



App helps combat antimicrobial resistance

By Kathryn Kazoleas

Antibiotics are part of life-saving treatments for many infectious diseases. However, with the overuse and misuse of these important medications, also termed antimicrobials, resistance is on the rise worldwide. Antimicrobial stewardship is the practice of minimizing antibiotic resistance by moderating and limiting antimicrobial use. During their residencies, Drs. Elizabeth Parfitt (Infectious Disease'14) and Paul Campsall (Critical Care Medicine'14) conceptualized the Spectrum MD app. Designed with the busy physician in mind, the app is a point-of-care tool that aids in the selection of appropriate microbial therapy for various diseases.



It's not uncommon that physicians have limited antimicrobial pharmacology knowledge. Since the microbiology of each medical facility varies, it is suggested that each facility carry its own antimicrobial guidelines. But, while prescribing guidelines and information is available online, many physicians may not have time to navigate the vast amount of information.

"The idea was to replace multiple resources with a single resource in a hand-held device to save time and to hopefully

get more clinicians using this information that is important for antimicrobial stewardship," says Campsall.



Parfitt and Campsall collaborated with a software-development group as well as a multidisciplinary team from the University of Calgary. The final product, which took nearly two years from conception to implementation, allows health-care professionals to enter select patient factors directly into the app and receive treatment recommendations specific to that patient. Furthermore, because guidelines and microbial resistance patterns differ among cities and provinces, the app is customizable to incorporate local sensitivity patterns.

Currently, customizable microbial profiles are available for hospitals throughout Calgary and the Providence Health Care group of hospitals in Vancouver. The team is also working on a children's hospital version that will be launched later this year.

"We essentially imagined the tool we as physicians wanted to use, and created it," says Parfitt.

Overuse of antimicrobials can lead not only to drug resistance, but other health issues such as drug toxicity, or complications such as C. difficile colitis. Prolonged hospital stays, secondary infections and the treatment of other various adverse side effects of antimicrobials also result in increased costs to the health-care system.

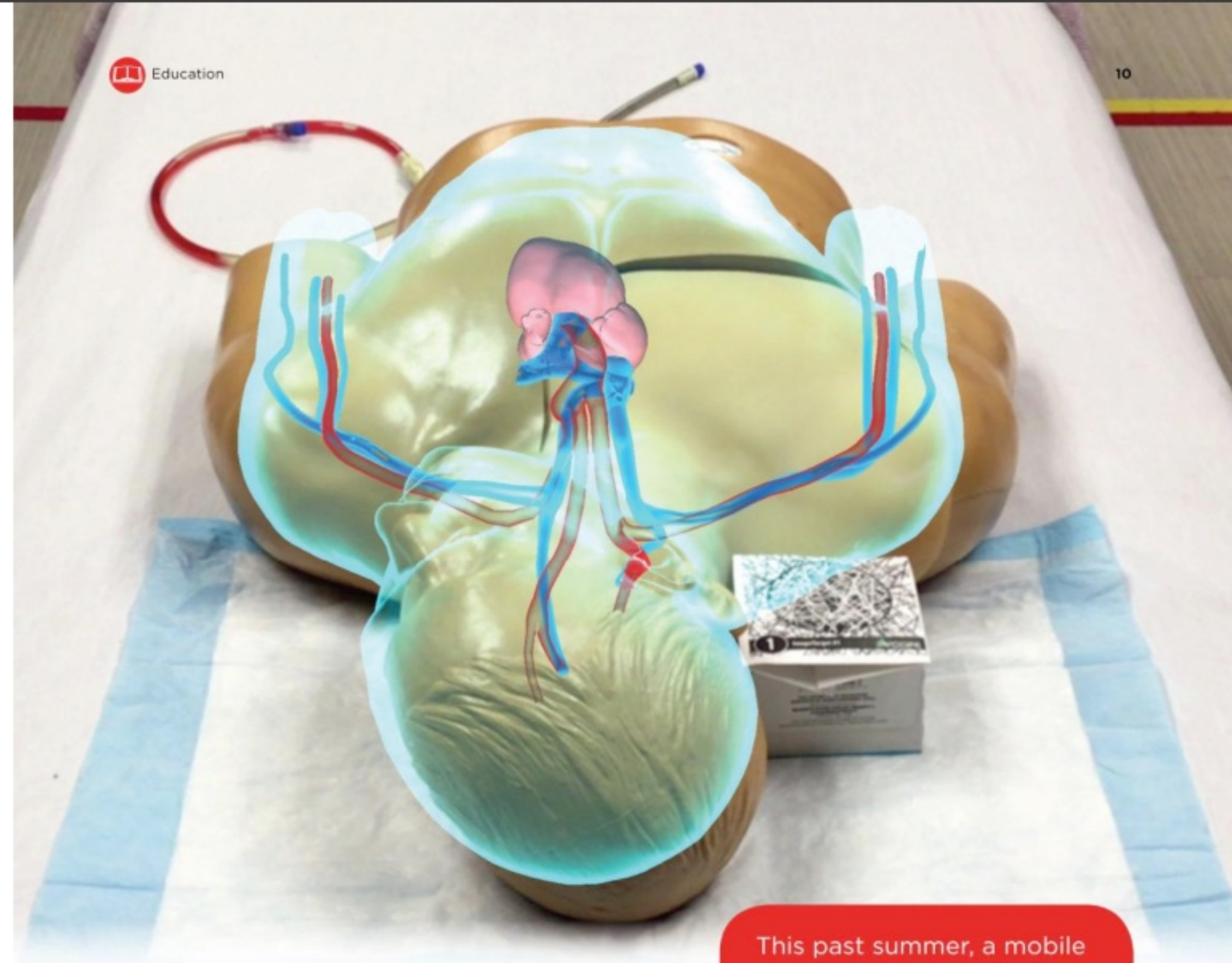
Parfitt says that while antimicrobial stewardship probably sounds quite boring, she and Campsall hope the app makes it more accessible, interesting and more mainstream.

As for future goals, there are many. The doctors not only hope to increase the number of medical centres that use the app, they hope to one day expand its capacity so it becomes a useful tool for outpatient care, in addition to the inpatient population it currently targets.



The free app is currently only available for iPhones through the AppStore.

Implementation of Spectrum MD in Calgary was recently recognized with a LEADing practice award from Canada Health Infoway and Accreditation Canada.



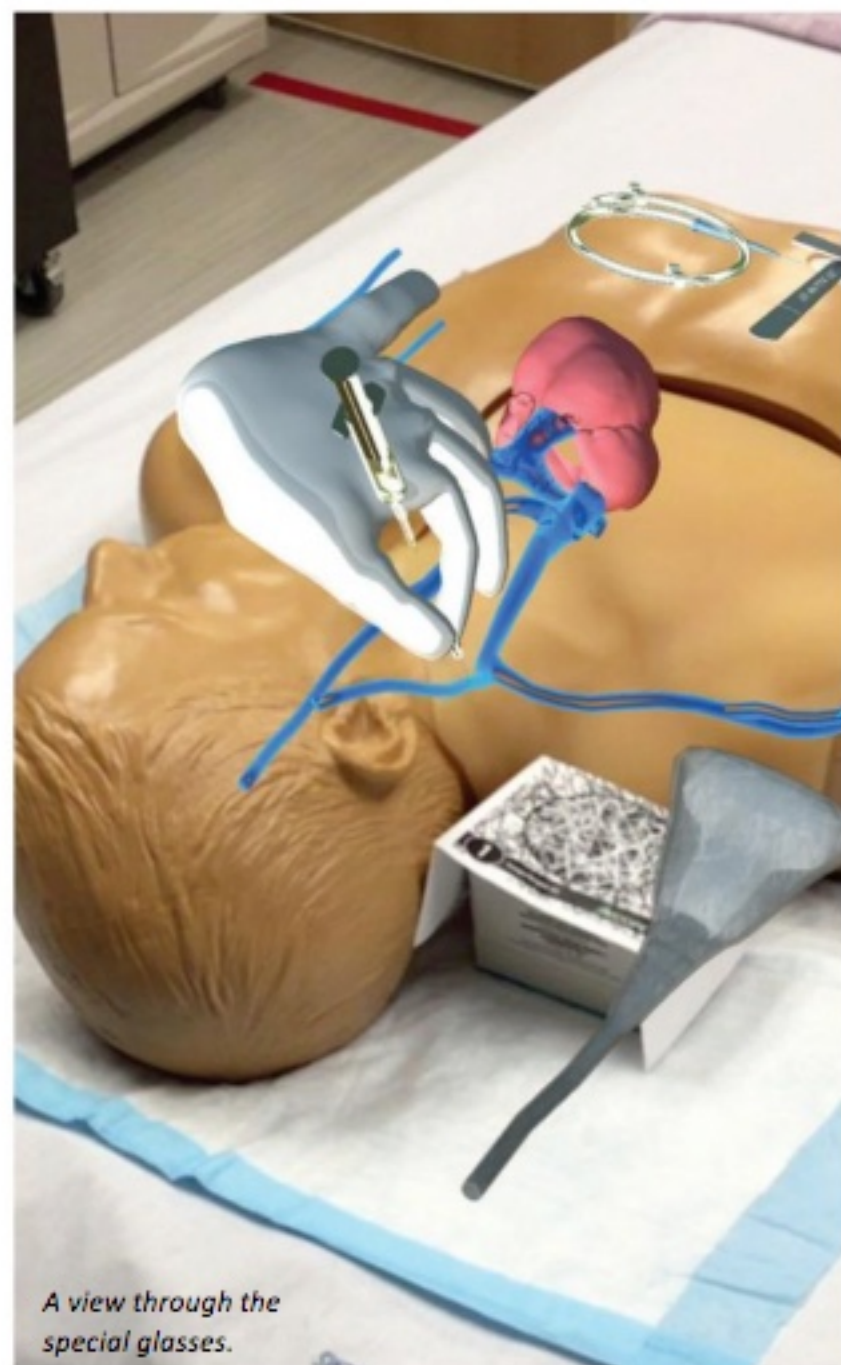
Augmented reality in medical education

By Julia MacGregor

This past summer, a mobile gaming app called Pokémon Go became a worldwide social phenomenon. The app encourages users to catch cute pocket monsters that appear in the real world through their phone screens. This new game is a simple example of augmented reality (AR), which uses a person's view of their physical environment and, through dynamic computer mapping, overlays visual information on top of it.



Dr. Irene Ma (left) guides Julie Babione, Senior Research Associate at W21C, through the CVC procedure.



A view through the special glasses.

After donning a pair of special glasses that contain an outward-facing camera, learners can see their real-world surroundings overlaid with instructional content and images. They then go step-by-step through the procedure with a task-trainer mannequin.

Dr. Irene Ma (PhD'15) has a different vision for AR outside of gaming. She wants to take this technology into the medical school and residency training program, to train the

next generation of physicians how to insert a central venous line correctly and safely.

"We know that simulation-based education improves outcomes in central venous catheterization (CVC)," says Ma, associate professor in the Division of General Internal Medicine at the

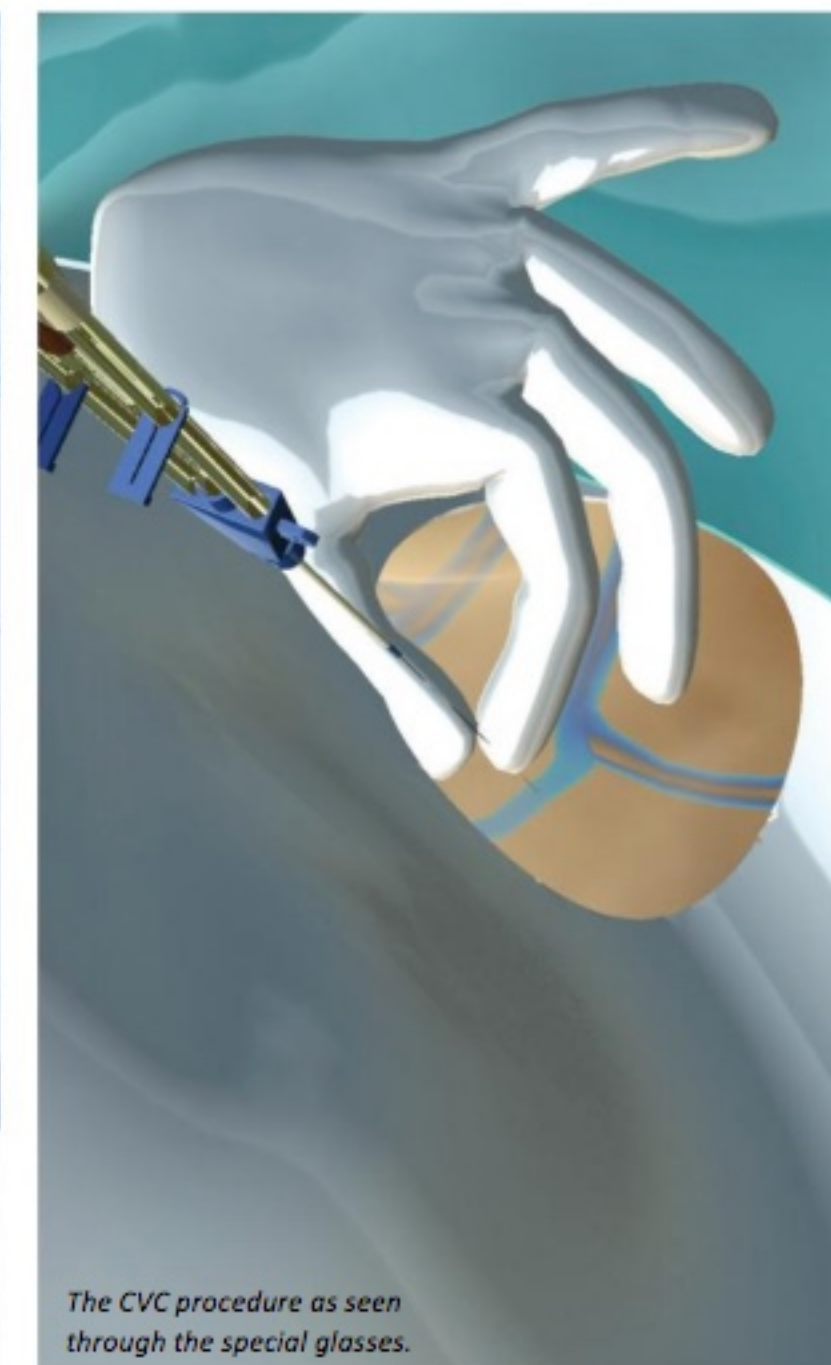
Cumming School of Medicine (CSM) and faculty member in the university's Ward of the 21st Century (W21C), O'Brien Institute

for Public Health. "As educators, studies have found that we unintentionally miss teaching 50 to 70 per cent of elements to learners by accidentally skipping steps and omitting explanations."

Inserting a central venous line is a complicated and time-consuming procedure that can take four hours or more to teach. In the United States alone, physicians insert more than 5 million central lines every year to allow medication delivery, nutritional support and the measurement of blood flow within the body's organs and tissues. They are necessary to care delivery, but there are numerous risks to patients if this procedure is performed incorrectly. The procedure involves inserting a catheter into a patient's internal jugular



The CVC procedure.



The CVC procedure as seen through the special glasses.

vein, which requires physicians to simultaneously operate a needle and an ultrasound machine.

Ma and the W21C have been working with Edmonton-based company Scope AR to build the medical education content for the CVC procedure into an augmented reality application. After donning a pair of special glasses that contain an outward-facing camera, learners can see their real-world surroundings overlaid with instructional content and images. They then go step-by-step through the procedure with a task-trainer mannequin.

Perceived benefits of the finalized augmented reality application will be the ability to deliver a standardized curriculum and user-based "education on demand."

"Rather than any one individual holding up a small group of learners to master a certain step, each learner may go at his or her own pace to practice and develop the skill," says Ma.

W21C researchers are currently working with Scope AR on evaluating the different iterations of the CVC application through a variety of methods. After the application is finalized, next steps are to bring this technology into the Cumming School of Medicine's Post Graduate Medical Education Program and evaluate its effectiveness with real medical learners.

If there is supporting evidence that augmented reality can effectively teach a complicated procedure such as CVC, this technology could then be used to teach

learners a wide array of bedside procedures and aid in reducing faculty teaching demands.

"The field of augmented reality is new territory for me," says Ma. "To work with the W21C team and Scope AR in translating the educational content into this application is very exciting."