

Technology is revolutionising nursing care

The development of robotics, virtual reality and artificial intelligence is revolutionising the nursing profession. The SILAB - part of the La Source Institute and School of Nursing in Lausanne - supports not only nurses but also start-ups. **BY GHISLAINE BLOCH**

Nurses in white coats stroll around in a vast open space that looks more like an industrial loft or an artificial, film-set hospital. Welcome to SILAB, the Source Innovation Lab at the La Source Institute and School of Nursing. While the patients may all be actors or articulated mannequins, the care staff are well and truly real. They are all third-year students doing a Bachelor of Science in Nursing, given the opportunity to hone their practical expertise and broaden their knowledge in this brand new facility. "The simulated hospital has 21 beds and two apartments in which students can practise providing home care," says Dominique Truchot-Cardot, full professor, associate dean of innovation and head of SILAB. "We designed a complete preclinical setting in which we can test innovations and analyse certain solutions supported by the SILAB."

The nursing students practice not only treating and caring for patients but also operating a robot, using an exoskeleton and understanding the data generated by sensors and other measuring devices. The development of robotics, virtual reality and artificial intelligence is revolutionising the nursing profession. "Nursing care is in the grip of major upheaval and we need to prepare our students for these changes," insists Dominique Truchot-Cardot. Accordingly, the programme includes serious games, virtual reality to learn about blood transfu-



Dominique Truchot-Cardot (Seated on the left), head of SILAB (the Source Innovation Lab at the La Source Institute and School of Nursing), with her team.

Founded in 1859
in Lausanne,
The La Source School
of Nursing was the
world's first secular
nursing school.

Today, the nursing
students practice
also operating a robot
(such as Pepper, below).



sions and clinical assessment, and the use of auscultation simulators.

Coping with the mass of data

Will robots one day replace carers? "If blood tests are performed by robots, so much the better. These repetitive technical procedures are boring and may even be dangerous sometimes. In the future, the nurse will just have to set the robot in motion, then explain the procedure and reassure the patient. The machine will never replace carers' emotional intelligence," says Dominique Truchot-Cardot. "The SILAB is helping students adopt these changes in technology and acquire a new awareness."

To address population aging and the explosion in chronic pathologies such as diabetes or hypertension, more and more patients will be equipped with sensors and connected bracelets. Often sensors will be installed in the homes of certain patients considered to be at risk. "Nurses must be able to work with and grasp this mass of data," adds Dominique Truchot-Cardot, who has practised as a specialist in intensive care.

"It is the nurse who knows the patient best and who will ensure the continuity of care, liaise between the patient, the doctor and the family, and be capable of making a thorough, multifocal assessment of the patient and his or her possibilities for rehabilitation and reintegration."

The SILAB will not confine its support to nurses: it also intends to guide start-ups.



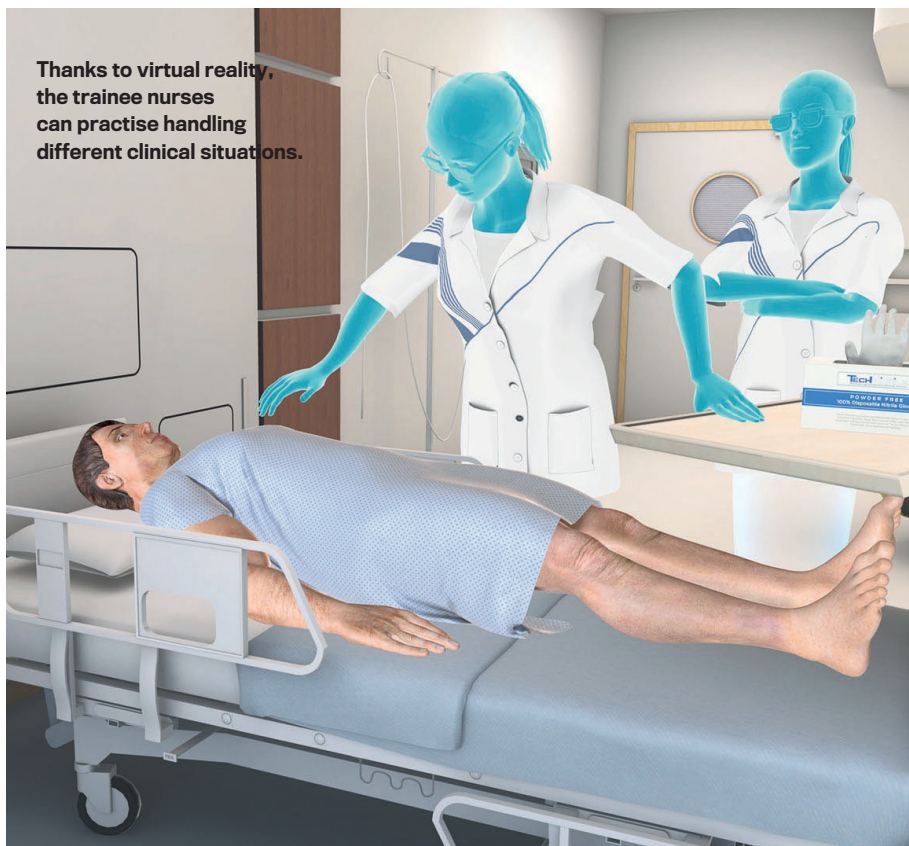
La Source has dedicated itself to developing and implementing innovative methods.

Many businesses regularly come to test their prototype there or assess their project. "We receive requests from two or three start-ups every week. In 2019, we supported about ten of them. The SILAB is a hub where the outside comes to meet real life. We offer solutions that revolve around the patient, not just around the client," says Dominique Truchot-Cardot, who is backed by a five-person team. A groundbreaking concept can be discussed and put to the test in practice.

Dominique Truchot-Cardot has observed that many businesses fail to factor in the reality of patient care in their project design and don't put it to the test of reality early enough. "I see some projects that will never make it to the patient's bedside because the interface is far too complicated or unsuited," says the specialist.

"Start-ups try to test their innovation in hospitals, but it isn't always possible. Hospitals can't take in all of the prototypes that are developed in Switzerland. It may even be dangerous in terms of data protection and patient security," points out Dominique Truchot-Cardot.

Thanks to virtual reality, the trainee nurses can practise handling different clinical situations.



UbiSim's global success in nursing training

In late 2017, the Vaud-based start-up UbiSim set out to develop a training tool for nursing care. "When we started out, we could only count on our team of virtual reality engineers. So, naturally, we approached the La Source School of Nursing in Lausanne to validate our project and together develop all of the virtual reality simulation scenarios for the students," says Gauthier Dubruel, co-founder of UbiSim.

Equipped with a virtual reality headset and controllers, the trainee nurses can practise handling different clinical situations ranging from using a sphygmomanometer to treating a newborn baby in respiratory distress.

The first scenario trained nurses in blood transfusions. "Immersive virtual reality gives

students an opportunity to practise in total freedom, without the limitations of time or nursing equipment and with no need for a teacher to be present," says Dominique Truchot-Cardot, full professor and associate dean of innovation, as she presents the SILAB.

"The platform is also used by professionals in continuing vocational training to reduce the risk of error, in particular by using more

"Around 4500 learners have already used our solution for their training courses"

complicated scenarios for which they are required to respond rapidly and accurately," adds Gauthier Dubruel.

Joint initiatives in Canada

In Switzerland, over 1,000 patients die each year as a result of a medical error and 10% of health costs are generated by adverse events. "A large part of these critical incidents could be avoided if patient care and treatment strictly followed approved protocols that are regularly updated and correctly applied," points out Dominique Truchot-Cardot. "By significantly increasing the opportunities and time available for trying out and rehearsing care techniques, the virtual reality platform developed by UbiSim and La Source will help improve the quality of care and increase patient safety, for the same level of human resources and budget."

With its staff of eight, UbiSim is now working with various training schools, universities and hospitals around the world, and in particular with the Centre Hospitalier Métropole Savoie, the Ensemble Hospitalier de la Côte and the Hôpital Jules Gonin in Lausanne. "Around 4,500 learners have already used our solution for their training courses. We adapt our scenarios to the needs of the nursing schools and care teams," adds Gauthier Dubruel, who is now focusing primarily on the North American market. The start-up, which recently opened an office in Montreal, plans to generate half of its revenue in Canada and the United States, while retaining its offices in the EdTech Collider at the Ecole polytechnique fédérale de Lausanne (EPFL). "We need to be as close as possible to our markets. There is also tremendous expertise in simulation, software development and 3D in North America."

In collaboration with the Université de Montréal Faculty of Nursing, UbiSim has been training nearly 350 students a year since autumn 2018 at a time when nursing internships are increasingly difficult to find. Two patient care modules have been developed, one on in-home patient care and the other set in a private practice. The aim is to situate the learning experience in context and provide an opportunity for students to visualise the steps of the nursing process, learn to handle the equipment and familiarise themselves with key situations they will encounter in their professional practice.

A shortage of nurses and midwives

The year 2020 is one we will remember. The images of nurses doing everything in their power to save lives are imprinted in our collective memory. Over and above the havoc it is wreaking, Covid-19 has shone a spotlight on the unflagging, Herculean efforts made by the medical profession and in particular nurses. We are more than ever aware that these women and men are indispensable and play a crucial role in promoting health, preventing disease and providing care. The World Health Organization (WHO) designated 2020 as the International Year of the Nurse and the Midwife, but also issued a stern warning: the world is short of six million nurses. By 2030, the global shortage of nurses and midwives will have reached nine million.

In a report on the status of the global nursing workforce, the UN's health agency, the international Nursing Now campaign and the International Council of Nurses (ICN) highlight the crucial role played by its profes-

sionals, who represent over half of all medical staff worldwide.

According to the report, there are just under 28 million active nursing professionals worldwide. The number rose by 4.7 million between 2014 and 2018, but there is still a global shortfall of 5.9 million nurses, with the most acute shortages to be found in the poorer countries of Africa, South East Asia, the Middle East and South America.

The ICN Chief Executive Officer Howard Catton noted that infection rates, medication errors and mortality rates are "higher when there are too few nurses". Mary Watkins, who co-chaired the report, expressed concern that, because the wealthier countries are not training sufficient professionals, they are relying on immigration, thereby worsening shortages in the departure countries.

The WHO believes that training more nurses and midwives is undoubtedly a cost-effective investment. The report by the High-Level Commission on Health Employment and Economic Growth concluded that "investments in education and job creation in the health and social sectors result in a triple return of improved health outcomes, global health security, and inclusive economic growth". "Nurses and midwives are the backbone of every health system: in 2020 we're calling on all countries to invest in nurses and midwives as part of their commitment to health for all," said Tedros Adhanom Ghebreyesus, WHO Director-General.

Globally, 70% of medical staff and social workers are women, as against 41% in all job sectors combined. The WHO is also calling on the world's governments to improve nurses' working conditions. The WHO further believes that it will not be possible to achieve the UN's Agenda 2030 sustainable development goals without nurses and midwives – whether they are the goals directly related to health or those aimed at combating poverty, achieving sustainable economic development, access to sanitation and gender equality for women and girls.

The shortage of nurses is also a topical issue in Switzerland, where population ageing is substantially increasing healthcare needs. Many nurses and midwives leave the profession early. To counter this trend, working conditions, which are not sufficiently attractive in Switzerland at the moment, must be improved.



Technis anticipates elderly people's falls

Technis, a company founded five years ago in Lausanne by engineers from the EPFL, was quick to turn to SILAB to test its technology. Today it is still working with this laboratory at the La Source Institute and School of Nursing to test its smart flooring solutions and familiarise nursing staff with the new technology. "We are currently rolling out our system of smart room sensors to address the needs of informal caregivers and nursing staff," says Florian Le Formal, in charge of the Technis Care product in this company with a staff of 20.

Technis Care can detect slight changes in elderly people's habits, such as the distance between steps, the speed at which they walk or the number of nocturnal awakenings. "Our sensors return all sorts of information and anticipate falls. If the distance between steps becomes shorter, it can indicate a certain functional decline that could lead to an accident," explains Florian Le Formal. "A number of nursing homes in Switzerland, France and Greece are testing the technology. At a later stage, we hope to cater for apartments equipped with medical technology."

In practice, the Technis pressure sensors are placed underneath the floor covering. When a person moves around, there is a disturbance in the electric signal. This information is combined with artificial intelligence and processed by the start-up's algorithms. If the system detects that the person is declining or wandering, it sends an alert to the care staff. Through its collaboration with the SILAB, the start-up hopes to be able to detect wandering in an apartment, which often reveals neurodegenerative disease several years before it becomes apparent.

The start-up, founded by Wiktor Bourée, has two product lines: the smart flooring solutions designed for healthcare applications and the smart mats that count visitor footfall entering a facility in order to record attendance figures and track people flow. The company's clients include universities, the Fondation Beyeler's art museum in Basle, Palexpo, CERN and amusement parks.

The Lausanne-based company plans to double its current 20-strong workforce by 2021. The start-up has an office in Paris and intends to expand into German-speaking Switzerland, Germany, Northern Italy, Spain and Great Britain.



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