

Triage Simulation for Emergency Preparedness Training

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Appreciation

Collaboration

- | Hamilton Consulting
- | National Capital Area Medical Simulation Center
- | Advanced Simulation Corporation
- | Numerical Data Laboratories

Support

- | Office of the Secretary of Defense – Health Affairs
- | RTI International, Internal R&D
- | Telemedicine and Advanced Technology Research Center
- | National Science Foundation
- | Agency for Healthcare Research and Quality
- | National Medical Technology Testbed

What is a Disaster

“Any situation where existing resources do not meet resource needs.”



Community



Scene



Facility

Medical Disasters

Multiple Injuries

- | Large number of casualties per medical provider
- | Different and/or combined injuries

Inadequate Resources

- | Limited personnel and/or competencies
- | Limited facilities, equipment, and supplies
- | Delay in transport, delay in definitive care

Other concerns

- | Scene safety
- | Biological or chemical contamination
- | Fatigue, emotional stress

Triage Simulation - Objectives

Knowledge

- | Familiarize clinical personnel with triage procedures
- | Recognize injuries, and anticipate complications

Skills

- | Practice assessment and treatment protocols
- | Practice triage protocols (e.g., MASS, START,..)

Attitude

- | Gain experience in multiple-casualty scenarios
- | Gain experience in managing limited resources
- | Gain confidence in triage decision-making
- | integrate learned knowledge through experience

Integrated Curriculum

Learning Simulation Progress Review Preferences

1 Prehospital Triage
2 Disaster Scenes
3 Triage Learning Objectives
4 Disaster Response
5 Triage Overview
6 On Scene
7 Triage Methods
8 Triage Methods
9 **ID – Me ...Triage Categories**
10 Civilian MCI
11 START
12 Respiratory Status
13 Perfusion Status
14 CNS Status
15 Jump-START
16 Respiratory Status
17 Perfusion Status
18 CNS Status
19 START-SAVE
20 RaPID-T
21 Summary

ID – Me ... Triage Categories

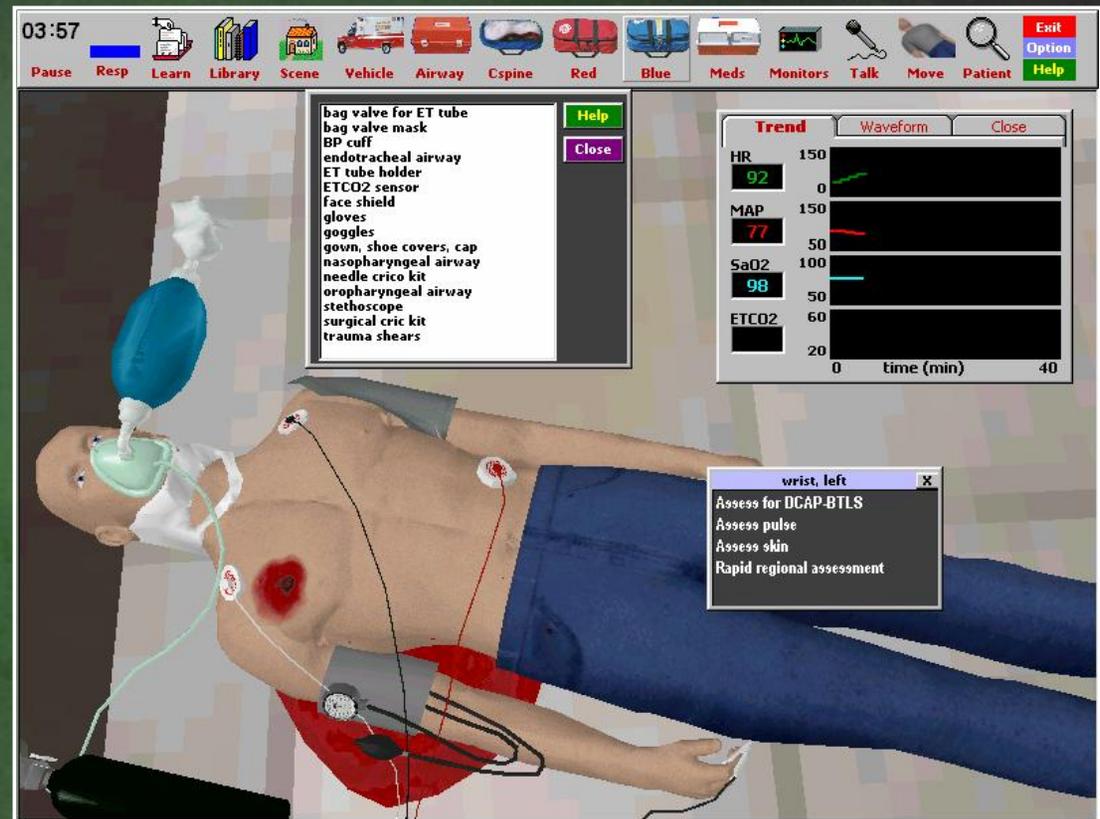
- **Immediate:** Life threatening injury
- **Delayed:** Need for hospital care
- **Minimal:** Need for limited care
- **Expectant:** No hope of survival

Care for patients should go immediate, expectant, delayed, minimal if resources permit
Red – immediate intervention or they will die
Yellow – needs care but will not die if you care for other patients
Black – death or near death due to injury or lack of resources
Green – Care for self, non-disruptive, and can ambulate to safety

Outline Notes Slide 9 of 21 Slide Show

Sim-Patient - Trauma Patient Simulator

- | Case-based scenarios
- | Occupation-based protocols
- | Configurable medical materiel
- | Interactive patient assessment
- | Interactive medical devices
- | Responsive physiology
- | Learning mode
- | After-Action Review



**Gunshot casualty with
hemorrhage and pneumothorax**

Skin texturing of clinical signs & injuries



Extremity fracture



Abdominal penetration

Casualty Behavior – Clinical Signs & Symptoms



DEMO

Physiology Models

(Extended ASC BODY, Smith and Starko)

Cardiovascular

- | beating heart
- | arterial & venous compartments
- | circulating blood transport
- | tissue compartments

Respiratory

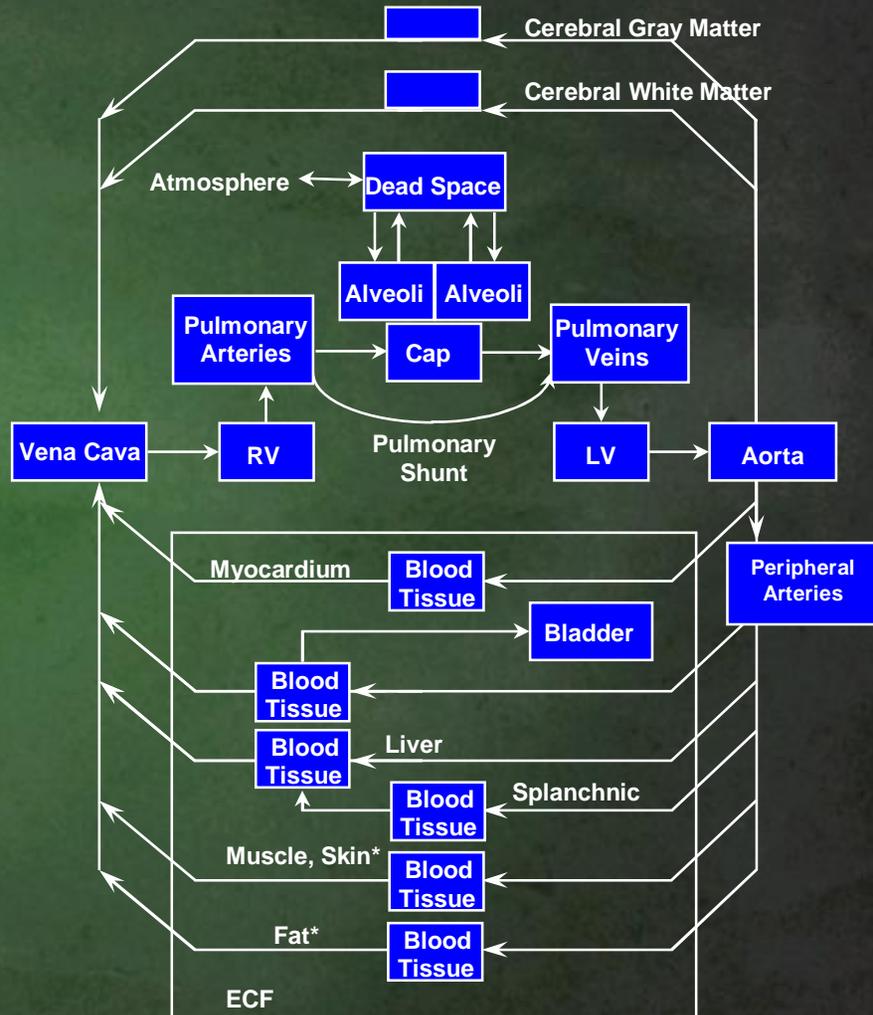
- | ventilation waveforms
- | O₂ / CO₂ gas exchange
- | O₂Hb transport / O₂ dissociation
- | O₂ utilization / CO₂ production

Pharmacological

- | IV, IM, and resp. routes
- | metabolism and excretion
- | Rx effects (CV, neural, muscular)

Other

- | level of consciousness
- | cerebral pulse pressure



Casualty Design (ATLS Criteria)

Case #	Primary Injury	Complications	Treatment Notes
1	Head, blunt trauma	Closed head injury	Evacuate
2	Head, penetration	Minor bleeding	First aid
3	Burn	Airway obstruction, fluid loss	airway and fluid management
4	Chest penetration	Pneumothorax, hemothorax	Thoracentesis, chest tube
5	Blunt trauma abdomen	Internal bleeding	Evacuate
6	Severe Orthopedic: pelvic and longbone	Internal bleeding, extremity function	Splint, evacuate
7	Thigh penetration: exit wound	Arterial bleeding, possible fracture	Pressure dressing, splint
8	Amputation	Arterial bleeding	Tourniquet
9	Panic	Anxiety reaction, hyperventilation	Calming, Rx, O ₂

Learning

Simulation

Progress

Review

Preferences



01:02

Pause



Learn



Scene



Misc



Airway



Trauma



Immobile



Monitor



Advanced



Meds



Talk



Move

Exit

Option

Help



Triage Tags

IMMEDIATE

DELAYED

MINIMAL

EXPECTANT

DECEASED

Point and Click



Left Side View

Right Side View

Initial View

Close

triage5z.avi

Features - Mass Casualty Simulator

- | Triage - Assess and Tag
- | Multiple patient simulation
- | Multiple physiology models
- | Multiple patient care
- | Medically-relevant animations
- | Learning mode
- | After-Action Review



Summary

- | A multiple-casualty simulation system has been developed and demonstrated for practice of disaster casualty triage.
- | Multiple-casualty scenarios can be effectively simulated using “gaming” computer technology (9 casualties in a 1 GB system)
- | Virtual patient simulation offers a new capability for training and evaluating medical response to multiple-casualty events.

Thank You

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