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Preparing the future pharmacy workforce: competency-based undergraduate curricula for teaching, learning and assessment with a focus on antimicrobial stewardship.

MARTIN, S. and TONNA, A.

2023





"Preparing the future pharmacy workforce: competency-based undergraduate curricula for teaching, learning and assessment with a focus on antimicrobial stewardship"

Facilitated by

Mrs Sandra Martin, Associate Professor in Pharmacy Practice

School of Pharmacy & Medical Sciences, University of Bradford, England

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Aberdeen, Scotland





By the end of session, participants will

Have a knowledge of the concept of competency-based undergraduate pharmacy education.

Have an understanding of ways of embedding competency-based teaching of antimicrobial stewardship (AMS) in the undergraduate pharmacy curriculum.

Have an appreciation of the strengths and limitations of different pedagogical approaches to competency-based teaching of AMS.

Be able to apply principles of competency-based teaching of AMS for case-based teaching scenarios.



5 minutes Welcome and introductions

25 minutes Introduction to competency-based UG

pharmacy education in the UK

30 minutes Application of knowledge gained to

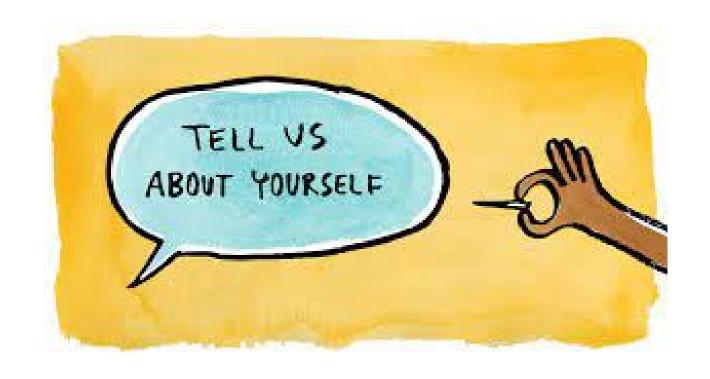
scenarios

30 minutes Feedback and discussion

15 minutes Summary and examples from practice

15 minutes Question & Answer and final discussion

Tell us about your background for teaching, learning and assessment for AMS



What is competency?

"Knowledge, behaviours, attitudes and skills that lead to the ability to do something successfully or efficiently"



Competency-based education

- Based on students achieving competencies

 skills, attitudes, behaviours and
 knowledge that are set prior.
- Individuals move on to apply their knowledge to performance.
- Students have clear outcomes they need to achieve some students may achieve this before others.
- Greater focus on the learner.



GPhC Initial Education & Training for Pharmacists in the UK (2021) 5 years: 4 years UG and 1 year foundation training in practice

Structured upon a competency-based, spiral curriculum

Student/trainee pharmacists' skills, knowledge, understanding and professional behaviours will progress throughout their initial education and training.

As they go through their MPharm degree they will be expected to demonstrate the learning outcomes to a greater depth, breadth and degree of complexity.

The foundation training year will further expose student/trainee pharmacists to new situations and environments.

This will give them opportunities to build upon their knowledge and skills and demonstrate these with patients in clinical settings.

Spiral Curriculum

- Bruner (1960) first described concept of a "Spiral curriculum": "Sequence of a curriculum" and "Structure of a subject"
- Harden (1999) Medical education "a spiral curriculum is one in which there is an iterative revisiting of topics, subjects or themes throughout the course. A spiral curriculum is not simply the repetition of a topic taught. It requires also the deepening of it, with each successive encounter building on the previous one"
- Iterative revisiting of topics/ subjects throughout the course, building on complexity

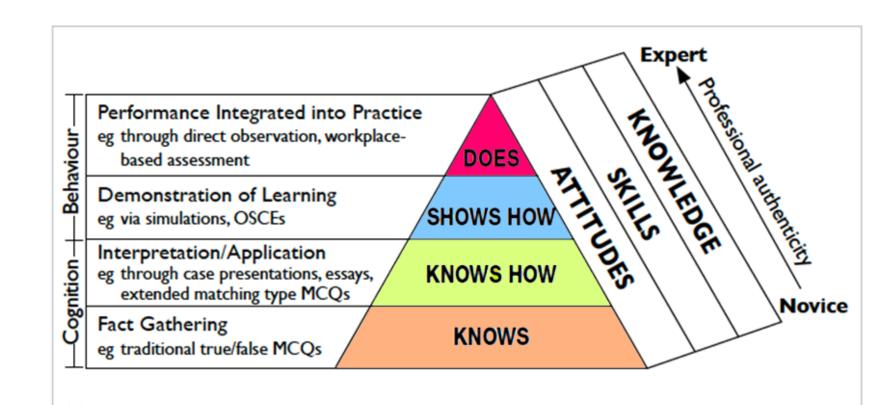


Competency-based curriculum



- Spady (1977) first linked competencies or outcomes for education to the concept of life-role.
- Competency-based curricula for medical education were first mooted in the 1970's (Frank, 2010).
- Miller (1990) first proposed his framework of clinical assessment as a pedagogical tool for medical curricula, to permit measurement of knowledge through objective test methods.
- Four critical features of competency-based education, namely "a focus on outcomes, an emphasis on abilities, a reduction of emphasis on time-based training and promotion of learner-centredness" (Gruppen, 2015).

GPhC IET
2021:
Millers
Pyramid of
Competence



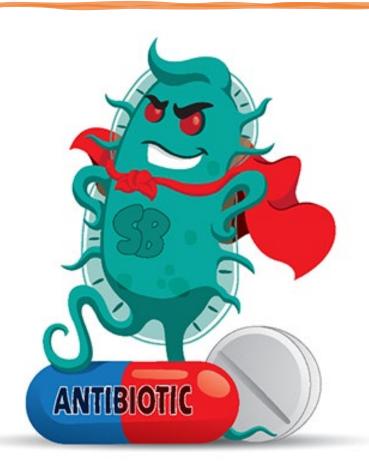
Miller's pyramid for assessing clinical competence



CONSEQUENCES OF INAPPROPRIATE USE OF ANTIBIOTICS

- Inappropriate use of antimicrobials is recognized by global organizations such as the WHO and the EU.
- Inappropriate use of antimicrobials leads to Antimicrobial resistance (AMR).
- Antibiotic resistance leads to longer hospital stays, higher medical costs and increased mortality.
- Each year an estimated 700,000 people die globally due to antimicrobial resistant infections.
- By 2050 global economic losses due to antimicrobial resistant infections is predicted to be \$100 trillion.

Background to Antimicrobial Resistance



- WHO defines antimicrobial resistance (AMR) as occurring
 "when bacteria, viruses, fungi and parasites change over time and no longer respond to medicines making infections harder to treat and increasing the risk of disease spread, severe illness and death."
- Concern: AMR leads to diseases that are more difficult to treat, sometimes being resistant to more than one antimicrobial (superbugs)
- Examples of those that are in our headlines include C difficile infection and MRSA (Meticillin resistant Staphylcoccus aureus)

How can we combat AMR?

Complex !... but one strategy is through antimicrobial stewardship (AMS) defined by the WHO as:

"A coherent set of actions which promote the responsible use of antimicrobials. This definition can be applied to actions at the individual level as well as the national and global level, and across human health, animal health and the environment." 1

WHO POLICY
GUIDANCE ON
INTEGRATED
ANTIMICROBIAL
STEWARDSHIP
ACTIVITIES

¹ https://apps.who.int/iris/bitstream/handle/10665/329404/9789241515481-eng.pdf

Competency-based education approach in UK

- Imperative to embed AMS into the curricula of all healthcare professionals
- AMS is a key activity that all healthcare professionals need to master, both for patient benefit, and to ensure environmental sustainability through sustainable prescribing
- A UK wide set of consensus-based, AMS competencies for undergraduate healthcare professional education was published in 2018
- Competency based education is the better pedagogic approach here since it is not just about knowledge but also about having the skills and behaviours to apply this knowledge effectively

Journal of Hospital Infection 100 (2018) 245-256



Journal of Hospital Infection



Development of consensus-based national antimicrobial stewardship competencies for UK undergraduate healthcare professional education

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M. Courtenay a,*, R. Limb, E. Castro-Sanchezc, R. Deslandesd, K. Hodsond,
G. Morris a, e, S. Reeves, M. Weiss, D. Ashiru-Oredope, H. Bain, A. Black,
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J. Bosanquet^g, A. Cockburn^j, C. Duggan^k, M. Fitzpatrick^l, R. Gallagher^m

D. Grant^b, J. McEwenⁿ, N. Reid^o, J. Sneddon^p, D. Stewart^q, A. Tonna^q,

P. White

Courtney, (2018) AMS competencies for UG HCP education in the UK

6 domains, with competency statements, and 54 descriptors

Domain	Description
1	Infection Prevention & Control
2	Antimicrobials & Antimicrobial Resistance
3	Antimicrobial Prescribing
4	Antimicrobial Prescribing Practice
5	Person-centred Care
6	Interprofessional Collaborative Practice

Domain 1: Infection Prevention & Control

1	Describing what a micro-organism is
2	Describing the different types of organisms that may cause infections
3	Explaining what an antimicrobial resistant organism is.
4	Explaining the 'chain of infection'.
5	Defining the components required for infection transmission (i.e. presence of an organism, route of transmission of the organism from one person to another, a host who is susceptible to infection).
6	Describing the routes of transmission of infectious organisms, i.e. contact, droplet, airborne routes.
7	Present and recognize the characteristics of a susceptible host.
8	Demonstrate an understanding of the importance of surveillance.
9	Describe how vaccines can prevent infections in susceptible persons
10	Demonstrate the application of standard precautions in healthcare environments.
11	Apply appropriate policies/procedures and guidelines when collecting and handling specimens.
12	Apply policies, procedures and guidelines relevant to infection control when presented with infection control cases and situations.
13	Implement work practices that reduce risk of infection (such as taking appropriate immunization or not coming to work when sick to ensure patient and other healthcare worker protection).
14	Appreciate that healthcare workers have the accountability and obligation to follow infection control protocols as part of their contract of employment.
15	Act as a role model to healthcare workers and members of the public by adhering to infection prevention and control principles.
16	Demonstrating knowledge and awareness of international/national strategies on infection prevention and control and antimicrobial resistance such as Global Action Plan for AMR and Save Lives – Clean Your Hands http://www.who.int/gpsc/5may/en/ and the UK Government's 5-year Antimicrobial Resistance Strategy.

Domain 2:
Antimicrobials
&
Antimicrobial
Resistance

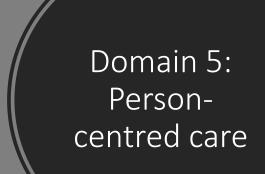
17	Recognise the symptoms of infection
18	Describe at least two different ways that antimicrobials may kill bacteria
19	Discuss how inappropriate antimicrobial use (including non-adherence to treatment regime) may lead to antimicrobial resistance.
20	Identify approaches to support optimal prescribing of antimicrobials.

Domain 3: Antimicrobial Prescribing

21	Explain how microbiology samples may aid diagnosis of infection.
22	Describe how and demonstrate (following local procedures) the appropriate taking of samples.
23	Interpret microbiology results/reports from the laboratory at a basic level.
24	Explain why self-limiting bacterial or viral infections are unlikely to benefit from antimicrobials.
25	Describe and demonstrate the self-management strategies required to treat self-limiting infections (i.e. analgesia/rest/fluids).
26	Understand the importance of following local antimicrobial policies (i.e. their development is based on local resistance patterns) and follow these policies in practice.
27	Explain the importance of documenting the indications for an antimicrobial (i.e. the route by which it is administered, its duration, dose, dose interval, and review date), in clinical notes and demonstrate this in practice.
28	Demonstrate an understanding of the factors that need to be considered when choosing an antimicrobial (including site of infection and type of bacteria likely to cause an infection at a particular site).
29	Describe broad-spectrum and narrow-spectrum antimicrobials and the contribution of broad-spectrum antimicrobials to antimicrobial resistance.
30	Present and be able to recognize the common side-effects associated with widely administered antimicrobials.
31	Demonstrate an understanding of why documenting a patient allergy to an antimicrobial is important.
32	Explain why it is important to consider certain physiological conditions (such as renal function) in patients who receive an antimicrobial.
33	Describe what is meant by delayed prescribing
34	Explain why it is essential that an accurate diagnosis of an allergy to an antimicrobial is based on history and laboratory tests.

Domain 4: Antimicrobial Prescribing Practice

35	Explain how you would recognize and manage sepsis.
36	Describe why it is important to use local guidelines to initiate prompt, effective antimicrobial treatment in patients with life-threatening infections.
37	Describe why it is important to switch from intravenous antimicrobials to oral therapy.
38	Describe how to switch from intravenous antimicrobials to oral therapy.
39	Understand the appropriateness of antimicrobial administration models such as outpatient parenteral antimicrobial therapy (OPAT).
40	Demonstrate an understanding of the rationale and use of perioperative prophylactic antimicrobials to prevent surgical site infection.
41	Discuss factors that can influence antimicrobial prescribing and the implications for antimicrobial stewardship programmes.
42	Describe the national guidance on completion of a course of antimicrobials.
43	Describe some of the medicines with which antimicrobials can sometimes interact.



44	Support participation of patients/carers, as integral partners when planning/delivering their care.
45	Share information with patients/carer in a respectful manner and in such a way that is understandable, encourages discussion, and enhances participation in decision-making.
46	Ensure that appropriate education and support is provided by learners to patients/carer, and others involved with their care or service.
47	Listen respectfully to the expressed needs of all parties in shaping and delivering care or services.
48	Discuss patient/carer expectations or demands of antimicrobials and the need to use antimicrobials appropriately.

Domain 6: Interprofessional collaborative practice

49	Demonstrate an understanding of the roles, responsibilities, and competencies of other health professionals involved in antimicrobial treatment policy decisions.
50	Explain why it is important that healthcare professionals, involved in the delivery of antimicrobial therapy (including the prescription, delivery and supply), have a common understanding of antimicrobial treatment policy decisions, the quantity of antimicrobial use, and effective patient/client outcomes.
51	Establish collaborative communication principles and actively listen to other professionals and patients/carer involved in the delivery of antimicrobial therapy.
52	Communicate effectively to ensure common understanding of care decisions.
53	Develop trusting relationships with patients/carer and other health/social care professionals.
54	Effectively use information and communication technology to improve interprofessional patient-centred care.

Implementation of the national antimicrobial stewardship competencies for UK undergraduate healthcare professional education within undergraduate pharmacy programmes: a survey of UK schools of pharmacy.

Objective:

To explore which of the AMS competencies are delivered, including when and at which level within UK undergraduate pharmacy programmes.

Methods:

A cross-sectional online questionnaire captured the level of study in which each competency was taught, the method of delivery and assessment of AMS education and examples of student feedback.

Conclusions

- UK schools of pharmacy should utilize the competency framework to identify gaps in their AMS, AMR and infection teaching.
- To prepare newly qualified pharmacists to be effective at delivering AMS and prescribing antimicrobials, schools of pharmacy should utilize more simulated environments and clinical placements for education and assessment of AMS.

Findings:

- Ten institutions completed the survey (33% response rate).
- No institution reported covering all 54
 AMS competencies and 5 of these were taught at half or fewer of the institutions.
- Key gaps were identified around taking samples, communication, outpatient parenteral antimicrobial therapy and surgical prophylaxis.
- The minimum time dedicated to AMS teaching differed between institutions (range 9–119 h).
- Teaching was generally through didactic methods, and assessment was generally through knowledge recall and objective structured clinical examinations.
- Feedback from students suggests they find AMS and antimicrobial resistance (AMR) to be complex yet important topics

Reference: Hamilton, R., Courtney, M., Frost, K.J., Harrison, R., Root, H., Allison, D.G., Tonna, A.P., Ashiru-Oredope, D., Aldeyab, M.A., Shemilt, K. and Martin, S.J. (2023). Implementation of the national antimicrobial stewardship competencies for UK undergraduate healthcare professional education within undergraduate pharmacy programmes: a survey of UK schools of pharmacy. *JAC-Antimicrobial Resistance*, Volume 5, Issue 4,

August 2023, dlad095, https://doi.org/10.1093/jacamr/dlad095

Approaches to teaching & learning

Approach	Comment	Advantages	Disadvantages
Lecture	Didactic, online or face to face Synchronous or asynchronous Large group, Passive learning	Large group Transfer knowledge	Passive learning
Laboratory practicals	Face to face Synchronous	Large or small group	Active learning
Workshop eg Case- based scenarios	Online or face-to-face Synchronous	Small groups	Active learning. Application of prior knowledge
Role-play/Simulations	Online or face-to-face Synchronous	Small groups/1:1	Active learning. Application of prior knowledge

Approaches to assessment

Pedagogical method	Advantages	Disadvantages
Multiple-choice questions/Single best answer questions (Knows)	Can cover broad range of topics, Easy to mark	Rote-learning [learning off memory with lack of ability to apply]
Essay (Knows How)	Can cover specific topic or a range of topics. Can use standard rubric for marking.	Some students have poorer academic writing skills. Time consuming to mark
Objective Structured Clinical Examinations (OSCEs) (Shows how)	Can standardize scenarios and marking rubrics. Safe space if "harm" identified.	Scenarios must be realistic. Time and resource (staff) consuming to plan and deliver. High pressure for students.
Direct observation/work-based assessment (Does)	Can see real-life application in real time.	Scenarios unpredictable/non standardized. Time to undertake during work.



Group work: 30 minutes

- Each group: One AMS competency with associated descriptors.
- Plan curriculum development for how to embed teaching, learning & assessment across the different stages of learning.
- Stages of learning: Undergraduate years
 1-4 and Foundation year (5).
- Flipchart provided: be ready to feedback to large group.



Example from Sandra's practice: Domain 3: Antimicrobial Prescribing Practice

Can make own prescribing decisions independently. Assessment is by assessing the action when showing ability: eg Descriptor 26: Understand the importance of following local antimicrobial policies (i.e their development is based on local resistance patterns) and follow these policies in practice. OSCE and responding to a case being provided independently, workplace assessment/portfolio

DOES

Incorporation to combine in more complex case-based discussion linking all facts provided to a specific patient e.g Descriptor 26: Understand the importance of following local antimicrobial policies (i.e their development is based on local resistance patterns) and follow these policies in practice. Assessment is by responding to set cases given

SHOWS HOW

Case based discussion with more interpretation of facts. e.g. Descriptor 24: Explain why self-limiting bacteria or viral infections are unlikely to benefit from antibiotics: starts to focus on the application of knowledge.

KNOWS HOW

Didactic teaching and self –directed learning to learn facts. eg Descriptor 29: Describe broad-spectrum & narrow spectrum antibiotics and the contribution of broad-spectrum antibiotics to AMR and Descriptor 30: Present and be able to recognize common side effects associated with widely prescribed antibiotics. Assessment is by recall of facts: MCQs, short/long questions

KNOWS



Example Stage 2: Domain 3, Descriptor 24: Explain why self-limiting bacteria or viral infections are unlikely to benefit from antibiotics: starts to focus on the application of knowledge

Case based scenario: discussion with more interpretation of facts.

You are working as a prescribing pharmacist in a GP surgery. A 25-year-old non-smoker presents with a 3-day history of nasal congestion and yellow discharge. He has not experienced these symptoms before, Temp 37.3°C, mild facial discomfort and no cough.

2nd year MPharm
Teaching: workshop with small groups and simple case-based scenarios.
Assessment: Single best answer from simple scenarios and set of antimicrobial guidelines

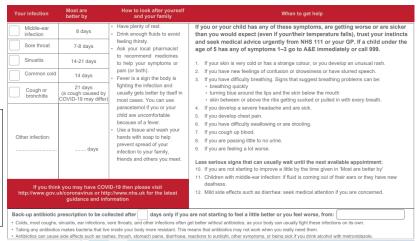
At this stage: KNOWS HOW

Educator notes: Discuss likely diagnosis and likely to be a viral infection. Treatment options and resources from TARGET website (RCGP) eg antimicrobial prescribing table and "Treating your infection" patient leaflets

Antimicrobial prescribing table (rcgp.org.uk)

Advise paracetamol or ibuprofen for pain. Little 5 days evidence that nasal saline or nasal phenoxymethylpenicillir decongestants help, but people may want to try Penicillin allergy: 200mg on day 1, then 100mg OD doxycycline (not in under NICE Symptoms for 10 days or less: no antibiotic. 12s) **OR** clarithromycin OR 500mg BD 5 days than 10 days; no antibiotic or back-up antibiotic erythromycin (if macrolide 250 to 500mg depending on likelihood of bacterial cause UK Health QDS or needed in pregnancy: Consider high-dose nasal corticosteroid (if over consider benefit/harm) 500 to 1000mg BD Security Second choice or first 500/125mg TDS Agency Systemically very unwell or high risk of choice if systemically complications: immediate antibiotic. very unwell or high risk 5 days For detailed information click on the visual summary of complications: co-amoxiclay

TREATING YOUR INFECTION - RESPIRATORY TRACT INFECTION (RTI)



Example from Antonella's practice Infection



Can make own prescribing decisions independently

Assessment is by assessing the action when showing ability: OSCE and responding to a case being provided independently, workplace assessment

Maybe in combination with a portfolio

DOES

Incorporation to combine in more complex case-based discussion linking all facts provided to a specific patient – e.g. infection recurring after few weeks with link to resistance

Assessment is by responding to set cases given

SHOWS HOW

Case based discussion with more interpretation of facts e.g. C &S reports, Lab parameters; starts to focus on the application of knowledge

KNOWS HOW

Didatic teaching and self –directed learning to learn facts

Assessment is by recall of facts: MCQs, short/long questions

KNOWS

Case-based approach

ROBERT GORDON UNIVERSITY ABERDEEN

Mr AM is a 75-year-old man admitted to hospital with new onset confusion, worsening shortness of breath (respiratory rate 32 breaths per min), production of purulent sputum and cough. His chest X-Ray shows a left-sided consolidation and his blood pressure was recorded as 120/80mmHg. Mr AM has no other significant past medical history. He is diagnosed with community acquired pneumonia (CAP). A sputum sample has been taken for culture and sensitivities but results will not be available for 48 hours.

Descriptor 26: Understand the importance of following local antimicrobial policies and follow these policies in practice.

Descriptor 17: Recognise the symptoms of infection

3rd year MPharm student assessment

At this stage: KNOWS HOW Element of SHOWS HOW

Hospital E	mpirical Antibiotic (Guidelines – Communi	ty acquired	pneumonia
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Use CURB65 score to assess severity: each parameter scores 1:

Confusion; Urea >7mmol/L; Respiratory rate ≥30/min; BP systolic <90 or diastolic ≤60; Age ≥65;

Confusion, orea > 11111101/2, Respiratory rate 230/11111, Dr. systonic 350 of diastonic 200, Age 203,					
Infection	1st Choice Antibiotic	2 nd Choice Antibiotic			
Mild CAP (CURB65 = 0 or 1)	Oral amoxicillin 1g every 8hrs Duration = 5 days	doxycycline 100mg daily			
		Duration = 5 days			
Moderate CAP (CURB65 = 2)	Oral amoxicillin 1g every 8hrs + oral clarithromycin 500mg twice daily Duration = 5 -7 days	doxycycline 100mg twice daily. Duration 5 -7 days			
Severe CAP If CURB65 ≥3	IV amoxicillin 1g every 8hrs + oral clarithromycin 500mg twice daily Duration = 7 – 10 days	IV co-trimoxazole 960mg twice daily. Duration = 7 – 10 days			



Calculate the CURB65 score for Mr AM and recommend appropriate antibiotic therapy, including dose, frequency and duration, using the hospital empirical antibiotic guidance provided

Explain the rational for using empirical antibiotic guidelines in the treatment of Mr AM's community acquired pneumonia

The culture and sensitivity results from the sputum sample become available. Recommend an appropriate antibiotic to treat Mr WG's infection based on the sensitivity results available. Justify your recommendation.

APPLICATION OF KNOWLEDGE

Culture and sensitivity:	Sputum sample		Mr WG
Organism	Resistant	Sensitive	
Streptococcus pneumoniae	amoxicillin	co-trimoxazole	
	doxycycline	clindamycin	

INCREASE COMPLEXITY

Need to think about

sensitivities

Why cotrimoxazole over

clindamycin

Descriptor 23: Interpret microbiology results/reports from the laboratory at a basic level.

Descriptor 28: Demonstrate an understanding of the factors that need to be considered when choosing an antimicrobial

Question & Answer



Summary

UNDERGRADUATE PHARMACY EDUCATION IN THE UK IS COMPETENCY-BASED, SPIRAL CURRICULUM (GPHC, 2021).

AMR IS A GLOBAL CHALLENGE (WHO).

CONSENSUS-BASED AMS COMPETENCIES FOR UG HEALTHCARE PROFESSIONALS IN THE UK (COURTNEY, 2018).

METHODS FOR TEACHING AND ASSESSMENT: STAGE OF CURRICULUM AND ADVANTAGES/DISADVANTAGES.

By the end of session, participants will

Have a knowledge of the concept of competency-based undergraduate pharmacy education.

Have an understanding of ways of embedding competency-based teaching of antimicrobial stewardship (AMS) in the undergraduate pharmacy curriculum.

Have an appreciation of the strengths and limitations of different pedagogical approaches to competency-based teaching of AMS.

Be able to apply principles of competency-based teaching of AMS for case-based teaching scenarios.

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