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# GRITTY REALISM

## A STAPLE IN MEDICAL EDUCATION AND TRAINING

The more realistic and comprehensive the training, the better prepared the trainees. This is the maxim of the NUS Yong Loo Lin School of Medicine, which is using simulation training to teach budding doctors and nurses to handle clinical situations while working as a team.

**N**othing is what it seems at the Centre for Healthcare Simulation (CHS). Located on the third floor of the medical school's flagship Centre for Translational Medicine building, the 5,247m<sup>2</sup> facility comprises hospital wards, consultation rooms, an operating theatre, an intensive care unit and an emergency room—all identical to those found in hospitals in Singapore. While the rooms are not filled with patients and busy staff, the realistic and gritty training that is delivered in these facilities is intended to prepare medical and nursing students for very real medical emergencies and situations.

The CHS designs and delivers training programmes that thrust medical students into emergency-type scenarios, replete with blood, gore and groans emanating from dummy patients. These are electronically

controlled manikins with uncannily life-like and interchangeable physical features. This means each manikin can produce a seizure or simulate a heart attack when the situation calls for it, and even swap genders in between cases.

### FAKE CRISES, REAL TEAMWORK

Through these sessions, medical students learn to work together under real-world stresses. But the work takes place in a safe space, where mistakes made can be addressed and corrected at the debrief session conducted after the training. No patient dies, and the only discomfort suffered are the occasional winces and grimaces that the students evince when their mistakes are picked upon and discussed by their teachers. And it's all for the purpose of turning out well-trained doctors and nurses.

"A lot of simulation sessions are team-based," says Associate Professor Suresh Pillai, Director of the CHS. "We don't run a simulation with a single

student or trainee, because the reality is you're not going to work all by yourself." As such, students work in teams of three or four, and their actions, interactions and reactions in different medical crises are observed by Assoc Prof Suresh.

Prior to Assoc Prof Suresh giving and controlling the scenario—much like a director orchestrating a hospital-based movie—roles are distributed among the team: one student is the team leader, another is in charge of the airway, and a third places an intravenous line and administers drugs, while someone else stands by to defibrillate the heart, if required.

This hands-on, team-based learning not only helps to impart clinical competencies, it also improves the students' other critical skills. "In addition to competency in certain skills, we are testing them on the 'soft' skills such as teamwork, communication, crisis management, patient safety awareness and compliance, and

even professionalism," explains Assoc Prof Suresh.

In addition to Assoc Prof Suresh's feedback, video recordings of the sessions allow the students to take note of their performance and missteps individually and collectively. The competencies that are tested may be different each time; each lesson is designed with specific objectives in mind, and is dependent on the programme. These can be specifically focused on areas within a medical specialty, such as emergency medicine, paediatrics, anaesthesia, internal medicine and surgery. Singular artificial body parts called task trainers are also available for students to practise their skills, such as hooking a patient's arm up to an IV drip correctly, or suturing a wound.

Year 4 medical student Mr Zebedee Wong still remembers his first encounter with simulation training: performing CPR on a manikin in his second year.

**"A LOT OF SIMULATION SESSIONS ARE TEAM-BASED. WE DON'T RUN A SIMULATION WITH A SINGLE STUDENT OR TRAINEE, BECAUSE THE REALITY IS YOU'RE NOT GOING TO WORK ALL BY YOURSELF."**

**— ASSOC PROF SURESH PILLAI**

"As we went on to Years 3 and 4, we were introduced to more complex clinical situations, such as learning how to run advance cardiac life support protocols as a team," he reveals. "The first time anyone runs advanced cardiac life support protocols, it's a big mess. People are running and bumping into each other. But by the end of a few rounds, you start to familiarise yourself with it and think, 'I've done this before; what do I need to do next? What are the other people in my team supposed to do?' It becomes second nature to you."

The development of this second nature, or the knowledge about what to do and the role of the others on a team, is vital when practising medicine, where events can take an unexpected turn that requires immediate and appropriate responses from the whole team.

These benefits are the reason the CHS is keen to arrange inter-faculty simulation sessions, getting staff and students from different disciplines

to train together. Students in the same school or course often train among themselves and sometimes across disciplines. The latter can be challenging, due to differing scheduling templates. It also plans to expand simulation training to occupy one-third of the NUS Medicine curriculum, up from the current 12% of the medical undergraduate syllabus.

### EXPANDING THE SIMULATED UNIVERSE

Moving forward, the Centre plans to acquire dummies with haptic capabilities, where the manikin can react to physical contact, so that a higher degree of verisimilitude can be achieved. Also, the CHS and the Keio-NUS Connective Ubiquitous Technology for Embodiments Centre (CUTE) are collaborating to deliver two virtual reality simulation (VRS) programs: VIHA and VISE.

**VIHA** The Virtual Interactive Human





## MORE SIMULATION COMING

News of the upcoming Virtual Reality Simulation (VRS) system was announced at the official opening of the Tahir Foundation Building in April this year. The facility is part of the NUS Medicine campus, and is named after Indonesian business leader and philanthropist Dato' Sri Dr Tahir, who donated S\$30 million to the NUS in 2012 to advance medical education and research. His generosity has enabled this development of the VRS system, as well as research and educational programmes.

The layout of the new building reflects the NUS' goal to further inter-professional education. It houses the Saw Swee Hock School of Public Health as well as the Pharmacy and Chemistry programmes of the NUS Faculty of Science, thus paving the way for the integration of present and future healthcare professionals. Spanning 17 floors, the expansive structure mixes research laboratories, teaching and learning spaces and student activity areas.

Anatomy (VIHA) program takes the corporeal visualisation of patients and the approach of hands-on learning much further. Adopted for the teaching of undergraduate anatomy classes, the VIHA program is a 3D reconstruction of a human cadaver. The cadaver's multi-faceted and interactive form provides for the intricacy of dissection, thus further educating students on the nuances of human anatomy. "This new model will allow students to virtually dissect the skin, subcutaneous tissue, muscle and bones down to the underlying organs, and trace all the blood vessels and nerves that originate from the organ, and be able to go back and forth at their own pace," describes Assoc Prof Suresh. Converting cadavers into a

virtual medium also ensures that each dissection leaves no trace, thus enabling lessons to be dispensed to multitudes of students—a cost-effective and sustainable approach. This will supplement the exposure that students get from Anatomy classes, where actual cadavers are studied: NUS Medicine has been using prosected cadavers since 2003 because of a shortage of donated bodies. The pilot program is slated to be introduced to first and second year medical students of the 2018 academic year, and is expected to be officially incorporated into the curriculum the year after. The CHS also plans to introduce the VIHA program to nursing students eventually.

**WISE** The Virtual Interactive

**“THE SPs WILL BE LOOKING OUT FOR EMPATHY. IN FACT, WE TRAIN THEM TO PROVIDE OPPORTUNITIES IN THEIR PORTRAYALS TO ELICIT EMPATHY FROM THE STUDENTS. THIS ALLOWS THE SPs TO GIVE FEEDBACK ON APPROPRIATE EMPATHY AND MISSED OPPORTUNITIES FOR EXPRESSING EMPATHY.”**

— ADJ ASSOC PROF NICOLA NGIAM



Medical students reacting to a simulated emergency.

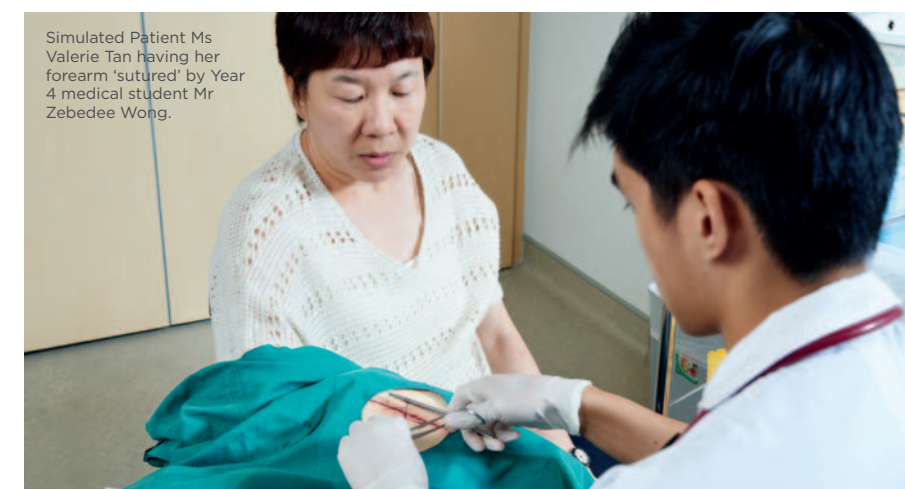
Simulation Environment (VISE) provides for a large-scale virtual teaching platform. Students learn how to work quickly and in collaboration with each other in real-life scenarios, such as in a mass-casualty incident, a hospital emergency room, or an operating theatre. "They put on goggles and gloves, walk into an environment and they react to it, like in a video game," Assoc Prof Suresh describes.

This trinity of pedagogies—traditional training with cadavers, and novel approaches such as virtual interactive technology and other types of simulation such as manikins—will have a substantial impact on medical education and beyond, says Professor Tan Chor Chuan, President of the National

University of Singapore (NUS), at an event in April. "Training our students on VR systems will ultimately help to improve the quality of clinical care and patient safety. Both basic procedural skills and difficult surgical procedures can be practised and rehearsed with the VR system to improve performance in real life situations." Examples of these procedures include administering lumbar punctures, chest tube insertion and urethral cauterisation.

### LESSONS FROM LIFE

The CHS also works very closely with 160 individuals trained to portray the roles of patients, family members or others to allow students to practise physical examination skills, history



Simulated Patient Ms Valerie Tan having her forearm 'sutured' by Year 4 medical student Mr Zebedee Wong.

taking skills, communication skills and other exercises.

Known as simulated patients (SP), these volunteers have to undergo rigorous training to know how to manifest the signs of illness convincingly. SPs are also trained to assess verbal and non-verbal cues from doctors and nurses. These range from knowing how to deal with distraught relatives who barge into the ward, how to react with appropriate body language, and how to handle all other interactions during the course of a busy day in hospitals and clinics.

"The SPs will be looking out for empathy," expounds Adjunct Associate Professor Nicola Ngiam. "In fact, we train them to provide opportunities in their portrayals to elicit empathy from the students. This allows the SPs to give feedback on appropriate empathy and missed opportunities for expressing empathy."

The SPs themselves have seen how their involvement has progressed over the years. "The SP's role over the last five years has expanded from simple role playing to complicated ones that involve psychotic illnesses, such as depression and bipolar disorder," observes Ms Valerie Tan, an SP since 2010, when the programme began to expand.

Other illnesses that can be 'performed' through speech and actions include Parkinson's disease, diabetes, gout and even toothaches—the last to engage dentistry students and hone their communication skills, so vital when dealing with anxious and uncomfortable patients on dental chairs.

Simulation training is also tailored and localised to put students through the healthcare issues that they are most likely to face in the future. "Breast cancer is so prevalent nowadays, so little beads are put inside the dummy's breast and placed on top of you—my goodness, it weighs a ton!" Ms Tan exclaims. "And they can feel for lumps in your breast." This translates to a form of hybrid simulation training, where manikins and task trainers are used in conjunction with SPs, layers of artifice laid upon each other in a bid for heightened realism and accuracy in the teaching of budding healthcare professionals.

The 'live' element of SPs also means that they can be used in different areas of an actual hospital, and for the continued education of medical professionals. "We have inter-professional programmes coming up between Nursing, Medicine and even Pharmacy," Assoc Prof Suresh reveals. "For example, someone orders the wrong drug, and the pharmacist who dispenses it can pick up on the error and correct it. We're aiming to have the pharmacists work together with doctors and nurses."

Signing up as an SP right from the start has given Ms Tan the opportunity to witness first-hand the cumulative impact simulation training has had on the student population. "There is a difference, and you can see it," says Ms Tan. "That's why I derive the greatest satisfaction when I give feedback on communication skills to Year 2 students, and they take the effort to communicate better when they do Family Medicine in Year 3. Some of them are so smooth that I've taken note of their names so they can become my doctors in the future!" +