail chest*	0
Motor	
Normal	2
Responds only to pain (other than decerebrate)	1
No response (or decerebrate)	0
Speech	
Normal	2
Confused	1
No intelligible words	0

Score ≤ 8 — Major Trauma  
 Score ≥ 9 — Minor Trauma

\*"Penetrating wounds to the abdomen or thorax" has been added after the study.

**TABLE 2. Field triage and emergency department disposition**

Categorization by Field Triage	CRAMS Score	Number of Patients	Categorization by ED Disposition				
			Minor Home	Intermediate		Major	
				Admitted Without Initial Surgery	Surgery Other than General or Neurosurgery	General or Neurosurgery	Died In ED
Minor	10	392	290	38	64	0**	0**
Minor	9	47	17	19	10	1**	0**
Minor Total	≥ 9	439	307	57	74	1**	0**
Major	8	25	4*	11	9	1	0
Major	7	13	1*	6	5	1	0
Major	6	6	1*	3	1	1	0
Major	5	9	0*	7	0	1	1
Major	4	2	0*	1	1	0	0
Major	3	2	0*	0	0	0	2
Major	2	2	0*	0	0	2	0
Major	1	0	0*	0	0	0	0
Major	0	2	0*	0	0	0	2
Major Total	≤ 8	61	6*	28	16	6	5
Grand Total		500	313	85	90	7	5

\*False positives.  
\*\*False negatives.

**TABLE 3.** Summary of Table 2

Field Categorization	Hospital Categorization			Total
	Minor	Intermediate	Major	
Minor CRAMS $\geq$ 9	307	131	1	439
Major CRAMS $\leq$ 8	6	44	11	61
Total	313	175	12	500

**TABLE 4.** Comparison of CRAMS and Champion's Trauma Score

Diagnosis	Correctly Triaged as Major Trauma	
	CRAMS Major $\leq$ 8	Champion Major $\leq$ 12
Stab wounds—abdomen	No (9)	No (16)
Ruptured kidney	Yes (8)	No (15)
Head injury	Yes (7)	No (13)
Ruptured spleen	Yes (5)	No (14)
Subdural hematoma	Yes (6)	Yes (11)
Head and internal injuries	Yes (2)	Yes (8)
Head and facial injuries	Yes (2)	Yes (4)
Head injury—died	Yes (3)	Yes (10)
Died in ED	Yes (5)	Yes (11)
Died in ED	Yes (3)	Yes (6)
Arrested in field	Yes (0)	Yes (3)
Arrested in field	Yes (0)	Yes (1)
Major trauma correctly triaged	92% (11/12)	67% (8/12)

Numbers in parentheses are scores obtained.

Of the 12 patients with a hospital categorization of major trauma, 11 were correctly triaged as major trauma (CRAMS  $\leq$  8) in the field (sensitivity, 92%). This compared to 8 who would have been triaged correctly as major trauma using Champion's Trauma Score (Table 4). Of the 313 patients with a hospital categorization of minor trauma, 307 were triaged as minor trauma (CRAMS  $\geq$  9) in the field (specificity, 98%).

#### DISCUSSION

Certain assumptions in the study

have to be acknowledged. First, the study was done in an EMS system that is currently not regionalized for trauma. In fact, the study was undertaken out of a need for a definition of major trauma as a first step in setting up a trauma regionalization plan. We assumed that trauma regionalization would not significantly affect the final ED disposition.

Second, field categorization included major and minor trauma, and hospital categorization included major, minor, and intermediate. We assumed that while it would not be in-

appropriate to have an intermediate trauma patient sent to a trauma center, many such patients can be adequately cared for at a satellite hospital. Admittedly, there are "intermediate" trauma patients who may have sustained severe trauma, but by definition they do not require immediate life-saving surgery. Intermediate trauma was defined as being admitted without initial surgery or going to the OR for other than general surgery or neurosurgery, ie, orthopedic, plastic, and ENT. A satellite hospital should be able to provide stabilizing care until transfer can be effected if it is necessary.

Although the main purpose of the study was not to compare the CRAMS with the Champion scale, it appears that the CRAMS, in addition to being simpler, may be more reliable than the Champion. Of the 12 major trauma patients, four would have been incorrectly triaged with the Champion scale, and only one was incorrectly triaged with the CRAMS scale. However, a larger number of major trauma patients would be needed before a definitive comparison could be made.

The one major trauma patient whom the CRAMS scale did not correctly triage had stab wounds to the abdomen. Although not all stab wounds are explored, many do require surgery. For this reason, the CRAMS scale has been modified to have "penetrating wounds to the abdomen or thorax" added to the abdomen component that receives 0. This would have increased the sensitivity to 100% for the study population. Still, it is likely that there will be a small group of patients who score well on parameters measured in the field and subsequently manifest signs of major trauma. If cooperative transfer agreements between satellite hospitals and trauma centers are in effect to catch these few patients, it should be unnecessary to send the 88% of patients that are minor trauma to a trauma center.

Evaluating the mechanism of injury, underlying medical condition, age, and any unusual information not measured in the scale is obviously important. While no method of assessment will be accurate 100% of the time, a good scale will help to minimize incorrect triage. Of the 500 patients studied, there were 6 false positives (triaged as major but proved to be minor) and one false negative (triaged as minor and proved to be major).

### CONCLUSION

The CRAMS scale provides a simple and reliable method of separating those patients who can be treated and released from those who may need life-saving surgery.

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## Call for Scientific Exhibits for the 1982 Scientific Assembly

The ACEP Scientific Meetings Committee has issued a call for scientific exhibits to be considered for presentation at the 1982 Scientific Assembly in San Francisco, California, September 28-October 1, 1982.

George Podgorny, MD, and Harold A. Jayne, MD, co-chairmen of the Scientific Meetings Committee, have set June 30, 1982, as the deadline for submission of notice of intent to present a scientific exhibit.

Exhibits should be directly related to some aspect of emergency medicine. Construction should be reasonably sturdy and data presented in sufficient clarity. Letters of intent and/or inquiries for information concerning scientific exhibits should be submitted to: Harold A. Jayne, MD, Scientific Meetings Committee, ACEP, PO Box 61911, Dallas, TX 75261.

All scientific exhibits presented at the meeting will be judged for their originality, presentation, and content values. The exhibit judged to be best will be awarded an appropriate citation and a \$1,000 prize.

The judgment of the Scientific Meetings Committee is final.