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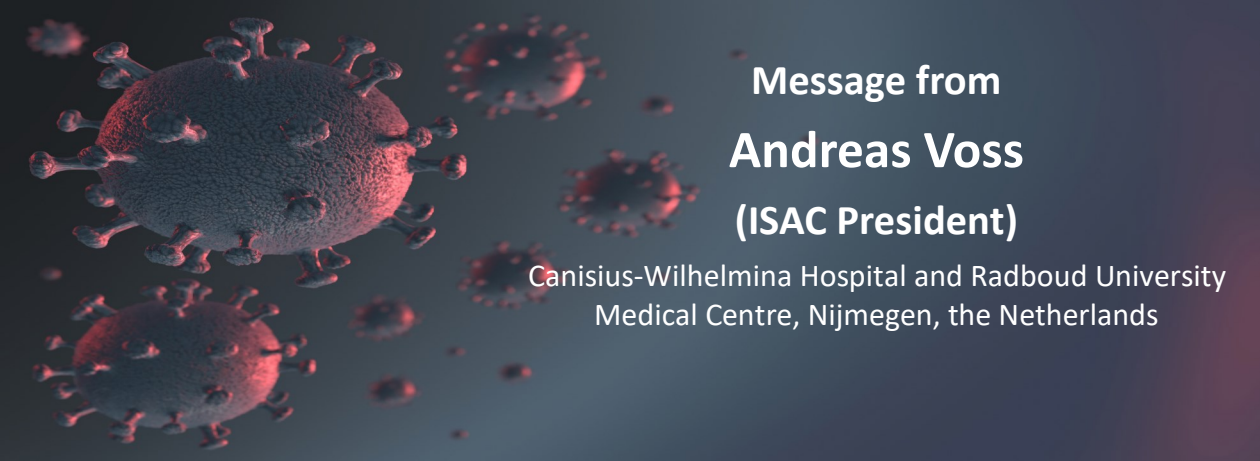
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Message from
Andreas Voss
(ISAC President)

Canisius-Wilhelmina Hospital and Radboud University
Medical Centre, Nijmegen, the Netherlands



I know that most of our colleagues will be extremely busy, working very long days, neglecting our loved ones (who seem to be in a state of permanent vacation) and dream about long nights of sleep, instead of dreaming during the much-needed sleep. We do so while dealing with many uncertainties and with a growing lack of needed medication and personal protective equipment.

Many of us have pushed our personal limits, which I personally feel by getting more sarcastic or by tearing up when receiving thank you notes and presents from strangers or when I listen to the morning report to hear that an exceedingly large number of patients have died overnight. I am still amazed to see how fast COVID-19 patients can switch from being mildly to severely sick or from being stable to dying. Luckily, at times, the switch also applies to being on weeks of ventilation to fast recoveries. Unfortunately, the latter group is still so much smaller than the first.

COVID-19 has brought up some good things, too. Cooperation between all medical specialities; de-regulation of care (work instead of completing paper-work); action instead of writing business cases to get what I need; close teamwork of those involved in the crisis-management; fast implementation of technical solutions and e-health; and last but not least, great appreciation of healthcare workers. Still, I would be happy to once again argue for weeks about a minuscule amount of money I need to actually run our department.

Sharing our experiences and feelings in a situation no-one has experienced over the last 100 years, at a time of a true global pandemic, might not only provide us with interesting insights, but also a feeling of shared emotions. As an international society whose Executive Committee members span the globe, we plan to host a webinar in which our international colleagues share their experiences of COVID-19 in their regions. “Around the world of COVID-19 in 80 minutes (or less)” will launch over the summer – keep an eye on the website / social media for more information or sign up to our mailing list by E-mailing secretariat@isac.world.

Some of our ISAC Executive Committee members, APUA Board Members and Chapters have shared their experiences for this newsletter.

In addition, Stefania Stefani, our Editor-in-Chief of *Journal of Global Antimicrobial Resistance (JGAR)*, had a similar idea of experience-sharing and has launched a new section in *JGAR*. “SARS CoV-2 Dispatches” welcoming short articles (up to 750 words) of relevant data and experiences on the pathogenesis, diagnosis, clinical management, epidemiology and surveillance of SARS-CoV-2. [See the website for more information.](#)

Wishing you all the best and the strength to continue the fight against COVID-19 in your hospital, region and country.

Creating a collaborative approach to antimicrobial stewardship education across the Gulf, Middle East and North Africa (MENA)

A case study from the British Society for Antimicrobial Chemotherapy (BSAC)

Dilip Nathwani, Tracey Guise, Debbie Cockayne



Dilip Nathwani OBE
Editor-in-Chief of JAC-AMR, Emeritus Honorary Professor of Infection, University of Dundee



Tracey Guise
Tracey Guise, CEO, British Society for Antimicrobial Chemotherapy



Debbie Cockayne
Managing Director, Page Medical Communications

Context

The British Society for Antimicrobial Chemotherapy (BSAC) is fast becoming recognised as one of the world’s most influential educators on antimicrobial stewardship (AMS).

As a learned society and charity, the central tenet of its mission is to work alongside others to provide open access, high-quality, support to those who need it most. This support takes many forms: workshops, conferences, public, media and political engagement, open access online courses amongst many other educational resources, professional fora, research grants, research publications (the Journal of Antimicrobial Chemotherapy) and a unique e-learning education and open access research journal- JAC-Antimicrobial Resistance), with a strong focus on low- and middle-income countries (LMICs).

In recent years, the Society has worked in many different countries including India, Brazil, Russia, and Kenya, with many different partners (from development banks, professional societies to government health departments, and supranational bodies like the World Health Organization).

Based on the premise of facilitating regional and global collaboration [Lancet Infect Dis 2017; 17: e56–63] and our growing experience of doing this, in February 2020 BSAC launched a collaborative aimed at developing, delivering, and evaluating, sustainable antimicrobial

stewardship programmes (ASPs) in hospitals across the Gulf, Middle East, and North Africa (MENA) region.

Aim

From the outset, BSAC’s MENA project recognised the challenges posed by variations between and within countries, organisations, and systems, across this huge geographical area. There was also recognition of the challenges faced by those in regions torn with turmoil due to conflict and political upheavals.

The aim was to create a network of otherwise disparate communities that, over time, could start to develop a more coherent and cohesive approach to responsible antimicrobial use regionally. The plan was to do this by:

- Providing education on the development of ASPs and interventions.
- Supporting the roll-out of train-the-trainer programmes.
- Facilitating the sharing of knowledge and expertise through peer-to-peer interaction and open access online resources.
- Facilitate the building of individual relationships, technical expertise, and the understanding of specific contextual challenges.
- Enabling measurement of the impact of education and interventions to demonstrate improvements in effective prescribing, patient outcomes, and to contribute to the containment or reduction of rates of antimicrobial resistance.

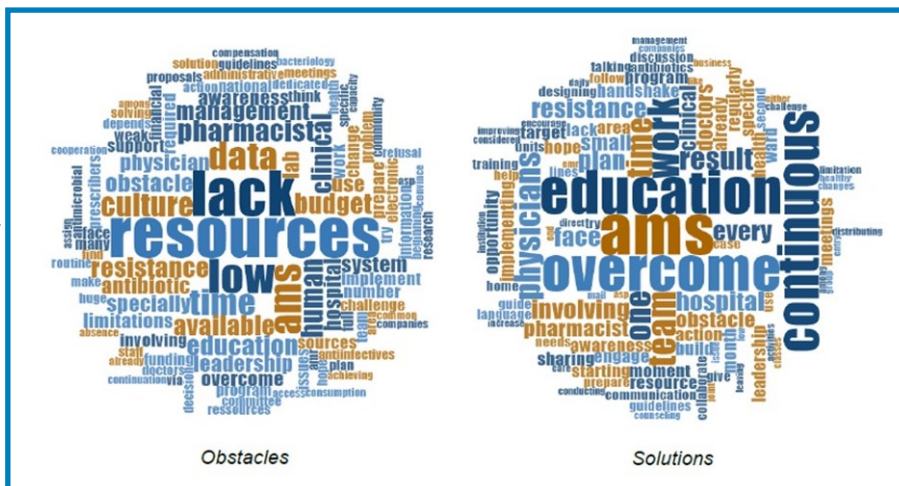


Figure 1. Word clouds of perceived obstacles and solutions in implementing an ASP, taken from post-conference survey responses and separated by node coding (n = 38)

Inaugural workshop

The initiative was launched with a train-the-trainer workshop [programme available here] in Dubai in February. It involved 72 delegates from the following 12 countries: United Arab Emirates, Tunisia, Saudi Arabia, Qatar, Oman, Lebanon, Kuwait, Jordan, Iraq, Iran, Egypt and Bahrain.

In addition to the traditional plenary sessions and workshops the event was used to unveil – in “real time” – a package of learning support that comprised: immediate access to a new online forum, online access to the course presentations within minutes of being given, instantaneous sharing of survey results, availability of filmed conference sessions within days of the workshop ending, an online discussion forum enabling delegates to share learning and resources as well as signposting to a diverse range of e-learning resources [www.bsac-vle.com and https://academic.oup.com/jacamr].

Workshop feedback

Many of the participants repeatedly highlighted the value of the workshop format, pointing to the unrivalled importance of face-to-face networking, and in coming together to identify common obstacles and solutions (Figure 1).

As far as those obstacles and solutions were concerned, a significant number of participants said the biggest barriers to AMS in the region were:

- Lack of resources (including IT, drugs and time).
- Staff shortages.
- Non-compliance of healthcare professionals, primarily as a result of widespread misconceptions

about AMR and AMS amongst prescribers.

- Lack of policies and guidelines or their implementation.

Impact

To uncover the ongoing needs of participants and to help chart progress, questionnaires were issued two weeks prior to, and immediately upon conclusion of, the train-the-trainer event.

The results (Figure 2) showed generic improvement in all 5 knowledge domains below with the greatest reported increases in understanding how to facilitate sharing of knowledge and expertise in AMS, accurate measurement and report on antibiotic quality and consumption and facilitating sharing and access to knowledge resources. These data as well as interactions with delegates are instrumental in providing educational programme developers with intelligence and direction of future courses and learning resource needs.

Building current and future education training delivery capacity and capability

More than half of the delegates (56.1%) were directly involved in AMS training preceding the conference, and 50% of those used e-learning resources to assist training. However, following the conference 100% of delegates said they were planning to share their learning with colleagues using workshop material as well as the e-learning resources available. They were keen to engage a broader health care professional community, for example more pharmacists and nurses as well as consider community engagement, for example schools and local media.

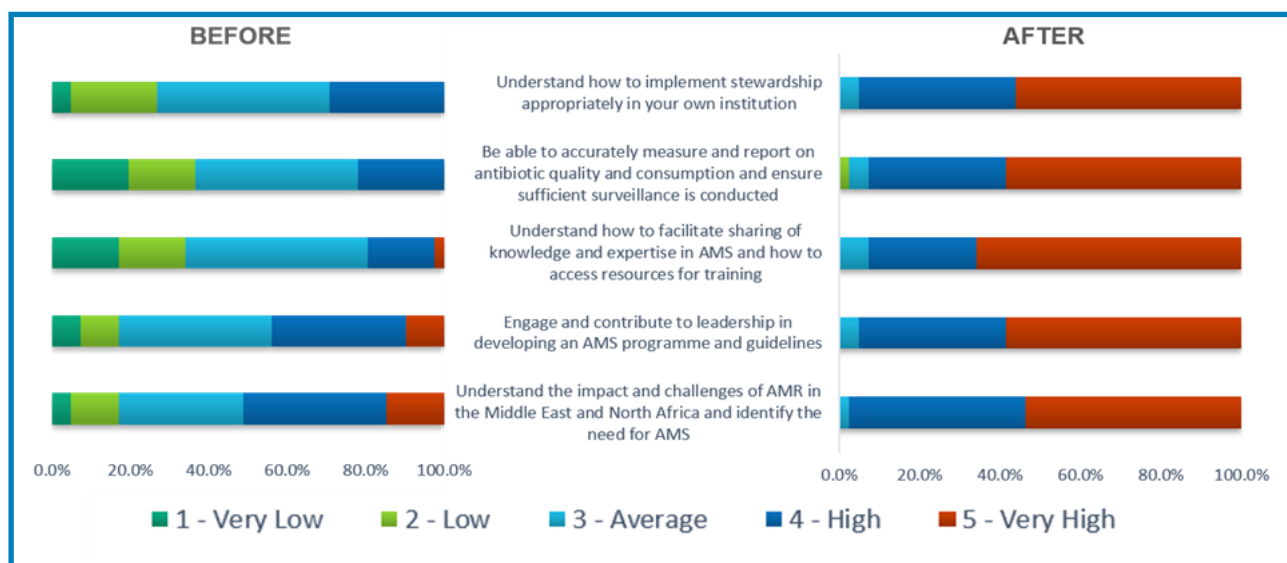
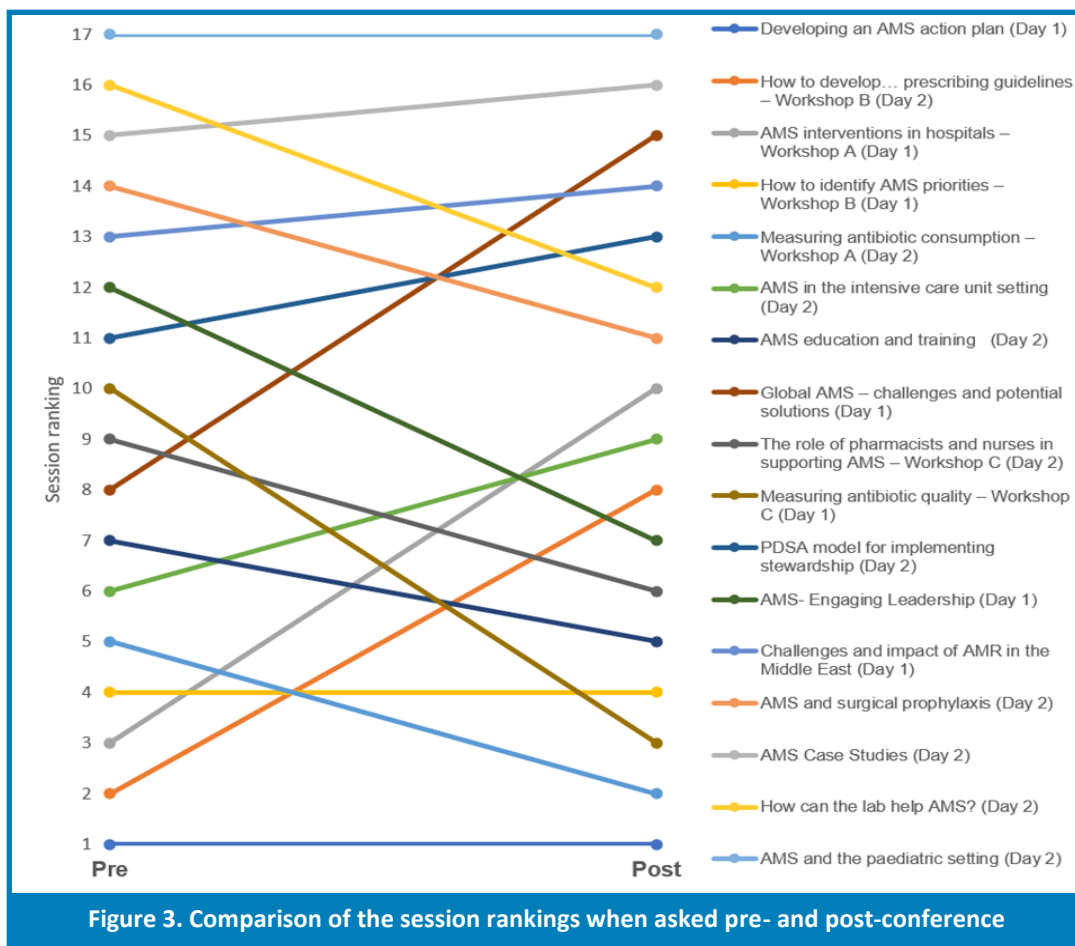


Figure 2. Comparison of level of knowledge on key learning objectives before and after attending the conference, by percentage of respondents who rated their level of knowledge on a scale of 1 to 5. Data was obtained from the post-conference survey and is therefore semi-retrospective (n = 41)



Course content preferences and strengths

When asked to rate conference sessions pre- and post-workshop, “Developing an AMS action plan” retained top spot (Figure 3) illustrating its critical importance and in many areas an unmet need. Other content preferences and value are illustrated in Figure 3. It is hoped the final evaluation report will also include the results of a three/ four -month follow-up to specifically assess how participants have put learning into action. It is hoped to make this available on JAC-AMR.

Next steps

Given the nature of the remaining challenges, it is important that the energy and momentum generated through the regional train-the-trainer workshop is sustained. As such, a significant amount of focus is being given to the next steps, which will see BSAC:

- Continue to establish separate collaboratives, with shared objectives for both:
 - Gulf-Middle East-North Africa
 - Africa (East, Central, South)
- Continue the development of the networking forum
- Host another AMS conference and training workshop in:
 - Kenya - Africa (East, Central, South)
- Launch a three-week MENA version of the Massive Open Online Course on Antimicrobial Stewardship (the first run will start on April 27, 2020).
- Provide training on measurement of antimicrobial

consumption (via a Point Prevalence Survey online course)

- Publish the full evaluation report in the open access online journal JAC-AMR.

Consideration will also be given to topics delegates said they would like to see covered in future events. These include, in-depth training on planning ASPs, guideline development, surveillance work, and the application of AMS to different clinical and social settings.

Connect

BSAC is always keen to work alongside others, including local professional societies as well as other international bodies committed to education such as the Alliance for Prudent Use of Antibiotics (APUA) - BSAC has global reach, commitment to supporting low- to middle-income countries (LMICs), and is multi-disciplinary in its approach. This is combined with the speed and economy with which the Society develops and delivers educational projects on a range of topics linked to antimicrobial therapy and stewardship. It is especially keen to hear from anyone interested in promoting or developing the MENA Forum, in a bid to increase user-numbers and to augment the quality of its outputs and outcomes.

For more information, contact BSAC’s CEO, Tracey Guise tguisse@bsac.org.uk.

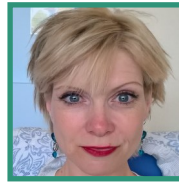
An update on e-Bug progress in France

Pia Touboul, Virginie Lacroix Hugues, Brigitte Dunais

Department of Public Health, Nice University Hospital, France



Pia Touboul

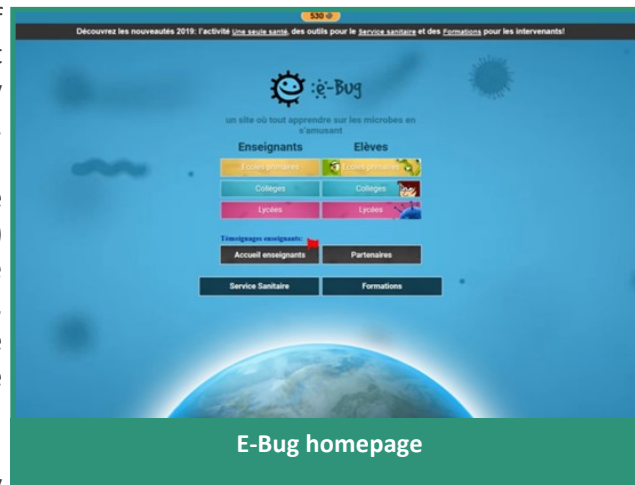


Virginie Lacroix Hugues



Brigitte Dunais

Students' awareness of the microbial world, including increasing antimicrobial resistance (AMR), is limited in Europe^{1,2}. An educational programme aiming to improve European children's knowledge of micro-organisms, transmission, prevention and treatment of infection and prudent antibiotic use was initiated by Public Health England, UK. This project, called e-Bug³, was supported by the European Union (DG Sanco) from 2006 to 2009, by the participating countries, (currently 27) and the European Centre for Disease Control (ECDC)⁴.



E-Bug homepage

The resources initially addressed junior (ages 7-11) and senior (ages 11-15)⁵ students and were extended in 2017 to include young adults (ages 15-18) focusing more specifically on antibiotics and vaccinations^{6,7}. Needs assessments^{2,6,7} were conducted, exploring curriculum, public health campaigns and conducting qualitative research among teachers and students, followed by quantitative and qualitative evaluations⁸.

The resources are considered evidence-based by the National Institute for Health Care and Excellence in 2017, (NICE guideline on antimicrobial stewardship)⁹.

France has been actively involved in this project since its initiation. The resources were translated and adapted to the national cultural context, curriculum and teaching conditions. In coordination with the Education and Health ministries¹⁰, over 170,000 educational packs were printed and disseminated to all 52,900 junior and 7,100 senior schools in France¹¹ (2009, 2011, 2013) by the National Institute for Health Education, potentially reaching over 10 million pupils¹². These downloadable, free, web-based³ resources include lesson plans for teachers, student worksheets, activities, animations, games and quizzes, designed to make learning interactive and fun¹³.

France has broadened its resources to include other relevant themes: microbiota, animal health and the One Health concept. This involved the ministries of agriculture and of the environment, as well as the national veterinary school.

In addition, massive open online courses (MOOCs) were developed and evaluated (2018) to meet teachers' needs⁶, available at the Ministry of Education Continuous professional training platform and on the e-Bug web site.

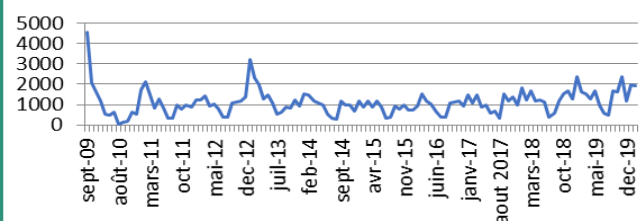
Furthermore, since 2018, French healthcare students must take part in health

promotion activities for the community. The French e-Bug coordination team was asked to develop educational material, and specific resources have been available on the e-Bug website since 2019.

The French e-Bug team also provides a discussion-based resource on prevention of AMR, targeting educators involved in the civilian National Service, now required for all 15-17 year-olds.

The French e-Bug project has been coordinated by the Nice University Hospital Public Health Department since 2006. French partners have actively contributed

Trends of visits to French e-Bug website 2009-2020



Use of the French e-Bug website is steadily increasing—usage is up by 17% in 2019 compared to 2018.

funding, scientific review, dissemination and promotion. Such wide institutional partnerships and enthusiastic support were very helpful in France for successful implementation.

That such a European programme has lasted so long and involved so many participants provides evidence of its recognition and success as a unique project designed for its particular target groups, relating both to education and public health while being creative and attractive for educators and students, and resulting in proven knowledge enhancement¹¹.

References

1. Lecky DM *et al.* What are school children in Europe being taught about hygiene and antibiotic use? *J Antimicrob Chemother.* 2011;66 Suppl 5:v13-21
2. Hawking MK *et al.* Attitudes and behaviours of adolescents towards antibiotics and self-care for respiratory tract infections: a qualitative study. *BMJ Open.* 2017;7:e015308
3. [e-BUG. \[ONLINE\]](#)
4. McNulty CA *et al.* Overview of e-Bug: an antibiotic and hygiene educational resource for schools. *J Antimicrob Chemother.* 2011 ;66 Suppl 5:v3-12
5. Lecky DM *et al.* Development of an educational resource on microbes, hygiene and prudent antibiotic use for junior and senior school children. *J Antimicrob Chemother.* 2011;66 Suppl 5:v23-31
6. Caroline Darnaud. Exploration des attitudes, comportements, connaissances des adolescents entre 15 et 18 ans concernant les antibiotiques et les vaccinations en France selon les enseignants et détermination des besoins des enseignants en matière d'outils pour l'éducation à la santé: étude qualitative dans le cadre du projet Européen e-Bug. *Médecine humaine et pathologie.* 2014.
7. Touboul Lundgren P *et al.* [How to raise awareness about antibiotics and vaccination among French teenagers?] [Article in English, French] *Sante Publique.* 2017;29:167-177
8. Lecky DM *et al.* Evaluation of e-Bug, an educational pack, teaching about prudent antibiotic use and hygiene, in the Czech Republic, France and England. *J Antimicrob Chemother.* 2010;65:2674-84
9. Endorsed resource – e-Bug educational pack (antibiotics) for children and young people. NICE Guidelines. 2017
10. e-Bug is included in the French National action plans to combat antibiotic resistance [ONLINE]
11. L'éducation nationale en chiffres 2019
12. Touboul P *et al.* The e-Bug project in France. *J Antimicrob Chemother.* 2011;66 Suppl 5:v67-70
13. Farrell D *et al.* Developing e-Bug web games to teach microbiology. *J Antimicrob Chemother.* 2011;66 Suppl 5:v33-8

A selection of e-Bug resources from interactive quizzes, to games, to animations to home projects

Below are 6 projects you can do at home, click below for some printable instructions.





Corona Virus in the Kingdom of Saudi Arabia

Mushira Enani

APUA Board Secretary, Riyadh, Kingdom of Saudi Arabia

Introduction

Coronaviruses (CoV) are a large family of RNA viruses that cause illnesses ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV). The new strain of coronavirus identified in December 2019 in Wuhan City, Hubei, China, has been named by the International Committee on Taxonomy of Viruses (ICTV) as Severe Acute Respiratory Syndrome Corona Virus-2 (SARS-CoV-2). The ICTV has determined that SARS-CoV-2 is the same species as SARS-CoV but a different strain. The World Health Organization (WHO) has named the disease associated with SARS-CoV-2 infections as Corona Virus Infectious Disease 2019 (COVID-19).

On 30 January 2020, WHO International Health Regulation Emergency Committee declared the disease a Public Health Emergency of International Concern. On 11 March 2020, it was declared a worldwide pandemic.

As of 17 April, there were 2,181,508 confirmed cases across the globe affecting 185 countries with 148,730 global deaths and 558,715 recoveries.

Kingdom of Saudi Arabia (KSA) reported the first patient with COVID-19 on 2 March. The incidence rate is estimated at 200 per 1 million persons with a total of 7,142 confirmed COVID-19 patients, 87 deaths and 1,049 recoveries, while there are 87 critical patients.

As determined and announced by the Ministry of Interior and Ministry of Health (MOH), high risk areas in KSA include Riyadh City, Holy City of Makkah, Madinah City, Jeddah City, Al-Hofuf City, AL-Qatif City and will be updated regularly on [this link](#).

KSA Response to COVID-19

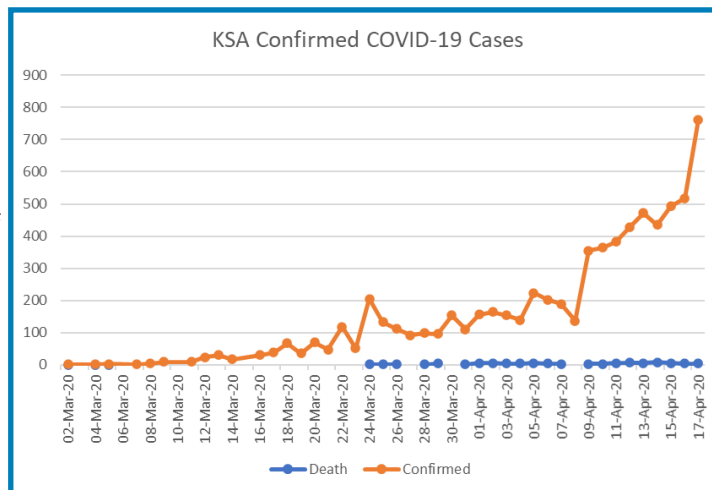
MERS-CoV outbreak emerged in KSA in 2012 and is still circulating in sporadic fashion. It caused multiple nosocomial outbreaks in some Saudi hospitals which has prompted intensive efforts by the Saudi MOH and led to

remarkable improvement in infection prevention and control practices across healthcare facilities of the Kingdom.

The first COVID-19 patient in KSA was reported on 2 March. A few days later, the Government of Saudi Arabia took precautionary and strong mitigation strategies to protect citizens and residents in the Kingdom. It also ensured the availability of immediate financial resources which will guarantee all direct preventive measures to limit the spread of the virus and address this pandemic crisis consequences, as well as protect government facilities and agencies and ensure the continuity of their work.

Key Community Containment and Mitigation Measures

- Cancellation of planned events and suspension of events with super-spreader potential.
- Use of social distancing measures to reduce direct and close contact between people in the community.
- Travel restrictions, including reduced flights and public transport and route restrictions without compromising essential services.
- Voluntary home quarantine of members of household contacts.
- Changes to funeral services to minimize crowd size and exposure to body fluids of the deceased.
- Clear communication from national and international health authorities to ensure verified information and avoid fake news, rumours and panic.
- Mass gatherings and events such as citywide festivals, religious gatherings, cultural celebrations, scientific conferences and large political events should be restricted.
- On 27 February, all visits to Mecca and Medina to perform Umrah and visit the holy mosques have been suspended, irrespective of nationality, visa type or residence status.
- Travellers are not permitted entry to the KSA with Umrah visas. Religious gatherings, including daily congregational prayers and Friday weekly congregational prayer in local mosques, have been suspended.



- Temperature screening of all airline passengers was also in effect, with travellers arriving from outside the KSA, including Saudi citizens and residents, being placed in health isolation for 14 days following their arrival.
- All international flights, both incoming and outgoing, were suspended from 15 March. All domestic flights, as well as inter-urban bus, taxi and train transportation, were all suspended beginning on 21 March. On 26 March, travel between regions of the KSA became prohibited.
- All international passenger traffic, whether by air, land or sea, has been suspended. All tourist travel is currently suspended.
- The KSA also suspended operations in many government agencies starting on 16 March. All schools and universities are temporarily closed with distance learning through virtual learning platforms. Operation of many markets and malls is suspended; gatherings in parks, beaches and resorts are prohibited. Restaurants are closed except for takeaway services. Pharmacies and grocery stores remain open to serve customers through governmental assigned online delivery applications and systems.
- A nationwide curfew (19.00–06.00) remains in effect for the entire country; the cities of Riyadh, Mecca, and Medina are under a 17.00–06.00 curfew. The curfew remains in effect for 21 days beginning on 23 March with limited exceptions for life and safety. Later on, Saudi Arabia imposed a 24-hour curfew and lockdown on the cities of Riyadh, Tabuk, Dammam, Dhahran and Hofuf and throughout the governorates of Jeddah, Taif, Qatif and Khobar as of 6 April.

A nationwide curfew (19.00–06.00) remains in effect for the entire country; the cities of Riyadh, Mecca and Medina are under a 17.00–06.00 curfew.

MOH Preparedness

The MOH has National and Regional Command and Control Centers (CCC) (i.e. Incident Command System) to coordinate roles and responsibilities of different entities to expedite real-time response during events. The CCC has activated a COVID-19 preparedness and response plan—it coordinates communications, surveillance, information, resource allocation and educational activities to prevent and control possible COVID-19 events.

A. CCC preparedness and real-time surveillance

National and Regional CCCs oversee the preparedness activities and lead national COVID-19 surveillance

through enforcing the existing structure of incident command with relevant stakeholders to achieve unified, consistent and timely actions over a significant period.

- Visual triage for passengers arriving from any country at all points of entry (POE).
- Thermal screening of passengers arriving from any country at all POE.
- Declaration of being in contact with a known case in the last 14 days at all POE.
- Suspected cases must immediately be managed by rapid relief teams and referred to designated hospitals.

A1. Preparedness of Healthcare Facilities

- Risk assessment and gap closure.
- Strengthen all healthcare facilities including the 25 designated hospitals (20 primary and secondary).
- Infection control procedures and visual triage is enforced and monitored in all healthcare facilities.
- Monitor capacity for isolation beds, healthcare workers and critical medical supplies.
 - Prepare and disseminate technical guidelines and operational protocols.

A2. Community based preparedness

- Support public places by PPEs capacity.
- CCC have prepared a risk communication plan during

different stages of possible outbreak—Communication and Health awareness.

- Designated hotline for public consultations or general questions about the disease.
- Designated hotline for healthcare workers for medical consultations.
- Health awareness on social media, POE and schools.

A3. Response

The CCC commanders are responsible for activating incident command system to coordinate actions of the relevant responders. The main goal of CCC and Regional CCC in response mode:

- Have real-time information about the outbreak.
- Manage resources for lab and infection control requirements (acquisitions, tracking and monitoring).
- Monitor COVID-19 cases in hospitals or household isolation.
- Plan and operate designated health facilities for the surge.
- Coordinate all actions between responders and stakeholders.

B. Rapid Response Teams (RRTs)

The public health team or rapid response team (RRT) at regional health affairs (or equivalent body) is responsible for initiating the epidemiological investigation. After activation through regional command and control leaders, the team should complete the epidemiological investigation in both healthcare and community settings using the COVID-19 epidemiological investigation forms. The form includes detailed items such as travel history and possible exposure which needs vigilant history taking and probing. Contacts identification is another important part of the required information (contacts as defined within surveillance case definition paragraph) and then list them for their tracing documentation (contact tracing form).

C. Hospital Level Preparedness

Currently, the MOH designated 25 hospitals for COVID-19 infected patients, amounting to 80,000 hospital beds and 8,000 intensive care unit (ICU) beds. In addition, 2,200 beds have been allocated for isolation of suspected and quarantined cases.

King Fahad Medical City (KFMC)

KFMC is a 1,200 bed tertiary care hospital, the core of the second health cluster in the capital of KSA which serves the population of north and east Riyadh City (population 7.2 million).

COVID-19 Command and Control Center and Task Force in KFMC is a multidisciplinary committee chaired by the CEO of the second cluster who is also the CEO of KFMC. It comprises a wide variety of membership including, but not limited to, executives, infectious diseases (ID) experts, infection control director, emergency physicians, disaster medicine experts, intensive care director, supply chain leaders, hospital

operations, in addition to representatives from MOH and CCC.

The role of ID physicians in KFMC

1. After emergency department (ED) staff have applied the visual triage on patients, if they scored high as per MOH COVID-19 case definition, ED refers patients to ID after taking the first nasopharyngeal swab for SARS-CoV-2 polymerase chain reaction (PCR). ID evaluate patients and request the necessary lab testing and imaging and follow the result of PCR. If the first swab is negative and clinical suspicion is still high, a second swab is taken and the patient is moved to a COVID-19 dedicated inpatient ward.
2. Regular rounds on ICU and COVID-19 dedicated wards to evaluate every patient and support internists who admit COVID-19 patients. We, as ID physicians, advise the line of management and decision to stop isolation and approve patients' discharge from the hospital.
3. Contribute to the establishment and update of COVID-19 clinical management guidelines.
4. Respond to all calls and queries raised by healthcare providers and infection control professionals.
5. Collaborate in research proposals with scientists and clinicians.

References

1. Saudi Ministry of Health Coronavirus Disease 19 (COVID-19) Guidelines March 2020 V1.2
2. Saudi Center for Disease Prevention and Control: Daily status report of confirmed case in KSA
3. Barry M *et al.* Coronavirus Disease 2019 (COVID-19) Pandemic in the Kingdom of Saudi Arabia: Mitigation Measures and Hospitals Preparedness. *Journal of Nature and Science of Medicine*. 2020

**The Ministry of Health
designated 25 hospitals for
COVID-19 infected patients,
amounting to 80,000 hospital
beds and 8,000 intensive care
unit (ICU) beds**

World Health Organization: East Mediterranean (EMRO) situation report as of 17 th April 2020				
Countries	Total	Recovered	Death	CRF
EMRO	116,220	59961	5667	4.9
KSA	7142	1049	87	1.3

Tales from the COVID-19 frontline



Souha Kanj
ISAC Executive Committee
Member / APUA Board Member
American University of Beirut
Medical University, Beirut, Lebanon

As of 10 June, Lebanon has reported 1,368 cases of COVID-19 with 2.2% mortality. Today the country is in partial lockdown. At the American University of Beirut Medical Center (AUBMC), we were very prompt in recognising the need to be prepared for the pandemic.

The following steps were taken. As Head of the Infectious Diseases Division and Chair of the Infection Control and Prevention Programme, I was appointed as a member of two taskforces—one formed by the leadership of the medical centre to prepare a COVID unit, and another formed by the AUB President to decide on issues related to students, employees and faculty members. Early decisions were taken about stopping all classes and minimising the number of employees on campus.

In the Medical Centre, together with a very dynamic Infection Control Prevention and Prevention team, we achieved the following:

1. Algorithms for triaging and testing in the emergency department were developed and updated daily.
2. A dedicated unit was prepared, physically separated from the main hospital, including an outpatient walk-in clinic, a medical ward staffed by infectious disease clinicians and a medical intensive care unit staffed by the pulmonary / critical care faculty members.
3. Reverse transcriptase polymerase chain reaction (RT-PCR) was acquired very early in the pandemic. To date, we have tested 7,000 cases, 98 of which were positive.
4. AUBMC treatment protocol was developed for management of COVID-19 infected patients including guidance depending on severity of illness and included antimicrobial and other required therapies.
5. Multiple educational videos were shared on social

media addressed to healthcare workers and lay people.

6. A video was developed with the help of the communication office on proper donning and doffing of PPEs.

7. A video was developed on mask wearing directives.

8. Protocols for re-sterilisation of the N 95 masks in view of the worldwide shortage with H2O2 and UV light.

9. Educational webinars addressed to medical doctors.

10. New flyers were developed on required COVID-19 precautions.

11. Developed educational leaflets for patients and visitors about the disease and the instructions for self quarantine.

12. Development of a resource website with useful information in both Arabic and English.



Sam Kariuki
APUA Kenya Chapter Leader
Kenya Medical Research
Institute, Nairobi, Kenya

Currently, our Kenya Medical Research Institute (KEMRI) team is involved in supporting the Ministry of Health with testing suspected cases of COVID-19. Our team is spread across five labs with capacity for reverse transcription polymerase chain reaction (RT-PCR). Over 46,500 have been tested so far and we aim to do more once rapid testing kits are available. In the last four weeks, we have embarked on sampling disease hotspots in community-based testing so we can establish the extent of infection in these settings.

Our team is also involved in providing technical support for validation and evaluation of PCR and RDT kits imported into the country.



Peg Riley
APUA Board Member
University of Massachusetts, Boston,
MA, USA

The COVID-19 situation in my home state of Massachusetts is 103,000 confirmed cases, 78,000 recovered and 7,316 deaths as of 8 June. As an academic, the greatest immediate impact of COVID-19 was the rapid transition to an online learning environment. The faculty scrambled to pull together the technologies and course materials to permit us to re-engage our students as quickly as possible. The first two weeks of online teaching focused primarily on student support and conversations about the virus and how students could educate their family and friends about the guidance materials being provided by the Centres for Disease Control and Prevention (CDC) and state and national government offices. I was delighted when several students proposed to help develop COVID-19 mitigation strategies. I sponsored their application to engage in the Johns Hopkins CBID COVID-19 Design Challenge and they were one of 230 teams chosen out of an astounding 515 team applications from 35 countries around the world! The team spent ~14 hours a day over the four-day competition focused on addressing the challenge of handwashing in regions under drought conditions and with limited access to soap. Their proposed solution was to use tea leaves and clay, both readily available in the target regions and with a substantial body of evidence of efficacy in eliminating viral particles from the skin. I cannot describe how proud I was that, in the midst of the confusion and anxiety of social isolation, they chose to remain connected to other scientists and health care workers and devote their considerable energy, enthusiasm and empathy to help others experiencing far more challenging lives. Finally, our university has been coordinating efforts to help hospitals in our community obtain PPE. One highly successful effort employed 3D printing to create face shields that were deployed across the state.



Minggui Wang
ISAC Executive Committee Member
Huashan Hospital, Fudan
University, Shanghai, China

Up to 12 April (the time of writing), China had 83,485 confirmed COVID-19 cases with 1,280 imported cases, 3,349 died, 78,038 cured and 2,098 are currently in hospitals for treatment with 139 severe cases. Currently, less than ten new confirmed cases of Chinese residents are reported each day in the mainland of China, but there are 10 - 100 imported new cases each day. Now, most people can go back to work and some schools have reopened, although people are required to wear masks when they go out and when in a room with other people.

As an ID specialist, I have participated in the management of COVID-19 in Shanghai for more than two months in several areas. First, I had to give up Chinese Spring Holidays and participate in the diagnosis and treatment of COVID-19 directly in the hospital in which I work. Second, I frequently communicate with leaders and professionals of the hospital to develop and update strategies for the management of COVID-19. Third, as the director of the department, I arrange the work of colleagues during this extraordinary time: two colleagues were dispatched to Wuhan for combating COVID-19; one colleague was dispatched to Shanghai Public Clinical Center where confirmed COVID-19 patients are treated; two colleagues are responsible for infection control in two campuses of the hospital; and eight colleagues participate in the diagnosis of COVID-19 in the fever outpatient clinic which is open 24 hours per day.

Matthew Dryden

ISAC Executive Committee Member

Hampshire Hospitals, Winchester & University of Southampton; Public Health England, Porton, UK

April 2020: I work in two organisations – one of which is the Rare and Imported Pathogens Department in Porton Down where we continue to run the Imported Fever Service. At the moment the most imported fever is COVID-19! I had a case from Southern Sudan yesterday! We are also validating COVID-19 testing technologies for the UK there. My other role is in infection and microbiology at the Hampshire Hospitals. We run a large lab in Basingstoke, but I am on clinical duty in Winchester for the next three days until Easter Sunday. We have hot wards and ICU for COVID patients on one floor, and non COVID patients elsewhere. I am just off to do a ward round. We have about 40 non-ventilated COVID patients today and eight ventilated ones. We are hoping to start a trial of Reactive Oxygen spray with the aim of reducing nasopharyngeal viral load and reducing transmission in patients, staff and contacts. Stay safe everyone.





Sade Ogunsola
ISAC Executive Committee Member
University of Lagos
Lagos, Nigeria

On the 28 February, Nigeria recorded her first case of COVID-19. The Nigerian Centre for Disease Control (NCDC) was notified, and the patient was immediately transferred to an isolation unit in Lagos and his contacts monitored. As of 8 April, Nigeria had recorded 276 laboratory confirmed cases with six deaths. Contrary to the situation in Europe and America, the patients we have seen so far are mostly between the ages of 19–59 years old and have not required ventilation. States with a high number of cases are on lockdown which includes Lagos state where I live, and which is the epicentre of this disease in Nigeria. There is panic in the country even amongst healthcare workers. Healthcare workers in many states in Nigeria believe they must wear full coverall to be safe and we have our work cut out getting them to realise they don't need that. The virus is spreading across the country and many states are setting up isolation facilities for COVID-19 for which we are assisting with technical advice.

I am representing Infection Control Africa Network (ICAN) on the Steering Committee of the Technical Working Group for infection prevention and control (IPC) of the NCDC and African Centres for Disease Control and Prevention to strengthen human capacity in IPC by developing locally appropriate content for IPC training across Africa. ICAN is also an implementing partners to deliver this training. We have trained healthcare workers, case managers as well as port health workers in 38 African countries. We are also providing technical assistance on contextualising guidance documents for the African continent. In a personal capacity, I sit on the COVID-19 strategic committee of Ondo state and on the Lagos state COVID-19 Research Steering Committee which is driving the research agenda for the state. I also provide technical support on IPC to the Lagos state response team and Think Tank. One major issue we continue to have is in the area of personal protective equipment. We are also preparing for the explosion of cases by beginning the strengthening of IPC at primary healthcare level.



Ray Saginur
ISAC Executive Officer / APUA
Board Member
Ottawa Hospital, Ottawa, ON,
Canada

Having retired from clinical practice just over a year ago, I anticipated a deceleration of my professional activities. I migrated to an almost full time position in the Ottawa Hospital Research Institute, chairing the research ethics board.

I described my situation immediately before the pandemic as an unsuccessful attempt at reducing my work to part time.

The pandemic has been an opportunity to link my infectious disease networks to my institute. I have been facilitating research, working on institutional priorities (clinical, research), guiding investigators in a variety of disciplines, from cardiology to bariatric medicine to surgical specialties to psychology. There has been a brisk and fascinating response from our research community to address immediate and longer term issues. My involvement has ranged from international, to national, regional and local. I am now working most of my waking hours.

COVID-19 started in earnest in Canada in late March and has expanded tremendously, about 100,000 cases at the time of writing this (10 June) (over 2500/million population), and is now apparently declining. Most deaths were of the elderly in chronic care. We were running about two weeks behind western Europe and the impact much less intense thus far than the U.S. or Europe. There was an anticipated surge of importation in mid-March, with returning travellers mostly from warmer climes, more or less concurrent with the imposition of distancing measures. At this stage, new cases are all locally acquired. Although Canada has low population density overall, the great majority is in a few centres, so most of the disease and response is urban. The remote North, once it is hit in earnest, is anticipated to suffer particularly, in view of domestic overcrowding, high endemicity of co-morbidities increasing risk, limited capacity to respond, and precarious logistics.



Heiman Wertheim
ISAC Executive Committee Member /
APUA Board Member
Radboud University Medical Center,
Nijmegen, the Netherlands

I am a medical microbiologist and Head of the Radboudumc Center for Infectious Diseases. Everyday, I work side by side with a multidisciplinary team in Radboud University Medical Center to deal proactively with the coronavirus crisis in my region and as an academic center to add new insights to COVID-19.

Before the first COVID-19 case was reported in the Netherlands in February, I was on a skiing trip with my family in the French alps. From the slopes, I would be on the phone with our hospital leadership to kick start a crisis team to be well prepared once SARS-CoV-2 turned up. In my current role as one of the two Chairs of the Infection Outbreak Team, it is a key responsibility to prepare and adapt our hospital to the daily changing coronavirus landscape for the benefit of our patients and healthcare workers.

We have a well-organised crisis team structure with an overarching team where big issues are discussed and policies are made. At the same time, I am also head of the Medical Microbiology Department, which includes the Infection Prevention and Control (IPC) team. The IPC teams in the Netherlands are usually organised within medical microbiology departments which has resulted in an active IPC society in the Netherlands. For instance, the low antibiotic resistance rates in the Netherlands are partly a result of that.

To deal with COVID-19 we needed to scale up the infection control team with medical students (to great satisfaction!), deal with shortages in testing capabilities (reagents and plastic ware) and shortages in masks, gowns, and many other important supplies. At the moment, we see that COVID-19 numbers are declining, except those requiring intensive care, and we have started to downscale the cohorting departments for COVID-19 patients. We used cohorting as it allows us to be more sustainable in the number of staff required



View from Radboud University Medical Center.
Translates as "Thank you Superstars"

and decrease the use of protective gear for healthcare workers.

Like everywhere in the world, the shortages in many critical supplies is a major issue. It is an ongoing hunt to have sufficient protective gear like masks to protect doctors and nurses. There has been some controversy regarding safety of surgical masks versus N95 masks. In the Netherlands we find surgical masks (type IIR) are safe for non-aerosol generating care.

Furthermore, we have an Innovation Lab where we look for alternatives and are able now to produce our own face shields. We have mitigated the increased use of masks by specifying in more detail the indications and prolonged wearing of N95 and surgical masks. We found in day to day practice that for non-aerosol generating procedures we could safely use surgical masks (IIR) in caring for COVID-19 patients.

Besides the concerns we have on how COVID-19 impacts society, it is also a heart-warming experience. It is amazing to see how flexible, creative and focused everyone is. There is a very good harmony and I really experience this also as a very special and warm time. Great team building moment!



Kumud Kafle
APUA Nepal Chapter Leader
Tribhuvan University,
Kathmandu, Nepal

As of 8 June, the COVID-19 situation in Nepal is as follows:

1. Total confirmed cases (PCR test): 3,762
2. Total number of PCR test done: 100,971
3. Deaths: 14
4. Total discharged: 488

Of the total positive cases, six have a flight history by four different airlines from different sectors. Two cases have travel history from India by train and bus. One case has no travel history. Of the nine confirmed cases, one case has been discharged after treatment, the remaining patients are receiving treatment in different hospitals.



Pierre Tattevin
APUA Board Chair
Centre Hospitalier Universitaire
de Rennes, Rennes, France

As of 16 April 2020, France seems to be slowly recovering from a devastating wave that affected at least 108,000 people (cumulative number of documented cases), and killed more than 15,000. Healthcare workers have faced situations they never thought possible, in terms of workload, staff and drugs shortages, and saturation of intensive care resources.

Sadly, antimicrobial stewardship (AMS) has been totally neglected in most settings, as the situation has left limited space for clinical reasoning. In addition, efforts on microbiological tests have been concentrated on the diagnosis of SARS-CoV-2 infection, and many laboratories had to interrupt some of their routine activities, including rapid diagnostic tests of bacterial infections, and drug susceptibility testing. The French Society of Infectious Diseases, together with other scientific societies, and the High Council of Public Health, issued guidelines for the appropriate use of antibiotics in COVID-19 patients, but these guidelines were probably poorly implemented, due to lack of communication, and lack of time. In this dreadful situation of overwhelmed healthcare systems, any suggestion that antibiotics may help to improve the condition of a worsening patient was immediately followed by antibiotic prescription, despite accumulating evidence that COVID-19 patients rarely suffer from bacterial superinfection during the first two weeks of illness.

Another collateral damage of the COVID-19 outbreak was the sub-optimal management of other infectious diseases, as any fever was first suspected as COVID-19. We all experienced erratic trajectories of patients with classical and easy-to-diagnose infectious diseases, but delayed diagnosis due to the time spent in the COVID-19 unit of an emergency department, waiting for thoracic CT scans and results of nasopharyngeal swabs, although a basic clinical examination would have easily disclosed acute pyelonephritis, or leg cellulitis.

Will we do better next time? It is probably too early to address this question, as our hospitals are still full of COVID-19 patients slowly recovering, or developing complications. But we have a duty to look back at our actions, when this outbreak will be totally controlled, be it through robust infection control actions, large immunization programmes, or only by the natural history of this pandemic. Hopefully, we will not see such tragedy again soon and we will have time to learn from our mistakes. AMS will be among the list of activities we need to do better on next time, if we are to mitigate the consequences of this scourge.



Fiona MacKenzie
ISAC Chief Executive Officer
Aberdeen Royal Infirmary,
Aberdeen, Scotland

Sadly, on 15 June 2020 the UK (population c. 68 million) had 296,857 lab confirmed cases and 41,736 deaths of people who had a positive test result. The peak was reached around mid-April with numbers falling steadily since then.

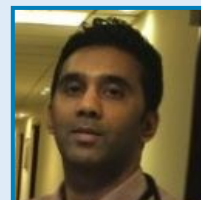
Within Scotland (population 5.5 million) there have been 18,030 confirmed cases and 2,448 deaths (over 50% are > 80 years of age and many were care home residents).

The epidemiology varies across the UK, leading to variance in the lifting of lockdown restrictions across the devolved nations – currently England is lifting restrictions more quickly than Scotland, Wales and Northern Ireland.

My role has changed significantly this year. I usually work half time as ISAC CEO and half time as a Clinical Scientist for the National Health Service in Scotland. Since March, I have been seconded to work full time for the Scottish Government on the response to the SARS CoV-2 pandemic. I chair the National COVID-19 Technical Group. My role includes co-ordinating and overseeing rollout and continued provision of testing across all Scottish hospital Microbiology / Virology laboratories. Challenges have included providing a testing service from small multidisciplinary laboratories in remote / rural locations to the large specialist laboratories in tertiary referral hospitals. Global supply chain issues have impacted Scottish testing but, thankfully, are now easing.

Current tasks include increasing testing to meet the “Test & Protect” policy and planning to incorporate SARS CoV-2 into respiratory testing panels in preparation for winter.

The pandemic has brought out the very best in people and has highlighted the role of the hidden heroes within our hospitals.



Abdul Ghafur
APUA Board Member
Apollo Hospital
Chennai, India

April 2020: The situation in India is still manageable. We have 6,000 patients and 200 deaths. India initiated lockdown well before any definite community spread. The lockdown is expected to have long term economic implications. The lockdown has already affected the income of daily wage workers. We have cancelled all elective admissions and non-emergency surgeries. The trend doesn't look bad so far. Fingers crossed!

ISAC Update on COVID-19 pandemic

ISAC is deeply aware and appreciative of the massive efforts currently being undertaken by our Member Societies and global colleagues in fighting the SARS CoV-2 / COVID-19 pandemic.

In common with colleagues around the world, all members of the ISAC Executive Committee are fully committed and engaged in leading this public health emergency at both national and international levels.

For that reason, all regular ISAC activities are temporarily on hold however, our ISAC office is still open (secretariat@ISAC.world)

We wish you all the best in the battle – stay safe.

JGAR moves to open access!

ISAC is delighted to announce that as of January 2020, the *Journal of Global Antimicrobial Resistance (JGAR)* is now a fully open access journal with no subscription charges!

Authors publishing in JGAR can make their work immediately, permanently, and freely accessible to researchers worldwide.

JGAR authors will pay an article publishing charge (APC), have a choice of license options, and retain copyright to their published work.

[Visit the website for more information.](#)

ICC – GCCMID Abstracts

Abstracts from the 31st International Congress of Antimicrobial Chemotherapy – 4th Gulf Congress of Clinical Microbiology and Infectious Disease have now been published in the *Journal of Infection and Public Health*. [Read all abstracts for free!](#)



International Society of Antimicrobial Chemotherapy
www.ISAC.world

Grant Opportunity

Applications for ISAC Project Grants are now open

- Applications for £5,000 - £10,000 invited to support low-resource research projects
- It's easy to apply
- Only principal applicant needs to be from an ISAC Member Society
- One country must be a low- to middle-income country

Deadline to submit extended to 1 September 2020
Apply at: <https://www.isac.world/funding/isac-project-grants>

32nd International Congress of Antimicrobial Chemotherapy (ICC)

ISAC is delighted to announce that the 32nd ICC will be held in Perth, Australia from 21 – 24 November 2021. The ICC will be co-hosted with the ISAC Member Society, the Australian Society for Antimicrobials (ASA).

To register your interest, please visit www.32ICC.org.

Global survey on "Influenza-like" symptoms and work-related behaviour

ISAC's Infection Prevention & Control (IPC) Working Group published the results

of their global survey on "Influenza-like" symptoms and work-related behaviour among healthcare workers and other professionals and found worryingly, many workers continue to work when sick—even when showing symptoms like fever.

The international survey shows that most workers would continue to work when sick with flu-like symptoms, according to the study published in PLOS ONE

[Read More >](#)



32nd International Congress of Antimicrobial Chemotherapy

PERTH, WESTERN AUSTRALIA
21 – 24 November 2021



International Society of Antimicrobial Chemotherapy
www.ISAC.world

Co-Hosted by
The Australian Society for Antimicrobials

www.32ICC.org

In Memoriam

All of us at APUA / ISAC were deeply saddened to learn of the passing of four eminent and highly respected colleagues. Our thoughts are with their families and colleagues.

Adel Fahad Al Othman (1964—2020)



Dr Adel Al-Othman passed away suddenly earlier this month, June 2020, in Saudi Arabia.

The ISAC Executive Committee had the pleasure of working with Dr Al-Othman over the course of two years when he took on the role of Co Programme Chair of the 31st International Congress of Antimicrobial Chemotherapy (ICC) – 4th Gulf Congress of Clinical Microbiology and Infectious Disease (GCCMID) in Dubai, November 2019. Dr Al-Othman was pivotal in helping ISAC bring the ICC to the Gulf Region, a first in ISAC history. For this, ISAC is very grateful.

Dr Al-Othman graduated in medicine in 1989 and joined the Department of Internal Medicine in King Fahad City-National Guard in 1990. He then got a scholarship in Canada in 1992 to specialise in internal medicine and infectious diseases. He obtained Canadian Fellowships in Internal Medicine in 1996 and in Infectious Diseases in 1998. He returned as a consultant in the Department of Internal Medicine and Infectious Diseases at King Abdulaziz Medical City - National Guard in Riyadh in 1998 until his death.

Dr Al-Othman held many important positions in Saudi Arabia and was also a member of several local, regional and international committees and societies, including: Royal Canadian College of Physicians, Canadian Society of Internal Medicine and Infectious Diseases, American Society for Infectious Diseases, European Society for Infectious Diseases, American Society for Medicinal Epidemiology. He was a member of many Saudi societies and committees in the field of infectious diseases, and he was distinguished in the field of AIDS control, infectious diseases of the weak immune, hospital infection and antibiotics, and medical and clinical scientific research. He was also a member of several charities such as the Manna Charity Association.

Keiichi Hiramatsu (1950—2020)

Prof. Keiichi Hiramatsu passed away on 5 June 2020 after a long battle with leukaemia. He was originally diagnosed in 2004 and returned to research, carrying on with his work with renewed vigour before succumbing to the illness.

Prof. Hiramatsu was well known to ISAC, having received ISAC's Hamao Umezawa Memorial Award (HUMA) in 2013 for his outstanding contributions to antimicrobial chemotherapy. In 2019, Prof. Hiramatsu was one of the first recipients of the ISAC Fellow Award which is bestowed upon individuals who excel in their field.



Having graduated from Tokyo University Medical School in 1975, Professor Hiramatsu studied internal medicine (1975-1978). He then engaged in research on immunology (1978-1983) and retrovirology (1984-1988) before commencing MRSA research at Juntendo University. Latterly, he was Emeritus Professor, Microbiology Director, Center of Excellence for Infection Control Science.

He will be best known for his achievements in MRSA research including: development of a rapid PCR detection method for MRSA now used in Europe and the USA (1996), discovery of the first VISA Mu50 and hetero-VISA Mu30 (1997) and identification of SCCmec types I~III from healthcare-associated MRSA (HA-MRSA) and types IV, V from community-associated MRSA (CAMRSA) (1999~2004). He was the first to sequence *S. aureus* (N315, Mu50) (2001) and CA-MRSA MW2 (2002). He also proposed thickened cell wall and 'peptidoglycan clogging' as a mechanism for vancomycin resistance in VISA strains (2003~2007) and discovered the origin of *mecA* gene in *S. fleurettii* (2010).

In 2008, during the screening of natural antibiotics, he re-discovered nybomycin as a 'Reverse Antibiotic (RA)' for quinolone resistance.

In 2010, he was elected as a Fellow of American Academy of Microbiology and in 2012, he became the director of newly established Research Centre for Infection Control Science at Juntendo University.

In Memoriam

Giuseppe Cornaglia (1958 - 2020)



Giuseppe Cornaglia receives the APUA Leadership Award

Giuseppe Cornaglia was well known to us all at both ISAC and APUA and will be missed very much.

Giuseppe Cornaglia took office as ESCMID president following the 17th ECCMID in Munich. He was ESCMID president from 2007-2009, and again from 2010-2012. He played a hugely significant role in the history of ESCMID, guiding it through a period of transformation, widening its global reach and introducing several key strategic initiatives. Relationships with other major international and national, non-European societies and organisations in the field flourished under his leadership.

ISAC had a special relationship with Giuseppe as he was ESCMID President when ISAC and ESCMID held joint ICC – ECCMID congresses in Munich (2007) and Milan (2011).

Giuseppe received the APUA Leadership in 2011 Award to recognise ESCMID and Dr Cornaglia for their invaluable work in establishing effective expert study groups and educational initiatives in developing countries to control antibiotic resistance and improve treatment.

[Read More >](#)

Jacques F. Acar (1931 – 2020)

Prof. Acar began his career as an infectious disease specialist at Hôpital Claude Bernard, Paris, France and then trained in microbiology at the Pasteur Institute and Harvard Medical School. Prof. Acar became Professor in Clinical Microbiology at Université Pierre et Marie Curie in Paris and led the research unit on antimicrobial resistance at the university as well as the laboratory for medical microbiology at the Hospitals of Saint Joseph and Broussais in Paris.

Jacques F. Acar was a founder member and former President of the ISID (International Society of Infectious Diseases) and one of the founding members of the European Society of Clinical Microbiology and Infectious Diseases (ESCMID).

Prof. Acar was prolific in the fight against antimicrobial resistance. In the 1970s, together with Prof. Thomas O'Brien, he established one of the earliest systems of antimicrobial resistance surveillance in hospitals. In 1981, when APUA was founded, he became a member of the scientific advisory board. Under the auspices of ESCMID, different study groups were launched to study antibiotics and bacterial resistance – he founded the European Study Group for Antibiotic Resistance (ESGAR) along with Prof. F. Baquero and Prof. G. Cornaglia. Latterly, he still worked for the Advisory Group on Integrated Surveillance of Antimicrobial Resistance (AGISAR) and as a senior expert at the World Organization for Animal Health (OIE).

