Military Operational Use of Total Intravenous Anesthesia/Target Controlled Anesthesia: Creating a Computer-mediated Education System Integrating Multi-modal Simulation

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Introduction:
The use of Total Intravenous Anesthesia (TIVA) technique via target controlled infusion (TCI) approaches, including recent computer innovations, is wide-spread in Europe (40-50% of aneshtetics) and Japan.[1 2] Many studies in these health systems demonstrate benefits in patient care (adverse event decrease, optimal intra-procedural anesthesia, and more rapid emergence and recovery times).[3 4 5] Yet demand for use of TIVA/TCI in the United States of America is essentially non-extant. In part, this may be attributed to the lack of FDA approved devices for use in TIVA/TCI administration. The efficiencies of personnel, pharmacy, equipment space/weight, and time (patient and provider) possible with TIVA/TCI could result in saved lives in forward deployed medical units. However, education in the TIVA/TCI anesthetic techniques and devices must be accomplished simultaneously with the lengthy device approval process. This project describes the development of the educational process.

Methods:
Our development of a computer-mediated TIVA/TCI education system uses multiple simulation modes integrating levels of military anesthesiology-related health care providers. The context of the military requires both distance, self-directed and face-to-face, directed teaching and learning modes.
In this fist phase of our project, we will conduct a needs assessment for each group of learners to determine scope and depth of content and which combination of educational modes is appropriate for each content element. [6] *Finally, the curriculum must integrate across all provider disciplines to encourage health care team interaction and shared understandings and peer to peer education.*

Results:
Our results will include: 1. the content of background reading (emphasis on electronic access), 2. an annotated list of computer based simulation programs for self-directed learning / self-study / distance learning based on the specified curriculum, 3. integrated systems evaluation protocols for learners, instruction by mode (including simulation), and administration of the educational program [7], 4. learners, instructors, and administrators guides for using the selected simulation programs, 5. suggested advanced exercises to practice TIVA/TCI in the simulated patient care environment.

Discussion:
Arguing for adoption of TIVA/TCI approaches, even absent an FDA approved device, the demands for predictable, high patient volume, high quality care under difficult field conditions in military medicine make the use of TIVA/TCI very attractive. We believe a sound educational process will help to improve acceptance of this valuable technique into military medicine, both at the base hospitals for reserve forces in their daily practice, as well as in the far forward front where the reserve forces can implement the experience previously gained.

TABLE 1:

Our design determines four critical components of this education process:

1. how to accomplish this educational effort for a wide range of health care providers and administrators distributed throughout the world and with varying degrees of resources (including other anesthesiologists),
2. how to provide just the right amount (scope and depth) of content for each type and individual learner,
3. how best to make the education engagement transportable as the learner physically moves or changes time availability,
4. how to provide a coherent, integrated system of evaluation of provider knowledge, skills, and judgment competency in a distributed multi-modal education system, and
5. how to evaluate effectiveness of the TIVA/TCI education program.[8]

TABLE 2

Project Plan:

Developing the structure of an inter-disciplinary curriculum for TIVA/TCI base on the Analysis of Need

1. Survey disciplinary provider groups
2. Conduct focus groups in each discipline
3. Conduct individual interviews of leaders in each discipline group
4. Evaluate current TIVA/TCI web based trainers,
5. Select protocol pharmacology.
6. Establish the virtual classroom platform.
7. Create the storybook plan for Web structure and function
8. Research, analyze and recommend TIVA/TCI education material to become content of the Web.

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