Robot features faster and more comfortable COVID-19 swabbing

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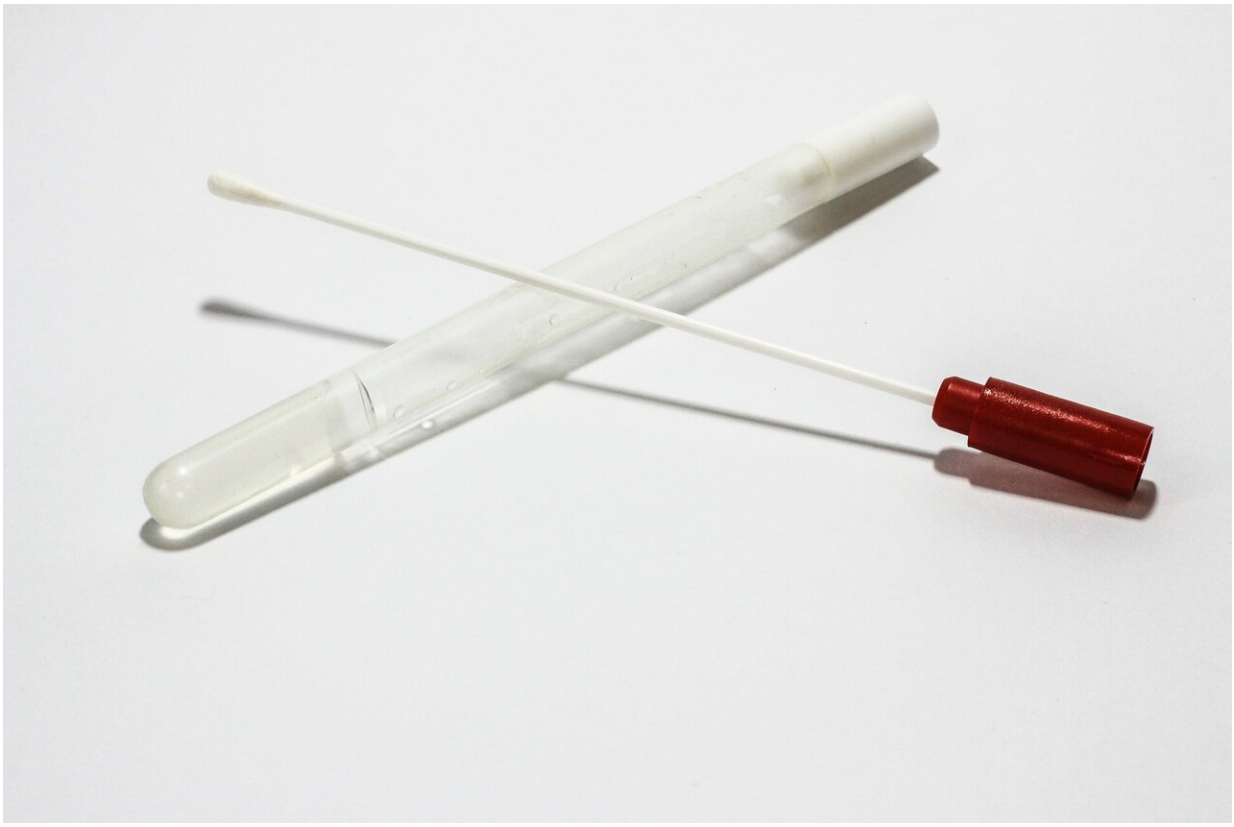

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A group of clinicians from the National Cancer Centre Singapore (NCCS), Singapore General Hospital (SGH) and Duke-NUS Medical School has partnered Biobot Surgical Pte Ltd, one of Singapore's

pioneers in the field of medical robotics technology, to develop a robot that automates nasal swabbing needed to diagnose COVID-19. Nasal swab is the preferred method of gathering the specimen as it gives the best yield for processing by laboratory.

Known as SwabBot, the robot was born to help address the limitations of manual COVID-19 swabbing by reducing swabbers' risk of exposure to the virus, reducing the need for trained manpower, standardizing the consistency of swabs taken and providing greater throughput of swab tests, as the robot does not suffer from fatigue and remains efficient throughout the day. Overall, the duration of the test is just 20 seconds from start to finish.

The project was initiated in April 2020, by a diverse group of clinicians from numerous specialties, including Head & Neck Surgery, Vascular Surgery, Internal Medicine and Otorhinolaryngology—Head & Neck Surgery. The team identified the need to perform nasal swabs for COVID-19 safely, quickly and consistently, in order to reduce swabbers' risk of exposure and improve patient experience. They collaborated with Biobot Surgical to develop the concept into a clinical prototype within three months. Principal Investigator Dr. Rena Dharmawan, Associate Consultant in Head and Neck Surgery, Division of Surgery and Surgical Oncology at NCCS, and Clinical Entrepreneur-in-Residence, Centre of Technology & Development (CTeD) at DukeNUS Medical School, said "Our team felt that we had to find a better way to swab patients to reduce the risk of exposure of COVID-19 to our healthcare workers, especially when patients sneeze or cough, during the swabbing process." "With SwabBot, healthcare workers can assist with the swabbing process from a safe distance. It also helps to optimize resources as fewer healthcare workers are needed to do the swab collection, and less Personal Protective Equipment (PPE) is utilized," said Dr. Rena who is also an alumnus of Duke-NUS.

SwabBot is a self-administered robot which allows individuals being swabbed to activate and terminate the swabbing process at will. When ready, they use their chin to activate the robot and begin the swabbing process. The robot extends the swab safely and gently through the nose to the back of the nasal cavity, which is typically about 10cm from the nostrils.

The robotic swabbing process takes about 20 seconds to complete. To ensure thesafety of the individual, the robot has a built-in feature, which retracts the swab stick if there is resistance when moving deeper into the nasal cavity. In the unlikely case that the individual is unable to tolerate the process, they can terminate it by moving their head away from the robot.

"We are thankful for the synergistic collaboration between our team of clinicians and engineering inventors. SwabBotTM never needs to stop for lunch and never suffers from fatigue. Even after many swabs, it retains the same gentle touch and precision as surgeons who perform very delicate procedures. Furthermore, the sample quality remains consistent even though nose structures can vary in size and shapes. What's even better, individuals are in full control of the swabbing process throughout!" said Dr. Luke Tay, Consultant, Department of Vascular Surgery, SGH.

To date, 75 SGH and Bright Vision Hospital patients have been recruited for theongoing clinical trial comparing SwabBot to manual swabbing done by humans. Mr Ariata Elizer Ellevera, a 49-year-old migrant worker admitted to Bright Vision Hospital for COVID-19 who was recruited for the clinical trial said, "I'm glad I signed up for the trial. The experience was painless, and the process of swabbing by the robot was very quick."

22 year old Mr Sean Woon, who was a volunteer in the clinical trial

shared, "I felt pretty comfortable throughout the process. Compared to my past swabbing experience I had with human hands, the process with the SwabBot was faster and less painful."

Using technology to improve diagnostic and treatment accuracy Mr Sim Kok Hwee, CEO of Biobot Surgical and its holding company ZIG Ventures, is thankful for the introduction to the SingHealth clinicians by a mutual friend, Mr Abel Ang, CEO of Advanced Medtech, and also the rapid pace at which the concept was rapidly prototyped by diversified engineering company, Zicom Group. "When we developed the SwabBot, we envisaged a self-swabbing device that could be deployed and used, similar to how self-check out systems are now prevalent in the supermarkets. This should be especially effective for rostered routine testing and reduce manpower involved in swabbing operations."

SingHealth, the public healthcare cluster which NCCS and SGH are part of, has fileda patent for this technology together with Biobot Surgical Pte Ltd. SwabBot has been registered with the Health Science Authority as a Class A medical device and BioBot is in preparation for CE marking for global commercialisation. The team is confident that SwabBot will be an invaluable addition to Singapore's COVID-19 testing to complement manual swabbing in the near future.

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