Case study

Learning Critical Elements
of Patient Safety with Simulation

TuPASS - Tubinger Patientsicherheits-
und Simulationszentrum

Tubingen, Germany

By: Ellen Thomseth, Laerdal Medical

TUPASS IN SHORT

Background

Tuebingen Center for Patient Safety and Simulation (TuPASS) was established in 1998. The simulation program is located in a clinical environment at the University Hospital of Tuebingen, where the facilities occupy 400 sq meters. TuPASS trains approximately 2000 participants every year, both students and healthcare professionals, internal and external clientele. The main principles are: Team training whenever possible, Train together those who work together, and Train where you work; mobile in situ training (pioneered by TuPASS). 50% of the conducted simulation courses take place outside TuPASS, such as training of air ambulance personnel. Further, the center facilitates Train-The-Trainer courses for instructors in medical simulation training. These courses are provided both at TuPASS and at several other simulation centers across Europe, and more than 100 instructors are annually trained. The initiative helps other centers develop and maintain a qualified staff. TuPASS is also founding member of the EuSiM group (www.eusim.org), a collaboration of 3 simulation centers for basic and advanced international instructor courses. So far, the EuSiM group has trained more than 1,000 instructors. Another field for TuPASS is running national incident reporting systems, and contributing to the analysis of critical incidents. TuPASS currently runs the German National Incident Reporting System – PaSOS - for the Anaesthesia Society. A fourth area of priority is research. All of the above-mentioned activities have the same goal, namely contribute to increased patient safety.
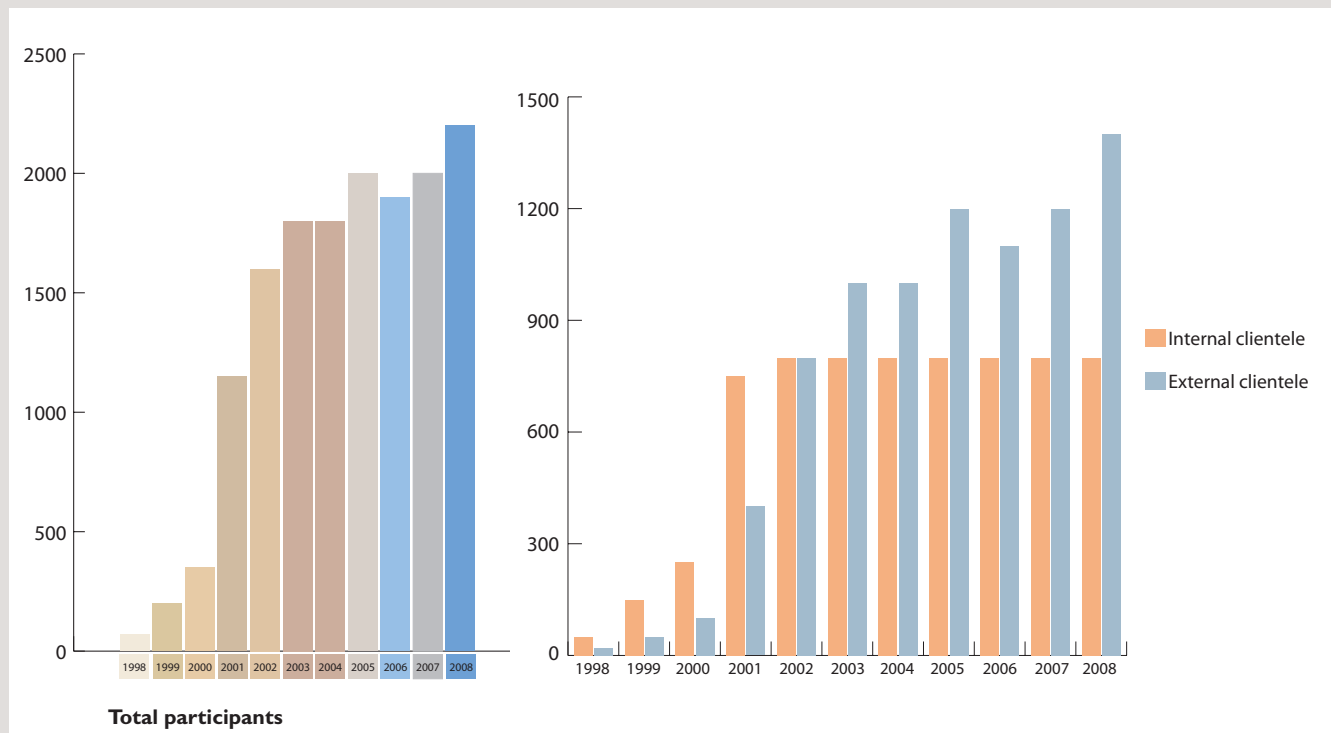
Profile

TuPASS is an innovator of high level simulation training and offers Critical Resource Management (CRM), Mobile in-situ training, Full Team Trainings in block trainings, Competency Management, Protocol Training, and Train-The-Trainer courses for instructors.

Floor plan

Activity

Total participants

Website: http://www.medizin.uni-tuebingen.de/psz/
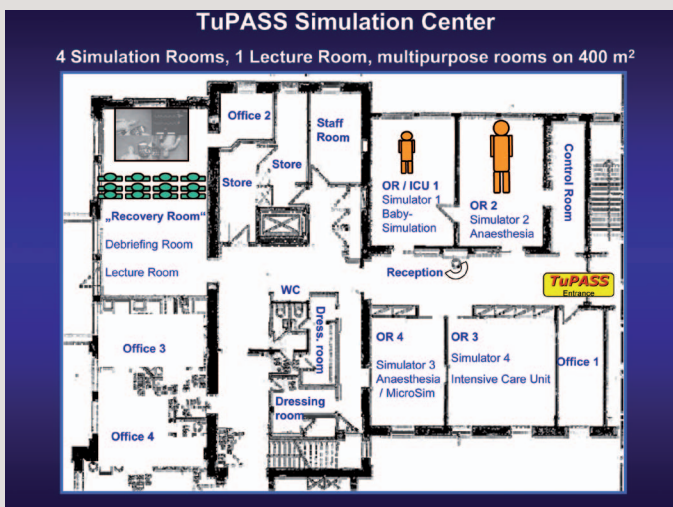
WHY SIMULATION WAS IMPLEMENTED

"The primary focus has been a broader approach to patient safety; human factors being one of the major killers in healthcare. Crisis Resource Management (CRM) is seen as the best option to counteract this threat. Simulation is an obvious tool to make these deficits visible, understandable and trainable, and clearly a means to reach our learning goals. We simulate because simulation is the only effective method to learn critical elements of patient safety." (Marcus Rall)

ORGANIZATIONAL MODEL

TuPASS is an integral part of the Tubingen University Hospital (Department of Anaesthesiology and Intensive Care Medicine) and a part of the University of Tubingen Medical School. TuPASS is represented on the hospital board via the head of Department of Anaesthesiology. The simulation program is headed by an MD/Anaesthesiologist, who also acts as instructor. Around 20 formally trained instructors conduct simulation training at TuPASS in-between their clinical duties at the hospital. TuPASS also collaborates with instructors from other parts of Germany, from other European countries, and instructors from other continents. Most of the associated instructors are graduates from the-train-the-trainer courses conducted at TuPASS. The regular staff is flexible and cooperates in solving practical tasks and challenges that occur along the way.

Staff competency levels

All instructors have a medical background and hold 4-day formal simulation-training courses (Level 1), where debriefing is highly emphasized. Apprentices learn from observing the fully qualified instructors, and gradually take on an active part, while receiving advice and guidance from the more experienced. To become a fully qualified instructor, the apprentice must be firm in CRM, highly motivated, and consider him/herself ready for the task. TuPASS, Barts (London), and DIMS (Denmark) simulation centers collaborate on developing levels 2 and 3 of the Train-The-Trainer courses.

For additional information: http://www.EUsim.org/

Staffing

Director
2nd Director – MD
1 secretary
1 technician
3 other employees

In-house Instructors: 8 MDs
1 M.Sc.
1 Ph.D.
6 nurses

Associated
Instructors: 20 local
50 from around the world

Facilities: TuPASS is equipped with 5 multi-purpose rooms. All rooms can be used for simulation, debriefing, and for lectures. There is one control room, and one larger room for lectures and debrief sessions. Scenarios can be run independently in all rooms.

Curriculum: The curriculum is developed and controlled by TuPASS. The scenarios are developed in accordance with selected learning objectives and the educational needs of each participating group. Main focuses are CRM, human factors, team work, decision making, and the field specific aspects. The simulation curriculum for medical students is embedded as a module and adapted to the broader medial curriculum.

FINANCIAL MODEL

The TuPASS simulation center is an integral part of the University Hospital (Universität Klinik TuPASS- UKT). Funding from the University Hospital and the Department of Anaesthesiology covers training of internal personnel (healthcare personnel and medical students from TuPASS) and daily management, including staff wages. Research activity and investments depend on internal competitive funding programs and external funding, such as national programs. Simulation training for external clientele is set at a higher price than cost price. The additional funding generated from the external activity enables TuPASS to carry out numerous projects that would otherwise not have been feasible.
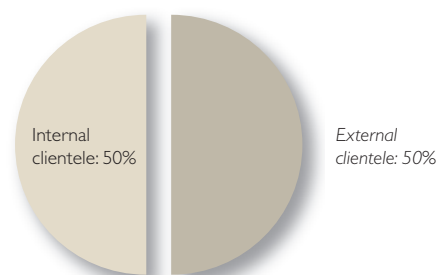

Internal clientele: 50%

External clientele: 50%

Figure 1 Funding

BENEFITS OF MODEL

- **Facilities:** The opportunity to run scenarios in several rooms at the same time provides flexibility and enables the center to train larger numbers of participants.
- **Location:** Internal clientele can easily access the training facilities. Training conducted away from the workplace prevents disruption and promotes focus. The conducted in situ training allows people who work together to train together at their own workplace. In situ training is moreover an excellent method to expose how poorly emergency situations might have been handled in actual clinical settings. Increased awareness promotes participants' focus on improving status quo.
- **Meeting Educational Needs:** By allocating time to clinical practice, the training staff manages to remain credible,

relevant, and down to earth, and thus maintain a clear understanding of the core participants' educational needs.

- **External Clientele:** Simulation courses for external clientele contribute to spreading the message that simulation training is effective, highly needed, and that focusing on human factors/CRM is crucial to attain improved patient safety. The broader perspective on Patient Safety - along with a strong focus on CRM and more generic training - helps bring this message forward. The external activity also generates additional funding.

DEMOGRAPHICS OF CLIENTELE

Professionals

Core TuPASS Activities	
Training of medical teams	EMS
Conduct Instructor courses	Ambulance personnel
	Casualty clinic personnel
	Paramedics
Teams	
Pre-hospital trauma team	**Instructor courses, seminars, meetings**
Cath lab teams	
Neonatologist team	Instructors in high-level
Paramedic-Physician teams	medical simulation (Train-The-Trainer courses)
Pediatric team	Advanced instructor courses
Physicians	Debriefing and CRM seminars
Anaesthesiologists	National simulation meetings and workshops
Cardiologists (Cath lab)	
Emergency physicians (pre/inhospital)	
General practitioners	**Other**
Intensivists	Radiology technical assistants
Internists	Firefighters
Neonatologists	
Obstetricians	
Pediatricians	Plans are underway to incorporate the hospital trauma team and more nurses into the simulation program.
Residents/House officers, all levels	
Nurses	
Anaesthesia	
Cath lab	
Emergency care	
Midwives	
Intensive care	
Operating room	
Pediatric care	

Postgraduates

Physicians	program
General practitioners	Casualty clinic
	Intensive care
Nurses	Operating Room
Anaesthesia	Registered nurses post
Anaesthesia postgraduate	graduate program

Undergraduates

Medical students in the 3rd, 4th, 5th, 6th clinical year
Nursing students

External Clientele

EMS providers
Equipment industry
German Air Rescue
Instructor courses
Hospitals
Pharmaceutical industry
Medical simulation training industry

EDUCATIONAL ACTIVITIES

The Circle of Learning framework identifies five learning modes and illustrates the continuing process of attaining and enhancing competence (fig 2). TuPASS facilitates knowledge acquisition, skills proficiency, and full-scale simulation. Computer simulation (Laerdal MicroSim) has been made an integral part of the exams for medical students (90% score = top grade, 80% score = Pass, < 70% score = Fail).

Underway
Medical students will be utilizing the Resusci Anne Skills Station to learn CPR, whereas professionals will apply the product to sustain and enhance previously acquired CPR skills. Starting October 2009, TuPASS University Hospital will be retraining their employees every 2 years. The Skills Station may be the chosen solution for both BLS and ACLS training of hospital personnel.
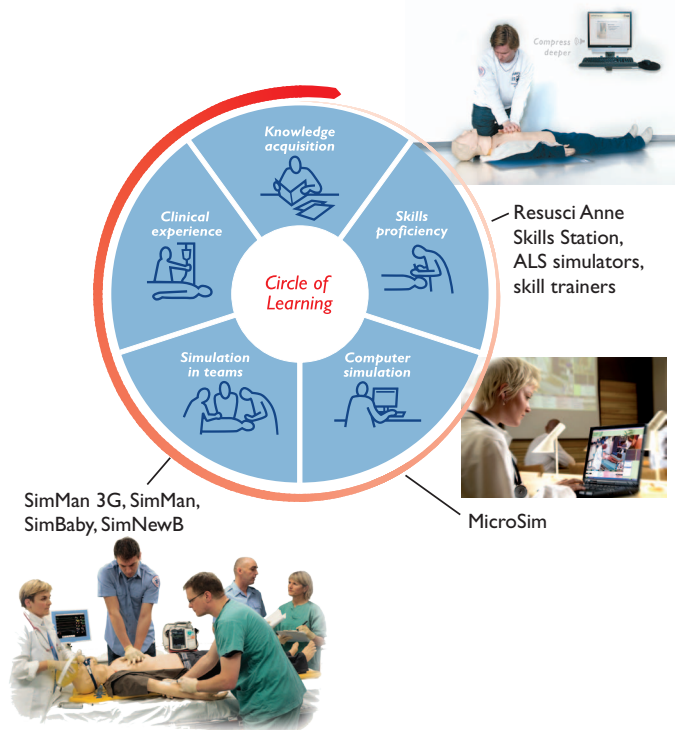
METHODOLOGY

Simulation Training in Teams

Preparation: Lecture and literature are used for knowledge acquisition.

Brief: A 30-minute orientation is provided, where participants are introduced to the basic principles regarding simulation training and to the topic for the upcoming scenario. Afterwards, the group is introduced to the equipment located in the simulation rooms.

Validity: TuPASS emphasizes validity to a high degree. The real key to generate learning outcomes is however the relevance of the simulation training. Realism is considered an instrument to achieve relevance. "One needs to be sufficiently realistic in order to be relevant." The focus is on CRM regardless of scenario.

Interactive Approach: When participants reveal difficulty in dealing with a case scenario, or would benefit from greater challenges, the instructor will simplify or complicate the scenario accordingly. Participants who are not playing active parts in the ongoing scenario, follow the action closely via live video transmission in the larger lecture room.

Scenarios: All scenarios are self-made.

Most frequently used scenarios for full team cases:

Acute, critical illness
Anaesthesia complications
Anaphylaxis
Cardiac complications: dysrythmia, arrest etc.
Chest pain
Coma
Difficult airway/Intubation
Epilepsy
Ethical issues related to end of life decisions/
patient death/parental presence
Hemorrhaging shock
Hypoglycemia
Impaired respiration
Intoxications
Myocardial infarction
Neonatal complications
Pediatric pre hospital complications
Pneumothorax
Pulmonary disease
Respiratory arrest
Stoke
Trauma cases

Figure 2 The Circle of Learning and chosen products

CHOSEN SOLUTION

Training equipment currently includes:
1 SimMan 3G
2 SimMan
2 SimBaby
1 SimNewB
10 PCs with 300 full MicroSim licenses
2 Resusci Anne Skills Station
1 ALS simulator (baby)
Laerdal skill trainers and manikins

The fact that SimMan 3G, SimMan, SimBaby, and SimNewB provide lifelike clinical feedback has made it easier to facilitate training for a number of learning objectives. The following features are especially appreciated at TuPASS:

• Airway
• Auscultation
• Flexibility/reliability of the control logic: the simulator always does what the instructor wants to happen
• Pulses
• Reliability (especially during mobile in-situ training)
• Respiration
• Vital sign monitor
• Voice option

Debriefing

The focus is rather on facilitation than traditional instruction, as such. The why why why (why3) technique is used to identify root causes for errors. The instructors/facilitators encourage the participants to share their perceptions and experiences with the rest of the group, and moreover to reflect on their own performance. The self-reflective learning is enhanced by the use of video that was recorded during the simulation training, because video clips illuminate the gap between the participants' good intentions and goals that are often in stark contrast to their actual performance.

Debriefing structure and focus points – step by step:
- How did you feel?
- What would you do different?
- What happened? (medical case and objectives)
- Why did things go wrong (or exceptionally well)
  - CRM focus!
- Good performance is also analyzed using why3
- Assisted by video clips
- Discussion with all involved (live video during scenario)
- How to make it better in the reality that is not an ideal reality?
- Take home messages

- Chronology - forwards and backwards
- Perspectives
- Learning objectives
- Performance - good and bad
- Video - increases interest among participants

WHAT MAKES GOOD SIMULATION PROGRAMS

Issenberg et al [2] reviewed and synthesized existing evidence in educational science that addressed the question - what are the features and uses of high-fidelity medical simulations that lead to most effective learning? Articles that demonstrated effective learning were purposely selected and reviewed. Several important features and aspects of medical simulations were identified and the authors concluded that the weight of the best available evidence suggests that high-fidelity medical simulations facilitate learning, when training is conducted under the 'right conditions.'

The right conditions include:
- Feedback is provided during the learning experience
- Learners engage in repetitive practice
- Simulation is integrated into the normal training schedule
- Learners practice with increasing levels of difficulty
- Simulation training is adapted to multiple learning strategies
- A wide variety of clinical conditions are provided for
- Learning on the simulator occurs in a controlled environment
- Individualized and team learning are provided
- Learning outcomes are clearly defined
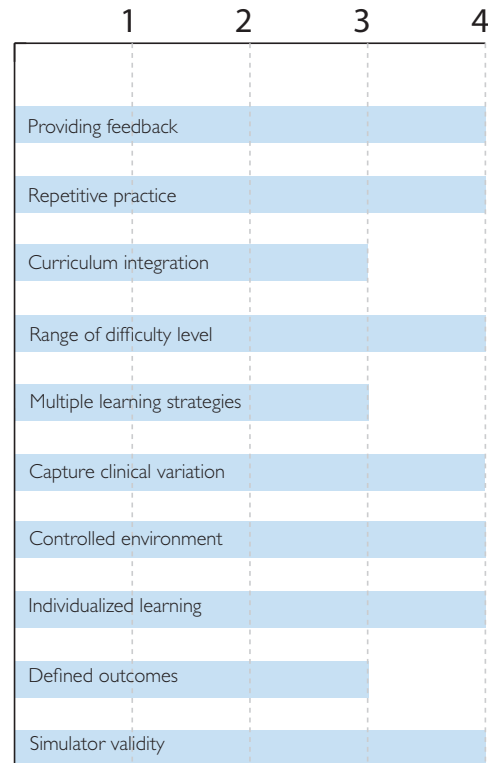- Ensures the simulator is a valid learning tool

Figure 3 The columns indicate to what degree TuPASS delivers on each of the listed right conditions - as assessed by the simulation center on a 4-point Likert scale (4 = highest). The right conditions are not individually graded

RESEARCH ACTIVITY

TuPASS conducts projects in relation to the following topics:
- Instructor training
- Debriefing using CRM
- CRM and related human factor skills
- Simulation relevance, ecological validity
- Long term follow up of simulation training effects
- Effect of bulk departmental trainings (training of large parts of departments in short time)
- Scenario development
- The simulation setting
- Human Factors
- Systems Safety
- High reliability organization theory (and the adaption to medicine)
- Projective Memory
- Incident Reporting
- Incident Analysis

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