


HIGH-FIDELITY SIMULATION TRAINING IN EMS


Wisconsin Simulation Study (2008/09)

Welcome / Introduction

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Waukesha County Technical College (Wisconsin)
- Wisconsin EMS licensure, education and training governed by Wisconsin Department of Health Services, Division of Public Health, EMS Section
 - Predominantly ss. 256; and DHS 110




Wisconsin EMS



□ 785 licensed ambulance services	□ 18,158 licensed EMS providers
□ 333 First Responder	□ 3,718 First Responders
□ 153 EMT-Basic	□ 8,253 EMT-Basics
□ 139 Int. Technician	□ 2,633 Int. Technicians
□ 16 Intermediate (I-99)	□ 225 Intermediates (I-99)
□ 135 Paramedic	□ 3,329 Paramedics
□ 9 Air Medical	

523,909 runs annually (2010) state-wide



Wisconsin EMS Training

- 27 State-Approved EMS Training Centers
 - 21 Provide Initial EMS Education
 - 2 EMT-Basic
 - 3 Int. Technician
 - 1 Intermediate (I-99)
 - 15 Paramedic
- 16 Wisconsin Technical Colleges
 - 323 Certified EMS Instructors
 - 2,513 Students Educated Annually (2009-10) In Initial Disciplines (Refresher training not included)
 - 800+ Paramedic



Paramedic Clinical and Field Training Requirements

- Minimum 500 hours of clinical and field time
- 8 airway management experiences
- 2 successful ETT placements
- 50 field contacts
- 15 pediatric contacts
- Various assessment and treatment plans for specific body systems and pathophysiologies
- Various skills, including medication administration routes



Problem Identification

- Field Site Issues
 - Services charging for precepting
 - "Borrowed servant" and workers compensation
 - Low call volume
 - Union/Collective Bargaining issues
 - Service benchmarks
 - Oversight
- Clinical Site Issues
 - Competition for clinical sites between programs and other health care disciplines
 - Low frequency of certain patient presentations
 - Limited OR access (liability concerns)
 - Oversight
 - Administrative Hurdles



Hypothesis

- High-fidelity simulation training can be utilized to supplement current educational methodologies without detriment to the EMS student.



Study Design

- Three training centers
 - Fox Valley, Mid-State, and Waukesha
- High-fidelity simulation mannequins were used
- Training centers ran and scheduled their labs according to local needs and constraints
- Student demographic data collected
- One-half of students in each section randomly selected to participate as a part of the study group (students must consent to participating)
- Study group students obtained one-half of all State-mandated competencies in simulation lab




Study Design

- Study group students received 250 hours of time credited to their total for the hours spent in the simulation lab obtaining the required competencies (one-half of the 500 hours mandated for clinical and field time in Rule)
- Students allowed to leave study group and receive pro-rated credit for hours spent in simulation lab experiences
- Study could have been terminated if simulation group student performance suffers substantially
- Students were assessed at the end of the respective program sections with a standardized evaluation tool (Objective Structured Clinical Evaluation, "OSCE")




Technology Overview




- Airway –
 - Oral and Nasal Adjuncts, Combitube, LMA, ETT Insertion
 - Surgical Airway
 - Spontaneous Respiration
 - Laryngospasm, Pharyngeal Obstruction, Trismus and Tongue Edema
 - Increased resistance
 - Pneumothorax decompression
 - Independent lung sounds (L v. R)
 - Exhaled CO₂

- Pulses
 - Carotid, Femoral, Brachial, Radial, Dorsalis Pedis and Posterior Tibialis
 - Synchronized with ECG or compressions
 - Variable strength given blood pressure
 - Pulse oximetry
 - Defibrillation, pacing and cardioversion
- Other
 - Heart sounds
 - Auscultated or palpated blood pressure
 - Bowel sounds
 - Cyanosis
 - Responsive pupils




The Participants




Student Demographics


- 69 Students
 - 47 male, 22 female
 - 32 Control Group Students; 37 Simulation Group Students
- Average Age = 26.7 (19 to 61)
- 38 Basics, 26 Intermediate Technicians, 5 Intermediates
- Average EMS Experience = 4.3 years (0 to 31)
 - 35% (24) with less than two years of experience
- Average Monthly Call Volume = 28.8 (0 to 250)
- 1 HS/GED, 40 Some College/Technical Diploma, 24 Associate Degree, 4 Bachelor Degree

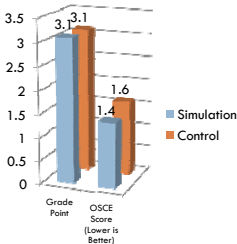


The Results

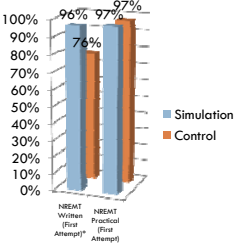


Standardized Testing






Metric	Simulation	Control
Grade Point	3.1	3.1
OSCE Score (Lower is Better)	1.4	1.6

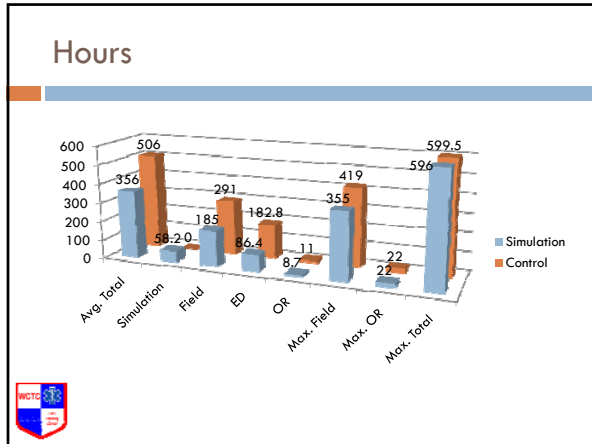


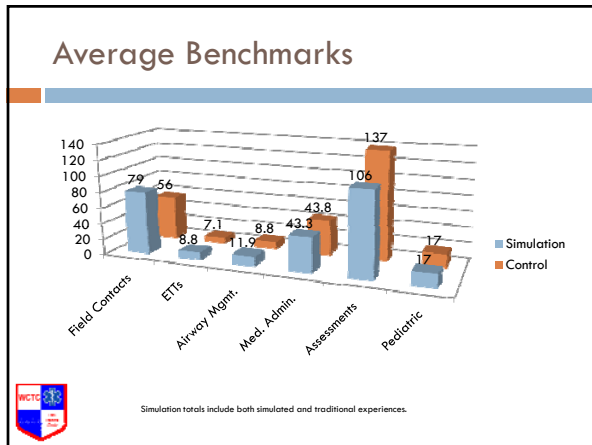
Exam Type	Simulation	Control
NREMT Written (First Attempt)	96%	76%
NREMT Practical (First Attempt)	97%	97%

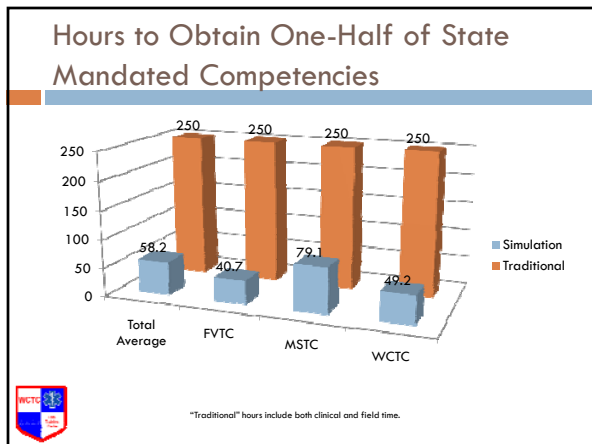
*NREMT had 56% pass rate for control (9) students vs. 91% for simulation (13) students. WCTC had same pass rate for both simulation (13) and control (12) students (92%). FVTC did not have any control student results at the time of data compilation; 100% of their simulation students (3) passed.

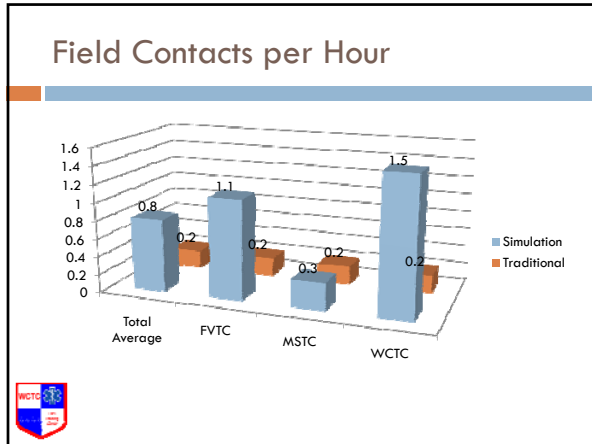
The Data

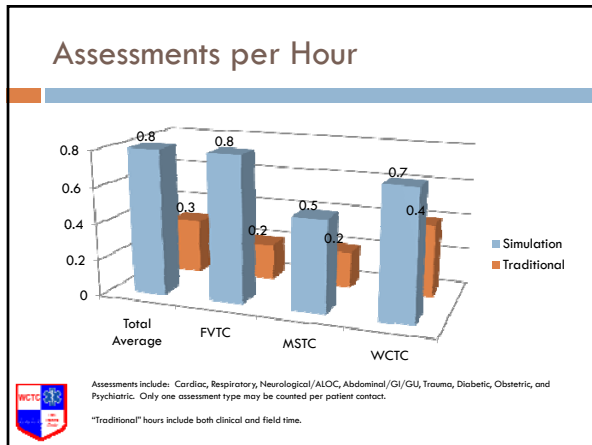


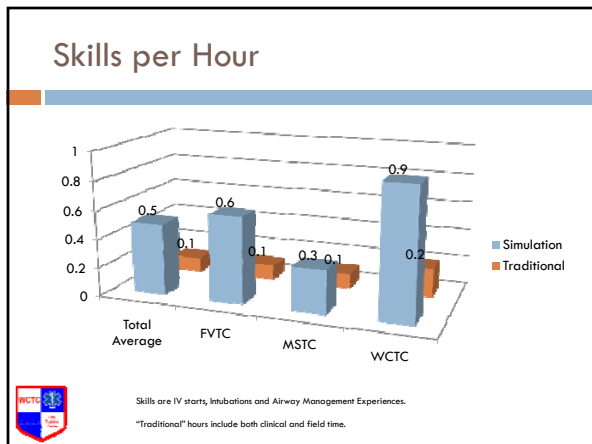


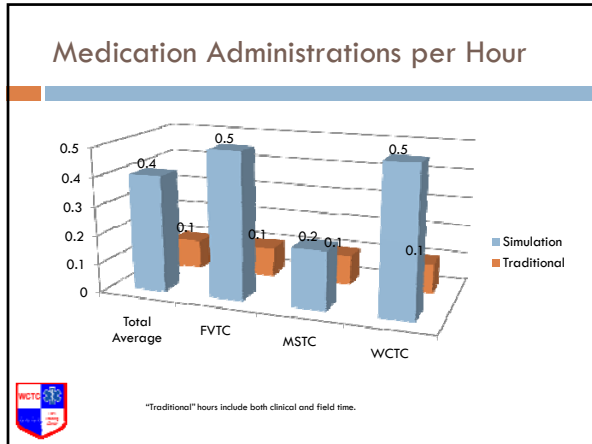












Simulation Efficiency Ratios

	Simulation-to-Traditional Hours Ratio
Simulation Hours	1 : 4.3 (3.2 min. to 6.1 max.)
Field Contacts per Hour	1 : 4.0 (1.5 min. to 7.5 max.)
Assessments per Hour	1 : 2.7 (2.8 min. to 4.0 max.)
Skills per Hour	1 : 5.0 (3.0 min. to 6.0 max.)
Medication Administrations per Hour	1 : 4.0 (2.0 min. to 5.0 max.)

Student Surveys

	Simulation	Control
Too much simulation lab time	Disagree	Disagree
Not enough simulation lab time	Neutral	Agree
Too much or not enough clinical time	Neutral	Neutral
Too much field time	Disagree	Neutral
Not enough field time	Neutral	Disagree
Clinical experiences reinforced learning	Agree	Strongly Agree
Field experiences reinforced learning	Strongly Agree	Agree
Simulation reinforced learning	Agree	Neutral
Simulation scenarios were challenging	Strongly Agree	Agree
Simulation scenarios reinforced learning	Strongly Agree	Agree
Simulation time was productive	Agree	Neutral
Clinical and field time was productive	Agree	Agree

19 students responded (10 simulation students, 9 control students)

Student Feedback

- "I fell that the people that participated in only clinical/field time were not given enough time in the HPS."
- "I think more experience [with] the HPS would have been beneficial to create some scenarios that cannot be created in day-to-day life in the field."
- "I would've liked to do more with it [HPS] before going into the field. It was a very good learning tool."
- "I spent a lot of days at field sites with [only] 1 or 2 calls."
- "If it weren't for HPS, I wouldn't have learned half as much or felt half as prepared."



Cost Savings (WCTC)

- 91.7 less ED hours per student
 - ▣ 16 students per section, 3:1 student-to-instructor ratio (occasionally 2:1), \$40.71 per instructor hour (without benefits)
 - ▣ $91.7 \times 16 / 3 \times 40.71 = \$19,909.90$
- 110 less field hours per student
 - ▣ 69% of field time last year was with a service that charges \$1.50 per hour.
 - ▣ 7.1% of field time last year was with a service that charges \$0.50 per hour.
 - ▣ $(110 \times 16 \times 0.69 \times 1.5) + (110 \times 16 \times 0.071 \times 0.5) = \$1,884.08$
- 49.2 simulation lab hours per student
 - ▣ Same as above with 4:1 student-to-instructor ratio
 - ▣ $49.2 \times 16 / 4 \times 40.71 = \$8,011.73$
- Savings per section $(19909.9 + 1884.08 - 8011.73) = \$13,782.25$





Conclusion




Identified Benefits

- Safe learning environment
 - Reduced liability
 - Patient confidentiality
 - Patient harm/injury
- More productive
- Flexibility and customization
- Cost efficiency
- Equal to better performance on standardized testing (written and practical)



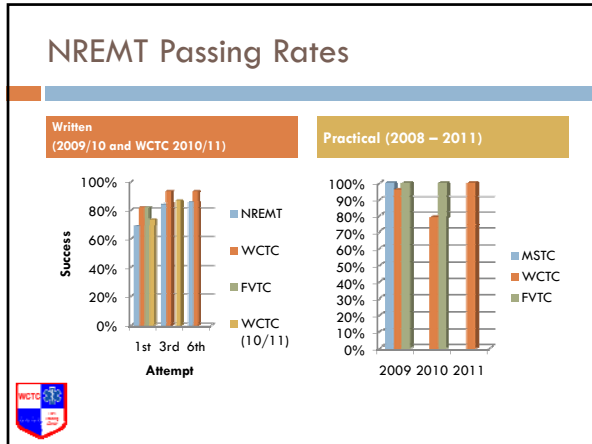
WI DHS EMS Requirements

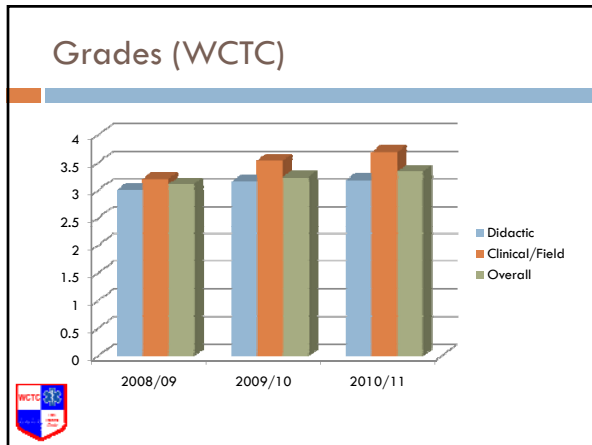
- High fidelity simulation competencies may be counted toward State-mandated competencies. No more than 50% of any specific competency category may be obtained through the use of simulation unless specified otherwise in the respective competency requirement document.
- Until competency-based system is implemented (no hours mandated in Rule), students receive three hours of time credited for every hour spent in a formal, high-fidelity simulation lab.

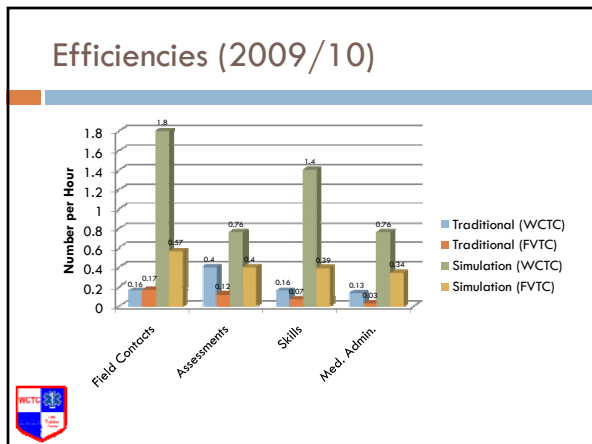


Follow-Up (Post-Study Results)









Additional Feedback

- The simulation lab is extremely helpful. The instructor challenged you and usually gave a challenging patient assessment.
- I thought HPS was very beneficial, especially because you can have "patients" that reflect what you are learning at that time in class. It greatly helped to reinforce the classroom content much better than clinicals and field time.
- HPS was great. It allowed me to be in charge. Field time doesn't; the medics need skills too.
- HPS is a better learning environment.



Questions?

Thank you!