Introduction

Virtual-reality based medical simulation is the application of computers to synthesizing an anatomical response to a simulated therapy. In particular, surgery simulation synthesizes tissue response to virtual surgical tools, typically, although not exclusively, a mechanical response to cutting or manipulation. This behavior can be thought of as a trade-off between material fidelity and computation time, which can be characterized as a spectrum. At one end of the spectrum predictive simulation consists of highly faithful off-line computations used by expert clinicians, while at the other end, interactive simulation offers a means of training residents, in order to improve their skill without risk to a real patient, typically by way of a haptic device. The two types of simulation embody conflicting requirements of efficiency and tissue fidelity, which recent research increasingly attempts to reconcile through new efficiencies.

The clinical need that justifies pursuing medical simulation with a strong predictive aspect lies in two marked tendencies in modern clinical practice: the compression of training schedules of medical residents and the constant influx of new therapeutic technologies. Recent compressions in training can adversely impact the development of clinical skill, especially surgical skill, particularly in the traditional framework whereby residents observe senior clinicians and gradually assume responsibility. Interactive simulation can provide a means for accelerating resident training, allowing young clinicians to take a more active role than in the traditional framework, and can result in measurable improvements to both skill and patient outcome.

The influx of new technology in clinical practice is characterized by the increasing use of physics- and computer-based technology, including image-guided and minimally invasive techniques. In surgery, this influx also includes recent therapies, such as the ultrasonic aspiration, lasers, and radiotherapy, as well as emerging technologies, such as molecular as well as robotic therapies. The result of this influx is a broad and technically complex armamentarium. As a result, medical simulation can play a pivotal role for expert clinicians who are either assimilating new therapies or refining experimental treatments.

This special issue will highlight new research in medical modeling and simulation while spanning a broad domain of application. Submissions for the special issue should focus new theory, methods, technologies, and tools with clinical appeal. Authors of high quality, unpublished contributions to this field of Modeling and Simulation are invited to submit papers to this Special Issue.

This special issue solicits papers on the following topics of interest, but not limited to:

- Biomechanical, thermal or other physically-based modeling of therapy.
- Patient-specific anatomical modeling, e.g. segmentation and/or meshing, for application to medical simulation.
- Validation of medical simulation, including phantoms.
- New frameworks for requirements specification for medical simulators.
- Development and application of new hardware technologies, such as haptic devices and massively parallel hardware acceleration.
Instructions for Manuscript Preparation

For manuscript formatting and other guidelines, please visit the Author Guidelines for SIMULATION.

Submissions for Full Paper Review

All manuscripts must be submitted electronically through the paper submission system to the SIMULATION Manuscript Submission System. Please note in your online cover letter that the submission is intended for the "Medical Simulation" special issue.

Note: Manuscripts must not have been previously published or be submitted for publication elsewhere. Each submitted manuscript must include title, names, authors' affiliations, postal and e-mail addresses, an extended paper, and a list of keywords. For multiple author submission, please identify the corresponding author.

Due Dates

Full papers due: December 15, 2012

Notification of acceptance: April 15, 2013

Minor Revisions due: May 15, 2013

Major Revisions due: June 15, 2013

Expected date of publication: Winter 2013

SIMULATION has a large number of submitted articles. Although 30% or less are accepted, there are numerous papers waiting for publication. The journal has increased the number of pages in 2012 to 128 pages per issue to speed up publication. Online versions of the articles are available as soon as the articles are accepted.
Final paper submissions

Each final submission must be prepared based on the Simulation journal requirements (see Author Guidelines for SIMULATION page).

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