

Education of Prescribing and Non-prescribing Healthcare Workers

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ESGAP

ESCMID STUDY
GROUP FOR
ANTIBIOTIC POLICIES

European Society of Clinical Microbiology and Infectious Diseases



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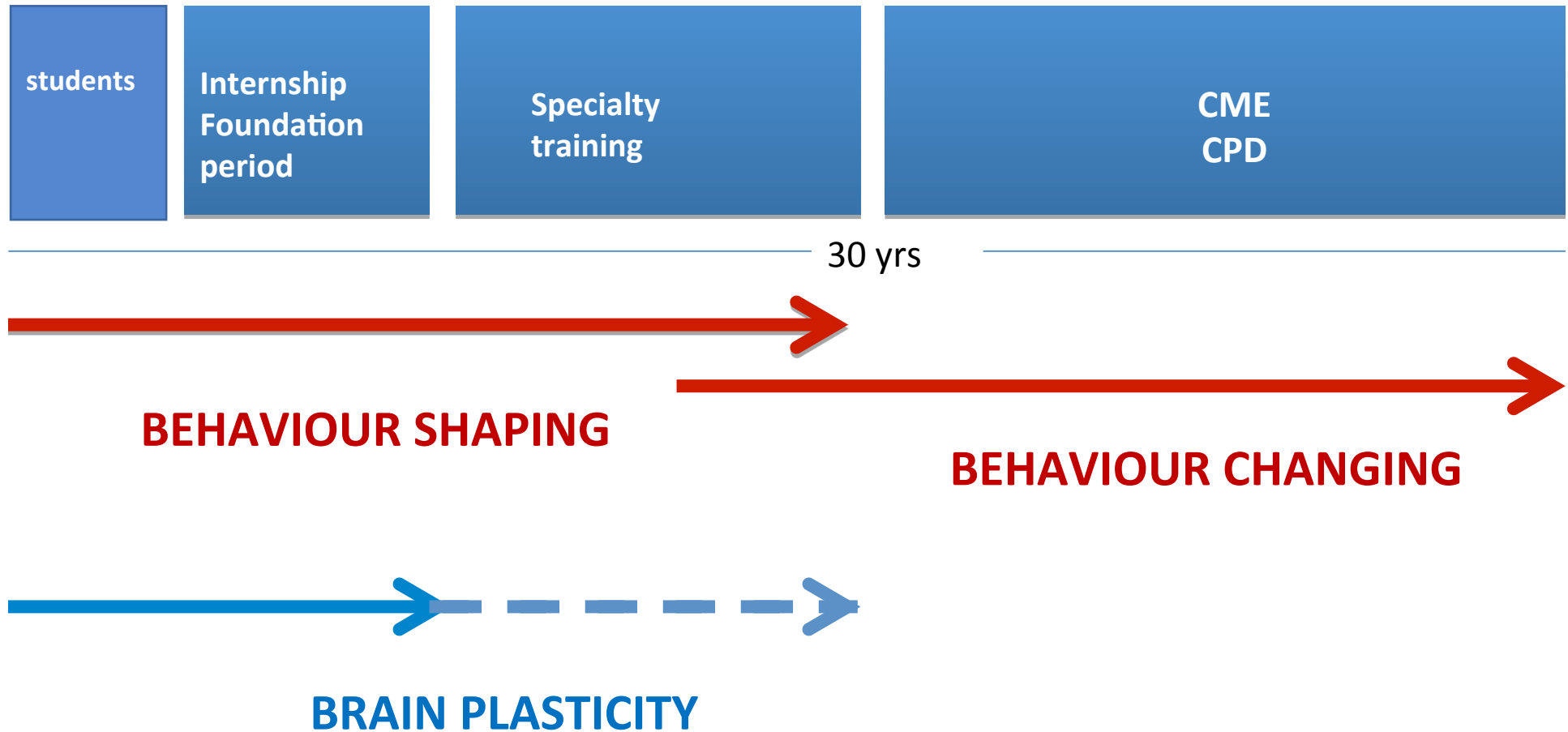
**Karolinska
Institutet**

“Students graduate from medical school
using antimicrobial agents as a
substitute for diagnostic acumen”

Harold Neu, 1978



Medical Career



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

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

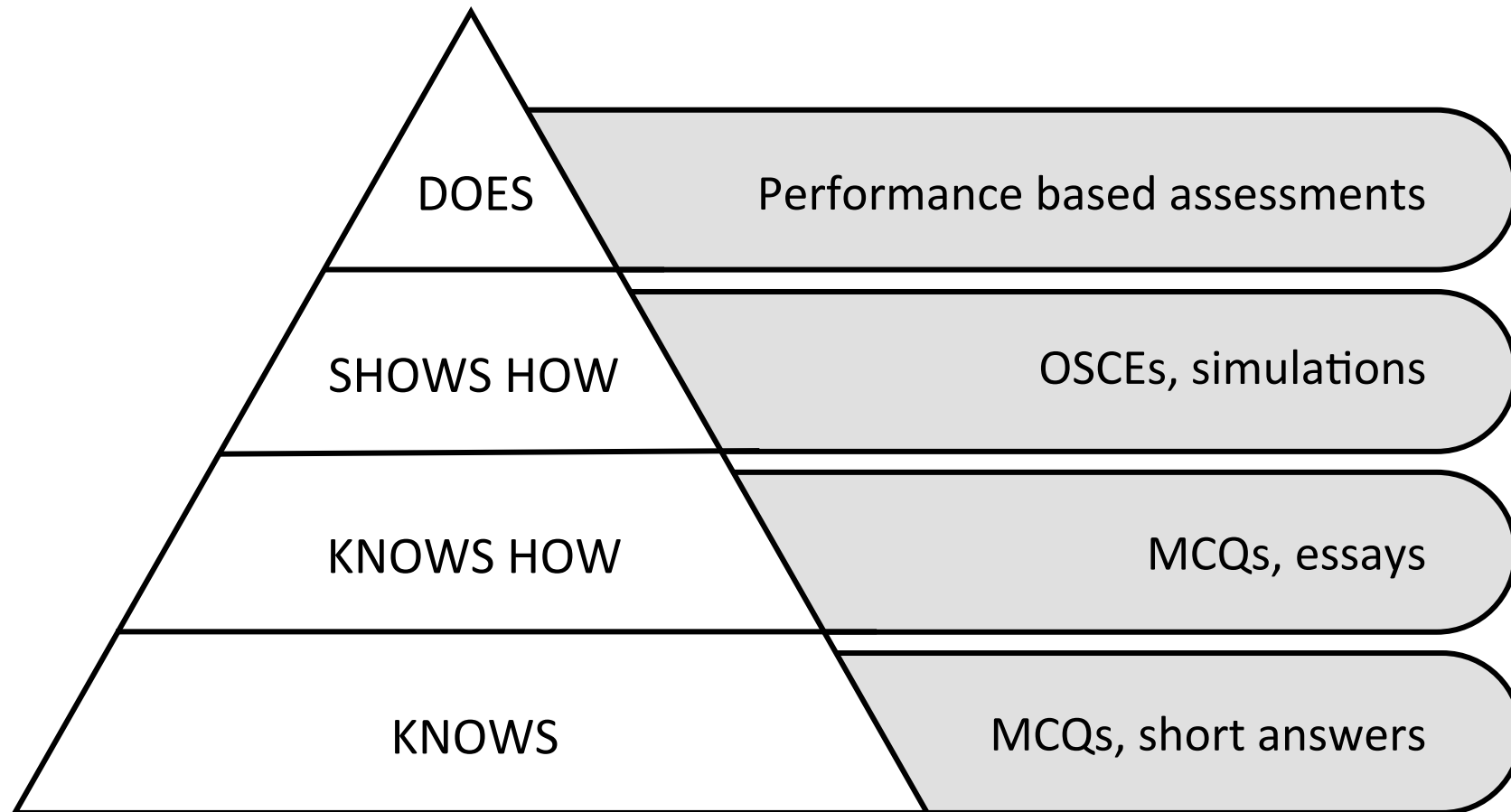
Phase of education	Physicians	Pharmacists	Nurses, midwives
Undergraduate studies	+	+	+
Internship/foundation	+	N/A	N/A
Specialty training	+	+*	+*
CME/CPD	+	+	+

CME/CPD, continuous medical education, continuous professional development

N/A, not available

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 specific
- **Prevention of infection**
- **Medical record keeping**
- **Prescribing antibiotics: empirical treatment**
- **Prescribing of antibiotics/targeted treatment**
- **Prescribing of antibiotics: standards of care**
- **Communication skills**



Miller's pyramid.

http://www.gp-training.net/training/educational_theory/adult_learning/miller.htm

Types of Education and Their Efficacy

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.

Medical Students

Students feel underprepared for antibiotic prescribing.

Study	region	Percentage of students who want more education on antibiotic use
Minen, 2010	USA	78%
Abbo 2013	USA	90%
Huang, 2013	China	89%
Dyar, 2014	Urope	74%
Student-PREPARE*	Europe	67%

Minen MT, et al. Microb Drug Resist 2010;16:285-9.

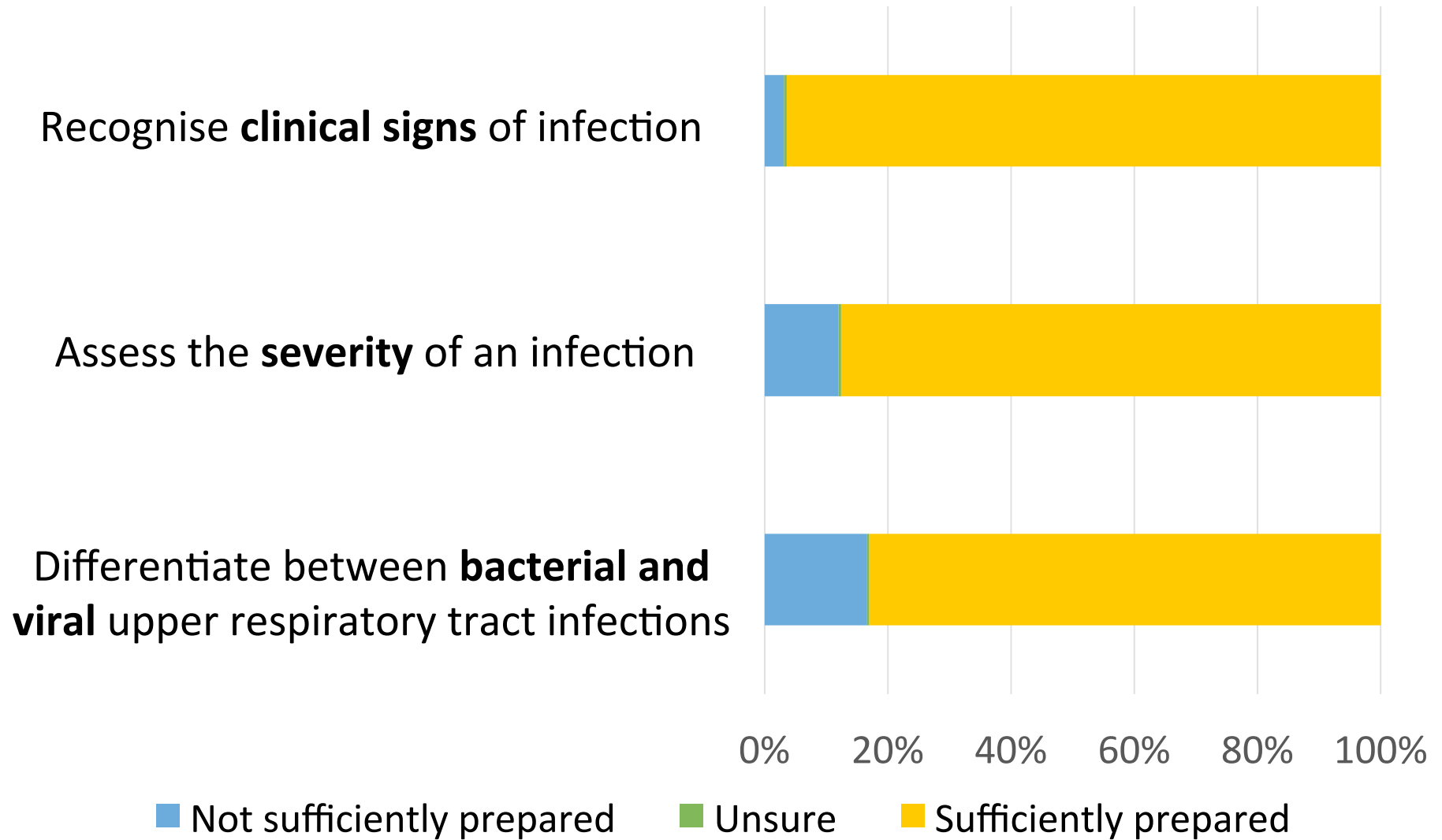
Abbo L, et al. Clin Infect Dis 2013;57:631-8.

Huang Y, et al. BMC Educ 2013;163. doi:10.1186/1472-6920-13-163.

Dyar OJ, et al. J Antimicrob Chemother 2014;69:842-6.

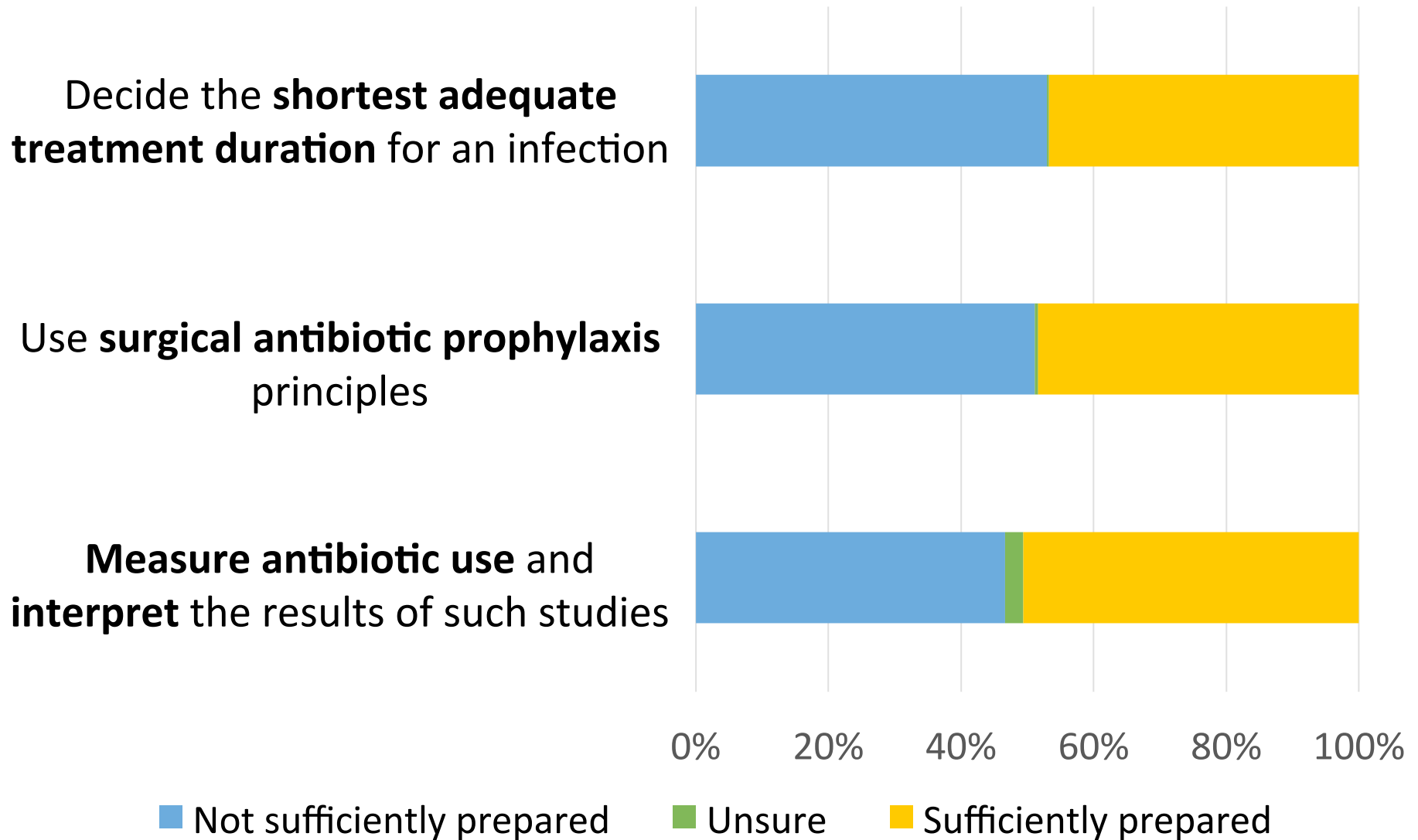
*unpublished

Students feel well prepared to



Data from Student-PREPARE, 2015

Students feel poorly prepared to



Data from Student-PREPARE, 2015

Why Should We Improve Undergraduate Education?

- **Students are engaged in a learning mind-set**
- **Students are encouraged to integrate different parts of their curricula**
- **Compulsory assessments, defined curricula and national licensing requirements can act as reinforcing mechanisms**



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Medicinska fakulteta v Ljubljani izdaja

POTRDILO,

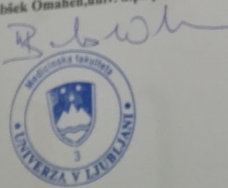
je **MARIJA LUCIJA BEOVIČ**, rojena 12. avgust 1989 v Ljubljani, RS,
mčala študij na odseku za medicino, oddelka za dodiplomski študij te fakultete
e 15. februarja 2016.

znovna 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.

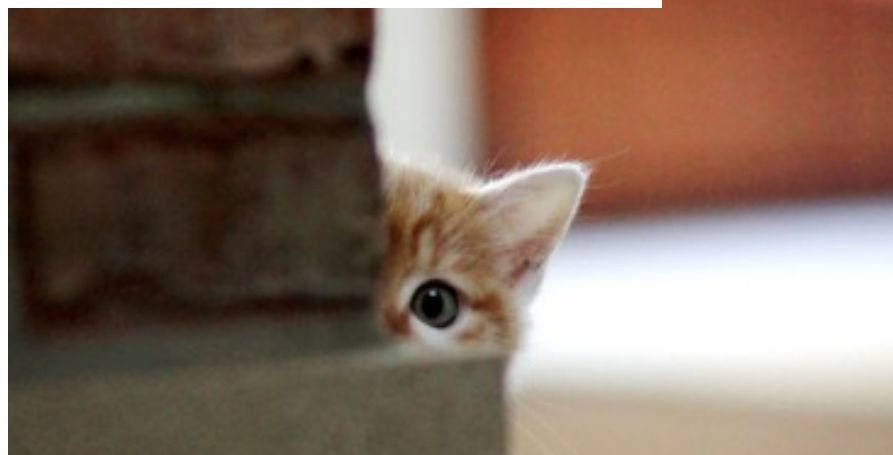
TAJNIK

Nastja Babieš Omahen, univ. dipl. prav.





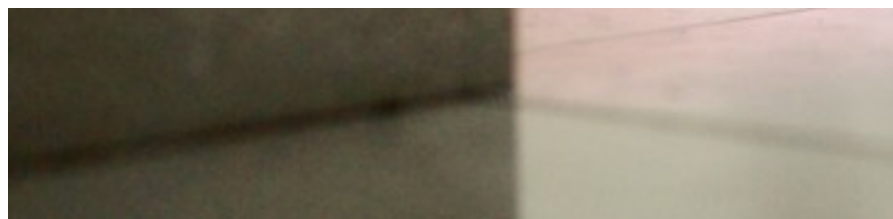
The start is very stressful.



New responsibilities.

New environment.

Emotional situations.



A window into the lives of junior doctors: narrative interviews exploring antimicrobial prescribing experiences

Karen Mattick^{1*}, Narcie Kelly¹ and Charlotte Rees²

127 narratives about the experience in antimicrobial prescribing experience:

- **Most young doctors report negative experience.**
- **Prescribing errors, complex prescribing situations, interpersonal tensions, prescribing dilemmas cited in most narratives.**

The knowledge



- **Apparently poor, the scores in most studies below 50%**
- **Local resistance rates usually under-estimated.**
- **Under-estimation of antibiotic misuse.**
- **No relationship between the years of training and the level of knowledge.**

**No knowledge gain in antibiotic prescribing/
stewardship during training.**

Chavez NJ, et al. Int Med J 2014, Naqvi A&Pulcini C. Med Mal Infect 2010, Drekonja DM, et al. Am J Infect Contr 2013, Navarro-San-Francisco C, et al. Enferm Infecc Microbiol Clin. 2012, Srinivasan A, et al. Arch Intern Med 2004, Mincey BA, et al. South Med J 2001. Abbo L, et al. ICHE 2011.



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 intensive care medicine	Infections as life threatening conditions

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.

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.*

The Culture

**WHAT IS
CULTURE?**



From: Hope College Blogs, available at <https://blogs.hope.edu/getting-race-right/our-context-where-we-are/the-history-we-inhabit/the-horizontal-dimension-of-race-social-culture/>

“The prescribing etiquette”

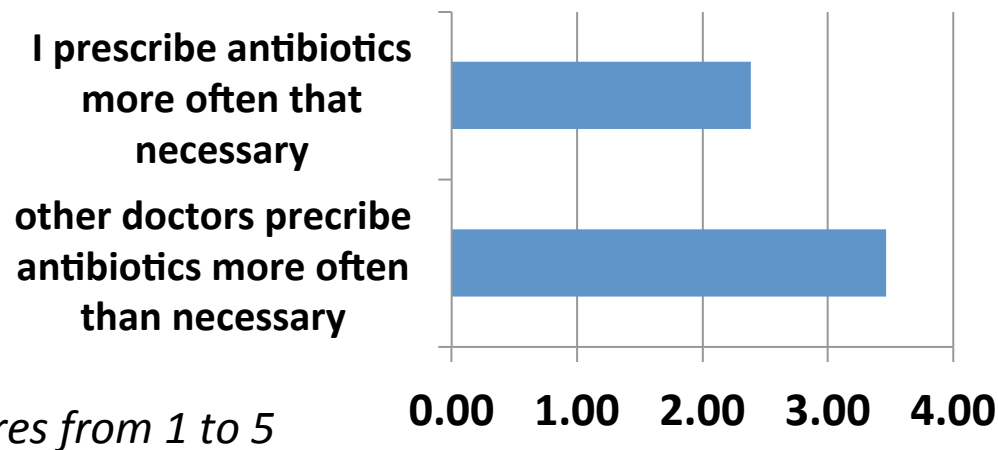
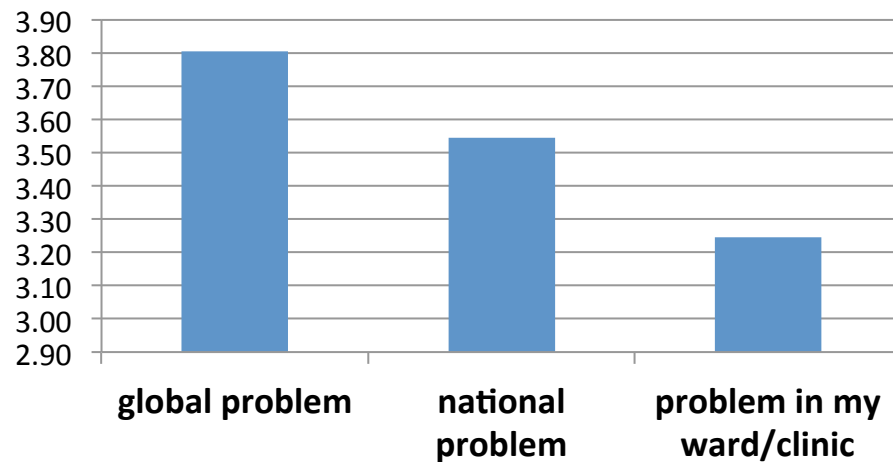
- The hierarchic organisation of the groups.
- The autonomous position of senior doctors who rely more on their experience than policies and guidelines.
- Culture of non-interference when an antimicrobial has been prescribed by a peer.



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

Oh no, not me... I never lost control...

Resistance is a ...



Scores from 1 to 5



Young doctors' perspective on antimicrobial resistance and prescribing (YPAR) study, N=2898, unpublished.

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.

Nurses in antimicrobial stewardship: the educational needs

Microbiology diagnostics	<ul style="list-style-type: none">- 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	<p>Understanding the basic principles of</p> <ul style="list-style-type: none">- de-escalation- switch to oral
Clinical knowledge and skills	<ul style="list-style-type: none">- Recognizing subtle signs of infection- Differentiating colonisation and infection
Communication skills	<p>Improved confidences in asking prescribers on infection and antibiotic treatment</p>

Conclusions

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