Multimedia Bedside Cardiac Examination: Controlled Intervention Study

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Background: Many factors have led to a decline in bedside cardiac examination skills which has been well documented at all levels of medical training and exacerbated by faculty who are themselves lacking in these skills. Methods: We have addressed two causative factors, the lack of exposure to "good teaching cases" and the dearth of experienced instruction, by the development of a multimedia database of audiovisual recordings of bedside cardiac examinations of over 200 patients with sounds, murmurs, and characteristic precordial and vascular pulsations. These "virtual patient examinations" (VPEs) are conducted by moving the stethoscope over the precordium while observing pulses, respiration, and/or postural maneuvers. VPEs include histories, case-based ECG, X-Ray imaging, as well as instructional text and tutorials in which heart sounds and murmurs are related to dynamic images that explain causation. These programs have been used in medical schools, using hospital curricula for training and are designed for classroom, small group, self-study, and for testing of examination skills. This teaching software was evaluated in a controlled intervention study to assess whether multimedia-based instruction could improve examination skills in third-year medical students. For the intervention group, 22 students received 12 hours of supervised instruction with software and were compared with 18 students receiving no special instruction. Both groups were tested at the beginning and end of 8-week medical clerkships with a 50-question, interactive multimedia program that uses audiovisual recordings of actual patients. A subset of the intervention group was tested a year after training to measure retention. Results: By paired t-test, mean test scores (out of 100) did not improve significantly for the control group (pretest: 62, posttest: 66, P = 0.3). Mean test scores for the intervention group improved from 58 to 74 (P = 0.0005). When 6 from the intervention group were tested a year later, their mean scores were 81 (P = 0.001). Conclusion: Complex cardiac examination skills can be taught and tested effectively and economically by VPE software, and these skills appear to be retained a year after training.

Clinical Skills Assessment Using Medical Simulation of Pulmonary Artery Catheterization: A Validation Study

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Background: Objective assessment of clinical decision-making and procedural skills has been limited to the use of standardized written tests of fund of knowledge. We set out to assess and validate the utility of a currently available endovascular simulator for the purposes of measuring procedural skills and knowledge of physicians across a spectrum of training levels for pulmonary artery catheterization (PAC).

Methods: A total of 36 physicians (12 medicine residents, 9 pulmonary/critical care fellows, 9 cardiology fellows and 6 invasive cardiac attendings) underwent assessment using the SimSuite™ System (Medical Simulation Corporation, Denver, CO). Each participant performed 5 simulated PAC cases and all metrics were recorded automatically. The primary outcome measures were: 1) mean time to complete the simulations, 2) mean fluoroscopy time used, 3) Mean time to successfully identify and treat complications. Satisfaction and face validity were assessed using a Likert-scale methodology questionnaire.

Results: Mean procedure time (5.5 versus 7.1 minutes (min), Kruskal Wallis Rank Sum test, p=0.003), mean fluoroscopy time (1.9 versus 3.6 min, p=0.012) and mean time to recognize and treat complications (1.4 versus 1.8 min, p=0.001) were significantly longer for residents than non-residents. Eight-nine percent of physicians agreed that procedural skills could be tested objectively using the SimSuite™ System, with 100% agreeing that it was an engaging and convincing enough environment to be used as an effective training tool.

Conclusions: An endovascular simulator can be used to objectively discriminate skill level for PAC procedural performance in realistic, standardized simulated cases, and is acceptable to physicians for both training and testing.

The First Use of Medical Simulation for the Training of a New Device Roll-Out

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Training for the use of new interventional devices has traditionally involved didactic lectures, bench demonstrations, animal labs, and/or cases proctored by an experienced user. Each of these techniques has limitations. Advanced simulation-based training may provide an advantage over prior educational methods as a platform to learn and develop skills with new devices and procedures.

For the launch of the FilterWire EX™ distal embolic protection device (Boston Scientific, Santa Clara, CA) for use during saphenous vein graft intervention, we employed a new approach in which operators performed 4 simulated patient scenarios using the device on the SimSuite System (Medical Simulation Corporation, Denver, Colorado). The SimSuite System incorporates a simulated patient and provides true angiographic images and 3D vascular data. FilterWire cases were based on data and experience from actual device trials, and incorporated realistic hemodynamic and pharmacologic responses.

Simulated cases were designed to reinforce critical teaching points including, filter delivery technique, checking for complete apposition to vessel wall, management of slow flow, and FilterWire retrieval. Operator “mistakes” made during simulation training were programmed to result in complications, allowing trainees to experience the patient management required to overcome these complications. Following FDA approval (June 4, 2003) 400 physician and lab personnel undertook training in a dedicated FilterWire simulator-equipped bus, at over 50 locations throughout the US as part of an FDA sanctioned new operator training. The simulator experience covered cases of the three proctored cases necessary for independent device use. Exit evaluations of the training experience and physician-based perception of skill level pre vs post simulation were collected and will be reported. In conclusion, this is the first reported use of medical simulation for physician training with a new medical device.

ORAL CONTRIBUTIONS

Computational Medicine as a Tool to Understand Structural Heart Disease

Tuesday, March 09, 2004, 4:00 p.m.-5:00 p.m.
Morial Convention Center, La Louisiane A

Standards for Evaluation of Myocardial Viability With FDG-Positron Emission Tomography: A Comparison of Quantitative Methods

(415,462),(521,469)

Methods: FDG uptake and 85Br perfusion imaging was performed at rest in 29 patients as part of a previous (PARR) study (JACC 2002;40:1735-43). Resting perfusion defects, mismatch and match (sce) scores were calculated as %LV, and compared between the PARR viability method and two new methods in the Emory Cardiovascular Toolbox (ECTb).

Results: By paired t-test, mean test scores (out of 100) did not improve significantly for the control group (pretest: 62, posttest: 66, P = 0.3). Mean test scores for the intervention group improved from 58 to 74 (P = 0.0005). When 6 from the intervention group were tested a year later, their mean scores were 81 (P = 0.001). Conclusion: Complex cardiac examination skills can be taught and tested effectively and economically by VPE software, and these skills appear to be retained a year after training.

Methods: Experimental validation of our technique is essential and that higher quality is produced. Quantitative validations using pediatric cardiac malformation models have affirmed that theoretical advantages of our technique are realized and that higher quality is produced. Validation of our technique is essential and that higher quality is produced. Quantitative validations using pediatric cardiac malformation models have affirmed that theoretical advantages of our technique are realized and that higher quality is produced. Quantitative validations using pediatric cardiac malformation models have affirmed that theoretical advantages of our technique are realized and that higher quality is produced. Quantitative validations using pediatric cardiac malformation models have affirmed that theoretical advantages of our technique are realized and that higher quality is produced. Quantitative validations using pediatric cardiac malformation models have affirmed that theoretical advantages of our technique are realized and that higher quality is produced.