Sim-Patient Triage Scenarios

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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, 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

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

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Sim-Patient Triage Casualties

Familiarize: Didactic Learning Objects
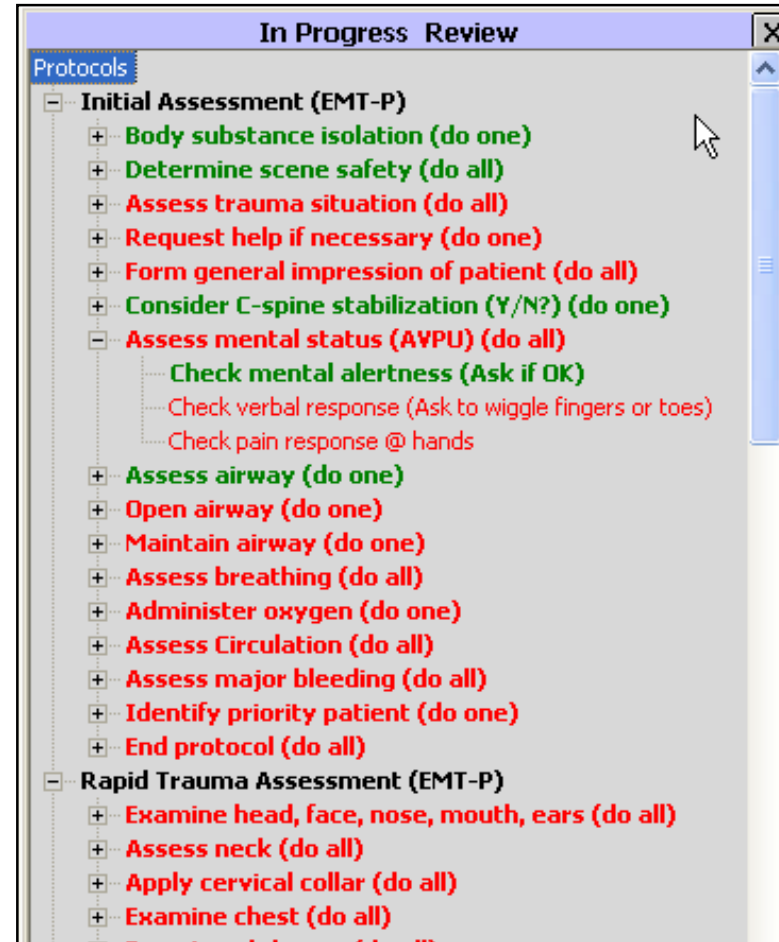
Acquire: Cognitive & Procedure Skills

Step-by-step instruction
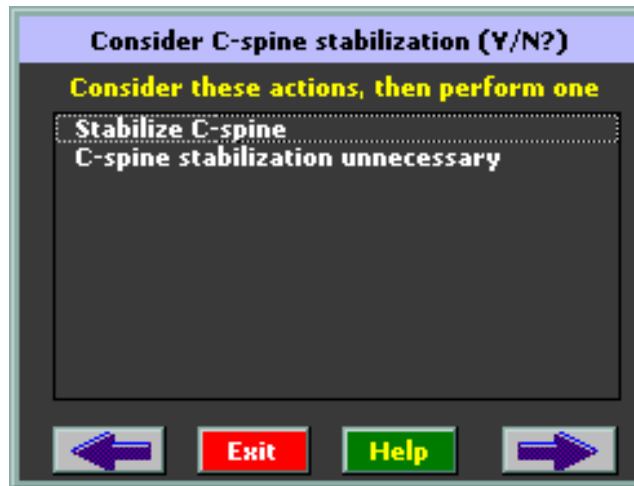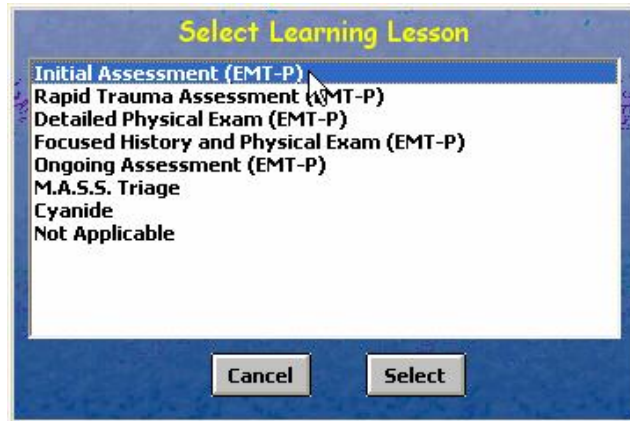
After-action checklist

Practice: Interactive Triage Scenarios

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
  - Scaleable 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.