Principles of effective ultrasound teaching

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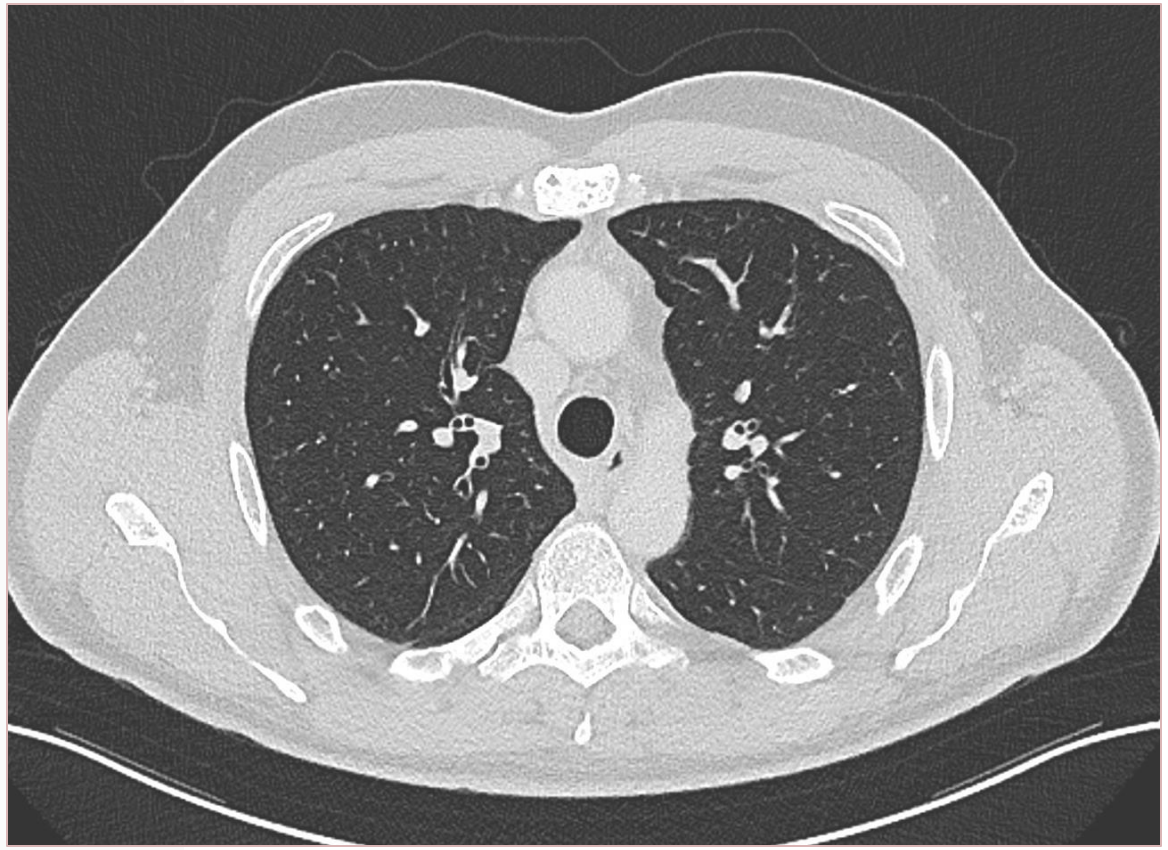
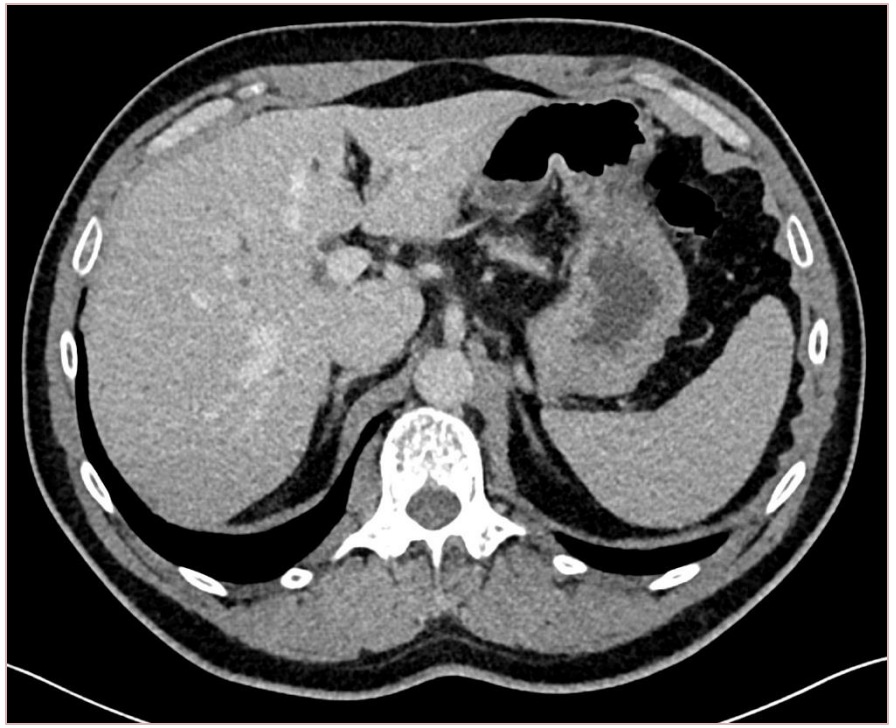
Conflicts of interests to declare





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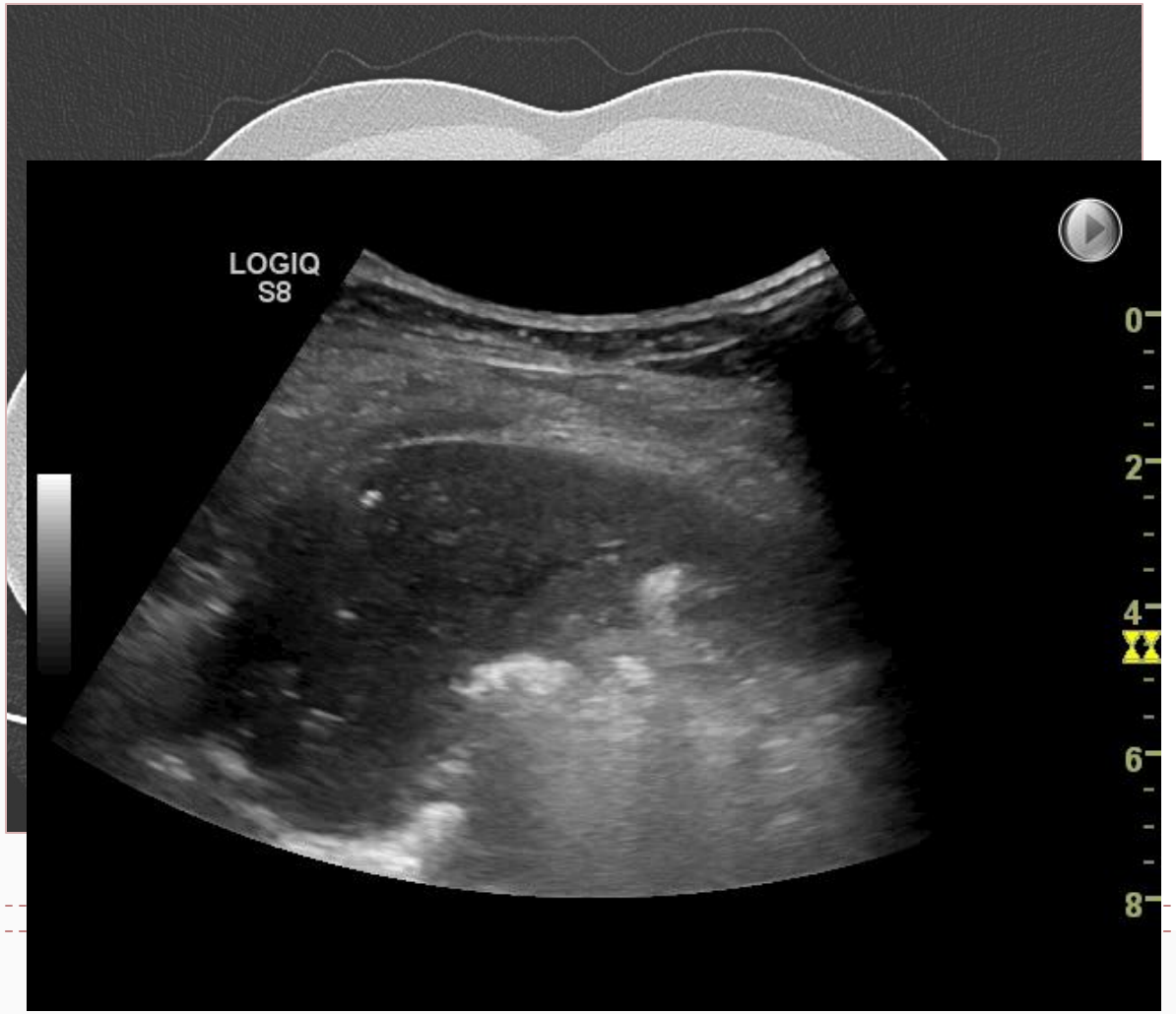

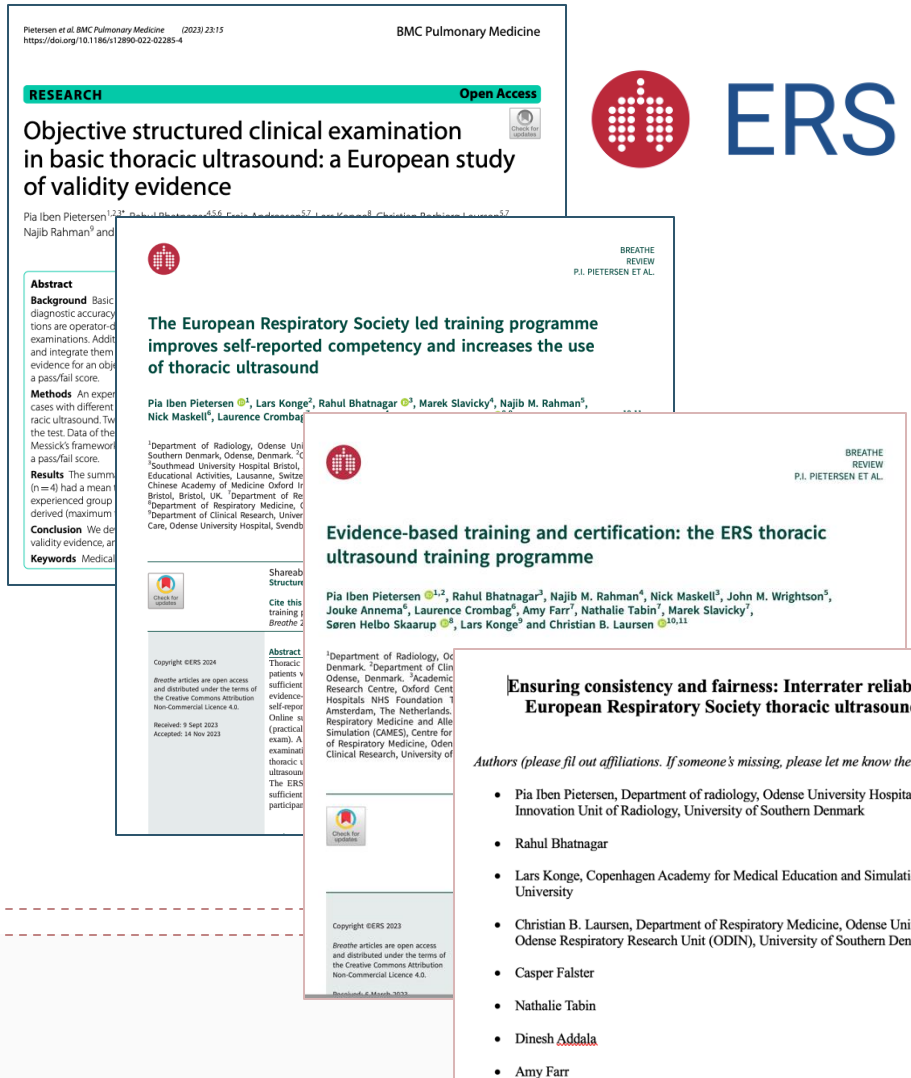

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https://doi.org/10.1186/s12890-022-02285-4

BMC Pulmonary Medicine

RESEARCH Open Access

Objective structured clinical examination in basic thoracic ultrasound: a European study of validity evidence

ERS

BREATHE REVIEW P.I. PIETERSEN ET AL.

The European Respiratory Society led training programme improves self-reported competency and increases the use of thoracic ultrasound

BREATHE REVIEW P.I. PIETERSEN ET AL.

Evidence-based training and certification: the ERS thoracic ultrasound training programme

Ensuring consistency and fairness: Interrater reliability of the European Respiratory Society thoracic ultrasound OSCE

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- Casper Falster
- Nathalie Tabin
- Dinesh Addala
- Amy Farr

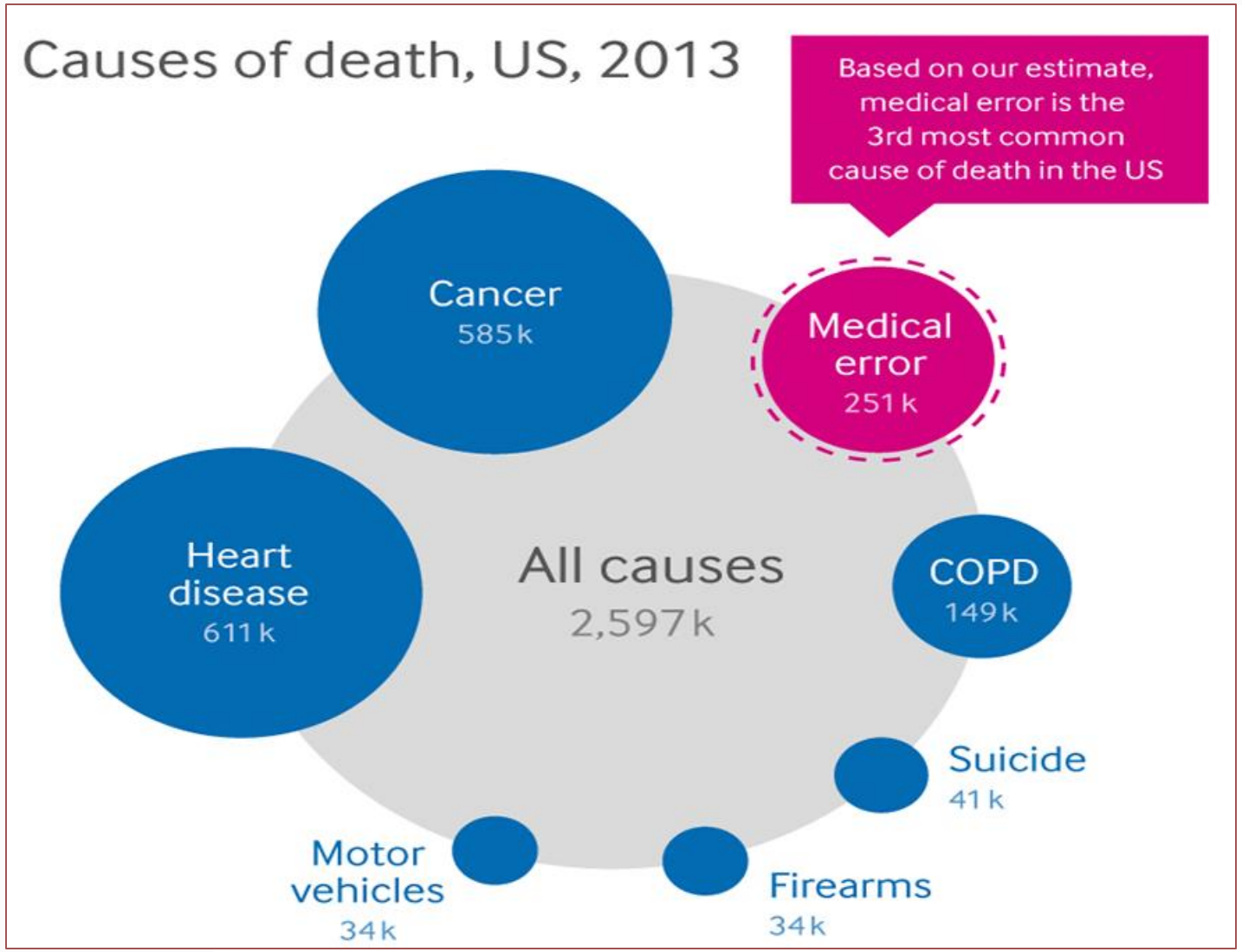
Agenda

To introduce and create awareness of different learning principles

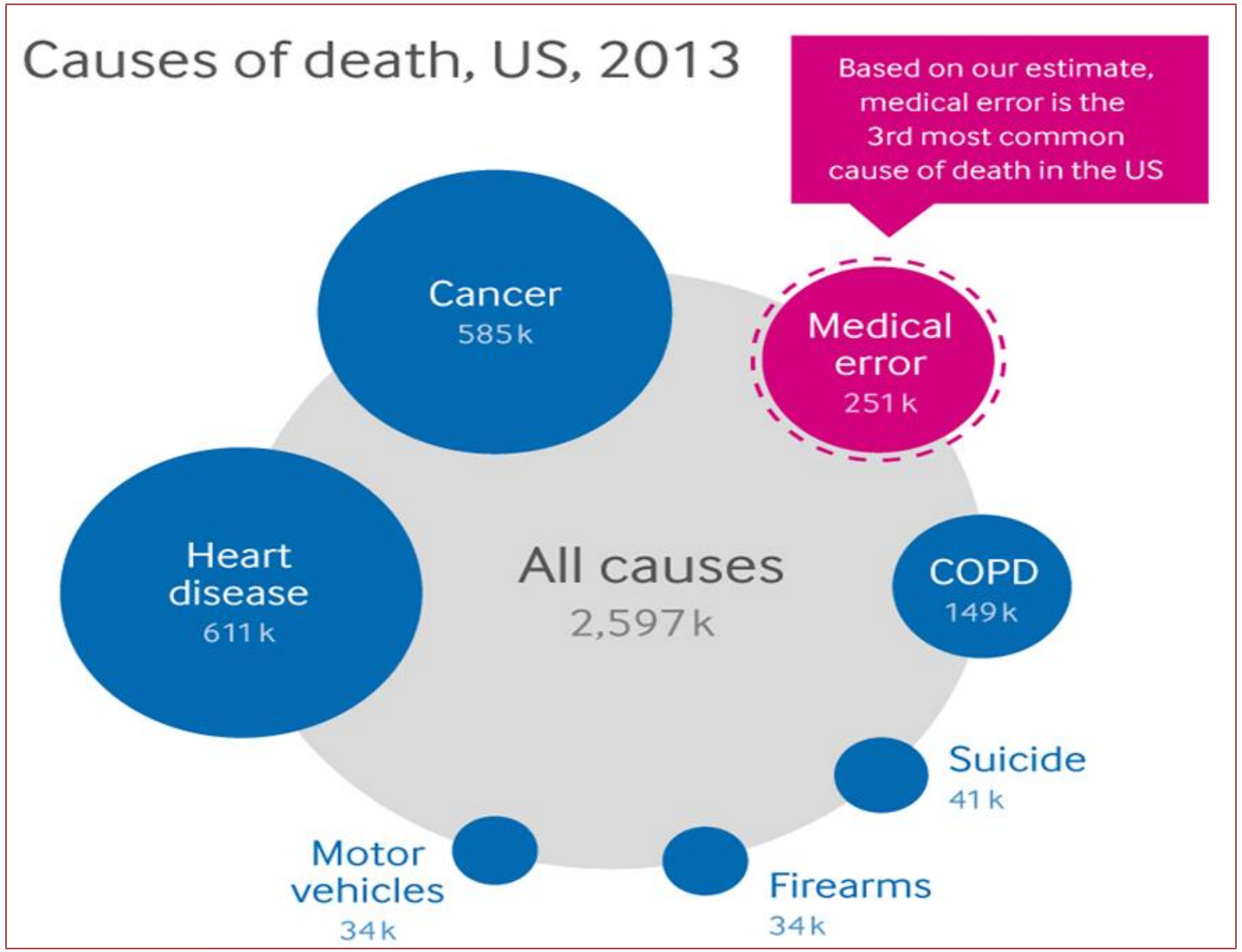
To create reflections on your ultrasound education and training

Why change a winning team?

Are we winning? And how can we win even more?



BMJ 2016; 353 doi: https://doi.org/10.1136/bmj.i2139 (Published 03 May 2016)



BMJ 2016; 353 doi: https://doi.org/10.1136/bmj.i2139 (Published 03 May 2016)

Medical errors = high costs

Despite the negative impact on the patient, it also affects:

- family and relatives,
- involved clinicians,
- nurses and other staff,
- healthcare facility in general

How do we reduce the risk of medical errors related to (intestinal) ultrasound?


RESULTS

Journal of Crohn's and Colitis, 2025, **19(2)**, jjaf011
https://doi.org/10.1093/ecco-jcc/jjaf011
Advance access publication 18 January 2025
Original Article

Systematic review on definitions of intestinal ultrasound treatment response and remission in inflammatory bowel disease

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Abstract

Background: Intestinal ultrasound (IUS) is emerging as a valuable tool to assess treatment response in inflammatory bowel disease (IBD) clinical trials. This study details how IUS defines response and remission to evaluate treatment efficacy in IBD patients.

Methods: We conducted a comprehensive search of studies from 1984 to March 31, 2024, focusing on IUS use in assessing treatment efficacy in IBD.

Results: A total of 51 studies were included: 31 on Crohn's disease (CD), 12 on ulcerative colitis (UC) and 8 on IBD. Ileocolonoscopy was used as a reference standard in 53% of studies. IUS-defined response was reported in 47% of studies, with the majority (71%) using changes in bowel wall thickness (BWT) and color Doppler signals (CDS) as key indicators. IUS-defined remission was reported in 53% of studies, primarily using normalization of BWT to <3 mm and CDS to grades 0 or 1 as criteria. Ultrasonographic activity scores were used in 16% of studies, including the Bowel Ultrasound Score (BUSS) in two CD studies, the International Bowel Ultrasound Segmental Activity Score (IBUS-SAS) in one CD study, and the Milan Ultrasound Criteria (MUC) in one UC study The remaining four studies used unvalidated scores without clear definitions of response or remission. Assessment times varied, most commonly at weeks 8–16, and at 6, 12, and 24 months.

Conclusions: This systematic review reveals significant variability in IUS definitions of response and remission in IBD, highlighting the need to standardize eligibility criteria and outcome measures for IUS in IBD clinical trials.

Key words: Inflammatory bowel disease; intestinal ultrasound; ultrasound response


RESULTS

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DOI: 10.1111/apt.16950

AP&T Alimentary Pharmacology & Therapeutics WILEY

The knowledge and skills needed to perform intestinal ultrasound for inflammatory bowel diseases—an international Delphi consensus survey

Gorm Roager Madsen[1,2,3] | Rune Wilkens[1,2] | Trine Boysen[1,2] | Johan Burisch[1,2] | Robert Bryant[4] | Dan Carter[5] | Krisztina Gecse[6] | Christian Maaser[7] | Giovanni Maconi[8] | Kerri Novak[9] | Carolina Palmela[10] | Leizl Joy Nayahangan[3] | Martin Grønnebæk Tolsgaard[3,11]

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Summary

Background: Intestinal ultrasound (IUS) is a non-invasive modality for monitoring disease activity in inflammatory bowel diseases (IBD). IUS training currently lacks well-defined standards and international consensus on competency criteria.

Aim: To achieve international consensus on what competencies should be expected from a newly certified IUS practitioner.

Methods: A three-round, iterative Delphi process was conducted among 54 IUS experts from 17 countries. Round 1 was a brainstorming phase with an open-ended question to identify the knowledge and skills that experts believe a newly certified IUS practitioner should possess. The experts' suggestions were then organised into statements by a Steering Committee. In round 2, the experts commented upon and rated the statements, which were revised accordingly. In round 3, the experts rated the revised statements. Statements meeting the pre-defined consensus criterion of

DOI: 10.1111/apt.16979

INVITED EDITORIAL

AP&T Alimentary Pharmacology & Therapeutics WILEY

Editorial: it's time to standardise competencies in intestinal ultrasound

Intestinal ultrasound (IUS) is a novel modality for monitoring inflammatory bowel disease (IBD), [illegible] other assessment tools such as colonoscopy and magnetic resonance imaging, the sensitivity and specificity of IUS are 75%–90% and 75%–100% in Crohn's disease, and, 74%–90% and 93%–96% in ulcerative colitis.[1-4] IUS has several advantages given its real-time, accurate, low cost, non-invasive and non-radiating nature. IUS also helps to promote a better understanding of the disease and adherence with treatment, as patients report better tolerability compared to other IBD monitoring tools.[5-7] Because of these features, IUS is increasingly implemented in IBD centres around the world.

Currently, there are a limited number of high-volume IUS centres and only a few formal training programmes. Part of the criticism facing IUS as an operator-dependent modality may be the lack of standardisation in IUS training. In order for IUS to gain widespread international recognition and routine utilisation, the development of standards expected of IUS practitioners is of utmost importance. In alignment, the World Federation for Ultrasound in Medicine and Biology called for agreement on international standards for education and training in IUS in a position paper.[8]

Madsen et al address this important unmet need by assembling an international consensus on the knowledge and skills required of newly certified IUS practitioners using a robust Delphi consensus survey methodology.[9] In the first round, ideas were generated through a brainstorming phase with open-ended questions to allow participants the freedom of response. Through two subsequent rounds, a steering committee worked in an iterative fashion to summarise responses and synthesise statements to ultimately compile a list of 41 competencies. The list of competencies developed were concise and relevant, yet also thoughtfully comprehensive reflecting the key aspects of IUS theory and practice. They were subsequently categorised into core components required of IUS practitioners including knowledge, technical skills and interpretation skills.

A strength of this study was the representation from 17 countries of international collaborators with substantial involvement in IUS training and research included in the Delphi panel. As there are a limited number of experts in this field, a larger and more diverse panel helps reduce bias and strengthen generalizability. However, despite the number of specialities included in the panel, only one radiologist participated. Given their expertise in ultrasound, involving more radiologists [illegible] to refine the technical and interpretation competencies identified.

Despite this limitation, the authors help to standardise competencies expected of a newly certified IUS practitioner. As the focus of medical education transitions towards competency-based training and as IUS utilisation continues to grow worldwide, this paper is a welcome addition to the expanding body of IUS literature and sets the foundation for guiding the quality, content, goals and focus of IUS training. The timeframe in which these competencies are met, the feasibility of achievement, and their effectiveness in fostering independent IUS performance should next be evaluated to determine whether this consensus requires adjustment in the future.

AUTHOR CONTRIBUTIONS

Jocelyn Jeong: Conceptualization (lead); writing – original draft (lead); writing – review and editing (lead). **Jennifer deBruyn:** Writing – original draft (supporting); writing – review and editing (supporting).

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Declaration of personal interests: J deBruyn was a survey respondent for the Delphi panel and did not have any involvement in study design, data analysis or manuscript preparation or approval. J deBruyn has served as a speaker or advisory board member for Pfizer, Mylan, Abbvie, and Amgen.

Declaration of funding interests: J Jeong has no personal/funding interests to declare.

DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analyzed during the current study

LINKED CONTENT

This article is linked to Madsen et al papers. To view these articles, visit https://doi.org/10.1111/apt.16950

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Jennifer deBruyn[2]

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AP&T correspondence columns are restricted to invited editorials and letters discussing papers that have been published in the journal. An invited editorial

What I then knew…..

- Evidence for the use of IBUS in diagnosing and monitoring several diseases /conditions
- Differences in terminology
- Delphi study on content (theoretical and practical needs) → learning outcomes

EFSUMB

EUROPEAN FEDERATION OF SOCIETIES FOR ULTRASOUND IN MEDICINE AND BIOLOGY

'Building a European Ultrasound Community'

MINIMUM TRAINING REQUIREMENTS FOR THE PRACTICE OF MEDICAL ULTRASOUND IN EUROPE

Appendix 5: Gastroenterological Ultrasound

This curriculum is intended for clinicians who perform gastroenterological ultrasound scans. It includes standards for theoretical knowledge and practical skills. At least Level 1 competence should be obtained by anyone performing gastroenterological ultrasound unsupervised

Level 1

- It is recommended that at least 5–10 examinations are performed by the trainee (under supervision) per week and that a minimum of 300 examinations in total are undertaken. However different trainees will acquire the necessary skills at different rates and the end point of the training programme should be judged by an assessment of competencies
- Examinations should encompass the full range of pathological conditions listed below
- A log book listing the types of examinations undertaken should be kept
- Training should usually be supervised by a level 2 practitioner.
- In certain circumstances it may be appropriate to delegate some of this supervision to an experienced level 1 practitioner with at least two years of regular practical experience.
- Trainees should attend an appropriate theoretical course and should read appropriate textbooks and literature
- It is recommended that a medical practitioner performing level 1 ultrasound should continue to perform at least 300 examinations each year on a regular basis and attend regular ultrasound meetings
- During the course of training the competency assessment sheet should be completed as this will determine in which area(s) the trainee can practice independently

Knowledge Base

Physics and Technology, Ultrasound Techniques and Administration: see Appendix 2

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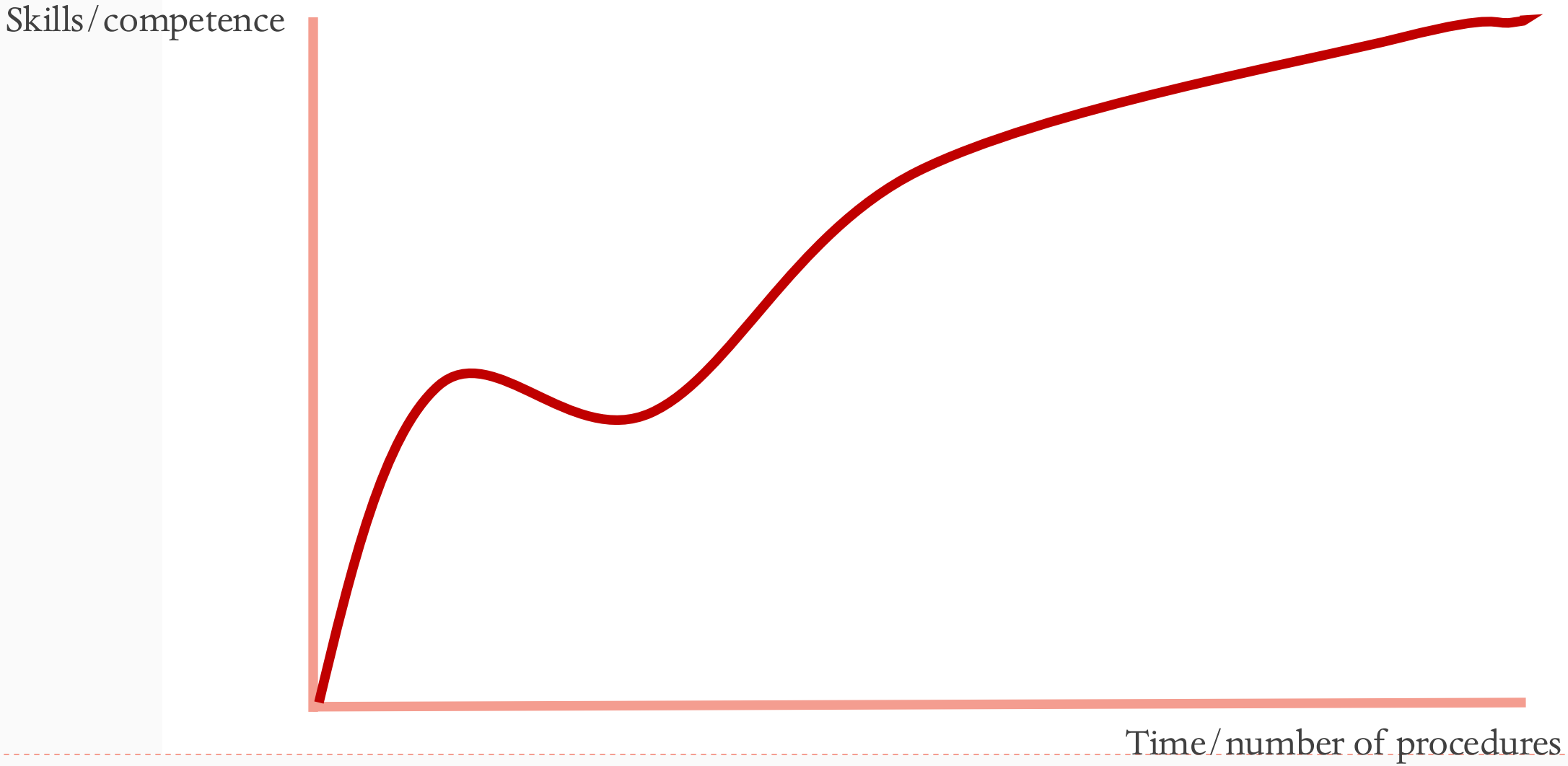
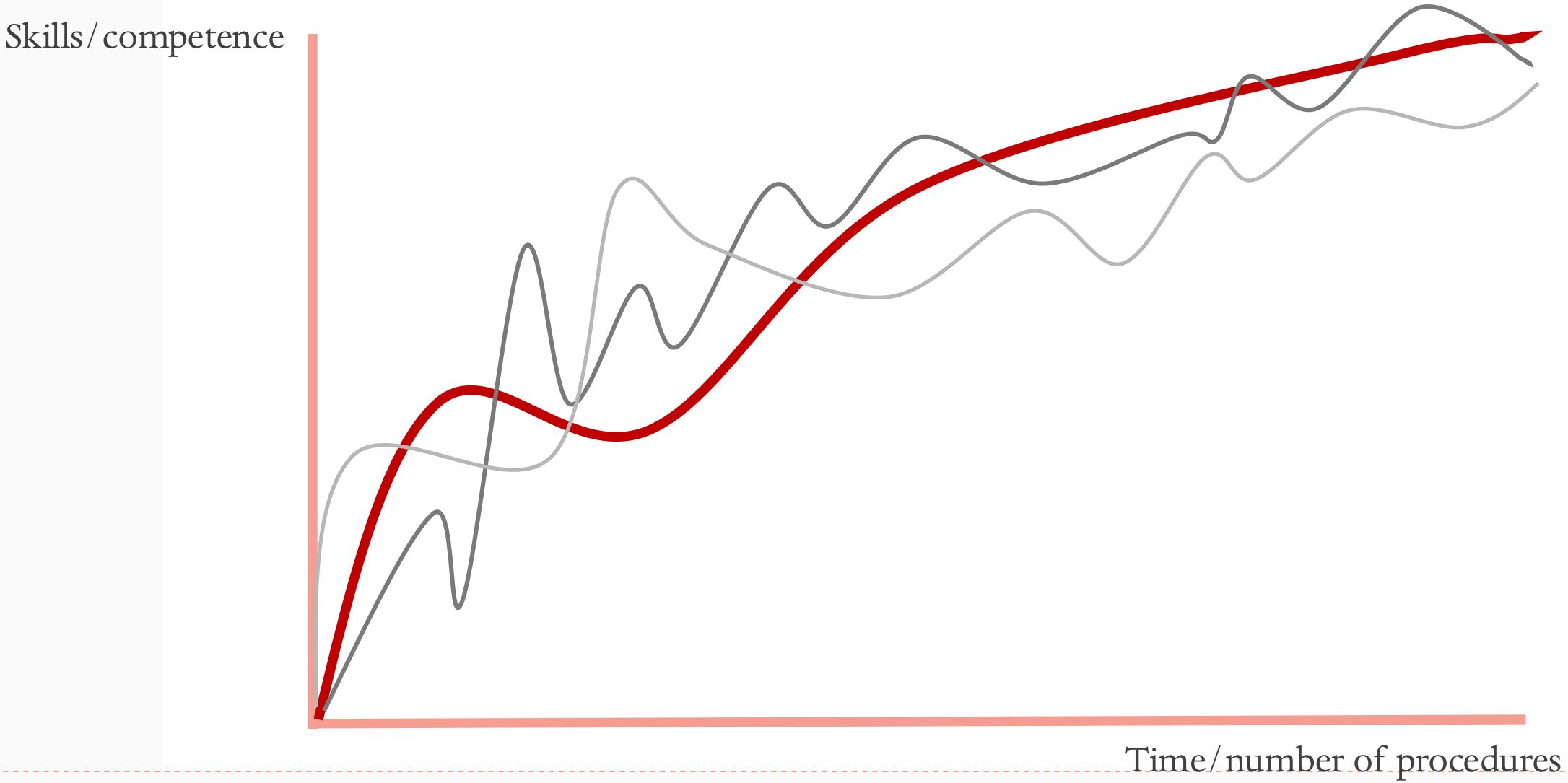

Skills/competence
Time/number of procedures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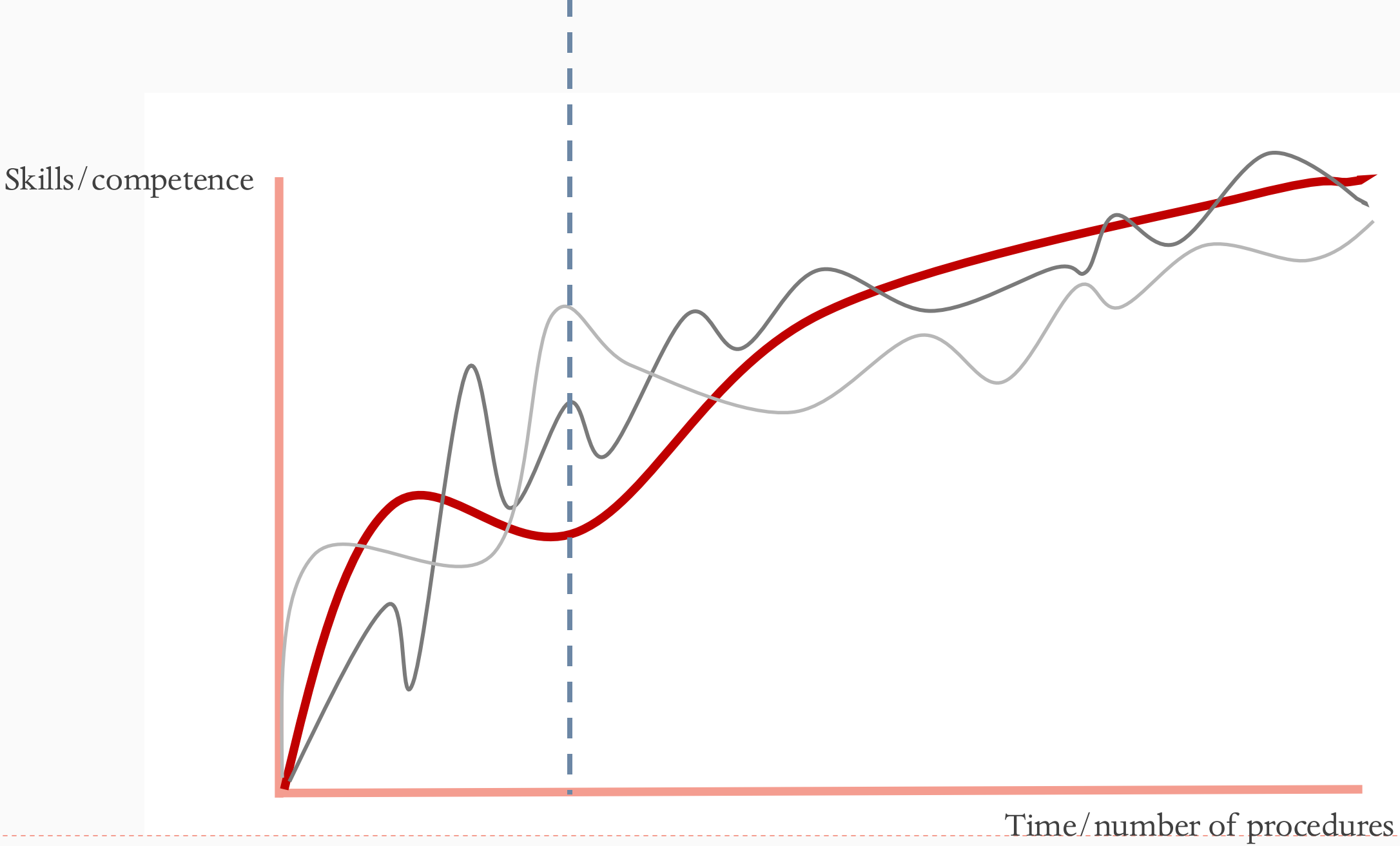
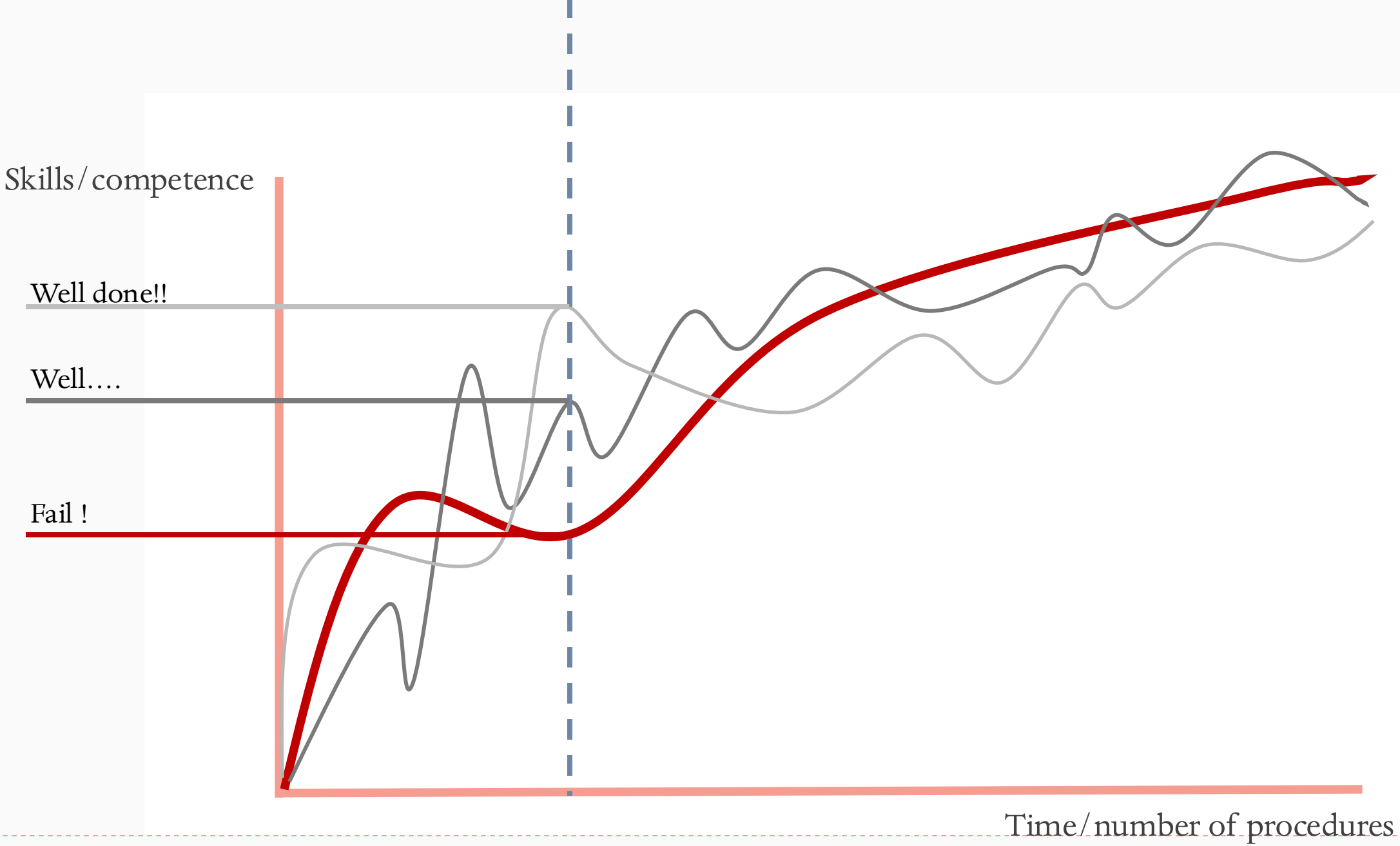
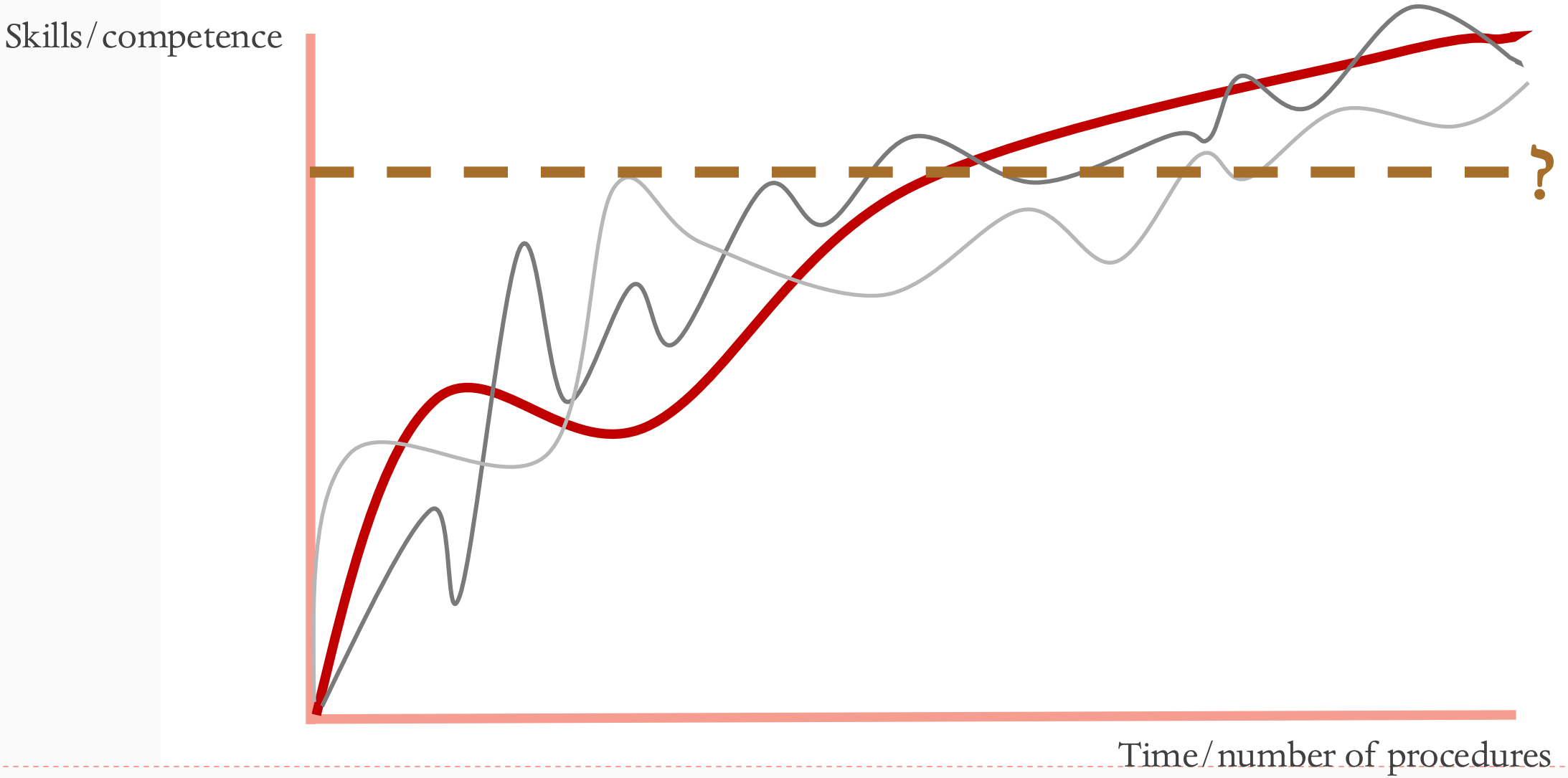
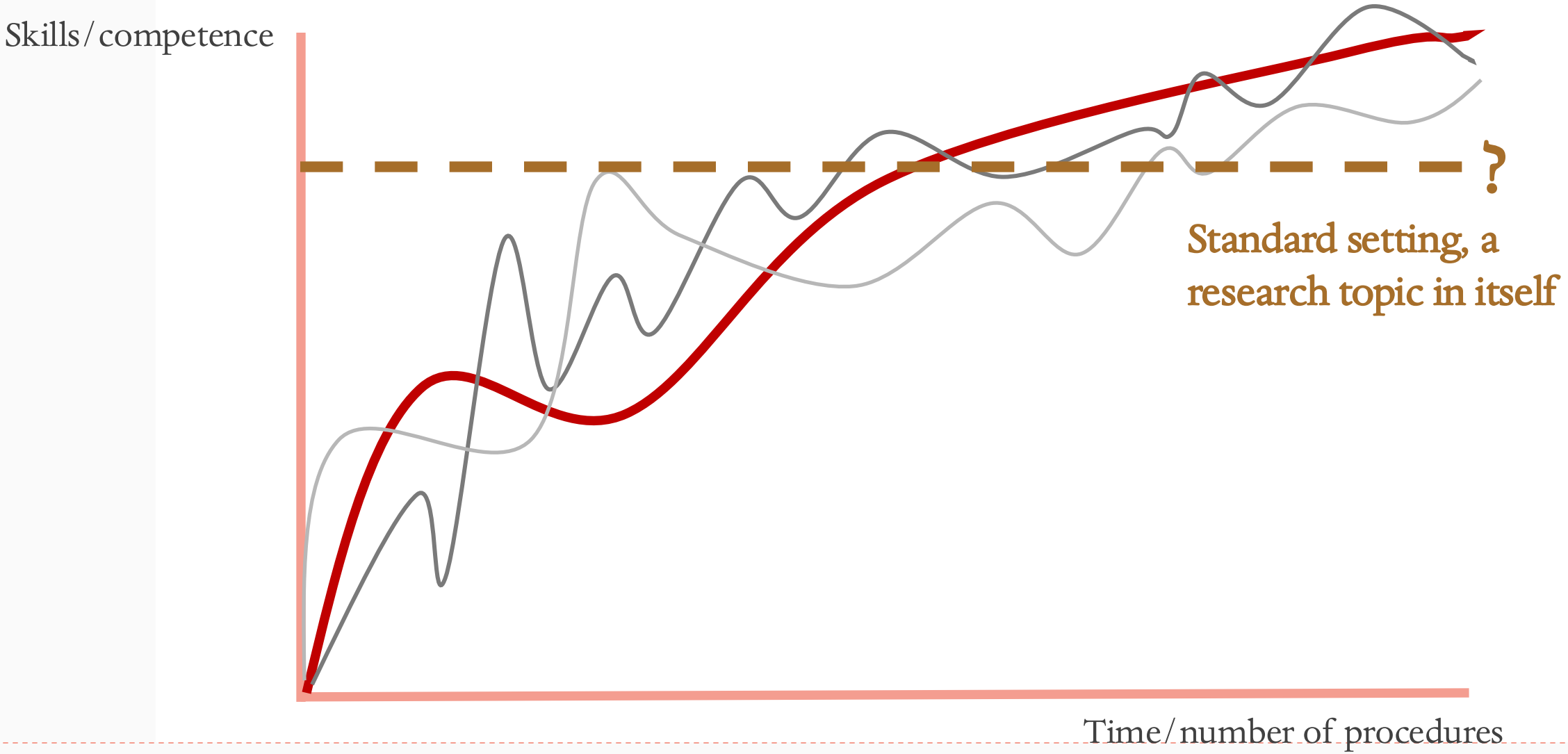

Skills/competence
Time/number of procedures


Skills/competence
Well done!!
Well….
Fail !
Time/number of procedures

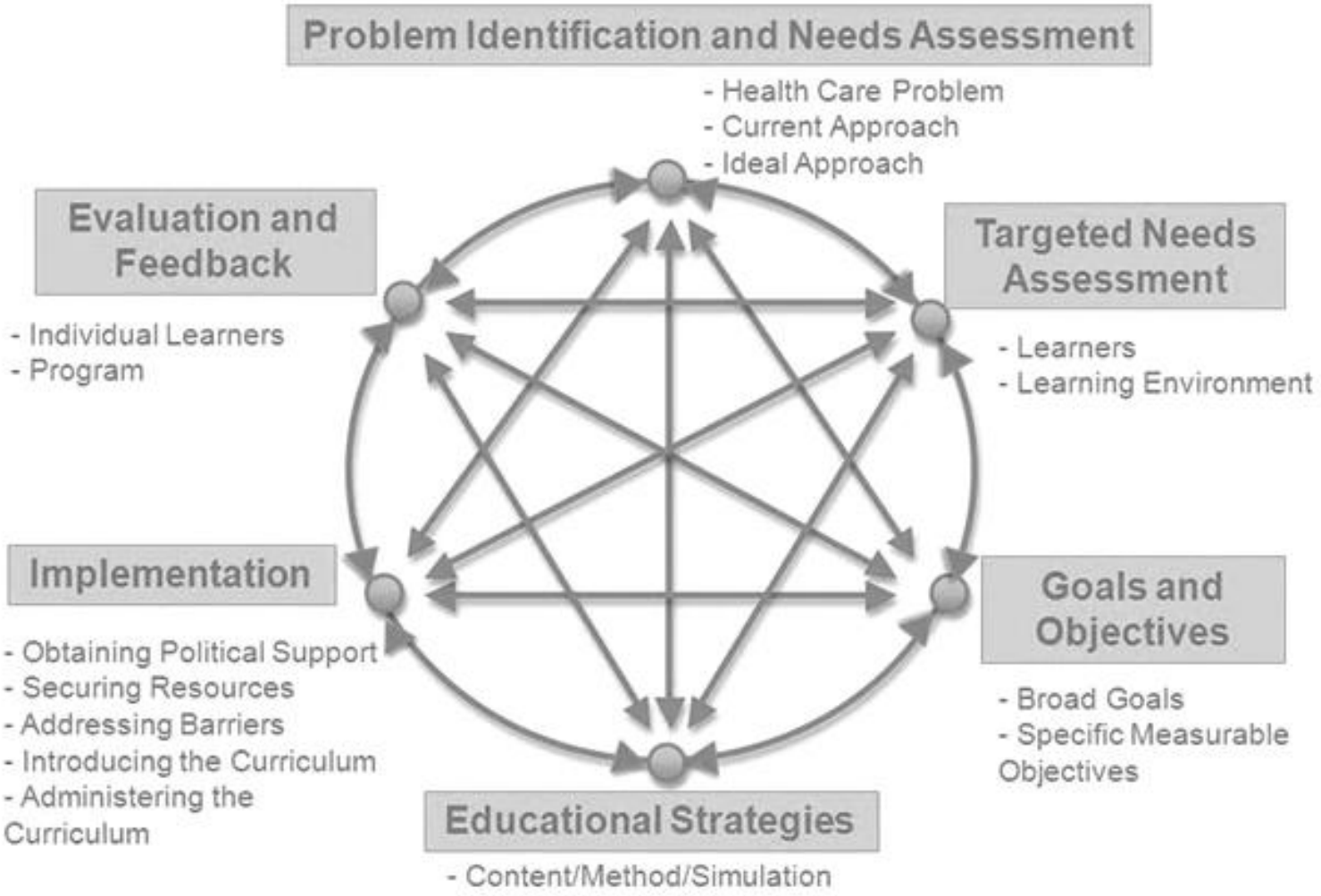

Skills/competence
?
Time/number of procedures


Skills / competence
?
Standard setting, a
research topic in itself
Time / number of procedures

Identify the needs and the learning/target population

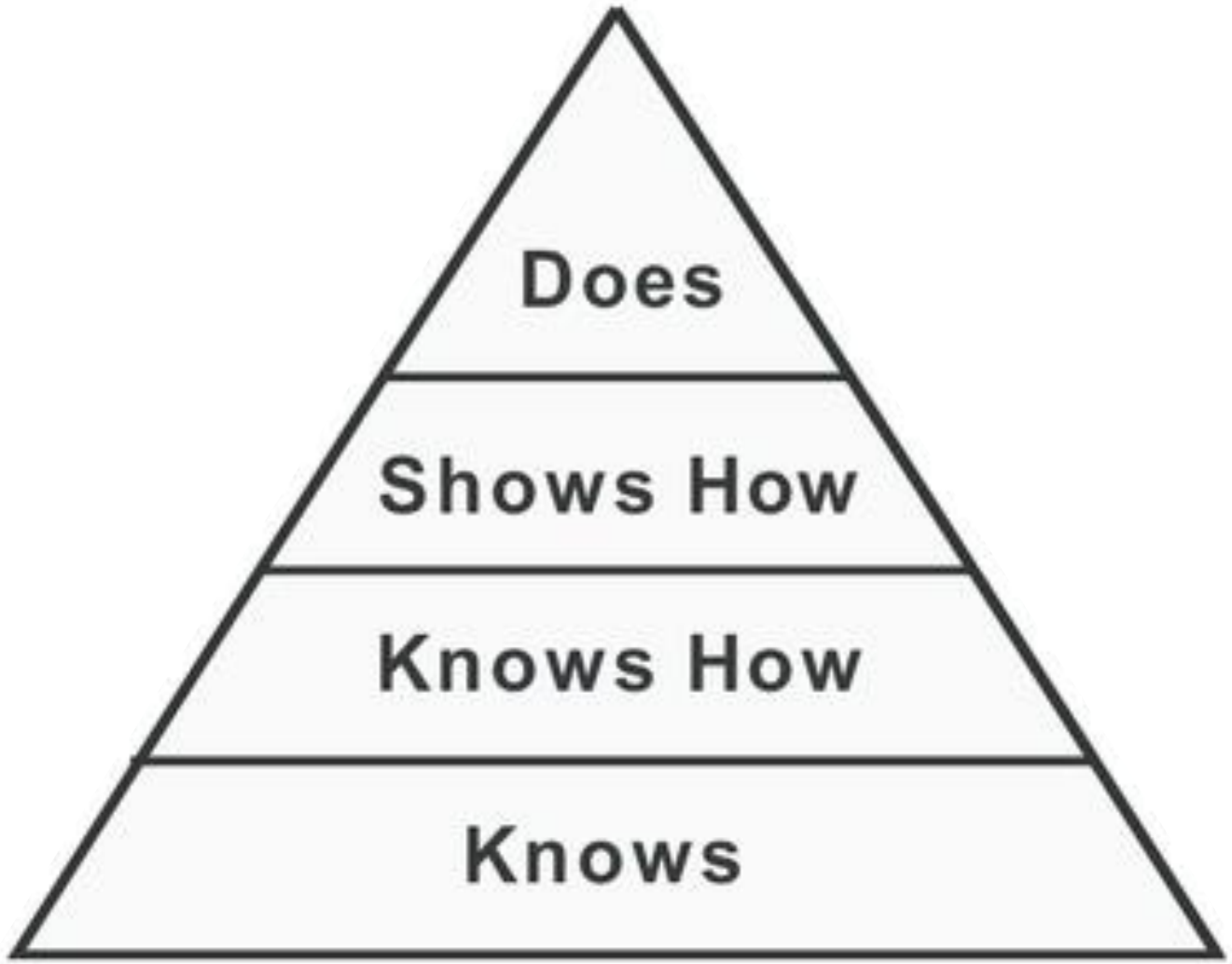
Acknowledge individual learning paces and competence development

Kern's six step approach to curriculum development



A quick sidestep into curriculum theory…

— now returning to principles of effective learning

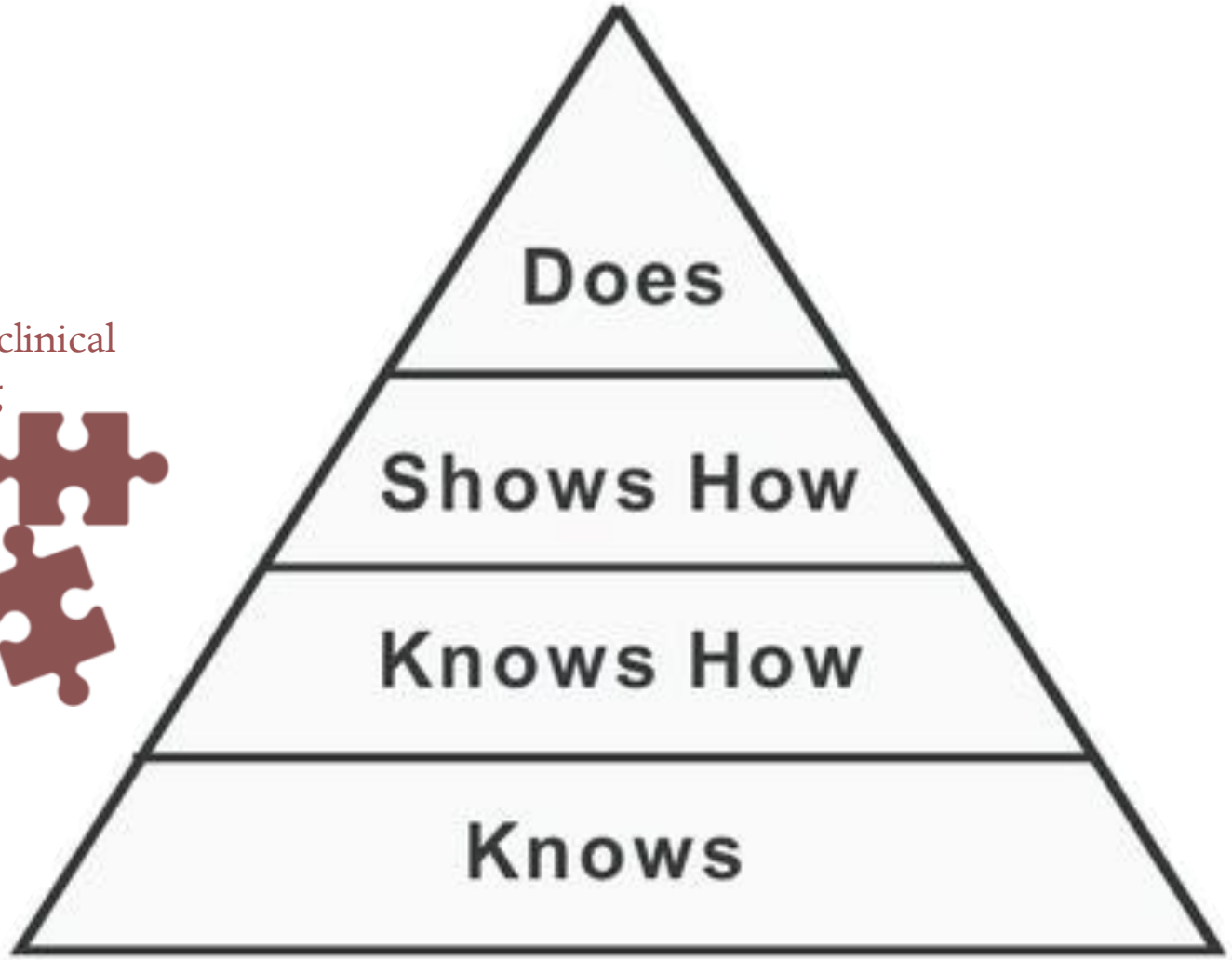


Miller GE. The assessment of clinical skills/competence/performance. *Acad Med.* 1990;65(9 Suppl):S63-S67.
doi:10.1097/00001888-199009000-00045

Theoretical knowledge

Integration and clinical decision-making

Practical skills



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Theoretical knowledge

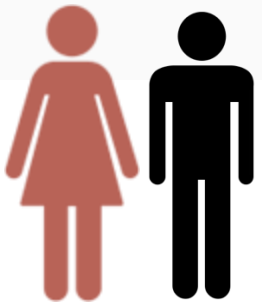
Integration and clinical decision-making

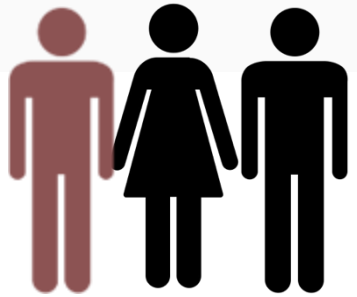
Practical skills

How are you planning/would you plan your IUS course?

And where do you see the barriers and challenges in effective IUS education and training?

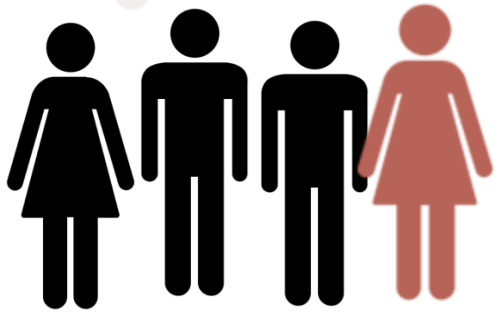
Theoretical knowledge

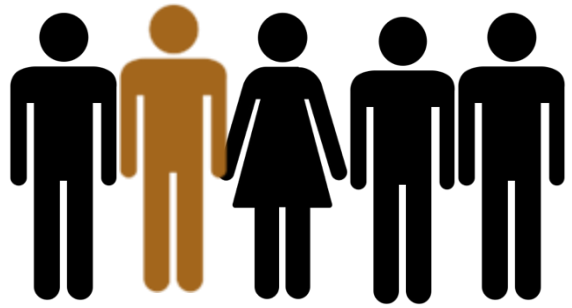




Integration and clinical decision-making

Practical skills



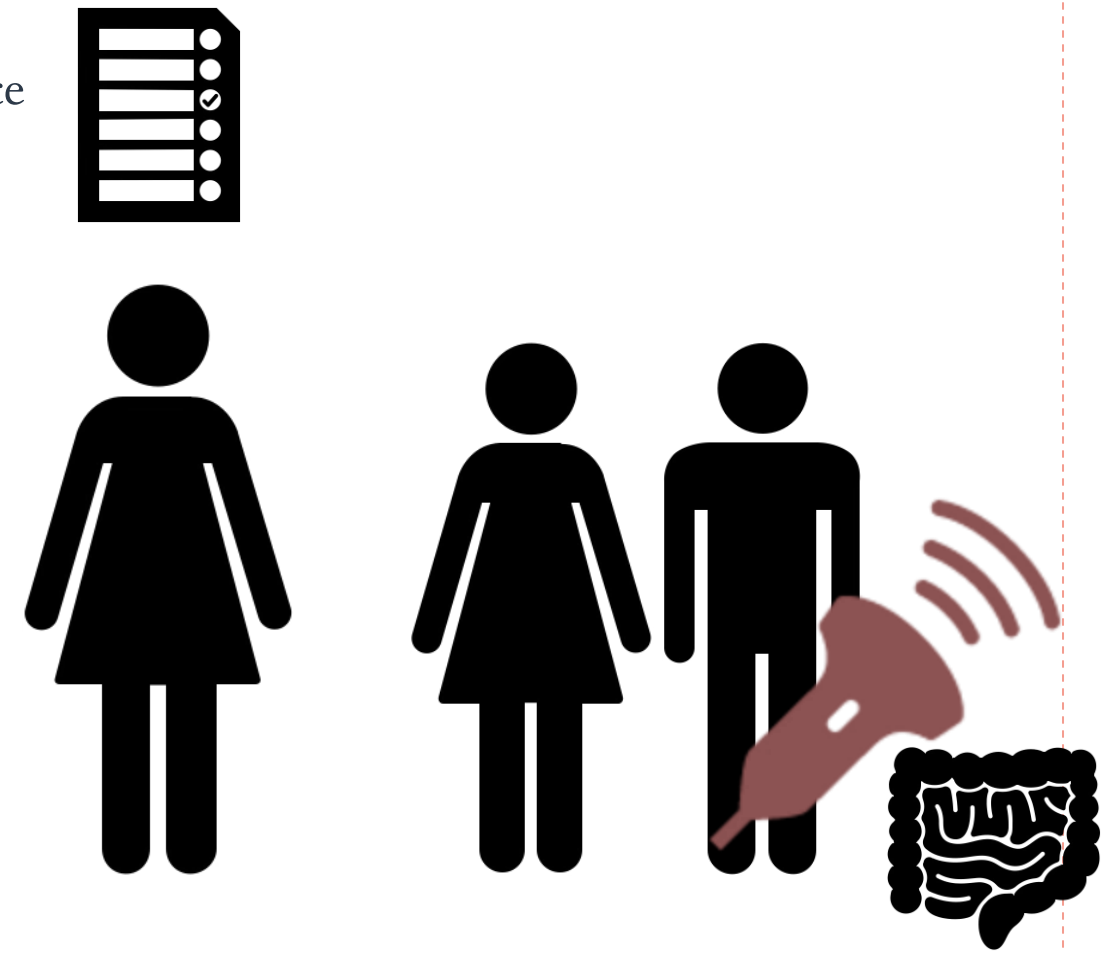


Learning principles and educational theories

Learning principles and educational theories

Acknowledge the differences between theoretical knowledge and practical skills

Deliberate practice emphasizes focused, repetitive practice with immediate feedback.



- Teacher-centered approach (ensures content and process)
- Requires specific, predefined learning goals and objectives
- Step-by-step approach
- Repetition and reinforcement
- Assessment and feedback
- Limitation: does not encourage reflection?

Errors, flaws, failures… Invitations to enhance learning?

Desirable difficulties suggests that learning is enhanced when learners face difficulties and creates reflection.

- Trainee-centered approach (ensures individual learning paces)
- Invites curiosity and errors as basis of learning → reflection
- Less direct supervision and immediate feedback
- Requires good communication and skills (from trainer)
- Can also integrate assessment and feedback

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What is your experience when supervising/teaching IBUS?

What works for you as a trainee and as a trainer?

Other relevant theories/learning principles

- Duad learning vs. single learning

bbott, E.F., Laack, T.A., Licatino, L.K. *et al.* Comparison of dyad versus individual simulation-based training on stress, anxiety, cognitive load, and performance: a randomized controlled trial. *BMC Med Educ* **21**, 367 (2021). https://doi.org/10.1186/s12909-021-02786-6

- Mastery learning

McGaghie WC. Mastery learning: it is time for medical education to join the 21st century. Acad Med. 2015 Nov;90(11):1438-41. doi: 10.1097/ACM.0000000000000911. PMID: 26375269.

- Assessment, assessment, assessment

Yudkowsky, Rachel MD, MHPE; Park, Yoon Soo PhD; Lineberry, Matthew PhD; Knox, Aaron MD; Ritter, E. Matthew MD. Setting Mastery Learning Standards. Academic Medicine 90(11):p 1495-1500, November 2015. | DOI: 10.1097/ACM.0000000000000887

Thank You

Questions and discussion are welcome

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