

Symposium on Advanced Infection Control 2020

For All Healthcare Professionals



THEME ON

Webinar on

19 - 20 Nov 2020

**ANTIBIOTIC
STEWARDSHIP
PROGRAMME**



醫院感染
IN HOSPITAL
INFECTIONS
Infection Disease Control
Training Centre
傳染病控制培訓中心

16:30 - 17:15

Experience in UK: Development and implementing a national ASP

17:15 - 18:00

Experience in UK: E- learning global education in ASP



Prof. Dilip NATHWANI

Emeritus Honorary Professor of Infection, the University of Dundee from Scotland

E-LEARNING GLOBAL EDUCATION SOLUTIONS IN ASP

DILIP NATHWANI

NOVEMBER 2020

Hong Kong Strategy and Action Plan on Antimicrobial Resistance 2017-2022

Figure 7: Framework of Hong Kong Strategy and Action Plan on Antimicrobial Resistance



Objective 5

Implement and enhance training in prescribing antimicrobials through antibiotic stewardship programme in human health sector





香港抗菌素耐藥性策略及行動計劃

The Hong Kong Strategy and Action Plan on Antimicrobial Resistance

Homepage	About AMR	Strategic Framework
For General Public	For Healthcare Workers	Press Releases & Publications
Activities to Combat AMR	Health Education Materials	Related Links

- Guidelines and Resources
 - Reducing bacterial resistance with IMPACT, 5th edition, Hong Kong
 - [Antibiotic Stewardship Programme in Primary Care](#)
 - Infection Control Corner
- "I-pledge" certificate for responsible use of antibiotics

1. EDUCATION- INVESTMENT, KEY DRIVER IN TACKLING AMR AND AMS DELIVERY- SCALING UP GLOBALLY

ANTIBIOTIC NEED AND PRESCRIBING IS A HUMAN BEHAVIOUR



**Human behavior flows from three
main sources: desire, emotion,
and knowledge.**

Plato

WHAT ABOUT INVESTMENT IN CURRENT AND INNOVATIVE EDUCATION SOLUTIONS ?



No other investment yields as great a return as the investment in education. An educated workforce is the foundation of every community and the future of every economy.

— *Brad Henry* —

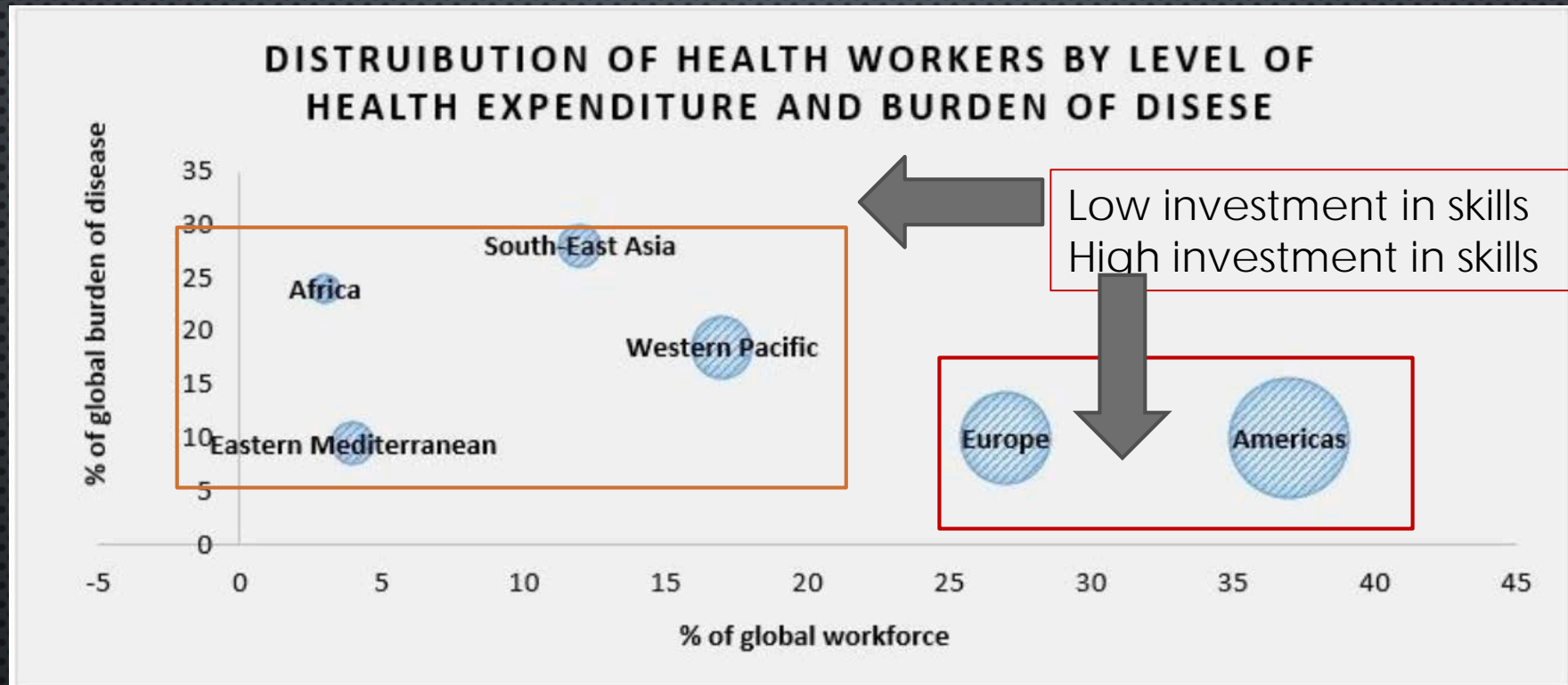
AZ QUOTES

WHY INVEST IN EDUCATION AND TRAINING ?

- DRIVERS OF ECONOMIC GROWTH :
 - 1. PUBLIC INFRASTRUCTURE INVESTMENT
 - 2. EDUCATION AND TRAINING
 - 3. R&D
 - 4. HEALTHCARE

“ For one Euro of general government expenditure in public investment [eg education] increases the gross domestic product (GDP) by an average of 30 to 80 Cents.”

Horn, G. A.; Gechert, S.; Rietzler, K.; Schmid, K. D. 2014: Streitfall Fiskalpolitik: Eine empirische Auswertung zur Höhe des Multiplikators, IMK Report, No. 92.

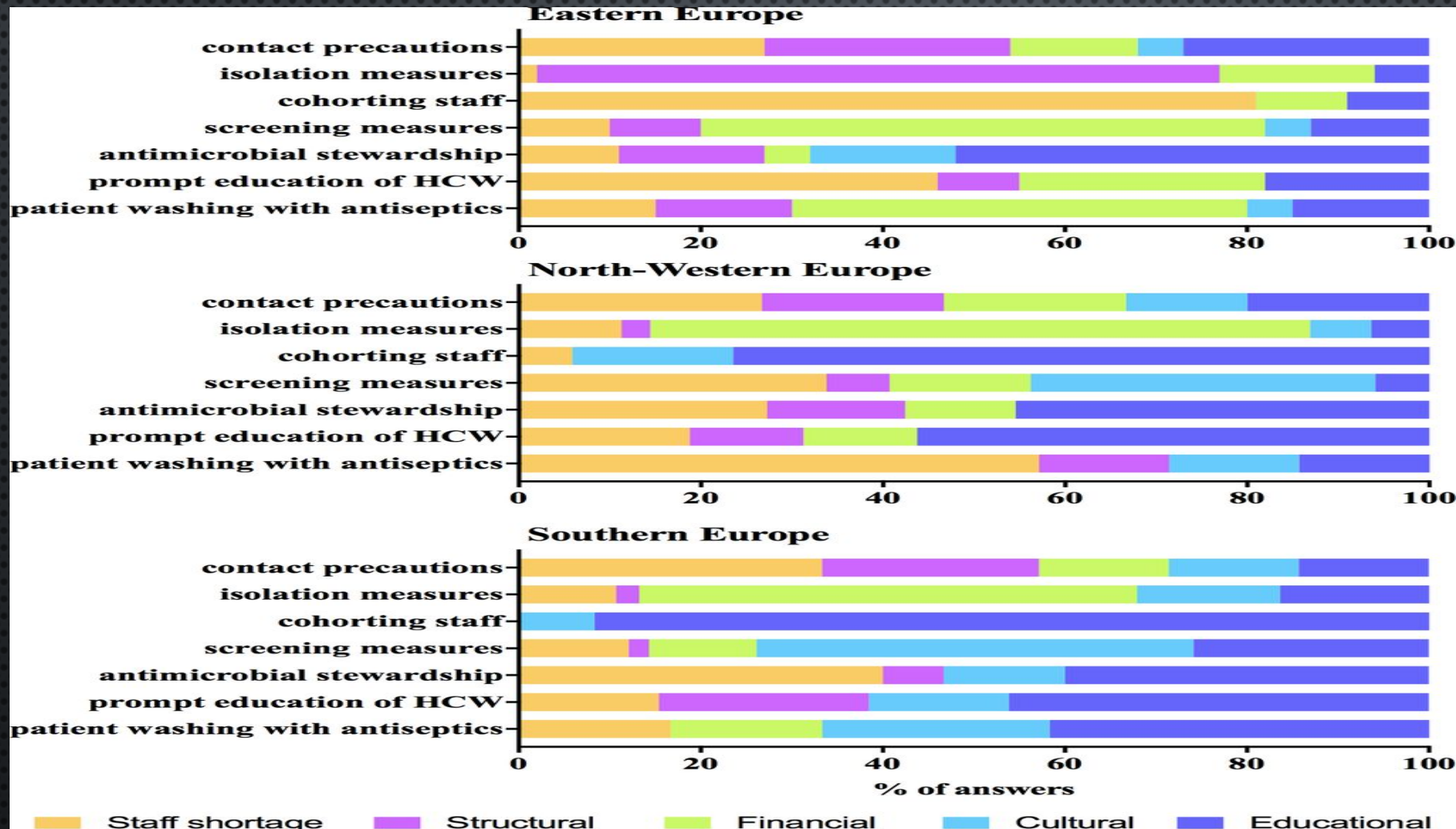


Distribution of health workers by level of health expenditure and burden of diseases, for WHO regions.
(Size of dots is proportional to health expenditure)

Image: WHO

Main reasons for low compliance with IPC & AMS- education a key factor

Evelina Tacconelli et al. BMJ Open 2019;9:e027683



AMS: STRUCTURE + PROCESS = OUTCOMES

Developing core elements and checklist items for global hospital antimicrobial stewardship programmes: a consensus approach

C. Pulcini ^{1,2,*}, F. Binda ^{1,2,3}, A.S. Lamkang ⁴, A. Trett ⁴, E. Charani ⁵, D.A. Goff ⁶, S. Harbarth ⁷, S.L. Hinrichsen ⁸, G. Levy-Hara ⁹, M. Mendelson ¹⁰, D. Nathwani ¹¹, R. Gunturu ¹², S. Singh ¹³, A. Srinivasan ¹⁴, V. Thamlikitkul ¹⁵, K. Thursky ¹⁶, E. Vlieghe ^{17,18,19}, H. Wertheim ²⁰, M. Zeng ²¹, S. Gandra ⁴, R. Laxminarayan ^{4,22}

Core elements:

1. Senior hospital management leadership towards AMS
2. Accountabilities and responsibilities
3. Available expertise on infection management
4. **Education and practical training**
5. Other actions aiming at responsible antimicrobial use
6. Monitoring and surveillance (on a continuous basis)
7. Reporting and feedback (on a continuous basis)

Box 4

Core element 4: Education and practical training

Checklist item 4.1:

Does your hospital offer a range of educational resources to support staff training on how to optimize antimicrobial prescribing?

Accompanying comment: *These resources can be developed locally or not, and can use multiple formats*

Checklist item 4.2:

Do the antimicrobial stewardship team members receive regular training in antimicrobial prescribing and stewardship?

Accompanying comment: *This training is usually not offered at the hospital level, but likely to be at a regional, national or international level. The hospital should however ensure that members of the antimicrobial stewardship team are adequately trained, according to local/regional/national requirements*

Suggested citation. Antimicrobial stewardship programmes in health-care facilities in low- and middle-income countries. A practical toolkit. Geneva: World Health Organization; 2019.
Licence: CC BY-NC-SA 3.0 IGO.

WHO TOOLKIT CHECKLIST

HEALTH-CARE FACILITY CORE ELEMENTS

Yes

No

4. EDUCATION AND TRAINING

18. Basic training in optimal antibiotic use for health-care professionals

The health-care facility offers basic induction training (e.g. sensitization on AMR and use of standard treatment guidelines) to staff on how to optimize antibiotic prescribing, dispensing and administration.

☐☐

19. Continued training in optimal antibiotic use for health-care professionals

The health-care facility offers continued educational resources (e.g. regular training on infection management) to train staff on how to optimize antibiotic prescribing, dispensing and administration.

☐☐

20. Initial and regular training of the AMS team in infection management

The health-care facility offers initial and regular training of the AMS team in infection management (diagnosis, prevention and treatment) and AMS. This training is usually not offered at the facility level, but is likely to be available at the regional, national or international level. The facility should, however, ensure that members of the AMS team are adequately trained, according to local/national requirements.

☐☐

What is the likely training budget for an average healthcare facility ?

The average training budget for large companies was \$19.7 million, while midsize companies allocated an average of \$2.1 million, and small companies dedicated an average of \$355,721.

Divide in training resources between private and public sector

The transformative potential of e-learning

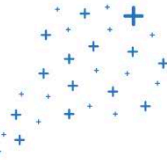
The transformative potential of e-learning enables education and training to become more learner-centred, interprofessional, outcome- and practice-focused, workplace-based, equitable, collaborative across education and training providers, and scalable at greater efficiency without compromising effectiveness. E-learning can accelerate the development of the right skills at the required scale to achieve universal health coverage and respond to emerging disease threats.

A review of e-learning studies found that computer- and web-based e-learning methods are as effective for building health worker knowledge and skills as traditional learning methods.⁸⁰ A global consortium of over 50 researchers and experts is conducting 12 systematic reviews. Preliminary findings suggest that e-learning is at least as effective as traditional forms of education for health professionals; and that, for example, serious gaming or gamification interventions and virtual reality environments have significant potential advantages over traditional methods in knowledge and skills acquisition. Further studies with more robust methodologies are required to determine the impact of e-learning on learning outcomes.

Recommendation: Harness the power of cost-effective information and communication technologies to enhance health education, people-centred health services, and health information systems.

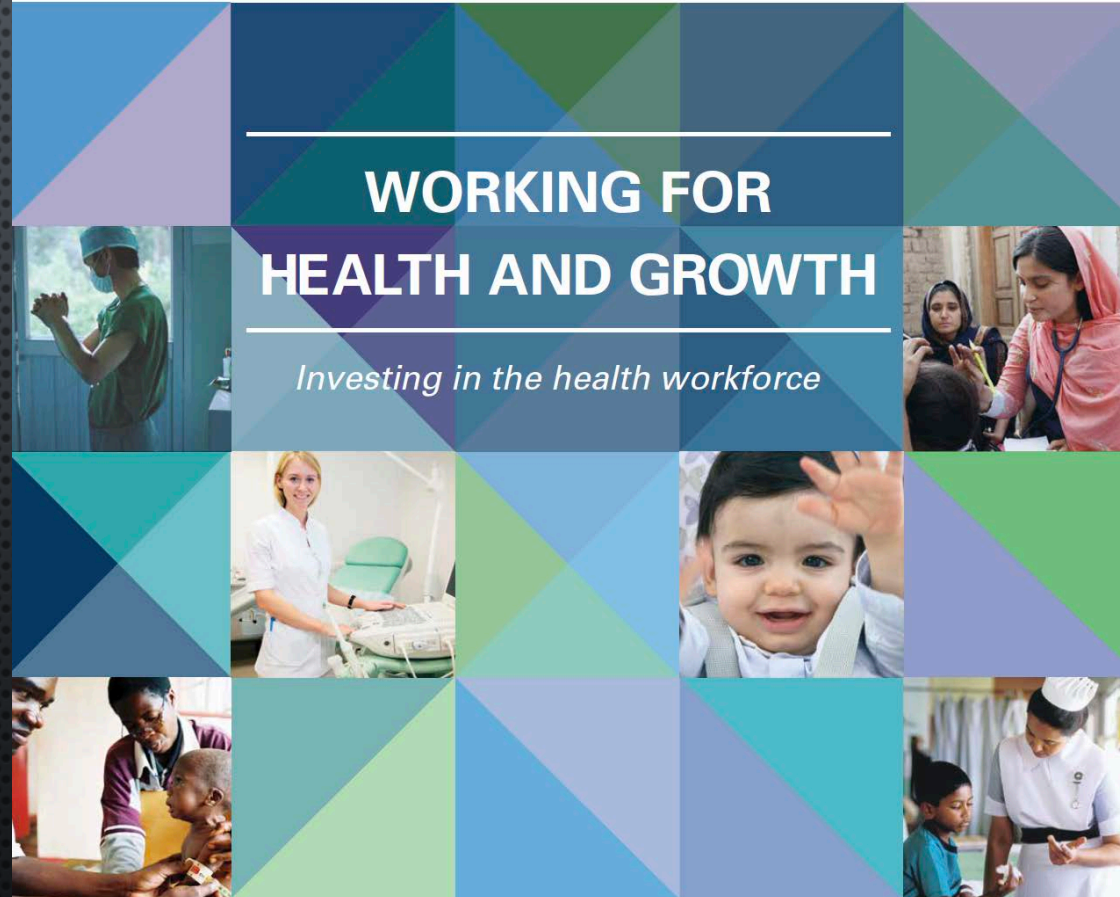


High-Level Commission on Health Employment and Economic Growth



WORKING FOR HEALTH AND GROWTH

Investing in the health workforce





**WHO COMPETENCY FRAMEWORK
FOR HEALTH WORKERS' EDUCATION
AND TRAINING ON ANTIMICROBIAL
RESISTANCE**



AMBITION TO PROVIDE UNIVERSAL TRAINING IN AMR TO HCPS'S

In 2015, the World Health Organization (WHO) launched the global action plan to fight antimicrobial resistance (AMR). The first objective of the plan calls for measures to improve health workers' education and training on AMR.

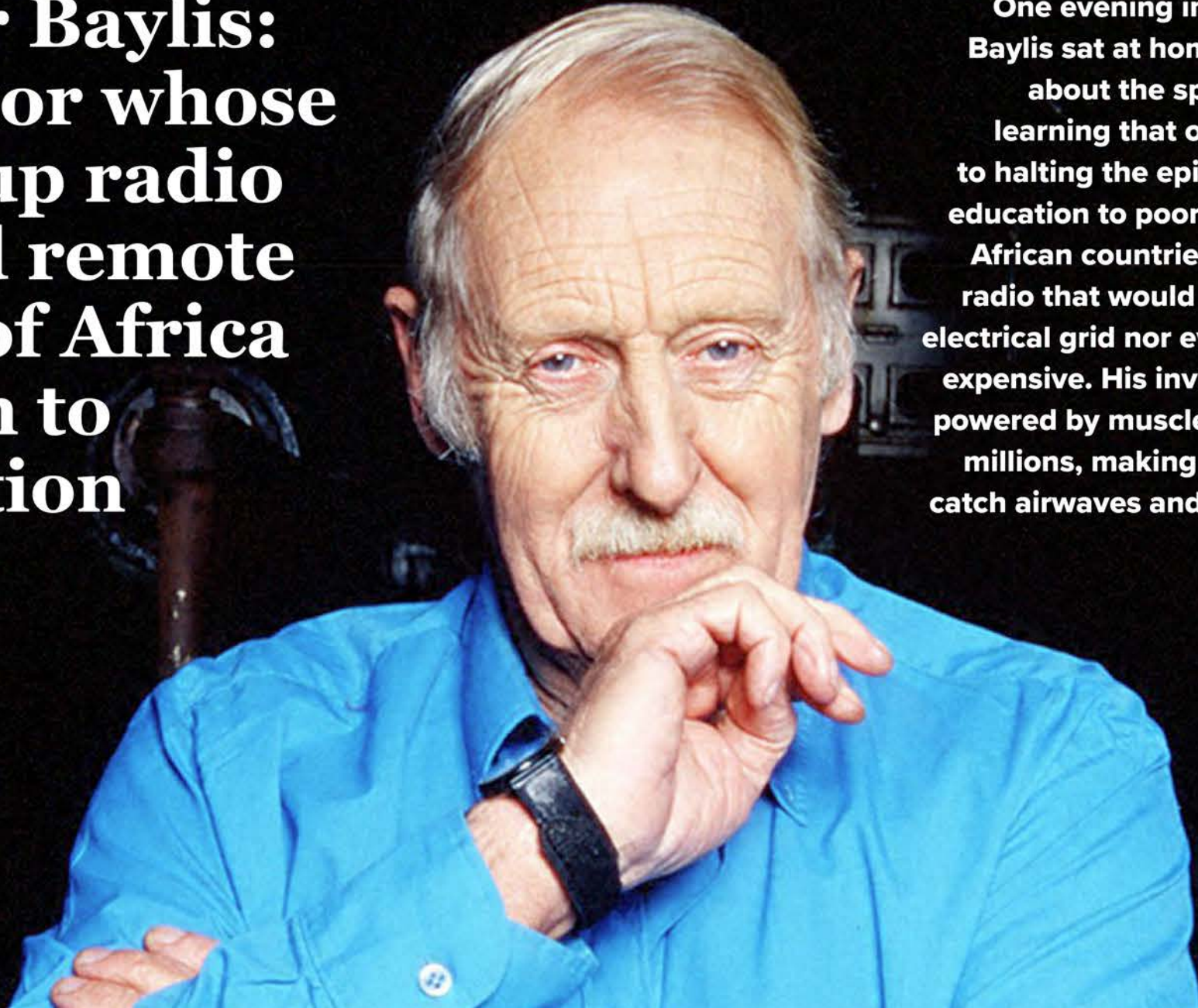
This WHO competency framework for health workers' education and training on AMR provides foundational normative guidance to help countries ensure that health workers are properly equipped with the competencies they need to combat the spread of AMR. Target users of this document include pre-service and in-service health education and training institutions; accreditation and licensing bodies; and health policy- and decision-making authorities.

2. EDUCATION- INNOVATION, E-LEARNING- WHAT IS IT, GROWTH AND VALUE

INNOVATION

EDUCATIONAL INNOVATIONS IN TIMES OF CRISIS

Trevor Baylis: Inventor whose wind-up radio helped remote parts of Africa tune in to education



One evening in the autumn of 1991, Trevor Baylis sat at home, watching a documentary about the spread of Aids in Africa. Upon learning that one of the greatest obstacles to halting the epidemic was extending health education to poor and remote communities in African countries, he set about developing a radio that would require neither access to an electrical grid nor even to batteries, which were expensive. His invention, a radio that could be powered by muscle alone, changed the lives of millions, making it easier than ever before to catch airwaves and all the treasures they carry.

COVID-19 Impact on Education

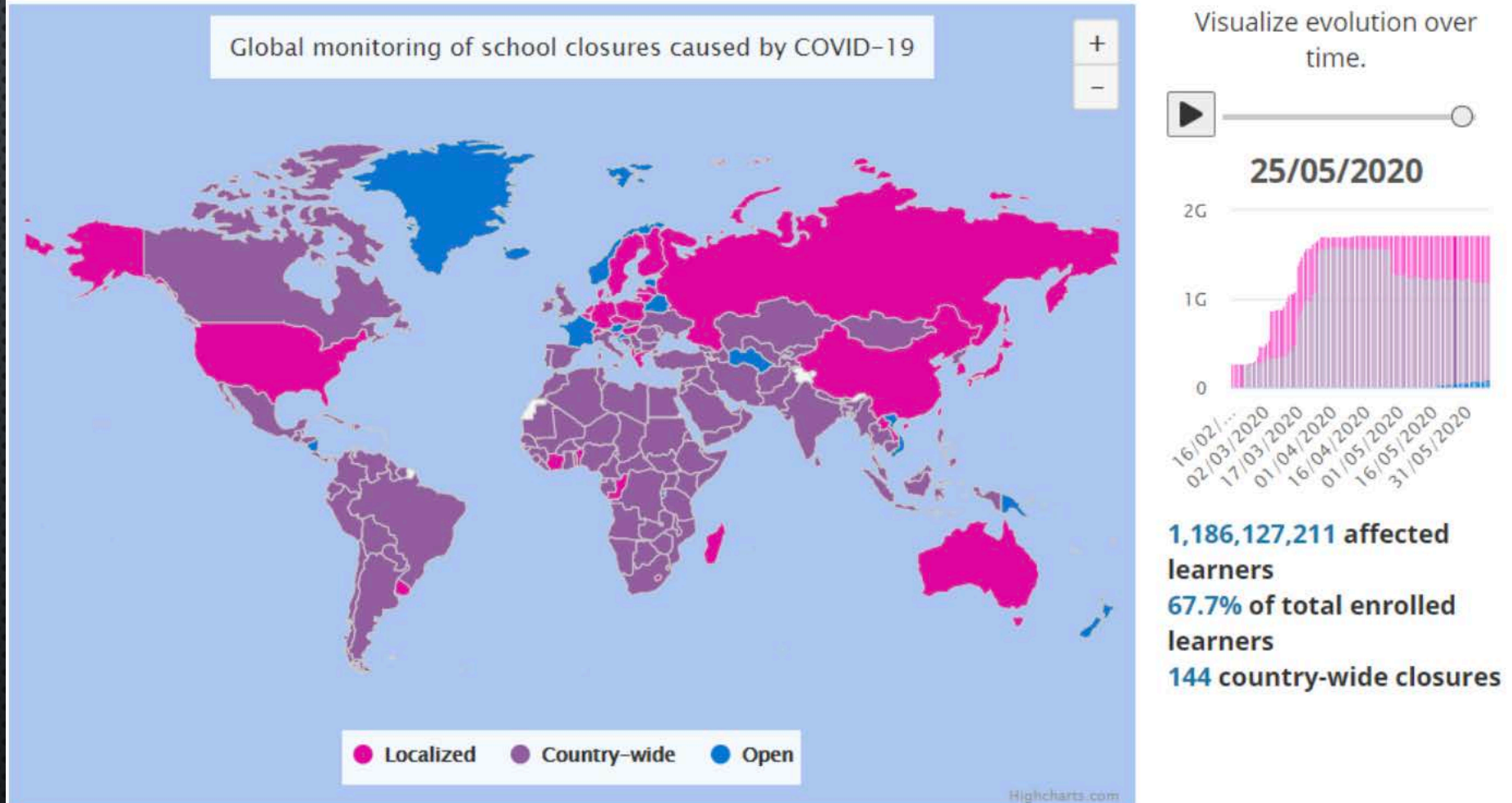


Figure 1: Screenshot of interactive dashboard created by UNESCO.

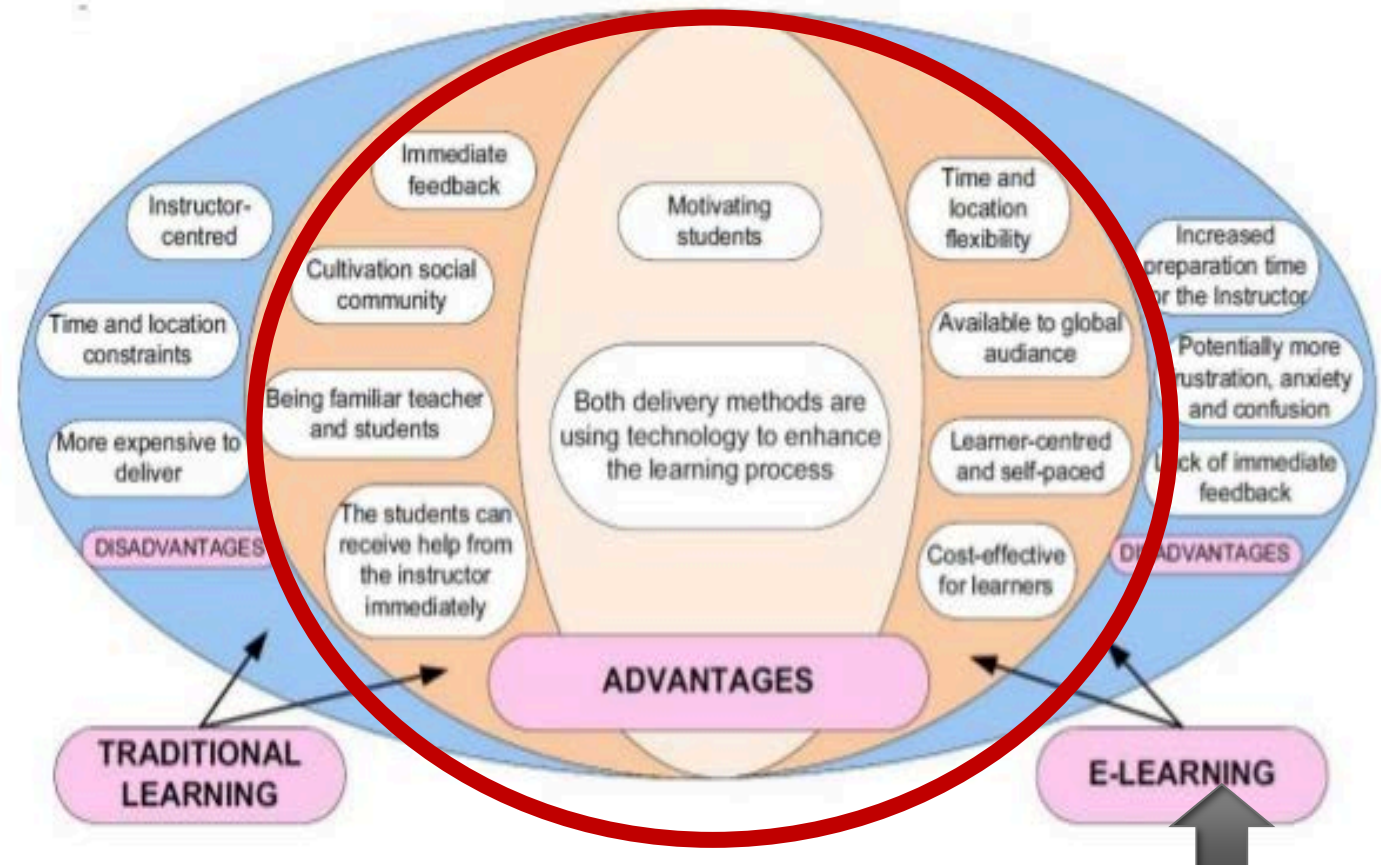
What is E-Learning?

- E-learning refers to the use of Internet Technology to deliver and enhance knowledge, skills and know-how.
- It is a new approach to learning where the Learner has control over What, When and Where he/she Learns.
- E-learning can be an initiated program in a corporation, institution or at individual level

Focus on Learner

- Designing, developing, delivering and assessing learning

Traditional Learning & E-Learning & Blended Learning



(Source: Nina Bencheva, 2010)

3 ways the coronavirus pandemic could reshape education



1. Education - nudged and pushed to change - could lead to surprising innovations

The slow pace of change in academic institutions globally is lamentable, with centuries-old, lecture-based approaches to teaching, entrenched institutional biases, and outmoded classrooms. However, COVID-19 has become a catalyst for educational institutions worldwide to search for innovative solutions in a relatively short period of time.

To help slow the virus' spread, students in Hong Kong started to [learning at home, in February, via interactive apps](#). In China, 120 million Chinese got access to learning material through [live television broadcasts](#).

Other simpler - yet no less creative - solutions were implemented around the globe. In one Nigerian school, standard asynchronous online learning tools (such as reading material via Google Classroom), were augmented with synchronous face-to-face video instruction, to help preempt school closures.

2. Public-private educational partnerships could grow in importance

In just the past few weeks, we have seen learning consortiums and coalitions taking shape, with diverse stakeholders - including governments, publishers, education professionals, technology providers, and telecom network operators - coming together to utilize digital platforms as a temporary solution to the crisis. In emerging countries where education has predominantly been provided by the government, this could become a prevalent and consequential trend to future education.

In China, the Ministry of Education has assembled a group of diverse constituents to develop a new [cloud-based, online learning and broadcasting platform](#) as well as to upgrade [a suite of education infrastructure](#), led by the Education Ministry and Ministry of Industry and Information Technology.

3. The digital divide could widen

Most schools in affected areas are finding stop-gap solutions to continue teaching, but the quality of learning is heavily dependent on the level and quality of digital access. After all, only around [60% of the globe's population is online](#). While virtual classes on personal tablets may be the norm in Hong Kong, for example, many students in less developed economies rely on lessons and assignments sent via WhatsApp or email.

Moreover, the less affluent and digitally savvy individual families are, the further their students are left behind. When classes transition online, these children lose out because of the cost of digital devices and data plans.

Unless access costs decrease and quality of access increase in all countries, the gap in education quality, and thus socioeconomic equality will be further exacerbated. The digital divide could become more extreme if educational access is dictated by access to the latest technologies.

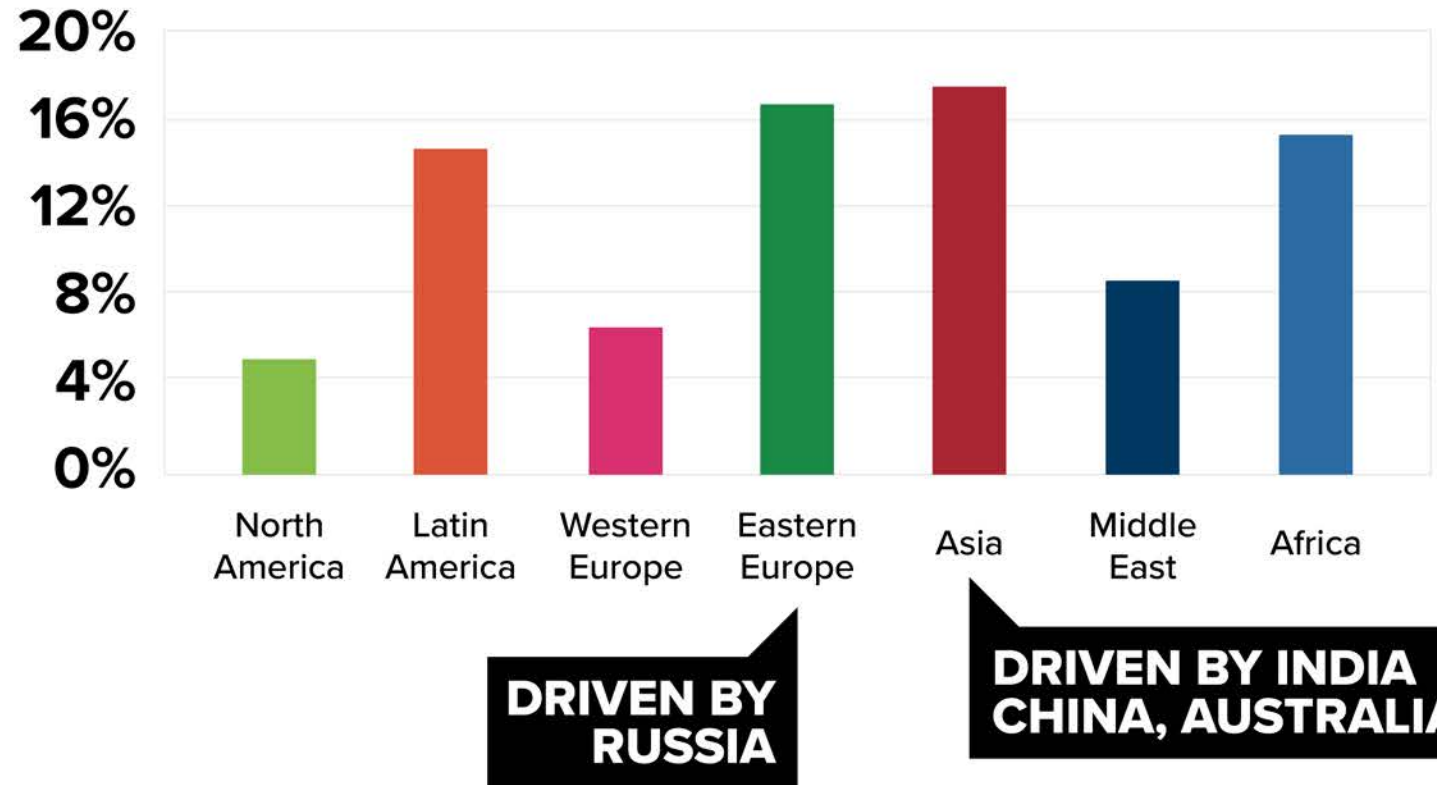
"Resilience must be built into our educational systems"

—Gloria Tam & Diana El-Azar, Minerva Project

China a key driver of the rise and rise of the e-learning industry



Growth by region



Global overview of E-learning industry

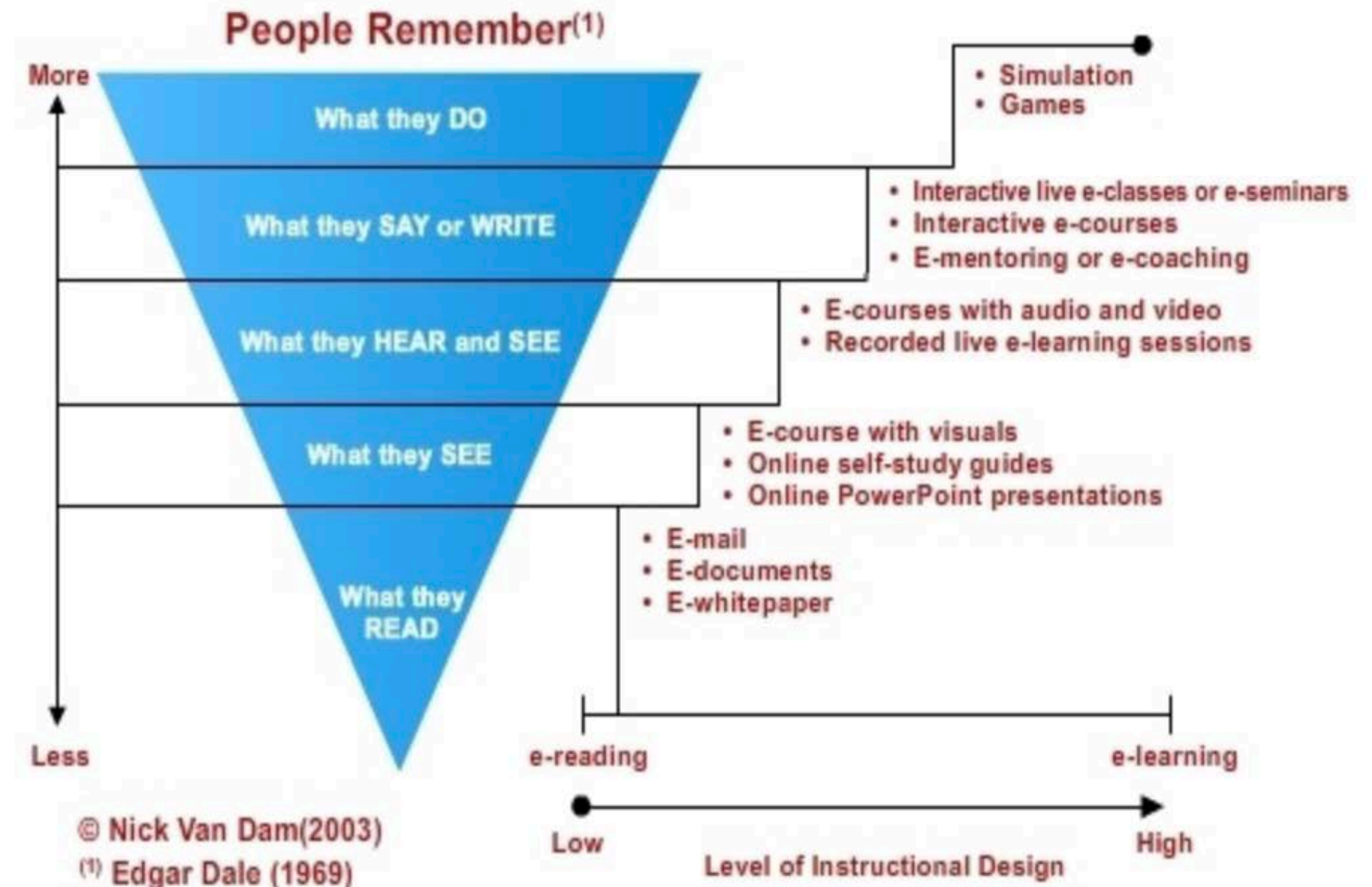
Source: Docebo E-learning market trends and forecast 2014-2016 report

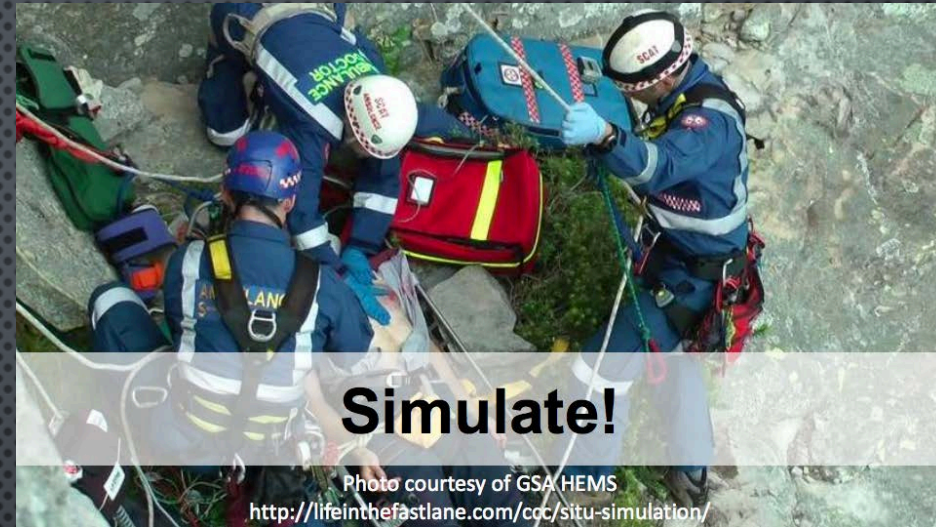
LEARNING DESIGN APPROACH TO E-LEARNING

How do we learn?



-William Glasser





Nothing
replaces the
bedside
mentor

Photos of Sir William Osler from
www.collectionscanada.gc.ca



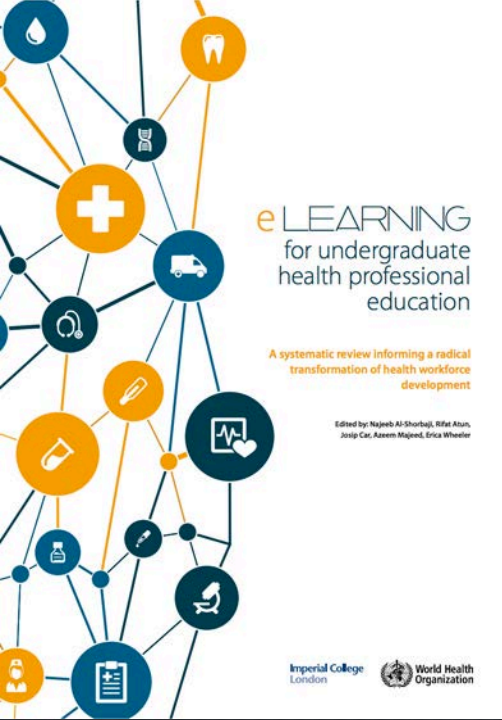
Tacit knowledge
sharing



#4

Make competency
(not time) matter





Practice and policy implications

Implementation

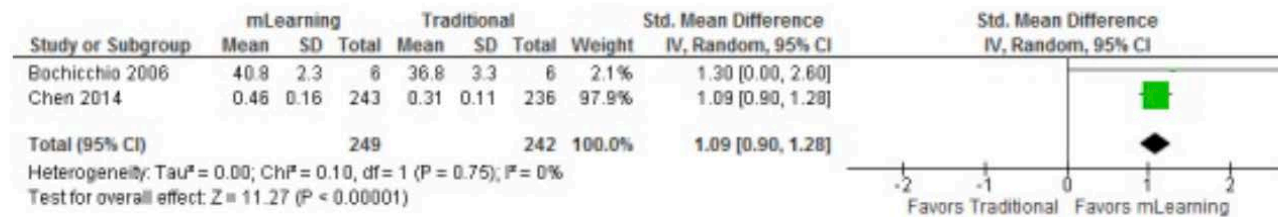
The potential seen in eLearning is high, especially since it may change the way we see education by:

- reducing the costs associated with delivering educational content;
- facilitating the development and scalability of educational interventions;
- breaking down the geographical and temporal barriers that limit access to, and availability of, education;
- improving access to relevant experts and novel curricula;
- allowing for personalization of eLearning based on learner behaviour;
- facilitating “immersive learning” through augmented reality and 3D learning environments;
- ubiquitous learning through mobile learning and cloud learning environments (1–4).

- implementing a systems approach to allow for a holistic analysis of the implementation and adoption process in diverse contexts and settings;
- building eLearning into the workforce through the appointment of eLearning champions and learning technologists, and the provision of professional development opportunities;
- ensuring ownership of, and responsibility for, eLearning innovations, providing a coordinated approach for decision-making at all levels of the institution;
- maximizing technology with the existing infrastructure and building on institutional strengths when implementing eLearning interventions;
- introducing policies at institutional, regional and national levels to ensure accessibility to eLearning platforms and broadband connectivity as well as policies to promote the eLearning in diverse contexts to ensure equitable distribution and availability.

Health Professions Digital Education on Antibiotic Management: Systematic Review and Meta-Analysis by the Digital Health Education Collaboration

[J Med Internet Res](#). 2019 Sep; 21(9): e14984.



Forest plot for postintervention knowledge outcome (mobile digital education vs traditional education). mLearning: mobile learning; IV: inverse variance.

Conclusions

Findings from studies deploying mobile or online modalities of digital education on antibiotic management were complementary and found to be more cost-effective than traditional education in improving clinical practice and postintervention knowledge, particularly in postregistration settings. There is a lack of evidence on the effectiveness of other digital education modalities such as virtual reality or serious games. Future studies should also include health care professionals working in settings other than primary care and low- and middle-income countries.

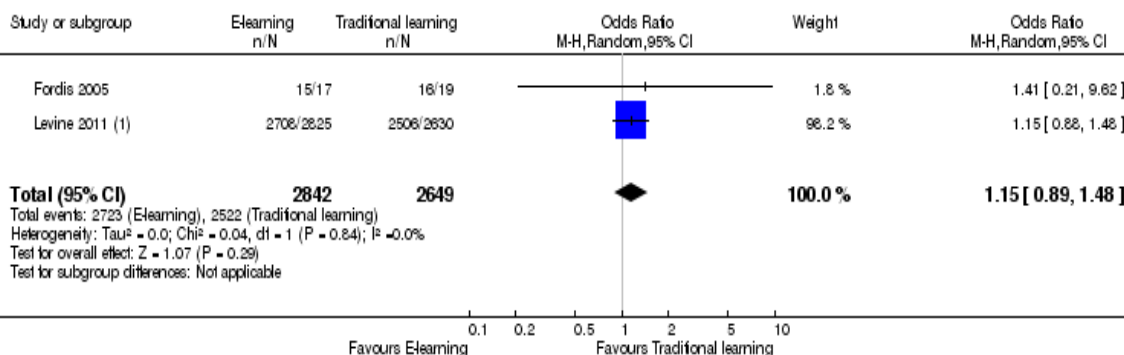
E-learning for health professionals (Review)

Vaona A, Banzi R, Kwag KH, Rigon G, Cereda D, Pecoraro V, Tramacere I, Moja L

Review: E-learning for health professionals

Comparison: 1 Behaviours

Outcome: 2 Patients appropriately treated (Fordis 2005 - treatment for dyslipidaemia; Levine 2011 - statin prescription)



(1) Fordis appropriate treatment for dyslipidaemia; Levine statin prescription

Vaona A, Banzi R, Kwag KH, Rigon G, Cereda D, Pecoraro V, Tramacere I, Moja L.

E-learning for health professionals.

Cochrane Database of Systematic Reviews 2018, Issue 1. Art. No.: CD011736.

DOI: 10.1002/14651858.CD011736.pub2.

www.cochranelibrary.com

Is e-learning more effective than traditional learning for health professionals?

What is the aim of this review?

The aim of this Cochrane Review is to find out whether e-learning, that is, interactive online educational programmes, is more effective than traditional learning (with no access to e-learning) in licensed health professionals for improving patient outcomes or health professionals' behaviours, skills and knowledge. Cochrane researchers collected and analysed all relevant evidence to answer this question and identified 16 studies.

Key messages

When compared to traditional learning, e-learning may make little or no difference for improving patient outcomes or health professionals' behaviours and knowledge, and it is uncertain whether it improves or reduces health professionals' skills.

Authors' conclusions:

When compared to traditional learning, e-learning may make little or no difference in patient outcomes or health professionals' behaviours, skills or knowledge. Even if e-learning could be more successful than traditional learning in particular medical education settings, general claims of it as inherently more effective than traditional learning may be misleading.

The Effectiveness of Blended Learning in Health Professions: Systematic Review and Meta-Analysis

(*J Med Internet Res* 2016;18(1):e2) doi: [10.2196/jmir.4807](https://doi.org/10.2196/jmir.4807)

Conclusions: Blended learning appears to have a consistent positive effect in comparison with no intervention, and to be more effective than or at least as effective as nonblended instruction for knowledge acquisition in health professions. Due to the large heterogeneity, the conclusion should be treated with caution.

STRENGTHS

- 1. Time flexibility**
- 2. Location flexibility**
- 3. Catering to wide audience**
- 4. wide availability of courses & content**
- 5. Immediate feedback**

WEAKNESSES

- 1. Technical Difficulties**
- 2. Learner's capability & confidence level**
- 3. Time Management**
- 4. Distractions, frustration, anxiety & confusion**
- 5. lack of personal/physical attention**

Journal of Educational Technology
Systems

2020, Vol. 49(1) 5–22

OPPORTUNITIES

- 1. Scope for Innovation & digital development**
- 2. Designing flexible programs**
- 3. Strengthen skills: problem solving, critical thinking, & adaptability**
- 4. Users can be of any age**
- 5. An innovative pedagogical approach (Radical transformation in all aspects of education)**

CHALLENGES

- 1. Unequal Distribution of ICT Infrastructure**
- 2. Quality of Education**
- 3. Digital Illiteracy**
- 4. Digital Divide**
- 5. Technology cost & Obsolescence**

3. EDUCATION- AMS AND E- LEARNING : COMPETENCY FRAMEWORK, CURRICULUM, IMPACT

Health professionals for a new century: transforming education to strengthen health systems in an interdependent world

Julio Frenk*, Lincoln Chen*, Zulfiqar A Bhutta, Jordan Cohen, Nigel Crisp, Timothy Evans, Harvey Fineberg, Patricia Garcia, Yang Ke, Patrick Kelley, Barry Kistnasamy, Afaf Meleis, David Naylor, Ariel Pablos-Mendez, Srinath Reddy, Susan Scrimshaw, Jaime Sepulveda, David Serwadda, Huda Zurayk

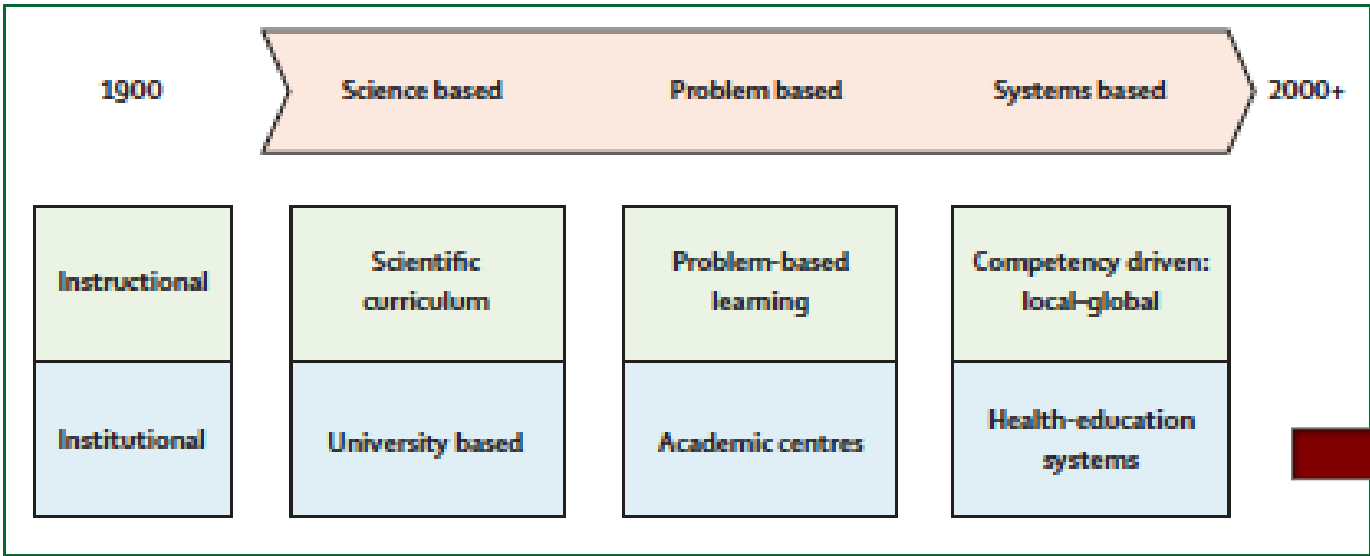


Figure 5: Three generations of reform

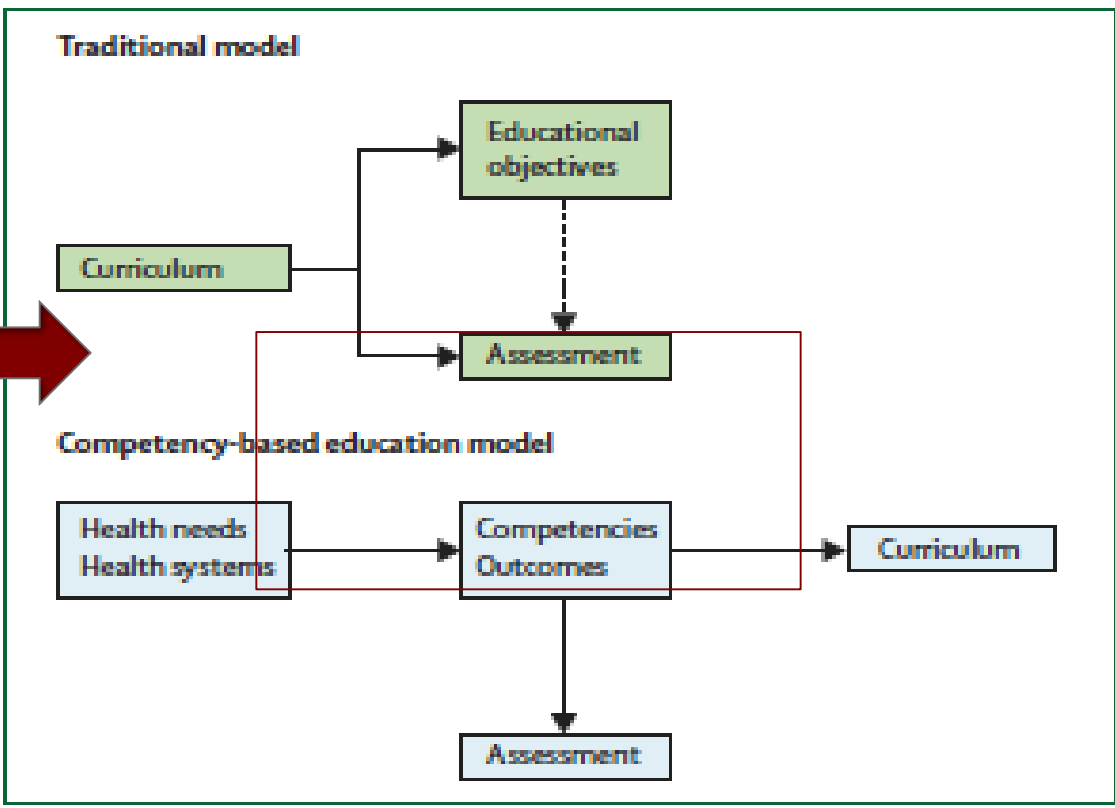


Figure 9: Competency-based education

MILLER'S FRAMEWORK FOR CLINICAL ASSESSMENT

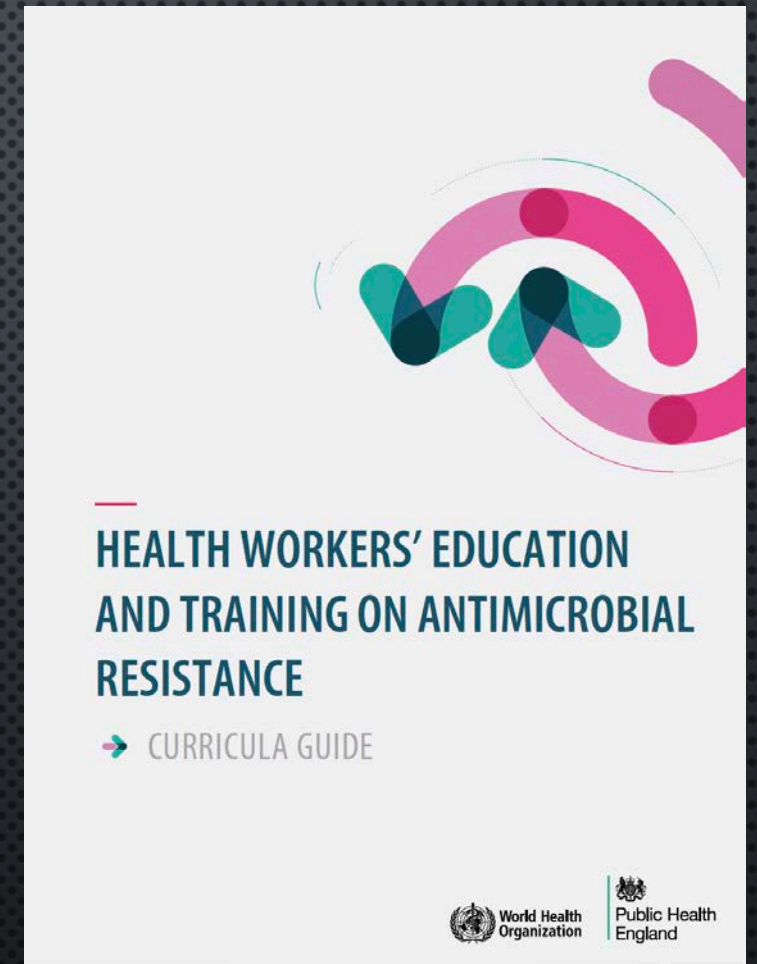
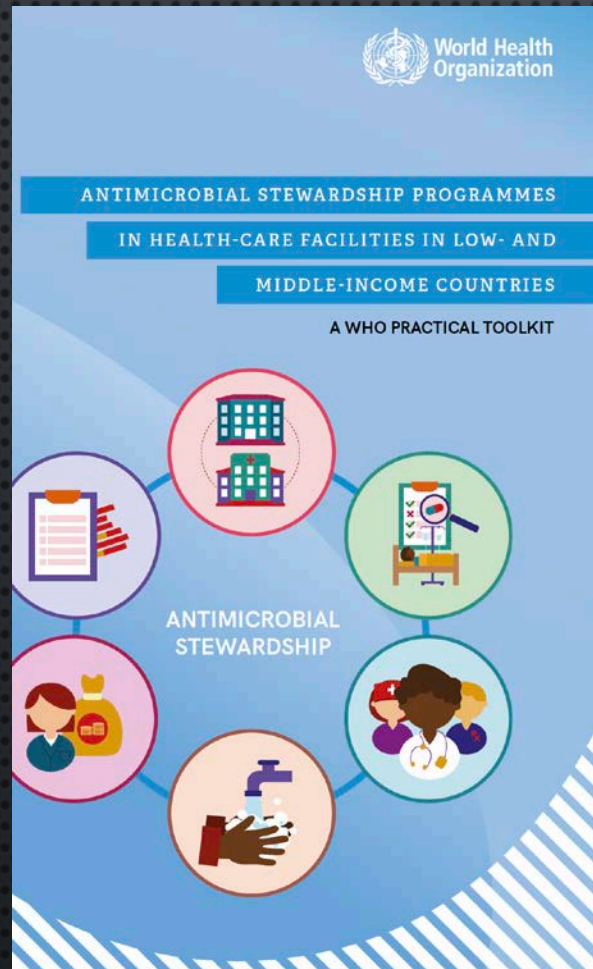
DOES
(Action)

SHOWS HOW
(Performance)

KNOWS HOW
(Competence)

KNOWS
(Knowledge)

WHO RESOURCES 2018-2019



The framework is configured in a tabular matrix format, containing core and additional AMR competencies, which have been organized across four domain areas and four categories of health workers. The domain areas include: foundations that build awareness of antimicrobial resistance, appropriate use of antimicrobial agents, infection prevention and control (IPC), and diagnostic stewardship and surveillance. The four categories of health worker groupings identify competencies that are required for: all health workers, prescribers, non-prescribers and public health officers/health services managers. This framework provides users with a reference tool to guide the analysis, framing and adaptation of locally relevant education and training materials on AMR.



TOPICS FOR COMPETENCY

- **A: INTRODUCTION TO ANTIMICROBIAL RESISTANCE (AMR)**

GLOBAL SITUATION OF AMR AND AMS; DRIVERS OF AMR; WASH AND IPC; CALL FOR ACTION

- **B: ANTIBIOTICS DIFFERENT ANTIBIOTIC CLASSES**

PK/PD, FORMULATIONS AND PATIENT CHARACTERISTICS, PRESCRIBING PRINCIPLES, PROPHYLAXIS, EMPIRIC, DEFINITIVE THERAPY AND DRIVERS OF EXCESS AMU, BEST PRESCRIBING PRACTICE AND ANTIBIOTIC STEWARDSHIP PRINCIPLES, DOCUMENTATION AND COMMUNICATION ON AB PRESCRIPTION AND USE, ALLERGIES, CROSS-REACTION, ADVERSE EFFECTS; ESSENTIAL MEDICINES LIST AND AWARE CATEGORIES

- **C: MICROBIOLOGY**

IMPORTANT TERMS, COMMON CAUSATIVE AGENTS AND RESISTANCE MECHANISMS, DATA COLLECTION AND ANALYSIS, SELECTIVE SENSITIVITY REPORTING, BUG-DRUG COMBINATION CHART, ANTI-BIOGRAM

- **D: CLINICAL SYNDROMES**

GUIDANCE AND BEST PRACTICE IN ANTIBIOTIC PRESCRIBING, COMMON INFECTIONS

- **E: ANTIBIOTIC STEWARDSHIP**

- PLAN ASP, PERFORM ABS INTERVENTIONS, ASSESS ASP

WHO COMPETENCY FRAMEWORK FOR HEALTH WORKERS' EDUCATION AND TRAINING ON ANTIMICROBIAL RESISTANCE



Sample joint vision statement for fighting AMR

We, the health care workers, accept the responsibility to improve patient care and health outcomes by protecting against the emergence and spread of antimicrobial resistance for patients and society, now and in the future. We shall achieve this goal by acquiring and maintaining the competencies related to AMR control including through improving leadership, awareness, knowledge, skills, attitudes and behavioural change regarding the appropriate prescription, dispensing and use of antimicrobials, and implementing better infection prevention and control and diagnostic stewardship.

Antimicrobial resistance domains ^a	Category 1: All health workers ^b	Category 2: Prescribers ^c	Category 3: Non-prescribers ^d			Category 4: Public health officers/health services managers ^e
			Nurses	Pharmacists	Laboratory scientists/technicians	
Appropriate use of antimicrobial agents Competency statement: Health worker demonstrates that they have the knowledge and understanding, according to their field and level of expertise, to facilitate optimal and safe use of antimicrobial agents for management of infections.	Relevance: High Knowledge: 1. Understand that antimicrobials have different resistance potential (AWaRE categories). 2. Understand the specific roles of other health care workers. 3. Understand the consequences (intended and unintended) of the use of antimicrobial therapy in humans. Skills: 1. Ensure effective management of antimicrobials (according to scope of practice) in infection therapy. Attitudes: 1. Encourage patient and peer professional interactions on antimicrobial prescription and therapy. 2. Ensure timely and appropriate feedback to prescribers and other care groups. 3. Willingness to participate in quality improvement programmes for antimicrobial use. 4. Willingness to communicate the risk of development and transmission of AMR spread within and outside of multidisciplinary antimicrobial teams.	Relevance: High Knowledge: 1. Diagnosis of disease including the ability to discriminate diseases of different infectious pathology. 2. Indication for antimicrobial therapy, including assessment of the severity of the infection (sepsis syndrome recognition) to inform urgency for therapy. 3. Understand that travel, recent hospitalization or previous microbiology findings of resistant bacteria are factors that predispose to colonization/infection with a resistant pathogen. 4. Understand common drug interactions between antimicrobials and other therapeutic agents, and between antimicrobials and food. Understand their clinical significance and the strategies to avoid interactions. 5. Appreciate the risk, benefits and limitations of the antimicrobial treatment in the context of the patient and setting. 6. Understand the concept of broad- and narrow-spectrum antibiotics and the importance of avoiding their unnecessary use, especially those with broad-spectrum activity. 7. Understand the use of antimicrobials in special care groups (e.g. paediatrics, pregnancy, breastfeeding, renal diseases and obese persons). 8. Understand the mechanisms of actions of the different antimicrobial drugs classes. 9. Understand how to develop a hospital formulary.	Relevance: High Knowledge: 1. Understand nurses' role in the therapeutic management of infectious diseases. Skills: 1. Administer and record antimicrobial medicines use including review of dose/time for accuracy. 2. Perform allergy checks. 3. Update clinical and laboratory results including renal function results, drug levels, and preliminary/final microbiology results. 4. Monitor and report adverse events of antimicrobial treatment. 5. Interact with other members of the stewardship team to promote optimal antimicrobial treatment in patients (teamwork). Attitudes: 1. Educate patients and family, and perform discharge teaching.	Relevance: High Knowledge: 1. Understand the significance of efficacy data for clinical benefit for each indication (magnitude of benefit estimated in clinical trials). 2. Pharmacokinetics: route of therapy, concept of bioavailability, dosing frequency, therapeutic drug monitoring and clearance. 3. Pharmacodynamics: tissue/organ adverse effects (e.g. abnormal liver function tests, renal toxicity). 4. Allergy: immediate, non-life threatening, severe adverse drug reactions (e.g. Steven Johnson Syndrome). Skills: 1. Assess prescriptions in accordance with local policies for antimicrobial use. 2. Review antimicrobial choice, dose, interval, duration and route of administration. 3. Give advice on dosage form, preparation and administration (especially for special patient cohorts such as children). 4. Counsel individuals and populations on the safe and rational use of antimicrobials (including the selection, use, contraindications, storage, drug interactions and side effects). 5. Accurately dispense prescribed antimicrobials for major and minor infections.	Relevance: Average Knowledge: 1. Understand the use of the antibiogram in detecting and reporting AMR patterns in settings where antibiograms are commonly used. Skills: 1. Recognize common mechanisms of resistance within an institution for different antimicrobial/organism combinations. Understand their impact on resistance to other antimicrobials. 2. Conduct antibiotics spectrum of activity analysis using the antibiogram to help determine the antibiotic agent of highest efficacy. Attitudes: 1. Provide laboratory users with guidance on the most appropriate tests and their limitations. 2. Ensure ready access to the tests and communication of results to clinicians – optimize clinical liaison. 3. Ensure timeliness in the handling of microbiology samples and communication of susceptibility results.	Relevance: Average Knowledge: 1. Understand where and how to search/retrieve best scientific evidence to support optimal use and therapy. 2. Understand the importance of promoting appropriate antimicrobial use according to their AWaRE categories, in order to implement specific resistance-prevention actions for these antimicrobials. Skills: 1. Develop a systematic approach to antimicrobial prescribing and design interventions to address gaps. 2. Assess needs and respond to antimicrobial shortages. 3. Address issues related to the availability of antimicrobials including the accelerated registration of quality, cost-effective essential antimicrobials as well as the use of good review practices (GRVP). Attitudes: 1. Advocate for a conducive environment and management structure that prioritizes antimicrobial stewardship and encourages accountability for best practices on actions to improve appropriate antimicrobial use in hospitals and community settings. 2. Ensure a regular supply of essential antimicrobials. 3. Ensure the availability of adequate human and material resources for delivering health care.

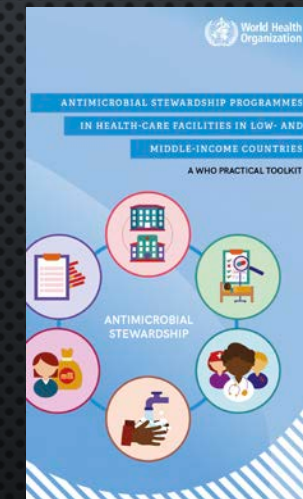
Table 1. Educational strategies to promote appropriate use of antibiotics

Category	Strategy
Passive	Printed educational materials delivered to clinician by mail or electronically.
	Clinical practice guidelines handed out by hospital.
	Traditional continuing medical education (formal didactic lectures, seminars, and conferences).
	Educational courses.
Active	Discussion groups for health professionals working in same facility.
	Personal visit by trained health professional (educational outreach visits and academic detailing).
	Interactive role-playing, hands-on-training, problem and case solving, and educational workshops or conferences outside provider's setting.
	Sequenced education sessions (learn-work-learn).

¹ A meta-analysis of the effectiveness of continuing medical education (CME) showed that active methods had a medium effect on prescribing behavior ($r = 0.33$) while passive methods had a small effect ($r = 0.20$) (Mansouri and Lockyer 2007). A review of studies testing interventions that changed the proportion of visits at which patients were prescribed antibiotics in ambulatory care showed a median effect of 12.9 percent (interquartile range 8.1–19.2 percent) for active education interventions versus 7.0 percent (interquartile range 3.0–10.1 percent) for passive education interventions (Ranji et al. 2008). Other reviews, however, found that passive education interventions had no effect (Arnold and Straus 2005; Satterlee et al. 2008). r = correlation (Pearson correlation effect sizes: 0.10 = small, 0.24 = medium, and 0.37 = large)

Category	Method
Passive	<ul style="list-style-type: none"> Printed educational materials Clinical practice guidelines Formal lectures Seminars, conferences Educational courses Reminders
Active	<ul style="list-style-type: none"> Discussion groups, journal clubs Educational outreach visits and academic discussions Audit and feedback Interactive role play, case scenarios, interactive educational workshops Sequenced educational sessions (learn-work-learn), learning by working (practice) Distance learning, e-learning

https://cddep.org/wp-content/uploads/2017/06/policy_brief_11_0_8.pdf



B,C,D > A,E



DELIVERING TRAINING: A COMPLEX RANGE OF INTERACTIONS



1. IDENTIFY COMPETENCIES

2. TYPES OF TEACHING SESSIONS/METHODS- LECTURES, TRAIN THE TRAINER WORKSHOPS, CBD'S, AUDIT/QI-FEEDBACK, M&M, SEA, COMPLAINTS ETC

3 TRAINING PLAN AND TEACHING CONTENT

4. VEHICLE OF DELIVERY/METHOD - FACE TO FACE, E-LEARNING, HYBRID OR BLENDED

5. LEVERS FOR PARTICIPATION- CPD, CERTIFICATION/ACCREDITATION, OTHER INCENTIVES

An international cross-sectional survey of antimicrobial stewardship programmes in hospitals

P. Howard^{1*}, C. Pulcini^{2,3}, G. Levy Hara⁴, R. M. West⁵, I. M. Gould⁶, S. Harbarth⁷ and D. Nathwani⁸ on behalf of the ESCMID Study Group for Antimicrobial Policies (ESGAP) and ISC Group on Antimicrobial Stewardship

Table 1. Summary of validated returns by continent

	Africa, n (%)	Asia, n (%)	Europe, n (%)	North America, n (%)	Oceania, n (%)	South and Central America, n (%)	Total, (n)
Number of countries returning questionnaires	10 (15)	14 (20)	26 (38)	5 (7)	2 (3)	12 (17)	67 ^a
Hospital returns by continent	44 (7)	50 (8)	361 (55)	72 (11)	30 (5)	103 (16)	660
Mean hospital returns by country (range)	4 (1–13)	3 (1–9)	12 (1–104)	15 (1–35)	15 (13–17)	7 (1–39)	8 (1–104)
Median hospital returns by country	2	2	8	9	15	4	3

^aRussia and Turkey had hospitals in both Europe and Asia.

- ◆ 96% of doctors received training, 94% pharmacists, 46% nurses
- ◆ Mainly face to face
- ◆ E-learning < 17%

Article

The State of Education and Training for Antimicrobial Stewardship Programs in Indian Hospitals—A Qualitative and Quantitative Assessment



Sanjeev Singh ^{1,*†}, Esmita Charani ^{2,†}, Chand Wattal ³, Anita Arora ⁴, Abi Jenkins ⁵ and Dilip Nathwani ⁶

Antibiotics **2019**, *8*, 11; doi:10.3390/antibiotics8010011

Table 2. Preferred methods of E&T for Antimicrobial Stewardship (AMS). Likert score range was 1 (Least preferred) to 5 (highly preferred).

E&T Methods	No of Respondents		Mean Likert Score
	Induction	Follow-Up	
Face-to-face lectures or presentation	25	15	3.87
Face-to-face workshops or seminars	10	9	4.31
Work-place teaching e.g., workbooks or portfolios	10	9	4.28
On the job' learning from practice	19	12	4.45
Web-based or e-learning	2	2	3.64
Mixed Methods (face to face interview + E learning)	7	4	4.40
Total	28	17	51

Education and management of antimicrobials amongst nurses in Africa—a situation analysis: an Infection Control Africa Network (ICAN)/BSAC online survey



Andre N. H. Bulabula^{1,2*}, Abi Jenkins³, Shaheen Mehtar^{1,2} and Dilip Nathwani⁴

J Antimicrob Chemother **2018**; *73*: 1408–1415

Ways the AMS education was delivered during employment

The dominant methods of AMS teaching reported were ‘on-the-job learning’ (71.3%, 62/87) and ‘face-to-face formal classes or presentations’ (70.1%, 61/87). Mixed methods of teaching (e.g. e-learning and workshops) were reported by 33.3% (29/87), face-to-face ‘hands-on’ workshops by 26.4% (23/87), work-based teaching (e.g. workbooks or portfolios of evidence) by 29.9% (26/87) and web-based e-learning by 9.2% (8/87). The education was provided *ad hoc* in 52.3% (45/86) or once a year in 19.8% (17/86).

Future training in AMS

Notably, 95.4% (164/172) of respondents said they would have liked further education/training in AMS. The preferred method for future training [based on a Likert scale (‘strongly like’)] was ‘hands-on’ workshop (53.8%, 77/143) and mixed methods (e.g. e-learning and workshops; 49.6% 68/137), followed by face-to-face classes or presentations 46.9% (67/143) and ‘on-the-job’ learning 46% (62/135). The least preferred methods for respondents to this survey were web-based or e-learning (38.2%, 47/123) delivered in isolation and work-based teaching, e.g. workbooks or portfolios of evidence (31%, 39/126). The topics of interest were developing

RESEARCH

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Mapping educational opportunities for healthcare workers on antimicrobial resistance and stewardship around the world

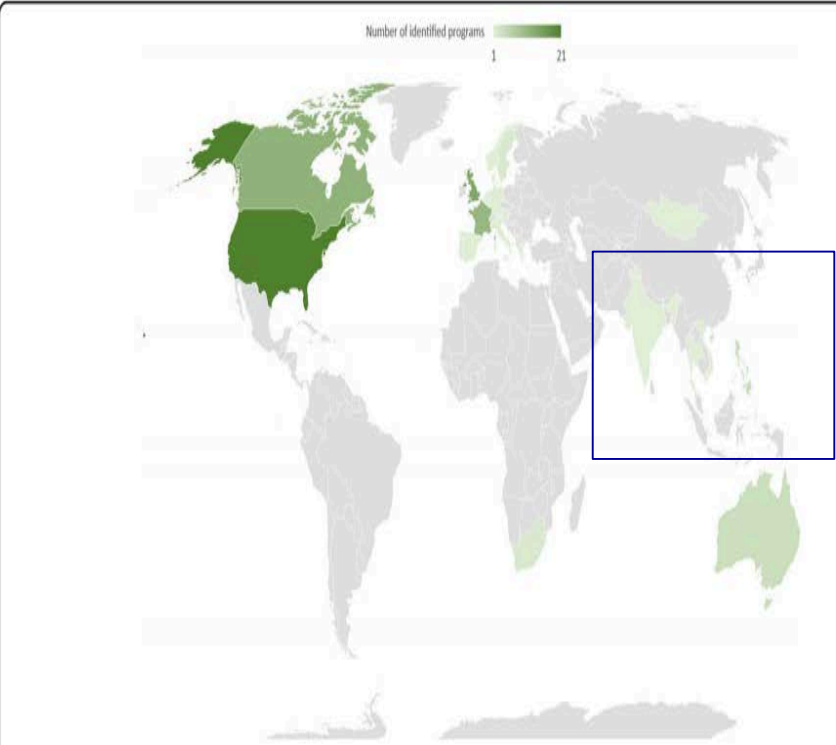


Fig. 4 Map of AMR education programs by region. Map was generated using Microsoft Excel and Bing



Fig. 1 Number of identified AMR education programs by program type

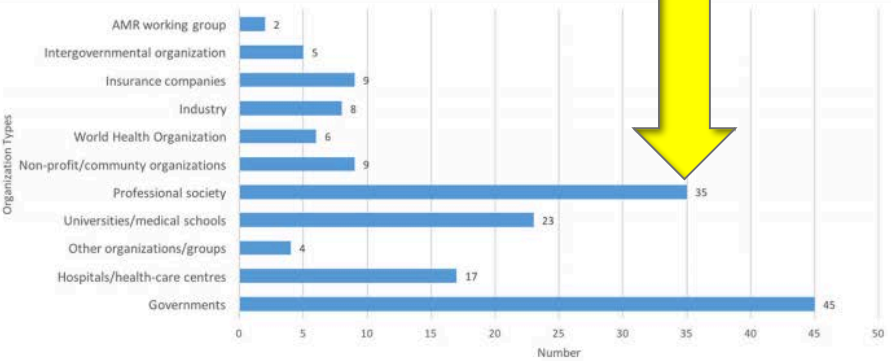
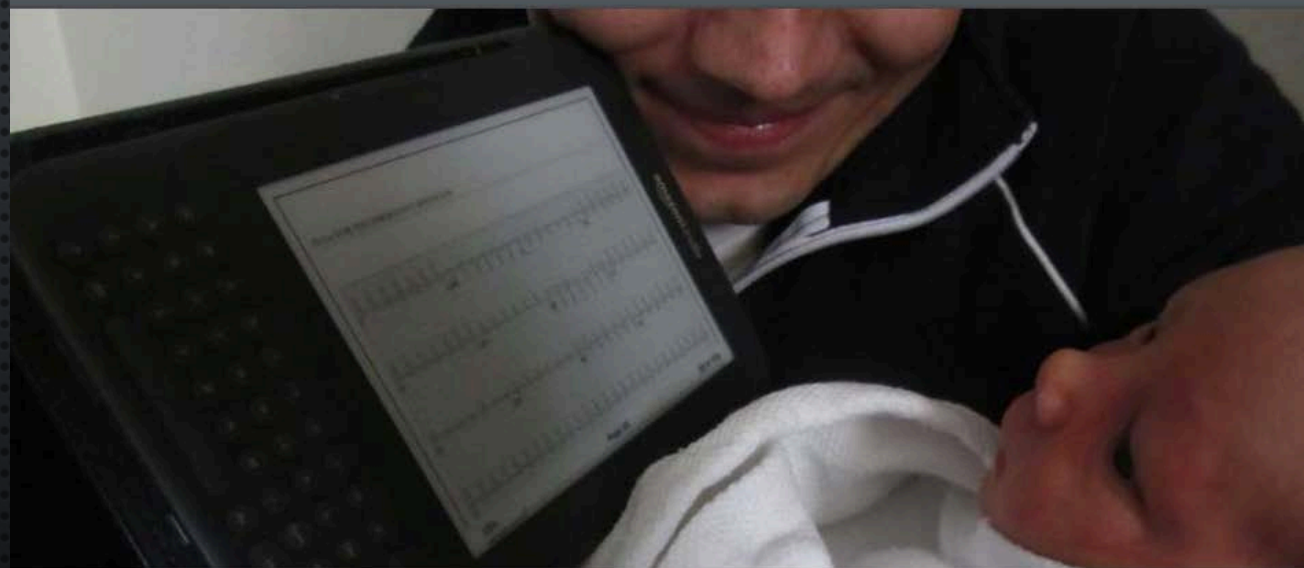


Fig. 2 Number of identified AMR education programs by organization type

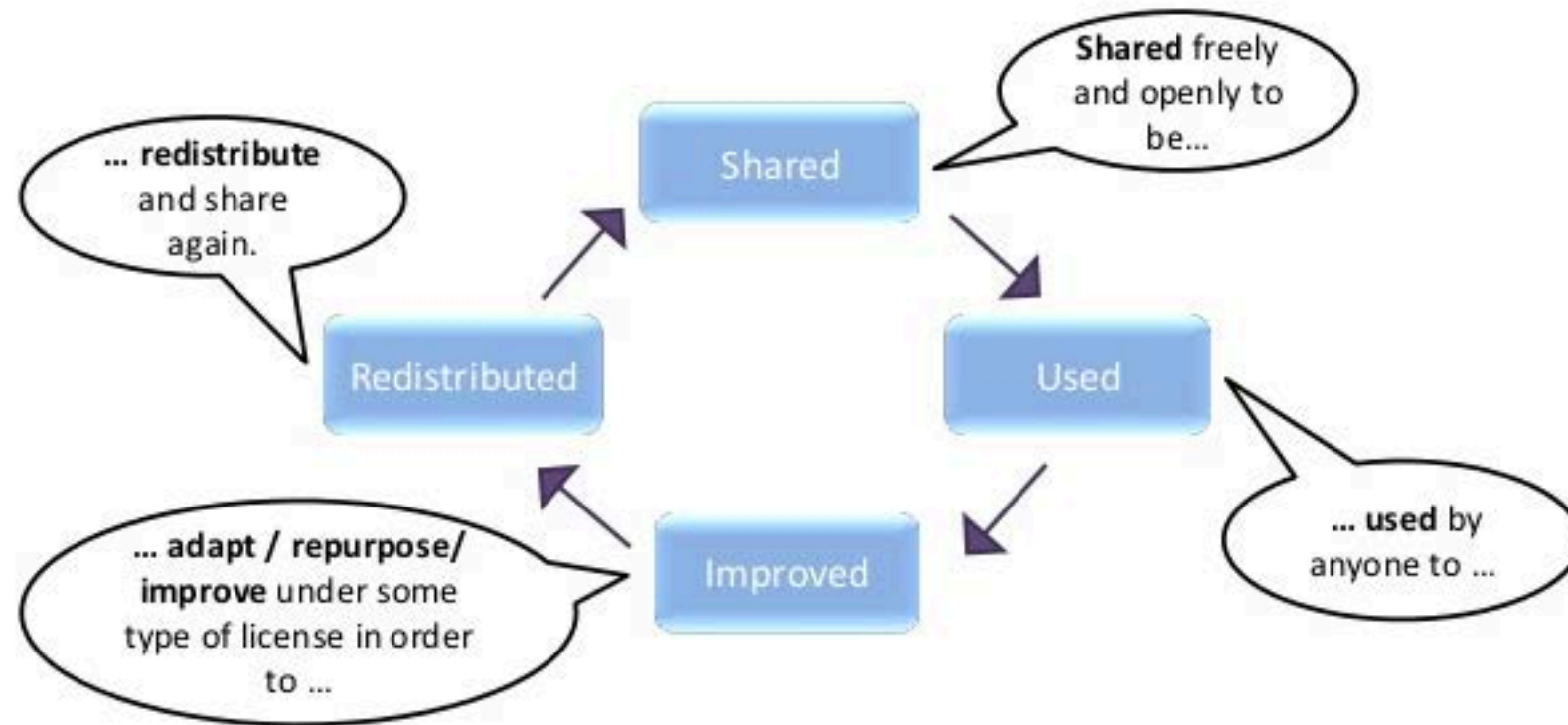
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4 Types of Digital Learning Resources



Simulations & Models

Simulations are usually equipped with interactive controls and activities where learners can vary any parameters in specific models and see real time changes in the outcome.



Graphics & Animations

Videos and graphics have a high sharing potential, which enables the knowledge to reach a wider audience.



Quizzes & Games

Interactive quizzes can be an innovative way to test the learners knowledge and moreover can modified as per the situation and the target audience.



E-books & E-notes

E-books are easily sharable and can be accessed almost anywhere allowing learners to stay in touch with a topic, at their convenience.



Advantages of eBooks

Even if you have never downloaded anything from the Internet before, it's incredibly easy to do so! You will be able to download the product instantly and you will also enjoy these benefits:

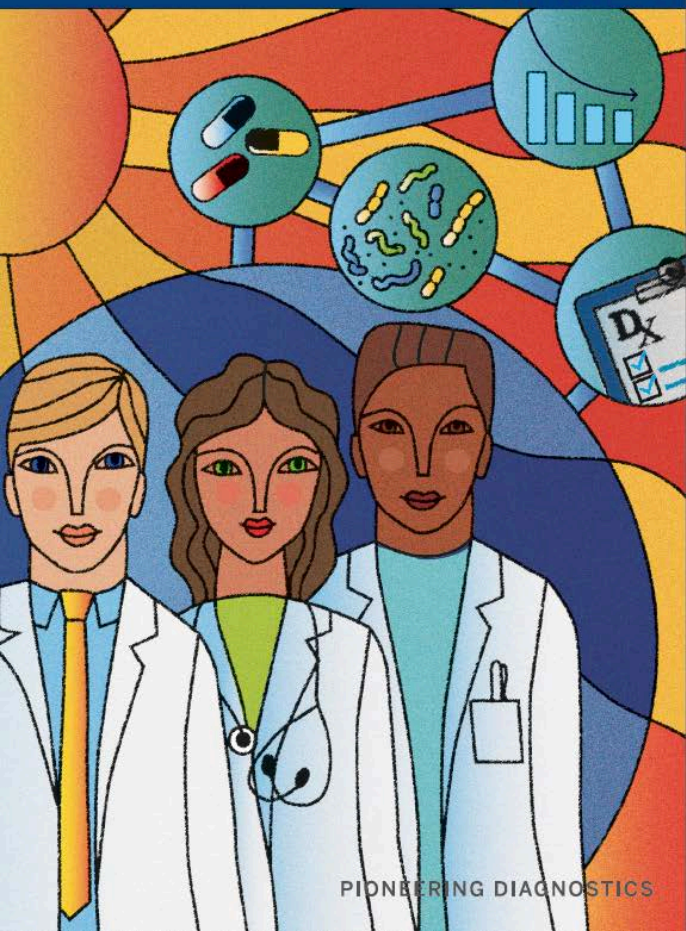
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ANTIMICROBIAL STEWARDSHIP

A practical guide to implementation in hospitals

2019 EDITION



PIONEERING DIAGNOSTICS

INTRODUCTION

The objective of this booklet is to provide practical recommendations for healthcare workers in hospitals to improve the quality of antibiotic prescribing and thereby improve patient clinical outcomes.

Most of the recommendations within this booklet have been adapted from the IDSA Guidelines [Dellit et al., 2007; Tamar F et al., 2016], the Australian Hospital Stewardship Guidance [Duguid et al., 2011], National Stewardship Guidance from Scotland [Nathwani et al., 2006], the UK [Start smart then Focus DOH, 2011; NICE Guideline [NG15], 2015] as well as from low and middle income countries [Van Dijk et al., 2018; Cox et al., 2017].

A key component of stewardship is the availability of clinical practice guidelines to support empiric and targeted prescribing. Although a high volume of such guidance is now being produced, for example the National Treatment Guidelines for Antimicrobial Use in Infectious Diseases in India, there is consistent evidence that guidelines on empirical antibiotic use did not routinely consider resistance patterns in their recommendations. Decision-makers should analyze and report the extent of local resistance patterns to allow better decision-making [Elias et al., 2017]. For this reason we have not referred to any specific clinical practice treatment guidelines.

We hope that this booklet will inform, encourage and support health professionals wishing to pursue the implementation of hospital Antimicrobial Stewardship initiatives, as well as combating antimicrobial resistance. Furthermore, we wish to highlight the importance of conducting hospital stewardship programs in tandem with stewardship in the community and other settings. The importance of stewardship in the animal setting is also recognized as in the “One Health” approach to AMR and stewardship recommended by WHO, FAO & OIE.



Prof. Dilip Nathwani

MB; DTM&H, FRCP, OBE

Consultant Physician and Honorary Professor of Infection
Director Academic Health Sciences Partnership in Tayside,
Ninewells Hospital and Medical School
Dundee, Scotland

CONTENTS

1	WHY IMPLEMENT ANTIMICROBIAL STEWARDSHIP IN HOSPITALS?	
1	Antimicrobial use	2
2	Combating antimicrobial resistance	4
3	Defining Antimicrobial Stewardship	6
4	Goals of antimicrobial stewardship and evidence for success	7
5	Implementation of Antimicrobial Stewardship Programs	12
2	HOW TO IMPLEMENT AN ANTIMICROBIAL STEWARDSHIP PROGRAM?	
1	Assess the motivations	17
2	Ensure accountability and leadership	17
3	Set up structure and organization	19
4	Define priorities and how to measure progress and success	20
5	Identify effective interventions for your setting	21
6	Identify key measurements for improvement	30
7	Educate and Train	38
8	Communicate	40
	ADDITIONAL RESOURCES	44
	REFERENCES	46



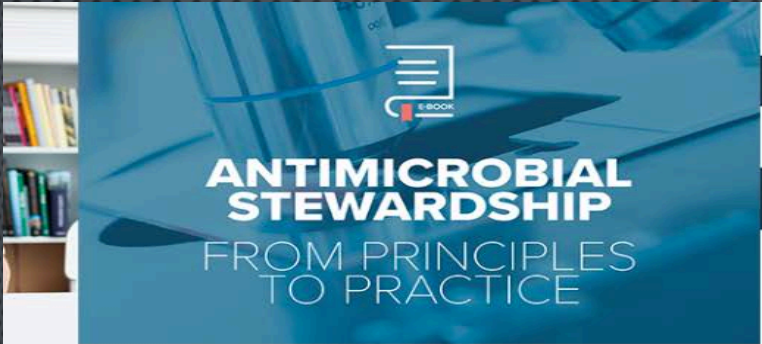
This booklet will primarily consider appropriate use of antimicrobial stewardship in hospitals and the structures and processes to support this.



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ANTIMICROBIAL STEWARDSHIP

FROM PRINCIPLES TO PRACTICE


WHAT IS THE ECONOMIC IMPACT OF AMR?
A review of Global Risk by the world economic forum

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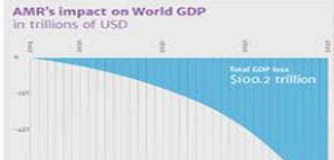
provides a global snapshot of the costs, impacts and burden of antibiotic-resistant bacteria across the globe. This illustrates the current burden, future death and economic burden has been forecasted through modelling studies.

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These powerful data underline the significant burden of these infections, often to the most vulnerable and least resourced populations of the world. For example, fig 6 provides a global snapshot of the mortality and economic impact on GDP of antibiotic-resistant bacteria across the globe. The fact that 2-3.5% of the global GDP would fall in 2050 because of inaction is a sobering thought that should inform global action through investment. The economic impact of specific and common drug resistant infections as opposed to



AMR's impact on World GDP in trillions of USD



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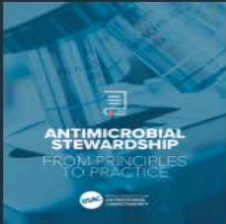
A **FREE eBook** from the British Society for Antimicrobial Chemotherapy

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Available as a PDF or an EPUB file, the book is easy to access and easy to update, and provides:

- An extensive overview of the day-to-day challenges posed by antimicrobial resistance
- Tools for setting up stewardship programmes
- Guidance on how to make the most of existing stewardship programmes
- Resources to apply the principles of stewardship to a wide range of professions, populations, and clinical/care settings
- Support for colleagues working in low and middle-income countries
- Advice on informing and influencing policymakers and journalists
- An interactive, multimedia, platform with links to many videos, podcasts, and PDFs

This book provides a perfect companion to BSAC's **FREE Massive Open Online Course on Antimicrobial Stewardship**, which is available in English, Mandarin, Spanish, and Russian. Visit www.futurelearn.com/courses/antimicrobial-stewardship for details.



Antimicrobial Stewardship: From Principles to Practice

Editor in chief:
Professor Dilip Nathwani OBE

* Indicates a required field

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Have you participated on the BSAC MOOC?
☐ Yes ☐ No

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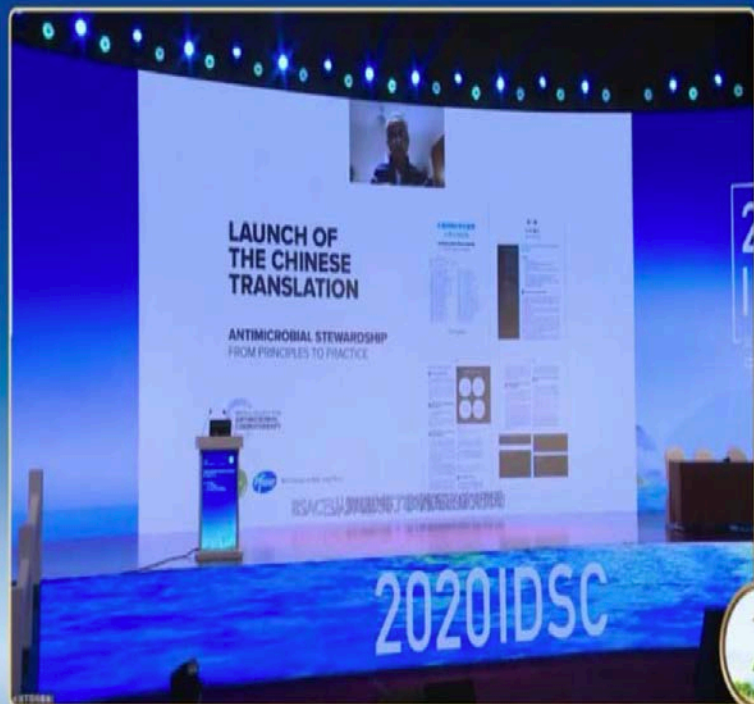
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LAUNCH OF THE CHINESE TRANSLATION

抗菌药物科学化管理 从理论到实践
Antimicrobial Stewardship From Principles to Practice

主 编 英国抗感染化疗学会
主 译 刘又宁 俞云松 邱海波
王明贵 徐英春

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抗菌药物科学化管理 从理论到实践 Antimicrobial Stewardship From Principles to Practice

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Online discussion forum for those developing and implementing national action plans to combat antimicrobial resistance(AMR)



The AMR-NAP discussion forum is a free and open online resource run by the WHO AMR Secretariat for those developing and implementing national action plans to combat antimicrobial resistance.

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Antimicrobial Stewardship: A competency-based approach

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This course will equip clinicians who frequently prescribe antimicrobials with knowledge and tools to improve their use of these essential medications in daily clinical practice. Through case based examples, the course will highlight how antimicrobial stewardship principles can be applied to common clinical scenarios. We will first review foundational clinical knowledge necessary to use antimicrobials wisely. Then, we will illustrate how clinicians can incorporate this knowledge into the management of patients with common infections through adherence to the five core competencies of appropriate antimicrobial prescribing. This course will provide a framework for approaching each clinical encounter from the perspective of combating antimicrobial resistance. We hope it will assist you in your practice and inspire you to be a champion of antimicrobial stewardship.

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Language: English

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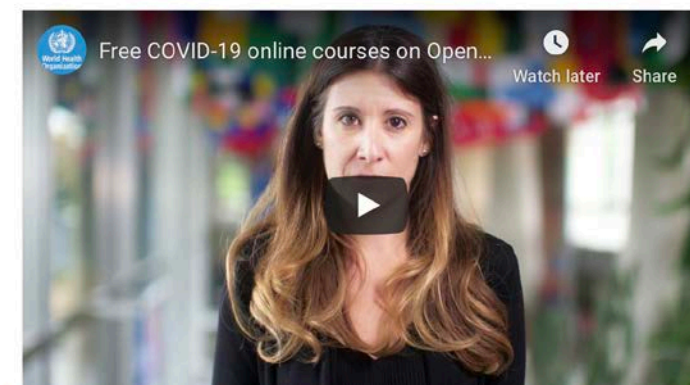
Using WHO's Infection Prevention and Control (IPC) core components as a roadmap, you will see how effective IPC programmes can prevent harm from health care-associated infections (HAI) and antimicrobial resistance (AMR) at the point of care. This course will introduce you to the multimodal strategy for IPC implementation, and define how this strategy works to create systemic and cultural changes that improve IPC practices. This foundational knowledge will guide you in effective development and implementation of IPC programmes and IPC education in your facility.

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CDC Training on Antibiotic Stewardship: Section 1

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★★★★★ 4.68 (629 Ratings)

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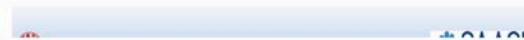
This interactive web-based activity is the first of four sections designed to help clinicians optimize antibiotic use to combat antibiotic resistance and improve healthcare quality and patient safety. This course will include information about antibiotic resistance and threats and a detailed explanation of the benefits of antibiotic stewardship. Additionally, this course will discuss risks and benefits of antibiotics, with a focus on [more](#).

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Clinical Antibiotic Stewardship for South Africa



- Enhanced surveillance
- Infection prevention
- Antimicrobial stewardship
 - Optimising the prescription of the antibiotic i.e., drug, dose, dosing interval, duration, route, de-escalation



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TOOLBOX

for action on antibiotic resistance

The ReAct Toolbox is a repository on antibiotic resistance that provides you with information, inspiration and guidance to take action. The Toolbox offers:

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Promoting the appropriate use of antimicrobials (including antibiotics), improving patient outcomes, reducing microbial resistance, and decreasing the spread of infections caused by multidrug-resistant organisms.

For more info about the Stanford Antimicrobial Safety and Sustainability Program, visit us at <http://med.stanford.edu/bugsanddrugs.html>. The Stanford University School of Medicine is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

Antimicrobial Stewardship: Optimization of Antibiotic Practices

To Prescribe or Not To Prescribe? Antibiotics and Outpatient Infections

Optimizing Antimicrobial Therapy with Timeouts

Antibiotic Stewardship Course

COURSE INTRO

Dr. Arjun Srinivasan (CAPT)

The CIDRAP Antimicrobial Stewardship Project (CIDRAP-ASP)

The Center for Infectious Disease Research and Policy (CIDRAP) at the University of Minnesota launched the CIDRAP-ASP in July 2016. The site offers high-quality information and educational resources on antimicrobial stewardship practice, research, and policy, including:

- Podcasts and webinars with subject matter experts
- Targeted policy analyses
- Extensive and up-to-date bibliographies and resource lists
- News stories about antimicrobial resistance and stewardship
- A weekly newsletter and an engaged online community of antimicrobial stewards

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Antimicrobial Stewardship Project

About ASP
Antimicrobial resistance is a critical global public health issue, and antimicrobial stewardship strategies are key to resolving the problem. CIDRAP's Antimicrobial Stewardship Project provides current, accurate, and comprehensive information on the topic and works to build an online community to address leading issues.

ASP Monthly Poll
What's your take on antibiotic prescribing for outpatients? Let us know in our NOVEMBER poll! View previous poll results.

WHO guidance says no routine post-surgery antibiotics
CIDRAP News | News Report | CIDRAP News | Nov 10, 2016
The WHO says preventive antibiotics should be used before and during surgery but not after.

ASP NEWS SCAN
OCT 26, 2016
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- Stewardship and antibiotic resistance
- New C-diff drug
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Antibiotics: Handle with Care (World Health Organization, Food and Agriculture Organization of the United Nations, World Organisation for Animal Health) - "Antibiotics: Handle with Care" is an interactive experience and global forum for learning about and sharing activities related to appropriate antibiotic use.

Bash the Bug (John Radcliffe Hospital) - "Bash the Bug," an online project led by the John Radcliffe Hospital in Oxford with funding from the Wellcome Trust and the Newton Fund, invites volunteers to aid in determining the effectiveness of antibiotics against more than 100,000 tuberculosis samples collected over 5 years.

Bugs in Bangkok (Célia Souque, University of Oxford) - The aim of Bugs in Bangkok, based at the Mahidol-Oxford Research Unit in Thailand, is to develop and test an antimicrobial resistance board game tailored to a Thai audience.

e-Bug (Public Health England) - e-Bug's aim is to educate children and young people across the globe, at junior and senior school level, about microbiology, hygiene and the spread, treatment and prevention of disease. e-Bug also aims to reinforce an awareness of the benefits of prudent antibiotic use and how inappropriate use can have an adverse effect on antibiotic resistance in the community. (Twitter: [@eBug_UK](#))

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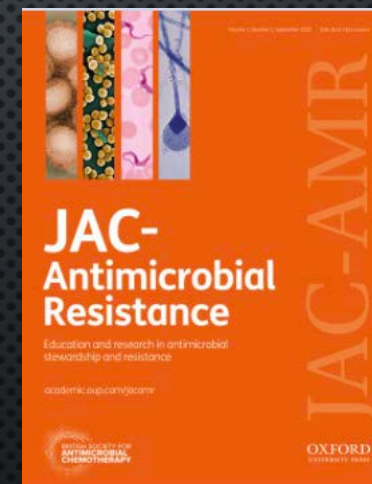
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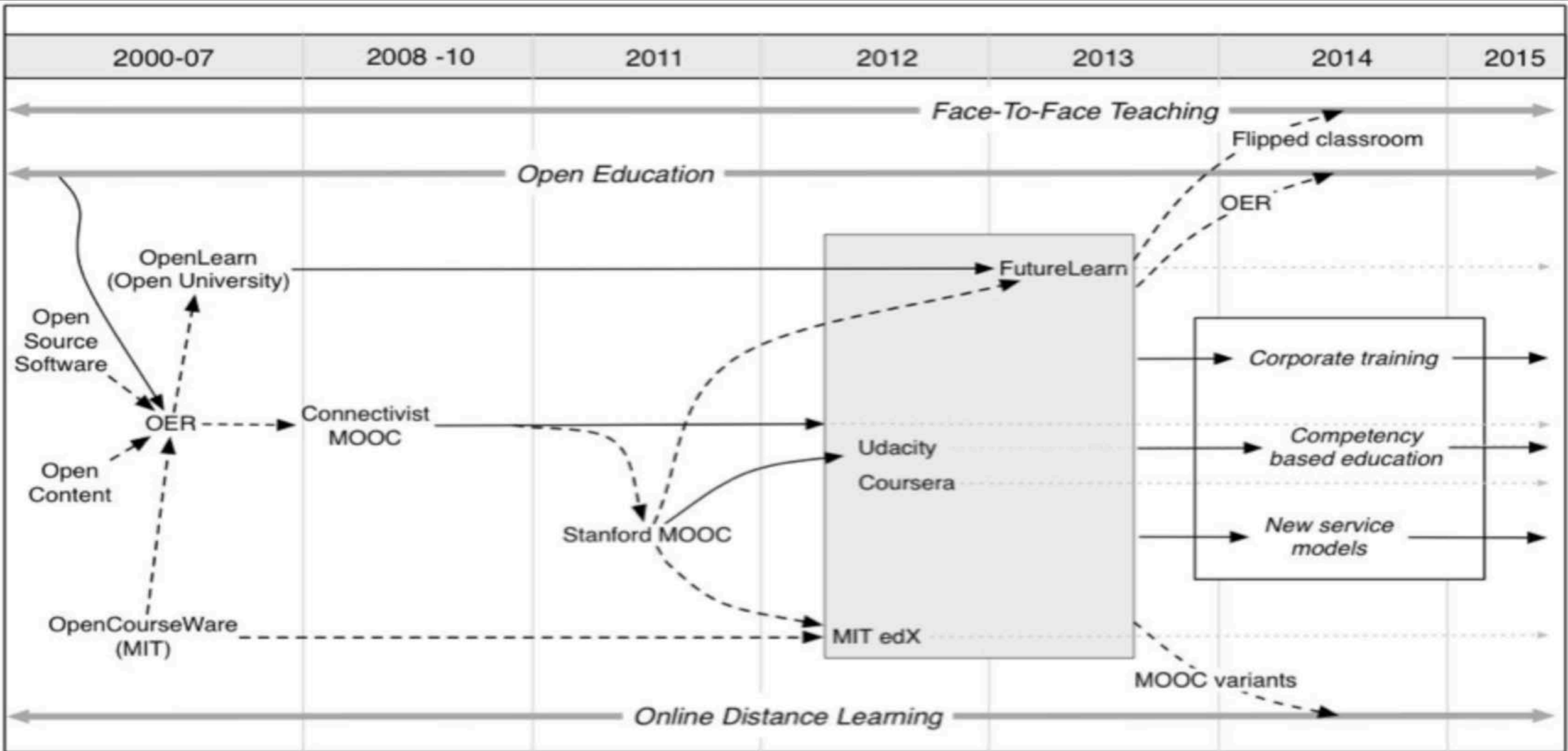
Open: Anyone, regardless of academic achievement, can use these courses, and they are free or extremely low-cost which makes them useful for everyone (assuming they speak the correct language – many MOOCs are available in 4 or 5 languages).



Online: Students can collaborate and interact with other learners from around the world – all that's necessary is a solid internet connection.



Courses: Rather than simply listening to a pre-recorded lecture on iTunesU or watching one in a video, MOOCs are designed from the ground up to be effective for online learning. The technology that's being used is still evolving, and the teaching methods continue to improve.



—————> Directly related
 - - - - -> An influence

[Shaded Box] Established MOOC platforms
 [White Box] Entrepreneurial initiatives



101M
Students



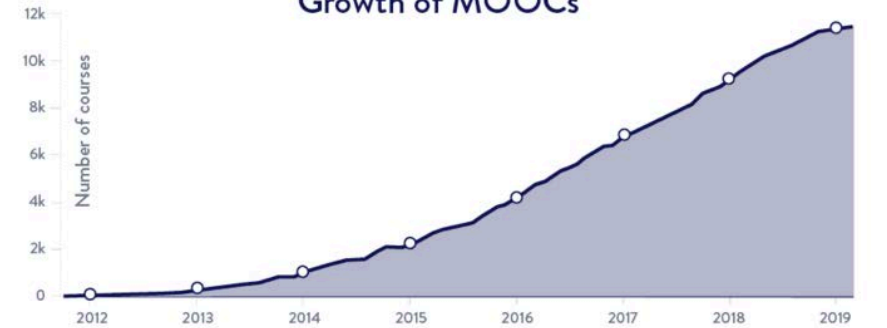
900+
Universities



11.4k
Courses

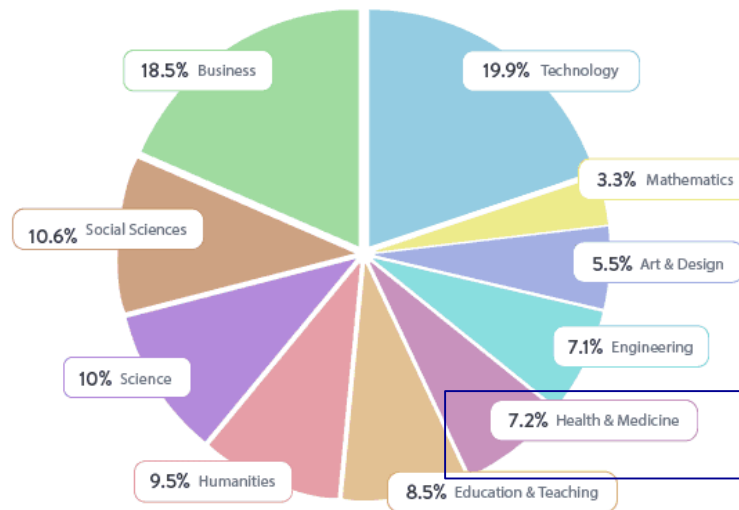
By the Numbers: MOOCs in 2018

Growth of MOOCs



By the Numbers: MOOCs in 2018

Course Distribution by Subject



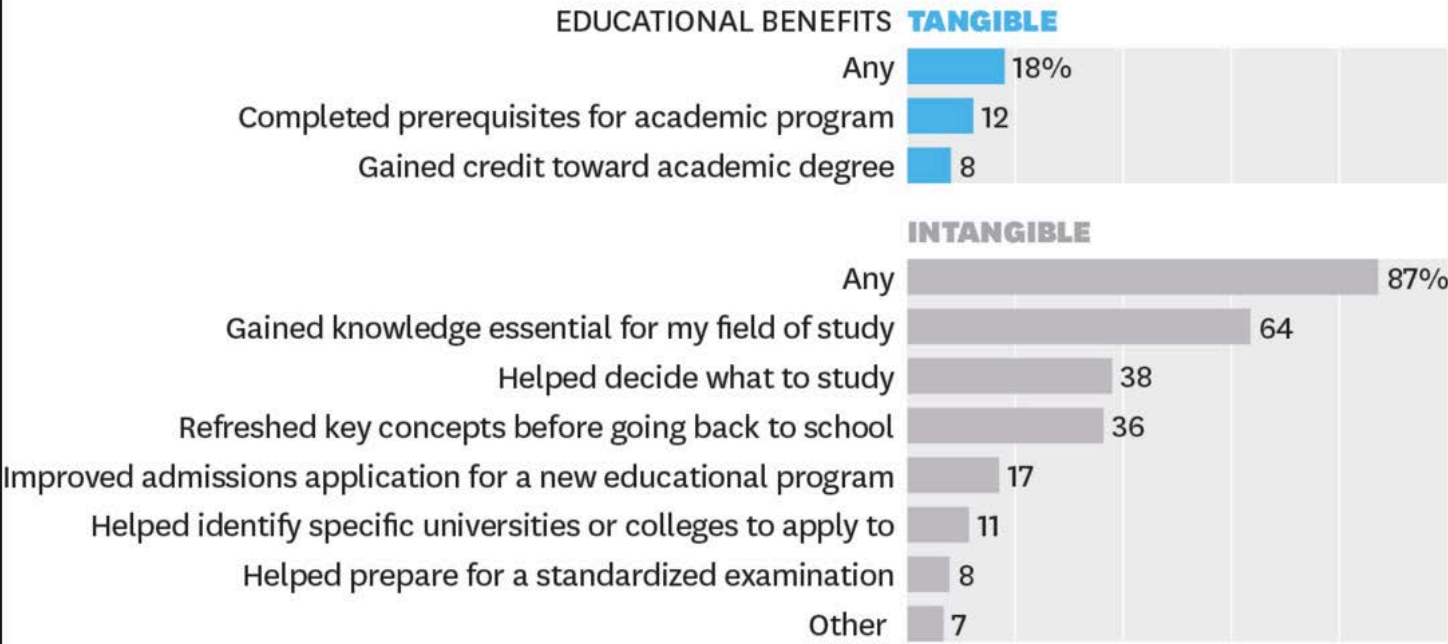
By the Numbers: MOOCs in 2017

Here is a list of the top five MOOC providers by registered users:

- Coursera — 37 million
- edX — 18 million
- XuetangX — 14 million
- Udacity — 10 million
- FutureLearn — 8.7 million

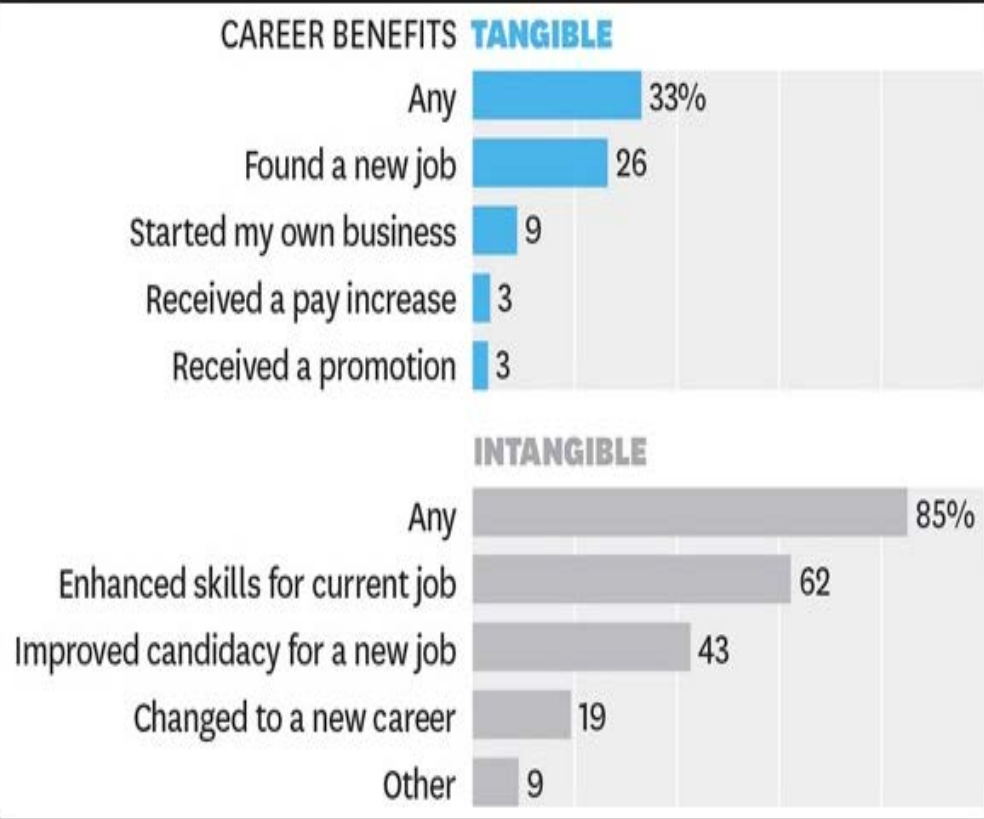
The Educational Benefits of MOOCs

As reported by those who stated educational benefits as their primary reason for completing a MOOC.



SOURCE COURSERA SURVEY DATA

© HBR.ORG





Main motivations for taking a MOOC, respondents from Colombia, the Philippines, and South Africa. Source: TASCHA

GLOBAL OPEN ACCESS LEARNING

ANTIMICROBIAL STEWARDSHIP MOOC

> 120000 participants
Since 2015

Total MOOC Enrolments since September 2015

163

Participants from countries across the globe, based on 21,232 known joiner locations



POST COURSE SURVEY RESULTS COMBINED FOR ALL FIVE RUNS



Strongly liked the discussion between subject experts



Found the course engaging or very engaging



Found the course the right length



Did the course at home



Course met or exceeded their expectations about learning about the subject



Met or exceeded their expectations about improving their career prospects



Met or exceeded their overall expectations



Were healthcare workers



Met or exceeded expectations about adding a fresh perspective to their role



Satisfied with the course?

AVAILABLE IN



ENGLISH



SPANISH



RUSSIAN



CHINESE

[Online Courses](#) / [Healthcare & Medicine](#)



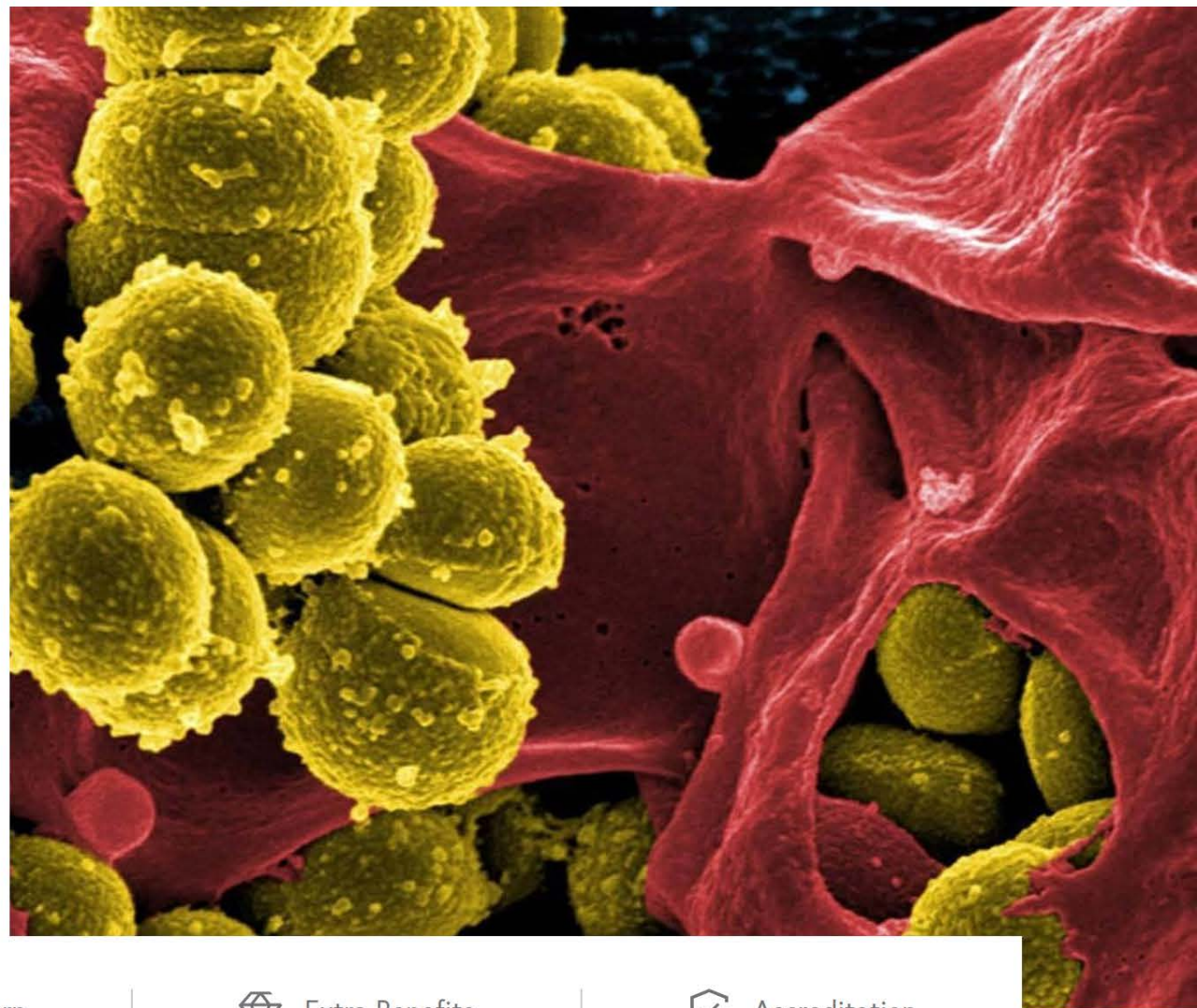
University
of Dundee



抗菌素管理: 管理抗生素耐药性

了解抗生素耐药性, 以及抗菌药物管理如何减缓或减少它, 这个免费的在线课程。

[Join course for free](#)



Duration
6 weeks



Weekly study
3 hours



Learn
Free



Extra Benefits
From £62
[Find out more](#)



Accreditation
Available
[More info](#)

FutureLearn

Subjects Courses Using FutureLearn

Search online courses

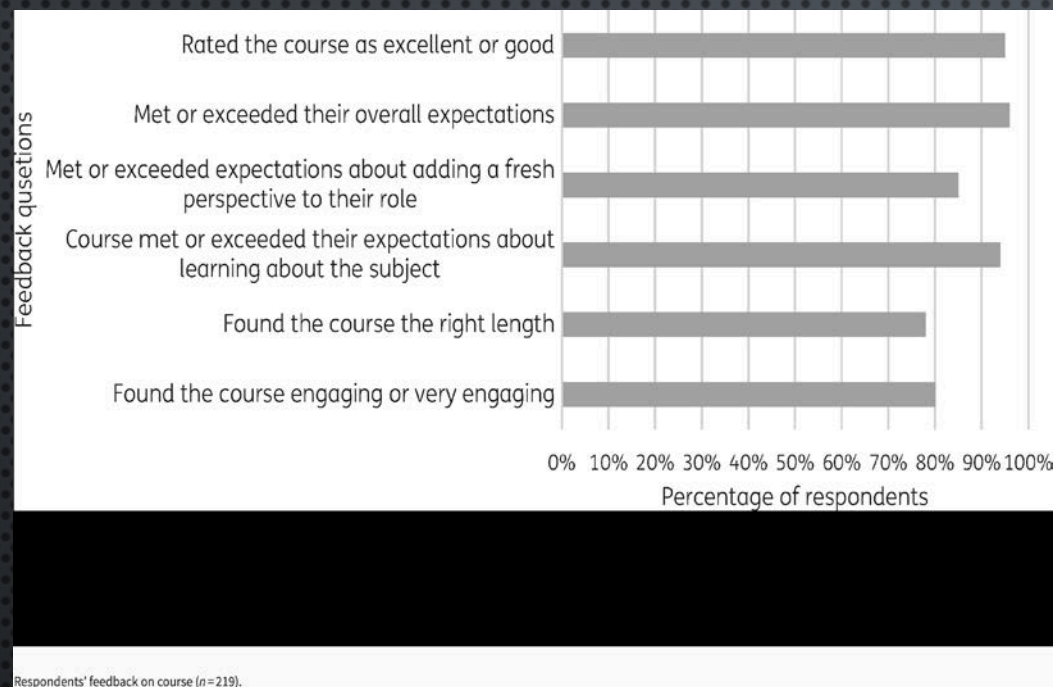
Online course in Healthcare & Medicine

Antimicrobial Stewardship: Managing Antibiotic Resistance

Understand antibiotic resistance, and how antimicrobial stewardship can slow down or reduce it, with this free online course

University of Dundee

Join course for free



Course evaluation—impact on practice

An implementation survey performed 6 months after completion of the first two courses was completed by 409 participants (1.2% of joiners, 3.5% of active learners) from 41 countries. Of these respondents, 325 (79%) were healthcare workers (including 37 pharmacists, 34 clinicians, 28 nurses, 18 microbiologists and 43 'other' professionals) and 160 (49%) of them reported that they had implemented stewardship interventions since completing the course.

Jacqueline Sneddon, Gavin Barlow, Sally Bradley, Adrian Brink, Sujith J Chandy, Dilip Nathwani, Development and impact of a massive open online course (MOOC) for antimicrobial stewardship, *Journal of Antimicrobial Chemotherapy*, Volume 73, Issue 4, April 2018, Pages 1091–1097, <https://doi.org/10.1093/jac/dkx493>



**INFECTION
LEARNING
HUB**

**BSAC INFECTION LEARNING HUB
OPEN ACCESS GLOBAL LEARNING**

ALL COURSES ACCREDITED

www.infectionlearninghub.co.uk

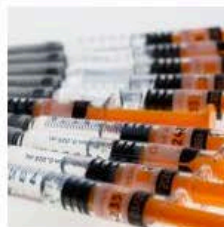


**BRITISH SOCIETY FOR
ANTIMICROBIAL
CHEMOTHERAPY**

Over 25 courses and webinars available open access

including translations into:

French
Mandarin
Portuguese
Russian
Spanish



The Role of Vaccines in Preventing Infectious Diseases and AMR

Designed for healthcare professionals across the globe.



FutureLearn



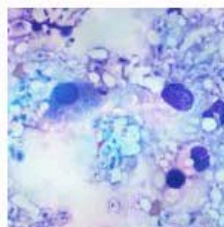
Time to complete: 3 - 4 weeks



CPD Points: 4



Enrolment date(s): 06 Jan 2020, 13 Apr 2020, 08 Jun 2020, 03 Aug 2020, 28 Sep 2020, 29 Nov 2020



The Role of Antifungal Stewardship

Explore the role and benefits of antifungal stewardship on this online course for healthcare professionals.



FutureLearn



Time to complete: 3 - 4 weeks



CPD Points: 9



Enrolment date(s): 30 Mar 2020, 01 Jun 2020, 03 Aug 2020, 05 Oct 2020, 07 Dec 2020

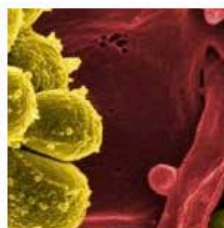


e-book – Antimicrobial Stewardship: From Principles to Practice

This innovative e-Book is available open access to all and provides a truly global and highly practical primer on the wise use of antibiotics



BSAC



Massive Open Online Course on Antimicrobial Stewardship

Designed for healthcare professionals across the globe, this open access six-week course will inform you about - and empower you to provide - safe, high-quality antibiotic use.



FutureLearn



Time to complete: 3 - 4 weeks



CPD Points: 18



Enrolment date(s): 10 Feb 2020, 11 May 2020, 10 Aug 2020, 09 Nov 2020



Massive Open Online Course on Antimicrobial Stewardship – Mandarin

Designed for healthcare professionals across the globe, this open access six-week course will inform you about - and empower you to provide - safe, high-quality antibiotic use.



FutureLearn



Time to complete: 3 - 4 weeks



CPD Points: 18



Enrolment date(s): 10 Feb 2020, 11 May 2020, 10 Aug 2020, 09 Nov 2020

Healthcare & Medicine

Antimicrobial & Antibiotic Resistance Courses

Antimicrobial resistance and antibiotic resistance are a major threat to public health. How can we tackle them? Get answers with a range of courses.

Courses 20 COURSES



BSAC

The Role of Vaccines in Preventing Infectious Diseases and Antimicrobial Resistance

★★★★★ 4.6 (46 reviews)

Learn how vaccines work and can be used for infectious disease control with this online course for healthcare professionals.

⌚ 2 weeks ⌚ 2 hrs per week



UEA (University of East Anglia)

Using Infection Control to Combat Antimicrobial Resistance

★★★★★ 4.7 (15 reviews)

Find out how effective infection control in health and social care can tackle the global risk of antimicrobial resistance.

⌚ 3 weeks ⌚ 3 hrs per week

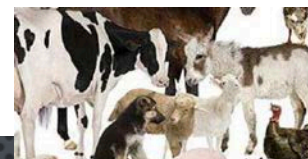


BSAC

Utilising Social Science and Behaviour Change in Antimicrobial Stewardship Programmes: Improving Healthcare

How can social science and behaviour change techniques be used within antimicrobial stewardship projects to bring about change.

⌚ 2 weeks ⌚ 3 hrs per week



BSAC

Antimicrobial Stewardship in Veterinary Practice

★★★★★ 4.9 (11 reviews)

How can good antimicrobial stewardship prevent antimicrobial resistance (AMR) in veterinary practices? Find out on this course.

⌚ 3 weeks ⌚ 3 hrs per week

🔓 Included in Unlimited



Wellcome Genome Campus
Advanced Courses and
Scientific Conferences

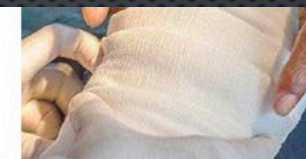
Bacterial Genomes: Antimicrobial Resistance in Bacterial Pathogens

★★★★★ 4.7 (117 reviews)

What's antimicrobial resistance and how can we detect it? Explore the clinical relevance of AMR and the methods used to detect it.

⌚ 3 weeks ⌚ 5 hrs per week

🔓 Free digital upgrade



BSAC & European Wound
Management Association

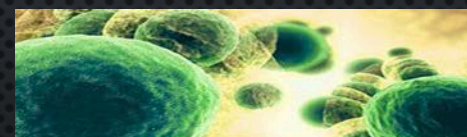
Antimicrobial Stewardship in Wound Management

★★★★★ 4.8 (44 reviews)

Gain insight into antimicrobial resistance, learn about the threats it poses to wound care, and explore preventative measures.

⌚ 3 weeks ⌚ 2 hrs per week

🔓 Included in Unlimited



BSAC

Challenges in Antibiotic Resistance: Gram Negative Bacteria

★★★★★ 4.7 (14 reviews)

This course by BSAC is for healthcare professionals managing infections. You will learn about Gram Negative Bacteria.

⌚ 3 weeks ⌚ 3 hrs per week

🔓 Included in Unlimited



BSAC & Imperial College
London

Tackling Antimicrobial Resistance: A Social Science Approach

Are you a health professional new to social science research? Find out how you can fight antimicrobial resistance on this course.

⌚ 3 weeks ⌚ 2 hrs per week

🔓 Included in Unlimited

COVID-19: RESOURCE HUB

AN EDUCATION AND TRAINING RESOURCE HUB
FROM BSAC AND JAC-ANTIMICROBIAL RESISTANCE

> **350 Resources Available NOW**

bsac.org.uk/covid-19-resource-hub

BRITISH SOCIETY FOR
**ANTIMICROBIAL
CHEMOTHERAPY**

COVID-19 Resources

Resources that are highlighted are the most recently posted resources

Filters

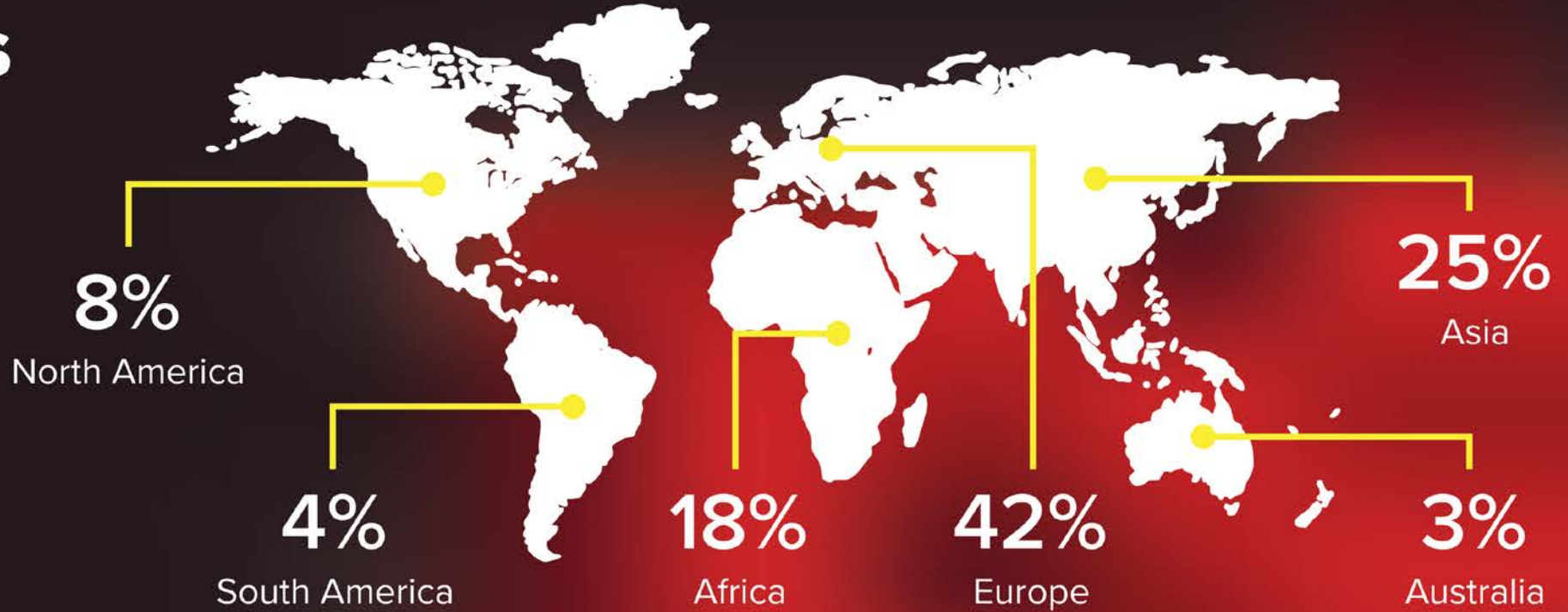
- Latest resources
- Clinical Guidance
- Clinical Trials
- Journals and articles
- Learned societies/Civil society
- Official Advice
- Online Learning
- Research
- Social

Search

- [Ing: Coronavirus: No-Panic: Helpguide \(PDF\)](#)
- [A real-time dashboard of clinical trials for COVID-19 \(Global Coronavirus COVID-19 Clinical Trial Tracker\)](#)
- [Academy of Medical Royal Colleges - COVID-19 Resources](#)
- [Africa CDC COVID-19 Resources](#)
- [American Academy of Pediatrics - Critical Updates on COVID-19](#)
- [American Academy of Pediatrics Journals - COVID-19: Overview and Evaluation - Pediatric Collection](#)
- [American College of Physicians - COVID-19 Resources](#)
- [American Society for Microbiology \(ASM\) COVID-19 research registry](#)
- [Animation: COVID-19 according to Toby Morris & Souade Willes](#)
- [Animation: Global COVID-19 prevention \(Stanford Medicine\)](#)
- [Animation: how COVID-19 impacts the body \(High Impact\)](#)
- [Animation: what happens if you get coronavirus \(Nucleus Medical Media\)](#)
- [Antibiotics - COVID-19 SSHP Briefs](#)
- [ANTHOC: COVID-19 - Algorithm for primary care](#)
- [Anticovid - a comprehensive open-access real-time platform of registered clinical studies for COVID-19](#)
- [Anticovid - link to resource](#)
- [ASHP: Assessment of Evidence for COVID-19 Related Treatments](#)
- [Association of American Medical Colleges \(AAMC\) - Coronavirus Clinical Guidance Repository](#)
- [Association of Surgeons of GB & Ireland - COVID-19 Resources](#)
- [Association of the British Pharmaceutical Industry \(ABPI\) - Responding to COVID-19](#)
- [Automated diagnosis and quantitative analysis of COVID-19 on imaging](#)
- [Avert Information about H1N1 - Coronavirus](#)
- [BCCSA COVID-19 guidance for vulnerable groups with congenital heart disease](#)

JAC-
**Antimicrobial
Resistance**

GLOBAL REACH OF OPEN ACCESS E-LEARNING



23
NUMBER OF COURSES
SINCE 2015

200,000+
UNIQUE LEARNERS
AND DOWNLOADS

 **6**
continents

 **215**
countries

 **37,000+**
learner locations

Met Expectations



Improved Knowledge



Improved Shared learning



Improved Applied learning



Online Courses / Healthcare & Medicine



Antimicrobial Stewardship for Africa

★★★★★ 4.4 (5 reviews)

Improve your knowledge of the spread of antimicrobial resistance in Africa and how to reduce it.

[Join course for free](#)

5,314 enrolled on this course



BESPOKE MOOC FOR AFRICA & MIDDLE EAST

Online Courses / Science, Engineering & Maths



Antimicrobial Stewardship for the Gulf, Middle East and North Africa

★★★★★ 4.7 (19 reviews)

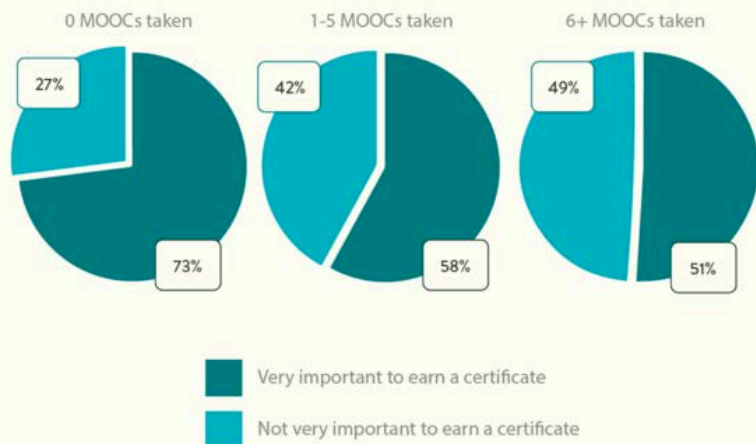
Improve your knowledge of the spread of antimicrobial resistance in the Gulf, Middle East and North Africa and how to reduce it.

[Join course for free](#)

1,965 enrolled on this course



Relationship of MOOCs taken to Importance of Certificate



CLASS CENTRAL
2017 Learner Survey



e-Education in Countries with Low and Medium Human Development Levels using MOOCs

Figure 2 summarizes the strategies proposed in this study to enable the implementation of e-Education initiatives using MOOCs in countries with low and medium human development levels.

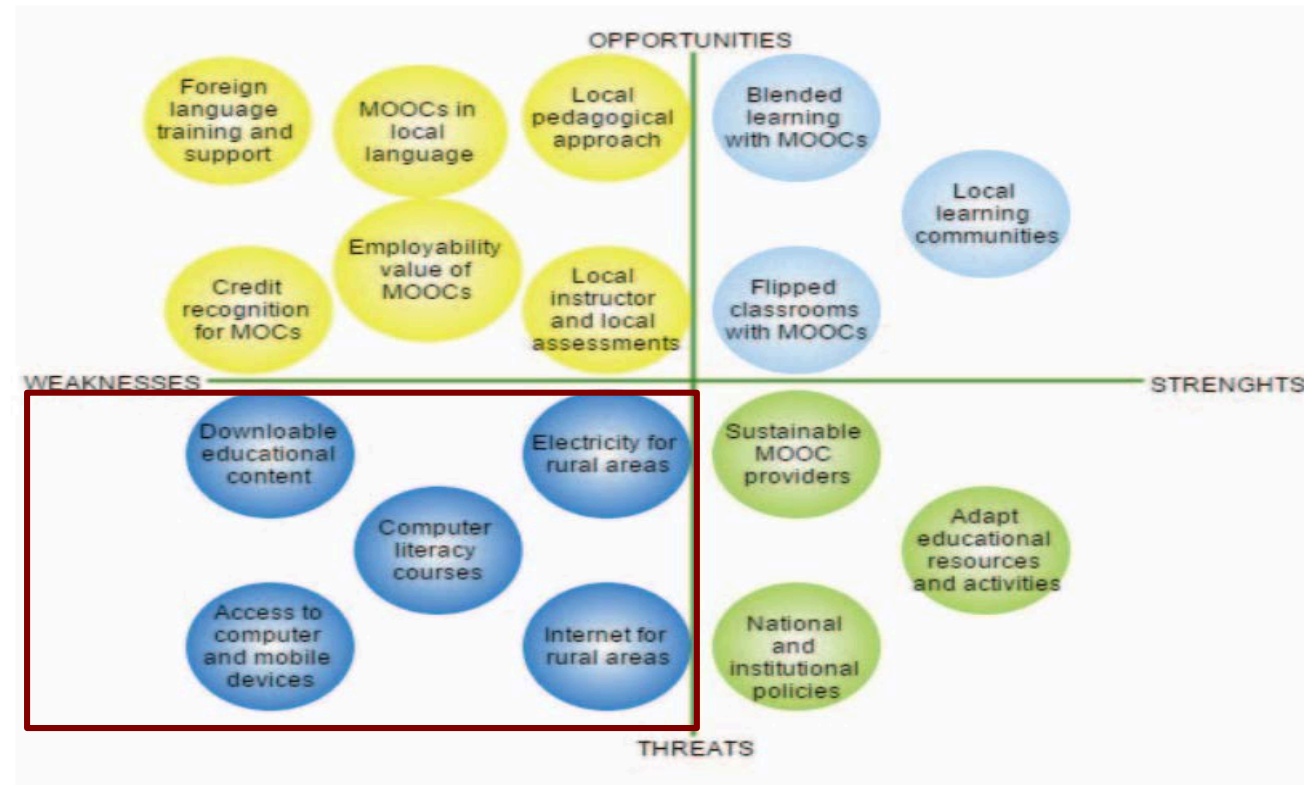
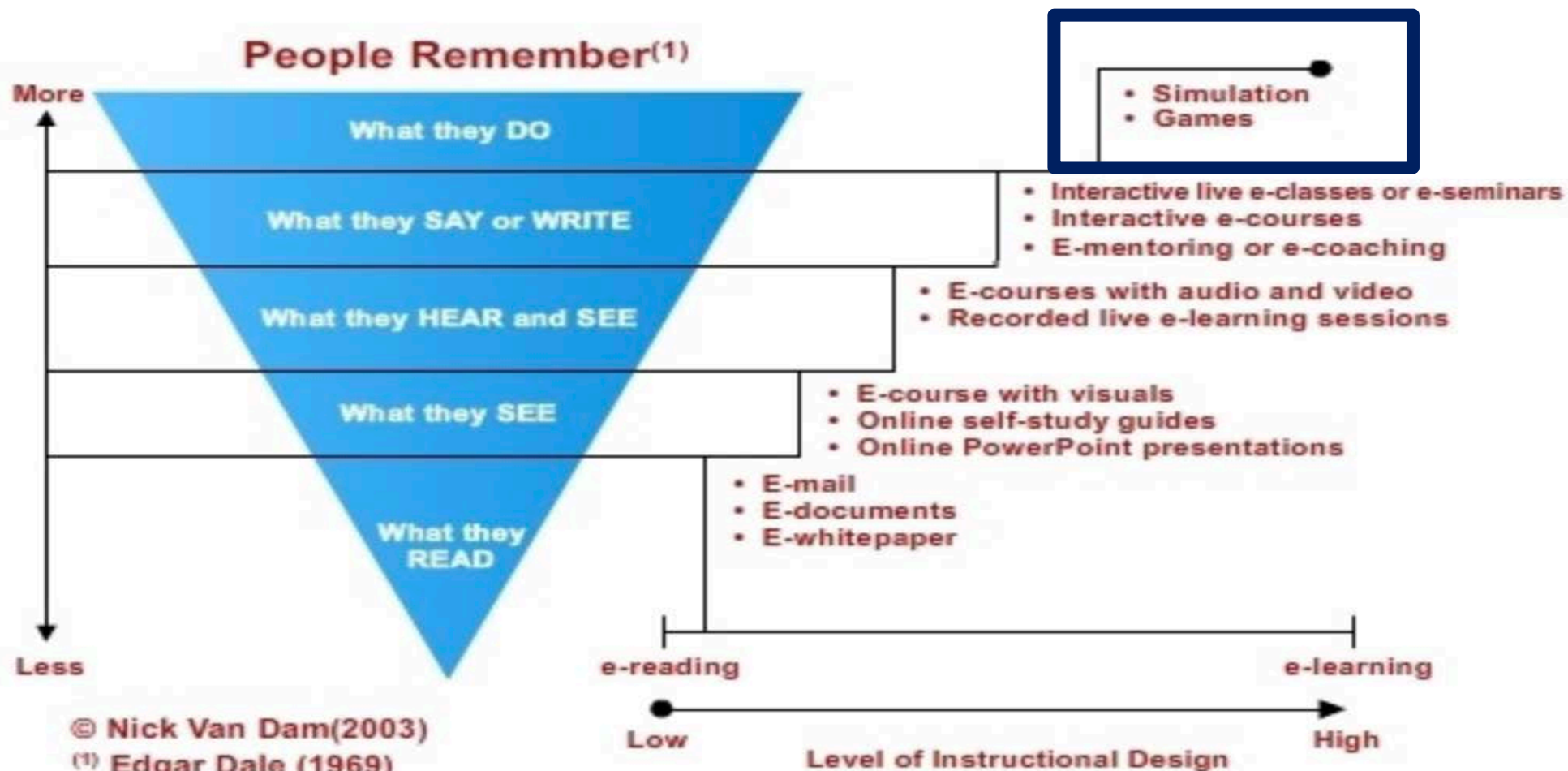


Figure 2. Proposed strategies to use MOOCs in e-Education

<https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=7461713>

LEARNING DESIGN APPROACH



Gamified e-learning course: A way to prudent use of antibiotics

Anders Holding Sørensen[1], Søren Jensen-Fangel[2], Dorte Brai Svendstrup[3], Mona Kjaersgaard[4], Nina Ank[5]

Sørensen A, Svendstrup D, Kjaersgaard M, Ank N
MedEdPublish

<https://doi.org/10.15694/mep.2018.0000099.1>

Sørensen A, Svendstrup D, Kjaersgaard M, Ank N
MedEdPublish
<https://doi.org/10.15694/mep.2018.0000099.1>

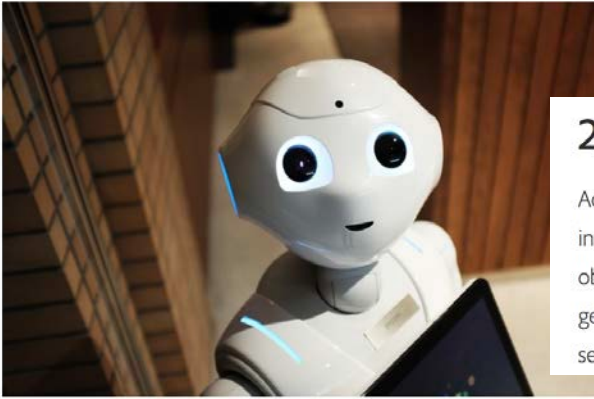


Figure 1: Flow diagram for the e-learning course: How a learner can navigate through the course.



7 E-Learning Technologies Which Are Ruling in 2020

1. Artificial Intelligence (AI)



2. Augmented Reality (AR)

According to Wikipedia, Augmented Reality (AR) defined as "an interactive experience of a real-world environment where the objects that reside in the real world are enhanced by computer-generated perceptual information, sometimes across multiple sensory modalities".

3. Machine Learning

The eLearning industry is getting more powerful with the assistance of technologies like ML (Machine Learning). ML is a sub-division of AI (Artificial Intelligence).

4. Virtual Reality



7. 3-D printing

3-D printing is another useful technology students utilizing nowadays. It assists students print out 3-D models. Students can likewise take 3-D printouts of difficult to visualize structures to help comprehend easily. For example, 3-D structures of particles for chemistry students, 3-D structures of cells, organs for biology students, or population maps for geography students, and so forth.

6. Cloud computing



Cloud computing is simply a group of computing assets situated at different places in the world. The system can be shared and accessed from anyplace on the planet. Cloud computing ensures access to fundamental information to anyone using any gadgets from the workplace.

5. Internet of things (IoT)

A myriad number of individuals are wondering what is the Internet of Things. It is taking all the things in the real world, for instance, a light bulb, a car or any material thing and connecting them to the Internet. Now you might be thinking about how IoT will be useful in e-learning.

OUR VISION FOR A NEW WAY OF SUPPORTING LEARNING IN AMR

**DEVELOPMENT OF A KNOWLEDGE ECCHANGE
PLATFORM - A TYPE OF OPEN EDUCATIONAL
QUALITY PEER REVIEW E-LEARNING RESPOSITORY
COMBINED WITH OPEN ACCESS RESEARCH AND NEWS**

DEVELOPING A KNOWLEDGE EXCHANGE PLATFORM

- KNOWLEDGE EXCHANGE IS ABOUT TAKING A SYSTEMATIC APPROACH TO SHARING TACIT KNOWLEDGE -- THE KNOWLEDGE THAT PEOPLE ACQUIRE THROUGH THEIR WORK EXPERIENCES, SUCCESSES AND CHALLENGES AROUND THE WORLD
- THE MAIN PURPOSE OF KNOWLEDGE EXCHANGE IS TO CONNECT. KNOWLEDGE EXCHANGE IS ESSENTIAL TO ACHIEVE CONTINUAL LEARNING FROM EXPERIENCE AND APPLY THAT LEARNING TO IMPROVE OUR WORK.
- TO ACHIEVE THESE OBJECTIVES, KNOWLEDGE EXCHANGE MAKES USE OF SPECIFIC TOOLS AND APPROACHES. THESE INCLUDE TOOLS FOR FOSTERING IN-PERSON (FACE-TO-FACE) EXCHANGE THEY ALSO INCLUDE PLATFORMS AND SOFTWARE TOOLS THAT ENABLE ONLINE NETWORKING AND KNOWLEDGE SHARING ACROSS GEOGRAPHIC AND ORGANIZATIONAL BARRIERS, SUPPORTING COMMUNITIES OF PRACTICE TO GROW, CO-CREATE SOLUTIONS, SHARE SUCCESSES AND KEY RESOURCES.
- A KEY FUNCTION OF KNOWLEDGE EXCHANGE IS TO PROMOTE THE UPTAKE AND USE OF THE MOST EFFECTIVE KNOWLEDGE EXCHANGE, BUILD PARTNERSHIPS TO SUPPORT EFFECTIVE NETWORKS, AND PROVISION OF TRAINING AND ADVICE.
- THE BENEFITS OF KNOWLEDGE EXCHANGE INCLUDE SAVINGS OF BOTH TIME AND MONEY, AND IMPROVEMENTS IN EFFECTIVENESS -- INCLUDING CAPACITY TO DEVELOP NEW AND BETTER APPROACHES TO OVERCOME CHALLENGES.

JAC- Antimicrobial Resistance

A fully open access journal publishing expert-reviewed educational stewardship resources and cutting edge, interdisciplinary research into the treatment and prevention of difficult-to-treat infections.

EDUCATION

> 500

AMS resources mapped

> 90

of these reviewed
by experts (and more
every week!)

RESEARCH

Clinically-focused
academic research
from around
the globe

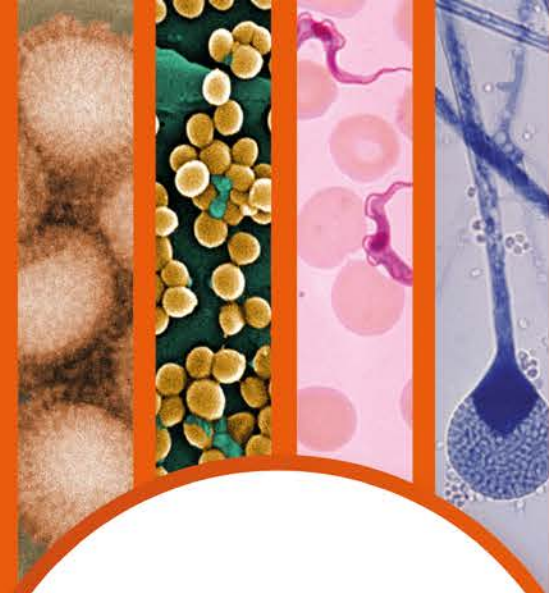
NEWS/
PODCAST
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CIDRAP

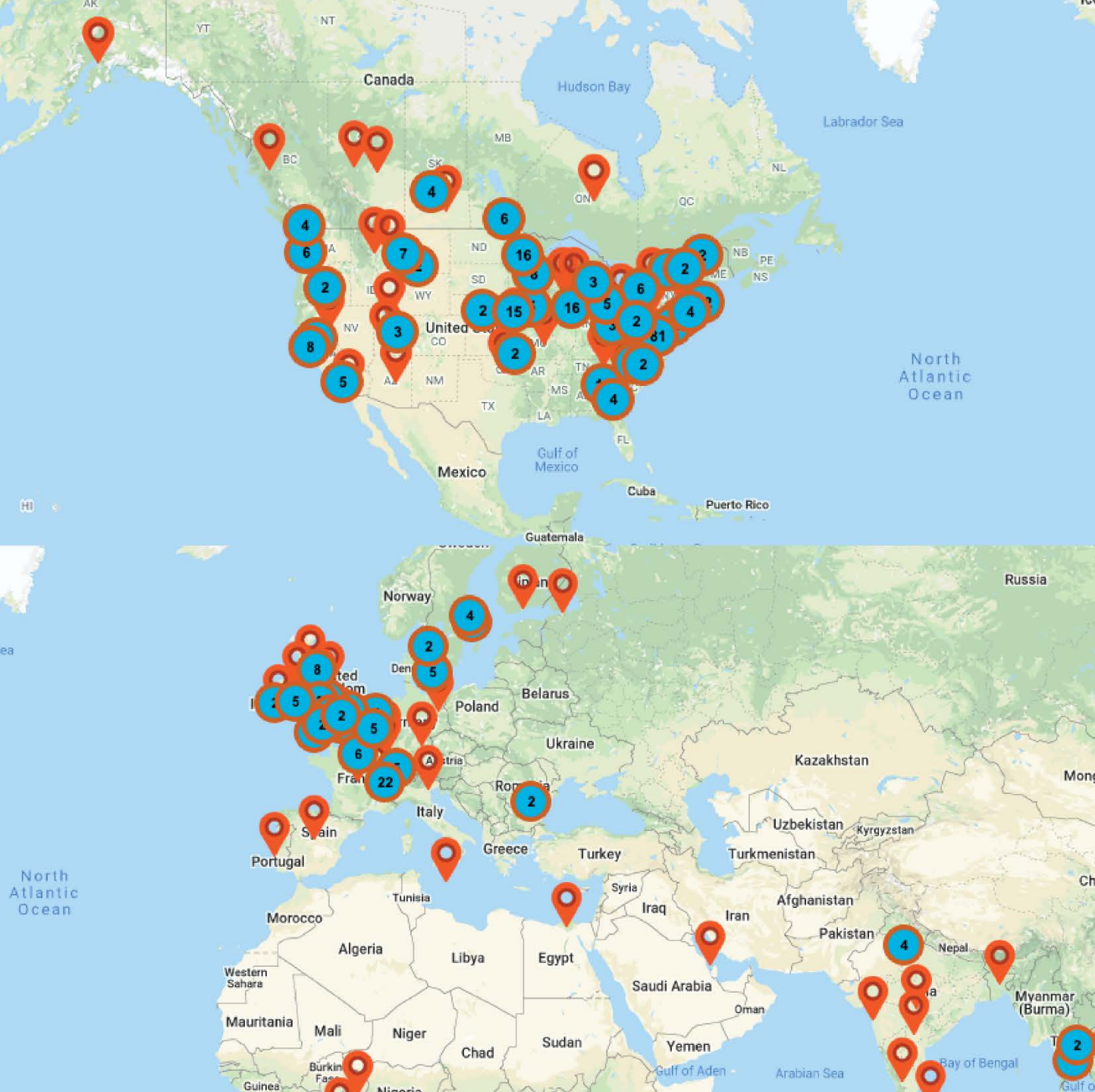
academic.oup.com/jacamr

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JAC- Antimicrobial Resistance

Education and research in antimicrobial
stewardship and resistance



OXFORD
UNIVERSITY PRESS

Resource Map

Peer and non-peer reviewed multi-media antimicrobial resistance and stewardship educational resources from differing health economies across the globe. The resources are classified according to the World Health Organisation national action plan classification system

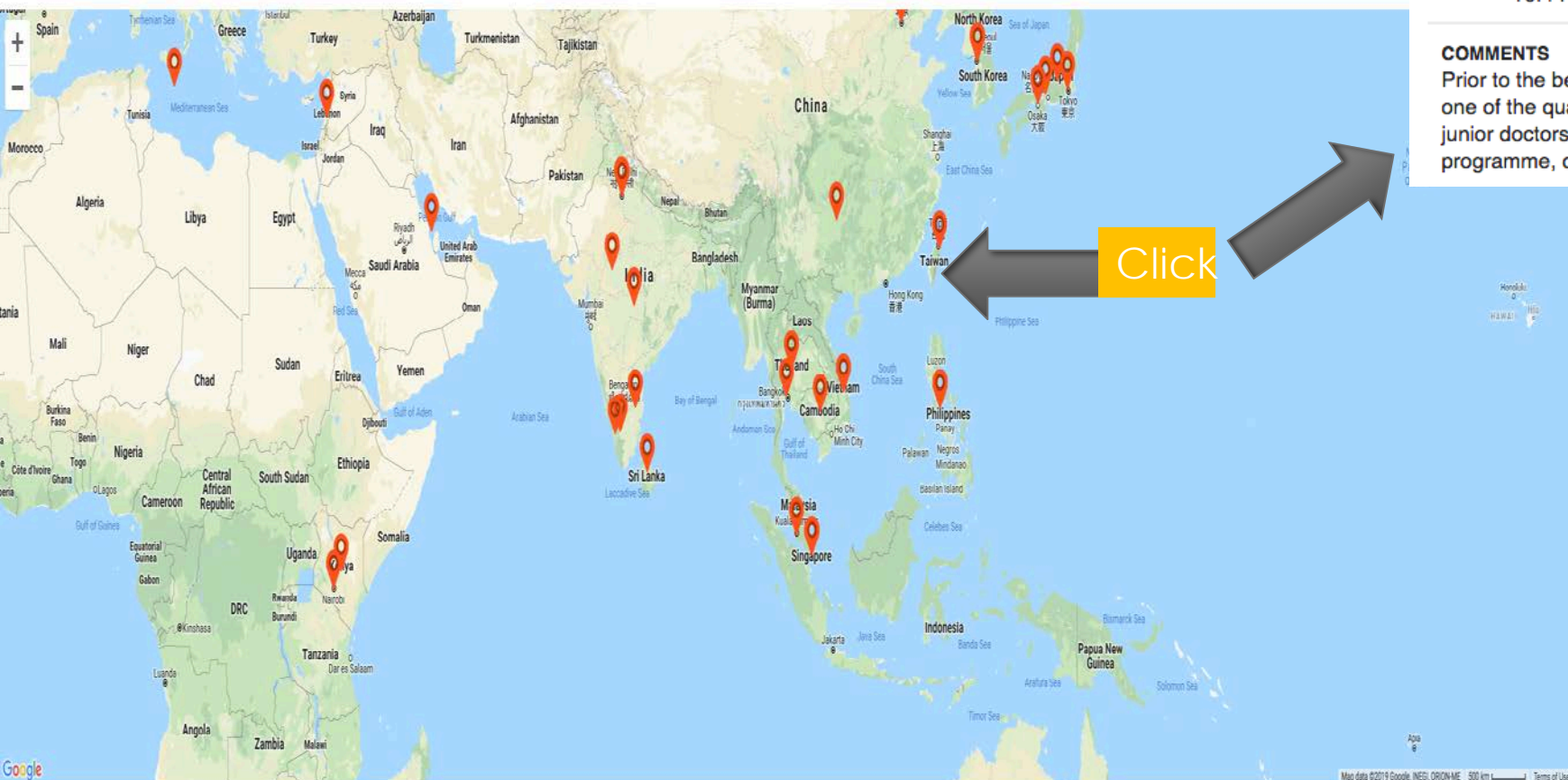
bsac-jac-amr.com/JAC-AMR-resources/



JAC-AMR

This database provides a rich blend of multi-media antimicrobial resistance and stewardship educational resources from differing health economies across the globe. The resources are classified according to the World Health Organisation national action plan classification system and are searchable using the filters below. Some of these resources have been or will be selected for peer review and publication in JAC-Antimicrobial Resistance going forward. If resources are already reviewed a link to the peer review publication has been provided.

Click [here](#) to submit educational resources direct to JAC-Antimicrobial Resistance for review



RESOURCE TYPE (DESCRIPTION OF RESOURCE)

1.9 Paper based resources- pdf,s, other type documents

SOURCE OF RESOURCE



ANTICIPATED DURATION

7.3 Self-paced

FOCUS OF TOPIC / RESOURCE

SETTING OF RESOURCE



TARGET AUDIENCE



LANGUAGE



RELEVANCE / APPLICABILITY



REUSABLE LEARNING / TEACHING RESOURCE THAT IS DOWNLOADABLE



AVAILABLE ACCREDITATION / CERTIFICATION / CREDIT BEARING



ACCESS

8.1 Free

COMMENTS

Prior to the beginning of AMS programme, all physicians were asked to attend at least one of the quart-yearly speeches on the rationale and principles of antibiotic therapy. The junior doctors and higher trainee doctors were requested to attend an educational programme, directed by the infectious diseases physicians. Since October 2013, an



Latest Reviews Educational Resource Centre

Access now

Read the latest reviews on global educational resources here. For details on upcoming reviews please review our database of resources under consideration.

[Read now](#)

Pharmaceutical, diagnostic, device manufacturers and commercial partners

Get involved – find out about the three distinct ways that you can submit resources for peer review publication, publish commercially focused materials or advertise directly in *JAC-Antimicrobial Resistance*.

[Find out more](#)

Latest Research Articles

Research articles

Read our introductory leading article [here](#) and the first of our open access research papers.

[Read now](#)

Antimicrobial stewardship in Australian health care: 2018

JAC-Antimicrobial Resistance, Volume 1, Issue 1, 1 January 2019, dlz010,
<https://doi.org/10.1093/jacamr/dlz010>

Published: 12 April 2019

[Abstract ▼](#)[Journal Article](#)

Ask the experts webinar: serious skin infections

JAC-Antimicrobial Resistance, Volume 1, Issue 1, 1 January 2019, dlz012,
<https://doi.org/10.1093/jacamr/dlz012>

Published: 12 April 2019

[Abstract ▼](#)[Journal Article](#)

Mechanisms of carbapenem resistance: exploring the complexities

JAC-Antimicrobial Resistance, Volume 1, Issue 1, 1 January 2019, dlz013,
<https://doi.org/10.1093/jacamr/dlz013>

Published: 12 April 2019

[Abstract ▼](#)[Journal Article](#)

Antimicrobial Stewardship Programme

JAC-Antimicrobial Resistance, Volume 1, Issue 1, 1 January 2019, dlz011,
<https://doi.org/10.1093/jacamr/dlz011>

Published: 12 April 2019

[Abstract ▼](#)[Journal Article](#)

Peer review commentary

This is a comprehensive introductory guide for medical students and clinicians wishing to review their knowledge according to most recent antibiotic prescribing guidelines. This is particularly valuable to review antibiotic prescribing in a relatively short period of time, and makes use of multi-media (including PowerPoints with accompanying lectures) with experts with comprehensive and credible epidemiological and medical understanding of antibiotic resistance and stewardship in the South African context.

There are 22 antibiotic prescribing topics, each with an accompanying multiple choice test to track the comprehension of the participant. This is a particular strength of this resource, since immediate feedback on retention of new information is pedagogically robust, and can also help to retain and engage participants.

How to escalate, deescalate and change antibiotic prescribing was also a strength of this resource, and came up early on in the learning activities provided. Flow charts were provided for learners in this lecture—as in the others—and so were reminders about how to read an antibiogram, how to choose the most appropriate therapy and how to choose dose and length of treatment.

A weakness of this resource is that there is relatively weak understanding/explanation of the bacterial diseases that make up the burden in South Africa. There are a some mentions of drug-resistant TB, such as in the lecture on antibiotics in pregnancy and lactation, but

Resource web link: <https://www.openlearning.com/courses/clinical-antibiotic-stewardship-for-south-africa/pages/introduction/>
(Full classification scheme available at: <http://bsac.org.uk/wp-content/uploads/2019/03/Educational-resource-review-classification-scheme.pdf>)









Clinical Antibiotic Stewardship for South Africa

Antimicrobial resistance is a major threat to modern medicine. This course in Clinical Antibiotic Stewardship brought to you by the South African Antibiotic Stewardship Programme (SAASP) teaches the principles of antibiotic prescribing and an approach to common clinical problems.

Whether you are a medical student or an experienced clinician, everyone can learn something new or update their skills.



Clinical antibiotic stewardship for South Africa

RESOURCE TYPE (DESCRIPTION OF RESOURCE)  Online/distance learning courses (MOOC, unfacilitated courses, online modules)/community of practice Webinars, video, online lectures (including PowerPoint), podcasts, animation video, maps, photos	
SOURCE OF RESOURCE Governments Professional societies Universities/higher education institutes Other: South African Antibiotic Stewardship Programme	 ANTICIPATED DURATION Self-paced
FOCUS OF TOPIC/RESOURCE Principles/practice of prudent prescribing AMS principles/practice Guidelines/policies/pathways for syndrome management of infections (empirics organ or organisms specific)	SETTING OF RESOURCE Service: Hospital Outpatient clinic Community/general practice Long-term care facility/nursing home Hospital and ambulatory
 TARGET AUDIENCE Medical students; Doctors	 LANGUAGE English
 RELEVANCE/APPLICABILITY LMIC, HMI	 REUSABLE LEARNING/TEACHING RESOURCE THAT IS DOWNLOADABLE Reusable; online resources that are accessible multiple times.
 AVAILABLE ACCREDITATION/CERTIFICATION/CREDIT BEARING No	 ACCESS Free

Panel: Next steps for global antibiotic stewardship collaboration

- Global antibiotic stewardship starts with individual stewards reaching out to each other to share experiences, education, and resources; to collaborate in research publication; and to set up mentoring programmes
- Antibiotic policies to optimise antibiotic use are not enough; individual stewards need to have a global perspective and contribute to coordinating activities
- Although each country's approach to antimicrobial stewardship is different, and when nurtured, individual effort can positively affect local and national antibiotic stewardship programmes
- Antibiotic stewardship models need to evolve from infection specialist-based teams to develop and use cadres of health-care professionals—including pharmacists, nurses, and community health workers—to meet the needs of the global population
- All health-care providers who prescribe antibiotics should take ownership and understand the societal burden of suboptimal antibiotic use

A global call from five countries to collaborate in antibiotic stewardship: united we succeed, divided we might fail

Debra A Goff, Ravina Kullar, Ellie J C Goldstein, Mark Gilchrist, Dilip Nathwani, Allen C Cheng, Kelly A Cairns, Kevin Escandón-Vargas, Maria Virginia Villegas, Adrian Brink, Dena van den Bergh, Marc Mendelson

Lancet Infect Dis 2017;
17: e56–63

Advocacy for Increased International Efforts for Antimicrobial Stewardship Actions in Low-and Middle-Income Countries on Behalf of Alliance for the Prudent Use of Antimicrobials (APUA), Under the Auspices of the International Society of Antimicrobial Chemotherapy (ISAC)

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AMS programs must be carefully contextualized. Despite the need to individually tailor AMS programs in LMIC, international collaborations remain highly valuable, through the dissemination of high-quality documents and educational material, that may be shared, adapted where needed, and adopted worldwide. This process, facilitated by modern communication tools, combines many benefits, including: (i) saving time, a precious dimension for health care workers, by avoiding the duplication of similar works in different settings; (ii) taking advantage of colleagues skills, and initiatives, through open access to the work performed in other parts of the world; (iii) sharing experiences, so that we all learn from each others' successes and failures.

Evidence for action: a One Health learning platform on interventions to tackle antimicrobial resistance

Didier Wernli, Peter S Jørgensen, E Jane Parmley, Max Troell, Shannon Majowicz, Stephan Harbarth, Anaïs Léger, Irene Lambraki, Tiscar Graells, Patrik J G Henriksson, Carolee Carson, Melanie Cousins, Gunilla Skoog Ståhlgren, Chadag V Mohan, Andrew J H Simpson, Barbara Wieland, Karl Pedersen, Annegret Schneider, Sujith J Chandy, Tikiri Priyantha Wijayathilaka, Jérôme Delamare-Deboutteville, Jordi Vila, Cecilia Stålsby Lundborg, Didier Pittet

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- An open access learning platform on interventions for antimicrobial resistance should be useful to a broad range of stakeholders, including health-care professionals, public health practitioners, policy makers, industries, and consumer groups. It would not only provide the possibility of complementing published sources with new information, but also enable the exchange of ideas through online community tools.

We have started this journey !!!!

CONCLUSIONS

- IMPORTANCE OF EDUCATION AND TRAINING TO AMR
- AMR CURRICULUM & COMPETENCY FRAMEWORK – WHO
- WHAT IS E-LEARNING AND COMPARISON TO TRADITIONAL LEARNING
- WHAT IS BLENDED LEARNING ?
- WHY E-LEARNING/BLENDED LEARNING IN AMR ?
- SUCCESS OF E-LEARNING MODELS IN AMR – OPEN ACCESS EDUCATION, MOOC, E-BOOKS
- INNOVATIONS & CHALLENGES WITH E-LEARNING IN AMR – GAMING, ETC
- NOVEL EDUCATION LEARNING PLATFORM & REGIONAL NETWORKS- JAC AMR, INFECTION LEARNING HUB/COVID-AMS RESOURCE CENTRE

Thank you

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