



St Vincent's

*Continuing the Mission of
the Sisters of Charity*

Report to the Australian Society for Simulation in Healthcare (ASSH)

Non-Technical Skills (NTS) in Synthetic Learning Environments – Mapping
Curricula for Vocational Specialist Training, Develop Evidence, Complete a
Needs Analysis & Pilot the Curriculum.

STAGE 1

**Systematic Literature Review:
Using Simulation to Teach Non Technical Skills**

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Glossary of Terminology

Synthetic learning environment (SLE)*	An area, used for the purpose of learning and related activities, the latter including research into, assessment and evaluation of learning, which reproduces components or aspects of the real world environment, to support learning.
Simulation*	Learning methods provided in SLEs, which support experiential learning. Key components of experiential learning include: <ul style="list-style-type: none"> a. The learner interacts with his or her environment. b. A high proportion of the learning activities enact activities and tasks representative of the learner's real world responsibilities. c. The environment needs to be sufficiently realistic for experiential learning to occur. Depending upon the learning objectives, realism can be built into the equipment, the surrounding environment or the overall integration of equipment, environment and interactions between learners and instructors ¹
Standardised / Simulated Patients	Specially trained actors to simulate "real" patients in the training environment.
Non Technical skills*	Cognitive functioning and observable behaviours that underpin safe and effective clinical practice. They may include, without being limited to, communication (patient-doctor, team) leadership, teamwork, situation awareness and decision-making, resource management, safe practice, adverse event minimization/ mitigation and professionalism
Role Play	Trainees or trainers interact while assuming the attitudes and actions of others as part of a scenario.
High fidelity simulation	Activities using mannequins with medium to high fidelity, to real patients eg. METI simulators and Laerdal Simman.
Immersive Simulation	Simulation education/experiences that encourage participants to become immersed in a task or setting as they would if it were the real situation. It involves the participant suspending disbelief and making decisions as they would in a real life situation. The ability to create an immersive simulation depends on the participant

¹ From Beaubien JM. Baker DP. The use of simulation for training teamwork skills in health care: how low can you go? Quality & Safety in Health Care. 13 Suppl 1:i51-6, 2004 Oct.

	characteristics, the fidelity of the simulation in terms of context (scenario), equipment and role-plays.
Part task trainer (low fidelity simulation)	Activities using mannequins or part mannequins (eg. IV arm), with lower realism, for instance the mannequins are unable to breathe independently.
Scenario based learning	Use of clinical scenarios to contextualise skills learning. Part task trainers, high fidelity simulators or actors can accomplish this type of learning. The scenario is written and appropriate training aids are used to facilitate the learning objectives.
Technical / Clinical skills*	Domain specific components of clinical practice directly required including patient assessment and clinical diagnostic reasoning, judgment and decision-making regarding therapy, procedural knowledge and technical skills relevant to execution of procedures.
Debriefing	Forum for reflection following a high fidelity simulation scenario in which the trainer facilitates discussion amongst participants using either recall but more routinely an audiovisual recording of the scenario.
Fidelity	The realism of either the equipment (eg. the simulator, defibrillator etc.) or the environment/setting (eg. operating theatre versus a physiotherapy gymnasium).
Vocational Specialist Trainee*	A medical practitioner undertaking post graduate training for the purpose of qualifying as a Fellow of a medical specialist college. The training is in accordance with the curriculum of the relevant accredited specialist college.
SESAM	Society in Europe for Simulation Applied to Medicine
IMSH	International Meeting on Simulation in Healthcare
ASME	Australian Society for Medical Education
AMEE	International Association for Medical Education

*Terms in this glossary are taken from Australian Society for Simulation in Healthcare (ASSH), (2007), *Request for Tender (RFT): Engagement of a consultant for Non-Technical Skills Training (NTS) in Synthetic Learning Environments – Mapping Curricula for Vocational Specialist Training, Develop Evidence, Complete a Needs Analysis & Pilot the Curriculum*, Queensland Health (TENDER NO ASSH/001/07).

Executive Summary

This report provides an overview of the current literature, both published and grey, in the use of simulation for the teaching of Non Technical Skills (NTS). In particular, the area of focus was in specialist medical training colleges.

The literature review is stage 1 of a four-stage project overseen by the Australian Society for Simulation in Healthcare (ASSH) and funded by the Commonwealth Government Department of Health and Ageing (DOHA). The project aim is to promote simulation based teaching of NTS, in order to promote and increase patient safety. Various forms of simulation teaching are included in the scope of this project.

A conventional approach to identifying papers for review was adopted utilising a broad range of search items and electronic databases. The review draws on literature from the past ten years, is limited to literature focusing on specialist training in the medical field, and does not include undergraduate medical training, nursing or allied health.

This literature review specifically addressed four outcomes as requested by the ASSH RFT (2007):

1. Incorporation of NTS into specialist training curricula internationally;
2. Identifying the methods and modalities of training NTS utilising simulation,
3. Provide evidence supporting specific methods or modalities for specified learning objectives or medical specialities.
4. Identifying issues influencing the integration of simulation training into clinical training.

The systematic literature review identified in excess of 5,000 published papers in 18 specialties, of which 96 papers related to NTS. The search also yielded in excess of 3,000 grey papers. Articles included in the published literature list were specifically chosen according to the selection criteria outlined in the methodology - this may have caused several seminal papers to be omitted, as they did not fit within the criteria of the search for this literature review.

The review demonstrated that there is very little consistency in the use of simulation as a teaching method for NTS. Of the specialties included in the project Paediatrics returned the highest returns for the indexed journal search, followed by Emergency Medicine, Surgery and Anaesthetics. However, there was no one discipline that had generated a significant body of published material on the teaching of NTS using simulation.

Based on the review the most commonly discussed NTS topics were:

- Crisis Resource Management (CRM)

- Teamwork
- Communication skills
- Open Disclosure
- End-of-Life Decision Making
- Breaking Bad News
- Error detection and patient safety
- Leadership
- Professionalism

The literature demonstrated that there were two dominant teaching methodologies that were being utilised to teach NTS. These methodologies were the use of standardised or simulated patients and the use of mannequins for medium fidelity and immersive / high fidelity simulation.

The adoption of these two methodologies has predominantly been for the teaching of communication skills and CRM. Each of these teaching methodologies is based on scenario-based learning in environment that the teaching occurs. These two methodologies would be adaptable to, and should be incorporated into the teaching of NTS for other specialist disciplines.

Many of the articles reviewed that incorporated the use of simulated patients required participants to perform a technical skill while developing or being assessed on their NTS. This merger of both technical and non-technical skills often utilises more than one simulation method in its delivery, would require training for educators to ensure its effective use, and continued development in medical training. The use of simulated patients most frequently was used in the training of medical specialist trainees when focusing on communication issues. Incorporated into this communication skill are the non-technical skills of end-of-life decisions and breaking bad news.

The use of CRM in scenario-based learning involves participants' involvement in reflective debriefing post clinical scenario. The participants discuss their performance based on the principles of Crisis Resource Management. CRM encompasses a skill set that is well developed within a number of specialities including Anaesthesia, Emergency Medicine and Intensive Care Medicine. These skills are easily transferable into other medical speciality training programs and are often the base for other NTS programs that are described as having a teamwork, leadership or communication focus.

Overall, the literature suggests that there is a large body of work on the use of simulation for specialist training colleges to build upon for training in the area of technical or clinical skills. There is; however, very few papers on the use of simulation for the teaching or assessment of NTS of specialist trainees. The included articles in the review made up approximately 2% of the identified articles.

This provides evidence for simulation providers and researchers to develop programs that utilise various forms of simulation to teach and provide feedback on NTS. Some specialties identified are working towards this but the development of more generic programs that could be adapted to cater for a number of specialties may be the optimal outcome.

Hence, the sparsity of literature on NTS and simulation suggest there needs to be a more vigorous endeavour toward program development and delivery.

1. Background

St Vincent's Hospital, Melbourne was commissioned by the Australian Society for Simulation in Healthcare (ASSH) to undertake a literature review as part of a Department of Health and Aging (DOHA) funded project looking at the use of simulation for the teaching of non-technical skills in specialist training colleges.

As described by the ASSH RFT (2007), the aim of this project was to promote non-technical skills (NTS) relevant to accredited specialist training in synthetic learning environments.

Non-technical skills (NTS) are commonly recognised to strengthen safe and effective clinical practice. Specialist training colleges have responded to evidence supporting the relevance of NTS by redesigning their curriculum to demonstrate a greater emphasis on NTS.

The use of simulation has been an established method that has been utilised to provide learning opportunities for NTS. Included in this is a variety of learning technologies and teaching and learning methods, available in synthetic learning environments that have been used for this purpose.

As described in the ASSH RFT (2007), there are a number of benefits that simulation can provide which can be used strategically in curricula design to enhance workplace learning. These include the following:

- Basic competencies can be addressed prior to learners practising on actual patients.
- Specific competencies may be acquired, refreshed or finessed by addressing them in a detailed manner.
- Learning technologies may be used as an alternative to patients where employing actual patients is unethical, unacceptable or logistically difficult.
- Learning encounters may be standardised.
- Learning encounters may be enhanced with reflective practice which contributes to deeper learning and change in practice.

However, regardless of these strengths, the level of uptake and use of simulation varies amongst specialist colleges. Simulation is under-utilised by all specialties, including the specialties that have adopted simulation into their training curricula. Even they can do more to integrate its applications into the implementation of training curricula. Other specialties could gain from the achievements of these early adopters to enhance learning in their specialty.

As described in the ASSH RFT, the causes of variation between the uptakes of simulation between various specialities are multi-factorial. Factors contributing to low utilization include:

1. low awareness of its potential;
2. low engagement by stakeholders;

3. inadequate understanding by curriculum designers
4. clinical teachers of how it can be incorporated into curricula and training activities;
5. lack of knowledge of factors underpinning purchasing decisions and evaluation of its impact and value for money;
6. perceived or actual lack of infrastructure,
7. Funding and other resources and a lack of awareness of, or access to, appropriate learning technologies and facilities.

Change management theory predicts that new practices will be more successfully adopted and sustained if a strategic approach is employed. If this model is applied to specialist medical training, simulation may see an increased utilisation through the increasing awareness amongst stakeholders, engaging early adopters to champion it and drive change within their specialty, and the establishment of a sustainable model for delivery, which overcomes some of the identified obstacles².

1.1 Aims and Objectives

The objective of this literature review as described by the ASSH RFT is to provide information and evidence supporting the role of simulation in training of NTS relevant to medical specialist training.

In order to achieve this, a structured systematic literature review was undertaken of both published and grey literature. It was intended that the aim of this systematic literature review be to:

1. Identify how NTS was being incorporated into specialist training curricula internationally.
2. Identify the methods and modalities utilised for NTS for NTS
3. Gather evidence supporting methods or modalities for specialist medical training programs.
4. Identify issues that influence the integration of simulation into clinical training.

² Issenberg B. The Scope of Simulation-based Healthcare Education, *Simulation in Healthcare* • Volume 1, Number 4, Winter 2006

2.0 Methodology

Design: Structured Literature Review

Search methods for identification of studies:

Electronic searches

Various electronic databases were used to identify relevant literature (Table 1)

Database	Host	Date last searched
The Cochrane Library ¹	Wiley InterScience	24.06.08
PubMed ²		9.05.08
EMBASE	Ovid Technologies v.OvidSP_UI01.00.02	24.06.08
CINAHL (Cumulative Index to Nursing & Allied Health Literature)	Ovid Technologies v.OvidSP_UI01.00.02	27.05.08
PsycINFO	Ovid Technologies v.OvidSP_UI01.00.02	27.05.08
PsychLit		no longer exists

Table 1: List of electronic search databases

¹Includes Cochrane database of clinical reviews, database of abstracts of reviews of effects, Cochrane central register of controlled trials, Health technology assessments database.

²Pubmed was selected as the database to access medline instead of OVID as the citations are more current.

Identification of Search Terms

A list of key words relevant to “simulation”, “post-graduate”, “non-technical skills”, and relevant “medical specialty” were generated through brainstorming. Each key word was then mapped to the relevant Medical Subject Heading (MeSH) using OVID medline, so that the appropriate MeSH terms could be used as the search term in place of the key word for all searches. Where no MeSH term existed for the key word, the key word was used in the search with the suffix ‘.mp’ to permit the identification of keywords not listed as MeSH terms.

The final list of search terms relevant to “simulation” included:

- Computer simulation;
- Patient simulation;
- High Fidelity Simulation.mp;
- Medium Fidelity Simulation.mp;
- Low Fidelity Simulation.mp;
- Virtual Reality.mp;
- Computer-Assisted Instruction;
- Virtual patient.mp;
- Virtual environment.mp;
- Therapy, Computer-Assisted;
- Synthetic environment.mp;
- Artificial environment.mp;
- Models, Anatomic;
- manikins;
- Visible Human Projects;
- Educational Technology;
- Standardised patients.mp;
- Computer-Assisted Instruction;
- Programmed Instruction as Topic;
- Part Task trainer;
- Immersive simulation.mp;
- Scenario.mp;
- Problem-Based Learning;
- Models, Educational;
- Case based learning.mp;
- Role Playing;
- Physician-Patient Relations;
- Clinical Competence,
- Procedural training;
- User-Computer Interface;
- debriefing.mp.

The final list of search terms relevant to “post-graduate” included: Resident.mp; Physicians; Societies, Medical; House Officer.mp; Advanced Trainee.mp; House Medical Officer.mp; Resident Medical Officer.mp, Medical Staff, Hospital; Education, Medical, Continuing; Education, Medical, Graduate; Trainee.mp; PGY1.mp; PGY2.mp; PGY3.mp; specialities, medicine; specialities, surgical; Inservice Training.

The final list of search terms relevant to “non-technical skills” included:

- Professional Competence;
- Clinical Competence;
- Communication;
- Crisis Resource Management.mp;
- Leadership;
- Decision Making;

- Problem solving;
- Negotiating;
- Patient Care Planning;
- Situational Awareness;
- Awareness;
- Task Performance and Analysis;
- Medical Errors;
- Safety;
- Accidents;
- Patient safety.mp;
- Physician-patient relations,
- Interpersonal Relations;
- Attitude of Health Personnel;
- Communication;
- Patient Care Management;
- Interprofessional Relations;
- Cooperative Behavior;
- Continuity of Patient Care;
- Handover.mp;
- Group Processes;
- Non-clinical skills.mp;
- Human Factors.mp;
- Health Resources;
- Resource Management.mp;
- Safety management;
- Risk management;
- Adverse event.mp;
- Sentinel event.mp,
- Sentinel Surveillance;
- Professional Practice;
- Professional Competence;
- Patient assessment.mp;
- Medical History Taking;
- Physical Examination;
- Diagnosis.

The following terms were also identified to describe each medical specialty:

Medical Specialty College	Relevant MeSH Term or other keyword
Australasian College of Dermatologists (ACD)	Dermatology
Australasian College of Emergency Medicine (ACEM)	Emergency Medicine; Trauma; Emergency Medical Services; Emergency Services, Hospital
Australian and New Zealand College of Anaesthetists (ANZCA)	Anaesthetist; anaesthesiology; anaesthetics
ANZCA - Joint Faculty of Intensive Care Medicine (JFICM)	Intensive Care
ANZCA - Faculty of Pain Medicine (FPM)	Pain
Royal Australasian College of Medical Administrators (RACMA)	Hospital Administrators; Physician Executives; Organization and Administration, Hospital;
Royal Australasian College of Physicians (RACP)	Internal medicine [includes MeSH subheadings: cardiology, endocrinology, gastroenterology, haematology, medical oncology, Nephrology, Rheumatology, Pulmonary medicine]; nuclear medicine; geriatrics, gerontology; Allergy and immunology; infectious disease; perinatology, neonatology; neurology; community medicine
RACP - Australasian Chapter of Palliative Medicine (ACPM)	Palliative Medicine; Terminal Care; Palliative Care
RACP - Australasian Faculty of Rehabilitation Medicine	Rehabilitation
RACP - Australasian Faculty of Occupational Medicine (AFOM)	Occupational Medicine
RACP - Australian Faculty of Public Health Medicine (AFPHM)	Public Health Professional
RACP - Paediatrics & Child Health Division (PCHM)	Paediatrics; paediatrician
Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG)	Obstetrics or Gynaecology
Royal Australian and New Zealand College of Ophthalmologists (RANZCO)	Ophthalmologists; Ophthalmology
Royal Australian and New Zealand College of Psychiatrists and the Faculties of Child and Adolescent Psychiatry, and Old Age (RANZCP)	Psychiatry

Medical Specialty College	Relevant MeSH Term or other keyword
Royal Australian and New Zealand College of Radiologists and the Faculty of Radiation Oncology	Radiology [includes MeSH subheadings nuclear medicine, Radiological oncology, interventional radiology]
Royal Australasian College of Surgeons (RACP)	Surgery; orthopaedics; gastroenterological surgery.mp; plastic surgery.mp; reconstructive surgery.mp; vascular surgery.mp; otolaryngological surgery.mp; head and neck surgery.mp; hepatobiliary surgery.mp; neurosurgery; urology; cardiothoracic surgery; colorectal surgery.
Royal College of Pathologists of Australia (RCPA)	Pathology

Table 2: Medical Specialty Search Terms

Search Strategy:

Briefly, a strategy was developed for Pubmed and then adapted for other databases. The Boolean operator “OR” was used to link search terms identified for “simulation”. This strategy was repeated (separately) for search terms relevant to “post-graduate”, and “non-clinical skills” and each medical specialty. These search commands for each of “simulation”, post-graduate” and “non-clinical” were then linked with the Boolean operator ‘AND” to produce a combined search. The combined search command was then linked to search terms for each medical specialty in separate searches using the Boolean operator “AND”.

For Pubmed, the search was limited to human studies published in the English language in core journals in the past 10 years and included clinical Trials, meta-analyses, classical Articles, comparative studies, evaluation Studies, journal article and validation Studies.

For CiNAHL the search was limited to studies published in the English language in the last 10 years and included research articles and systematic reviews.

Study Selection

Citations retrieved from electronic searches were downloaded into a citation manager. Duplicates and review articles [excluding meta-analyses and systematic reviews] were deleted and two reviewers for potentially eligible studies then independently scanned titles and abstracts.

The full article was retrieved where the title and abstract alone was insufficient to exclude the article or where one reviewer considered it may be of relevance.

Articles were included into the literature review when the focus of the article was on medical specialties and /or specialty training. Articles were not included if they focused on the allied health or nursing disciplines. Where articles were interprofessional and included medical speciality trainees, they

were included. Undergraduate medical training was not included into the search criteria.

Studies were rejected if they clearly did not meet inclusion criteria.

Grey Literature

In addition to electronic searches, the following sources were accessed to identify relevant grey literature:

- SESAM conference proceedings
- IMSH conference proceedings
- OZZAWA conference proceedings
- ASME conference proceedings
- AMEE conference proceedings
- SIMTECT conference proceedings
- Prato Clinical Skills Conference

In addition to the above, the following National and international organisations were contacted to identify grey literature relevant to the review:

- Harvard University, Boston
- Stanford University, Palo Alto
- Sheffield Vascular Institute, UK
- Imperial College, UK
- John Hopkins Hospital, Baltimore.
- University Clinic, Mainz
- Stirling Simulation Centre
- University of Bristol
- St Thomas's Medical School
- Peninsula Medical School
- University of Toronto
- Ottawa Hospital
- McGill University Health Centre
- Dalhousie University
- Wellington Hospital
- Medical Education Technologies Inc. (METI)
- Laerdal
- Scientific Educational Supplies SES
- Southern Health Simulation Centre / Monash University
- Gippsland Clinical School, Monash University
- Sydney Simulation Centre
- Centre for Medical and Health Sciences Education, Monash University
- Royal Australian and New Zealand College of Anaesthetists

- QLD Skills Development Centre
- UTS, Burnie
- Flinders Simulation Centre
- Queensland Health
- St Vincent's Simulation Centre, Sydney
- Clinical Training and Education Centre (CTEC), Western Australia

3.0 Results

3.1 Literature Review

Electronic Search Results

The number of citations retrieved for each specialty from each database is provided in Table 3.

Specialty	Pubmed	CINAHL	EMBASE	Cochrane	Psych Info	Total *	Total Relevant
Emergency	276	0	32	0	0	308	15
Dermatology	17	10	2	0	15	45	0
Anaesthesiology	117	72	12	0	27	226	5
Intensive care	141	920	21	0	8	1078	3
Pain	119	1	0	0	1	121	0
Pathology	189	210	6	0	2	407	8
Radiology	141	48	6	0	0	12	1
Surgery	1164	65	71	0	0	1244	10
Psychiatry	73	64	5	0	4	92	2
Ophthalmology	36	3	0	0	0	39	0
O&G	206	58	9	0	0	224	4
Medical Administration	174	0	0	0	0	174	16
Physicians - Paediatrics	188	260	17	0	4	219	28
Physicians - Public Health	233	6	0	0	0	239	
Physicians - Occupational Medicine	1	14	1	0	0	12	
Physicians - Rehabilitation Medicine	69	187	2	0	0	81	0
Physicians - Palliative Medicine	139	143	13	0	0	293	2
Physicians - OTHER	423	133	31	0	0	574	5
neurology	24						
community medicine	7						
internal medicine	352						
Neonatology, Perinatology	7						
Gerontology	17						
Immunology	3						
Infectious	6						

Specialty	Pubmed	CINAHL	EMBASE	Cochrane	Psych Info	Total *	Total Relevant
disease							
Nuclear medicine	7						

*Excluding Duplicates and Reviews

Table 3: Electronic search results by specialty

After excluding duplicates and reviews, the total number of relevant articles for each specialty was identified. The specialty for which the largest number of studies was found was Paediatrics. The Following section details the findings of the search for each specialty.

1. Australasian College of Dermatologists (ACD)
2. Australasian College of Emergency Medicine (ACEM)
3. Australian and New Zealand College of Anaesthetists (ANZCA)
4. ANZCA - Joint Faculty of Intensive Care Medicine (JFICM)
5. ANZCA - Faculty of Pain Medicine (FPM)
6. Royal Australasian College of Medical Administrators (RACMA)
7. Royal Australasian College of Physicians (RACP)
8. RACP - Australasian Chapter of Palliative Medicine (ACPM)
9. RACP - Australasian Faculty of Rehabilitation Medicine
10. RACP - Australasian Faculty of Occupational Medicine (AFOM)
11. RACP - Australian Faculty of Public Health Medicine (AFPHM)
12. RACP - Paediatrics & Child Health Division (PCHM)
13. Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG)
14. Royal Australian and New Zealand College of Ophthalmologists (RANZCO)
15. Royal Australian and New Zealand College of Psychiatrists and the Faculties of Child and Adolescent Psychiatry, and Old Age (RANZCP)
16. Royal Australian and New Zealand College of Radiologists and the Faculty of Radiation Oncology
17. Royal Australasian College of Surgeons (RACP)
18. Royal College of Pathologists of Australia (RCPA)

3.1.1 Non Technical Skills by Specialty

Palliative Care Medicine

The literature review identified two articles in relation to the use of simulation to teach non-technical skills. In both articles, the aim was to improve communication skills and the simulation technique employed was the use of Standardised Patients. Alexander et al, (2006) discuss the development of a short course for internal medicine residents to teach communication skills required for delivering bad news and eliciting patients' preferences for end-of-life care. Their course involved small group activities, lectures and role-plays. The outcomes were assessed by videotaping the resident's interactions with the Standardised Patients and the results indicated an improvement in "specific skills including discussing probability,

presenting clinical scenarios, and asking about prior experience with end-of-life decision making”. Serwint (2002) used standardised patients to teach residents about breaking bad news. This article focuses on aspects of using standardised patients including the case development, the types of standardised patients that can be used, training and the evaluation of the program.

Physician other

There were five articles identified in which standardised patients were used to train and/or assess physician communication skills following a training intervention. Carney et al (1999) and Gerrity et al (1999) found that interactions with standardised patients following training to identify depression in a patient, resulted in more appropriate questions about affect and feeling which was more likely to identify a diagnosis of depression. Luck et al (2002) conducted a study to validate the use of standardised patients to measure physician practice and concluded that properly trained standardised patients compare well with independent assessment of physician communication. Mills et al (2002) found standardised patients were able to identify interpersonal skills more accurately and thoroughly than the resident physicians themselves. Cooper et al (2002) used simulations to train rheumatology residents in consultation communication skills. They found that there was a need to include communication skills training in postgraduate training programs as undergraduate communication skill training was deemed inadequate by the trainees. Delvaux et al (2005) used standardised patients to train physician communication skills in the context of delivering information to cancer patients and their relatives. Communication skills were assessed using the Cancer Research Campaign workshop evaluation manual and by the simulated patient ratings. Groups were randomly assigned to the basic training and then the consolidation training, which involved three additional workshops. Results demonstrated improved communication skills in the consolidation-training group including the use of open questions, screening questions, empathy, negotiating and summarising techniques.

An additional article was identified in which simulation was used to assess interpersonal skills. The article by Millis et al (2002) dealt with simulation as a method of assessing a non-technical skill rather than to teach that skill. The authors compared standardised patient ratings of physician interpersonal skills with self-ratings and faculty observation ratings. Results showed that the trainees had difficulty with accurately self-rating their interpersonal skills and the standardised patients provided trainees with insight into this area of their practice.

Obstetrics and Gynaecology

The majority of articles identified in the field of Obstetrics and Gynaecology were related to the use of simulation to teach clinical skills or management. Only four articles were identified which related to non-technical skills. These were categorised into:

1. Error detection;
2. Teamwork.

Thompson et al (2004) used on site simulations of eclampsia patients to identify deficiencies in the care of eclampsia patients. Maslovitz et al (2007) used simulation training with four emergency scenarios including; eclamptic seizure, post partum haemorrhage, shoulder dystocia and breech extraction. High fidelity mannequins were used and the training groups were teams of residents and midwives. Their results showed improvement in scores where scenarios were repeated and the ability for the simulation to identify common errors in management of these scenarios, including delay in transportation, documentation issues and unfamiliarity with protocols.

Morgan et al. (2007) used an obstetric simulation to assess teamwork. They used the Human Factors Rating Scale but failed to show this as a valid tool for assessing performance in this environment and recommended a more context specific tool be developed. Crofts et al. (2007) assessed the change in knowledge of midwives and obstetricians following obstetric emergency training in both a simulation centre and a local hospital setting and found no significant difference between acquisitions of knowledge in either setting. It was not clear whether teamwork measures were made during this study.

Gardner et al. (2008) looked at evaluating team training and communication with obstetric clinicians as part of a medical indemnity insurance premium program. It concluded that the course improved both communication and team training and that simulation based CRM training can serve as a strategy for mitigating adverse perinatal events.

Emergency Medicine

There were 15 articles identified relating to the use of simulation to teach Non-technical skills in emergency medicine postgraduate training. These were categorised into areas including:

1. Error detection or management
2. Professionalism
3. Crisis Resource management
4. Integration into the curriculum
5. Cognitive reasoning
6. Communication skills
7. Teamwork

Three articles were identified related to error detection or teaching error management. Kozer et al (2004) conducted a study using mock paediatric resuscitations using a simulation to observe errors in medication ordering and administration. Participants were emergency physicians and nurses. The participants gave a total of 125 orders for medication in which 17% did not specify the dose. Nine errors were observed during the ordering phase, of which five were intercepted before administration to the patient. Additionally, errors were observed in the measured doses given to the patient who deviated from ordered dosages. Whilst this study did not use

simulation to train the participants, it was a useful modality for analysing error in clinical practice. Muller et al (2006) developed a one day training program using simulations to teach crew resource management. Participants were emergency physicians, nurses and paramedics. The course was rated highly for relevance and the authors suggest this approach is applicable to other areas of medicine. Young et al (2007) studied the cognitive processes of emergency residents and general surgery residents as they managed four “critically ill patient” simulations. Their results demonstrated that those residents with 10 weeks or more of intensive care (ICU) experience were more proactive and made fewer errors than residents with less ICU experience.

Gisoldi et al (2004) used high fidelity simulations to assess emergency medicine resident’s professionalism when faced with ethical dilemmas. They found differences in performance according to experience level of the residents with more senior residents having better overall performance. Although limited by small sample number they recommended the need for improved resident education in the areas of professionalism and ethics. A similar study by Girzadas et al (2007) were able to use high fidelity simulations to differentiate between novice and experienced emergency residents in terms of clinical decision making and in particular time to action.

Reznick et al (2003) discuss the pilot program of the Emergency Medicine Crisis Resource Management (EMCRM) simulation course to teach emergency residents crisis resource management principles. This course was based on the Anaesthetic equivalent. The course was rated very favorably in terms of relevance and applicability to practice, although it was only a pilot program and no other detailed evaluation was performed including such as transfer of skills to the workplace.

Binstadt et al, (2007) describe the integration of simulation into their emergency resident program. They describe a total curriculum integration which is a novel approach compared to other graduate programs.

Bond et al (2004) describe the use of simulation to teach cognitive reasoning. They used a one off simulation experience for emergency residents to teach metacognitive strategies and found that the senior residents benefited more from this approach than the more junior residents who focused on knowledge acquisition rather than reasoning.

Three articles were identified that describe the use of simulation to teach communication skills in emergency residents. Bandiera et al (2005) used role-play to manage issues such as teaching efficiently, dealing with the difficult learner and common mistakes. They evaluated participants four months after their return to the workplace with all respondents reporting improved confidence with teaching and evidence of implementation of new skills learnt including giving feedback, setting learning objectives and identifying teaching opportunities. Hobgood et al (2005) report on a course “GRIEV_ING” which used role-play to improve the death notification skills of emergency residents. Significant improvements were seen in the residents post intervention communication scores, which were obtained from

observation of interactions with standardised patients and written questionnaires. McLaughlin et al (2007), likewise, used simulation to teach management of sexual assault in the emergency department. As with the Hobgood study, they used role-play within the educational intervention and observation with standardised patient interviews to assess. They compared the resident results to nurses who had undergone a Sexual Assault Nurse Examiner (SANE) course and found that their intervention raised resident results to similar levels as those nurses who had undergone the SANE course.

Four articles were identified in the category of using simulation to teach or assess teamwork skills in emergency medicine postgraduate training. Dev et al (2007) describe the development of a computer-based simulator (the Virtual Emergency Department) for distance training in teamwork and leadership skills. They found that this provided a realistic, yet safe, environment to practice these skills on repeated occasions, which is not available in the real world environment. Holcomb et al (2002) used a high fidelity human simulator to evaluate trauma team performance. Participants included military nurses, physicians and medics. Teams were evaluated at arrival and at the completion of the rotation. Two trauma scenarios were used. The authors described an improvement in team performance with the training and were able to evaluate the trauma team's performance in a reproducible manner. Leiba et al (2006) describe the use of a Standardised patient to evaluate team responses to anthrax drills. Teams consisted of emergency physicians and nurses. The authors concluded that the drills were a useful educational intervention but not sufficient on their own to prepare teams for bioterrorism. Mikrogianakis et al (2008) used simulations to stage mock paediatric trauma codes for training emergency physicians. Each simulation was videotaped and analysed by two independent raters. Results showed that whilst there was improved ratings of resident confidence post training there were not significant improvements in the team functioning post intervention.

Anaesthetics

The colleges of Anaesthesiology have long been leaders in the use of Simulation in medicine. Numerous articles were identified in relation to the use of simulators to teach clinical skills, the evaluation of types of simulators and the use of simulation to assess clinical skills. Surprisingly there was a paucity of articles identified on the use of simulation to train Non-technical skills. Sinz (2007) provides a history of anaesthesiology's role in simulation and the potential future developments in this area of medical education. In addition, Wheeler et al (2005) discuss the role of simulation in identifying error in practice and teaching error prevention strategies.

The articles identified which deal with Non Technical Skills includes areas such as:

- Teamwork
- Crisis resource Management skills
- Communication skills

Blum et al (2005) describe a one-day simulation course aimed at improving communication skills through team training. They used “probes”, a technique for placing clinical information with team members in order to track information sharing between team members. They demonstrated construct validity for the probe methodology but no statistical difference in information sharing resulting from the training. Hansen et al (2008) describe team-oriented training for rural trauma. The teams trained included surgeons, anaesthetists and nurses. They trained thirty-eight teams using modules of operative sessions on live porcine models, which involved communication, collaboration, and team based problem solving. Participants reported increased proficiency with damage control techniques. They also reported a change in hospital protocols (17 out of 18) for trauma management because of the course.

Weller et al (2003) describe a survey of practice following a simulation course in crisis management. They found that the participants reported changes to practice because of the training, which was not limited to the crisis areas that were trained but rather extended to other areas of practice.

Harms et al (2004) reported a communication skills course using role-play and evaluated the effect of the course on patient satisfaction. They reported that participants felt their interpersonal skills had improved and patient satisfaction results likewise improved post training.

Surgery

The use of simulation in surgical postgraduate training is widely reported and focuses on the development and implementation of bench models and Virtual reality training to teach surgical skills such as laparoscopic techniques and suturing. However, only ten articles were identified which used simulation to teach or assess non-technical skills. The articles identified could be categorised into:

- Team training
- Crisis resource management
- Interprofessional skills
- Patient safety and error management
- Communication skills
- Differentiating between novice and expert

Hirshberg et al (1999) developed a computer model of the emergency room and related hospital facilities to assess elements of surgical response to multiple casualties. They used this model to identify blocks in flow of patients and staff number requirements.

Knudson et al (2008) used high fidelity simulation to train surgical residents to manage critically ill trauma patients. Initial management skills and crisis management skills were assessed by independent observer review of videotapes. They compared groups that were trained using simulation to groups who received a didactic lecture. The SIM trained residents received

higher overall scores particularly in the teamwork skills assessed. Hammond et al (2002) used high fidelity simulation to assess cognitive skills of junior surgical residents. They reported an improvement in the resident's confidence to call for help when managing critically ill patients.

Hassett et al (2006) reported using standardised patients to evaluate the growth in interpersonal skills of surgical residents in their first year of training. Their study demonstrated a low level of self-awareness of their interpersonal skills by the surgical resident.

Brewster et al (2005) reported a pilot project using bench models and standardised patients to integrate teaching of surgical skills with interpersonal skills and professionalism. They reported a high level of satisfaction with the training from participants. Chan et al (2005) used standardised patients and scenarios to determine how surgeons disclose medical errors to patients. Each encounter was scored on five communication elements of effective error disclosure. The author has concluded that there is a significant gap between how surgeons report error and patient preferences.

Corke et al (2005) undertook an observational study using standardised patients to determine how surgeons manage discussing treatment options with patients with acute, life threatening illness and major co morbidities. They found that the doctors focused on technical medical issues and placed less emphasis on patient related issues such as fear. They felt that there was need for additional communication skills training for surgeons to assist them in these situations.

Steinemann et al (2005) used role-play with standardised patients to train surgical residents in providing smoking cessation counselling to patients. This training was compared to a didactic lecture. Results showed no significant difference between the groups with both groups improving their knowledge, attitude and counselling skills. Klaristenfeld et al (2007) used role-play to teach surgical residents skills in managing end of life issues and palliative care with patients. The residents felt more comfortable to speak to patients about these issues post course and at three month follow up.

Hawkins et al (2000) used computer simulations and standardised patients to establish reference performance levels for experienced doctors to determine the utility of these methods for diagnostic assessment. They were able to distinguish consistent differences between experienced surgeons and students and felt that this methodology could be useful to evaluate practicing doctors.

Dermatology

Forty-four articles were reviewed. There were no articles that were relevant to simulation or non-technical skills training.

Medical Administrator

There were 174 articles identified relating to the search criteria for the College of Medical Administrators. Upon further investigation, 16 of the articles had a focus on the use of simulation to teach Non-technical skills in postgraduate training. These were categorised into areas including:

- Open Disclosure
- Braking Bad News
- Crisis Resource management
- Leadership
- Written Communication
- Verbal Communication

Cooper et al (2008) discussed the effects of simulation-based training to look at the differences in the safety climate among hospital-based anaesthesia departments. Cooper concluded that CRM training alone was insufficient to alter engrained behaviours in the absence of further reinforcing actions to promote a safe climate.

Cowles et al (2001) discussed the doctor-patient communication in surgery and the attitude of the patients to having residents in training programs participate in their surgery. They found that orientating patients to the resident education process is vital to patient' perception of care and may render patients more willing to participate, hence, highlighting the importance of effective communication between medical staff and patients.

Fairbanks et al (2007) discussed the communication patterns in the Emergency Department. Data in relation to communication events, including duration, mode, partner, location, and interruptions were recorded. These recordings identified who communicated with each other and for what reasons and assisted in developing communication patterns and give a direction for future planning.

Hampers et al (1999) discussed the language barriers and resource utilization in a paediatric emergency department. Hampers concluded that effective communication was of increased difficulty if a language barrier is present and this barrier is associated with increased resource utilization for diagnostic studies and increased Emergency Department visits.

Hampers et al (2002) discussed the need for bilingual physicians or interpreters when treating non-English speaking patients. Hampers found that the treatment of patients when communication was difficult made decision making was more cautious and increased costs of investigations but did not result in increased length of stay.

Huff (2005) discussed open disclosure with families and patients post error occurrence. Huff identified that open communication regarding the incident

often diffuses anger and allows for a fair financial settlement. Olsen et al (1998) also focused on communication and breaking bad news post death in an Emergency Department. Olsen discussed the difficulties physicians have with communicating death notification and having an educational plan associated with death notification. Improved skill in death notification, as suggested by Olsen, would not only benefit families but also serve society by possibly increasing organ and tissue donations.

Proctor et al (2002) discussed communication that occurs from and from the emergency Department when providing telephone advice. Much of this advice is provided to the public who request detailed instruction or medical advice. This article explored the medico legal issues associated with the quality of instruction and advice provided.

Rhodes et al (2007) discussed patient and doctor communication regarding domestic violence. This article identified several provider communication behaviours that facilitate patient disclosure of experiences with abuse. The examples provided highlighted common pitfalls and exemplary practices for screening for abuse and response to disclosure of abuse.

Saunders et al (2003) investigated whether patients were more satisfied with an outpatient consultation if they received a copy of the written communication to their General Practitioner (GP). It was found that if patients received a copy of the correspondence to their GP they were more satisfied with their attendance in clinic and this was an effective means of aiding communication.

Solvoy (2002) discussed the use of email as a method of communication between physicians and patients in addition to phone conversations. Solvoy concluded that email, as a form of communication, was advantageous in that it was cost effective and provided additional information for patients.

Spath (2003) wrote about the importance of communication between patients and health services. Spath suggested that if patients were more involved in their own care and their needs were heard there could be an improvement in health care safety.

Takayesu and Hutson (2004) also discussed communication, however, focused on the skill of breaking bad news and communicating life-threatening diagnosis to patients in emergency departments. This article discusses the difficulties encountered by emergency physicians in disclosing new, life-threatening diagnosis and the role of allied health professionals in addressing non-medical concerns of these patients.

Xia et al (2007) investigated how the use of a whiteboard can inform others about emergency department communication. The article demonstrated that written communication on such a medium as a whiteboard is able to demonstrate the complex and intricate teamwork that occurs in the emergency department. This communication assists with team building, resource-planning, tracking of patients and multidisciplinary problem solving.

Ophthalmology

The literature search for the specialty of ophthalmology returned 30 articles, which were reviewed. Of these articles, three were relevant to simulation. Each of these articles related to the use of Simulation or Virtual Reality technology to teaching clinical skills. One article could not be assessed due to lack of abstract.

There were no articles specifically relating to Non-technical skills.

Paediatrics and Child Health

Two hundred and twenty-one articles were reviewed of which 29 were relevant to the criteria of NTS. The topic areas covered within the search were:

- Communication
- End of Life decisions
- Breaking bad news
- Leadership

Anand et al (2005) analysed the e-mail communication between primary care providers and parents and concluded that e-mail communication focused more on medical content than administrative issues. It was also concluded that those who utilized e-mail were very positive about its use. Borowitz and Wyatt (1998) discussed the use of e-mail for 'consultations'. They concluded that email provides a very effective method of parents, guardians, and health professionals communicating in a timely fashion. Kleiner et al (2002) discussed in their paper the attitudes of physicians and parents to electronic communication. It was concluded that those physicians within the study were opposed to using e-mail to communicate where as parents were positive toward its use. Rosen and Kwok (2007) investigated the use of e-mail as the preferred communication method to answering questions from parents. It was concluded that physicians prefer e-mail communication rather than phone conversations as it takes less time.

Komoroski (1998) also wrote about the use of e-mail for communication. In this paper, email was used as a communication method for education. Multiple choice and short answer questions were circulated via e-mail on a daily basis. It was concluded that this was an effective method of communication for paediatric residents. Muething et al (2007) discussed the increased communication and inclusion in decision making when a "family centred bedside round" occurs. It was concluded that family involvement improves communication between physicians and families and makes families more comfortable about the care process.

Mangione-Smith et al (2001) discussed the expectations of parents and physicians regarding the prescribing of antibiotics to children who have no clinical indications to show they require them. The communication between the physician and the parent was deemed to be the most important factor in contributing to satisfaction of the parent with treatment. Stille et al (2001)

discussed the communication with parents about their child's health and using them as intermediaries. The conclusion from this paper is that the parents are not necessarily comfortable with this role and that in order to be effective physicians should discuss whether they are comfortable with this.

Bagtell et al (2002) developed a discussion based seminar series in order to successfully provide paediatric residents with basic information regarding end of life care. This program was found to significantly increase the confidence of clinicians in caring for seriously ill and dying children. Ferguson et al (2006) discussed the use of CD-Rom to educate physicians in communicating to families the diagnosis of Down Syndrome. They found this to be a very effective method and concluded that this methodology could be extended to other life altering disabilities. Hurwitz et al (2004) discussed the issues associated with caring for children with cancer at the end of their life, including issues associated with the assessment of the patient, the clinical care that is provided and the involvement of the family in this process. Vrakking et al (2005) also discussed end of life decision making for children in the setting of the Netherlands. This paper concluded that decisions regarding end of life were made through communicating with parents and other caregivers, as most children were not able to participate in these discussions. Vaidya (1999) also used standardised patients to improve the performance of paediatric intensive care specialists in breaking bad news and concluded that it was one of the first programs to demonstrate short-term improvement in physicians.

Knapp and Mulligan-Smith (2005) discussed the issues associated with a child death in the emergency department. Amongst these issues were the communication difficulties in informing the child's General Practitioner about the death, requesting post-mortem examinations and procurement of organ donation. McCabe (2008) looked at end of life issues associated with children and their families. The paper concluded that Paediatric residents have limited experience with end of life care and do not feel adequately trained. The residents felt that with increased training their perception of confidence did not increase. Greenberg (1999) also discussed the use of standardised patients to train paediatric emergency fellows on how to break bad news regarding child death.

Taveras et al (2004) discussed communication with breastfeeding mothers. They found that the majority of mothers spoke about breastfeeding with their paediatric specialist rather than their obstetric specialist. It was concluded that unintentional communication gaps occurred and that approaches to enhance communication between obstetricians and mothers was required. Vaidya et al (1999) wrote about a workshop in which they taught physicians using standardized patients. The study demonstrated short-term improvement in physician's performance in conveying bad news in a paediatric intensive care setting.

Brown et al (2005) describe a pilot program that utilizes paediatric-standardized patients (SP) to aid the training of residents in interviewing skills addressing complex mental health issues. They found that this was an effective method of training for medical staff in complex NTS that was

associated with mental health issues. Hardoff and Schonmann (2001) also utilized SPs to train physicians in skills associated with adolescents. This program was shown to be very effective at increasing the communication skills of physicians with teenagers. Wissow et al (2002) looked at whether a longitudinal relationship between resident and patient was sufficient to promote discussion, disclosure, and detection of psychosocial issues. This paper concluded that training in communication skills might help residents achieve this.

Gilfoyle et al investigated the development of a leadership skills workshop in paediatric advanced resuscitation. They concluded that residents acquired leadership skills following the intervention that were unlikely to have been developed without attending the program. Babitch (2006) investigated a practice management skills program for residents that was provided over a 12 month period and included both medical and personnel management issues. One of the results of this program was a positive influence on the leadership abilities of those involved.

Hampers et al (1999) investigated the communication barriers associated with language and that these barriers contributed to a higher rate of resource utilization and increased Emergency Department visits, hence, creating a link between effective communication and efficiency. Mihalic et al (2007) discussed the education associated with Paediatric training and cultural competencies. They concluded that cultural competencies be part of the paediatric curriculum in a changing cultural environment in the U.S. population.

Jones et al (2007) wrote about informed consent for surgery and the processes that occur. They discussed the communication process and the importance of this process.

Mikrogianakis et al (2008) investigated team training using simulation of mock trauma codes as an education initiative. The paper concluded that residents self reported an increase in confidence, knowledge and comfort level in managing paediatric trauma. It also raised resident's awareness of knowledge gaps but was unable to measure a significant change in team functioning post intervention. Jankouskas et al (2007) also investigated CRM training of multidisciplinary teams including paediatric specialists and anaesthetists. This study concluded that there was a perceived increase in team collaboration, satisfaction with care and observed team skills due to multidisciplinary CRM training.

Shiple et al (2005) discussed the teaching of paediatrics to residents in an effort to increase understanding of community health and child advocacy. It was concluded that training in this area would improve leadership and collaborative skills of practitioners and improve child health in the community.

Violato et al (2006) discussed whether it was possible to develop feasible, valid and reliable multisource feedback data for paediatricians. They developed surveys that addressed competencies relating to communication

skills, professionalism, collegiality, continuing professional development and collaboration. They concluded that surveys were able to be developed that provided this data.

Pain

122 articles were reviewed. There were no articles identified relevant to simulation or non-technical skills training.

Pathology

There were 407 articles reviewed within the search criteria relating to pathology. Of the 407 articles, there were 26 relating to the use of simulation methods in training. There were 8 articles that discussed the use of simulation as a mode for training of medical professionals in the development of NTS.

Chockinov (2002) discussed the use of video footage to develop an overarching framework for the maintenance of dignity when approaching end of life decisions for those patients that are terminally ill. Finnerty et al (2002) also focused on end of life decisions associated with pregnant women and informing family and guardians as to their directives in advance in relation to topics such as trauma, cancer, and aging. Haidet et al (1998) also had a focus on end of life decisions. It included the preferences for resuscitation of metastatic colorectal cancer patients and how they communicate their wishes to physicians. This paper concluded that patients with metastatic colorectal cancer had definite opinions on end of life decisions and that direct communication between patients and physicians did not improve the significant misunderstanding between patients and physicians. Oh et al (2004) also wrote on the subject of end of life decisions and the withholding of treatment for patients with terminal malignancies in Korea. They concluded that the values held regarding therapeutic decision-making and the withholding of life sustaining treatment varies between family members and physicians. Tulskey (2005) also discussed the need for communication skills at the end of life. This article identified and discussed many of the factors families encounter when facing end of life decisions.

Ernst et al (1999) discussed effective methods to manage, review and distribute digital imaging and communications in medicine. Ernst et al discussed the use of a windows based Picture Archiving and Communications Systems (PACS) system as an effective method for the communication of results of investigations for medical professionals. Riva and Gramatica (2003) discuss the development of electronic communication methods between clinicians and between clinicians and patients. This chapter discussed how electronic communication methods have decreased cost of healthcare and in many instances made healthcare more effective.

Towle and Hoffman (2002) discuss an advanced communications program for fourth year medical students. Although not within the scope of the project, as it is not inclusive of undergraduate or prevocational programs,

this paper is worth noting as the structure and format would be of great value to those developing NTS courses in the future.

Rehabilitation

Within the rehabilitation specialty, 12 articles were reviewed. One article related to CME of Physicians. This article related to the use of online learning and videoconferencing to teach about workplace injury. There are slight and tenuous links between this area and simulation.

Psychiatry

Ninety-four articles were reviewed. Of these only 6 were relevant to simulation. Three of the four articles dealt with the use of standardised patients for teaching or assessing communication skills in undergraduates. One article related to the use of CD ROMs to teach about patients with personality disorders. Therefore, there were no articles on NTS that were relevant to this Literature review. The NTS articles relating to undergraduate medical education have been listed below. An additional 2 articles were about NTS, one by Rimondini et al. (2006) discussed the need for active listening skills amongst young psychiatrists which assists in their emotion focusing skills. The second was by Fichtner et al. (2000) which discussed a program that developed leadership skills and clinical team functioning. The authors concluded that this program was of value when coupled and supplemented with other educational activities.

1. Hall, M. J., G. Adamo, et al. (2004). "Use of standardized patients to enhance a psychiatry clerkship." *Acad Med* 79(1): 28-31.
2. Sack, S., B. Drabant, et al. (2002). "Communicating about sexuality: an initiative across the core clerkships." *Acad Med* 77(11): 1159-60.
3. Towle, A. and J. Hoffman (2002). "An advanced communication skills course for fourth-year, post-clerkship students." *Acad Med* 77(11): 1165-6.

Radiology and Oncology

The literature review identified 157 articles of which one related to the use of simulation to teach NTS. Sica et al (1999) discussed a CRM course that was adapted from anaesthesia CRM to incorporate radiology. They found that the use of simulation was an effective method for teaching CRM to radiologists.

Intensive Care Medicine

The literature review identified 1078 articles of which three related to the use of simulation to teach non-technical skills in Intensive Care residents. Vaidya et al (1999) used simulated patients to teach breaking bad news. Training was undertaken and blinded assessors assessed performance using a checklist. The training resulted in improved performance from control groups. Two articles used simulation to train residents in team behaviours using high fidelity simulators. DeVita et al (2005) used simulation to train

Medical Emergency Teams. Participants who felt that the training had improved performance; however, this was a preliminary study only undertook evaluations. Zabari, et al. (2006) used simulation to try and improve interactions between obstetricians and neonatologists. Results indicated improved team response times and improved communication skill utilisation as assessed by checklist analysis of videotapes.

3.2 Grey Literature Results

International Contact List

Name	Sim Centre/Company
Lou Oberndorf	METI
Stefan Moenk	Mainz
Nicky Maran	Stirling
Mark Tooley	Bristol
Elaine Gill	St Thomas
Paul Bradley	Plymouth
Lisa Satterthwaite	Mt Sinai, Toronto
Dan Raemar	Harvard University, Boston
David Gaba	Stanford University, Palo Alto , California
Jonathon Beard	Sheffield Vascular Institute, UK
Roger Kneebone	Imperial College, UK
Pierre Cardinal	Ottawa
Kevin LaChappelle	Montreal
Toni Laidlaw	Dalhousie
Jennifer Weller	NZ
Brian Robinson	NZ
Betsy Hunt	John Hopkins
Nicole Shilkofski	John Hopkins

Table 4: Grey Literature International Contact List

Australian Contact List

Name	Simulation Centre/Company
Brendan Flanagan	Southern Health Simulation Centre Monash University
Debra Nestel	Gippsland Clinical School, Monash University
Leonie Watterson	Sydney Simulation Centre
Brian Jolly	Centre for Medical and Health Sciences Education Monash University
Mary Lawson	Royal Australian and New Zealand College of Anesthetist
Marcus Watson	QLD Skills Development Centre
Maree Gleeson	UTS, Burnie
Harry Owen	Flinders Simulation Centre

Name	Simulation Centre/Company
Richard Morris	WA
Katie Walker	QLD SDC
Peter Lee	Queensland Health
Janet Chan	St Vincent's Simulation Centre, Sydney
Nik Whisson	Scientific Educational Supplies
Bill Thalmeier	Laerdal Australia

Table 5: Grey Literature Australian Contact List

3.2.1 Grey Literature General

Ozzawa 2008 Abstracts

Seven hundred and seventy-seven abstracts were reviewed which included abstracts for long papers, short papers, posters and workshops. Forty-seven abstracts were identified as simulation related studies involving mannequin based or standardised patients and scenario based learning. However, the majority of these abstracts described the use of simulation to teach and or assess clinical skills. In addition, the participants were undergraduate or discipline other than medicine such as nursing or allied health. There were no articles identified regarding the use of simulation to teach non-technical skills in postgraduate medicine disciplines.

First International Clinical Skills Conference, Prato 2005

One hundred and fifty-seven abstracts were reviewed which included keynote addresses, keynote workshops, workshops, full papers, brief papers and posters. Thirty-six abstracts related to the use of simulation, simulated patients or other forms of simulated teaching. These papers referred to undergraduate and postgraduate medicine, nursing and allied health, however no abstracts referred to the use of simulation in postgraduate medical disciplines to teach non-technical skills.

Second International Clinical Skills Conference, Prato 2007

One hundred and thirty-eight abstracts were reviewed which included keynote addresses, workshops, full papers, and posters. Twenty-three abstracts related to the use of simulation, simulated patients or other forms of simulated teaching. These papers referred to undergraduate and postgraduate medicine, nursing and allied health. Two papers specifically dealt with postgraduate medical specialty training. The first paper by Pliego and Errichetti, discussed a communication rating scale 'Sim Com T' to train and assess performance in medical teams. The authors presented a workshop on how they used this rating scale however; no details were provided as to the medical disciplines involved. Yule et al. presented a workshop on the NOTSS tool (Non Technical Skills for surgeons). This tool provides the opportunity for consultant (attending) surgeons to give feedback to colleagues and trainees based on structured observations of

non-technical aspects of performance in the intraoperative environment. Further research into this topic yielded the following articles relevant to the use of this tool in postgraduate surgical training:

- Surgeons' non-technical skills in the operating room: Reliability testing of the NOTSS behaviour rating system. *World Journal of Surgery*.
- Yule, S., Flin, R., Rowley, D., Mitchell, A., Youngson, G.G., Maran, N., Paterson-Brown, S. (in press). Debriefing surgical trainees on non-technical skills (NOTSS). *Cognition, Technology & Work*.
- Healey, A., Catchpole, K., & Yule, S. (in press). Enhancing surgical systems. *Cognition, Technology & Work*.
- Yule, S., Flin, R., Paterson-Brown, S., Maran, N., Rowley, D. (in press). Development of a rating system for surgeons' non-technical skills. *Medical Education* Download article (in press)(177kb)
- Flin, R., Yule, S., McKenzie, L., Paterson-Brown, S., Maran, N. (2006). Attitudes to teamwork and safety in the operating theatre. *The Surgeon*, 4:3; 145-151 Download article(359kb):Download additional tables(114kb):Download ORMAQ questionnaire(120kb)
- Yule, S., Flin, R., Paterson-Brown, S. & Maran, N. (2006). Non-technical skills for surgeons: A review of the literature. *Surgery*, 139: 140-149 Download pdf article(141kb)
- Flin, R. & Yule, S. (2004). Leadership for Safety: Industrial Experience. *Quality and Safety in Healthcare*, 13 (suppl II): ii45-ii51. Download pdf article(105kb)

Victorian Government Department of Human Services Commissioned Projects

Three reports were completed because of the Victorian Government Department of Human Services undertaking projects based around simulation and or clinical skills teaching. Two of these reports looked specifically into the approaches for teaching of clinical skills at an undergraduate level. The third of these reports was a systematic literature review completed by Flanagan, Clavisi and Nestel in 2007 that identified "Efficacy and effectiveness of simulation based training for learning and assessment in health care". This report provided an overview of simulation in healthcare in regards to seven specific topics:

- 1) Transferability of skills learned via simulation to real life patient care
- 2) Clinical skills (including the use of simulation for both education and training [e.g. upskilling and, continuing education] and for, competence assessment and remediation).
- 3) Decision making (situational awareness)
- 4) Communication with patients
- 5) Teamwork, including communication between clinicians

- 6) Leadership
- 7) Cost effectiveness of simulation-based training compared to direct patient contact

The review suggested the following about simulation;

“...simulation makes a valuable contribution to learning for students, trainees and clinicians. It enables learning of both routine and non-routine procedures and management of patients. Simulation is widely used in teaching and learning, in assessments both as formative and where high stakes decisions are made. The range of simulation modalities varies widely.”

The review identified several articles based on NTS but also identified that there is currently not enough robust research in the area of simulation and NTS or clinical skills and that this lack of robust research was an issue.

SESAM Meetings

SESAM Annual Meeting 1994

Date: 1994
Venue: Copenhagen, Denmark
Abstracts: N/A

SESAM Annual Meeting 1996

Date: 1996
Venue: Copenhagen, Denmark
Abstracts: N/A

SESAM Annual Meeting 1998

Date: Jan 17, 1998
Venue: Tucson, Arizona (USA)
Abstracts: N/A

SESAM Annual Meeting 1999

Date: August 27 & 28, 1999
Venue: Esbjerg, Denmark

Three abstracts were presented in the abstract list. All three related to simulation and one of these papers was related to training of non technical skills. This paper looked at Trauma Team training, however, was not specific to a specialty training program.

SESAM Annual Meeting 2000

Date: March 31, April 1, 2000
Venue: Mainz, Germany

Fourteen abstracts were presented in the abstract list. All abstracts related to simulation and one of these papers was related to training of non technical skills and in particular the training around Crisis Resource

Management (CRM). This paper although discussing NTS focused on education at undergraduate medical level.

SESAM Annual Meeting 2001

Date: March 30, March 31, 2001
Venue: Stirling, United Kingdom
Abstracts: N/A

SESAM Annual Meeting 2002

Date: May 10 &11, 2002
Venue: Santander, Spain
Abstracts: N/A

SESAM Annual Meeting 2003

Date: April 3 - 5, 2003
Venue: St Bartholomew's Hospital, London, United Kingdom

Thirteen abstracts were presented in the abstract list. All abstracts related to simulation and three of these papers related to training of non technical skills and in particular the training around Crisis Resource Management (CRM) with Anesthetists. These papers discussed how and why anesthetists perform and react with anesthetic crisis with the operating theatre environment.

SESAM Annual Meeting 2004

Date: June 17 - 19, 2004
Venue: Center for Advanced Medical Simulation at Karolinska University Hospital Huddinge, Stockholm, Sweden

Sixty-three abstracts were presented in the abstract list. All abstracts related to simulation and nine of these papers related to training of non technical skills. Eight of the nine discussed CRM and teamwork training as pivotal to improving patient safety. All of the nine papers presented mentioned communication skills as being part of their work. Two of the papers were with Anesthetists, one on trauma, one theatre teams, one multiprofessional and the final three did not list the professions involved. The final NTS paper presented focused on leadership training for trauma teams.

SESAM Annual Meeting 2005

Date: May 19 - 21, 2005
Venue: Bristol Medical Simulation Centre, Bristol, UK
Abstracts: N/A

SESAM Annual Meeting 2006

Date: June 29 - July 1, 2006
Venue: Porto, Portugal
Abstracts: All scientific abstracts were published in Simulation in Healthcare (Vol. 1, No. 3, Fall 2006).

SESAM Annual Meeting 2007

Date: June 18 - 20, 2007

Venue: Herlev Hospital, Copenhagen, Denmark

Abstracts: N/A

SESAM Annual Meeting 2008

Date: June 19 - 21, 2008

Venue: Hertfordshire Intensive Care & Emergency Simulation Centre (HICESC) at the University of Hertfordshire, Hatfield, United Kingdom.

Eighty-seven abstracts were presented in the abstract list for oral presentations, workshops and posters. All abstracts related to simulation and one of the oral papers related to training of non technical skills and in particular the training around communication at undergraduate medical level. Three of the poster abstracts related to NTS. One focused on whether NTS training in a multidisciplinary paediatric teams improved CRM training and the remaining two papers focus solely on CRM principles.

Society for Simulation in Healthcare (SSH)

2001 International Meeting on Medical Simulation

Thirty-seven abstracts were presented in the abstract list. All abstracts related to simulation and five related to the use of NTS as the focus of their program. Three of the five abstracts were on CRM principles and training. Two of the three had a paediatric focus and the third had a nursing focus. The fourth abstract was on improving communication skills and the last was on improving teamwork through scenario based training.

2002 International Meeting on Medical Simulation

Forty abstracts were reviewed of which only three related to NTS. Two of these related to Crisis resource management training and the remaining abstract related to NTS specifically in Anesthetics and how simulation can assist in the development of NTS.

2003 International Meeting on Medical Simulation

Forty-eight abstracts were reviewed of which 7 related to programs that had an NTS focus. Four of these were on CRM principles and teamwork. One was specifically on improving communication skills and another specifically and solely on further developing the ability of people to work in teams. The last was a review of the Anaesthetics NTS program (ANTS) that was presented the previous year in 2002.

2004 International Meeting on Medical Simulation

Seventy abstracts were reviewed of which 18 related to programs that had an NTS focus. Ten of these were on CRM principles and teamwork. Three

were specifically on improving communication. Two were on upskilling medical staff on breaking bad news and making end of life decisions. Other papers addressed NTS skills specifically in surgeons and improving time management skills through simulation. The last of the papers was another review of the implementation process of the ANTS program.

2005 International Meeting on Medical Simulation

Sixty-eight abstracts were reviewed of which 12 related to programs that had an NTS focus. Six of these were on CRM principles and teamwork. One of the CRM papers related directly to the training of instructors to conduct CRM simulation programs. One of the papers discussed a method for assessing the NTS of surgeons. Two programs were about leadership skills and the development of these skills through using simulation. Three papers looked at issues around making and communicating end of life decisions and how the use of simulation may assist.

2006 International Meeting on Medical Simulation

One hundred and two abstracts were reviewed of which 19 related to programs that had an NTS focus. Nine of these were on CRM principles and teamwork. Two programs were about leadership skills and the development of these skills through using simulation. One paper looked at issues around making and communicating end of life decisions and how simulation of this activity may assist. There were two leadership skills development through simulation and one paper around the skill of communicating with patients and families when breaking bad news.

2007 International Meeting on Medical Simulation

Sixty-nine abstracts were reviewed of which 5 related to programs that had an NTS focus. One of these abstracts related to undergraduate teaching of medical students in communication and could not be included in this review. One of the articles was on breaking bad news using simulation training. This article used two scenarios incorporating medical error and infant death to assist in the teaching of breaking bad news. Participants found this to be a very useful method of teaching this skill. CRM and anaesthesia was the focus of the second article and how the participant's NTS held up post CRM training. Leadership training in anaesthesia was the focus of the third article in which non-routine anaesthesia events occurred and the method of leadership behaviours displayed were categorized and discussed. The last of the articles looked at 360-degree feedback in communication in ICU. This tool was used to assess the skills of the fellow in family meetings to advice on further areas of improvement.

2008 International Meeting on Medical Simulation

Sixty-nine abstracts were reviewed of which 18 related to programs that had an NTS focus. Six of these were on CRM principles and teamwork. Two

papers focused on NTS in general and the training for NTS using simulation. Seven of the papers discussed the use of simulation to improve communication skills in a variety of simulated environments. Included in these were team related activities and how effective communication improves the performance of teams. Two of the seven communication papers focused on undergraduate medical students and although being important are not within the scope of this project. One of the papers used simulation to question the professionalism of physicians placing them in situations in which they needed to make ethically difficult decisions. Two papers looked at issues around making and communicating end of life decisions and how simulation of this activity may assist.

SIMTECT HEALTH

SimTecT 2005 Healthcare Simulation conference

Date: November 1-3, 2005

Venue: Royal Brisbane and Women's Hospital Education Centre/ Queensland Health Skills Development Centre, Australia

Fifty-three abstracts were presented in the abstract list. All abstracts related to simulation and three of these papers related to training of non technical skills. Two of the three discussed CRM and teamwork training including one on obstetric emergencies and one on Virtual reality and CRM training. The last of the papers was a workshop on using simulation to teach communication skills.

SimTecT 2006 Healthcare Simulation conference

Date: September 11-14, 2006

Venue: Royal Brisbane and Women's Hospital Education Centre/ Queensland Health Skills Development Centre, Australia

Sixty-two abstracts were presented in the abstract list. All abstracts related to simulation and eleven of these papers related to training of non technical skills. Eight of the eleven discussed CRM and teamwork training including one of which was related to undergraduate medical training. One of the papers discussed the general use of simulation to increase NTS by participants. Two of the articles focused on development of communication skills and the use of simulation to develop these skills.

SimTecT 2007 Healthcare Simulation conference

Date: September 3-6, 2007

Venue: Royal Brisbane and Women's Hospital Education Centre/ Queensland Health Skills Development Centre, Australia

Fifty abstracts were presented in the abstract list. All abstracts related to simulation and six of these papers related to training of non technical skills. Three of the nine discussed CRM and teamwork training as pivotal to improving patient safety. One of the papers discussed self assessment of

NTS by participants in simulation activities and two discussed improving communication skills of health professional with other health professionals through immersive simulation.

SimTecT 2008 Healthcare Simulation conference

Date: September 8-11, 2008

Venue: Royal Brisbane and Women's Hospital Education Centre/ Queensland Health Skills Development Centre, Australia

One hundred abstracts were presented in the abstract list. All abstracts related to simulation and ten of these papers related to training of non technical skills. Five of the nine discussed CRM and teamwork training. One of the papers discussed leadership development in simulation and through using simulation and was a round table discussion. The remaining four abstracts discussed development of communication skills within the health profession and methods to create and deliver communication skills programs.

Association for Medical Education in Europe

AMEE Conference 2001

Date: September 2-5, 2001

Venue: Berlin, Germany

Four hundred and sixteen abstracts were presented in the abstract list. All abstracts related to undergraduate education of medical students at various levels. Of the abstracts presented there were thirteen papers that discussed NTS in some form. All of these abstracts were in relation to undergraduate education of medical students and three of these had links to postgraduate education. The abstracts presented, although of interest, do not present enough content around postgraduate specialist training to be included in the literature review.

AMEE Conference 2002

Date: August 29 – September 1, 2002

Venue: Lisbon, Portugal

Four hundred and sixteen abstracts were presented in the abstract list. All abstracts related to undergraduate education of medical students at various levels. Of the abstracts presented there were thirteen papers that discussed NTS in some form. All of these abstracts were in relation to undergraduate education of medical students and three of these had links to postgraduate education. The abstracts presented, although of interest, do not present enough content around postgraduate specialist training to be included in the literature review.

AMEE Conference 2003 onwards

Abstracts from the AMEE conferences were reviewed. There were a number of articles on NTS; however, the articles were all based on undergraduate education and not within the criteria for this literature review.

4.0 Discussion

The discussion has been separated into four sections directly related to the aims of the literature review as outlined in section 1, the background of the literature review. It is evident through analysis of the published and grey literature that the teaching of NTS is of great importance and the frequency in which it is being taught is increasing. In many cases, no one NTS is taught in isolation and that many of the skills work in tandem, complement each other, and are therefore taught in this manner. Many of the skills are taught using a combination of both standardised patients and mannequins and are taught to small groups.

1. Incorporation of NTS into specialist training curricula internationally

- The specialties of surgery, anaesthetics, paediatrics, and emergency medicine are producing the largest amount of research and programs that utilize various forms of simulation to teach technical skills.
- Paediatrics, surgery, and emergency medicine returned the highest number of papers that discussed NTS.
- The most commonly addressed NTS are:
 1. Error detection or management
 2. Professionalism
 3. Crisis Resource management
 4. Integration into the curriculum
 5. Cognitive reasoning
 6. Communication skills
 7. Teamwork
- Communication was a major area of concentration for articles in both published and grey literature.
- The NTS that are most discussed in communication are its role in breaking bad news and end of life decisions.
- Articles focused on both written and verbal communication and the value of effective and sound communication amongst health professionals.
- Authors often investigated communication between health professionals when in an Emergency Department setting and how the interaction between health professionals was critical to providing high-level care for the patient in a timely and cost effective manner.
- It was concluded that language barriers were also of great importance when discussing a diagnosis with a family and especially when breaking bad news or discussing possible end of life decisions.
- One of the papers used simulation to question the professionalism of physicians placing them in situations in which they needed to make ethically difficult decisions.
- Although there were a number of programs and papers identified that discussed the development of leadership skills and clinical leadership,

many of the specialties had not developed leadership specific programs for their specialist trainees or fellows.

- Simulation is most frequently utilised by the disciplines of Anaesthesia, Emergency Medicine, Paediatrics, Medical Administration and Surgery.
- CRM adapted from anaesthesia to ED, ICU, paediatrics, O&G, radiology and surgery
- The specialty of anaesthetics was the only specialty that had a purpose developed NTS course that had been rigorously evaluated and analysed (Anaesthetic Non Technical Skills; A.N.T.S.). Note ANTS is a competency framework not a course or program

2. Methods and modalities of training NTS utilizing simulation

- There is an increasing body of work that discusses the use of simulation for the teaching of clinical or technical skills although outside of the scope of the review.
- Standardised patients are commonly used to teach communication skills. Descriptions of using standardised patients including the case development, the types of standardised patients that can be used, training and the evaluation of the program.
- Immersive mannequin-based simulation is most often used to teach and develop skills associated with CRM and teamwork. Original descriptions of CRM were published more than a decade ago so not captured in this review (unless through a search of bibliographies)
- More than one NTS is usually taught in a program as they often complement each other.
- Amongst the literature associated with NTS and specialist training colleges, CRM occurs frequently.
- Dev et al (2007) describe the development of a computer-based simulator (the Virtual Emergency Department) for distance training in teamwork and leadership skills. They found that this provided a realistic, yet safe, environment to practice these skills on repeated occasions, which is not available in the real world environment.

3. Evidence supporting specific methods or modalities for specified learning objectives or medical specialities.

- “...simulation makes a valuable contribution to learning for students, trainees and clinicians. It enables learning of both routine and non-routine procedures and management of patients. Simulation is widely used in teaching and learning, in assessments both as formative and where high stakes decisions are made. The range of simulation modalities varies widely.” The review identified several articles based on NTS but also identified that there is currently not enough robust research in the area of simulation and NTS or clinical skills and that this lack of robust research was an issue. Flanagan
- The literature often discusses the interaction of team members and analysed whether immersive CRM simulations had an impact on

improving teamwork and communication in an effort to produce better performing teams, hence improving patient safety and decreasing error occurrence. The area of CRM is possibly the most frequently addressed topic within simulation and much was written about its origins within aviation and its application with the anaesthetic field. Many of the CRM courses are to assist in application of the specialist technical skills under pressure and common clinical complications; however, many articles discussed the application of NTS in conjunction with technical skills that assist in overcoming clinical complications to provide a positive outcome. It is most often used to determine how teams interact and demonstrate many of the other listed NTS. The CRM courses analysed in the literature often incorporate the NTS of Leadership, communication skills and teamwork.

- Use to identify deficiencies, cognitive reasoning, errors, professionalism, levels of experience in clinical decision-making and responsiveness in ED.
- Klaristenfeld et al (2007) used role-play to teach surgical residents skills in managing end of life issues and palliative care with patients. The residents felt more comfortable to speak to patients about these issues post course and at three month follow up.
- Knudson et al (2008) used high fidelity simulation to train surgical residents to manage critically ill trauma patients. Initial management skills and crisis management skills were assessed by independent observer review of videotapes. They compared groups that were trained using simulation to groups who received a didactic lecture. The SIM trained residents received 18 higher overall scores particularly in the teamwork skills assessed.
- Hammond et al (2002) used high fidelity simulation to assess cognitive skills of junior surgical residents. They reported an improvement in the resident's confidence to call for help when managing critically ill patients.
- Brewster et al (2005) reported a pilot project using bench models and standardised patients to integrate teaching of surgical skills with interpersonal skills and professionalism. They reported a high level of satisfaction with the training from participants.
- Chan et al (2005) used standardised patients and scenarios to determine how surgeons disclose medical errors to patients. Each encounter was scored on five communication elements of effective error disclosure. The author has concluded that there is a significant gap between how surgeons report error and patient preferences. Surprisingly there was a paucity of articles identified on the use of simulation to train Non-technical skills.
- Holcomb et al (2002) used a high fidelity human simulator to evaluate trauma team performance. Participants included military nurses, physicians and medics. Teams were evaluated at arrival and at the completion of the rotation. Two trauma scenarios were used. The authors described an improvement in team performance with the training and were able to evaluate the trauma team's performance in a reproducible manner.

- The skill of leadership was often discussed and developed within teamwork and CRM programs that were most often delivered via immersive or high fidelity simulation. Breaking bad news Literature in this area often discussed programs in which standardised patients were used in role-plays to assist in the training of registrars, fellows and consultants.
- Delvaux et al (2005) used standardised patients to train physician communication skills in the context of delivering information to cancer patients and their relatives. Communication skills were assessed using the Cancer Research Campaign workshop evaluation manual and by the simulated patient ratings. Groups were randomly assigned to the basic training and then the consolidation training, which involved three additional workshops. Results demonstrated improved communication skills in the consolidation-training group including the use of open questions, screening questions, empathy, negotiating and summarising techniques.
- Hobgood et al (2005) report on a course “GRIEV_ING” which used role-play to improve the death notification skills of emergency residents. Significant improvements were seen in the residents post intervention communication scores which were obtained from observation of interactions with standardised patients and written
- O&G showed improvement in scores where scenarios were repeated and the ability for the simulation to identify common errors in management of these scenarios, including delay in transportation, documentation issues and unfamiliarity with protocols.
- Gardner et al. (2008) looked at evaluating team training and communication with obstetric clinicians as part of a medical indemnity insurance premium program. It concluded that the course improved both communication and team training and that simulation based CRM training can serve as a strategy for mitigating adverse perinatal events.
- Bandiera et al (2005) used role-play to manage issues such as teaching efficiently, dealing with the difficult learner and common mistakes. They evaluated participants four months after their return to the workplace with all respondents reporting improved confidence with teaching and evidence of implementation of new skills learnt including giving feedback, setting learning objectives and identifying teaching opportunities.
- Gilfoyle et al investigated the development of a leadership skills workshop in paediatric advanced resuscitation. They concluded that residents acquired leadership skills following the intervention that were unlikely to have been developed without attending the program.
- Mikrogianakis et al (2008) investigated team training using simulation of mock trauma codes as an education initiative.

4. Issues influencing the integration of simulation training into clinical training.

- Binstadt et al, (2007) describe the integration of simulation into their emergency resident program. They describe a total curriculum integration which is a novel approach compared to other graduate programs.
- 360-degree feedback in communication in ICU. This tool was used to assess the skills of the fellow in family meetings to advise on further areas of improvement No tools
- Curriculum: Tools Two papers specifically dealt with postgraduate medical specialty training. The first paper by Pliego and Errichetti, discussed a communication rating scale 'Sim Com T' to train and assess performance in medical teams. Yule et al. presented a workshop on the NOTSS tool (Non Technical Skills for surgeons). Further research into this topic yielded the following articles relevant to the use of this tool in postgraduate surgical training.

Appendix 1 – Full Reference List by Discipline

Palliative care

Non technical Skills

1. Alexander, S. C., S. A. Keitz, et al. (2006). "A controlled trial of a short course to improve residents' communication with patients at the end of life." *Acad Med* 81(11): 1008-12.
2. Serwint, J. R. (2002). The use of standardized patients in paediatric residency training in palliative care: Anatomy of a standardized patient case scenario. *Journal of Palliative Medicine*. 5(1): 145-153.

Physician Other

Clinical management or technical Skills

1. Bloom, M. B., C. L. Rawn, et al. (2003). "Virtual reality applied to procedural testing: the next era." *Ann Surg* 237(3): 442-8.
2. Colt, H. G., S. W. Crawford, et al. (2001). "Virtual reality bronchoscopy simulation: a revolution in procedural training." *Chest* 120(4): 1333-9.
3. Felsher, J. J., M. Olesevich, et al. (2005). "Validation of a flexible endoscopy simulator." *Am J Surg* 189(4): 497-500
4. Gallagher, A. G. and C. U. Cates (2004). "Virtual reality training for the operating room and cardiac catheterisation laboratory." *Lancet* 364(9444): 1538-40.
5. Park, J., H. MacRae, et al. (2007) Randomized controlled trial of virtual reality simulator training: transfer to live patients. *The American Journal of Surgery* , 194 (2): 205 - 211
6. Park, J., H. MacRae, et al. (2007). "Randomized controlled trial of virtual reality simulator training: transfer to live patients." *Am J Surg* 194(2): 205-11.
7. Patel, A. D., A. G. Gallagher, et al. (2006). "Learning curves and reliability measures for virtual reality simulation in the performance assessment of carotid angiography." *J Am Coll Cardiol* 47(9): 1796-802.
8. Sedlack, R. E. and J. C. Kolars (2002). "Colonoscopy curriculum development and performance-based assessment criteria on a computer-based endoscopy simulator." *Acad Med* 77(7): 750-1.
9. Kory, P. D., L. A. Eisen, et al. (2007). "Initial airway management skills of senior residents: simulation training compared with traditional training." *Chest* 132(6): 1927-31.
10. Mayo, P. H., J. E. Hackney, et al. (2004). "Achieving house staff competence in emergency airway management: results of a teaching program using a computerized patient simulator." *Crit Care Med* 32(12): 2422-7.
11. McMahan, G. T., C. Monaghan, et al. (2005). "A simulator-based curriculum to promote comparative and reflective analysis in an internal medicine clerkship." *Acad Med* 80(1): 84-9.

12. Rosenthal, M. E., M. Adachi, et al. (2006). "Achieving house staff competence in emergency airway management using scenario based simulation training: comparison of attending vs. house staff trainers." *Chest* 129(6): 1453-8.
13. Shavit, I., I. Keidan, et al. (2007). "Enhancing patient safety during paediatric sedation: the impact of simulation-based training of nonanesthesiologists." *Arch Pediatr Adolesc Med* 161(8): 740-3.
14. Wayne, D. B., A. Didwania, et al. (2008). "Simulation-based education improves quality of care during cardiac arrest team responses at an academic teaching hospital: a case-control study." *Chest* 133(1): 56-61.
15. Wayne, D. B., V. J. Siddall, et al. (2006). "A longitudinal study of internal medicine residents' retention of advanced cardiac life support skills." *Acad Med* 81(10 Suppl): S9-S12.
16. Mahnke, C. B., A. Nowalk, et al. (2004). "Comparison of two educational interventions on paediatric resident auscultation skills." *Paediatrics* 113(5): 1331-5.
17. Nendaz, M. R., B. Ponte, et al. (2006) Live or computerized simulation of clinical encounters: Do clinicians work up patient cases differently? *Med Inform Internet Med* 31(1):1-8.
18. Obeso, V. T., D. L. Gordon, et al. (2005). "A multicenter study to provide evidence of construct validity in a computer-based outcome measure of neurology clinical skills." *Acad Med* 80(10 Suppl): S71-4.
19. Vukanovic-Criley, J. M., S. Criley, et al. (2006) Competency in cardiac examination skills in medical students, trainees, physicians, and faculty: A multicenter study. *Arch Intern Med*. 166:610-616.
20. Hatala, R., E. G. Col, et al. (2007) Does physical examination competence correlate with bedside diagnostic acumen? An observational study. *Med Teach*. 29 (2):199-203.
21. Hatala, R., B. O. Kassen, et al. (2005). "Incorporating simulation technology in a Canadian internal medicine specialty examination: a descriptive report." *Acad Med* 80(6): 554-6.
22. Peabody, J. W., J. Luck, et al. (2000). "Comparison of vignettes, standardized patients, and chart abstraction: a prospective validation study of 3 methods for measuring quality." *Jama* 283(13): 1715
23. Hawkins, R., M. M. Gaglione, et al (2004). Assessment of patient management skills and clinical skills of practising doctors using computer-based case simulations and standardised patients. *Med Educ*, 38:958-968.

Non technical skills

1. Luck, J. and J. W. Peabody (2002). "Using standardised patients to measure physicians' practice: validation study using audio recordings." *Bmj* 325(7366): 679.
2. Carney, P. A., M. S. Eliassen, et al. (1999). "How physician communication influences recognition of depression in primary care." *J Fam Pract* 48(12): 958-64.
4. Cooper, V. and A. Hassell (2002). "Teaching consultation skills in higher specialist training: experience of a workshop for specialist registrars in rheumatology." *Rheumatology (Oxford)* 41(10): 1168-71.

5. Delvaux, N., I. Merckaert, et al. (2005). "Physicians' communication with a cancer patient and a relative: a randomized study assessing the efficacy of consolidation workshops." *Cancer* 103(11): 2397-411.
6. Gerrity, M. S., S. A. Cole, et al. (1999). "Improving the recognition and management of depression: is there a role for physician education?" *J Fam Pract* 48(12): 949-57.
7. Millis, S. R., S. S. Jain, et al. (2002). "Assessing physicians' interpersonal skills: do patients and physicians see eye-to-eye?" *Am J Phys Med Rehabil* 81(12): 946-51.
8. Alexander, S. C., S. A. Keitz, et al. (2006). "A controlled trial of a short course to improve residents' communication with patients at the end of life." *Acad Med* 81(11): 1008-12.
9. Vaidya, V.U., Greenberg, L.W., Patel, K.M., Strauss, L.H. and Pollack, M.M. (1999). Teaching physicians how to break bad news: a 1-day workshop using standardized parents. *Archives of Paediatrics & Adolescent Medicine* 1999 153(4): 419-22.

General articles on simulation and health care training

1. Issenberg, S. B., W. C. McGaghie, et al. (1999). "Simulation technology for health care professional skills training and assessment." *Jama* 282(9): 861-6.
2. Letterie, G. S. (2003). "Medical education as a science: the quality of evidence for computer-assisted instruction." *Am J Obstet Gynecol* 188(3): 849-53.

Obstetrics and Gynaecology

Clinical management or technical Skills

1. "Virtual reality simulation training can improve technical skills during laparoscopic salpingectomy for ectopic pregnancy... *BJOG*. 2006 Dec;113(12):1382-7." *BJOG: An International Journal of Obstetrics and Gynaecology* 114(5): 656.
2. Aggarwal, R., A. Tully, et al. (2006). "Virtual reality simulation training can improve technical skills during laparoscopic salpingectomy for ectopic pregnancy." *Bjog* 113(12): 1382-7.
3. Daniels, K., & Parness, A., (2008). Development and Use of Mechanical Devices for Simulation of Seizure and Hemorrhage in Obstetrical Team Training. *Simulation in Healthcare: The Journal of the Society for Simulation in Healthcare*. 3(1):42-46, Spring 2008.
4. Gor, M., R. McCloy, et al. (2003). "Virtual reality laparoscopic simulator for assessment in gynaecology." *Bjog* 110(2): 181-7.
5. Hammond, I. and K. Karthigasu (2006). Training, assessment and competency in gynaecologic surgery. *Best Practice & Research Clinical Obstetrics & Gynaecology*, 20 (1):173 – 187.
6. Kirby, T. O., T. M. Numnum, et al. (2008). "A prospective evaluation of a simulator-based laparoscopic training program for gynecology residents." *J Am Coll Surg* 206(2): 343-8.
7. Lentz, G. M., L. S. Mandel, et al. (2005). "A six-year study of surgical teaching and skills evaluation for obstetric/gynecologic residents in

- porcine and inanimate surgical models." *Am J Obstet Gynecol* 193(6): 2056-61.
8. Lentz, G. M., L. S. Mandel, et al. (2001). "Testing surgical skills of obstetric and gynecologic residents in a bench laboratory setting: validity and reliability." *Am J Obstet Gynecol* 184(7): 1462-8; discussion 1468-70.
 9. Leslie, K. K., P. Dipasquale-Lehnerz, et al. (2005). "Obstetric forceps training using visual feedback and the isometric strength testing unit." *Obstet Gynecol* 105(2): 377-82.
 10. Letterie, G. S. (2002). "How virtual reality may enhance training in obstetrics and gynecology." *Am J Obstet Gynecol* 187(3 Suppl): S37-40.
 11. Letterie, G. S. (2003). "Medical education as a science: the quality of evidence for computer-assisted instruction." *Am J Obstet Gynecol* 188(3): 849-53.
 12. Marchevsky, A. M., R. Khurana, et al. (2006). "The use of virtual microscopy for proficiency testing in gynecologic cytopathology: a feasibility study using ScanScope." *Arch Pathol Lab Med* 130(3): 349-55.
 13. Banks, E. H., S. Chudnoff, et al. (2007). "Does a surgical simulator improve resident operative performance of laparoscopic tubal ligation?" *Am J Obstet Gynecol* 197(5): 541 e1-5.
 14. Burchard, E. R., E. G. Lockrow, et al. (2007). "Simulation training improves resident performance in operative hysteroscopic resection techniques." *Am J Obstet Gynecol* 197(5): 542 e1-4.
 15. Newmark, J., V. Dandolu, et al. (2007). "Correlating virtual reality and box trainer tasks in the assessment of laparoscopic surgical skills." *Am J Obstet Gynecol* 197(5): 546 e1-4.
 16. Dupuis, O., R. Moreau, et al. (2006). "A new obstetric forceps for the training of junior doctors: a comparison of the spatial dispersion of forceps blade trajectories between junior and senior obstetricians." *Am J Obstet Gynecol* 194(6): 1524-31.
 17. Erickson, S. S. (1999). "A model for teaching newborn circumcision." *Obstet Gynecol* 93(5 Pt 1): 783-4.
 18. Anderson, E. R., R. Black, et al. (2005). "Acute obstetric emergency drill in England and Wales: a survey of practice." *Bjog* 112(3): 372-5.
 19. Crofts, J. F., D. Ellis, et al. (2007). "Change in knowledge of midwives and obstetricians following obstetric emergency training: a randomised controlled trial of local hospital, simulation centre and teamwork training." *Bjog* 114(12): 1534-41.
 20. Crofts, J. F., G. Attilakos, et al. (2005). "Shoulder dystocia training using a new birth training mannequin." *Bjog* 112(7): 997-9.
 21. Crofts, J. F., C. Bartlett, et al. (2006). "Training for shoulder dystocia: a trial of simulation using low-fidelity and high-fidelity mannequins." *Obstet Gynecol* 108(6): 1477-85.
 22. Crofts, J. F., C. Bartlett, et al. (2007). "Management of shoulder dystocia: skill retention 6 and 12 months after training." *Obstet Gynecol* 110(5): 1069-74.
 23. Moore, K. D. and L. J. Voutsos (2008). "Management of shoulder dystocia skill retention 6 and 12 months after training... *Obstet Gynecol*. 2007 Nov;110(5):1069-74." *Obstetrics and Gynecology* 111(4): 994.
 24. Deering, S., J. Brown, et al. (2006). "Simulation training and resident performance of singleton vaginal breech delivery." *Obstet Gynecol* 107(1): 86-9.

25. Deering, S., S. Poggi, et al. (2004). "Improving resident competency in the management of shoulder dystocia with simulation training." *Obstet Gynecol* 103(6): 1224-8.
26. Maslovitz, S., G. Barkai, et al. (2007). "Recurrent obstetric management mistakes identified by simulation." *Obstet Gynecol* 109(6): 1295-300.
27. Thompson, S., S. Neal, et al. (2004). "Clinical risk management in obstetrics: eclampsia drills." *Bmj* 328(7434): 269-71.
28. Dauphin-McKenzie, N., M. J. Celestin, et al. (2007). "The advanced life support in obstetrics course as an orientation tool for obstetrics and gynecology residents." *Am J Obstet Gynecol* 196(5): e27-8.
29. Swift, S. E. and J. F. Carter (2006). "Institution and validation of an observed structured assessment of technical skills (OSATS) for obstetrics and gynecology residents and faculty." *Am J Obstet Gynecol* 195(2): 617-21; discussion 621-3.
30. Vogt, V. Y., V. M. Givens, et al. (2003). "Is a resident's score on a videotaped objective structured assessment of technical skills affected by revealing the resident's identity?" *Am J Obstet Gynecol* 189(3): 688-91.

Non technical Skills

1. Colletti, L., L. Gruppen, et al. (2001). "Teaching students to break bad news." *Am J Surg* 182(1): 20-3.
2. Crofts, J. F., D. Ellis, et al. (2007). "Change in knowledge of midwives and obstetricians following obstetric emergency training: a randomised controlled trial of local hospital, simulation centre and teamwork training." *Bjog* 114(12): 1534-41.
3. Ferguson, J. E., 2nd, H. L. Kleinert, et al. (2006). "Resident physicians' competencies and attitudes in delivering a postnatal diagnosis of Down syndrome." *Obstet Gynecol* 108(4): 898-905.
4. Gardner, R., Walzer, T., et al (2008). *Obstetric Simulation as a Risk Control Strategy: Course Design and Evaluation. Simulation in Healthcare: The Journal of the Society for Simulation in Healthcare.* 3(2):119-127, Summer 2008.
5. Maslovitz, S., G. Barkai, et al. (2007). "Recurrent obstetric management mistakes identified by simulation." *Obstet Gynecol* 109(6): 1295-300.
6. Morgan, P. J., R. Pittini, et al. (2007). "Evaluating teamwork in a simulated obstetric environment." *Anesthesiology* 106(5): 907-15.
7. Pickard, S., P. Baraitser, et al. (2003). "Can gynaecology teaching associates provide high quality effective training for medical students in the United Kingdom? Comparative study." *Bmj* 327(7428): 1389-92.

General Article on Simulation in Obstetrics

1. Macedonia, C. R., R. B. Gherman, et al. (2003). "Simulation laboratories for training in obstetrics and gynecology." *Obstet Gynecol* 102(2): 388-92.

Emergency Medicine

Clinical management or technical skills

2. Ander, D. S., A. Hanson, et al. (2004). "Assessing resident skills in the use of rescue airway devices." *Ann Emerg Med* 44(4): 314-9.
3. Barsuk, D., A. Ziv, et al. (2005). "Using advanced simulation for recognition and correction of gaps in airway and breathing management skills in prehospital trauma care." *Anesth Analg* 100(3): 803-9, table of contents.
4. Calkins, M. D. and T. D. Robinson (1999). "Combat trauma airway management: endotracheal intubation versus laryngeal mask airway versus combitube use by Navy SEAL and Reconnaissance combat corpsmen." *J Trauma* 46(5): 927-32.
5. Cherry, R. A., J. Williams, et al. (2007) The Effectiveness of a Human Patient Simulator in the ATLS Shock Skills Station. *Journal of Surgical Research* 139(2):229-35
6. Deutsch, E. S., D. Dixit, et al. (2007). "Management of aerodigestive tract foreign bodies: innovative teaching concepts." *Ann Otol Rhinol Laryngol* 116(5): 319-23.
7. Hogan, M. P., D. E. Pace, et al. (2006) Use of human patient simulation and the Situation Awareness Global Assessment Technique in practical trauma skills assessment. *J Trauma* 61:1047-1052.
8. Marshall, R. L., J. S. Smith, et al. (2001). "Use of a human patient simulator in the development of resident trauma management skills." *J Trauma* 51(1): 17-21.
9. Mayrose, J., & Myers, J., (2007) Endotracheal Intubation: Application of Virtual Reality to Emergency Medical Services Education. *Simulation in Healthcare: The Journal of the Society for Simulation in Healthcare*. 2(4):231-234, Winter 2007.
10. Olympio, M. A., R. Whelan, et al. (2003) Failure of simulation training to change residents' management of oesophageal intubation. *British Journal of Anaesthesia* 91(3): 312-318
11. Rosenthal, M. E., M. Adachi, et al. (2006). "Achieving housestaff competence in emergency airway management using scenario based simulation training: comparison of attending vs housestaff trainers." *Chest* 129(6): 1453-8.
12. Ruppert, M., M. W. Reith, et al. (1999). "Checking for breathing: evaluation of the diagnostic capability of emergency medical services personnel, physicians, medical students, and medical laypersons." *Ann Emerg Med* 34(6): 720-9.
13. Shavit, I., I. Keidan, et al. (2007). "Enhancing patient safety during paediatric sedation: the impact of simulation-based training of nonanesthesiologists." *Arch Pediatr Adolesc Med* 161(8): 740-3.
14. Weinstock, P. H., L. J. Kappus, et al. (2005) Toward a new paradigm in hospital-based paediatric education: The development of an onsite simulator program. *Paediatric Critical Care Medicine*. 6(6):712-713.
15. Willy, C., J. Sterk, et al. (1998) Computer-assisted training program for simulation of triage, resuscitation, and evacuation of casualties. *Military Medicine*, 163(4): 234-138.

16. Xiao, Y., F. J. Seagull, et al. (2007). "Video-based training increases sterile-technique compliance during central venous catheter insertion." *Crit Care Med* 35(5): 1302-6.

Non technical skills

1. Kozer, E., W. Seto, et al. (2004). "Prospective observational study on the incidence of medication errors during simulated resuscitation in a paediatric emergency department." *Bmj* 329(7478): 1321.
2. Muller, M. P., M. Hansel, et al. (2007) Six steps from head to hand: A simulator based transfer oriented psychological training to improve patient safety. *Resuscitation* 73:137-143.
3. Young, J. S., J. B. Stokes, et al. (2007). "Proactive versus reactive: the effect of experience on performance in a critical care simulator." *Am J Surg* 193(1): 100-4.
4. Reznek, M., R. Smith-Coggins, et al. (2001) Emergency Medicine Crisis Resource Management (EMCRM) Simulation & Gaming, 32(2): 175-193.
5. Bond, W. F., L. M. Deitrick, et al. (2004). "Using simulation to instruct emergency medicine residents in cognitive forcing strategies." *Acad Med* 79(5): 438-46.
6. Bandiera, G., S. Lee, et al. (2005) Faculty perceptions and practice impact of a faculty development workshop on emergency medicine teaching. *Can J Emerg Med* 7(5):321-7.
7. Hobgood, C., D. Harward, et al. (2005) The educational intervention "GRIEV_ING" improves the death notification skills of residents. *Acad Emerg Med*. 12(4):296-301.
8. McLaughlin, S. A., C. Monahan, et al. (2007). "Implementation and evaluation of a training program for the management of sexual assault in the emergency department." *Ann Emerg Med* 49(4): 489-94.
9. Dev, P., P. Youngblood, et al. "Virtual Worlds and Team Training."
10. Holcomb, J. B., R. D. Dumire, et al. (2002). "Evaluation of trauma team performance using an advanced human patient simulator for resuscitation training." *J Trauma* 52(6): 1078-85; discussion 1085-6.
11. Hansen, K. S., P. E. Uggen, et al. (2008). "Team-oriented training for damage control surgery in rural trauma: a new paradigm." *J Trauma* 64(4): 949-53; discussion 953-4.
12. Leiba, A., A. Goldberg, et al. (2006). "Lessons learned from clinical anthrax drills: evaluation of knowledge and preparedness for a bioterrorist threat in Israeli emergency departments." *Ann Emerg Med* 48(2): 194-9, 199 e1-2.
13. Mikrogianakis, A., M. H. Osmond, et al. (2008). "Evaluation of a multidisciplinary paediatric mock trauma code educational initiative: a pilot study." *J Trauma* 64(3): 761-7.

General Articles

1. Binstadt, E. S., R. M. Walls, et al. (2007) A Comprehensive Medical Simulation Education Curriculum for Emergency Medicine Residents. *Annals of Emergency Medicine* 49(4):505 – 507.

Simulation to differentiate between expert and novice

1. Girzadas Jr, D. V., L. Clay, et al. (2007) High fidelity simulation can discriminate between novice and experienced residents when assessing competency in patient care. *Med Teach* 29(5): 452-456.
2. Gisondi, M. A., R. Smith-Coggins, et al. (2004) Assessment of resident professionalism using high-fidelity simulation of ethical dilemmas. *Acad Emerg Med.* 11:931–937.

Anaesthetics

Clinical Management or technical Skills

1. Rosenstock, C., D. Ostergaard, et al. (2004). Residents lack knowledge and practical skills in handling the difficult airway. *Acta Anaesthesiologica Scandinavica* 48:1014 - 1018
2. Berkenstadt, H., A. Ziv, et al. (2003). "The use of advanced simulation in the training of anesthesiologists to treat chemical warfare casualties." *Anesth Analg* 96(6): 1739-42
17. Blum, M. G., T. W. Powers, et al. (2004). "Bronchoscopy simulator effectively prepares junior residents to competently perform basic clinical bronchoscopy." *Ann Thorac Surg* 78(1): 287-91;
18. Chen, P. T., H. W. Cheng, et al (2008) Instructor-based real-time multimedia medical simulation to update concepts of difficult airway management for experienced airway practitioners. *J Chin Med Assoc* 71:174–9
19. Cook, T. M., C. Green, et al. (2007). "Evaluation of four airway training manikins as patient simulators for the insertion of single use laryngeal mask airways." *Anaesthesia* 62(7): 713-8.
20. Johnson, K. B., N. D. Syroid, et al. (2008) Part task and variable priority training in first-year anaesthesia resident education: A combined didactic and simulation-based approach to improve management of adverse airway and respiratory events. *Anesthesiology* 108:831-40.
21. Kuduvalli, P. M., A. Jervis, et al. (2008). "Unanticipated difficult airway management in anaesthetised patients: a prospective study of the effect of mannequin training on management strategies and skill retention." *Anaesthesia* 63(4): 364-9.
22. Lui, P. W. (2008) Things we should know when designing simulator-based teaching in difficult airway management. *J Chin Med Assoc* 71(4):163-64.
23. Olympio, M. A., R. Whelan, et al. (2003) Failure of simulation training to change residents' management of oesophageal intubation. *British Journal of Anaesthesia*, 91(3): 312-318.
24. Ottestad, E., J. R. Boulet, et al. (2007). "Evaluating the management of septic shock using patient simulation." *Crit Care Med* 35(3): 769-75.
25. Owen, H., V. Follows, et al. (2002). "Learning to apply effective cricoid pressure using a part task trainer." *Anaesthesia* 57(11): 1098-101.
26. Schwid, H. A., G. A. Rooke, et al. (1999). "Use of a computerized advanced cardiac life support simulator improves retention of advanced cardiac

- life support guidelines better than a textbook review." *Crit Care Med* 27(4): 821-4.
27. Shavit, I., I. Keidan, et al. (2007). "Enhancing patient safety during paediatric sedation: the impact of simulation-based training of nonanesthesiologists." *Arch Pediatr Adolesc Med* 161(8): 740-3.
 28. Smith, H. M., A. K. Jacob, et al. (2008). "Simulation education in anaesthesia training: a case report of successful resuscitation of bupivacaine-induced cardiac arrest linked to recent simulation training." *Anesth Analg* 106(5): 1581-4
 29. Stringer, K. R., S. Bajenov, et al. (2002). "Training in airway management." *Anaesthesia* 57(10): 967-83. Simulation in assessment of Clinical Skills
 30. Savoldelli, G. L., V. N. Naik, et al. (2006). "Evaluation of patient simulator performance as an adjunct to the oral examination for senior anaesthesia residents." *Anesthesiology* 104(3): 475-81.
 31. Murray, D. J., J. R. Boulet, et al. (2007). "Performance of residents and anesthesiologists in a simulation-based skill assessment." *Anesthesiology* 107(5): 705-13.
 32. Rosenblatt, M. A. and K. J. Abrams (2002). "The use of a human patient simulator in the evaluation of and development of a remedial prescription for an anesthesiologist with lapsed medical skills." *Anesth Analg* 94(1): 149-53
 33. Schwid, H. A., G. A. Rooke, et al. (2002). "Evaluation of anaesthesia residents using mannequin-based simulation: a multiinstitutional study." *Anesthesiology* 97(6): 1434-44.
 34. Weller, J. M., B. J. Robinson, et al. (2005). "Psychometric characteristics of simulation-based assessment in anaesthesia and accuracy of self-assessed scores." *Anaesthesia* 60(3): 245-50

Non Technical Skills

1. Blum, RH., Raemer, D.B., Carroll, J.S, Sunder, N., Felstein, D.M, Cooper, J.B. (2005). "A method for measuring the effectiveness of simulation-based team training for improving communication skills." *Anesth Analg* 100(5): 1375-80
2. Hansen, K. S., P. E. Uggen, et al. (2008). "Team-oriented training for damage control surgery in rural trauma: a new paradigm." *J Trauma* 64(4): 949-53
3. Harms, C., J. R. Young, et al. (2004). "Improving anaesthetists' communication skills." *Anaesthesia* 59(2): 166-72.
4. Wheeler, S. J. and D. W. Wheeler (2005). "Medication errors in anaesthesia and critical care." *Anaesthesia* 60(3): 257-73.

Evaluation of Simulation Effectiveness

1. Byrne, A. J., A. J. Sellen, et al. (2002). "Effect of videotape feedback on anaesthetists' performance while managing simulated anaesthetic crises: a multicentre study." *Anaesthesia* 57(2): 176-9.

2. Savoldelli, G. L., V. N. Naik, et al. (2007). Value of debriefing during simulated crisis management: Oral versus video-assisted oral feedback. *Current Opinion in Anaesthesiology*. 20(6):605-613.
3. Jackson, K. M. and T. M. Cook (2007). "Evaluation of four airway training manikins as patient simulators for the insertion of eight types of supraglottic airway devices." *Anaesthesia* 62(4): 388-93.
4. Jordan, G. M., J. Silsby, et al. (2007). "Evaluation of four manikins as simulators for teaching airway management procedures specified in the Difficult Airway Society guidelines, and other advanced airway skills." *Anaesthesia* 62(7): 708-12
5. Silsby, J., G. Jordan, et al. (2006). "Evaluation of four airway training manikins as simulators for inserting the LMA Classic*." *Anaesthesia* 61(6): 576-9.
6. Sudhir, G., M. R. Stacey, et al. (2007). "Evaluation of the Basic Airway Model, a novel mask ventilation training manikin." *Anaesthesia* 62(9): 944-7.
7. Varaday, S. S., S. M. Yentis, et al. (2004). "A homemade model for training in cricothyrotomy." *Anaesthesia* 59(10): 1012-5.
8. Weidenbach, M., H. Drachsler, et al. (2007). "EchoComTEE - a simulator for transoesophageal echocardiography." *Anaesthesia* 62(4): 347-53.
9. Weller, J., Morris, R., et al. (2006) Effective Management of Anaesthetic Crises: Development and Evaluation of a College-accredited Simulation-based Course for Anaesthesia Education in Australia and New Zealand. *Simulation in Healthcare: The Journal of the Society for Simulation in Healthcare*. 1(4):209-214, Winter 2006.

General Simulation Articles

1. Cumin, D. and A. F. Merry (2007). "Simulators for use in anaesthesia." *Anaesthesia* 62(2): 151-62.
2. Sinz, E. H. "Anesthesiology National CME Program and ASA Activities in Simulation."
3. Weller, J., L. Wilson, et al. (2003). "Survey of change in practice following simulation-based training in crisis management." *Anaesthesia* 58(5): 471-3.

Use of Simulation to differentiate Novice and Expert

1. Devitt, J. H., M. M. Kurrek, et al. (1998). "Testing internal consistency and construct validity during evaluation of performance in a patient simulator." *Anesth Analg* 86(6): 1160-4.

Surgery

Simulator Analysis

1. Aboud, E., O. Al-Mefty, et al. (2002). "New laboratory model for neurosurgical training that simulates live surgery." *J Neurosurg* 97(6): 1367-72.
2. Carte, F., Aggarwal S., et al (2006). Consensus guidelines for validation of virtual reality surgical simulators. *Simulation in Healthcare: The Journal of the Society for Simulation in Healthcare*. 1(3):171-179, Fall 2006.
3. Mathis, K., & Wiegmann, D.,(2007). Construct Validation of a Laparoscopic Surgical Simulator. *Simulation in Healthcare: The Journal of the Society for Simulation in Healthcare*. 2(3):178-182, Fall 2007.

Clinical management or technical skills

1. Adrales, G. L., U. B. Chu, et al. (2004). "Development of a valid, cost-effective laparoscopic training program." *Am J Surg* 187(2): 157-63.
2. Aggarwal, R., T. P. Grantcharov, et al. (2006). "An evidence-based virtual reality training program for novice laparoscopic surgeons." *Ann Surg* 244(2): 310-4.
3. Aggarwal, R., J. Hance, et al. (2006). "Training junior operative residents in laparoscopic suturing skills is feasible and efficacious." *Surgery* 139(6): 729-34.
4. Aggarwal, R., K. Moorthy, et al. (2004). "Laparoscopic skills training and assessment." *Br J Surg* 91(12): 1549-58.
5. Aggarwal, R., A. Tully, et al. (2006). "Virtual reality simulation training can improve technical skills during laparoscopic salpingectomy for ectopic pregnancy." *Bjog* 113(12): 1382-7.
6. Aggarwal, R., J. Ward, et al. (2007). "Proving the effectiveness of virtual reality simulation for training in laparoscopic surgery." *Ann Surg* 246(5): 771-9.
7. Ahlberg, G., O. Kruuna, et al. (2005). "Is the learning curve for laparoscopic fundoplication determined by the teacher or the pupil?" *Am J Surg* 189(2): 184-9.
8. Ahlering, T. E., D. Skarecky, et al. (2003). "Successful transfer of open surgical skills to a laparoscopic environment using a robotic interface: initial experience with laparoscopic radical prostatectomy." *J Urol* 170(5): 1738-41.
9. Amin, M., C. A. Rosen, et al. (2007). "Hands-on training methods for vocal fold injection education." *Ann Otol Rhinol Laryngol* 116(1): 1-6.
10. Anastakis, D. J., G. Regehr, et al. (1999). "Assessment of technical skills transfer from the bench training model to the human model." *Am J Surg* 177(2): 167-70.
11. Anastakis, D. J., K. R. Wanzel, et al. (2003). "Evaluating the effectiveness of a 2-year curriculum in a surgical skills center." *Am J Surg* 185(4): 378-85.
12. Andreatta, P. B., D. T. Woodrum, et al. (2006). "Laparoscopic skills are improved with LapMentor training: results of a randomized, double-blinded study." *Ann Surg* 243(6): 854-60; discussion 860-3.
13. Backstein, D., Z. Agnidis, et al. (2004). "The effectiveness of video feedback in the acquisition of orthopedic technical skills." *Am J Surg* 187(3): 427-32.

14. Banks, E., S. Pardanani, et al. (2006). "A surgical skills laboratory improves residents' knowledge and performance of episiotomy repair." *Am J Obstet Gynecol* 195(5): 1463-7.
15. Banks, E. H., S. Chudnoff, et al. (2007). "Does a surgical simulator improve resident operative performance of laparoscopic tubal ligation?" *Am J Obstet Gynecol* 197(5): 541 e1-5.
16. Bann, S., M. Khan, et al. (2005). "Surgical skill is predicted by the ability to detect errors." *Am J Surg* 189(4): 412-5.
17. Beard, J. D., B. C. Jolly, et al. (2005). "Assessing the technical skills of surgical trainees." *Br J Surg* 92(6): 778-82.
18. Berg, D. A., R. E. Milner, et al. (2007). "A cost-effective approach to establishing a surgical skills laboratory." *Surgery* 142(5): 712-21.
19. Bingener, J., T. Boyd, et al. (2008). "Randomized double-blinded trial investigating the impact of a curriculum focused on error recognition on laparoscopic suturing training." *Am J Surg* 195(2): 179-82.
20. Black, S. A., R. H. Harrison, et al. (2007). "Competence assessment of senior vascular trainees using a carotid endarterectomy bench model." *Br J Surg* 94(10): 1226-31.
21. Bloom, M. B., C. L. Rawn, et al. (2003). "Virtual reality applied to procedural testing: the next era." *Ann Surg* 237(3): 442-8.
22. Blum, M. G., T. W. Powers, et al. (2004). "Bronchoscopy simulator effectively prepares junior residents to competently perform basic clinical bronchoscopy." *Ann Thorac Surg* 78(1): 287-91; discussion 287-91.
23. Botden, S. M. B. I., S. N. Buzink, et al. (2008) ProMIS augmented reality training of laparoscopic procedures face validity. *Simulation in Healthcare* 3 (2), 97-102.
24. Brewster, L. P., D. A. Risucci, et al. (2008). "Comparison of resident self-assessments with trained faculty and standardized patient assessments of clinical and technical skills in a structured educational module." *Am J Surg* 195(1): 1-4.
25. Brydges, R., R. Classen, et al. (2006). "Computer-assisted assessment of one-handed knot tying skills performed within various contexts: a construct validity study." *Am J Surg* 192(1): 109-13.
26. Brydges, R., A. Kurahashi, et al. (2008). "Developing criteria for proficiency-based training of surgical technical skills using simulation: changes in performances as a function of training year." *J Am Coll Surg* 206(2): 205-11.
27. Burchard, E. R., E. G. Lockrow, et al. (2007). "Simulation training improves resident performance in operative hysteroscopic resection techniques." *Am J Obstet Gynecol* 197(5): 542 e1-4.
28. Calkins, M. D. and T. D. Robinson (1999). "Combat trauma airway management: endotracheal intubation versus laryngeal mask airway versus combitube use by Navy SEAL and Reconnaissance combat corpsmen." *J Trauma* 46(5): 927-32.
29. Cannon, W. D., D. G. Eckhoff, et al. (2006). "Report of a group developing a virtual reality simulator for arthroscopic surgery of the knee joint." *Clin Orthop Relat Res* 442: 21-9.
30. Champion, H. R. and A. G. Gallagher (2003). "Surgical simulation - a 'good idea whose time has come'." *Br J Surg* 90(7): 767-8.

31. Chitwood, W. R., Jr., L. W. Nifong, et al. (2001). "Robotic surgical training in an academic institution." *Ann Surg* 234(4): 475-84; discussion 484-6.
32. Chung, K. D. and R. C. Watzke (2004). "A simple device for teaching direct ophthalmoscopy to primary care practitioners." *Am J Ophthalmol* 138(3): 501-2.
33. Clayman, R. V. (1999). "Virtual endoscopy for planning and simulation of minimally invasive neurosurgery." *J Urol* 162(5): 1875-6.
34. Cobb, J. P., V. Kannan, et al. (2007). "Navigation reduces the learning curve in resurfacing total hip arthroplasty." *Clin Orthop Relat Res* 463: 90-7.
35. Colt, H. G., S. W. Crawford, et al. (2001). "Virtual reality bronchoscopy simulation: a revolution in procedural training." *Chest* 120(4): 1333-9.
36. Corica, F. A., J. R. Boker, et al. (2006). "Short-term impact of a laparoscopic "mini-residency" experience on postgraduate urologists' practice patterns." *J Am Coll Surg* 203(5): 692-8.
37. Cundiff, G. W., A. C. Weidner, et al. (2001). "Effectiveness of laparoscopic cadaveric dissection in enhancing resident comprehension of pelvic anatomy." *J Am Coll Surg* 192(4): 492-7.
38. Darzi, A. and S. Mackay (2002). "Skills assessment of surgeons." *Surgery* 131(2): 121-4.
39. Datta, V., S. Bann, et al. (2006). "Technical skills examination for general surgical trainees." *Br J Surg* 93(9): 1139-46.
40. Datta, V., S. Bann, et al. (2004). "Comparison of bench test evaluations of surgical skill with live operating performance assessments." *J Am Coll Surg* 199(4): 603-6.
41. Datta, V., A. Chang, et al. (2002). "The relationship between motion analysis and surgical technical assessments." *Am J Surg* 184(1): 70-3.
42. Datta, V., S. Mackay, et al. (2001). "The use of electromagnetic motion tracking analysis to objectively measure open surgical skill in the laboratory-based model." *J Am Coll Surg* 193(5): 479-85.
43. Derossis, A. M., G. M. Fried, et al. (1998). "Development of a model for training and evaluation of laparoscopic skills." *Am J Surg* 175(6): 482-7.
44. Dinsmore, R. C. and J. H. North (2000). "Basic skin flaps for the general surgeon: a teaching method." *South Med J* 93(8): 783-6.
45. Dubrowski, A., J. Park, et al. (2007). "A comparison of single- and multiple-stage approaches to teaching laparoscopic suturing." *Am J Surg* 193(2): 269-73.
46. Dubrowski, A., R. Sidhu, et al. (2005). "Quantification of motion characteristics and forces applied to tissues during suturing." *Am J Surg* 190(1): 131-6.
47. Eastridge, B. J., E. C. Hamilton, et al. (2003). "Effect of sleep deprivation on the performance of simulated laparoscopic surgical skill." *Am J Surg* 186(2): 169-74.
48. Edison, M. I., S. Horgan, et al. (2001). "Using small-group workshops to improve surgical residents' technical skills." *Acad Med* 76(5): 557-8.
49. Engum, S. A., P. Jeffries, et al. (2003). "Intravenous catheter training system: computer-based education versus traditional learning methods." *Am J Surg* 186(1): 67-74.
50. Eriksen, J. R. and T. Grantcharov (2005) Objective assessment of laparoscopic skills using a virtual reality stimulator. *Surgical Endoscopy* 19(9):1216-1219

51. Feldman, L. S., S. E. Hagarty, et al. (2004). "Relationship between objective assessment of technical skills and subjective in-training evaluations in surgical residents." *J Am Coll Surg* 198(1): 105-10.
52. Feldman, L. S., V. Sherman, et al. (2004). "Using simulators to assess laparoscopic competence: ready for widespread use?" *Surgery* 135(1): 28-42.
53. Felsher, J. J., M. Olesevich, et al. (2005). "Validation of a flexible endoscopy simulator." *Am J Surg* 189(4): 497-500.
54. Figert, P. L., A. E. Park, et al. (2001). "Transfer of training in acquiring laparoscopic skills." *J Am Coll Surg* 193(5): 533-7.
55. Francis, N. K., G. B. Hanna, et al. (2001). "Reliability of the Advanced Dundee Endoscopic Psychomotor Tester for bimanual tasks." *Arch Surg* 136(1): 40-3.
56. Francis, N. K., G. B. Hanna, et al. (2002). "The performance of master surgeons on the Advanced Dundee Endoscopic Psychomotor Tester: contrast validity study." *Arch Surg* 137(7): 841-4.
57. Fraser, S. A., D. R. Klassen, et al. (2003) Evaluating laparoscopic skills, setting the pass/fail score for the MISTELS system. *Surgical Endoscopy* 17(6):964-967.
58. Fried, G. M., L. S. Feldman, et al. (2004). "Proving the value of simulation in laparoscopic surgery." *Ann Surg* 240(3): 518-25; discussion 525-8.
59. Fried, M. P., B. Sadoughi, et al. (2007). "Construct validity of the endoscopic sinus surgery simulator: II. Assessment of discriminant validity and expert benchmarking." *Arch Otolaryngol Head Neck Surg* 133(4): 350-7.
60. Friedlich, M., T. Wood, et al. (2002). "Structured assessment of minor surgical skills (SAMSS) for clinical clerks." *Acad Med* 77(10 Suppl): S39-41.
61. Gallagher, A. G. and C. U. Cates (2004). "Virtual reality training for the operating room and cardiac catheterisation laboratory." *Lancet* 364(9444): 1538-40.
62. Gallagher, A. G., E. M. Ritter, et al. (2005). "Virtual reality simulation for the operating room: proficiency-based training as a paradigm shift in surgical skills training." *Ann Surg* 241(2): 364-72.
63. Gallagher, A. G., C. D. Smith, et al. (2003). "Psychomotor skills assessment in practicing surgeons experienced in performing advanced laparoscopic procedures." *J Am Coll Surg* 197(3): 479-88.
64. Gettman, M. T., C. Q. Le, et al. (2008). "Analysis of a computer based simulator as an educational tool for cystoscopy: subjective and objective results." *J Urol* 179(1): 267-71.
65. Gherman, R. and S. Chauhan (2005). "Evaluation of residents' delivery notes after a simulated shoulder dystocia." *Obstet Gynecol* 105(2): 448; author reply 448-9.
66. Goff, B. A., G. M. Lentz, et al. (2001). "Development of a bench station objective structured assessment of technical skills." *Obstet Gynecol* 98(3): 412-6.
67. Goff, B. A., G. M. Lentz, et al. (1999). "Formal teaching of surgical skills in an obstetric-gynecologic residency." *Obstet Gynecol* 93(5 Pt 1): 785-90.
68. Gofton, W., A. Dubrowski, et al. (2007). "The effect of computer navigation on trainee learning of surgical skills." *J Bone Joint Surg Am* 89(12): 2819-27.

69. Gorman, P. J., A. H. Meier, et al. (1999). "Simulation and virtual reality in surgical education: real or unreal?" *Arch Surg* 134(11): 1203-8.
70. Grantcharov, T. P., L. Bardram, et al. (2007) Impact of hand dominance, gender, and experience with computer games on performance in virtual reality laparoscopy. *The American Journal of Sports Medicine* 35:883-888.
71. Grantcharov, T. P., L. Bardram, et al. (2003). "Learning curves and impact of previous operative experience on performance on a virtual reality simulator to test laparoscopic surgical skills." *Am J Surg* 185(2): 146-9.
72. Grantcharov, T. P., V. B. Kristiansen, et al. (2004). "Randomized clinical trial of virtual reality simulation for laparoscopic skills training." *Br J Surg* 91(2): 146-50.
73. Grober, E. D., S. J. Hamstra, et al. (2004). "The educational impact of bench model fidelity on the acquisition of technical skill: the use of clinically relevant outcome measures." *Ann Surg* 240(2): 374-81.
74. Grober, E. D., S. J. Hamstra, et al. (2004). "Laboratory based training in urological microsurgery with bench model simulators: a randomized controlled trial evaluating the durability of technical skill." *J Urol* 172(1): 378-81.
75. Grunwald, T., T. Krummel, et al. (2004). "Advanced technologies in plastic surgery: how new innovations can improve our training and practice." *Plast Reconstr Surg* 114(6): 1556-67.
76. Gumbs, A. A., N. J. Hogle, et al. (2007). "Evaluation of resident laparoscopic performance using global operative assessment of laparoscopic skills." *J Am Coll Surg* 204(2): 308-13.
77. Gunther, S. B., G. E. Soto, et al. (2002). "Interactive computer simulations of knee-replacement surgery." *Acad Med* 77(7): 753-4.
78. Guru, K. A., B. W. Kuvshinoff, et al. (2007). "Impact of robotics and laparoscopy on surgical skills: A comparative study." *J Am Coll Surg* 204(1): 96-101.
79. Haluck, R. S. and T. M. Krummel (2000). "Computers and virtual reality for surgical education in the 21st century." *Arch Surg* 135(7): 786-92.
80. Haluck, R. S., R. L. Marshall, et al. (2001). "Are surgery training programs ready for virtual reality? A survey of program directors in general surgery." *J Am Coll Surg* 193(6): 660-5.
81. Hamad, G. G., M. T. Brown, et al. (2007). "Postoperative video debriefing reduces technical errors in laparoscopic surgery." *Am J Surg* 194(1): 110-4.
82. Hamdorf, J. M. and J. C. Hall (2000). "Acquiring surgical skills." *Br J Surg* 87(1): 28-37.
83. Hamilton, E. C., D. J. Scott, et al. (2001). "Improving operative performance using a laparoscopic hernia simulator." *Am J Surg* 182(6): 725-8.
84. Hammond, L., J. Ketchum, et al. (2005). "Accreditation council on graduate medical education technical skills competency compliance: urologic surgical skills." *J Am Coll Surg* 201(3): 454-7.
85. Hanly, E. J., M. R. Marohn, et al. (2004). "Multiservice laparoscopic surgical training using the daVinci surgical system." *Am J Surg* 187(2): 309-15.

86. Haponik, E. F., G. B. Russell, et al. (2000). "Bronchoscopy training: current fellows' experiences and some concerns for the future." *Chest* 118(3): 625-30.
87. Hassan, I., K. Maschuw, et al. (2006) Novices in surgery are the target group of a virtual reality training laboratory. *Eur Surg Res* 38:109-113.
88. Hassan, I., P. Weyers, et al. (2006). "Negative stress-coping strategies among novices in surgery correlate with poor virtual laparoscopic performance." *Br J Surg* 93(12): 1554-9.
89. Heng, P. A., C. Y. Cheng, et al. (2006). "Virtual reality techniques. Application to anatomic visualization and orthopaedics training." *Clin Orthop Relat Res* 442: 5-12.
90. Herrera Jr, F. A. and D. W. Easter (2006) Minimally Invasive Surgery: Training in Resident Education. *Current Surgery* 63(3):166-9.
91. Hikichi, T., A. Yoshida, et al. (2000). "Vitreous surgery simulator." *Arch Ophthalmol* 118(12): 1679-81.
92. Hislop, S. J., J. H. Hsu, et al. (2007) Simulator assessment of innate endovascular aptitude versus empirically correct performance. *Journal of Vascular and Interventional Radiology* 18 (4):535 – 544.
93. Horton, K. M., M. R. Horton, et al. (2007). "Advanced visualization of airways with 64-MDCT: 3D mapping and virtual bronchoscopy." *AJR Am J Roentgenol* 189(6): 1387-96.
94. Immenroth, M., T. Burger, et al. (2007). "Mental training in surgical education: a randomized controlled trial." *Ann Surg* 245(3): 385-91.
95. Ind, T. E., J. C. Shelton, et al. (2001). "Influence of training on reliability of surgical knots." *Bjog* 108(10): 1013-6.
96. Issenberg, S. B., W. C. McGaghie, et al. (1999). "Simulation technology for health care professional skills training and assessment." *Jama* 282(9): 861-6.
97. Jaramaz, B. and K. Eckman (2006). "Virtual reality simulation of fluoroscopic navigation." *Clin Orthop Relat Res* 442: 30-4.
98. Jensen, A. R., R. Milner, et al. (2008). "Effective instruction of vascular anastomosis in the surgical skills laboratory." *Am J Surg* 195(2): 189-94.
99. Jordan, J. A., A. G. Gallagher, et al. (2000). "A comparison between randomly alternating imaging, normal laparoscopic imaging, and virtual reality training in laparoscopic psychomotor skill acquisition." *Am J Surg* 180(3): 208-11.
100. Kahol, K., M. J. Leyba, et al. (2008). "Effect of fatigue on psychomotor and cognitive skills." *Am J Surg* 195(2): 195-204.
101. Katz, R., A. Nadu, et al. (2003). "A simplified 5-step model for training laparoscopic urethrovesical anastomosis." *J Urol* 169(6): 2041-4.
102. Keehner, M. M., F. Tendick, et al. (2004). "Spatial ability, experience, and skill in laparoscopic surgery." *Am J Surg* 188(1): 71-5.
103. Kingston, A. J., J. D. Broome, et al. (2000) Repetitive stereotactics: An inanimate laboratory technique to improve hand-eye coordination in laparoscopy. *Gynaecological Endoscopy* 9:401-408
104. Kirby, T. O., T. M. Numnum, et al. (2008). "A prospective evaluation of a simulator-based laparoscopic training program for gynecology residents." *J Am Coll Surg* 206(2): 343-8.
105. Korndorffer, J. R., Jr., J. B. Dunne, et al. (2005). "Simulator training for laparoscopic suturing using performance goals translates to the operating room." *J Am Coll Surg* 201(1): 23-9.

106. Korndorffer, J. R., Jr., D. J. Scott, et al. (2005). "Developing and testing competency levels for laparoscopic skills training." *Arch Surg* 140(1): 80-4.
107. Korndorffer, J. R., Jr., D. Stefanidis, et al. (2006). "Laparoscopic skills laboratories: current assessment and a call for resident training standards." *Am J Surg* 191(1): 17-22.
108. Koyama, T., H. Okudera, et al. (1999). "Computer-generated surgical simulation of morphological changes in microstructures: concepts of "virtual retractor." Technical note." *J Neurosurg* 90(4): 780-5.
109. Larsen, C. R., T. Grantcharov, et al. (2007) Objective assessment of gynecologic laparoscopic skills using the LapSimGyn virtual reality simulator. *Current Opinion in Obstetrics & Gynecology*. 19(4):402-410.
110. Leopold, S. S., H. D. Morgan, et al. (2005). "Impact of educational intervention on confidence and competence in the performance of a simple surgical task." *J Bone Joint Surg Am* 87(5): 1031-7.
111. Lin, E., S. Szomstein, et al. (2003). "Model for teaching laparoscopic colectomy to surgical residents." *Am J Surg* 186(1): 45-8.
112. Lynch, T. G. and P. D. Schneider (2000). "Availability of content information does not improve performance on computerized case simulations." *Am J Surg* 179(6): 472-5.
113. MacDonald, J., R. G. Williams, et al. (2003). "Self-assessment in simulation-based surgical skills training." *Am J Surg* 185(4): 319-22.
114. Macmillan, A. I. and A. Cuschieri (1999). "Assessment of innate ability and skills for endoscopic manipulations by the Advanced Dundee Endoscopic Psychomotor Tester: predictive and concurrent validity." *Am J Surg* 177(3): 274-7.
115. Madan, A. K., C. T. Frantzides, et al. (2005). "Participants' opinions of laparoscopic training devices after a basic laparoscopic training course." *Am J Surg* 189(6): 758-61.
116. Mann, B. D., B. M. Eidelson, et al. (2002). "The development of an interactive game-based tool for learning surgical management algorithms via computer." *Am J Surg* 183(3): 305-8.
117. Marshall, R. L., J. S. Smith, et al. (2001). "Use of a human patient simulator in the development of resident trauma management skills." *J Trauma* 51(1): 17-21.
118. Matsumoto, E. D., S. J. Hamstra, et al. (2001). "A novel approach to endourological training: training at the Surgical Skills Center." *J Urol* 166(4): 1261-6.
119. Matsumoto, E. D., K. T. Pace, et al. (2006) Virtual reality ureteroscopy simulator as a valid tool for assessing endourological skills. *Int J Urol*. 13(7):896-901.
120. Matsumoto, E. D., S. J. Hamstra, et al. (2002). "The effect of bench model fidelity on endourological skills: a randomized controlled study." *J Urol* 167(3): 1243-7.
121. Matsumoto, E. D., G. V. Kondraske, et al. (2006). "Assessment of basic human performance resources predicts performance of ureteroscopy." *Am J Surg* 191(6): 817-20.
122. McCarthy, M. C., M. R. Ranzinger, et al. (2002). "Accuracy of cricothyroidotomy performed in canine and human cadaver models during surgical skills training." *J Am Coll Surg* 195(5): 627-9.

123. McDougall, E. M., F. A. Corica, et al. (2006). "Construct validity testing of a laparoscopic surgical simulator." *J Am Coll Surg* 202(5): 779-87.
124. Meier, A. H., J. Henry, et al. (2005). "Implementation of a Web- and simulation-based curriculum to ease the transition from medical school to surgical internship." *Am J Surg* 190(1): 137-40.
125. Meier, A. H., C. L. Rawn, et al. (2001). "Virtual reality: surgical application--challenge for the new millennium." *J Am Coll Surg* 192(3): 372-84.
126. Michelson, J. D. (2006). "Simulation in orthopaedic education: an overview of theory and practice." *J Bone Joint Surg Am* 88(6): 1405-11.
127. Moorthy, K., Y. Munz, et al. (2006). "Self-assessment of performance among surgical trainees during simulated procedures in a simulated operating theater." *Am J Surg* 192(1): 114-8.
128. Moorthy, K., Y. Munz, et al. (2006). "Surgical crisis management skills training and assessment: a simulation[corrected]-based approach to enhancing operating room performance." *Ann Surg* 244(1): 139-47.
129. Moorthy, K., Y. Munz, et al. (2003). "Objective assessment of technical skills in surgery." *Bmj* 327(7422): 1032-7.
130. Moulton, C. A., A. Dubrowski, et al. (2006). "Teaching surgical skills: what kind of practice makes perfect?: a randomized, controlled trial." *Ann Surg* 244(3): 400-9.
131. Neequaye, S. K., R. Aggarwal, et al. (2007) Identification of Skills Common to Renal and Iliac Endovascular Procedures Performed on a Virtual Reality Simulator. *Eur J Vasc Endovasc Surg*. 33:525-532.
132. Neri, E., P. Boraschi, et al. (2000). "MR virtual endoscopy of the upper urinary tract." *AJR Am J Roentgenol* 175(6): 1697-702.
133. Newmark, J., V. Dandolu, et al. (2007). "Correlating virtual reality and box trainer tasks in the assessment of laparoscopic surgical skills." *Am J Obstet Gynecol* 197(5): 546 e1-4.
134. O'Toole, R. V., R. R. Playter, et al. (1999). "Measuring and developing suturing technique with a virtual reality surgical simulator." *J Am Coll Surg* 189(1): 114-27.
135. Owa, A. O., H. O. Gbejuade, et al. (2003). "A middle-ear simulator for practicing prosthesis placement for otosclerosis surgery using ward-based materials." *J Laryngol Otol* 117(6): 490-2.
136. Paisley, A. M., P. J. Baldwin, et al. (2001). "Validity of surgical simulation for the assessment of operative skill." *Br J Surg* 88(11): 1525-32.
137. Park, J., H. MacRae, et al. (2007). "Randomized controlled trial of virtual reality simulator training: transfer to live patients." *Am J Surg* 194(2): 205-11.
138. Passman, M. A., P. S. Fleiser, et al. (2007). "Should simulator-based endovascular training be integrated into general surgery residency programs?" *Am J Surg* 194(2): 212-9.
139. Patel, A. D., A. G. Gallagher, et al. (2006). "Learning curves and reliability measures for virtual reality simulation in the performance assessment of carotid angiography." *J Am Coll Cardiol* 47(9): 1796-802.
140. Peters, J. H., G. M. Fried, et al. (2004). "Development and validation of a comprehensive program of education and assessment of the basic fundamentals of laparoscopic surgery." *Surgery* 135(1): 21-7.

141. Pickhardt, P. J. (2003). "Three-dimensional endoluminal CT colonography (virtual colonoscopy): comparison of three commercially available systems." *AJR Am J Roentgenol* 181(6): 1599-606.
142. Poss, R., J. D. Mabrey, et al. (2000). "Development of a virtual reality arthroscopic knee simulator." *J Bone Joint Surg Am* 82-A(10): 1495-9.
143. Powers, T. W., K. M. Murayama, et al. (2002). "Housestaff performance is improved by participation in a laparoscopic skills curriculum." *Am J Surg* 184(6): 626-9; discussion 629-30.
144. Prystowsky, J. B., G. Regehr, et al. (1999). "A virtual reality module for intravenous catheter placement." *Am J Surg* 177(2): 171-5.
145. Ram, B., M. Oluwole, et al. (1999). "Surgical simulation: an animal tissue model for training in therapeutic and diagnostic bronchoscopy." *J Laryngol Otol* 113(2): 149-51.
146. Rashid, H. H., T. Kowalewski, et al. (2007). "The virtual reality transurethral prostatic resection trainer: evaluation of discriminate validity." *J Urol* 177(6): 2283-6.
147. Risucci, D., A. Geiss, et al. (2001). "Surgeon-specific factors in the acquisition of laparoscopic surgical skills." *Am J Surg* 181(4): 289-93.
148. Ritter, E. M., D. A. McClusky, 3rd, et al. (2006). "Perceptual, visuospatial, and psychomotor abilities correlate with duration of training required on a virtual-reality flexible endoscopy simulator." *Am J Surg* 192(3): 379-84.
149. Rogers, D. A., G. Regehr, et al. (2000). "The impact of external feedback on computer-assisted learning for surgical technical skill training." *Am J Surg* 179(4): 341-3.
150. Rogers, D. A., G. Regehr, et al. (2002). "A role for error training in surgical technical skill instruction and evaluation." *Am J Surg* 183(3): 242-5.
151. Rosser, J. C., B. Herman, et al. (2000). "Effectiveness of a CD-ROM multimedia tutorial in transferring cognitive knowledge essential for laparoscopic skill training." *Am J Surg* 179(4): 320-4.
152. Rosser, J. C., Jr., L. E. Rosser, et al. (1998). "Objective evaluation of a laparoscopic surgical skill program for residents and senior surgeons." *Arch Surg* 133(6): 657-61.
153. Saleh, G. M., V. Gauba, et al. (2008). "Motion analysis as a tool for the evaluation of oculoplastic surgical skill: evaluation of oculoplastic surgical skill." *Arch Ophthalmol* 126(2): 213-6.
154. Saleh, G. M., G. Voyatzis, et al. (2006). "Evaluating surgical dexterity during corneal suturing." *Arch Ophthalmol* 124(9): 1263-6.
155. Satava, R. M. (2006). "Virtual reality surgical simulator: the first steps. 1993." *Clin Orthop Relat Res* 442: 2-4.
156. Satava, R. M., A. G. Gallagher, et al. (2003). "Surgical competence and surgical proficiency: definitions, taxonomy, and metrics." *J Am Coll Surg* 196(6): 933-7.
157. Satish, U., S. Streufert, et al. (2001). "Strategic management simulations is a novel way to measure resident competencies." *Am J Surg* 181(6): 557-61.
158. Schijven, M. P. and J. Jakimowicz (2004) The learning curve on the Xitact LS 500 laparoscopy simulator: Profiles of performance. *Surg Endosc* 18: 121-127.

159. Schijven, M. P., J. J. Jakimowicz, et al. (2005) The Eindhoven laparoscopic cholecystectomy training course - Improving operating room performance using virtual reality training: Results from the first E.A.E.S. accredited virtual reality trainings curriculum. *Surg Endosc* 19: 1220–1226.
160. Schijven, M. P., J. J. Jakimowicz, et al. (2004) How to select aspirant laparoscopic surgical trainees: Establishing concurrent validity comparing Xitact LS500 index performance scores with standardized psychomotor Aptitude Test Battery scores. *J Surg Res* 121(1):112-9.
161. Scott, D., (2006). Patient Safety, Competency, and the Future of Surgical Simulation. *Simulation in Healthcare: The Journal of the Society for Simulation in Healthcare*. 1(3):164-170, Fall 2006.
162. Scott, D. J., P. C. Bergen, et al. (2000). "Laparoscopic training on bench models: better and more cost effective than operating room experience?" *J Am Coll Surg* 191(3): 272-83.
163. Sedlack, R. E. and J. C. Kolars (2002). "Colonoscopy curriculum development and performance-based assessment criteria on a computer-based endoscopy simulator." *Acad Med* 77(7): 750-1.
164. Seymour, N. E. (2005) Integrating simulation into a busy residency program. *Minim Invasive Ther Allied Technol*. 14(4):280-6.
165. Seymour, N. E. (2005) Virtual reality in general surgical training. *European Surgery* 37(5):298-303
166. Seymour, N. E., A. G. Gallagher, et al. (2002). "Virtual reality training improves operating room performance: results of a randomized, double-blinded study." *Ann Surg* 236(4): 458-63; discussion 463-4.
167. Silverstein, J. C., F. Dech, et al. (2002). "Virtual reality: immersive hepatic surgery educational environment." *Surgery* 132(2): 274-7.
168. Smith, C. D., T. M. Farrell, et al. (2001). "Assessing laparoscopic manipulative skills." *Am J Surg* 181(6): 547-50.
169. Smith, J. E. and A. P. Jackson (2000). "Learning fiberoptic endoscopy. Nasotracheal or orotracheal intubations first?" *Anaesthesia* 55(11): 1072-5.
170. Soper, R. J., G. Brooks, et al. (2001). "A training model for circumcision of the newborn." *Clin Pediatr (Phila)* 40(7): 409-12.
171. Stefanidis, D., C. E. Acker, et al. (2008) Challenges during the Implementation of a Laparoscopic Skills Curriculum in a Busy General Surgery Residency Program. *J Surg Educ*. 65(1):4-7.
172. Stefanidis, D., J. R. Korndorffer, Jr., et al. (2006). "Psychomotor testing predicts rate of skill acquisition for proficiency-based laparoscopic skills training." *Surgery* 140(2): 252-62.
173. Stefanidis, D., J. R. Korndorffer, Jr., et al. (2007). "Limited feedback and video tutorials optimize learning and resource utilization during laparoscopic simulator training." *Surgery* 142(2): 202-6.
174. Stefanidis, D., J. R. Korndorffer, Jr., et al. (2007). "Closing the gap in operative performance between novices and experts: does harder mean better for laparoscopic simulator training?" *J Am Coll Surg* 205(2): 307-13.
175. Stefanidis, D., J. R. Korndorffer, Jr., et al. (2006). "Proficiency maintenance: impact of ongoing simulator training on laparoscopic skill retention." *J Am Coll Surg* 202(4): 599-603.

176. Stefanidis, D., J. R. Korndorffer, Jr., et al. (2005). "Skill retention following proficiency-based laparoscopic simulator training." *Surgery* 138(2): 165-70.
177. Stefanidis, D., J. R. Korndorffer Jr, et al. (2008) Psychomotor testing predicts rate of skill acquisition for proficiency-based laparoscopic skills training. *ANZ Journal of Surgery*. 78(4):291-296.
178. Stefanidis, D., M. W. Scerbo, et al. (2008). "Do novices display automaticity during simulator training?" *Am J Surg* 195(2): 210-3.
179. Stefanidis, D., R. Sierra, et al. (2006). "Intensive continuing medical education course training on simulators results in proficiency for laparoscopic suturing." *Am J Surg* 191(1): 23-7.
180. Strom, P., L. Hedman, et al. (2006) Early exposure to haptic feedback enhances performance in surgical simulator training: A prospective randomized crossover study in surgical residents. *SURGICAL ENDOSCOPY AND OTHER INTERVENTIONAL TECHNIQUES* (20) : 9, s. 1383-1388.
181. Summers, A. N., G. C. Rinehart, et al. (1999). "Acquisition of surgical skills: a randomized trial of didactic, videotape, and computer-based training." *Surgery* 126(2): 330-6.
182. Summers, R. M., N. R. Aggarwal, et al. (2002). "CT virtual bronchoscopy of the central airways in patients with Wegener's granulomatosis." *Chest* 121(1): 242-50.
183. Sutherland, L. M., P. F. Middleton, et al. (2006). "Surgical simulation: a systematic review." *Ann Surg* 243(3): 291-300.
184. Szalay, D., H. MacRae, et al. (2000). "Using operative outcome to assess technical skill." *Am J Surg* 180(3): 234-7.
185. Takiguchi, S., M. Sekimoto, et al. (2005) Cyber visual training as a new method for the mastery of endoscopic surgery. *Surg Endosc* 19: 1204–1210.
186. Tavakol, M., M. A. Mohagheghi, et al. (2008) Assessing the Skills of Surgical Residents Using Simulation. *Journal of Surgical Education*, 65(2): 77-83.
187. Tedesco, M. M., J. J. Pak, et al. (2008) Simulation-based endovascular skills assessment: The future of credentialing? *J Vasc Surg*. 47:1008-1.
188. Torgerson, C. S., R. Brydges, et al. (2007). "Drilling simulated temporal bones with left-handed tools: a left-hander's right?" *Ann Otol Rhinol Laryngol* 116(11): 819-26.
189. Traxer, O., M. T. Gettman, et al. (2001). "The impact of intense laparoscopic skills training on the operative performance of urology residents." *J Urol* 166(5): 1658-61.
190. Uchal, M., J. Tjugum, et al. (2005). "The impact of sleep deprivation on product quality and procedure effectiveness in a laparoscopic physical simulator: a randomized controlled trial." *Am J Surg* 189(6): 753-7.
191. Uribe, J. I. S., W. M. Ralph Jr, et al. (2004) Learning curves, acquisition, and retention of skills trained with the endoscopic sinus surgery simulator *Am J Rhinol*18(2):87-92.
192. Van Herzele, I., R. Aggarwal, et al. (2007) Virtual reality simulation objectively differentiates level of carotid stent experience in experienced interventionalists. *J Vasc Surg* 46:855-863.

193. Varaday, S. S., S. M. Yentis, et al. (2004). "A homemade model for training in cricothyrotomy." *Anaesthesia* 59(10): 1012-5.
194. Velmahos, G. C., K. G. Toutouzas, et al. (2004). "Cognitive task analysis for teaching technical skills in an inanimate surgical skills laboratory." *Am J Surg* 187(1): 114-9.
195. Wanzel, K. R., S. J. Hamstra, et al. (2003). "Visual-spatial ability correlates with efficiency of hand motion and successful surgical performance." *Surgery* 134(5): 750-7.
196. Wanzel, K. R., E. D. Matsumoto, et al. (2002). "Teaching technical skills: training on a simple, inexpensive, and portable model." *Plast Reconstr Surg* 109(1): 258-63.
197. Watterson, J. D., D. T. Beiko, et al. (2002). "Randomized prospective blinded study validating acquisition of ureteroscopy skills using computer based virtual reality endourological simulator." *J Urol* 168(5): 1928-32.
198. Wood, B. J. and P. Razavi (2002). "Virtual endoscopy: a promising new technology." *Am Fam Physician* 66(1): 107-12.
199. Young, J. S., J. B. Stokes, et al. (2007). "Proactive versus reactive: the effect of experience on performance in a critical care simulator." *Am J Surg* 193(1): 100-4.
200. Youngblood, P. L., S. Srivastava, et al. (2005). "Comparison of training on two laparoscopic simulators and assessment of skills transfer to surgical performance." *J Am Coll Surg* 200(4): 546-51.
201. Zirkle, M., D. W. Roberson, et al. (2007) Using a virtual reality temporal bone simulator to assess otolaryngology trainees. *Laryngoscope*. 117(2):258-63.

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1. Hirshberg, A., M. Stein, et al. (1999). "Surgical resource utilization in urban terrorist bombing: a computer simulation." *J Trauma* 47(3): 545-50.
2. Knudson, M. M., L. Khaw, et al. (2008). "Trauma training in simulation: translating skills from SIM time to real time." *J Trauma* 64(2): 255-63; discussion 263-4
2. Brewster, L. P., D. A. Risucci, et al. (2005). "Management of adverse surgical events: a structured education module for residents." *Am J Surg* 190(5): 687-90.
3. Chan, D. K., T. H. Gallagher, et al. (2005). "How surgeons disclose medical errors to patients: a study using standardized patients." *Surgery* 138(5): 851-8.
4. Colletti, L., L. Gruppen, et al. (2001). "Teaching students to break bad news." *Am J Surg* 182(1): 20-3.
5. Corke, C. F., P. J. Stow, et al. "How doctors discuss major interventions with high risk patients: An observational study."
6. Hammond, J., M. Bermann, et al. (2002). "Incorporation of a computerized human patient simulator in critical care training: a preliminary report." *J Trauma* 53(6): 1064-7.

7. Hansen, K. S., P. E. Uggen, et al. (2008). "Team-oriented training for damage control surgery in rural trauma: a new paradigm." *J Trauma* 64(4): 949-53; discussion 953-4.
8. Hassett, J. M., K. Zinnerstrom, et al. (2006). "Utilization of standardized patients to evaluate clinical and interpersonal skills of surgical residents." *Surgery* 140(4): 633-8; discussion 638-9.
9. Hawkins, R., M. M. Gaglione, et al. (2004) Assessment of patient management skills and clinical skills of practising doctors using computer-based case simulations and standardised patients. *Med Educ* 38:958-968.
10. Klaristenfeld, D. D., D. T. Harrington, et al. (2008) Teaching palliative care and end-of-life issues: A core curriculum for surgical residents. *American Journal of Hospice and Palliative Medicine* 24(6) 499-507.
11. Knudson, M. M., L. Khaw, et al. (2008). "Trauma training in simulation: translating skills from SIM time to real time." *J Trauma* 64(2): 255-63; discussion 263-4.
12. Steinemann, S., T. Roytman, et al. (2005). "Impact of education on smoking cessation counseling by surgical residents." *Am J Surg* 189(1): 44-6.

Uncertain

1. McGreevy, J. M. (2005). "The aviation paradigm and surgical education." *J Am Coll Surg* 201(1): 110-7.
2. Sachdeva, A. K. and P. G. Blair (2004). "Educating surgery residents in patient safety." *Surg Clin North Am* 84(6): 1669-98, xii.

General Articles on simulation

1. Murphy, J. G., F. Cremonini, et al. (2007) Is simulation based medicine training the future of clinical medicine? *Eur Rev Med Pharmacol Sc* 11 (1) : 1-8.
2. Roberts, K. E., R. L. Bell, et al. (2006) Evolution of surgical skills training. *World J Gastroenterol* 12(20): 3219-3224.

Dermatology

Simulation and Clinical management or technical skills

1. Abbasi, N. R., M. Yancovitz, et al. (2008). "Utility of lesion diameter in the clinical diagnosis of cutaneous melanoma." *Arch Dermatol* 144(4): 469-74.
2. Adedeji, A. and J. W. Gray (2005). "MRSA at an English children's hospital from 1998 to 2003." *Archives of Disease in Childhood* 90(7): 720-3.
3. Alahlafi, A. and S. Burge (2005). "What should undergraduate medical students know about psoriasis? Involving patients in curriculum development: modified Delphi technique." *Bmj* 330(7492): 633-6.

4. Al-Rubaiy, L. K. Q. and K. K. Al-Rubiay (2006). "Alcohol consumption and smoking: a risk factor for psoriasis." *Internet Journal of Dermatology* 4(2): 7p.
5. Bjellerup, M. (2006). "Determining venous incompetence: a report from a specialised leg ulcer clinic." *Journal of Wound Care* 15(10): 429-30, 433-6.
6. Brotherton, S. E., P. H. Rockey, et al. (2004). US Graduate Medical Education, 2003-2004, *JAMA: Journal of the American Medical Association* Vol 292(9) Sep 2004, 1032-1037.
7. Bystryn, J. C. (2002). "Can nondermatologists really recognize potentially dangerous skin lesions as well as dermatologists?" *Arch Dermatol* 138(10): 1378.
8. Castle, D. J. and K. A. Phillips (2002). *Disorders of body image*. Petersfield, England, Wrightson Biomedical Publishing.
9. Charles, C. A., V. S. Yee, et al. (2005). "Variation in the diagnosis, treatment, and management of melanoma in situ: a survey of US dermatologists." *Arch Dermatol* 141(6): 723-9.
10. Chen, S. C., D. M. Bravata, et al. (2001). "A comparison of dermatologists' and primary care physicians' accuracy in diagnosing melanoma: a systematic review." *Arch Dermatol* 137(12): 1627-34.
11. Collins, K. and P. Nicolson (2002). The meaning of 'satisfaction' for people with dermatological problems: Re-assessing approaches to qualitative health psychology research, *Journal of Health Psychology* Vol 7(5) Sep 2002, 615-629.
12. Dolianitis, C., J. Kelly, et al. (2005). "Comparative performance of 4 dermoscopic algorithms by nonexperts for the diagnosis of melanocytic lesions." *Arch Dermatol* 141(8): 1008-14.
13. Ellabib, M. S. and Z. M. Khalifa (2001). "Dermatophytes and other fungi associated with skin mycoses in Tripoli, Libya." *Annals of Saudi Medicine* 21(3-4): 193-5.
14. Feliciano, K. V. O., M. H. Kovacs, et al. (1998). "Perceptions regarding leprosy and resulting handicaps prior to diagnosis in Recife, Brazil [Spanish]." *Pan American Journal of Public Health* 3(5): 293-302.
15. Fellechner, B. L. and T. W. Findley (1991). "Malpractice in physical medicine and rehabilitation: a review and analysis of existing data." *American Journal of Physical Medicine & Rehabilitation* 70(3): 124-8.
16. Ferraz, L. B., F. A. Almeida, et al. (2006). The impact of lupus erythematosus cutaneous on the Quality of life: The Brazilian-Portuguese version of DLQI, *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care & Rehabilitation* Vol 15(3) Apr 2006, 565-570.
17. Fliege, H., A. Grimm, et al. (2007). Frequency of ICD-10 Factitious Disorder: Survey of Senior Hospital Consultants and Physicians in Private Practice, *Psychosomatics: Journal of Consultation Liaison Psychiatry* Vol 48(1) Jan-Feb 2007, 60-64.
18. Glaessl, A., A. G. Schreyer, et al. (2001). "Laser surgical planning with magnetic resonance imaging-based 3-dimensional reconstructions for intralesional Nd:YAG laser therapy of a venous malformation of the neck." *Arch Dermatol* 137(10): 1331-5.
19. Granlund, H., C.-J. Thoden, et al. (2003). Realtime teleconsultations versus face-to-face consultations in dermatology: Immediate and six-

- month outcome, *Journal of Telemedicine and Telecare* Vol 9(4) 2003, 204-209.
20. Hallam-Jones, R., K. R. Wylie, et al. (2001). Sexual difficulties within a group of patients with vulvodynia, *Sexual and Relationship Therapy* Vol 16(2) May 2001, 113-126.
 21. Harris, J. M., Jr., S. J. Salasche, et al. (2001). "The internet and the globalisation of medical education." *Bmj* 323(7321): 1106.
 22. Hartmann, A. C. and P. D. Cruz, Jr. (1998). "Interactive mechanisms for teaching dermatology to medical students." *Arch Dermatol* 134(6): 725-8.
 23. Lawton, S. (2002). "Assessing the patient with a skin condition... this article was originally published in the *Journal of Tissue Viability*, 2001, Vol 11, No 3, pages 113-15." *World Wide Wounds*: 5p.
 24. Levenson, J. L. (2005). *The American psychiatric publishing textbook of psychosomatic medicine*. Washington, DC, American Psychiatric Publishing, Inc.
 25. Levenson, J. L. (2007). *Essentials of psychosomatic medicine*. Washington, DC, American Psychiatric Publishing, Inc.
 26. MacKie, R. M., C. A. Bray, et al. (2002). "Observational study of type of surgical training and outcome of definitive surgery for primary malignant melanoma." *Bmj* 325(7375): 1276-7.
 27. Merenstein, D., D. Meyers, et al. (2007). "How well do family physicians manage skin lesions?" *J Fam Pract* 56(1): 40-5.
 28. Moore, M. M., A. C. Geller, et al. (2006). "Skin cancer examination teaching in US medical education." *Arch Dermatol* 142(4): 439-44.
 29. Morton, M. J. and S. S. Sonnad (2007). Women on professional society and journal editorial boards, *Journal of the National Medical Association* Vol 99(7) Jul 2007, 764-771.
 30. Ogbogu, P., A. B. Fleischer, Jr., et al. (2001). "Physicians' and patients' perspectives on office-based dispensing: the central role of the physician-patient relationship." *Arch Dermatol* 137(2): 151-4.
 31. Owoeye, O. A., O. F. Aina, et al. (2007). "An assessment of emotional pain among subjects with chronic dermatological problems in Lagos, Nigeria." *International Journal of Psychiatry in Medicine* 37(2): 129-38.
 32. Papadopoulos, L., C. Walker, et al. (2000). The relationship between body location and psychological morbidity in individuals with acne vulgaris, *Psychology, Health & Medicine* Vol 5(4) Nov 2000, 431-438.
 33. Passchier, J., J. Erdman, et al. (2006). Androgenetic Alopecia: Stress of Discovery, *Psychological Reports* Vol 98(1) Feb 2006, 226-228.
 34. Poulos, G. A., R. T. Brodell, et al. (2008). "Improving quality and patient satisfaction in dermatology office practice." *Arch Dermatol* 144(2): 263-5.
 35. Reichel, J. L., R. P. Peirson, et al. (2004). "Teaching and evaluation of surgical skills in dermatology: results of a survey." *Arch Dermatol* 140(11): 1365-9.
 36. Sehgal, V. N., K. Sardana, et al. "Management of complications following leprosy: An evolving scenario."
 37. Sellheyer, K. and W. F. Bergfeld (2006). "Differences in biopsy techniques of actinic keratoses by plastic surgeons and dermatologists: a histologically controlled pilot study." *Arch Dermatol* 142(4): 455-9.

38. Stratman, E. and J. Dyer (2002). "Problem-based learning: an approach to dermatology resident education." *Arch Dermatol* 138(10): 1299-302.
39. Swartling, C., H. Naver, et al. (2001). Botulinum A toxin improves life quality in severe primary focal hyperhidrosis, *European Journal of Neurology* Vol 8(3) May 2001, 247-252.
40. Uzun, O., C. Basoglu, et al. (2003). Body dysmorphic disorder in patients with acne, *Comprehensive Psychiatry* Vol 44(5) Sep-Oct 2003, 415-419.
41. Vega-Memije, M. E., A. Mosqueda-Taylor, et al. (2002). "Actinic prurigo cheilitis: clinicopathologic analysis and therapeutic results in 116 cases." *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontics* 94(1): 83-91.
42. Wang, T. S., J. L. Schwartz, et al. (2004). "An education theory-based method to teach a procedural skill." *Arch Dermatol* 140(11): 1357-61.
43. Weinberg, J. M. (2003). "An overview of infliximab, etanercept, efalizumab, and alefacept as biologic therapy for psoriasis." *Clinical Therapeutics* 25(10): 2487-505.
44. Wylie, K., R. Hallam-Jones, et al. (2004). Psychological difficulties within a group of patients with vulvodynia, *Journal of Psychosomatic Obstetrics & Gynecology* Vol 25(3-4) Sep-Dec 2004, 257-265.

Medical Administrators

Simulation and Clinical management or technical skills

1. Anderson, E. R., R. Black, et al. (2005). "Acute obstetric emergency drill in England and Wales: a survey of practice." *Bjog* 112(3): 372-5.
Multidisciplinary training for obstetric emergencies is an issue of current interest
2. Blunt, D. and D. O'Regan (2005). "Using PACS as a teaching resource." *Br J Radiol* 78(930): 483-4.
3. Chen, P., M. J. Tanasijevic, et al. (2003). "A computer-based intervention for improving the appropriateness of antiepileptic drug level monitoring." *Am J Clin Pathol* 119(3): 432-8.
4. Fischer, M. A., D. H. Solomon, et al. (2003). "Conversion from intravenous to oral medications: assessment of a computerized intervention for hospitalized patients." *Arch Intern Med* 163(21): 2585-9.
5. Gold, J. P., W. B. Begg, et al. (2005). "Evaluation of web-based learning tools: lessons learned from the thoracic surgery directors association curriculum project three-year experience." *Ann Thorac Surg* 80(3): 802-9; discussion 809-10.
6. Hirshberg, A., M. Stein, et al. (1999). "Surgical resource utilization in urban terrorist bombing: a computer simulation." *J Trauma* 47(3): 545-50.
7. Jensen, A. R., R. Milner, et al. (2008). "Effective instruction of vascular anastomosis in the surgical skills laboratory." *Am J Surg* 195(2): 189-94.
8. Kozer, E., W. Seto, et al. (2004). "Prospective observational study on the incidence of medication errors during simulated resuscitation in a paediatric emergency department." *Bmj* 329(7478): 1321.
9. Kuiken, T. and H. Prather (1998). "A computer education program to improve physician awareness of rehabilitation hospital charges." *Arch Phys Med Rehabil* 79(8): 910-4.

10. Leiba, A., A. Goldberg, et al. (2006). "Lessons learned from clinical anthrax drills: evaluation of knowledge and preparedness for a bioterrorist threat in Israeli emergency departments." *Ann Emerg Med* 48(2): 194-9, 199 e1-2.
11. Marchevsky, A. M., R. Khurana, et al. (2006). "The use of virtual microscopy for proficiency testing in gynecologic cytopathology: a feasibility study using ScanScope." *Arch Pathol Lab Med* 130(3): 349-55.
12. Nates, J. L. (2004). "Combined external and internal hospital disaster: impact and response in a Houston trauma center intensive care unit." *Crit Care Med* 32(3): 686-90.
13. Nissen, S. E., A. M. Abdulla, et al. (2004). "Working group 6: The role of technology to enhance clinical and educational efficiency." *J Am Coll Cardiol* 44(2): 256-60.
14. Pusic, M., K. Johnson, et al. (2001). "Utilization of a paediatric emergency department education computer." *Arch Pediatr Adolesc Med* 155(2): 129-34.
15. Rhodes, K. V., D. S. Lauderdale, et al. (2002). ""Between me and the computer": increased detection of intimate partner violence using a computer questionnaire." *Ann Emerg Med* 40(5): 476-84.
16. Rhodes, K. V., D. S. Lauderdale, et al. (2001). "Better health while you wait: a controlled trial of a computer-based intervention for screening and health promotion in the emergency department." *Ann Emerg Med* 37(3): 284-91.
17. Sachdeva, A. K. and T. R. Russell (2007). "Safe introduction of new procedures and emerging technologies in surgery: education, credentialing, and privileging." *Surg Clin North Am* 87(4): 853-66, vi-vii.
18. Shuhaiber, J. H. (2004). "Augmented reality in surgery." *Arch Surg* 139(2): 170-4.
19. Subramanian, U., S. D. Fihn, et al. (2004). "A controlled trial of including symptom data in computer-based care suggestions for managing patients with chronic heart failure." *Am J Med* 116(6): 375-84.
20. Tamblyn, R., A. Huang, et al. (2003). "The medical office of the 21st century (MOXXI): effectiveness of computerized decision-making support in reducing inappropriate prescribing in primary care." *Cmaj* 169(6): 549-56.

Simulation and Non Technical Skills

1. Cooper, J. B., R. H. Blum, et al. (2008). "Differences in safety climate among hospital anaesthesia departments and the effect of a realistic simulation-based training program." *Anesth Analg* 106(2): 574-84.
2. Cowles, R. A., C. A. Moyer, et al. (2001). "Doctor-patient communication in surgery: attitudes and expectations of general surgery patients about the involvement and education of surgical residents." *J Am Coll Surg* 193(1): 73-80.
3. Fairbanks, R. J., A. M. Bisantz, et al. (2007). "Emergency department communication links and patterns." *Ann Emerg Med* 50(4): 396-406.
4. Fox, P. K. and S. Patterson (2006). "Practical ethics. To apologize or not, that is the question." *Hosp Health Netw* 80(7): 24.

5. Hampers, L. C., S. Cha, et al. (1999). "Language barriers and resource utilization in a paediatric emergency department." *Paediatrics* 103(6 Pt 1): 1253-6.
6. Hampers, L. C. and J. E. McNulty (2002). "Professional interpreters and bilingual physicians in a paediatric emergency department: effect on resource utilization." *Arch Pediatr Adolesc Med* 156(11): 1108-13.
7. Huff, C. (2005). "The not-so-simple truth." *Hosp Health Netw* 79(8): 44-6, 55, 2.
8. Olsen, J. C., M. L. Buenefe, et al. (1998). "Death in the emergency department." *Ann Emerg Med* 31(6): 758-65.
9. Proctor, J. H., A. J. Hirshberg, et al. (2002). "Providing telephone advice from the emergency department." *Ann Emerg Med* 40(2): 217-9.
10. Rhodes, K. V., R. M. Frankel, et al. (2007). ""You're not a victim of domestic violence, are you?" Provider patient communication about domestic violence." *Ann Intern Med* 147(9): 620-7.
11. Saunders, N. C., C. Georgalas, et al. (2003). "Does receiving a copy of correspondence improve patients' satisfaction with their out-patient consultation?" *J Laryngol Otol* 117(2): 126-9.
12. Solovy, A. (2002). "E-mail minus 'e-mail'. California study shows that online communication can benefit patients, physicians and payers." *Hosp Health Netw* 76(11): 26.
13. Spath, P. L. (2003). ""Can you hear me now?" Providers must give patients a voice in efforts to reduce medical errors." *Hosp Health Netw* 77(12): 36-40, 49, 2.
14. Squires, A. (2001). "Leadership development for the new manager in the small, acute care facility." *J Nurs Adm* 31(12): 561-4.
15. Takayesu, J. K. and H. R. Hutson (2004). "Communicating life-threatening diagnoses to patients in the emergency department." *Ann Emerg Med* 43(6): 749-55.
16. Xiao, Y., S. Schenkel, et al. (2007). "What whiteboards in a trauma center operating suite can teach us about emergency department communication." *Ann Emerg Med* 50(4): 387-95.

Ophthalmology

Simulation and Clinical management or technical skills

1. Hikichi, T., A. Yoshida, et al. (2000). "Vitreous surgery simulator." *Arch Ophthalmol* 118(12): 1679-81.
2. Marmor, M. F. (2006). "Ophthalmology and art: simulation of Monet's cataracts and Degas' retinal disease." *Arch Ophthalmol* 124(12): 1764-9.
3. Saleh, G. M., G. Voyatzis, et al. (2006). "Evaluating surgical dexterity during corneal suturing." *Arch Ophthalmol* 124(9): 1263-6.

Paediatrics and Child Health

Simulation and Clinical management or technical skills

1. Adler, M. D., J. L. Trainor, et al. "Development and Evaluation of High-Fidelity Simulation Case Scenarios for Paediatric Resident Education."

- valid data. copyright 2007 Ambulatory Paediatric Association.
2. Aeder, L., L. Altshuler, et al. "The "Culture OSCE" - Introducing a formative assessment into a postgraduate program."
 3. Berg, R. A., R. W. Hilwig, et al. (1999). "Simulated mouth-to-mouth ventilation and chest compressions (bystander cardiopulmonary resuscitation) improves outcome in a swine model of prehospital paediatric asphyxial cardiac arrest." *Crit Care Med* 27(9): 1893-9.
 4. Brett-Fleegler, M. B., R. J. Vinci, et al. (2008). "A simulator-based tool that assesses paediatric resident resuscitation competency." *Paediatrics* 121(3): e597-603.
 5. Bridgemohan, C. F., S. Levy, et al. (2005). Teaching paediatric residents about learning disorders: Use of standardised case discussion versus multimedia computer tutorial, *Medical Education* Vol 39(8) Aug 2005, 797-806.
 6. Christakis, D. A., F. J. Zimmerman, et al. (2006). "Improving paediatric prevention via the internet: a randomized, controlled trial." *Paediatrics* 118(3): 1157-66.
 7. Cook, A., J. L. Salle, et al. (2005). "Prospective evaluation of remote, interactive videoconferencing to enhance urology resident education: the genitourinary teleteaching initiative." *J Urol* 174(5): 1958-60.
 8. Deutsch, E. S., D. Dixit, et al. (2007). "Management of aerodigestive tract foreign bodies: innovative teaching concepts." *Ann Otol Rhinol Laryngol* 116(5): 319-23.
 9. Fiedor, M. L. (2004). "Paediatric simulation: a valuable tool for paediatric medical education." *Crit Care Med* 32(2 Suppl): S72-4.
 10. Gaskin, P. R., S. E. Owens, et al. (2000). "Clinical auscultation skills in paediatric residents." *Paediatrics* 105(6): 1184-7.
 11. Hoe, C. L., E. Samei, et al. (2006). "Simulation of liver lesions for paediatric CT." *Radiology* 238(2): 699-705.
 12. Hunt, E. A., A. R. Walker, et al. (2008). "Simulation of in-hospital paediatric medical emergencies and cardiopulmonary arrests: highlighting the importance of the first 5 minutes." *Paediatrics* 121(1): e34-43.
 13. Kanani, M., E. Kocyildirim, et al. (2004). "Method and value of digital recording of operations for congenital heart disease." *Ann Thorac Surg* 78(6): 2146-9; discussion 2149.
 14. Kozer, E., W. Seto, et al. (2004). "Prospective observational study on the incidence of medication errors during simulated resuscitation in a paediatric emergency department." *Bmj* 329(7478): 1321.
 15. Lane, J. L., A. Ziv, et al. (1999). "A paediatric clinical skills assessment using children as standardized patients." *Arch Pediatr Adolesc Med* 153(6): 637-44.
 16. Levi, B. H. (2007). "Addressing parents' concerns about childhood immunizations: a tutorial for primary care providers." *Paediatrics* 120(1): 18-26.
 17. Nadel, F. M., J. M. Lavelle, et al. (2000). "Teaching resuscitation to paediatric residents: the effects of an intervention." *Arch Pediatr Adolesc Med* 154(10): 1049-54.
 18. Ozuah, P. O., J. Curtis, et al. (2001). "Impact of problem-based learning on residents' self-directed learning." *Arch Pediatr Adolesc Med* 155(6): 669-72.

19. Ozuah, P. O., J. Orbe, et al. (2002). "Ambulatory rounds: a venue for evidence-based medicine." *Acad Med* 77(7): 740-1.
20. Reid, J. R., M. J. Goske, et al. (2004). "Creating an international comprehensive web-based curriculum in paediatric radiology." *AJR Am J Roentgenol* 182(3): 797-801.
21. Roche, P. L., M. R. Ciccarelli, et al. (2007). "Multi-school collaboration to develop and test nutrition computer modules for paediatric residents." *J Am Diet Assoc* 107(9): 1586-9.
22. Ryan, L. M., A. D. DePiero, et al. (2004). "Recognition and management of paediatric fractures by paediatric residents." *Paediatrics* 114(6): 1530-3.
23. Serwint, J. R. "The use of standardized patients in paediatric residency training in palliative care: Anatomy of a standardized patient case scenario."
24. Shavit, I., I. Keidan, et al. (2007). "Enhancing patient safety during paediatric sedation: the impact of simulation-based training of nonanesthesiologists." *Arch Pediatr Adolesc Med* 161(8): 740-3.
25. Tsai, T. C. "Using children as standardised patients for assessing clinical competence in paediatrics."
26. Weinstock, P. H., L. J. Kappus, et al. "Toward a new paradigm in hospital-based paediatric education: The development of an onsite simulator program."
27. Wetzel, R. C. (2001). "The virtual paediatric intensive care unit. Practice in the new millennium." *Pediatr Clin North Am* 48(3): 795-814.

Simulation and Non Technical Skills

1. Anand, S. G., M. J. Feldman, et al. (2005). "A content analysis of e-mail communication between primary care providers and parents." *Paediatrics* 115(5): 1283-8.
2. Babitch, L. A. (2006). "Teaching practice management skills to paediatric residents." *Clin Pediatr (Phila)* 45(9): 846-9.
3. Bagatell, R., R. Meyer, et al. (2002). "When children die: a seminar series for paediatric residents." *Paediatrics* 110(2 Pt 1): 348-53.
4. Borowitz, S. M. and J. C. Wyatt (1998). "The origin, content, and workload of e-mail consultations." *Jama* 280(15): 1321-4.
5. Brown, R., S. Doonan, et al. (2005). "Using children as simulated patients in communication training for residents and medical students: a pilot program." *Acad Med* 80(12): 1114-20.
6. Ferguson, J. E., 2nd, H. L. Kleinert, et al. (2006). "Resident physicians' competencies and attitudes in delivering a postnatal diagnosis of Down syndrome." *Obstet Gynecol* 108(4): 898-905.
7. Gilfoyle, E., R. Gottesman, et al. "Development of a leadership skills workshop in paediatric advanced resuscitation."
8. Greenberg, L.W., Ochsenschlager, D., O'Donnell, R., Mastruserio, J. and Cohen, G.J. (1999). "Communicating bad news: a paediatric department's evaluation of a simulated intervention." *Paediatrics* 1999 103(6 Pt 1): 1210-7.
9. Hampers, L. C., S. Cha, et al. (1999). "Language barriers and resource utilization in a paediatric emergency department." *Paediatrics* 103(6 Pt 1): 1253-6.
10. Hardoff, D. and S. Schonmann (2001). "Training physicians in communication skills with adolescents using teenage actors as simulated patients." *Medical Education* Vol 35(3) Mar 2001, 206-210.

11. Hurwitz, C. A., J. Duncan, et al. (2004). "Caring for the child with cancer at the close of life: "there are people who make it, and I'm hoping I'm one of them"." *Jama* 292(17): 2141-9.
12. Jankouskas, T., Chasko Bush, M., et al. (2007) *Crisis Resource Management: Evaluating Outcomes of a Multidisciplinary Team. Simulation in Healthcare: The Journal of the Society for Simulation in Healthcare*. 2(2):96-101, Summer 2007.
13. Jones, J. W., L. B. McCullough, et al. (2007). "A comprehensive primer of surgical informed consent." *Surg Clin North Am* 87(4): 903-18, viii.
14. Kleiner, K. D., R. Akers, et al. (2002). "Parent and physician attitudes regarding electronic communication in paediatric practices." *Paediatrics* 109(5): 740-4.
15. Knapp, J. and D. Mulligan-Smith (2005). "Death of a child in the emergency department." *Paediatrics* 115(5): 1432-7.
16. Komoroski, E. M. (1998). "Use of e-mail to teach residents paediatric emergency medicine." *Arch Pediatr Adolesc Med* 152(11): 1141-6.
17. Mangione-Smith, R., E. A. McGlynn, et al. (2001). "Parent expectations for antibiotics, physician-parent communication, and satisfaction." *Arch Pediatr Adolesc Med* 155(7): 800-6.
18. McCabe, M. E., E. A. Hunt, et al. (2008). "Paediatric residents' clinical and educational experiences with end-of-life care." *Paediatrics* 121(4): e731-7.
19. Mihalic, A. P., A. E. Dobbie, et al. (2007). "Cultural competence teaching in U.S. paediatric clerkships in 2006." *Acad Med* 82(6): 558-62.
20. Mikrogianakis, A., M. H. Osmond, et al. (2008). "Evaluation of a multidisciplinary paediatric mock trauma code educational initiative: a pilot study." *J Trauma* 64(3): 761-7.
21. Muething, S. E., U. R. Kotagal, et al. (2007). "Family-centered bedside rounds: a new approach to patient care and teaching." *Paediatrics* 119(4): 829-32.
22. Rosen, P. and C. K. Kwok (2007). "Patient-physician e-mail: an opportunity to transform paediatric health care delivery." *Paediatrics* 120(4): 701-6.
23. Shipley, L. J., S. M. Stelzner, et al. (2005). "Teaching community paediatrics to paediatric residents: strategic approaches and successful models for education in community health and child advocacy." *Paediatrics* 115(4 Suppl): 1150-7.
24. Stille, C. J., W. A. Primack, et al. (2001) "Parents as information intermediaries between primary care and specialty physicians."
25. Taveras, E. M., R. Li, et al. (2004). "Mothers' and clinicians' perspectives on breastfeeding counseling during routine preventive visits." *Paediatrics* 113(5): e405-11.
26. Vaidya, V. U., L. W. Greenberg, et al. (1999). "Teaching physicians how to break bad news: a 1-day workshop using standardized parents." *Arch Pediatr Adolesc Med* 153(4): 419-22.
27. Violato, C., J. M. Lockyer, et al. (2006). "Assessment of paediatricians by a regulatory authority." *Paediatrics* 117(3): 796-802.
28. Vrakking, A. M., A. van der Heide, et al. (2005). "Medical end-of-life decisions for children in the Netherlands." *Arch Pediatr Adolesc Med* 159(9): 802-9.
29. Wissow, L. S., D. Roter, et al. (2002). "Mechanisms behind the failure of residents' longitudinal primary care to promote disclosure and discussion of psychosocial issues." *Arch Pediatr Adolesc Med* 156(7): 685-92.

Pathology

Simulation and Clinical management or technical skills

1. Aikawa, L., D. C. Moreira Zornoff, et al. "Guide of internet sites for the study of cardiology. [Portuguese, English]."
2. Asano, F., Y. Matsuno, et al. (2006). "A virtual bronchoscopic navigation system for pulmonary peripheral lesions." *Chest* 130(2): 559-66.
3. Asano, F., J. Shindoh, et al. (2004). "Ultrathin bronchoscopic barium marking with virtual bronchoscopic navigation for fluoroscopy-assisted thoracoscopic surgery." *Chest* 126(5): 1687-93.
4. Becker, D. B., T. Pilgram, et al. (2004). "Accuracy in identification of patients with 22q11.2 deletion by likely care providers using facial photographs." *Plast Reconstr Surg* 114(6): 1367-72.
5. Beller, G. A. (2006). "A proposal for an advanced cardiovascular imaging training track." *J Am Coll Cardiol* 48(7): 1299-303.
6. Cobb, J. P., V. Kannan, et al. (2007). "Navigation reduces the learning curve in resurfacing total hip arthroplasty." *Clin Orthop Relat Res* 463: 90-7.
7. Costello, S. S. P., D. J. Johnston, et al. "Development and evaluation of the virtual pathology slide: A new tool in telepathology."
8. Crowley, R. S., E. Legowski, et al. "Evaluation of an Intelligent Tutoring System in Pathology: Effects of External Representation on Performance Gains, Metacognition, and Acceptance."
9. Kronz, J. D., M. A. Silberman, et al. (2000). "A web-based tutorial improves practicing pathologists' Gleason grading of images of prostate carcinoma specimens obtained by needle biopsy: validation of a new medical education paradigm." *Cancer* 89(8): 1818-23.
10. Lamade, W., G. Glombitza, et al. (2000). "The impact of 3-dimensional reconstructions on operation planning in liver surgery." *Arch Surg* 135(11): 1256-61.
11. Letterie, G. S. (2003). "Medical education as a science: the quality of evidence for computer-assisted instruction." *Am J Obstet Gynecol* 188(3): 849-53.
12. Lundin, M., J. Lundin, et al. (2004). "A digital atlas of breast histopathology: an application of web based virtual microscopy." *J Clin Pathol* 57(12): 1288-91.
13. Mann, B. D., B. M. Eidelson, et al. (2002). "The development of an interactive game-based tool for learning surgical management algorithms via computer." *Am J Surg* 183(3): 305-8.
14. Neri, E., P. Boraschi, et al. (2000). "MR virtual endoscopy of the upper urinary tract." *AJR Am J Roentgenol* 175(6): 1697-702.
15. Pickhardt, P. J. (2003). "Three-dimensional endoluminal CT colonography (virtual colonoscopy): comparison of three commercially available systems." *AJR Am J Roentgenol* 181(6): 1599-606.
16. Pickhardt, P. J., P. A. Nugent, et al. (2004). "Flat colorectal lesions in asymptomatic adults: implications for screening with CT virtual colonoscopy." *AJR Am J Roentgenol* 183(5): 1343-7.
17. Stamatakos, G. S., V. P. Antipas, et al. (2006). "A four-dimensional computer simulation model of the in vivo response to radiotherapy of

- glioblastoma multiforme: studies on the effect of clonogenic cell density." *Br J Radiol* 79(941): 389-400.
18. Tangtrakulwanich, B., W. Kwunpiroj, et al. (2006). "Teleconsultation with digital camera images is useful for fracture care." *Clin Orthop Relat Res* 449: 308-12.

Simulation and Non Technical Skills

1. Chochinov, H. M. (2002). "Dignity-conserving care--a new model for palliative care: helping the patient feel valued." *Jama* 287(17): 2253-60.
2. Ernst, R., V. T. Le, et al. (1999). "A picture archiving and communications system featuring multiple monitors using Windows98... Proceedings of the 16th Symposium for Computer Applications in Radiology. "PACS: Performance Improvement in Radiology." Houston TX, May 6-9, 1999." *Journal of Digital Imaging* 12(2): Suppl 1: 106-8.
3. Finnerty, J. F., C. W. Fuerst, et al. (2002). "End-of-life discussions for the primary care obstetrician/gynecologist." *Am J Obstet Gynecol* 187(2): 296-301.
4. Haidet, P., M. B. Hamel, et al. (1998). "Outcomes, preferences for resuscitation, and physician-patient communication among patients with metastatic colorectal cancer. SUPPORT Investigators. Study to Understand Prognoses and Preferences for Outcomes and Risks of Treatments." *Am J Med* 105(3): 222-9.
5. Oh, D. Y., J. E. Kim, et al. (2004). "Discrepancies among patients, family members, and physicians in Korea in terms of values regarding the withholding of treatment from patients with terminal malignancies." *Cancer* 100(9): 1961-6.
6. Riva, G. and F. Gramatica, (2003), "From stethoscope to ambient intelligence: The evolution of healthcare."
7. Towle, A. and J. Hoffman (2002). "An advanced communication skills course for fourth-year, post-clerkship students." *Acad Med* 77(11): 1165-6.
8. Tulsky, J. A. (2005). "Beyond advance directives: importance of communication skills at the end of life." *Jama* 294(3): 359-65.

Rehabilitation

Simulation and Clinical management or technical skills

1. Karlinsky, H., C. Dunn, et al. "Workplace injury management: Using new technology to deliver and evaluate physician continuing medical education."

Psychiatry

Simulation and Clinical management or technical skills

1. Akatsu, H. and J. Kuffner (1998). "Medicine and the Internet." *West J Med* 169(5): 311-7.
2. Akhondzadeh, S., S. Erfani, et al. (2004). "Cyproheptadine in the treatment of autistic disorder: a double-blind placebo-controlled trial." *Journal of Clinical Pharmacy and Therapeutics* 29(2): 145-50.
3. Alberts, W. M., G. Bepler, et al. (2003). "Lung cancer. Practice organization." *Chest* 123(1 Suppl): 332S-337S.
4. Alhamad, A. M., M. H. Al-Sawaf, et al. (2006). "Differential aspects of consultation-liaison psychiatry in a Saudi hospital. II: knowledge and attitudes of physicians and patients." *Eastern Mediterranean Health Journal* 12(3-4): 324-30.
5. Angelos, P., R. Lafreniere, et al. (2003). "Ethical issues in surgical treatment and research." *Curr Probl Surg* 40(7): 353-448.
6. Arora, S., C. M. Geppert, et al. (2007). "Academic health center management of chronic diseases through knowledge networks: Project ECHO." *Acad Med* 82(2): 154-60.
7. Arora, S., C. M. A. Geppert, et al. "Academic health center management of chronic diseases through knowledge networks: Project ECHO."
8. Baetz, M., D. B. Larson, et al. (2002). "Religious psychiatry: the Canadian experience." *J Nerv Ment Dis* 190(8): 557-9.
9. Barnaby, B., C. Drummond, et al. (2003). "Substance misuse in psychiatric inpatients: comparison of a screening questionnaire survey with case notes." *Bmj* 327(7418): 783-4.
10. Baum, K. (2005). "Independent medical examinations: an expanding source of physician liability." *Ann Intern Med* 142(12 Pt 1): 974-8.
11. Beredjikian, P. K., D. J. Bozentka, et al. (2001). "E-mail in clinical orthopaedic practice." *J Bone Joint Surg Am* 83-A(4): 615-8.
12. Bernstein, J., C. Perlis, et al. (2000). "Ethics in sports medicine." *Clin Orthop Relat Res*(378): 50-60.
13. Bernstein, J., C. Perlis, et al. (2004). "Normative ethics in sports medicine." *Clin Orthop Relat Res*(420): 309-18.
14. Biederman, J., C. R. Petty, et al. (2008). "Familial risk analyses of attention deficit hyperactivity disorder and substance use disorders." *American Journal of Psychiatry* 165(1): 107-15.
15. Blaskiewicz, R. J., R. S. Park, et al. (2004). "The influence of testing context and clinical rotation order on students' OSCE performance." *Acad Med* 79(6): 597-601.
16. Blumenthal, D., M. Gokhale, et al. (2001). "Preparedness for clinical practice: reports of graduating residents at academic health centers." *Jama* 286(9): 1027-34.
17. Boatwright, E. A., B. S. Tozer, et al. (2005). "Health care maintenance in female adolescents." *Mayo Clin Proc* 80(12): 1641-50.
18. Braverman, P. K. (2000). "Adolescent girls' and boys' preferences for provider gender and confidentiality in their health care." *Clin Pediatr (Phila)* 39(6): 375-6.

19. Brewer, B. (2003). "GMC health procedures." *Bmj* 326(7391): S106.
20. Brodkey, A. C. and D. L. Shaw (2002). "Women's health competencies in the undergraduate psychiatry curriculum: past and future." *Am J Obstet Gynecol* 187(3 Suppl): S15-8.
21. Christison, G. W., M. G. Haviland, et al. (2002). "The medical condition regard scale: measuring reactions to diagnoses." *Acad Med* 77(3): 257-62.
22. Cruess, R., J. H. McIlroy, et al. (2006). "The Professionalism Mini-evaluation Exercise: a preliminary investigation." *Acad Med* 81(10 Suppl): S74-8.
23. Curlin, F. A., R. E. Lawrence, et al. (2007). "Religion, spirituality, and medicine: psychiatrists' and other physicians' differing observations, interpretations, and clinical approaches." *Am J Psychiatry* 164(12): 1825-31.
24. D'Alessandro, D. M. and N. P. Dosa (2001). "Empowering children and families with information technology." *Arch Pediatr Adolesc Med* 155(10): 1131-6.
25. DaRosa, D. A., A. H. Niehaus, et al. (2000). "Assessment of a surgery clerkship's performance evaluation system." *Am J Surg* 179(2): 145-9.
26. Dehlendorf, C. E. and S. M. Wolfe (1998). "Physicians disciplined for sex-related offenses." *Jama* 279(23): 1883-8.
27. Enbom, J. A., P. Parshley, et al. (2004). "A follow-up evaluation of sexual misconduct complaints: the Oregon Board of Medical Examiners, 1998 through 2002." *Am J Obstet Gynecol* 190(6): 1642-50; discussion 1650-3, 6A.
28. Ferris, L. E., H. Barkun, et al. (1998). "Defining the physician's duty to warn: consensus statement of Ontario's Medical Expert Panel on Duty to Inform." *Cmaj* 158(11): 1473-9.
29. Forsell, Y. and B. Winblad (1997). "Psychiatric symptoms in a total population of very elderly: data from physician examinations and informant reports." *Aging & Mental Health* 1(3): 238-42.
30. Garimella, R. N., S. B. Plichta, et al. (2002). "How physicians feel about assisting female victims of intimate-partner violence." *Acad Med* 77(12 Pt 1): 1262-5.
31. Gibson, R. C., M. Fenton, et al. (2004). "Zuclopenthixol acetate for acute schizophrenia and similar serious mental illnesses." *Cochrane Database of Systematic Reviews* 3.
32. Golladay, G. J., I. H. Kirschenbaum, et al. (1998). "Internet resources for orthopaedic surgeons." *J Bone Joint Surg Am* 80(10): 1525-32.
33. Goodfriend, M., T. Bryant, 3rd, et al. (2006). "A model for training paediatricians to expand mental health services in the community practice setting." *Clin Pediatr (Phila)* 45(7): 649-54.
34. Gunter, T. D., J. Srinivasaraghavan, et al. (2003). Misinformed Regulation of Electronic Medicine Is Unfair to Responsible Telepsychiatry, *Journal of the American Academy of Psychiatry and the Law* Vol 31(1) 2003, 10-14.
35. Hall, D. (2003). "Protecting children, supporting professionals." *Arch Dis Child* 88(7): 557-9.
36. Hall, M. J., G. Adamo, et al. (2004). "Use of standardized patients to enhance a psychiatry clerkship." *Acad Med* 79(1): 28-31.

37. Hawton, K., E. Townsend, et al. (1999). "Psychosocial and pharmacological treatments for deliberate self harm." *Cochrane Database of Systematic Reviews* 4.
38. Heikkinen, A., K. Puura, et al. (2005). Improving GPs' skills and competencies in child psychiatry, *Nordic Journal of Psychiatry* Vol 59(2) Apr 2005, 114-120.
39. Hodges, B., C. Inch, et al. (2001). "Improving the psychiatric knowledge, skills, and attitudes of primary care physicians, 1950-2000: a review." *Am J Psychiatry* 158(10): 1579-86.
40. Hodges, B., G. Regehr, et al. (1999). "OSCE checklists do not capture increasing levels of expertise." *Acad Med* 74(10): 1129-34.
41. Hojat, M., J. S. Gonnella, et al. (2002). "Physician empathy: definition, components, measurement, and relationship to gender and specialty." *Am J Psychiatry* 159(9): 1563-9.
42. Hux, J. E., M. P. Melady, et al. (1999). "Confidential prescriber feedback and education to improve antibiotic use in primary care: a controlled trial." *Cmaj* 161(4): 388-92.
43. Illes, J., M. P. Kirschen, et al. (2008). "Practical approaches to incidental findings in brain imaging research." *Neurology* 70(5): 384-90.
44. Kales, H. C., A. R. DiNardo, et al. (2006). "International medical graduates and the diagnosis and treatment of late-life depression." *Acad Med* 81(2): 171-5.
45. Kapur, N., J. Cooper, et al. (2005). "Predicting the risk of repetition after self harm: cohort study." *Bmj* 330(7488): 394-5.
46. Khaliq, A. A., H. Dimassi, et al. (2005). "Disciplinary action against physicians: who is likely to get disciplined?" *Am J Med* 118(7): 773-7.
47. Kleiner, K. D., R. Akers, et al. (2002). "Parent and physician attitudes regarding electronic communication in paediatric practices." *Paediatrics* 109(5): 740-4.
48. Kushner, T. and D. Thomasma (2001). "What do I do now?" *West J Med* 174(5): 354.
49. Lacroix, M., G. Nycum, et al. (2008). "Should physicians warn patients' relatives of genetic risks?" *Cmaj* 178(5): 593-5.
50. Lawson, S. R., J. D. Hoban, et al. (2004). "Understanding primary care residency choices: a test of selected variables in the Bland-Meurer model." *Acad Med* 79(10 Suppl): S36-9.
51. Letterie, G. S. (2002). "How virtual reality may enhance training in obstetrics and gynecology." *Am J Obstet Gynecol* 187(3 Suppl): S37-40.
52. Lockyer, J. M. and C. Violato (2004). "An examination of the appropriateness of using a common peer assessment instrument to assess physician skills across specialties." *Acad Med* 79(10 Suppl): S5-8.
53. Mahendran, R., M. Hendriks, et al. (2006). "Case management in a psychiatric hospital: review of outcomes and resource utilisation." *Hong Kong Journal of Psychiatry* 16(1): 3-6.
54. Malone, D., S. Marriott, et al. (2007). "Community mental health teams (CMHTs) for people with severe mental illnesses and disordered personality." *Cochrane Database of Systematic Reviews* 3.
55. Mandl, K. D., I. S. Kohane, et al. (1998). "Electronic patient-physician communication: problems and promise." *Ann Intern Med* 129(6): 495-500.

56. Martin, J. B. (2002). "The integration of neurology, psychiatry, and neuroscience in the 21st century." *Am J Psychiatry* 159(5): 695-704.
57. McCarthy, M. K., R. J. Birnbaum, et al. (2000). Problem-based learning and psychiatry residency education, *Harvard Review of Psychiatry* Vol 7(5) Jan-Feb 2000, 305-308.
58. Morrison, J. and T. Morrison (2001). "Psychiatrists disciplined by a state medical board." *Am J Psychiatry* 158(3): 474-8.
59. Moseley, T. H., M. J. Cantrell, et al. (2002). "Clinical skills center attending: an innovative senior medical school elective." *Acad Med* 77(11): 1176.
60. Mullen, L. S., R. O. Rieder, et al. (2004). "Testing psychodynamic psychotherapy skills among psychiatric residents: the psychodynamic psychotherapy competency test." *Am J Psychiatry* 161(9): 1658-64.
61. Muller, M. J. and E. Davids (1999). "Relationship of psychiatric experience and interrater reliability in assessment of negative symptoms." *J Nerv Ment Dis* 187(5): 316-8.
62. Pantilat, S. Z., A. Alpers, et al. (1999). "A new doctor in the house: ethical issues in hospitalist systems." *Jama* 282(2): 171-4.
63. Parkin, A. (2000). "Computers in clinical practice: applying experience from child psychiatry." *Bmj* 321(7261): 615-8.
64. Podichetty, V. and D. Penn (2004). "The progressive roles of electronic medicine: benefits, concerns, and costs." *Am J Med Sci* 328(2): 94-9.
65. Povar, G. J., H. Blumen, et al. (2004). "Ethics in practice: managed care and the changing health care environment: medicine as a profession managed care ethics working group statement." *Ann Intern Med* 141(2): 131-6.
66. Pryse-Phillips, W. E., D. W. Dodick, et al. (1998). "Guidelines for the nonpharmacologic management of migraine in clinical practice. Canadian Headache Society." *Cmaj* 159(1): 47-54.
67. Rajput, V. and C. E. Bekes (2002). "Ethical issues in hospital medicine." *Med Clin North Am* 86(4): 869-86.
68. Rhodes, K. V., D. S. Lauderdale, et al. (2002). "Between me and the computer": increased detection of intimate partner violence using a computer questionnaire." *Ann Emerg Med* 40(5): 476-84.
69. Rhodes, R. (1998). "Ethical considerations for residents." *Acad Med* 73(8): 854-64.
70. Roberts, L. W., J. H. Coverdale, et al. (2003). Evidence, Methods, and Psychiatric Education, *Academic Psychiatry* Vol 27(4) Win 2003, 227-228.
71. Rodriguez, M. A., A. M. Craig, et al. (1998). "Patient attitudes about mandatory reporting of domestic violence. Implications for health care professionals." *West J Med* 169(6): 337-41.
72. Sack, S., B. Drabant, et al. (2002). "Communicating about sexuality: an initiative across the core clerkships." *Acad Med* 77(11): 1159-60.
73. Sekhobo, J. P. and C. M. Druschel (2001). "An evaluation of congenital malformations surveillance in New York State: an application of Centers for Disease Control and Prevention (CDC) guidelines for evaluating surveillance systems." *Public Health Rep* 116(4): 296-305.
74. Shrier, I., S. Green, et al. (1998). "Knowledge of and attitude toward patient confidentiality within three family medicine teaching units." *Acad Med* 73(6): 710-2.

75. Singh, S. P., H. Baxter, et al. (1998). "Changing the attitudes of 'tomorrow's doctors' towards mental illness and psychiatry: a comparison of two teaching methods." *Medical Education* 32(2): 115-20.
76. Stanley, N., J. Manthorpe, et al. "Family physicians' interventions with young people in distress and their parents: Managing confidentiality and levels of engagement."
77. Straus, S. E., K. Wilson, et al. (2004). "Severe acute respiratory syndrome and its impact on professionalism: qualitative study of physicians' behaviour during an emerging healthcare crisis." *Bmj* 329(7457): 83.
78. Sugarman, J., K. Regan, et al. (1999). "Ethical ramifications of alternative means of recruiting research participants from cancer registries." *Cancer* 86(4): 647-51.
79. Sutherland, J. K. and P. Cowan "Using special interest sessions to design and implement a fatigue management group for people with multiple sclerosis."
80. Swen, J. J., I. Wilting, et al. (2008). "Pharmacogenetics: from bench to byte." *Clin Pharmacol Ther* 83(5): 781-7.
81. Tarren-Sweeney, M. and V. Carr "Principles for development of multi-disciplinary, mental health learning modules for undergraduate, postgraduate and continuing education."
82. Tasman, A. (2000). "Presidential address: the doctor-patient relationship." *Am J Psychiatry* 157(11): 1762-8.
83. Todkill, A. M. (2001). "Boundary crossing: the physician and the photographer." *Cmaj* 165(1): 35-6.
84. Towle, A. and J. Hoffman (2002). "An advanced communication skills course for fourth-year, post-clerkship students." *Acad Med* 77(11): 1165-6.
85. Weissman, J. S., J. Betancourt, et al. (2005). "Resident physicians' preparedness to provide cross-cultural care." *Jama* 294(9): 1058-67.
86. Wewetzer, C., T. Jans, et al. (2001). "Long-term outcome and prognosis of obsessive-compulsive disorder with onset in childhood or adolescence." *European Child & Adolescent Psychiatry* 10(1): 37-46.
87. White, P. (2002). "Legal issues in teleradiology-distant thoughts!" *Br J Radiol* 75(891): 201-6.
88. Williamson, K. J., D. V. Coonrod, et al. (2004). "Screening for domestic violence: practice patterns, knowledge, and attitudes of physicians in Arizona." *South Med J* 97(11): 1049-54.
89. Windish, D. M., P. M. Paulman, et al. (2004). "Do clerkship directors think medical students are prepared for the clerkship years?" *Acad Med* 79(1): 56-61.
90. Wisner, K. L., D. A. Zarin, et al. (2000). "Risk-benefit decision making for treatment of depression during pregnancy." *Am J Psychiatry* 157(12): 1933-40.
91. Yudkowsky, R. (1999). "Can resident evaluations demonstrate increases in residents' skills over time?" *Acad Med* 74(10 Suppl): S108-10.
92. Zisook, S., S. Benjamin, et al. "Alternate methods of teaching psychopharmacology."

Simulation and Non Technical Skills

1. Fichtner, C.G., Stout, C.E., Dove, H. and Lardon, C.S.(2000). Psychiatric leadership and the clinical team: simulated in vivo treatment planning performance as teamwork proxy and learning laboratory. *Administration & Policy in Mental Health* 2000 27(5): 313-37.
2. Rimondini, M., Del Piccolo, L., Goss, C., Mazzi, M., Paccaloni, M. and Zimmermann, C. (2006). Communication skills in psychiatry residents-- how do they handle patient concerns? An application of sequence analysis to interviews with simulated patients. *Psychotherapy & Psychosomatics* 2006 75(3): 161-9.

Radiology and Oncology

Simulation and Clinical management or technical skills

1. Asano, F., J. Shindoh, et al. (2004). "Ultrathin bronchoscopic barium marking with virtual bronchoscopic navigation for fluoroscopy-assisted thoracoscopic surgery." *Chest* 126(5): 1687-93.
2. Blunt, D. and D. O'Regan (2005). "Using PACS as a teaching resource." *Br J Radiol* 78(930): 483-4.
3. Brennan, D. D., G. Zamboni, et al. (2007). "Virtual Whipple: preoperative surgical planning with volume-rendered MDCT images to identify arterial variants relevant to the Whipple procedure." *AJR Am J Roentgenol* 188(5): W451-5.
4. Cameron, B. M. and R. A. Robb (2006). "Virtual-reality-assisted interventional procedures." *Clin Orthop Relat Res* 442: 63-73.
5. Cotton, P. B., V. L. Durkalski, et al. (2004). "Computed tomographic colonography (virtual colonoscopy): a multicenter comparison with standard colonoscopy for detection of colorectal neoplasia." *Jama* 291(14): 1713-9.
6. Gaca, A. M., D. P. Frush, et al. "Enhancing paediatric safety: Using simulation to assess radiology resident preparedness for anaphylaxis from intravenous contrast media."
7. Glaessel, A., A. G. Schreyer, et al. (2001). "Laser surgical planning with magnetic resonance imaging-based 3-dimensional reconstructions for intralesional Nd:YAG laser therapy of a venous malformation of the neck." *Arch Dermatol* 137(10): 1331-5.
8. Gunderman, R. B. and P. K. Wilson (2005). "Viewpoint: exploring the human interior: the roles of cadaver dissection and radiologic imaging in teaching anatomy." *Acad Med* 80(8): 745-9.
9. Hirshberg, A., M. Stein, et al. (1999). "Surgical resource utilization in urban terrorist bombing: a computer simulation." *J Trauma* 47(3): 545-50.
10. Hoe, C. L., E. Samei, et al. (2006). "Simulation of liver lesions for paediatric CT." *Radiology* 238(2): 699-705.
11. Horton, K. M., M. R. Horton, et al. (2007). "Advanced visualization of airways with 64-MDCT: 3D mapping and virtual bronchoscopy." *AJR Am J Roentgenol* 189(6): 1387-96.

12. Jaramaz, B. and K. Eckman (2006). "Virtual reality simulation of fluoroscopic navigation." *Clin Orthop Relat Res* 442: 30-4.
13. Leiba, A., A. Goldberg, et al. (2006). "Lessons learned from clinical anthrax drills: evaluation of knowledge and preparedness for a bioterrorist threat in Israeli emergency departments." *Ann Emerg Med* 48(2): 194-9, 199 e1-2.
14. Letterie, G. S. (2003). "Medical education as a science: the quality of evidence for computer-assisted instruction." *Am J Obstet Gynecol* 188(3): 849-53.
15. Lynch, T. G., D. J. Steele, et al. (2001). "Learning preferences, computer attitudes, and test performance with computer-aided instruction." *Am J Surg* 181(4): 368-71.
16. Monsky, W. L., D. Levine, et al. (2002). "Using a sonographic simulator to assess residents before overnight call." *AJR Am J Roentgenol* 178(1): 35-9.
17. Patel, A. D., A. G. Gallagher, et al. (2006). "Learning curves and reliability measures for virtual reality simulation in the performance assessment of carotid angiography." *J Am Coll Cardiol* 47(9): 1796-802.
18. Reid, J. R., M. J. Goske, et al. (2004). "Creating an international comprehensive web-based curriculum in paediatric radiology." *AJR Am J Roentgenol* 182(3): 797-801.
19. Summers, R. M., N. R. Aggarwal, et al. (2002). "CT virtual bronchoscopy of the central airways in patients with Wegener's granulomatosis." *Chest* 121(1): 242-50.
20. Suzuki, M., A. Hagiwara, et al. (2007). "Rapid-prototyped temporal bone and inner-ear models replicated by adjusting computed tomography thresholds." *J Laryngol Otol* 121(11): 1025-8.
21. Tangtrakulwanich, B., W. Kwunpiroj, et al. (2006). "Teleconsultation with digital camera images is useful for fracture care." *Clin Orthop Relat Res* 449: 308-12.
22. Williamson, K. B., J. L. Steele, et al. (2002). "Assessing radiology resident reporting skills." *Radiology* 225(3): 719-22.
23. Wood, B. J. and P. Razavi (2002). "Virtual endoscopy: a promising new technology." *Am Fam Physician* 66(1): 107-12.
24. Yeung, A. C. and P. C. Block "Effectiveness of medical simulators in endovascular training."

Simulation and Non Technical Skills

1. Sica, G. T., D. M. Barron, et al. (1999) "Computerized realistic simulation: A teaching module for crisis management in radiology."

Intensive Care Medicine

Simulation and Clinical management or technical skills

1. Clay, A. S., L. Que, et al. (2007). "Debriefing in the intensive care unit: a feedback tool to facilitate bedside teaching." *Crit Care Med* 35(3): 738-54. Review Article on Simulation for educating residents
2. Croley, W. C. and D. M. Rothenberg "Education of trainees in the intensive care unit." copyright 2007 Lippincott Williams & Wilkins, Inc.
3. Murphy, J. G., F. Cremonini, et al. "Is simulation based medicine training the future of clinical medicine?"
4. Weinstock, P. H., L. J. Kappus, et al. "Toward a new paradigm in hospital-based paediatric education: The development of an onsite simulator program Copyright copyright 2005 by the Society of Critical Care Medicine and the World Federation of Paediatric Intensive and Critical Care Societies.
5. Marsch, S. C., F. Tschan, et al. (2005). "Performance of first responders in simulated cardiac arrests." *Crit Care Med* 33(5): 963-7.
6. Dunning, J., J. Nandi, et al. (2006). "The Cardiac Surgery Advanced Life Support Course (CALs): delivering significant improvements in emergency cardiothoracic care." *Ann Thorac Surg* 81(5): 1767-72.
7. Ottestad, E., J. R. Boulet, et al. (2007). "Evaluating the management of septic shock using patient simulation." *Crit Care Med* 35(3): 769-75.
8. Young, J. S., J. E. Dubose, et al. (2007). "The use of "war games" to evaluate performance of students and residents in basic clinical scenarios: a disturbing analysis." *J Trauma* 63(3): 556-64
9. Young, J. S., J. B. Stokes, et al. (2007). "Proactive versus reactive: the effect of experience on performance in a critical care simulator." *Am J Surg* 193(1): 100-4.
10. Bochicchio, G. V., P. A. Smit, et al. (2006). "Pilot study of a web-based antibiotic decision management guide." *J Am Coll Surg* 202(3): 459-67.
11. Huang, D. T., G. Clermont, et al. (2007). "Implementation of early goal-directed therapy for severe sepsis and septic shock: a decision analysis." *Critical Care Medicine* 35(9): 2090-100.

Simulation and Non Technical Skills

1. DeVita, M. A., J. Schaefer, et al. "Improving medical emergency team (MET) performance using a novel curriculum and a computerized human patient simulator."
2. Zabari, M., G. Suresh, et al. (2006). "Implementation and case-study results of potentially better practices for collaboration between obstetrics and neonatology to achieve improved perinatal outcomes." *Paediatrics* 118 Suppl 2: S153-8.

3. Vaidya, V. U., L. W. Greenberg, et al. (1999). "Teaching physicians how to break bad news: a 1-day workshop using standardized parents." *Arch Pediatr Adolesc Med* 153(4): 419-22.

General / Non Specialty Specific Articles on NTS and Simulation (inclusive of articles published outside of search range)

1. Daniels, K. & Parness, A. (2008). Development and Use of Mechanical Devices for Simulation of Seizure and Hemorrhage in Obstetrical Team Training. *Simulation in Healthcare: The Journal of the Society for Simulation in Healthcare*. 3(1):42-46, Spring 2008.
2. Dieckmann, P., David Gaba, D., Rall, M., (2007). Deepening the Theoretical Foundations of Patient Simulation as Social Practice. *Simulation in Healthcare: The Journal of the Society for Simulation in Healthcare*. 2(3):183-193, Fall 2007.
3. Gabba, D., (2007). The Future Vision of Simulation in Healthcare. *Simulation in Healthcare: The Journal of the Society for Simulation in Healthcare*. 2(2):126-135, Summer 2007.
4. Gaba, D., Howard, S., Fish, K., Smith, B. & Sowb, Y. (2001) Simulation-Based Training in Anesthesia Crisis Resource Management (ACRM): A Decade of Experience, *Simulation and Gaming*, Vol. 32, page(s) 175-193 2001.
5. Gaba, D., DeAnda, A. (1989), The response of anesthesia trainees to simulated critical incidents. *Anesth Analg* 1989; 68:444-51.
6. Gaba, D., Howard, S., Flanagan, B., Smith, B., Fish, Kevin J., Botney, R., (1998) Assessment of Clinical Performance during Simulated Crises Using Both Technical and Behavioral Ratings *Anesthesiology: July 1998 - Volume 89 - Issue 1 - pp 8-18*
7. Holzman, R.S., Cooper, J.B., Gaba, D.M., Philip, J.H., Small, S.D., Feinstein, D. (1995), Anesthesia crisis resource management: real-life simulation training in operating room crises. *J Clin Anesth*. 1995 Dec;7(8):675-87.
8. Howard, SK., Gaba, D.M., Fish, K.J., Yang, G., Sarnquist, F.H. (1992), Anesthesia crisis resource management training: teaching anesthesiologists to handle critical incidents. *Aviat Space Environ Med*. 1992 Sep;63(9):763-70.
9. Malec, J., Torshe, L., Dunn W., Wiegmann, D., Arnold, J., Brow, D., Phatak, V. (2007). The Mayo High Performance Teamwork Scale: Reliability and Validity for Evaluating Key Crew Resource Management Skills. *Simulation in Healthcare: The Journal of the Society for Simulation in Healthcare*. 2(1):4-10, Spring 2007.
10. Rosen, M., Salas, E., Wilson, K., King, H., Salisbury, M., Augenstein, J., Robinson, D. Birnbach, D. (2008). *Measuring Team Performance in Simulation-Based Training: Adopting Best Practices for Healthcare*. *Simulation in Healthcare: The Journal of the Society for Simulation in Healthcare*. 3(1):33-41, Spring 2008.
11. Roter, D.L., Larson, S., Shinitzky, H., Chernoff, R., Serwint, J.R., Adamo, G. and Wissow, L. (2004). Use of an innovative video feedback technique to enhance communication skills training. *Medical Education*. 2004 38(2):145-157.