



# Sim-Patient Triage Scenarios

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US Army Medical Research and Materiel Command, Ft. Detrick, Maryland**



# Project Description



- **Learning Objectives**

- Familiarize personnel with triage procedures
- Recognize injuries, and anticipate complications
- Practice assessment, triage and treatment
- Practice scene evacuation management

- **Specific Aims**

- Provide trauma scenarios with 6-9 casualties
- Provide graphically-accurate injury representations
- Provide physiologically-responsive trauma conditions
- Simulate consumable medical resources
- Simulate MEDEVAC requests and transport management
- Provide student performance feedback



# Baseline: Sim-Patient IRAD



- **STATCare**

- Single casualty
  - Graphics
  - Physiology
  - Animation
- Resource sets
- Renderware

- **Sim-Patient IRAD**

- Multiple casualties
- Learning management
- RTI behavior engine
- NDL Gamebryo



**Gunshot casualty with hemorrhage and pneumothorax**



# 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,<br>fluid loss        | airway and fluid<br>management |
| 4      | Chest penetration                         | Pneumothorax,<br>hemothorax              | Thoracentesis,<br>chest tube   |
| 5      | Blunt trauma<br>abdomen                   | Internal bleeding                        | Evacuate                       |
| 6      | Severe Orthopedic:<br>pelvic and longbone | Internal bleeding,<br>extremity function | Splint, evacuate               |
| 7      | Thigh penetration:<br>exit wound          | Arterial bleeding,<br>possible fracture  | Pressure dressing,<br>splint   |
| 8      | Amputation                                | Arterial bleeding                        | Tourniquet                     |
| 9      | Panic                                     | Anxiety reaction,<br>hyperventilation    | Calming, Rx, O <sub>2</sub>    |

Advisor: COL Mark Bowyer, MD, National Capitol Area Medical Simulation Center



# Sim-Patient Triage Casualties





# Familiarize: Didactic Learning Objects



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

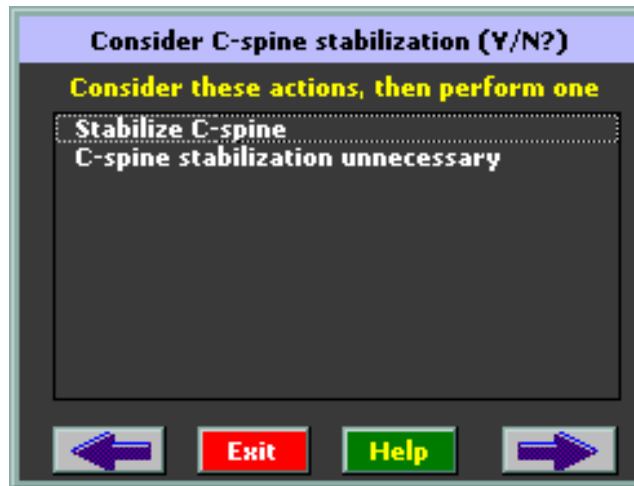
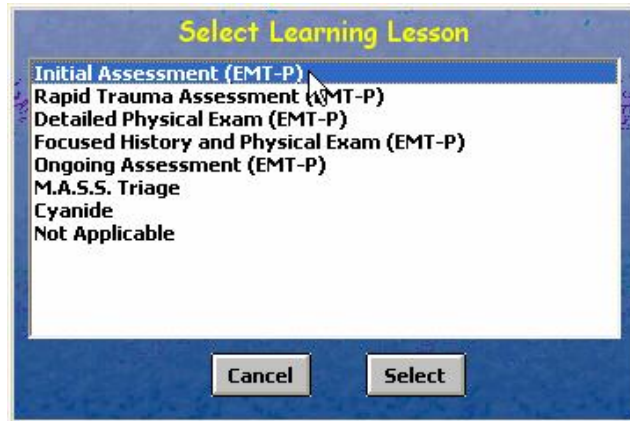
Outline Notes Slide 9 of 21 Slide Show



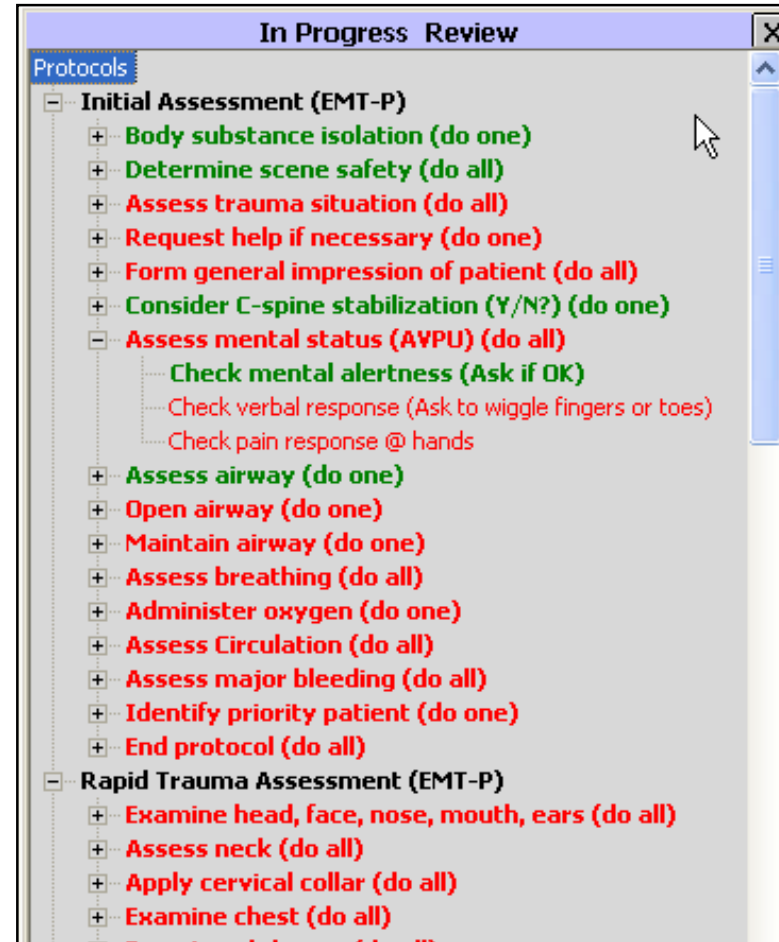
# Acquire: Cognitive & Procedure Skills



## Step-by-step instruction



## After-action checklist





# Practice: Interactive Triage Scenarios



Learning Tabs

Medical Resources



Transport management

Triage Tags

Quick patient navigation





# Validate: Case Log / Instructor Review



| Time | A | B | LOC    | HR | BP     | RR | SaO2 | Interaction                          | Object           | Message           |
|------|---|---|--------|----|--------|----|------|--------------------------------------|------------------|-------------------|
| 7    |   |   |        |    |        |    |      | > Apply cervical collar              |                  |                   |
| 30   | 1 | 1 | Verbal | 67 | 120/68 | 14 | 98   |                                      |                  |                   |
| 39   |   |   |        |    |        |    |      | > Apply BP cuff                      |                  | What did you say? |
| 59   |   |   |        |    |        |    |      | Remove clothing                      | shirt, open c... | Clothing removed  |
| 60   | 1 | 1 | Verbal | 70 | 114/69 | 15 | 98   |                                      |                  |                   |
| 62   |   |   |        |    |        |    |      | Remove clothing                      | sleeve, shor...  | Clothing removed  |
| 63   |   |   |        |    |        |    |      | Remove clothing                      | sleeve, shor...  | Clothing removed  |
| 71   |   |   |        |    |        |    |      | > Apply occlusive dressing, 3-sid... | chest, upper...  |                   |
| 90   | 1 | 1 | Verbal | 74 | 111/68 | 14 | 98   |                                      |                  |                   |
| 120  | 1 | 1 | Verbal | 77 | 110/68 | 14 | 98   |                                      |                  |                   |
| 150  | 1 | 1 | Verbal | 79 | 108/69 | 14 | 98   |                                      |                  |                   |
| 159  |   |   |        |    |        |    |      | > Administer dopamine                |                  |                   |



# Deliverables, Milestones



- **Deliverable(s):**
  - **Multiple-casualty trauma triage scenarios**
  - **Scenario CDs for distribution** (req. runtime license)
  - **Four Sim-Patient simulation systems**
    - 1 - Camp Bucca, Iraq
    - 1 - School of Combat Medicine, Fort Campbell, KY
    - 1 - Fort Belvoir, VA
    - 1 – undecided
  
- **Key Milestone Dates & Milestones:**
  - **June 05**                      **project completed**
  - **July 05**                        **evaluation started at Fort Campbell**
  - **October 05**                    **evaluation to be completed**



# Potential Benefits, Military Relevance



- **Potential Benefit(s):**

- Training and assessment of multiple-casualty medical response
- Scenario-based training with physiologically-responsive casualties
- Visually stimulating with graphically intense casualties for generating emotional involvement
- Challenges the student with the chaos of multiple-casualty assessment and management, with limited transport and depleting resources

- **Military Relevance:**

- Portable for deployment in the theater of operations.
- Affordable for distribution to small, local training units
- Scalable for use at larger training centers
- Can be networked for team training, or interfaced to “dumb” manikins for haptic hands-on skills assessment



# Successes, Challenges to Date



- **Successes:**
  - Multiple-casualties, each with real-time physiology
  - Four systems delivered for pre/post deployment training
  
- **Challenges:**
  - **Technical:**
    - 3D conversion required complete rework of casualty models, casualty animations, supporting software, and supporting database
    - Multiple-casualty simulation requires substantial processing (3 GHz), graphics (256 MB), and memory (2 GB) resources
    - No “gold standard” for evaluating triage effectiveness
  
  - **Programmatic:**
    - No significant issues
    - No clear mechanism for transferring R&D prototype technologies to practical application (i.e., DoD Acquisition and Deployment)



# Sim-Patient Haptic Concepts



Desktop skill-station with part-task medical skill trainers.



Semi-immersive experience using life-size projection display.



# “Take-Home” Message



- **Science &/or Technology Gaps Near-Term:**
  - Current behavior models are relatively basic. Behaviors should include medically-relevant animations, spontaneous gestures and utterances, context-based casualty dialogue, and context-based movement.
  - Multiple providers should train to work together. Preliminary work on networking Sim-Patient for team training has shown promise.
  - Open standards for interfacing virtual patients with manikins, part-task trainers, and virtual medical devices should be developed.
- **Other**
  - Multiple-patient scenarios can be effectively simulated using “gaming” computer technology (9 casualties in a 2 GB system).
  - With Sim-Patient, RTI’s patient simulation technology has moved from the prototype (STATCare) to early-adopter phase.