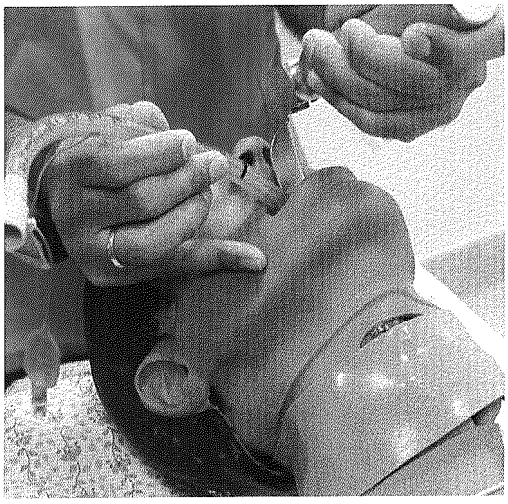
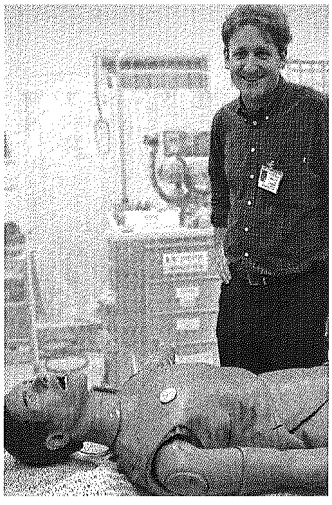
Learning From Mistakes

A soldier's body lies motionless on the floor. Bloods runs over his face, his fixed gaze and slightly open mouth are clear signs of a serious injury. Thick smoke obscures the situation while three orderlies and a medic get to work on the patient. The initial diagnosis: serious head injury, tongue blocking the airway. A first attempt at intubation fails. The only option is to perform a tracheotomy. The team works fast. The commotion gets louder. Suddenly the injured man crashes – his pulse is barely there. Quickly the medic loads a syringe to restart the heart. A few moments later the situation has been turned around and the patient is stable again. The smoke clears and it becomes apparent that the military emergency is an exercise being carried out in an almost empty room. The injured soldier is still lying on the floor, a state that isn't going to change any time soon – because it's a dummy. Mr. Hurt Head is the nickname for a lifelike plastic model used specially for head injuries.

Mr. Hurt Head isn't a soldier at all; he's a trauma mannequin, one of many high-tech dummies being used to simulate medical emergencies at MSR, the Israel Center for Medical Simulation at the Sheba Medical Center in Tel Aviv. Medical simulation is





Learning from mistakes without doing harm. Dr. Amitai Ziv with one of his high-tech dummies

Far left:
When speed and precision matter. Intubations can be simulated on this lifelike dummy

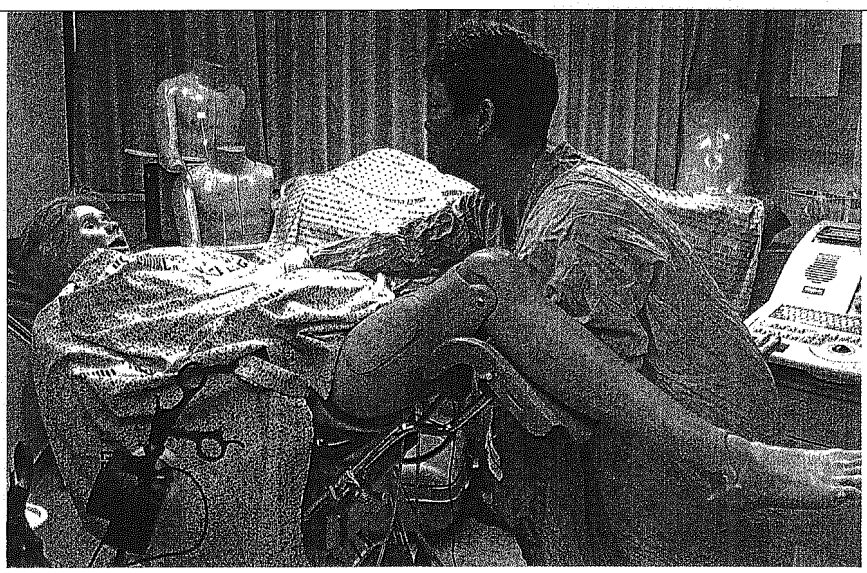
From combat pilot to pioneer of medical training: Israeli doctor Amitai Ziv has transferred his experience of flight simulation to training programmes for health care professionals. Dr. Ziv is the founder of MSR, a leading international organization in the field of medical simulation. The practice sessions being carried out on high-tech dummies at this virtual clinic are just the start.

MSR's area of expertise and its virtual hospital is housed in a grey building adjoining the main clinic's vast complex. On two floors health care professionals practise emergencies of many kinds in frightening realistic simulations. Not every dummy patient looks as gruesome as Mr. Hurt Head with his injured jaw, broken teeth and lacerations to the throat, but each one is complex and anatomically realistic. SimMan, for example, is used for various procedures in the throat and chest area, exhibiting vital signs like heart rate, breathing and other highly realistic functions. Cannulations, chest compressions and defibrillation can all be performed. In contrast to their human counterparts, SimMan and his colleagues are computer-enhanced. While the trainees are taking care of their patient, the trainers and simulator operators sit behind a one-way mirror following the treatment and can initiate additional complications spontaneously.

Trauma scenarios are pre-programmed into mannequins like SimMan and Mr. Hurt Head and can be supplemented with individual problems. MSR also uses an advanced mannequin known as HPS (Human Patient Simulator). In addition to breath sounds, chest rise and fall and pulse, HPS has blinking eyes and reactive pupils and can even respond to drugs. This amount of technology comes at a price with each mannequin costing around 40,000 to 250,000 dollars. All key parameters are stored and multiple cameras record the sessions so that the experience can be debriefed in detail afterwards in the next room. Mistakes are unavoidable in these kinds of exercises under stress and are actually desirable, as they are an important part of training.

"Simulation means you can learn from mistakes," says Dr. Amitai Ziv. Now in his mid-40s this youthful, curly-haired doctor is the founder of MSR and a world-renowned expert in the field of medical simulation. Although MSR is just five years old, Ziv's career began 20 years ago as a combat pilot in the Israeli air force, training in a simulator himself. He had more exposure to simulators later as a pilot trainer. During his subsequent medical studies he continued to take part in flight missions regularly as a reservist. It rapidly became clear to him that a mandatory aspect of pilot training should be standard practice in the medical profession. "No pilot gets in a plane right away to learn how to fly. Why can't we apply the principle of simulation to medicine in the same way." Sitting in a simulated cockpit and making stupid mistakes is how you learn to handle emergency situations. This simple insight effectively sparked the initial idea for MSR. Ziv went on to gain further experience while studying in the US, including in Philadelphia where he collaborated on developing a clinical skills assessment in which actors were used to practise typical work situations. In the late 90s Ziv was involved in developing an ultrasound simulator. "At that time," he remembers, "health care professionals weren't open to simulation models yet." This would soon change. In 2000 he returned to Israel, became deputy director of the Sheba Medical Center in Tel Aviv, the country's biggest hospital, and began to make his vision a reality by setting up MSR.

MSR is a virtual hospital. Mannequins with rigid bodies and wide-open eyes lie in the treatment rooms waiting for their next assignment. Each practice room is fitted with a computerized camera to direct and record the exercises. In the smaller consulting rooms, however, the high-tech facilities play no part. This is where communication skills are practised. At MSR simulation doesn't just involve role-plays deploying vast amounts



Staging a realistic delivery: mother and baby are represented by dummies

of technology – there is also a place for psychological training. Professional actors are employed for this purpose, preparing thoroughly for their roles and entering the consulting room as patients. The situations explored are usually difficult, exceptional cases where humanistic skills are important in finding the right balance of sensitivity and assertiveness.

For example, a physician sees a married couple with a young daughter and finds out in the course of a tense conversation that the father sexually abuses both the wife and the daughter. The father then goes berserk, becoming extremely aggressive. The mother and daughter are crying and screaming. For young doctors, getting this situation under control is no easy task. How it can be done is then discussed by the whole team based on video analysis, exploring aspects such as negotiation and body language in depth. Scenes like this are an unavoidable part of the medical profession, just like delivering bad news. The training programme also covers situations such as informing people of the death of a family member or telling a mother that her newborn baby has died. The difficulties of these situations and realistic performances by professional actors put a lot of pressure on the trainees. Again it is intended to be that way and, as Ziv recounts, can often lead to the trainees leaving consultations in tears.

Sometimes technical and psychological simulations are combined, for example to replicate childbirth. Here an actress lies on the bed playing the part of an expectant mother experiencing certain complications while a dummy lower part of the body further down the bed is used for the technical part of the delivery.

Information

MSR
Israel Center for Medical Simulation
www.msr.org.il

MSR has become one of the world's leading institutions in the field of medical simulation. There are similar training models in other countries says Dr. Ziv, but none as broadly based as MSR. Over the past five years MSR has instructed some 28,000 trainees working with around 800 instructors. The Israeli military is a key collaborator, with each military medic attending simulation training at least once. Here injuries from terror and missile attacks are simulated, as is the use of biological weapons like anthrax. According to Ziv, simulation is now a crucial part of medical training. "It makes more sense for health care professionals to learn from problem cases by practising on a dummy, or in role-play situations, than on real patients which is often what happens."

Mannequins are becoming increasingly technically sophisticated and more lifelike. The fact that the Canadian CAE Group, a leading manufacturer of civil and military flight simulators, is getting into medical simulation is a sure sign for Ziv that this area will become increasingly important in the future. Aviation and medicine – the connection is clearly no coincidence and Ziv's biography not just the fate of an individual. MSR's courses have long been transcending boundaries, including in aspects that cannot be taken for granted in Israel. Recently 40 Palestinian physicians attended three days of training at the virtual hospital. In a special project, doctors and nurses from Ethiopia will receive specific instruction in the management of AIDS patients. Just like its founder and director, MSR benefits from international links and works with numerous clinics in the US, Brazil, Turkey, Italy and Germany. Ziv will soon be visiting the US once more when he is presented with the Charles Bronfman Prize, a $100,000 international award in recognition of his humanitarian work.

Simulation training isn't just about technology. Professional actors are used to practise stressful, everyday medical situations