IMPROVING MEDICAL CRISIS TEAM PERFORMANCE USING A COMPUTERIZED HUMAN PATIENT SIMULATOR

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ABSTRACT

Objective: Crisis TEAM Training (CTT) using human simulators can be used to develop team skills, and improve team performance during a medical crisis.

Methods: Prospective cohort of trainees undergoing crisis team training course using a Laerdal SimMan at a university tertiary care hospital, from March 2002 to May 2003. Each course consisted of (1) Web-based presentation and pretest prior to the course (material focuses on TEAM organization and specifies roles and goals of individuals responding to a crisis); (2) brief review prior to simulation; and (3) three different scenario simulations (sessions). There are five scenarios, and three were utilized for each course. Participants were videorecorded to facilitate debriefing. Participants assessed for completion of organizational and procedural tasks within 1 and 3 minutes.

Measurements and Main Results: We trained 138 clinically experienced individuals: 69 critical care (CC) nurses, 48 physicians, and 21 respiratory therapists. Task completion rate was 26%, and rose to 89% from the first to the third session (p= 0.001). Simulated "survival" (completing predetermined critical tasks within 3 minutes) increased from 1/9 in the first session to 9/9 in the third (p<0.002).

Discussion: There are little data on compliance with ACLS guidelines in a crisis situation. Our data during CTT indicates critical task completion is low even among ACLS trained individuals at the beginning of the course. Following CTT focusing on team organization skills, TEAM performance improved significantly.

Conclusions: Performance of critical tasks like defibrillation during crisis scenarios is poor at baseline when tested in a simulator setting. Following Crisis TEAM Training, performance may improve.

INTRODUCTION

Human patient simulation is an effective tool medical education for individuals, and trauma teams. However, to our knowledge there are no reports of training teams to respond to other medical crisis situations. Although not widely reported in the medical literature, many professionals recognize that in-hospital team response to medical crisis may be chaotic.

To try to improve crisis response at the University of Pittsburgh, we created a "Crisis TEAM Training" course that utilizes web-based computerized human simulator technology. (We capitalize TEAM for emphasis). Our preliminary experience in improving design of a crisis response, and training multidisciplinary teams to respond to in-hospital crisis events is described in this poster.

METHODS

Setting. The UPMC WISER center has 10 full body Laerdal SimMan simulators occupies 7000 sq. ft.

Simulator. The Laerdal SimMan is a computer-based mannequin with human physiology emulation capability.

Video recording. We utilized two video cameras in the simulation patient room using a digital video recorder model VT400, from EZCam Inc. (Trenton, MI). The EZCam software allows playback of the cameras and patient monitor via a web browser.

Trainees. Trainees were ACLS certified within two years of their simulation training and included critical care nurses, respiratory therapists, and physicians. Every course had at least one person from each discipline. Physicians were usually trainees (including fellows in Critical Care Medicine (CCM) and Pulmonary/CCM, and residents in internal medicine, anesthesiology, and emergency medicine).

Curriculum. The Crisis TEAM Training course has four components: a web-based power point pre-course presentation, a brief didactic session, video recorded simulations, and a facilitator moderated debriefing.

Crisis Response. Our design for team response is highly detailed: team member roles, the goals for each team member, the tasks delegated to that role (Figure 1), and communication pathways.

Simulations. We selected 3 of 5 simulation scenarios for each course:1) ventricular fibrillation (pulseless apnea); 2)hemodynamically significant ventricular tachycardia in an awake patient; 3) acute unresponsiveness due to opioid overdose or 4) stroke, and 5)acute pulmonary edema due to acute myocardial infarction.

Measuring Performance. The primary goal of the crisis team is mannequin "survival." Survival required effective airway management, maintenance of circulation, and delivering the "definitive treatment" for the scenario (e.g. defibrillation for v. fibrillation. We measured completion of key organizational and treatment tasks. The task completion rate (%) is the number of tasks completed divided by the number applicable for each scenario. The tasks fall into 3 domains: 1) Patient assessment & treatment, 2) team organization, & 3) communication. Scoring is recorded during debriefing on a preformatted Excel spreadsheet; completed tasks assigned a score of 1, incomplete gets a "0". We play the video for the first 60 seconds, and assign scores for each task required within this time frame. The next two minutes are then reviewed, followed by scoring of the three-minute goals.

METHODS: TEAM Roles and Goals

Team Roles & Goals

Note: This slide is part of the CORE CURRICULUM

Personnel	Role, responsibility
1. Airway Manager	Assist ventilation, intubate
2. Airway Assistant	Assist ventilation, oxygen and suction setup, suction
3. Bedside Nurse (Floor RN)	Assess enough patent IV's, push meds,defib pads, check pulse*.
4. Crash Cart Nurse (ICURN)	Prepare meds, record code events
5. Team Leader	Assess team, analyze data, direct treatment, triage to next care site.
6. Chest com pressions	Perform chest compressions*
7. Procedure MD	Perform procedures: iv, chest tubes,ABGs, etc*.
8. Recorder Nurse (ICURN)	Data manager: results, chart, interventions

RESULTS

Task completion and simulated survival rate
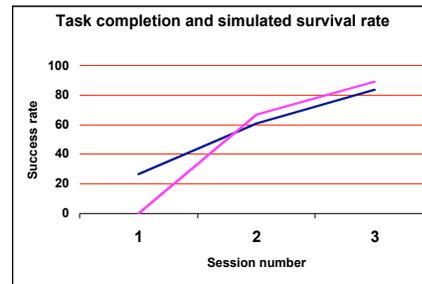
Overall team task completion rate (blue line) and simulated survival rate (pink line) during first, second and third scenario encountered by 134 trainees during 9 three-hour Crisis TEAM Training programs.

CONCLUSION

Effective teamwork requires: delegation of task responsibility to specific team members, "choreographing" movements so that team members do not interfere with each others' activities, prioritizing tasks, and equally importantly, effective communication.

Team training recognition that multistep processes are needed to accomplish even "simple" tasks like appropriate delivery of effective chest compressions (position 2 team members in appropriate location, check pulse, verify pulselessness, place backboard, perform compressions, simultaneously assess pulse for effectiveness).

Meticulous design of the team response enables standardized training and rehearsal, fosters dissemination of goals, and permits objective performance assessment.

Our novel multidisciplinary simulator-based Crisis TEAM training program has generated pilot data that suggests it is effective in improving performance in a simulation setting.

Additional work is needed to definitively demonstrate efficacy, and to determine whether behaviors learned in simulated crisis transfer to clinical crisis responses.

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