

Collaborative Solutions Targeting Antimicrobial Resistance Threats in Health Systems



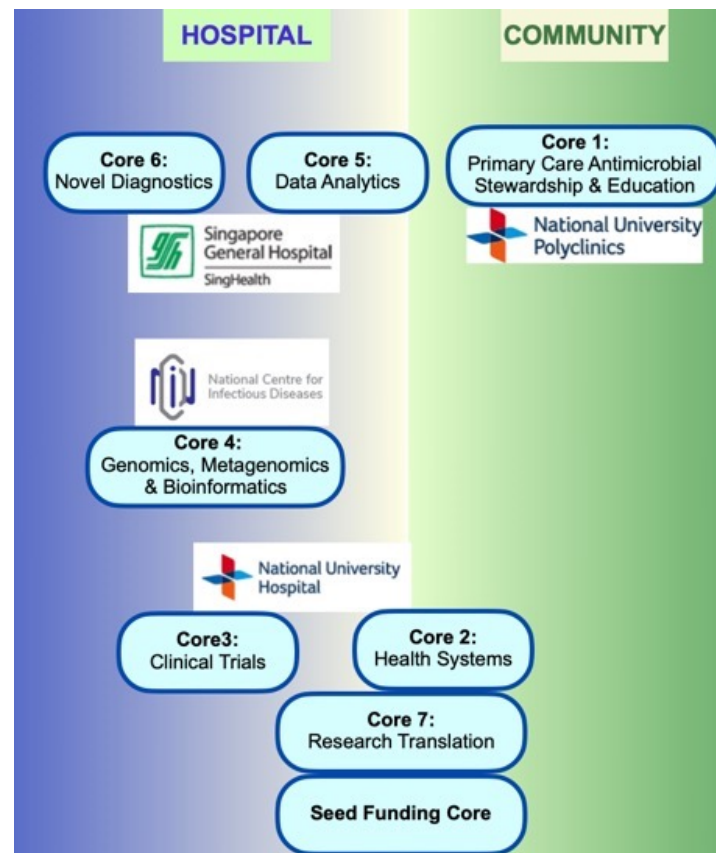
2017-2025



Vision

A multidisciplinary, impactful and internationally renowned AMR research programme

The **aim** of the CoSTAR-HS programme is to develop, implement and evaluate practical and novel solutions targeting AMR.



2017-2021

Stopping antibiotics early may help patients: SGH

Early discharge, costs saved when drug intake ends in a day if bacterial infection found unlikely

Salma Khalik
Senior Health Correspondent

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Each year, more than 100 patients at Singapore General Hospital (SGH) are able to go home 7½ days earlier, saving about \$11,000 in treatment costs – all because their use of a strong antibiotic was stopped after just one day.

ance of bacteria in the digestive system, often resulting in patients suffering from diarrhoea. They may also get rashes, liver and renal problems, and a drop in platelet count.

SGH has been doing these reviews of patients in the first 24 hours after admission since 2010. It is the only hospital in Singapore to do so.

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et well faster and be discharged earlier. The programme reviews the use of antibiotics for three days, when the results for bacteria are available for earlier reviews, a patient is on an antibiotic to see if there is any risk of resistance, said Professor Andrea

gested a patient be taken off antibiotics, the full test results could not find any bacterial infection.

In fact, about 40 per cent more patients could have gone down this route, but their doctors chose not to stop their antibiotic treatment.

In terms of patients returning to hospital within 14 days, those who were taken off the antibiotic after one day also fared better.

Programme, said different hospitals approach the issue differently.

She added that SGH is able to offer the 24-hour review because it has the technology, support from infectious disease specialist pharmacists and buy-in from doctors.

It has five pharmacists specialising in infectious diseases, including Dr Kuan. Other hospitals may have

Antibiotic cocktails to fight infections resistant to drugs

SGH team combines 'older' antibiotics with other drugs in bid to tackle such infections

Livette Lai
Health Correspondent

When they have been on the market for several years, even the most potent antibiotics do not quite pack the punch they did when they were first developed.

This is because bacteria mutate and develop resistance to these drugs, making them tougher to kill. A team of pharmacists at Singapore General Hospital (SGH) is trying to overcome this problem by creating cocktails made up of 'older' antibiotics.

These older drugs may not be effective when used in isolation. But when combined with other drugs, they can help to cure drug-resistant infections.

"Bacteria are small and can change very fast," said Associate Professor Andrea Kuan, a pharmacy clinician-scientist at SGH. "They can multiply every 20 minutes. They are much more efficient creatures."

Mutations can surface within days, and resistance to new antibiotics can emerge within years. This is why there are so few new drugs in the pipeline, according to Dr Kuan, who explained, "When something new comes out, bacteria become resistant to it very fast, so it's not profitable for companies."

As part of a study, Dr Kuan's team looked at data from 300 patients with serious drug-resistant infection between 2009 and 2014.

One group had received one of more than 100 drug combinations that had been conceived in-house from 12 antibiotics and tested to identify the most effective.

Another received individual antibiotics, while a third group was treated with drug combinations that had been used in studies conducted overseas.

The researchers found that 13 per cent of people treated with the in-house drug combinations eventually died from their infections.

However, the figure was double for the other two methods used.

The team presented its findings at a conference last year, and is now working on a specific way of identifying the most effective combination of antibiotics.

In Parliament last week, Senior Minister of State for Health Lam Pin Min spoke about the need to tackle the problem of drug-resistant micro-organisms.

The issue has been worsened by the overuse of antimicrobials such as antibiotics in the human, animal and agricultural sectors."

Dr Lam said.

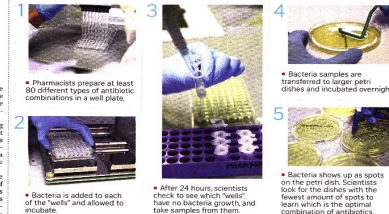
A national plan on antimicrobial resistance was launched last November.

When something new comes out, bacteria becomes resistant to it in two years, so it's not profitable for companies.

DEATH OF NEW DRUGS
When something new comes out, bacteria becomes resistant to it in two years, so it's not profitable for companies.

Finding the right drug combinations

Pharmacists at the Singapore General Hospital are working out the best combinations of antibiotics to fight off various drug-resistant bacteria.



• Pharmacists prepare at least 80 different types of antibiotic combinations in a well plate.

• Bacteria is added to each of the 'wells' and allowed to incubate.

• After 24 hours, scientists check to see which 'wells' have no bacteria growth, and take samples from them.

• Bacteria shows up as spots on the petri dish. Scientists look for the dishes with the fewest amount of spots to learn which is the optimal combination of antibiotics.

Source: SINGAPORE GENERAL HOSPITAL, 37 PHOTO: SEAH KWANG PING, STRAITS TIMES GRAPHICS

Recycle & repurposing of current antibiotics- to which the resistant bacteria are not sensitive to when given alone.

This testing is approved by SGH Medical Board for clinical service.

- Developed **11-drug antimicrobial assay** (patent application pending)
- Ongoing Therapeutic Drug Monitoring (TDM) feasibility study in collaboration with industry (Shimazu- S\$1 million funding) and public healthcare institutions

In progress: AI guided prescribing of appropriate antibiotics

CoSTAR-HS: NCID-led Collaborations

Transmission research in AMR

THE LANCET
Infectious Diseases

Clinical outcomes and bacterial characteristics of carbapenem-resistant *Klebsiella pneumoniae* complex among patients from different global regions (CRACKLE-2): a prospective, multicentre, cohort study

EMERGING INFECTIOUS DISEASES*

Duration of Carbapenemase-Producing *Enterobacteriaceae* Carriage in Hospital Patients

nature medicine

Cartography of opportunistic pathogens and antibiotic resistance genes in a tertiary hospital environment

Clinical Infectious Diseases

Clinical and Molecular Epidemiology of Carbapenem-Resistant Enterobacteriaceae Among Adult Inpatients in Singapore ^{TRIP}

Acquisition of Plasmid with Carbapenem-Resistance Gene *bla*_{KPC2} in Hypervirulent *Klebsiella pneumoniae*, Singapore

EMERGING INFECTIOUS DISEASES*

2017-2021

Transmission research in COVID-19

The NEW ENGLAND
JOURNAL of MEDICINE

SARS-CoV-2 Infection among Travelers Returning from Wuhan, China

JAMA Network™

Air, Surface Environmental, and Personal Protective Equipment Contamination by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) From a Symptomatic Patient

THE LANCET
Infectious Diseases

SARS-CoV-2 seroprevalence and transmission risk factors among high-risk close contacts: a retrospective cohort study

nature communications

Detection of air and surface contamination by SARS-CoV-2 in hospital rooms of infected patients

Active projects

Oral capsule-administered faecal microbiota transplantation for intestinal carbapenemase-producing Enterobacteriaceae decolonization.

Household transmission of carbapenemase-producing Enterobacteriaceae Singapore: A cohort study

CoSTAR-HS: NUHS-led Collaborations

2017-2021

Policy and health systems research in AMR

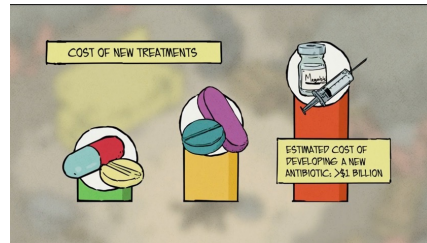
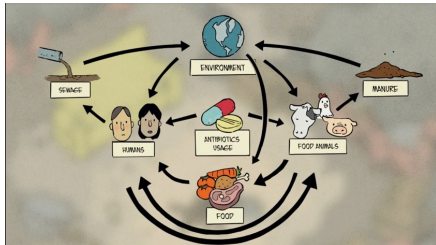


Review

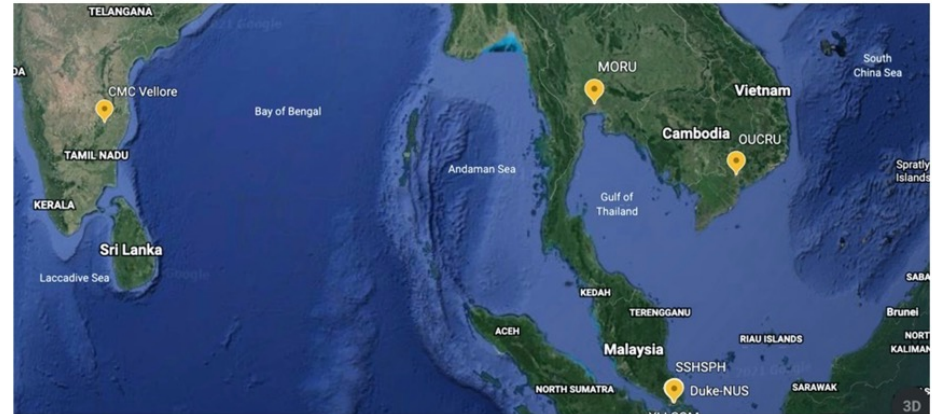
An analysis of national action plans on antimicrobial resistance in Southeast Asia using a governance framework approach

Alvin Qijia Chua^{a,*}, Monica Verma^a, Li Yang Hsu^a, Helena Legido-Quigley^{a,b}

Public Awareness & Education



ADVANCing Clinical Evidence in Infectious Diseases (ADVANCE ID)



Regional clinical trial network for AMR conceived in 2017 after successful establishment of CoSTAR-HS. Funded by Wellcome Trust and local institutions; supported by Singapore Clinical Research Institute