jpiamr
Joint Programming Initiative
on Antimicrobial Resistance

Contextual information on the how the digital world can help fight AMR | Hacking AMR 2019

AMR and Digital World

- Lack of information technology (IT) infrastructure is often cited as a barrier to AMR Research. (Barrier to develop tools to better control AMR or to AMR stewardship).
- Need to find innovative approaches in low resources settings (limited access to technology, need for training on how to use tools).
- Artificial Intelligence systems to monitor or predict the spread of pathogens, to help diagnose patients, to rapidly identify the nature of the infection.
- There are few open access software options that might support an IT infrastructure for AMR surveillance (as WHONET Software, Epi Info , HELICSWin.Net).
- IT systems should support regular communication between central and local levels to enable feedback, improved data quality, and acceptance by users.
- The recent digital transformation in certain hospital settings gives access to real-time lab results, digital prescriptions, electronic clinical decision support for accurate and timely diagnosis – It can be brought forward to help with outbreak probabilities, pathogen predictions, underlying condition of patients.
- «Telehealth involves the use of telecommunications and virtual technology to deliver health care outside of traditional health-care facilities. Telehealth, which requires access only to telecommunications, is the most basic element of *eHealth*, which uses a wider range of information and communication technologies (ICTs)» It improves access to clinical services, specialists, education, particularly valuable in rural and remote locations.
- IT solutions must be flexible in a rapidly changing situation where information needs, sources, and technology continue to evolve.
- IT systems should be associated with continuous communication between central and local levels to improve feedback, procedures, and acceptability by local users.
- IT systems can facilitate surveillance where there are requirements of relevant and timely information to be optimised.
- Digital world can help collect data and report on antimicrobial usage.
- Digital world can facilitate studies on cost analysis and burden of AMR.
- Use of accessible and curated dashboards can influence prescribers.
- Consider technical components required to run the technology, such as electrical power – technology should help plan better for the medical needs of residents who

rely on electricity dependent medical devices because these devices can fail during long power outages in case of emergency situations.

Although the below examples are human centric, most of them can be transposed under the *One Health* approach in Human, Animal and Environment.

Examples of where IT systems can help in the fight against AMR

- Mobile applications
    – Dosing calculators
    – Antibiograms
    – Medication intake reminders
    – Educational 'games/challenges' (app or video game) about hygiene and AMR to create awareness among the general public (particularly for countries where patients could self-purchase antibiotics).
    – Stewardship app customisable to local prescribing guidelines for hospital physicians.

- 'Smart' medication packaging
    – i.e. smart blister packs that capture patient intake data and can remind patients of next dose, could also connect to a mobile app, data could be transferred and accessed by physician.

- Electronic medication management
    – Formularies
    – Electronic antimicrobial approval systems - Approving medicines for indications
    – Dissemination of disease-or medication-based guidelines
    – Education (programs, webinar, videoconferencing)
    – Reports
    – Veterinary medicines records to ensure that animal products for human use are safe and free from veterinary drug residues; to show legitimate source for veterinary drugs; timely tracking of treatment for animals https://www.hants.gov.uk/business/tradingstandards/businessadvice/animalhealth/veterinarymedicine

- Electronic healthcare record
    – Error alerts (allergy, dosing, drug-drug interactions)
    – Sepsis risk prevention
    – e-prescribing and repeat prescriptions
        o Dosing
        o Alerts
    – Medication reconciliation
    – Dispensing
    – Low inventory
    – Administration protocols for nurses and physicians

- AMR alerts in real-time
- Antibiotic waste/pollution

- Tech for recording antibiotic use in animals
  - Electronic records of vet prescriptions?
  - Apps for farmers to report antibiotic use
- Trends and outbreaks alerts
  - Compiling data through health app to identify source of food borne outbreak
- Surveillance
  - Connecting or transferring data from patients' diagnostic test results into surveillance programmes (low and middle-income countries).
  - Using IA to identify trend in infection pattern to predict next outbreak or track the transmission pattern (using IA with genomic data tracking resistance gene).
  - Keeping track of where the animals come from when they are sold between different farms is important to track spread of disease including resistant bacteria.
- Electronic infection prevention surveillance systems
  - Registration and monitoring app for hospital or nursing home infections
- Innovative platform for scientists to share data (social media platform like Twitter but more sophisticated and geared to sharing data)
  - Or an innovative mechanism that could be embedded within an existing social media platform (digital solutions to engage Silicon Valley)
- Data analysis techniques
- Integration between pharmacy and microbiology labs
- At the pharmacy…
  - Tests/educational e-tools for patients as part of counselling with pharmacist.
- Telehealth
  - Live, audio and video interactive links for clinical consultations and education.
  - Storage of digital images, video, audio and clinical data for secure transmission and use in remote clinics.
  - Teleradiology and telepathology for remote reporting and clinical advice for diagnostic tests.
  - Telehealth services and equipment to monitor people's health in their homes.
  - Remote consultations help protect patients who are susceptible to developing resistant strains of infections and stop spreading germs in a waiting room…
  - Peer-to-peer information exchange.
- Awareness
  - Behaviour change for patients, public and prescribers (physicians and veterinarians).
  - Increase awareness and commitment of governments and the private sector.
  - https://antibioticguardian.com

Reference links

Global Antimicrobial Resistance Surveillance System (WHO GLASS)
https://www.who.int/glass/en

ReACT https://www/reactgroup.org/toolbox

https://www.safetyandquality.gov.au/sites/default/files/migrated/Chapter4-Information-technology-to-support-antimicrobial-stewardship.pdf

https://www.who.int/sustainable-development/health-sector/strategies/telehealth/en/

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5391533/

https://www.phe.gov/Preparedness/news/events/anniversary/Pages/digital.aspx

https://www.bmj.com/content/358/bmj.j3781

https://www.who.int/ehealth/about/en/

Antibiotic use calculators, e.g. AMC Tool & Antimicrobial use calculator.

Biocheck.ugent (risk-based scoring system to evaluate on-farm biosecurity in a scientific and an independent way)

Medicines Quality Database

Outbreak Database – Worldwide Database for Nosocomial Outbreaks

ProMED-mail, the Program for Monitoring Emerging Diseases

An interesting video showing an available tool that uses metadata to provide information in a wide variety of health-related fields – possible to search for AMR and clinical research or funding source, or biobanks, etc.
DISQOVER.com https://www.youtube.com/watch?v=1oCCGqRg8xw

Hacking Health Global Sparkboard https://hackinghealth.sparkboard.com