How to educate prescribers:
effective educational strategies for AMS

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ESGAP
ESCMID STUDY GROUP FOR ANTIBIOTIC POLICIES
European Society of Clinical Microbiology and Infectious Diseases

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Medicinska fakulteta

IDSA & SHEA Guidelines for Implementation of Antimicrobial Stewardship in Hospitals

2007

Education is essential!
(strong recommendation, low level of evidence)

2016

II. Is Didactic Education a Useful Antibiotic Stewardship Intervention for Reducing Inappropriate Antibiotic Use?

Recommendation

2. We suggest against relying solely on didactic educational materials for stewardship *(weak recommendation, low-quality evidence).*

Dellit TH, et al. Clin Infect Dis 2007; 44:159–77. , Barlam TF, et al. Clin Infect Dis 2016;62(10):e51–e77

IDSA & SHEA Guidelines for Implementation of Antimicrobial Stewardship in Hospitals

2007

Education is essential!
(strong recommendation, low level of evidence)

However, education alone, without incorporation of active intervention, is only marginally effective.

2016

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Education in AMS

- **Who should be educated?**
- **When should the education be started?**
- **What should be the content of AMS teaching?**
- **How to teach?**
- **Barriers?**

Health-care Workers Who Should be Included in Education on Responsible Antimicrobial Prescribing

Phase of education	Physicians	Pharmacists	Nurses, midwives
Undergraduate studies	+	+	+
Internship/foundation	+	N/A	N/A
Specialty training	+	+*	+*
CME/CPD	+	+	+

***If available, CME, continuous medical education, CPD, continuous professional development**

Dyar OJ, Beović B. Education of healthcare professionals on responsible antimicrobial prescribing. In: Pulcini C, Ergonul O, Can F, Beović B, eds. Antimicrobial stewardship. Elsevier 2016.

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C			

Hospital, primary care, nursing homes…

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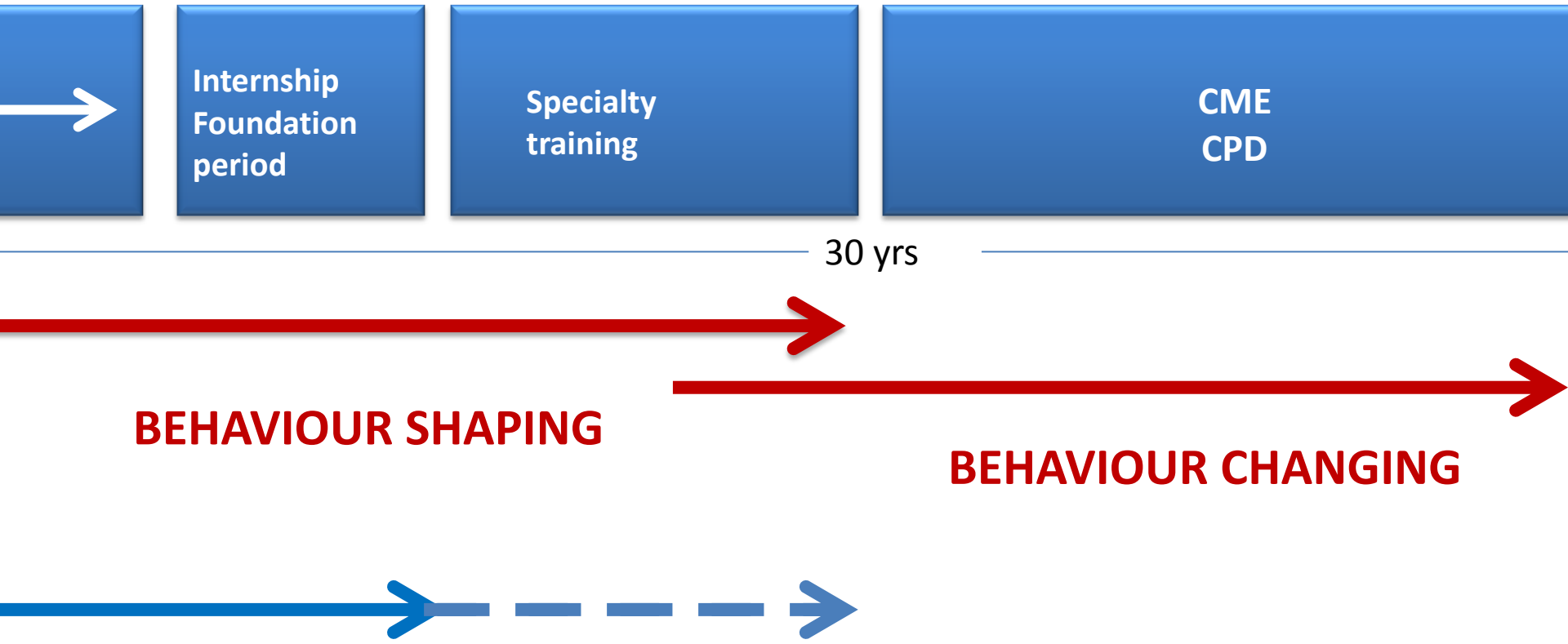
Medical Career



Adapted from:
Arain M, et al. Neuropsyh Dis Treat 2013; 9 449–61.
Pulcini C, Gyssens IC. Virulence 2013; 4: 192-202.

The Reinforcing Advantages of Undergraduate Education in AMS

- Engagement in a learning mindset
- Integration of curricula
- Defined curricula, compulsory assessment, national licensing requirements

Dyar OJ, Beović B. Education of healthcare professionals on responsible antimicrobial prescribing. In: Pulcini C, Ergonul O, Can F, Beović B, eds. Antimicrobial stewardship. Elsevier 2016.

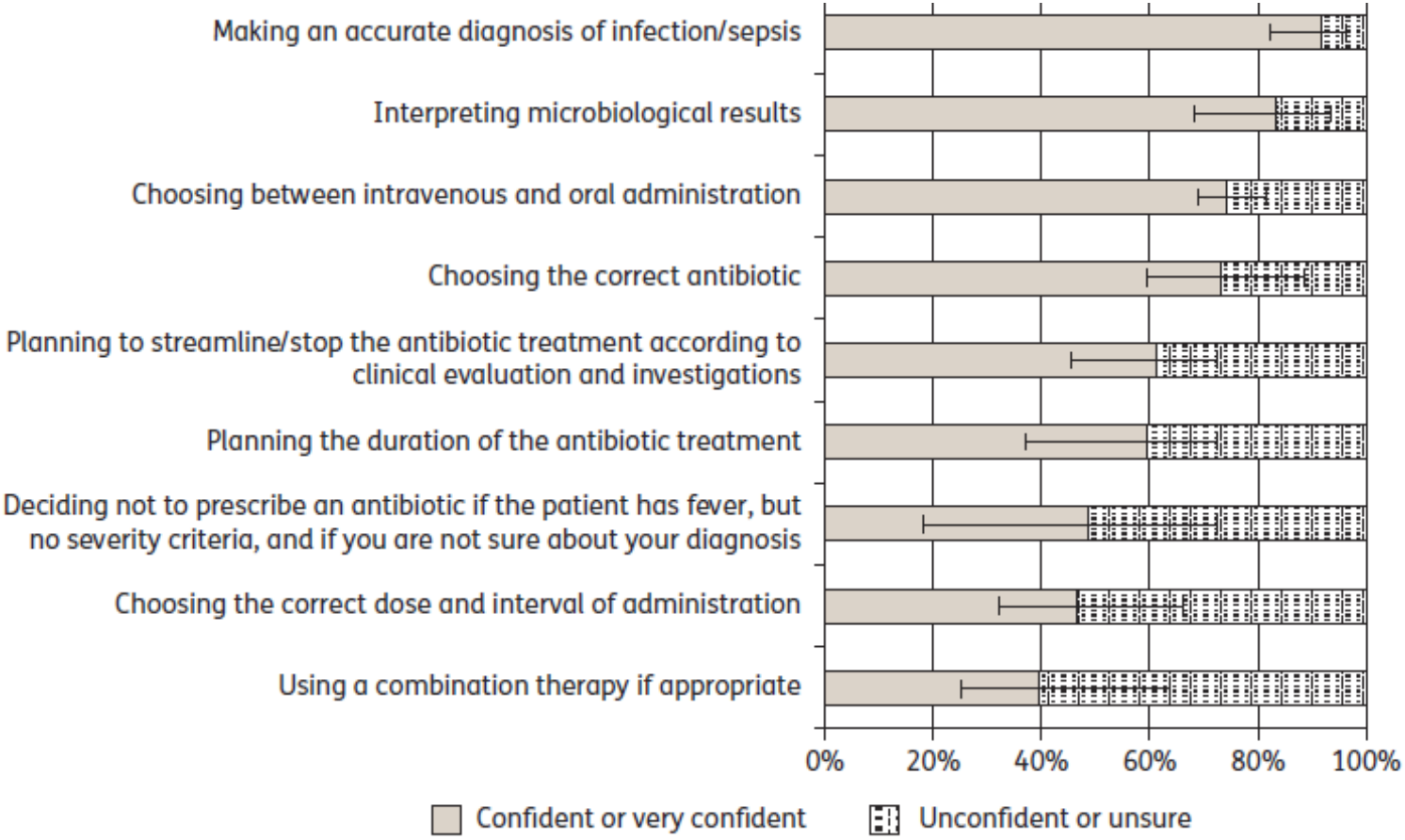
The Perceived Need for Education on Antibiotic Use in Undergraduate Students

Study (year of publication)	Region	% of students saying that they need more education
Minen (2010)	USA	78
Abbo (2013)	USA	90
Huang (2013)	China	89
Dyar (2014)	Europe	74
Student PREPARE (2015*)	Europe	67

*date of study, unpublished

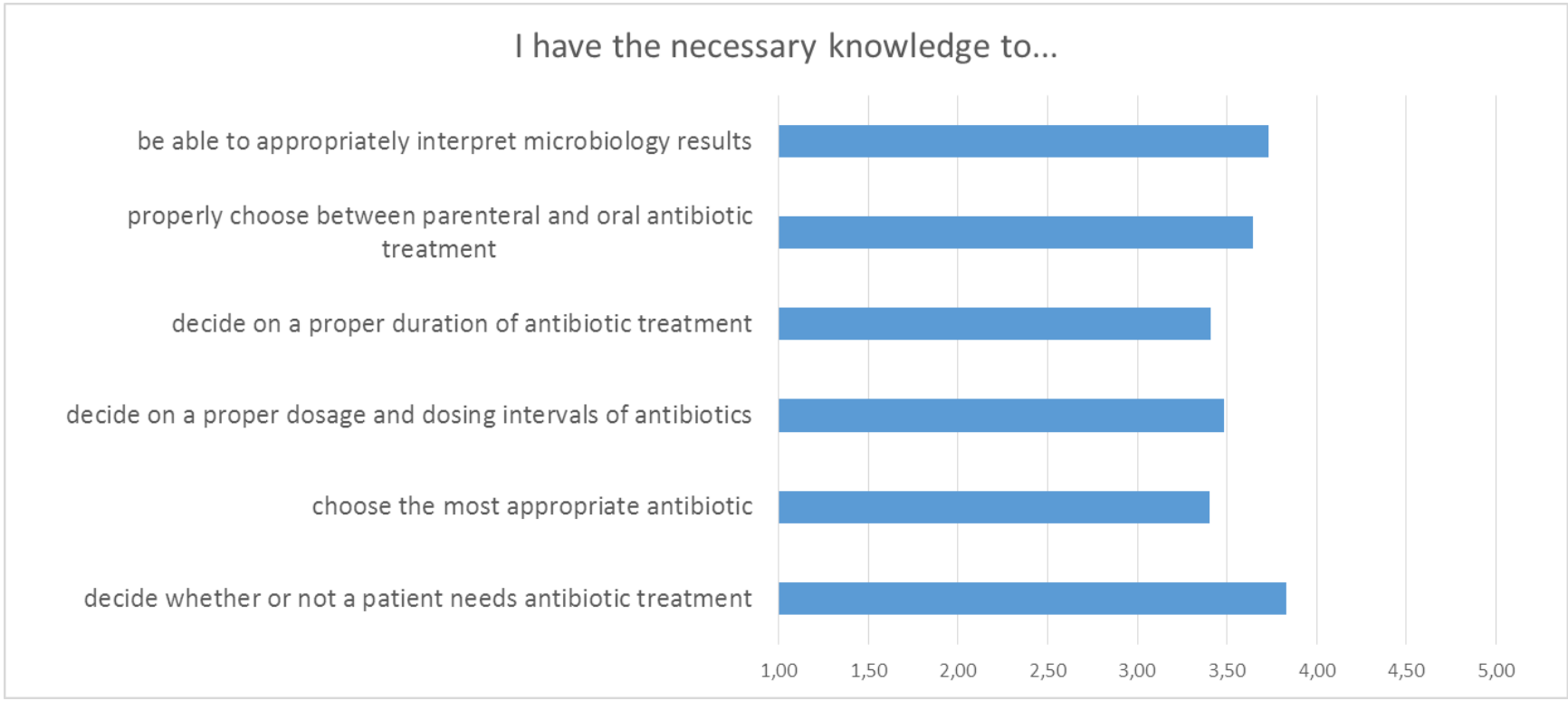
Dyar OJ, Beović B. Education of healthcare professionals on responsible antimicrobial prescribing. In: Pulcini C, Ergonul O, Can F, Beović B, eds. Antimicrobial stewardship. Elsevier 2016.

What Do Undergraduate Medical Students (Percieve to) Know and Don‘t Know



Final year students from 7 European medical schools. Dyar PJ, et al CMI 2014; 69:842-6.

Young Doctors in Training: the Percieved Knowledge:



Scores from 1 to 5

The survey included 2842 young doctors from 12 countries.

Beovic B, et al. ECCMID 2017,

Topics in Education on Prudent Use of Antimicrobial Prescribing

- **Bacterial resistance: mechanisms, hygiene**
- **Antibiotics: mode of action, pharmacokinetics, safety, cost**
- **Diagnosis of infection: inflammation, microbiology**
- **Treatment of infection: indication for antimicrobials, organ specifics**
- **Prevention of infection**
- **Medical record keeping**
- **Prescribing antibiotics: empirical treatment**
- **Prescribing of antibiotics/targeted treatment**
- **Prescribing of antibiotics: standards of care**
- **Communication skills**

From Pucini C&Gyssens IC. Virulence 2013;4:192-202.

Competencies in Antimicrobial Prescribing and Stewardship

Competency is the ability to do something successfully or efficiently. It is a combination of knowledge, skills, motives and personal traits.

Competencies may be used

- *on individual basis to improve individuals knowledge/skills/behaviour*
- *for regulators/education providers to set the extent, the content and the standard of the knowledge/skills/behaviour*
- *….*

Public Health England

ARHAI

Department of Health
Expert Advisory Committee on Antimicrobial Resistance and Healthcare Associated Infection

Published September 2013 PHE publications gateway number: 2013206

Antimicrobial prescribing and stewardship competencies

Infection prevention and control

Antimicrobial resistance and antimicrobials

Prescribing antimicrobials

Antimicrobial stewardship

Monitoring and learning

.

Draft ESCMID generic competencies in antimicrobial prescribing and stewardship

- Under development, the project is led by ESGAP
- Searching for a wide consensus: the process of development includes experts from all European countries
- Generic competencies can be further modified to the competencies in antimicrobial prescribing and stewardship for infectious diseases physicians, surgeons, pharmacists….

Types of Education in AMS

Type of education	Efficacy
Lectures	Modest
Interactive lectures	Moderate
Interactive small group sessions	Moderate
Printed material	Modest
Reminders	Moderate
Guidelines, clinical pathways	Modest to moderate
Audit and feedback	Moderate
Outreach visits	Moderate to high
We-based interactive programmes	moderate

Adapted from Cisneros JM, et al. Enferm Infecc Microbiol Clin 2013;31:Suppl4:31-7, and Ohl CA, et al. Infect Dis Clin North Am 2014;28:177-93.

What Type of Education in AMS is Most Successful?

- **Systematic review of 28 RTCs**
- **Antibiotic prescription decreased by 9 to 52%**
- **Innapropriate prescriptions decreased by 41% on average**
- **Small group education seems to most effective (52%) followed guidelines and leaflets (42%)**

Lee CR, et al. Biomed Res Int 2015; Article ID 214021

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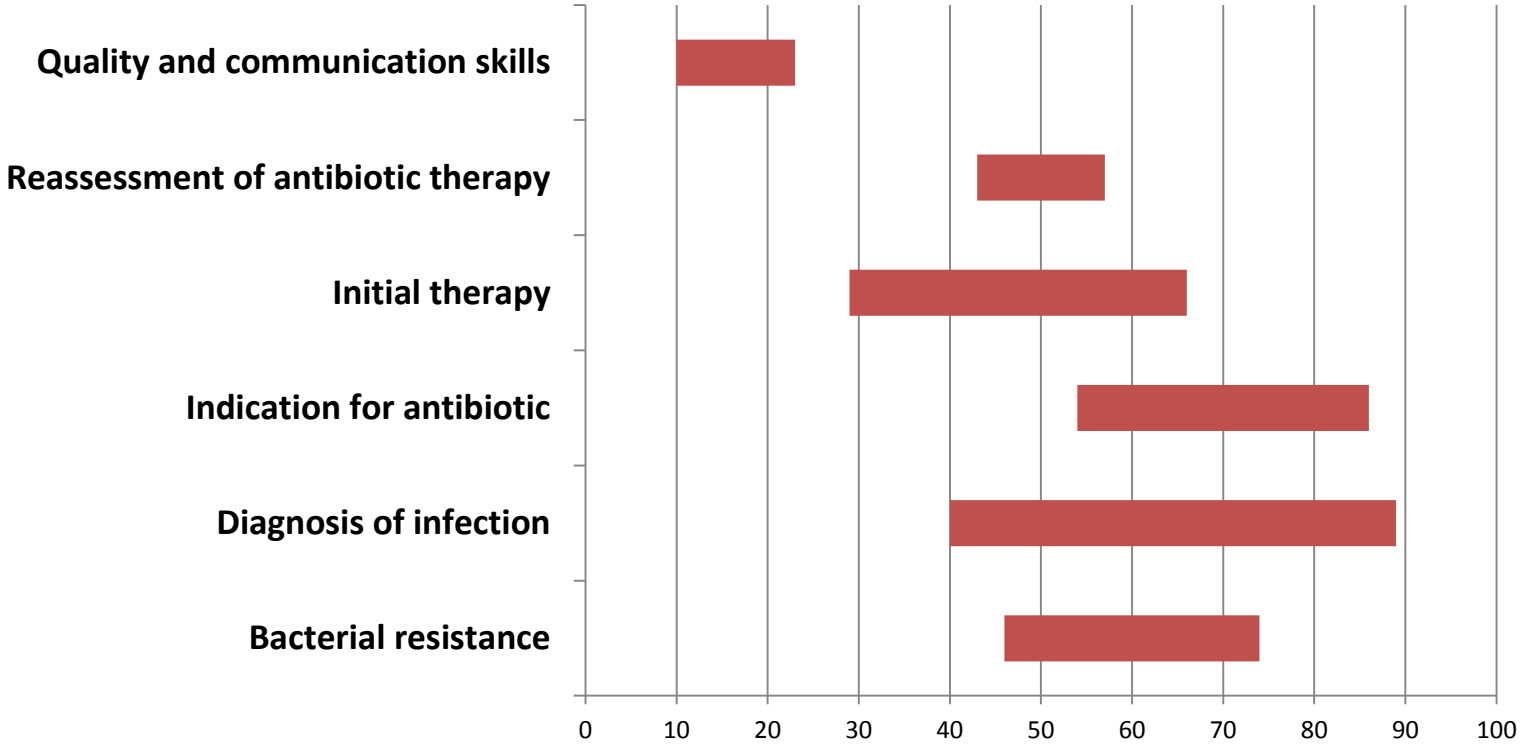
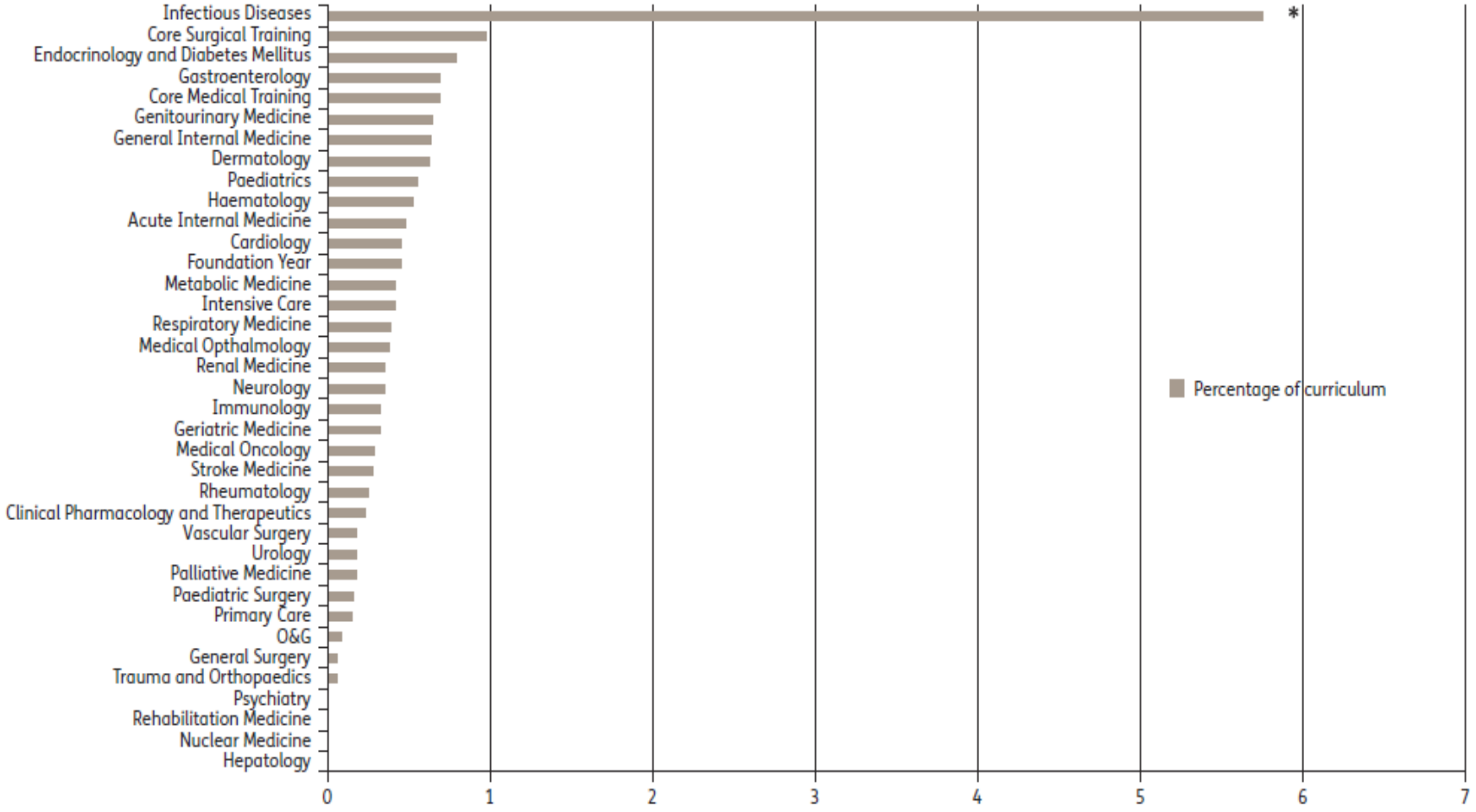
Coverage of Prudent Antibiotic Use Principles in 34 Surveyed Medical Schools in Europe: the Range of Coverage of Single Topics



Pulcini C, et al. Clin Microbiol Infect. 2015; 21(4):354-61.

Percentage of UK Specialty Training Curricula Related to AMS and/or AMR



J Antimicrob Chemother 2016; **71**: 3284–3292

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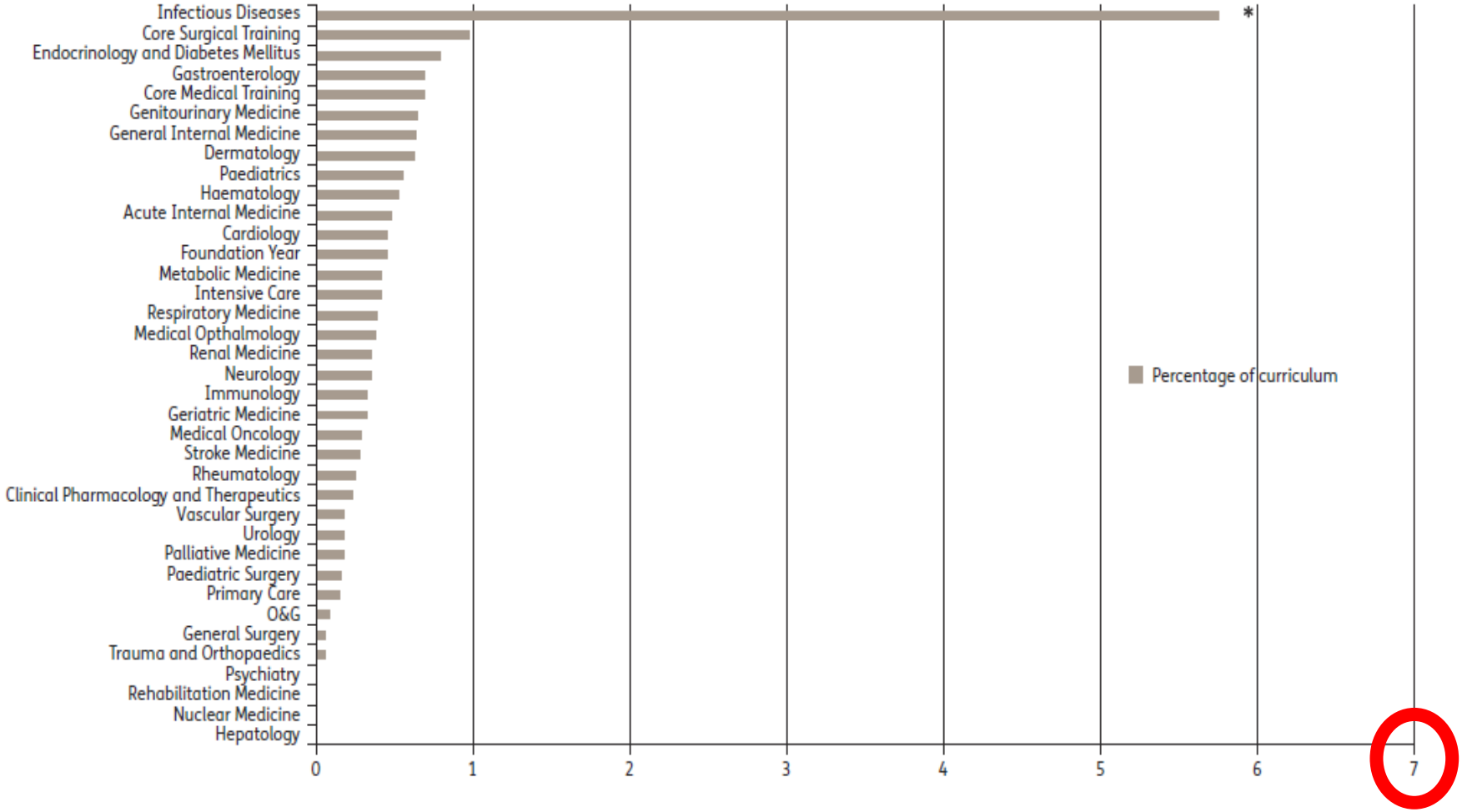

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European Union of Medical Specialists
Section of Laboratory Medicine/Medical Biopathology

Antibiotic Stewardship in Specialty Training Curricula

General surgery	Soft tissue and musculoskeletal system: diabetic foot, defects in skin and soft tissue, compartment syndrome, amputations
Plastic, Reconstructive and Aesthetic Surgery	Management of severe soft tissue infections including necrotizing fasciitis and gas gangrene
Pediatrics	Appropriate and safe prescribing of antibiotics and antivirals
Neurology	Neurological infections (list of syndromes)
Medical microbiology	Antibiotic stewardship
Infectious diseases	The issues related to optimal use of antimicrobials
Geriatrics	Lung infections including tuberculosis, urinary problems including infection
Gastroenterology	Microbiology of the normal gut and infections as a cause of disease
Cardiology	Select appropriate antibiotic for endocarditis
Anaesthesiology, pain and intesive care medicine	Infections as life threatening conditions

Specific Aspects od Education in AMS for Undergraduate Students

- Students should be educated to address **dual responsibility** of the prescriber: optimizing individual therapy and minimizing the resistance for the future patients

- The role of the **hidden curriculum**: the students may receive conflicting messages from the curriculum outside the teaching dedicated to antimicrobilas

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Štev.: 002-5-020/2016
Ljubljana, 15.2.2016

edicinska fakulteta v Ljubljani izdaja

POTRDILO,

je MARIJA LUCIJA BEOVIĆ, rojena 12. avgust 1989 v Ljubljani, RS,
nčala študij na odseku za medicino, oddelka za dodiplomski študij te fakultete
e 15. februarja 2016.

enovana je pridobila na podlagi 11. člena Zakona o strokovnih in znanstvenih
dovih (Uradni list RS št. 61/2006) naslov doktorica medicine.

potrdilo izdaja Medicinska fakulteta v Ljubljani na prošnjo imenovane kot
az, da si je pridobila strokovni naslov "doktorica medicine" in velja do
čitve diplome.

TAJNIK

Nastja Babiček Omahen,univ. dipl. prav.

Medicinska fakulteta
UNIVERZA V LJUBLJANI

The start is very stressful.

New responsibilities.
New environment.
Emotional situations.

Brennan N, et al. Med Educ 2010; 44: 449–458.

Qualitative study in 60 medical graduates from 3 UK medical schools

- **Prescribing is the weakest part of the practice.**
- **Prescribing is a complex proces which includes clinical skills, pharmacology and practicalities of prescribing.**
- **Prescribing is percieved as most prone to errors.**

Illing JC, et al. BMC Medical Education 2013, 13:34.

Social and Professional Influences on Antimicrobial Prescribing for Doctors-in-Training: a Realist Review

Papoutsi C, et al. J Antimicrob Chemother 2017, doi:10.1093/jac/dkx194

The crucial role of hierarchy!

Fear of criticism

Fear of individual responsiblity

Sustaining positive relationship and reputation for the progression of the career

Fitting into the team

Practices of senior physicians who bear the responsibility understood as legitimate

Role modelling in the attitude towards guidelines and patient‘s expectations (+/-)

Assistance seeking may be challenging

Collective hierarchical norms (not just an individual relationship)

“The prescribing etiquette”

- **The hierarchic organisation of the groups.**

- **The autonomous position of senior doctors who rely more on their experience than policies and guidelines.**

- **Culture of non-interference when an antimicrobial has been prescribed by a peer.**

Charani E, et al. Clin Infect Dis 2013;57:188–96.

Continuous medical education (CME)
Continuous professional development (CPD)

CPD: to improve all aspects of a medical practitioner's performance:

- ***knowledge***
- ***skills***
- ***attitudes***

Antibiotic stewardship and prescribing are typical CPD activities.

Basel Declaration. Available at: http://www.uems.eu/general/glossary

Which type of education?

(Potentially) most effective educational interventions in CME/CPD:

- **Repetitive (*Repetitio est mater studiorum*)**
- **Multiple techniques education**
- **Interventions using an external reference group (reminders, outreach visits and audit and feedback)**

Johnson MJ, May CR. BMJ Open 2015;5:e008592.
Bordage G, et al. Chest 2009;135:29S-36S.

Education of pharmacists in antimicrobial stewardship and prescribing

- ***UK: Clinical Pharmacy Association Pharmacy Infection Network has developed a professional curriculum for antimicrobial pharmacists.***

- ***USA: several educational programmes for ID pharmacists which include some aspects of antibiotic stewardship.***

- ***Scottish Doctors Online Training System (DOTS).***

Chahine AB, et al. Journal of Pharmacy Practice 2015; 28: 585-91.
Nathwani D, et al. J Antimicrob Chemother 2011; 70: 1277-80.

Hosp Pharm 2014;49(1):32–41
2014 © Thomas Land Publishers, Inc.
www.hospital-pharmacy.com
doi: 10.1310/hpj4901-32

Original Article

Development of Antimicrobial Competencies and Training for Staff Hospital Pharmacists

*Marsha F. Crader, PharmD**

- **Antibiotic selection for common syndromes including interpretation of susceptibility testing**
- **Renal dosing**
- **Switch to oral**
- **Pharmacokinetics (Therapeutic drug monitoring)**

Nurses in antimicrobial stewardship: the educational needs

Microbiology diagnostics	- **The understanding and skills on how to obtain the specimens** - **understanding of the process in the laboratory** - **Interpretation of microbiology testing results: differentiation of Gram-positive and Gram-negative bacteria, basic principles of the antibiogram**
Pathophysiology and pharmacotherapy of infection	**Understanding the basic principles of** - **de-escalation** - **switch to oral**
Clinical knowledge and skills	- **Recognizing subtle signs of infection** - **Differentiating colonisation and infection**
Communication skills	**Improved confidences in asking prescribers on infection and antibiotic treatment**

Olans RD, et al. J Contin Nurs Educ 2015; 46: 318-21.

Conclusions

- **Most important determinants of antimicrobial prescribing in young doctors in training are knowledge and “the prescribing etiquette”.**
- **The post-graduate training curricula include very few knowledge and skills in antimicrobial prescribing and stewardship.**
- **Education in antimicrobials stewardship for pharmacists and nurses is very limited.**

Steps forward:

- **Development of competencies for antimicrobial prescribing and stewardship for all stages of education and all professions**
- **Inclusion of the competencies in the curricula**
- **Antimicrobial stewardship and prescribing should be included in CPD.**
- **Education in antimicrobial stewardship for pharmacists and nurses.**

Steps forward:

- **Development of competencies for antimicrobial**
- **be**
- **pharmacists and nurses.**

„If you think that education is expensive, you should consider ignorance”

Socrates