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Keynote, NVK symposium vernieuwende onderwijsvormen
Dordrecht, 7 juni 2021

Medisch onderwijs door de jaren heen en visie op de toekomst

Olle ten Cate, PhD

Expertisecentrum voor Onderwijs en Opleiding

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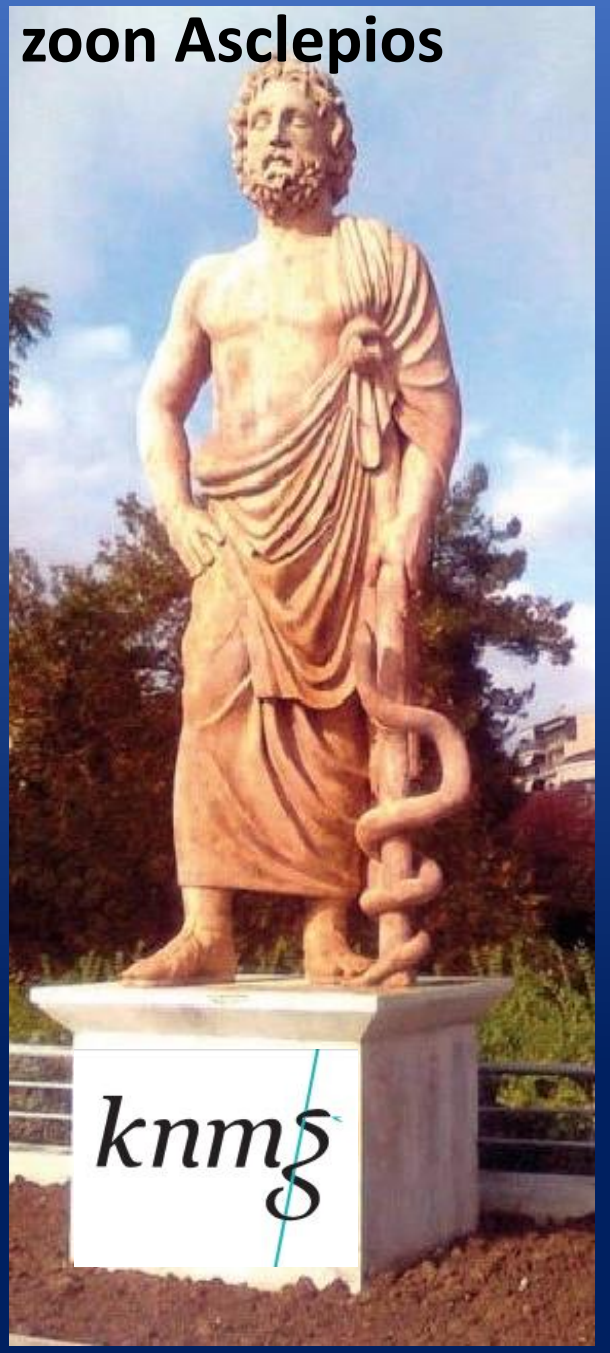
Apollo vertrouwt Centaur Chiron de zorg en opvoeding toe van zijn zoon Asclepios



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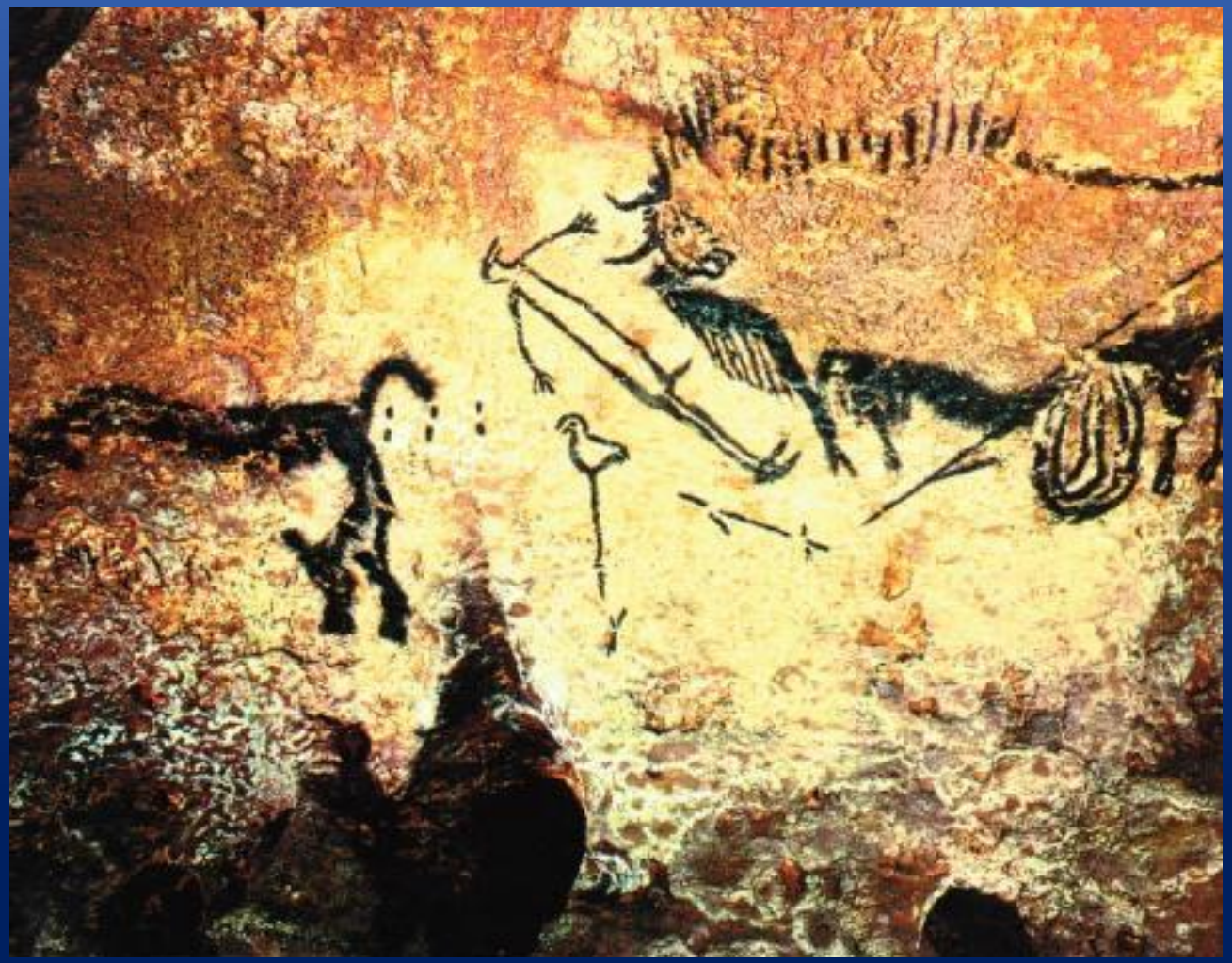
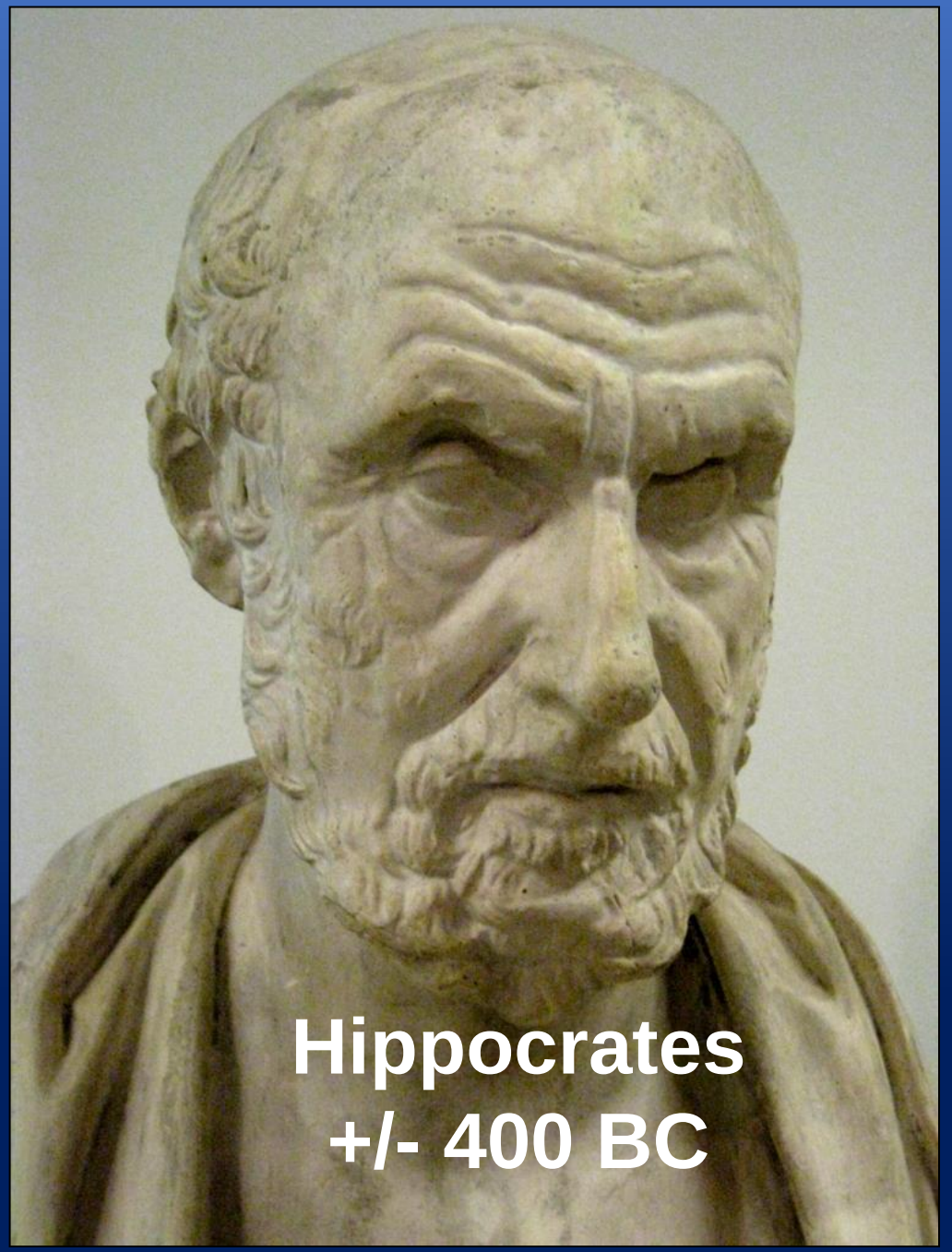
Eerste healer/shaman, Lascaux, ca13.000 BC





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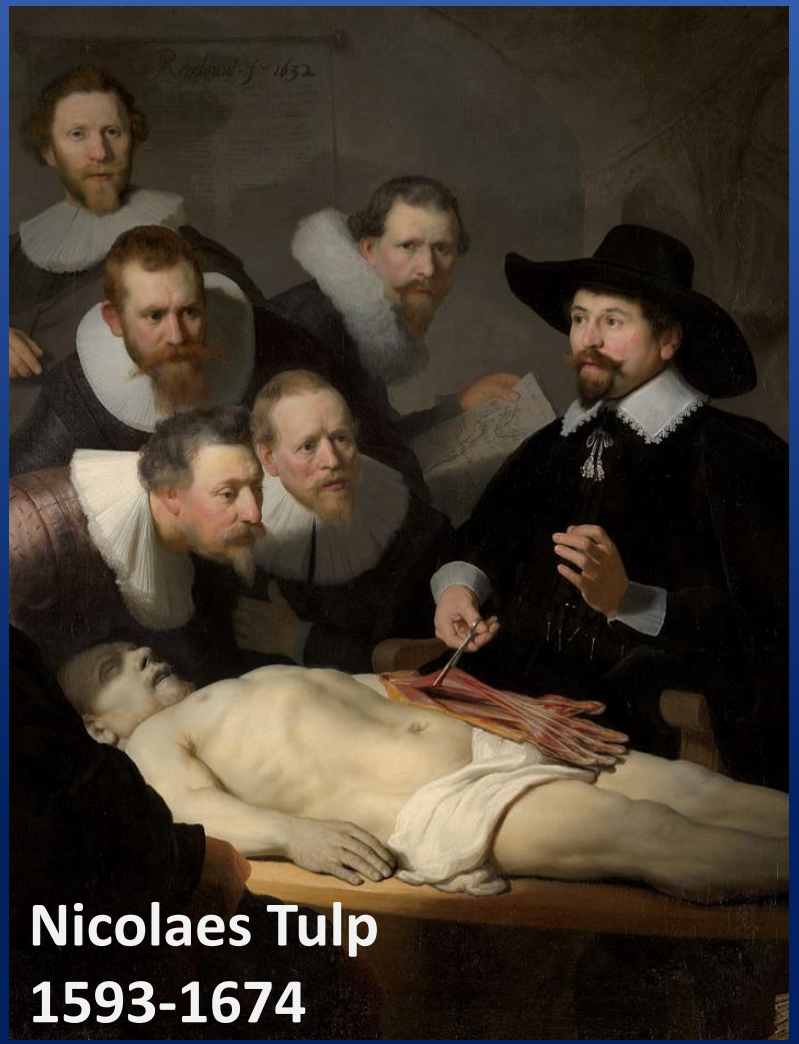
Famous physicians who helped shape the image of the profession



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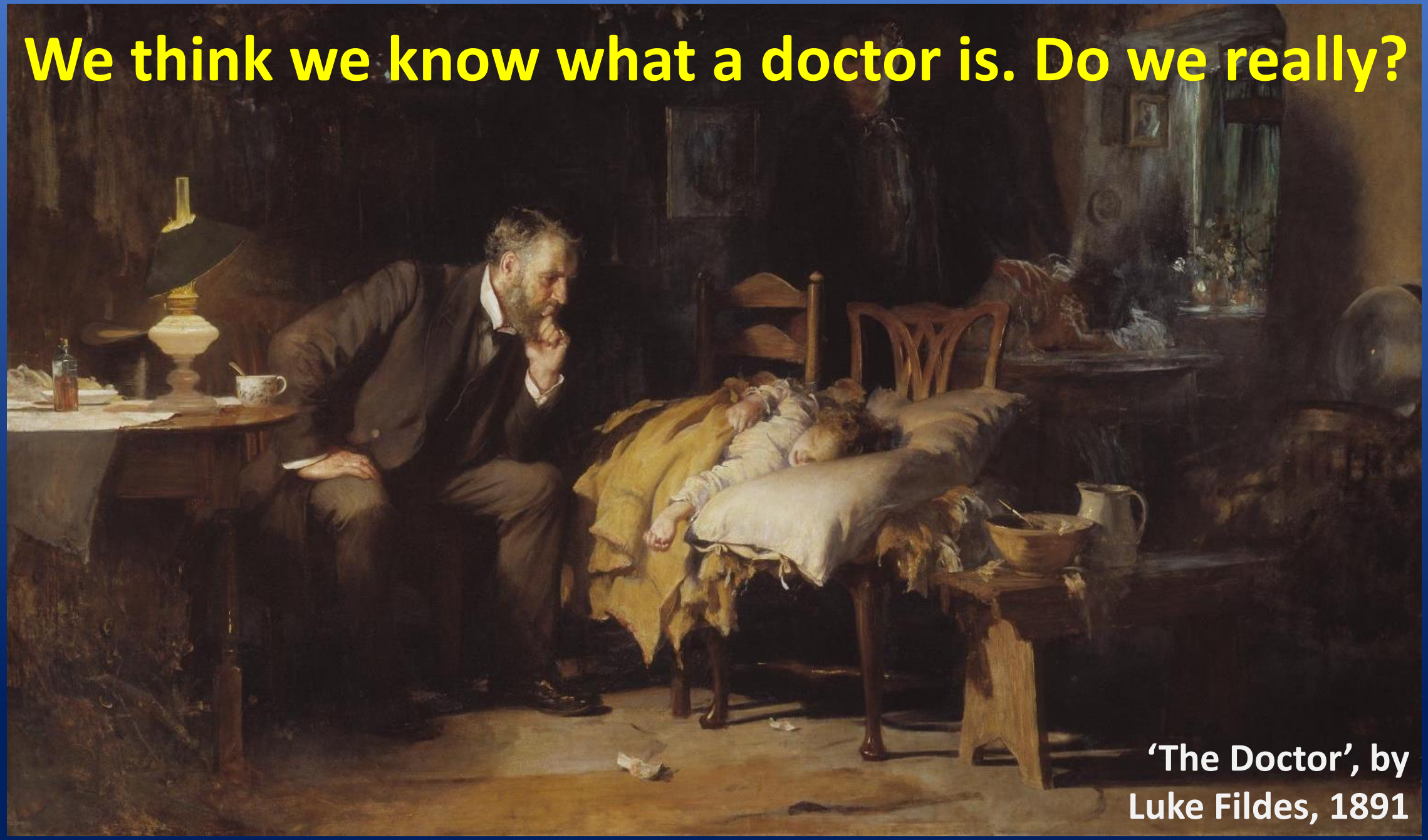
We think we know what a doctor is. Do we really?



‘The Doctor’, by Luke Fildes, 1891

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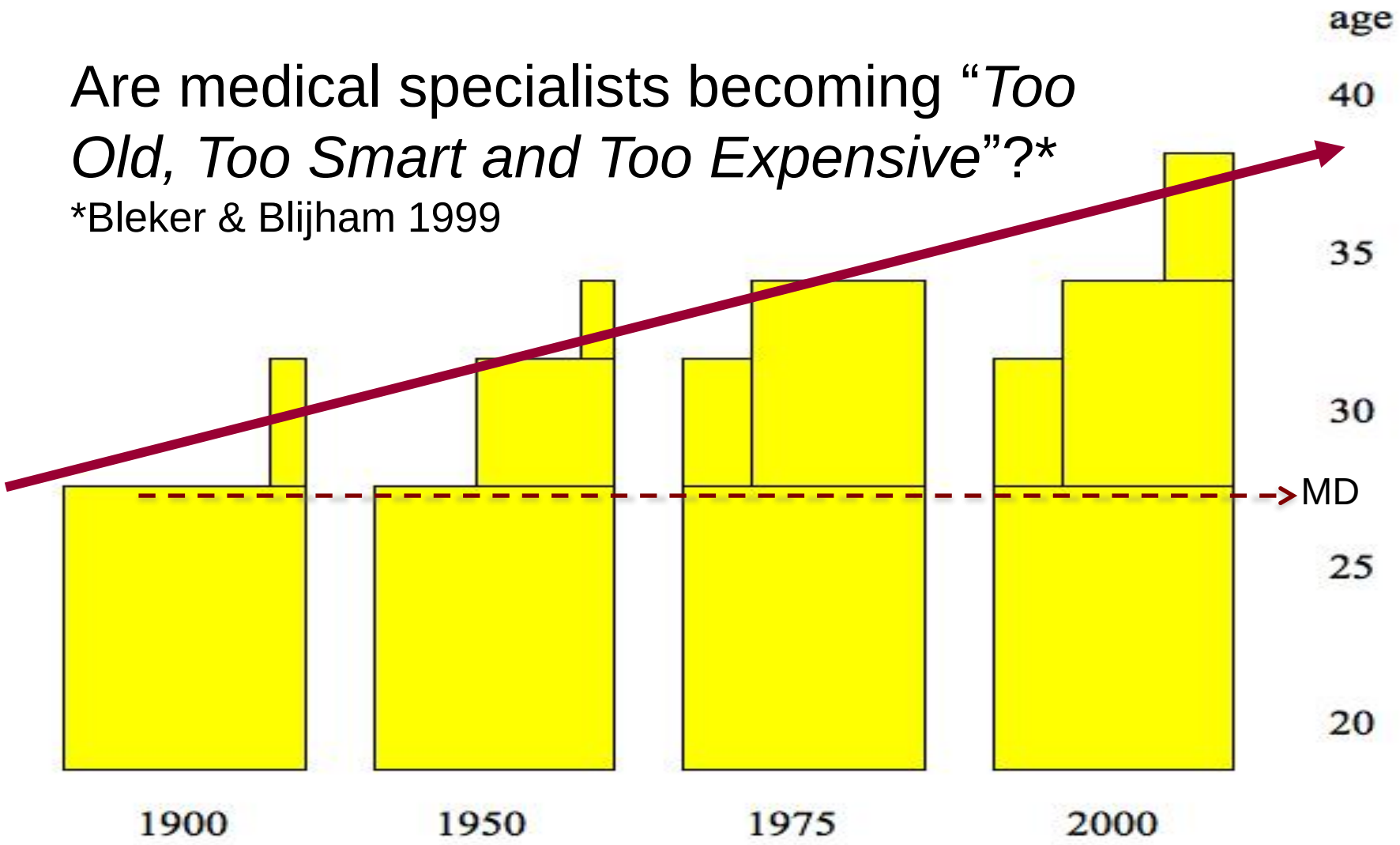
Reasons to Make You Rethink what a Doctor is – Anno 2021

1. The long trajectory to unsupervised practice
2. Generalists versus specialists
3. What foundational knowledge should all medical doctors have?
4. Practical significance of medical degree differs across the globe
5. Medical knowledge and care: no longer just prerogative of doctors
6. From memorizing information to coping with information
7. Rethinking the transition from learning to practice
8. Towards a dynamic portfolio of EPAs serving across a life time

The long trajectory to unsupervised practice

Are medical specialists becoming "*Too Old, Too Smart and Too Expensive*"?*

*Bleker & Blijham 1999



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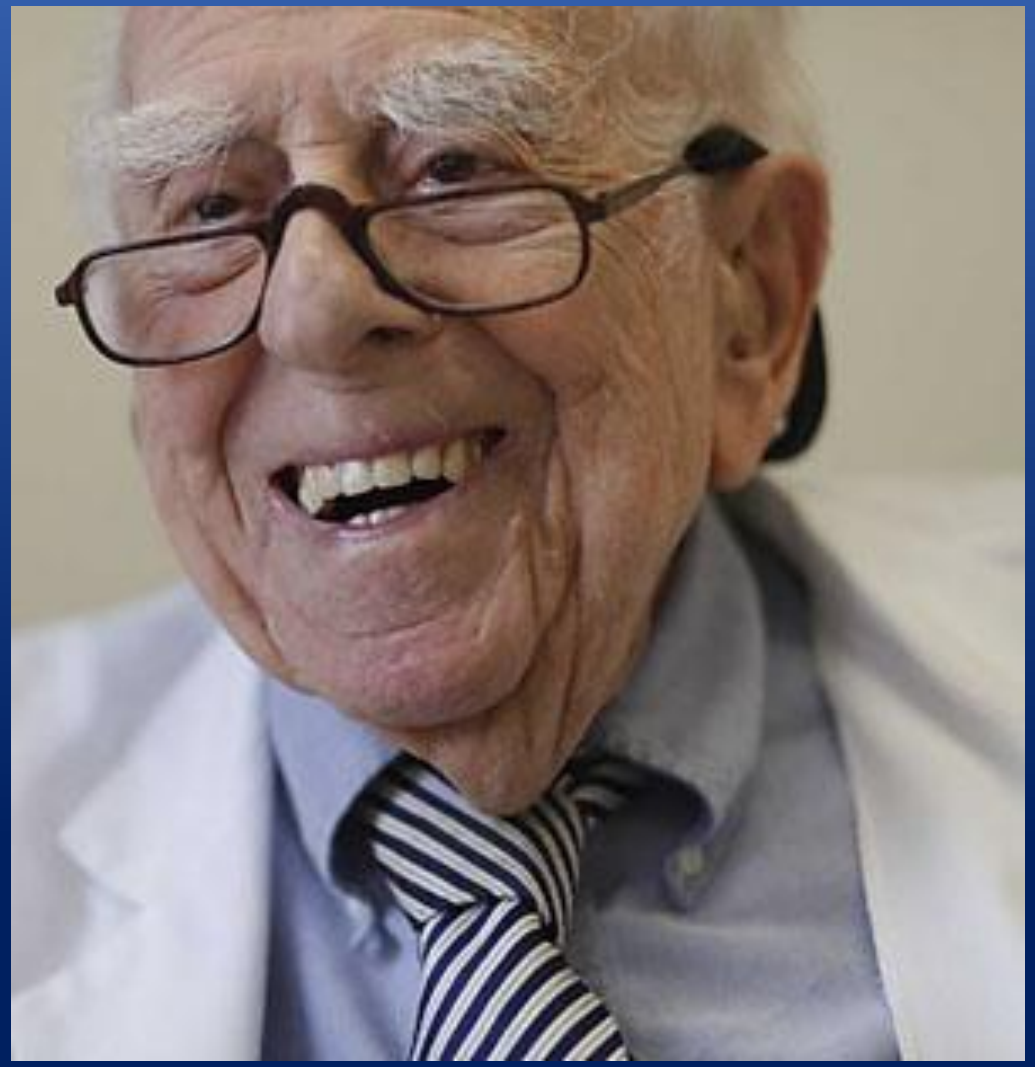
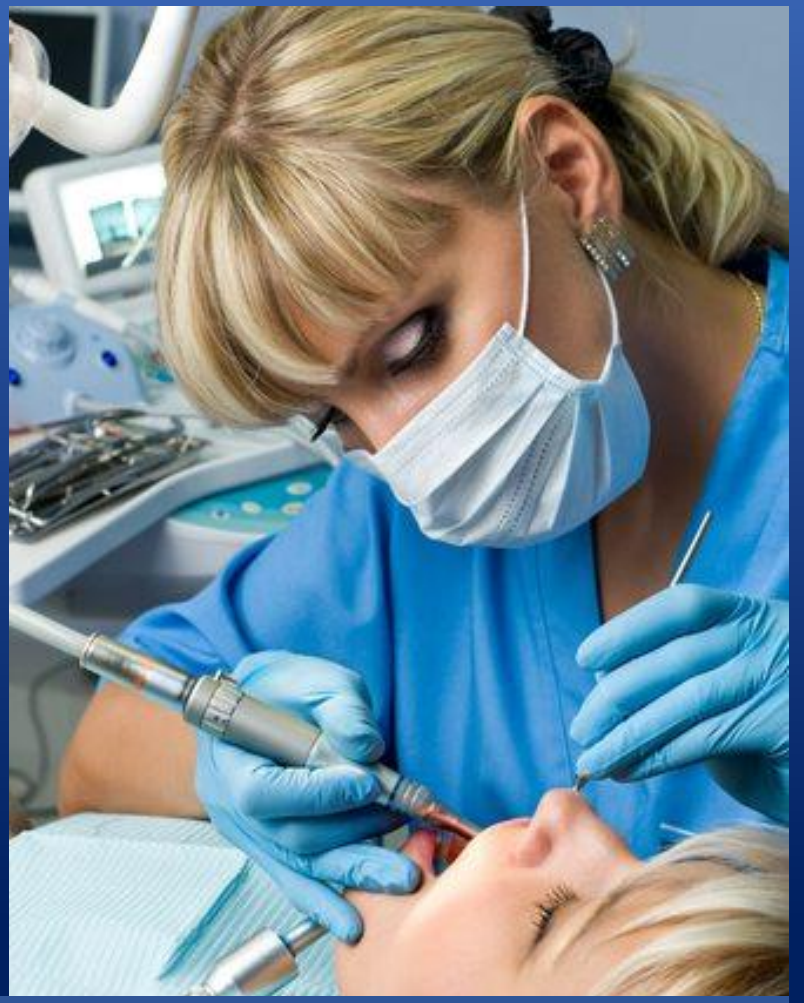
Glad to be finished with training



Training of dentists versus ophthalmologists



Dentistry: 6 to 8 years after secondary school

O*phthalmology*: 11 to 12 years after secondary school

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Generalists versus specialists

- Specialists provide high level care but contribute to fragmentation of the health care landscape
- Generalists (either MDs or ‘general specialists’) have lower status, less power, and lower salaries
- What if.. generalists would become the leaders in health care – the contractors of the patient navigating the health care system
- ..And specialists became the subcontractors for diagnostic and therapeutic procedures, ordered by the generalist

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Generalists versus specialists
Just imagine..

Contractor has:	Subcontractor has:
General knowledge and overview	Specalized knowledge and skills
Network of sub-contractors	Being hired by main contactor
Overall responsibility, liability, general prestige	Specific responsibility, liability, focused prestige
Highest salary	Lower salary

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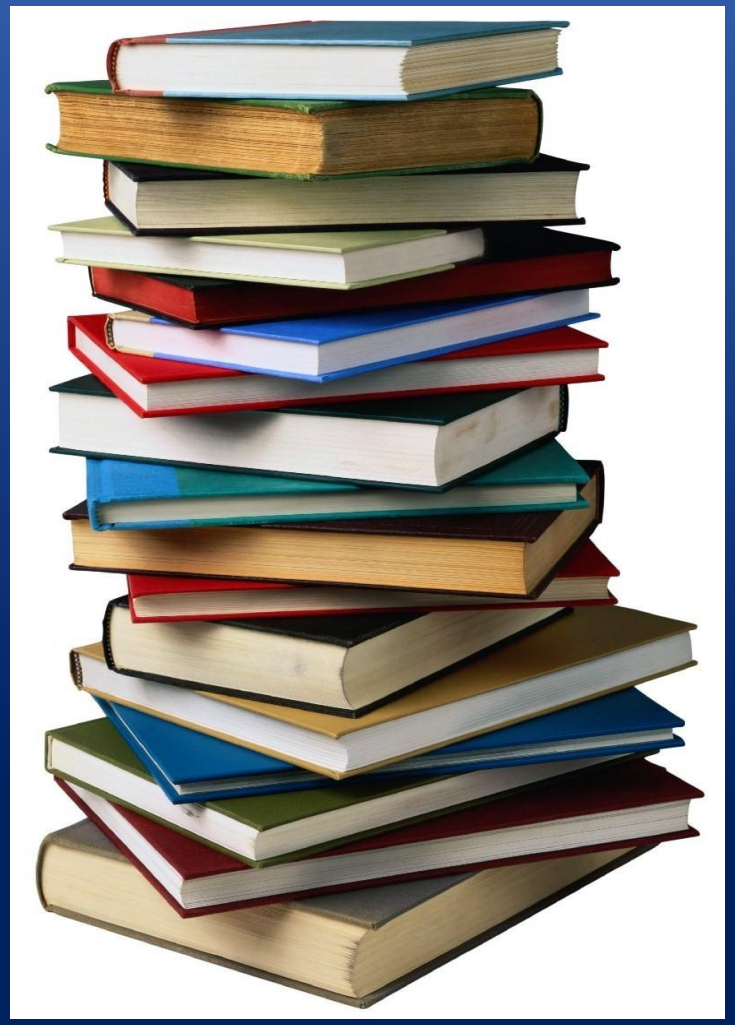
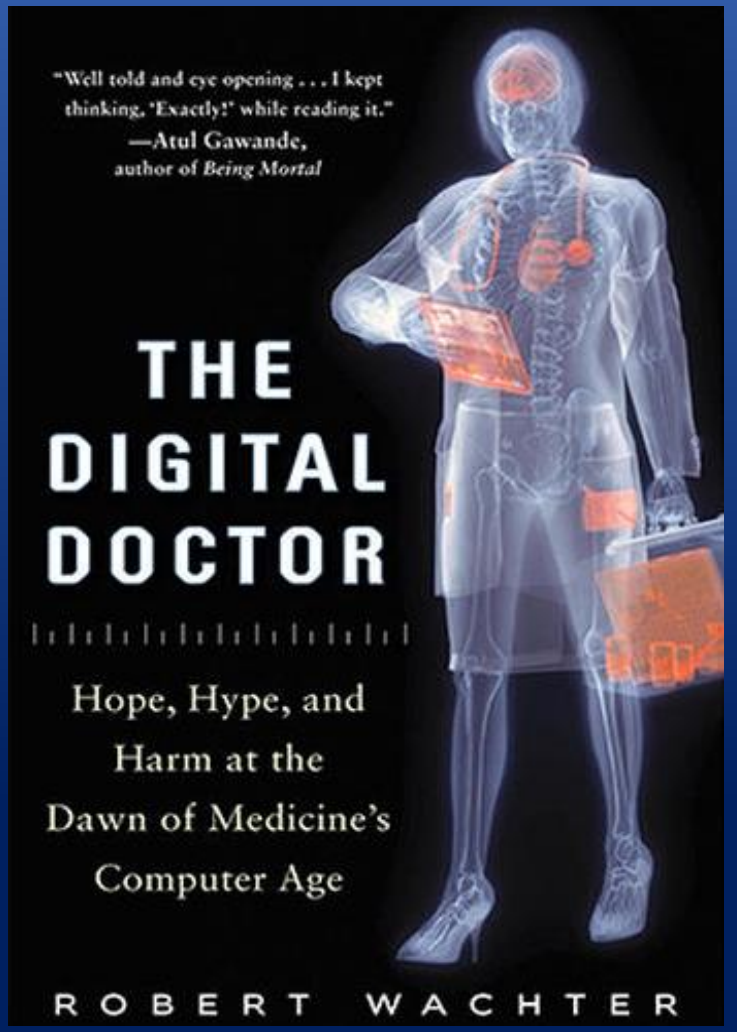
What foundational knowledge should all doctors have?





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What foundational knowledge should all doctors have?

- Flexner: solid scientific knowledge foundation is needed (1910)
- In 2020, “solid foundational knowledge” has exploded
- Generalists and specialists diverge in opinion what is needed
- USMLE-step1 scores do not predict clinical performance well
- Electives create divergence among graduates: the doctor is not one concept
- Clinical competence is in part context-dependent

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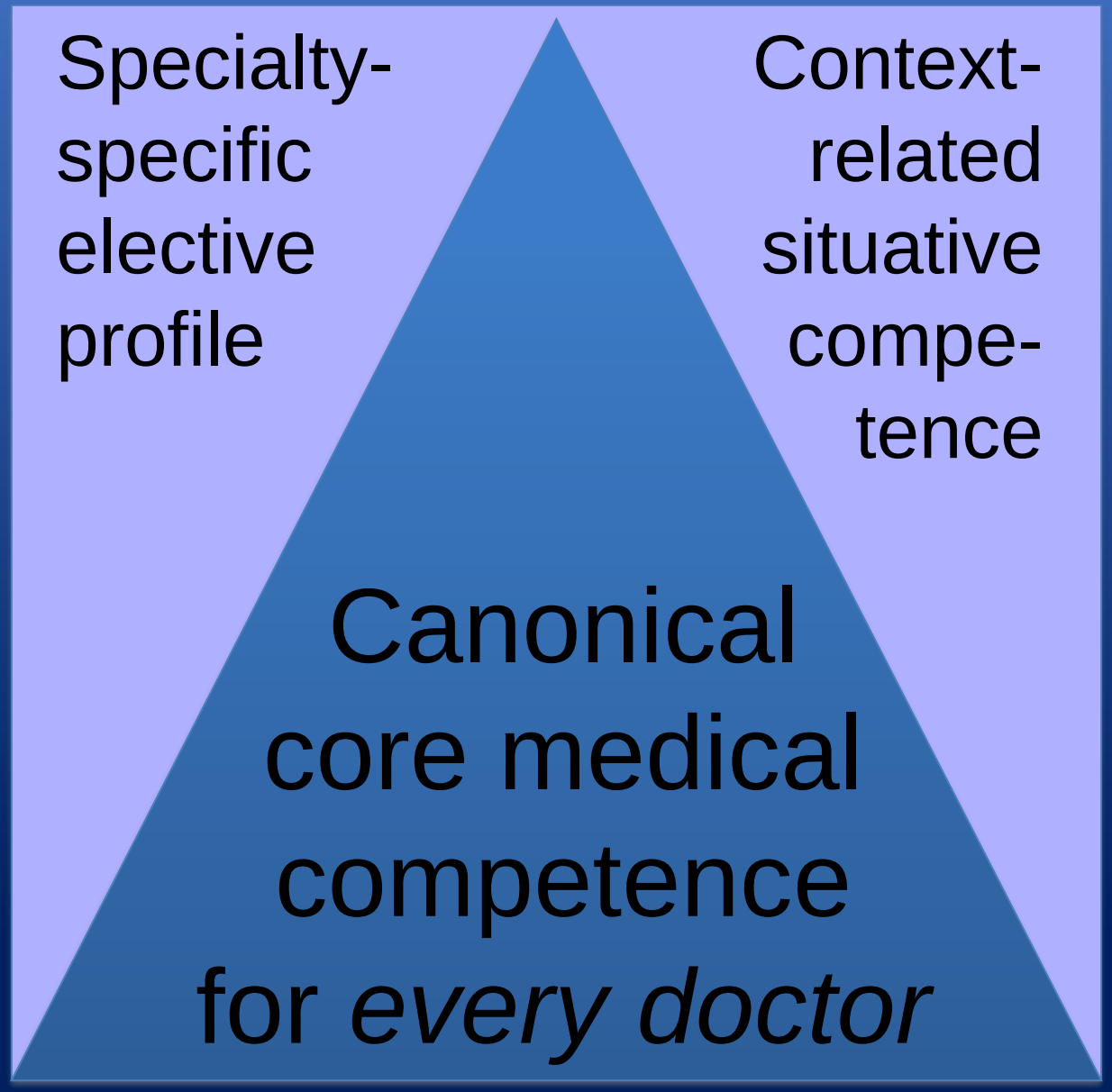
Specialty-specific elective profile
Context-related situative compe-tence
Canonical core medical competence for *every doctor*

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Practical significance of the medical degree differs across the globe

- World-wide, many different ways to become medical practitioner
- The (western) medical graduate has legal privileges, but no longer the right to work without supervision: medical degree has become a ‘ticket to the next stage of training’
- However: non-western MDs often have primary care social service in a rural area with little supervision and/or no PGME

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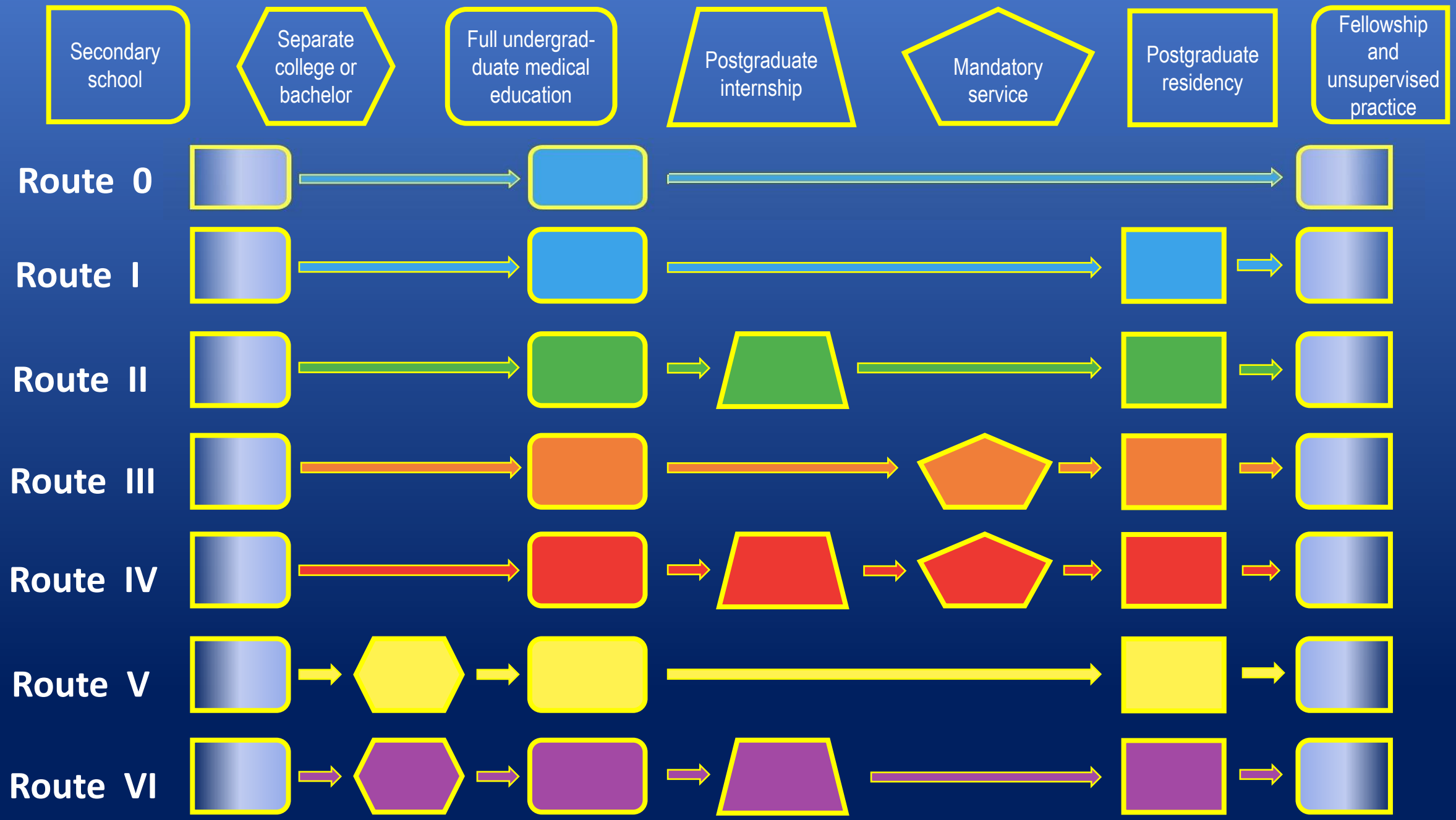

Wijnen-Meijer et al, Academic Medicine, 2021

Medical care and medical knowledge: no longer the prerogative of doctors only

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Medical care and medical knowledge: no longer the prerogative of doctors only

- “The Doctor” – now: 30 to 50 specialties
- Co-workers (Psychologists, Physical Therapists, Nurse practitioners, Physician Assistants, Family doctor assistants, Dieticians, etc) increasingly carry out physician tasks
- Responsibilities shared in interprofessional teams
- Medical knowledge is quickly being democritized, thanks to Google

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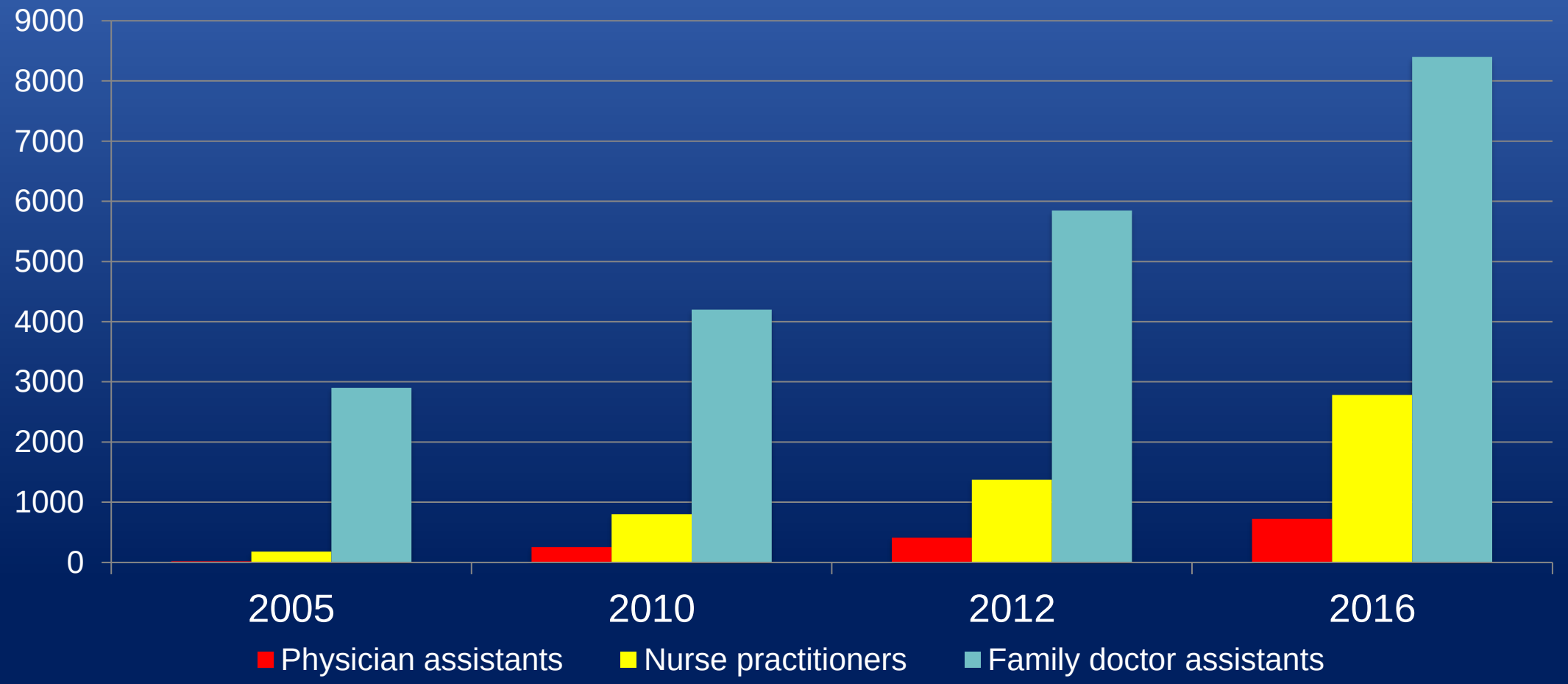
Increased substitutes for doctor-led care in the Netherlands



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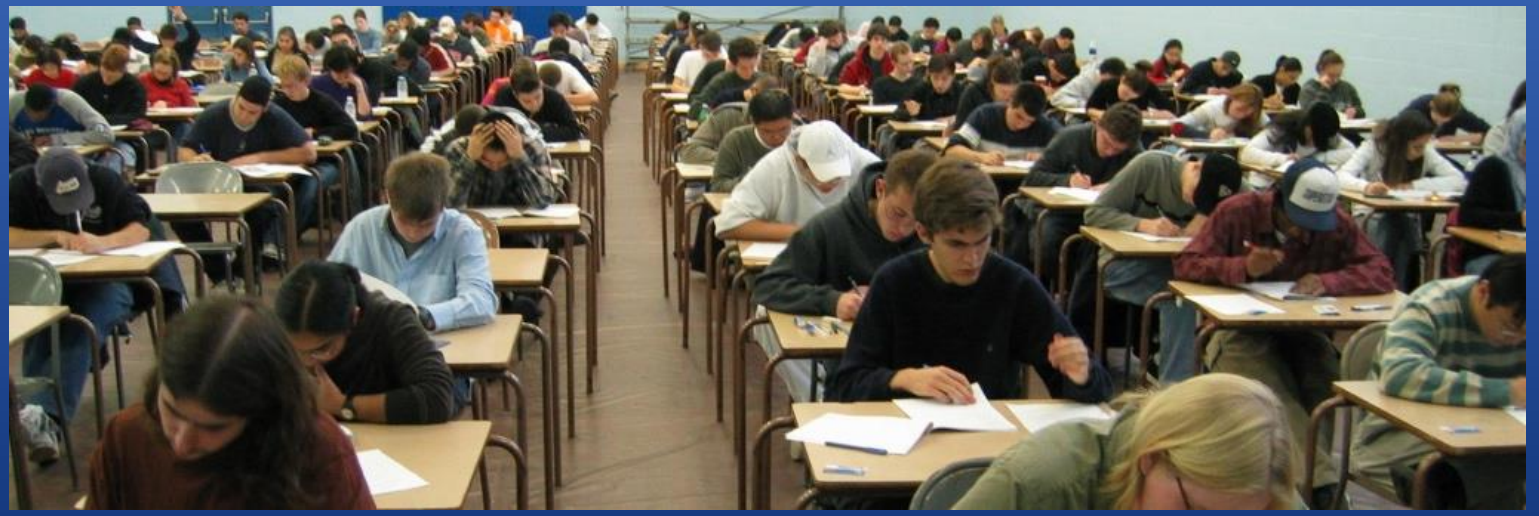
From memorizing facts to coping with information



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From memorizing facts to coping with information

- Medical curricula cannot teach all relevant information anymore; graduates cannot know it all
- Navigating “knowledge clouds” may become more important than possessing knowledge
- Adaptive expertise / adaptive competence (creatively coping with *unfamiliar* problems) may become key
- Artificial Intelligence will support memory and reasoning

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AI will

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Viewpoint | Health Care Reform

December 17,

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The AJT Report

News and issues that affect organ and tissue transplantation

Doctor AI

Using mc

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The NEW ENGLAND JOURNAL of MEDICINE

EP

Advances in Health Sciences Education
https://doi.org/10.1007/s10459-020-10009-8

INVITED PAPER

Check for updates

The role of data science and machine learning in Health Professions Education: practical applications, theoretical contributions, and epistemic beliefs

Martin G. Tolsgaard[1,2] · Christy K. Boscardin[3] · Yoon Soo Park[4,5] · Monica M. Cuddy[6] · Stefanie S. Sebok-Syer[7]

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AMA Journal of Ethics
Illuminating the Art of Medicine

MEDICAL EDUCATION
FEB 2019

Reimagining Medical Education in the Age of AI

Steven A. Wartman, MD, PhD and C. Donald Combs, PhD

Citation | PDF | Altmetric

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So, what next?

- The medical degree in 2020 is different than in 1920; more rapid change is ahead
- Further growth of training length is unsustainable. A new model is needed.
- The purpose of the medical degree differs across the globe
- Democratized knowledge requires a continuous, skilled interaction with credible information sources.
- Scarcity of information is replaced by scarcity of skills in finding, selecting, valuing credibilty, and applying information.
- Learning should not be limited to a formal program; should become an inherent component of practice

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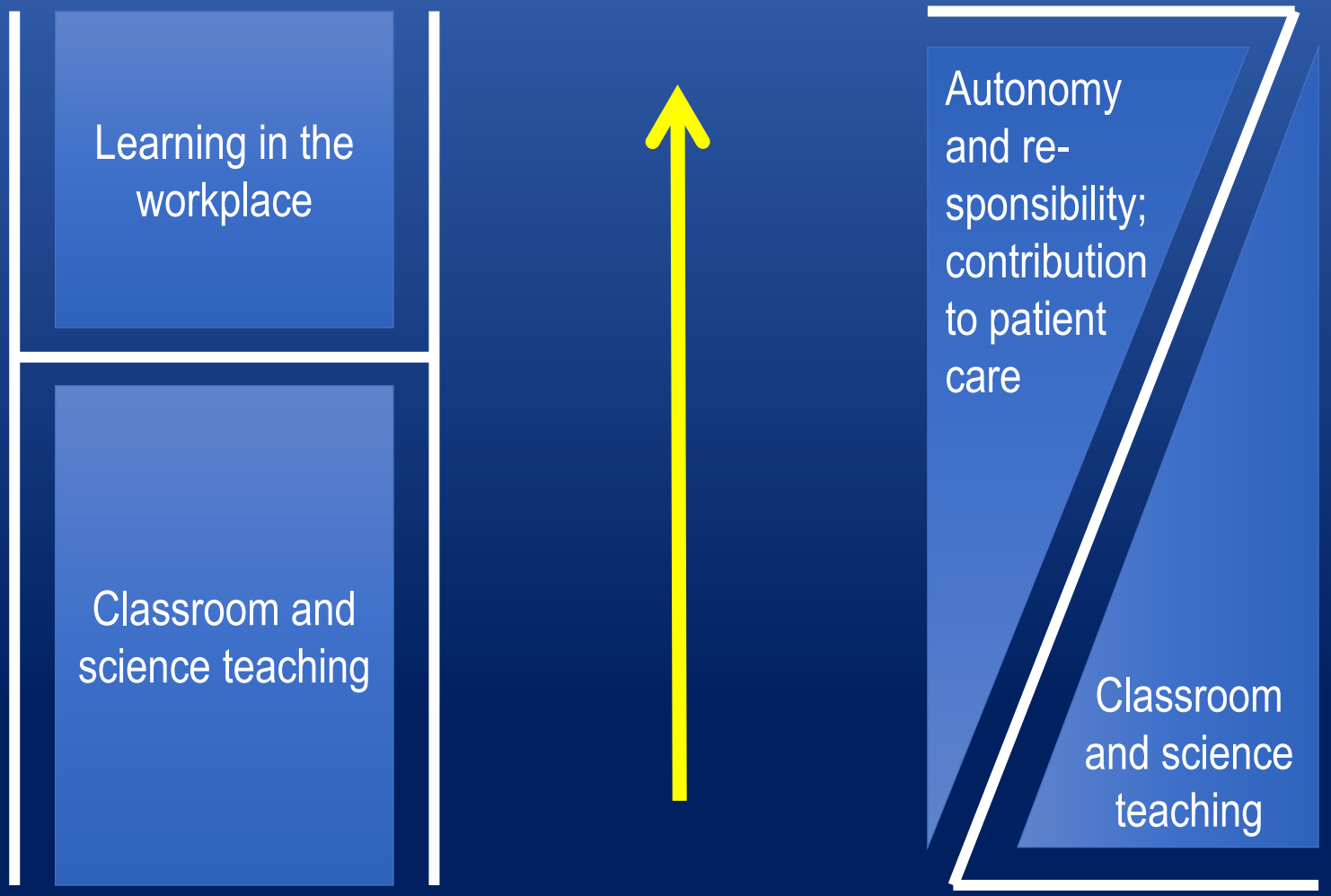
From a Flexnerian H-shaped curriculum to a modern Z-shaped curriculum



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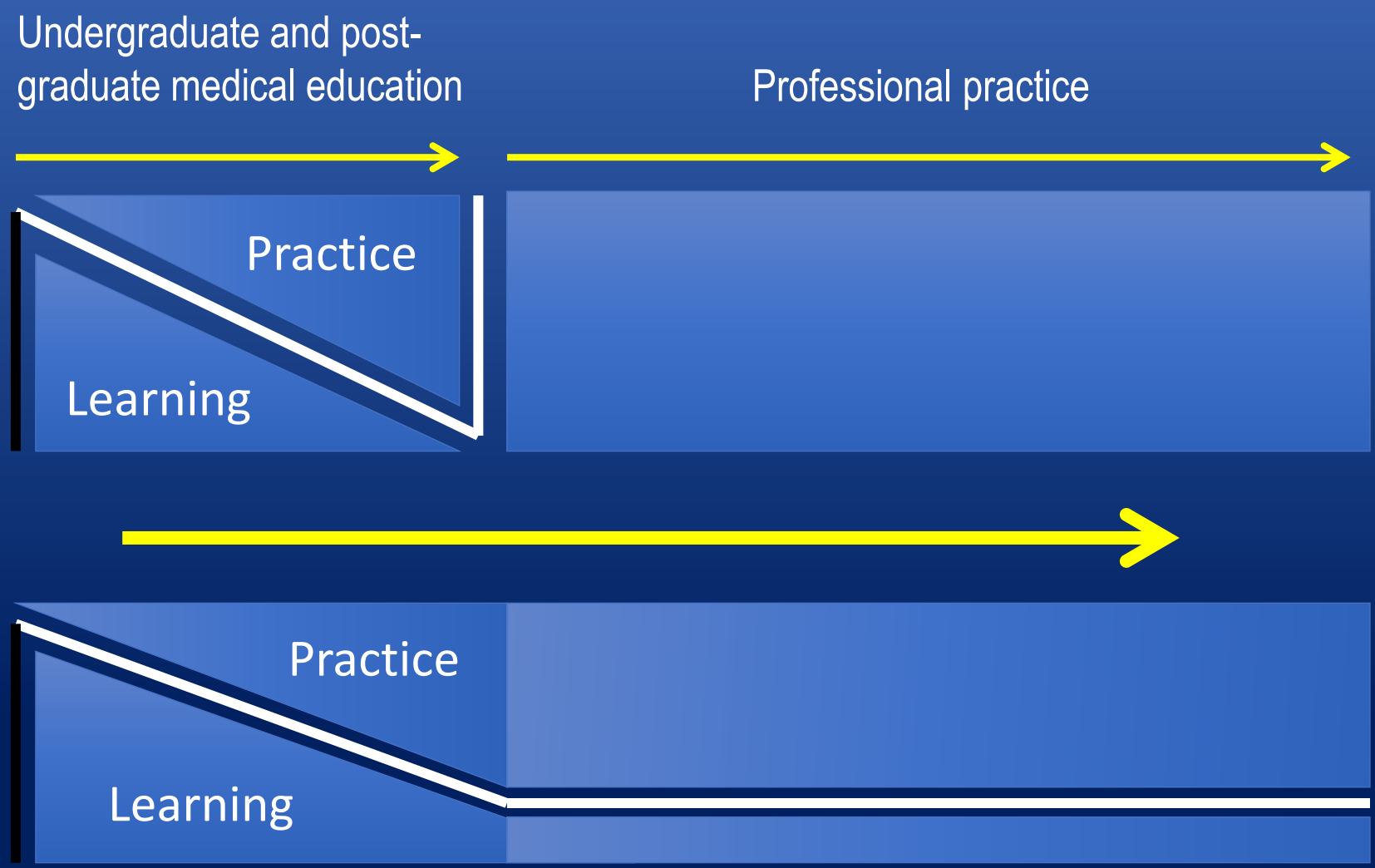
The next paradigm shift may de-emphasise transitions



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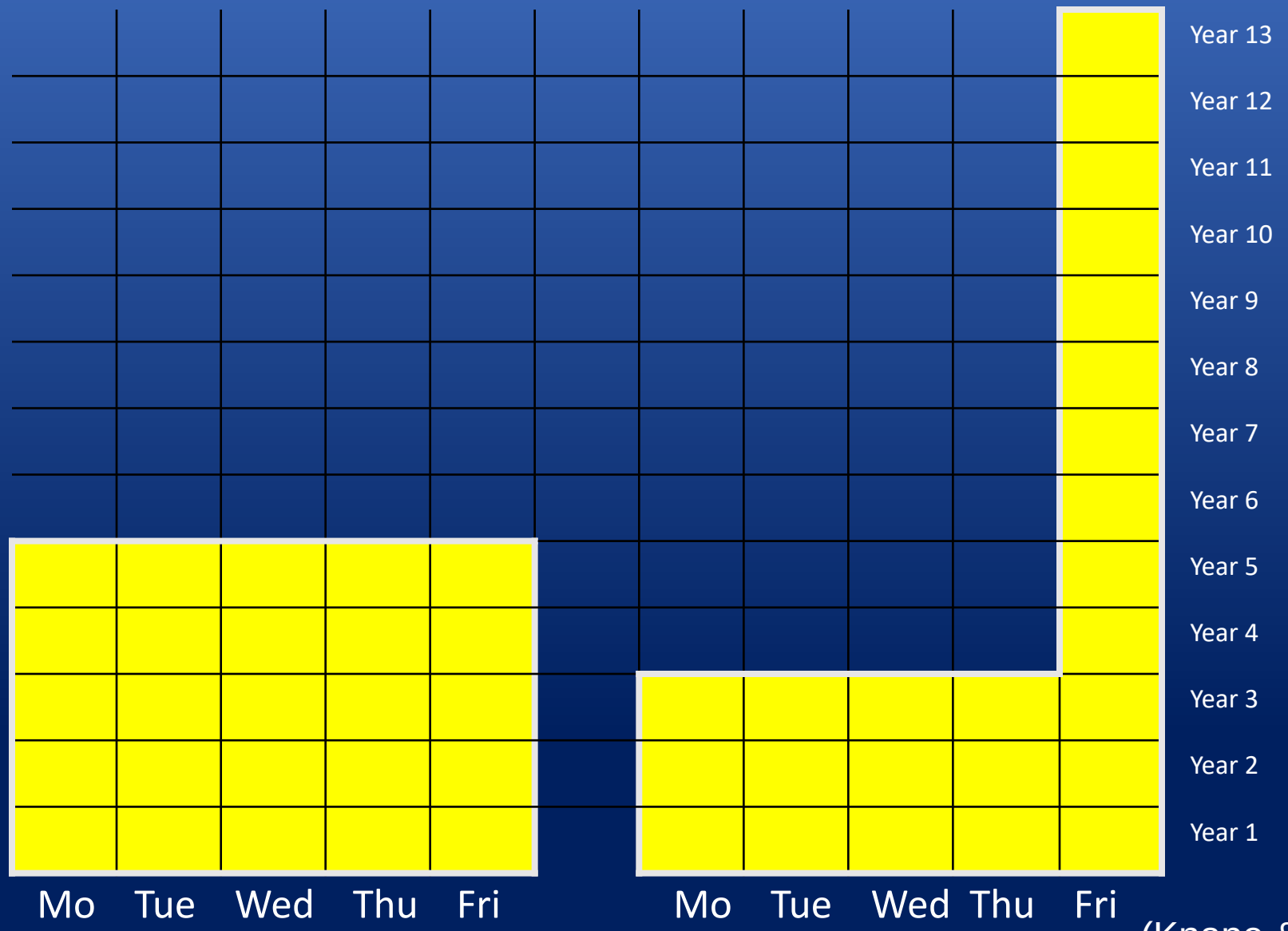
Flipping part of postgraduate training 90°, into CPD



(Knape & ten Cate, 2010)

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Entrustable Professional Activity

- **Definition**: *Unit of professional practice* (a task) that can be fully entrusted to a trainee, once he or she has demonstrated the necessary competence to execute this activity unsupervised
- **Purpose**: To operationalize competency-based medical education through a stepwise and safe engagement of trainees in clinical practice – with a progressive (bounded) autonomy
- **Becoming competent**: Passing the threshold that allows for sufficient trust in the trainee to act unsupervised

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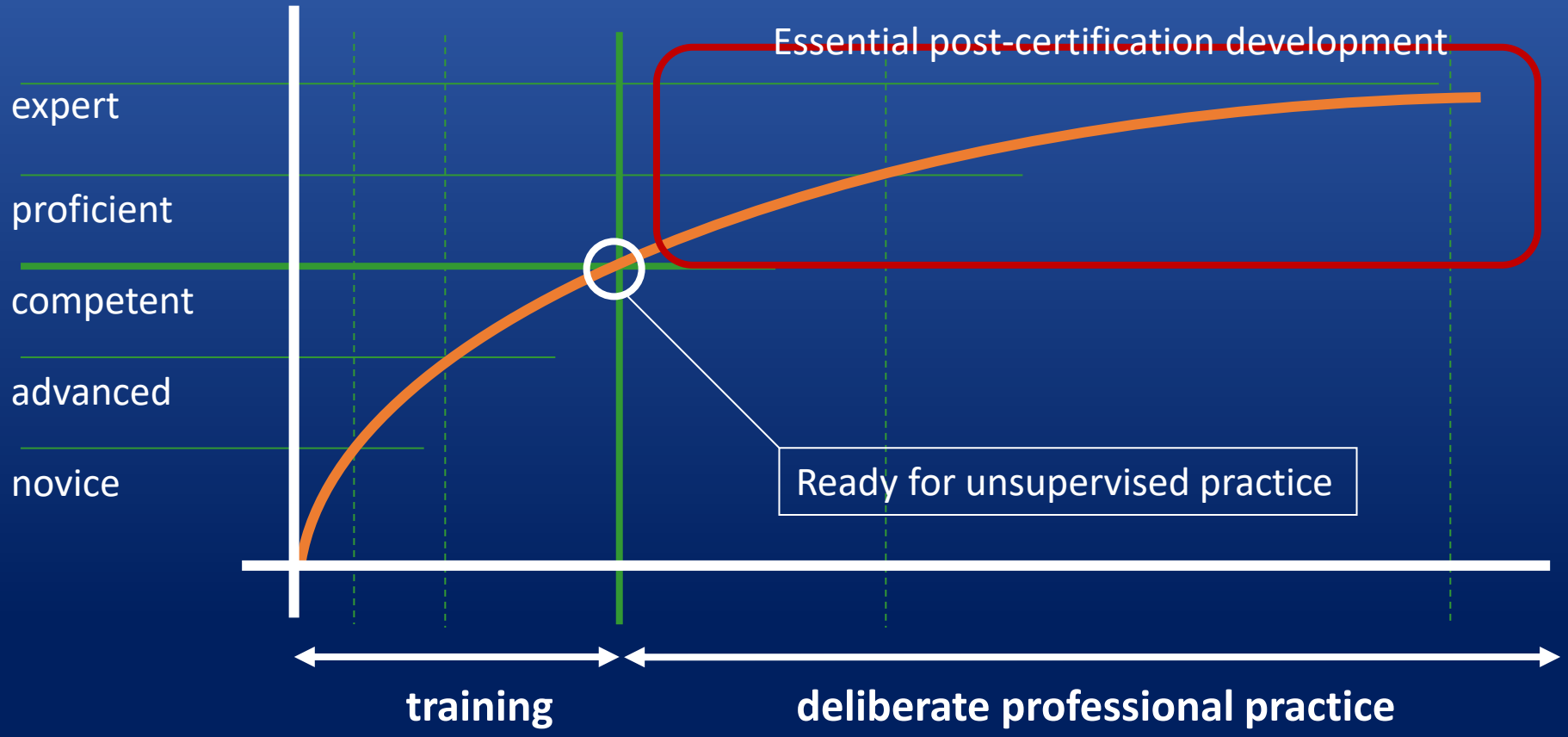
Growth of competence over time



Dreyfus & Dreyfus 1986; ten Cate et al, 2010

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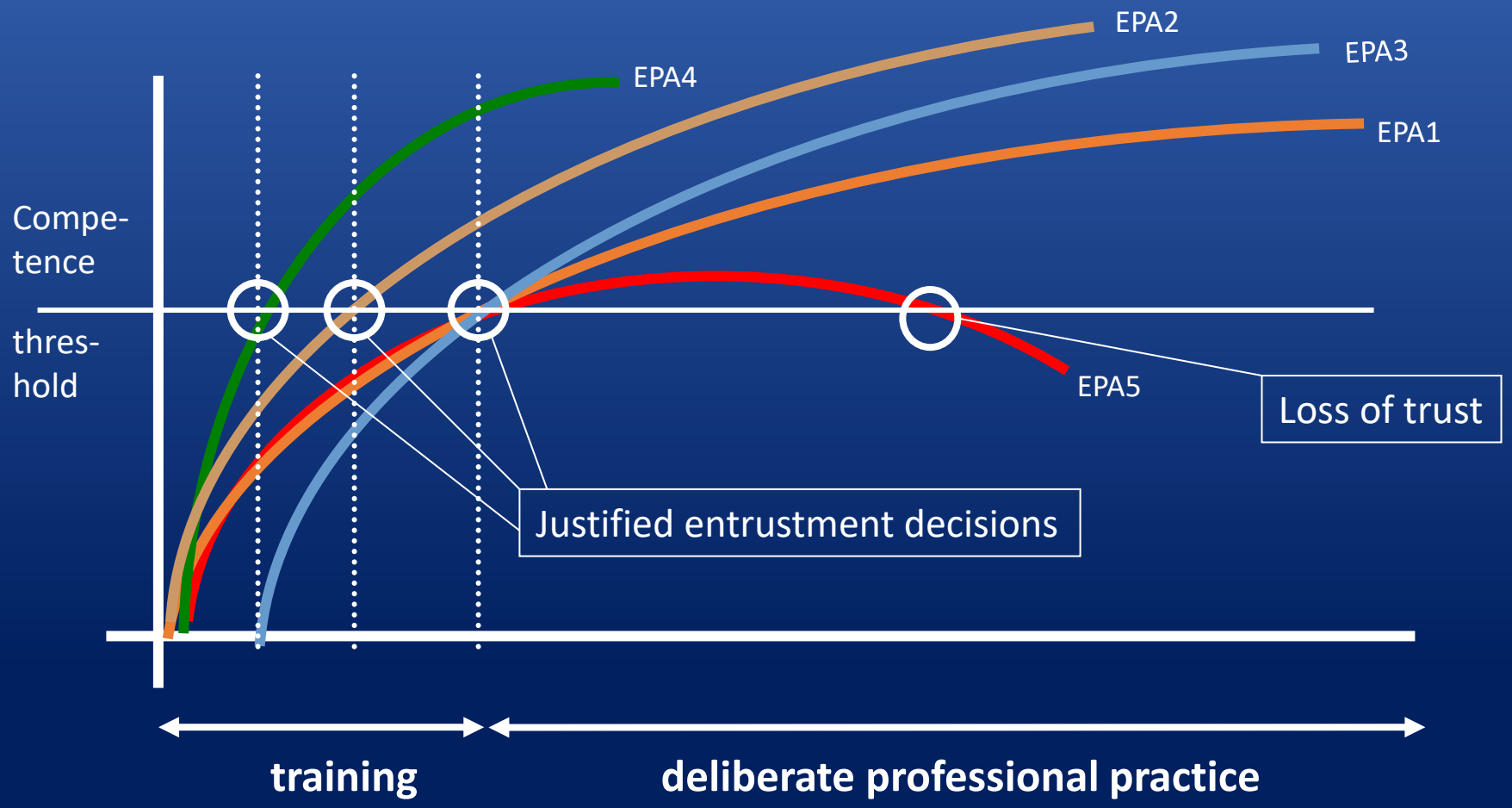
Competency curves of one trainee for various EPAs



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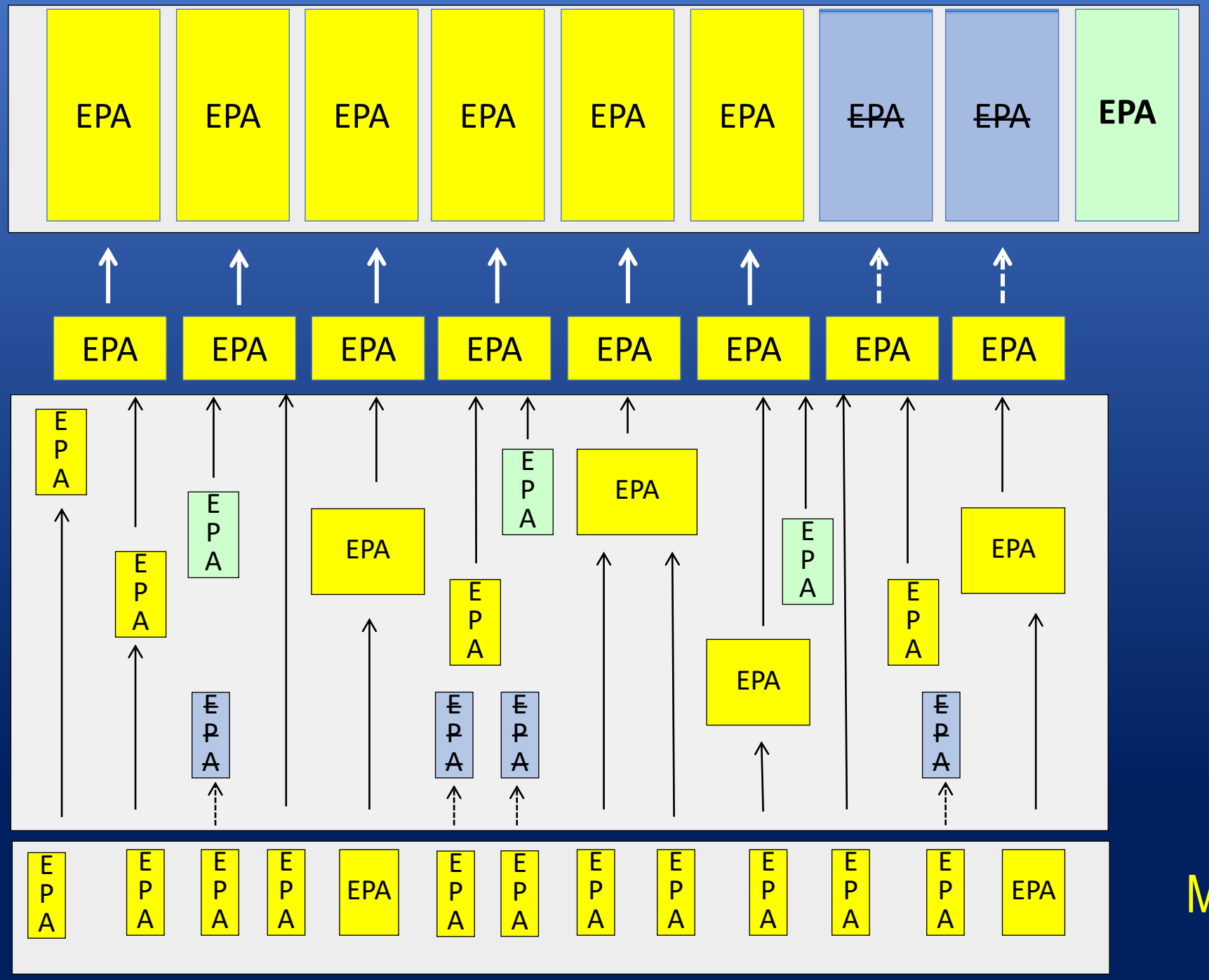
Envisioning medical competence as *a dynamic portfolio of certified EPAs* across a lifetime

- EPAs can be flexibly added or replaced after training
- Boundaries can be crossed
  - between UME-GME-CME
  - between specialities, to tailor individual physicians' needs
  - between professions
- Medical competence: becomes rather a *state* than a *trait*

EPAs may lead to rethinking structure of health care workforce



Ten Cate & Carraccio, 2019

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Medical license

Specialty certification

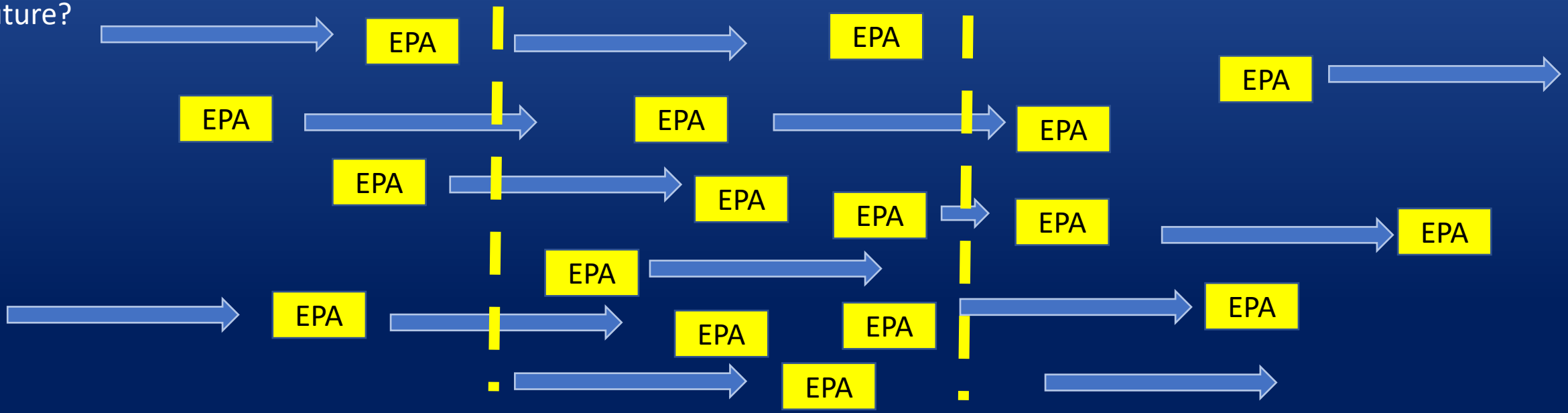
No autonomy, privileges and responsibities

Limited autonomy, privileges and responsibities

Full autonomy, privileges and responsibities

now

future?



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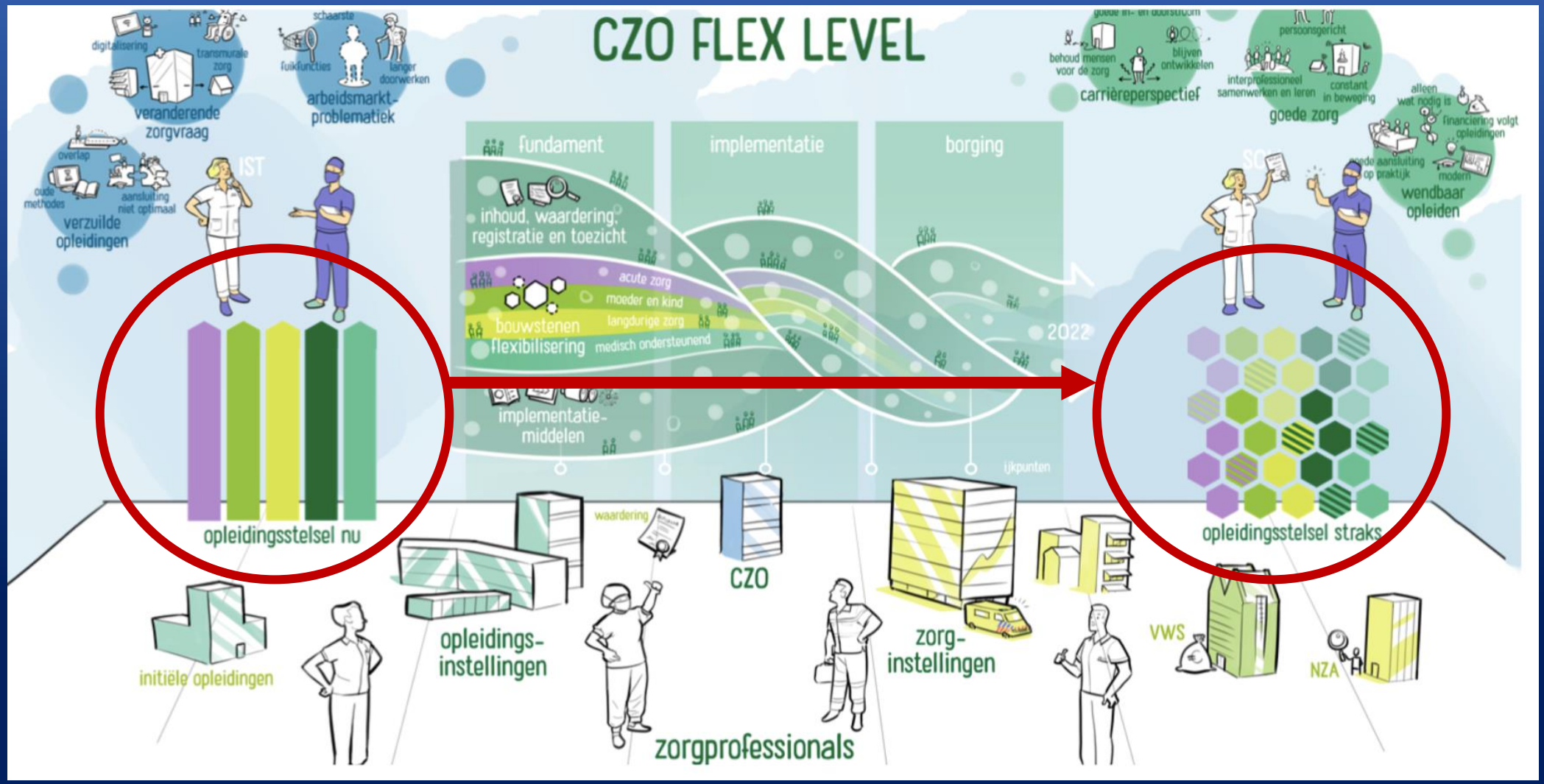
Dutch nurse speciality training programs to be flexibilized by 2022 using EPAs



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The future of medical education and practice?

- Further lengthing of training is not an option
- But, knowledge keeps increasing
- Ergo, basic training for a generalist degree – covering core EPAs..
- ..supplemented with elective, specialty EPAs, responding to practice needs. These may be transdisciplinary EPAs
- Medical practice will require continuous adaptive competence
- Competency-based medical education moves to *competency-based medical practice*, reflected in dynamic portfolio of EPAs

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References

- Bleker OP, Blijham G. Te Oud, te Knap, en te Duur. Opleiding tot medisch specialist kan veel korter. Med Contact (Bussum). 1999;54(36):1201–2013.
- Hinton G. Deep learning-a technology with the potential to transform health care. JAMA - J Am Med Assoc. 2018;320(11):1101–2.
- Knape JT., ten Cate TJ. Still too old, too smart and too expensive [Nog altijd te oud, te knap, te duur][in Dutch]. Med Contact (Bussum). 2010;65(13):582–5.
- Rajkomar A, Dean J, Kohane I. Machine Learning in Medicine. N Engl J Med. 2019;380(14):1347–58.
- ten Cate O, What is a 21st-century doctor? Rethinking the significance of the medical degree. Acad Med. 2014;89(7).
- ten Cate O, Billett S. Competency-based medical education: Origins, perspectives and potentialities. Med Educ. 2014;48(3):325–32.
- ten Cate O, Carraccio C. Envisioning a true continuum of competency-based medical education, training and practice. Acad Med. 2019;94(9):1283–8.
- ten Cate O. Entrustability of professional activities and competency-based training. Med Educ. 2005;39(12):1176–7.
- ten Cate O, An Updated Primer on Entrustable Professional Activities. Rev Bras Educ Med. 2019;43:712–20.
- ten Cate O, Snell L, Carraccio C. Medical competence: the interplay between individual ability and the health care environment. Med Teach. 2010 Jan;32(8):669–75.
- Teunissen PW, Watling C, Schrewe B, Asgarova S, Ellaway R, Myers K, et al. Contextual Competence: how residents develop competent performance in new settings. Med Educ. 2021; Early Online
- Wachter R. The Digital Doctor. Hope, Hype, and Harm, at the Dawn of Medicine's Computer Age. New York: McGraw-Hill; 2015.
- Wijnen-Meijer M, et al. Vertical integration in medical education: the broader perspective. BMC Med Education. 2020;(20):509.
- Wartman SA, Combs CD. Reimagining Medical Education in the Age of AI. AMA J Ethics. 2019;21(2):146–52.
- Wartman SA, Combs CD. Medical education must move from the information age to the age of artificial intelligence. Acad Med. 2018;93(8):1107–9.