Year report iMERR 2019

iMERR aims to improve the selection and education of a new generation of doctors through educational research

Prof. Dr. W.W. van den Broek, director of Medical Education Erasmus MC.

Introduction

The EUR, TU Delft, and the Erasmus MC wish to move beyond traditional ways of collaboration to a new way of joining forces. They share one vision how to promote health and organize modern healthcare and aim to realize this vision by deeply rooting multidisciplinary collaboration in their organizations. They therefore adopt a strategy of synergy in the areas of research, education and innovation.

This is called the Convergence strategy and it will educate a new kind of professionals specifically trained to bridge disciplines.

The future will require biologists using mathematical modeling and computer programing, nurses familiar with patient monitoring devices and data collection, surgeons who operate precision robots, engineers and designers with sensitivity for patient compliance, computer scientists versed in health data ethics and physicists who can converse with pediatricians.

Convergence will be established in a new generation of scientists, doctors, nurses and engineers. Creating educational programs to train this new generation is a key part of Erasmus MC – TU Delft convergence. All ready existing examples of these educational programs are Nanobiology and Clinical Technology/ Technical Medicine.

Convergence through education delivers challenges for the future of iMERR.

Medical education should include options to learn high-level quantitative skills (analysis, computation, artificial intelligence). Engineers and data scientists need to learn clinical thinking and experience clinical settings as part of their training. These developments can broaden our field of subjects and topics to study. Clinical reasoning with the influence of Artificial Intelligence or the use of Big Data with se-

lection of students are possible future challenges to study within iMERR. How do we design engaging and effective online education, using these innovative techniques that will fit our goals and is indeed evidence based?

Key words: medical education, continuing medical education, admission test college, clinical clerkship, internship and residency, online learning, blended learning, e-learning, instructional design, game-based learning, self-regulated learning, clinical reasoning, minority recruitment.

Scientific publications

Alwan, I. Al, Magzoub, M.E.M., Haqwi, A. Al, Badri, M., Yousif, S.M. Al, Babiker, A. , Mamede Studart Soares, S. & Schmidt, H.G. (2019). Do poor patients suffer from inaccurate diagnoses more than well-to-do patients? A randomized control trial. BMC Medical Education, 19 (1):386. doi: 10.1186/s12909-019-1805-6

Andel, C.E.E. van, Born, M.Ph., Themmen, A.P.N. & Stegers-Jager, K.M. (2019). Broadly sampled assessment reduces ethnicity-related differences in clinical grades. Medical Education, 53 (3), 264-275. doi: 10.1111/medu.13790

Chamberland, M., Setrakian, J., St-Onge, C., Bergeron, L., Mamede Studart Soares, S. & Schmidt, H.G. (2019). Does providing the correct diagnosis as feedback after self-explanation improve medical students diagnostic performance? BMC Medical Education, 19:194. doi: 10.1186/s12909-019-1638-3

Costa, G.B., Moura, A.S., Brandao, P.R., Schmidt, H.G. & Mamede Studart Soares, S. (2019). Effects of deliberate reflection on diagnostic accuracy, confidence and diagnostic calibration in dermatology. Perspectives on Medical Education, 8 (4), 230-236. doi: 10.1007/s40037-019-0522-5.

Gennissen L, de la Croix A, Stegers-Jager K , de Graaf J, Fluit C, de Hoog M. Organic or organised: an interaction analysis to identify how interactional practices

influence participa-tion in group decision meetings for residency selection. BMJ Open 2019;9:e026424. doi: 10.1136/bmjopen-2018-026424 (*these authors contributed equally)*

Hautz, W.E., Kammer, J.E., Hautz, S.C., Sauter, T.C., Zwaan, L., Exadaktylos, A.K., Birrenbach, T., Maier, V., Muller, M. & Schauber, S.K. (2019). Diagnostic error increases mortality and length of hospital stay in patients presenting through the emergency room. Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine, 27:54. doi: 10.1186/s13049-019-0629-z

Kickert, R., Meeuwisse, M., Stegers-Jager, K.M., Koppenol-Gonzalez, G.V., Arends, L.R. & Prinzie, P. (2019). Assessment policies and academic performance within a single course: The role of motivation and self-regulation. Assessment and Evaluation in Higher Education : an international journal, 44 (8), 1177-1190. doi: 10.1080/02602938.2019.1580674

Kremer, T., Mamede Studart Soares, S., Broek, W.W. van den, Schmidt, H.G. , Nunes, M.D.T. & Martins, M.A. (2019). Influence of negative emotions on residents' learning of scientific information: an experimental study. Perspectives on Medical Education, 8 (4), 209-215. doi: 10.1007/s40037-019-00525-8

Leng, W.E. de, Stegers-Jager, K.M., Born, M.Ph. & Themmen, A.P.N. (2019). Faking on a situational judgment test in a medical school selection setting: Effect of different scoring methods? International Journal of Selection and Assessment, 27 (3), 235-248. doi: 10.1111/ijsa.12251

Leng, W.E. de, Stegers-Jager, K.M., Born, M.Ph. & Themmen, A.P.N. (2019). MUM effect in medical education: taking into account the recipient and training setting. Medical Education, 53 (2), 106-108. doi: 10.1111/medu.13779

Mamede Studart Soares, S., Figueiredo-Soares, T., Santos, S.M.E., Faria, R. de, Schmidt, H.G. & Gog, T. van (2019). Fostering novice students' diagnostic ability: the value of guiding deliberate reflection. Medical Education, 53 (6), 628-637. doi: 10.1111/medu.13829

Ribeiro, L.M.C., Mamede Studart Soares, S., Brito, E.M. de, Moura, A.S., Faria, R. de & Schmidt, H.G. (2019). Effects of deliberate reflection on students' engagement in learning and learning outcomes. Medical Education, 53 (4), 390-397. doi: 10.1111/medu.13798

Rotgans, I.J. (iMERR), Schmidt, H.G., Rosby, L.V., Tan, G.J.S., Mamede Studart Soares, S., Zwaan, L. & Low-Beer, N. (2019). Evidence supporting dual-process theory of medical diagnosis: a functional near-infrared spectroscopy study. Medical Education, 53 (2), 143-152. doi: 10.1111/medu.13681

Sibbald, M., Sherbino, J., Ilgen, J.S., Zwaan, L., Blissett, S., Monteiro, S. & Norman, G. (2019). Debiasing versus knowledge retrieval checklists to reduce diagnostic error in ECG interpretation. Advances in Health Sciences Education, 24 (3), 427-440. doi: 10.1007/s10459-019-09875-8

Zwaan, L. & Hautz, W.E. (2019). Bridging the gap between uncertainty, confidence and diagnostic accuracy: calibration is key. BMJ Quality & Safety, 28 (5), 352-355. doi: 10.1136/bmjqs-2018-009078

Dissertations

Badenhorst, E. (2019, maart 7). Dissecting misconceptions : Exploring the extent and nature of medical students' failure to understand. EUR Prom./coprom.: prof.dr. H.G. Schmidt & S. Mamede.

Hays, G.J. (2019, mei 3). Developing a new measure for conceptual knowledge: The concept retrieval technique. EUR Prom./coprom.: prof.dr. H.G. Schmidt, prof.dr. H.T. van der Molen & I.J. Rotgans.

Leng, W.E. de (2019, december 18). Measuring Integrity for Selection into Medical School : Development of a Situational Judgement Test. EUR Prom./coprom.: Prof. Dr. Ir. A.P.N. Themmen, prof.dr. M.Ph. Born & Dr. K.M. Stegers-Jager.

Conference proceedings and presentations

T.J.E. Faber, M.E.W. Dankbaar, J.J.G. van Merriënboer. Game design voor complex leren in de zorg. 4C/ID als leidraad voor het herontwerp van een serious game. 4C/ID Gebruikers-dag, Nijmegen, the Netherlands, April 12th, 2019.

Georgiadis, K., Faber, T., & Westra, W. (2019). Bolstering Stealth Assessment in Serious Games. Book: Games and Learning Alliance, 8th International Conference, GALA 2019, Athens, Greece, November 27–29, 2019, Proceedings. doi: 10.1007/978-3-030-34350-7-21

Dr. L. Zwaan provided the keynote presentation at the International Behavioral Science in Surgery conference: Title: Identifying Research Priorities for Diagnostic Safety. Amsterdam, The Netherlands. (December 2019)

Dr. L. Zwaan provided the keynote presentation at Symposium on Diagnostic Medicine of the Royal College of Physicians, Edinburgh. Title: The Psychology of Diagnostic Thinking. Edinburgh, UK. (September 2019)

Dr. L. Zwaan provided the keynote presentation for a symposium on Radiology and patient safety for farewell symposium of radiologist Gerrit Jager in Jeroen Bosch hospital, Den Bosch. Title: 'Diagnostic errors, a patient safety priority'. (May 2019)

Dr. L. Zwaan was selected to present at 'The best of the best' abstract session at Diagnostic Error in Medicine conference in Washington DC. Presentation title: Identifying Research Priorities to Advance Diagnostic Safety Research'. (November 2019)

Dr. Silvia Mamede provided the opening keynote presentation at the 2020 European Research in Medical Education conference in Copenhagen, Denmark. Title: "Future Doctors' Clinical Reasoning Skills?". (May 2019)

Dr. Silvia Mamede presented a short communication at the AMEE 2019 conference. Title: "Effect of a knowledge-oriented intervention on physicians' diagnostic accuracy and susceptibility to bias: A randomized controlled experiment." (August 2019).

Dr Karen Stegers-Jager provided a workshop at the "VSNU Learning community toelatingsbeleid". Title: Bijna 20 jaar selectie bij geneeskunde: wat zijn de "geleerde lessen"? (April 2019)

Dr. K.M. Stegers-Jager presented a research paper at the AMEE 2019 conference. Title: Genderspecific effects of raising first-year standards on performance and stress levels of medical students.

Dr. K.M. Stegers-Jager provided a lecture at the Institut für Biochemie und Molekulare Zellbi-ologie Zentrum für Experimentelle Medizin Universitätsklinikum Eppendorf Hamburg. Title of presentation: Almost 20 years of non-grades-based selection for medical school: what are the lessons learned? (December 2019).

J. Kuhn presented a speed talk at Research in Medical Education conference in Copenhagen. Presentation title: 'Teaching Reflective Reasoning in Medical Diagnosis: Does Explaining on Video Help Learning?'. (May 2019)

J. Kuhn presented at Diagnostic Error in Medicine conference in Washington DC. Presentation title: 'Improving Diagnostic Calibration by Providing Feedback to General-Practice Residents'. (November 2019)

J. Kuhn presented a poster at Diagnostic Error in Medicine conference in Washington DC. Poster title: 'Teaching Reflective Reasoning through Explaining on Video'. (November 2019).

J. Staal presented a poster at Research in Medical Education conference in Copenhagen. Presentation title: 'Unraveling information processing in correct and incorrect diagnoses'. (May 2019).

J. Staal presented a poster at Diagnostic Error in Medicine conference in Washington DC. Poster title: 'Thinking Fast or Slow, That's the Question? Are Cognitive Biases Related to Fast Diagnostic Reasoning?' (November 2019).

Grants

Center for learning and Innovation Fellowship (€21.778). Title: 'The art of seeing! Does looking at art help to avoid cognitive bias in decision making?' Dr. L. Zwaan, Dr. A. Linsen, Dr. S. Mamede, Prof. Dr. Walter van den Broek, Dr. David Pols and Dr. Marijn Hulsbergen.

Gordon & Betty Moore Foundation. Patient generated research priorities to Advance Diagnostic Safety Research (Dr. L. Zwaan) ($50.000)

Inselspitel Hostpital Bern. Main applicant Wolf Hautz. (CHF 586.301) iMERR co-

applicant L. Zwaan "The digital diagnostician: how information technology affects medical diagnoses".

Ongoing PhD trajectories within the EUR

Learning from diagnostic mistakes that resulted in a liability claim, Charlotte van Sassen, MD.

Complex decisions are made daily by general practitioners. Clinical reasoning is a core task of GPs and therefore an important teaching method in medicine. It usually involves training /practicing with clinical case vignettes. A variety of educational

approaches to analyze clinical case vignettes have been studied, such as deliberate reflection and self-explanation. But there is increasing evidence that the most important factor in determining educational effectiveness is the content of the cases used for teaching. Interestingly there has been very little attention to content. Most clinical case vignettes are general cases instead of representing knowledge gaps. For this project we intend to answer the research question: Can malpractice claims be effectively used as learning material in the clinical reasoning education of GP vocational training? The studies we will be based on the database of the biggest liability insurance company of the Netherlands for GPs, named VVAA. It contains all the claims against GP's on diagnostic error between 2012-2017.

Assessment of medical trainee performance during the clerkships: Exploring potential effects of assessors' first impressions in workplace-based assessments, Inge Otto, MA.

A growing international body of research demonstrates that students from ethnic minority groups perform less well at medical school as compared to students from majority groups – also in The Netherlands. The question of why this pattern exists remains largely unanswered. In this project, we zoom in on the assessors who carry out workplace-based assessments of medical trainees during the clerkships. Is it possible that they, without being aware of this, form different first impressions of trainees with different ethnic backgrounds? Do assessors' first impressions possibly affect their judgements of the performance of medical trainees? From other contexts, such as job interviews, voting decisions, and dating, we know that first impressions can affect decision-making. We use experimental and qualitative studies to explore what role assessors and assessment may play in the under-evaluation of

medical trainees with ethnic minority backgrounds. We currently work on the designs and materials for the first two experimental studies.

Examining the cognitive causes of errors in diagnostic reasoning, Justine Staal, MSc.

The project is about better understanding the cognitive causes of diagnostic errors. Diagnostic errors are defined as missed, wrong, or delayed diagnoses. Currently, flaws in clinical reasoning and lacking clinical knowledge are seen as the leading causes of diagnostic errors.

The project focusses specifically on flaws in clinical reasoning as a cause of errors. In this view, fast clinical reasoning and the use of mental shortcuts causes clinicians to miss information and make mistakes - called cognitive biases - because of that. This view proposes that clinicians should slow down and consider all information. However, fast reasoning is often correct and diagnostic error interventions based on simply slowing down reasoning are mostly ineffective. This begs the question whether fast reasoning is really only a cause of errors, or also an effective form of clinical reasoning.

In two experiments, this project will examine how fast and slow clinical reasoning relate to diagnostic errors due to cognitive flaws. We will compare the time residents in Internal Medicine took to diagnose cases when the diagnosis was correct or incorrect due to cognitive bias (study 1). Next, this study will be replicated using eye-tracking to provide more insight in what information in a clinical case is used or neglected when a diagnosis is correct or incorrect due to cognitive bias (study 2). The first study has been completed and we are currently conducting the second study.

Furthermore, because current interventions (e.g. interventions that only slow down clinical reasoning) are often ineffective, we will explore the effectiveness of

different interventions to reduce diagnostic errors: feedback (study 3) and diagnostic checklists (study 4). Giving residents feedback on their performance might help them to better recognize when they should ask for help or double-check a diagnosis, by properly calibrating their confidence in their diagnoses and their actual accuracy. Diagnostic checklists might improve clinical reasoning by giving a systematic approach and making sure that clinicians do not forget important steps during the diagnosis.

How to increase diversity and inclusion of medical students with various ethnic backgrounds during their clerkships?, Chantal van Andel, MSc.

Differences in grades between students with and without migration background are often said to be influenced by implicit bias of assessors. People have implicit biases, such as stereotypes and prejudices, and these can color judgments and behaviors. Many trainings and interventions in medical education have the aim to reduce implicit bias in assessment, yet many of those fail to be effective, and some even reinforce bias. The current study assesses the effect of descriptive norms on stereotypical bias. Descriptive norms ("the majority of people does…"), as opposed to prescriptive norms ("you should do…"), can have strong effects on one's judgments, because it communicates what the majority-norm is. "If everybody does it, it's OK if I do it too!". In that sense, discrimination could be contagious, like smoking and obesity.

Like bias, there are other factors that could cause differences in grades between students with and without migration background during their clerkships. Contextual factors, like the hospital work culture or scoring formats in assessments could also have their effects. In another pilot study, we have seen that Erasmus MC medical culture differs from peripheral hospitals in terms of patient care that is

more complex and long-term, and the culture also tends to be more hierarchical, ambitious, impersonal and competitive. Does such a culture lead to more ethnicity-related differences in grades? That is the first research question. The second research question focuses on the effects of the scoring category "doubtful" that has recently been added to the scoring format, and implies a category that lies between the "below" and "normal" performance level. What does adding such a category do to the amount of insufficient and sufficient grades that has been given? And is "doubtful" a category that is often given to students with migration background? Most clinical assessments are socially determined, like "professionalism", and it would therefore be interesting to see whether student ethnicity plays a role in these less-sharply defined competences.

Using real-time cognitive and non-cognitive indicators for regulation and self-regulation in game-based learning, Tjitske Faber, MD.

The project focuses on finding indicators for effective game-based learning in the context of emergency medicine. By collaborating with experts in medicine, game design and educational sciences, she searches for ways to implement adaptive learning and increase self-regulation in medical students playing a simulation game. One studies was conducted in 2019 and a chapter on instructional game design was accepted for publication in 2020. Future studies will focus on the validation of exploratory findings and the value of stress measurements as indicator for learning in the game-based environment.

Teaching Reflection Through Modelling As A Strategy To Counteract Diagnostic Mistakes In General Practice, Josepha Kuhn, MsC.

Josepha Kuhn's project has investigated whether and how reflective diagnostic reasoning can be taught to general practice trainees. Different instructional approaches, using particularly example-based learning have been tested. Two new studies have been conducted in 2019, and the data collected is presently being analyzed. The project is expected to be completed in 2020.

Learning of surgery skills using a step-by-step video approach, Tahmina Nazari, MD

This thesis is regarding the effects of structured surgical procedural learning. Surgical procedural learning takes place on three levels; learning by observing, by doing, and by reflecting.

For learning by observing, first a structuring method to segment surgical procedures into steps was developed and validated, the step-by-step framework. The effects of this framework were tested on anatomical knowledge and surgical performance in high school students and medical students, respectively. Then the effects of an online platform that utilizes the structuring step-by-step framework were assessed.

For learning by doing, a survey was performed to evaluate the preferences of surgical residents to learn a surgical procedure. Secondly, a simulation model to practice a surgical procedure was developed and validated.

The learning by reflecting starts by evaluating a step-by-step feedback tool and its effects in comparison to a global rating scale tool. Finally, an objective assessment tool such as motion tracking was researched.

The effect of selection methods on the diversity of the population of medical students and the relation with student academic performance during medical school. Suzanne Fikrat-Wevers, MSc.

In the Netherlands, approximately three times as many applicants apply for medical schools as the number of places available. Since 2000, the central lottery has gradually been replaced by decentralized selection procedures, which are designed by the faculties themselves. Previous research suggested that potentially successful candidates from ethnic minority groups, lower socioeconomic groups and/or first generation students in higher education are deterred by selection procedures and by medical training itself. Diversity in the population of medical students is essential to build a population of medical doctors representative of the Dutch (patient) population and for promoting excellence in healthcare and education. In this PhD program qualitative and quantitative research techniques will be used to investigate how students in medical education can be selected in a valid way, while at the same time guaranteeing the preservation of diversity. The research project is part of a Dutch consortium and partially funded by NRO (Nationaal Regieorgaan Onderwijsonderzoek, The Netherlands) and started this year.

The effect of admission and assessment policies on student performance, wellbeing and stress. Vera Broks, MSc.

Medical schools are challenged to create academic environments that stimulate students to maintain satisfactory progress, while maintaining their health. This PhD program focuses on the effect of the admission policy (student selection) and assessment policy on student performance and psychological and biological stress in medical students, and the possible differences for different subgroups. Cohort

studies are executed to explore student characteristics and factors of selection and assessment policies that either positively or negatively correlate with academic outcome and student wellbeing in a multidisciplinary team combining sociology, psychology, and biomedical and educational sciences. The research project is partially funded by a grant from the Center for Learning and Innovation (EUR) and started this year.

Ongoing PhD trajectories outside the EUR

The Influence of Reflection upon Clinical Experiences on Medical Students' Learning Process and Outcomes.

Ligia Cayres Ribeiro, MD, UNIFENAS Medical College, Belo Horizonte, Brazil.

The project investigates the effects of deliberate reflection while practicing the diagnosis of clinical cases on medical students' learning of clinical diagnosis. A series of experimental studies have investigated the effects of deliberate reflection relative to more conventional instructional approaches on learning process, measured by situational interest, cognitive engagement and time-on-task, and on learning outcomes.

Developing Clinical Competence: Studies in Professionalism and Diagnostic Reasoning.

Ahmed Al Rumayyan, MD, Medical College King Saud bin Abdul-Aziz University for Health Sciences, Riyadh, Saudi Arabia.

The project has investigated the development of two critical competences for medical practice: professionalism and clinical reasoning. Three studies have been conducted to identify how professionalism is conceived, lapses in professionalism, and its conceptual framework in different cultures. How clinical reasoning can be taught has been addressed by two studies that explored two different instructional approaches for practice with clinical cases. The PhD thesis has been approved by the inner committee, and planning for the defense is ongoing.

Contextual Factors Influencing Physicians' Diagnostic Performance: The Effects of Time Pressure.

Dalal Al Qahtani, MD, Medical College King Saud bin Abdul-Aziz University for Health Sciences, Riyadh, Saudi Arabia.

The project has investigated whether and the cognitive pathways through which time pressure affects physicians' diagnostic accuracy. Three experimental studies with internal medicine residents have been conducted as well as a qualitative study. Three articles have been published, the fourth has been submitted, and the writing for the introductory and concluding chapters is presently ongoing.

Diagnostic Reasoning: In Search of System 1 and System 2.

Lucy Victoria Rosby, MD, Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore.

The project has examined the neuroscientific support for the dual-process theory of medical diagnosis. By using near-infrared spectroscopy for the first time in research on diagnostic reasoning, the project has examined neurological correlates of System-1 and System-2, and their development through training. Two studies have been published, and the third one is presently ongoing.

Technology in Medical Care and the Teaching of Clinical Reasoning.

Daniel Franci, MD, Faculty of Medicine, UNICAMP, Brazil.

The project examines whether and how technological additions to health care affect medical students' learning of clinical reasoning and whether they can be used to foster it. The first two studies examined the effects of point-of-care ultrasound on acquisition of diagnostic know-ledge. Data collected in both studies are presently being analyzed.

Students' emotions and learning in medical education.

Telma Kremer, MSc

The project has examined the influence on students' learning of negative emotions triggered by situations routinely encountered by students in their educational activities. First, students' perceptions on emotion-triggering situations were examined. The results of this study guided the design of three subsequent experimental studies that have shown negative emotions to negatively affect learning process, measured by time-on-task and cognitive engagement, and learning outcomes, and explored antidotes that could be adopted by teachers. Three studies have been published, and the report of the fourth one is presently ongoing.

How to Make the Best out of Deliberate Reflection during Practice with Clinical Cases fort he Teaching of Clinical Reasoning.

Raquel Lima Sampaio, MD, Medical College University Christus, Fortaleza, Brazil.

The project, initiated in November 2019, aims at examining the optimal use of deliberate reflection during students' practice with clinical cases. Previous studies have shown the deliberate reflection procedure to be an effective approach to foster the development of students' clinical reasoning, but research is still scarce. The project comprises experimental studies aimed at exploring the underlying mechanisms of deliberate reflection, whether and how the effectiveness of the approach can be increased, and whether its positive effect, previously measured after a one- or two-week interval, lasts longer.

Using Electronic Platforms for the Development of Medical Students' Clinical Reasoning: Information Presentation and Processing.

Gustavo Labanca, MD, Federal University of Ouro Preto, Brazil.

The project, which started in December 2019, will study the use of electronic platforms for practice the diagnosis and management of clinical cases in the teaching of clinical reasoning, exploring in particular the effects of clinical information presentation (serial-cue vs whole-case) and instructional approaches for processing of case information (differential diagnosis vs cued-reflection vs generative reflection) on students' learning.

Research reputation

Dr. Silvia Mamede is an international guest professor at the Inselspital, University of Bern, Switzerland, supported by a grant provided by the university guest professorship program to develop the collaboration with Dr. Wolf Hautz's research group in the field of clinical reasoning.

In 2019, Dr. Sílvia Mamede worked at ad hoc reviewer for the top medical journals (Annals of Internal Medicine, BMJ Q&S, Medical Decision Making, Clinical Medicine), medical education journals (Medical Education, BMC Medical Education, BMC Medicine, and general education journals (Computers in Human Behaviour).

Conference organization

Dr Karen Stegers-Jager was chair of the 2019 Annual Meeting of the NVMO (Dutch society on Medical Education). This 2-day conference in Rotterdam, titled "Van diversiteit naar inclusie. Samen naar goede zorg voor iedereen!", had over a 1000 participants.

Diagnostic Error in Medicine conference in Padova Italy, Dr. Laura Zwaan is co-chair

Positions in professional society

Dr. Mary Dankbaar is

- member of the Technology Enhanced Working group of the AMEE (=Association for Medical Education Europe)

- member of the board of the Dutch Society of Simulation in Healthcare (DSSH) and chair of the DSSH commission on serious games
- chair of the NVMO working group on digital learning and innovation

(NVMO=Dutch Society for Medical Education)

Dr. Laura Zwaan is member and former chair of the research committee of the Society to Improve Diagnosis in Medicine.

Dr. Karen Stegers-Jager is member of the scientific committee of the NVMO

Fellows

1. Dr. Silvia Mamede, MD, PhD, co-director of iMERR
2. Dr. Andrea Woltman, PhD, chair of the advisory board of iMERR
3. Dr. Karen Stegers-Jager, PhD, member advisory board iMERR
4. Dr. Mary Dankbaar, PhD, member advisory board iMERR
5. Prof Dr. Henk Schmidt, PhD, member advisory board iMERR
6. Dr. Laura Zwaan, PhD, member advisory board iMERR

Associate members

1. Dr. Jelmer Alsma, MD, PhD
2. Prof. Dr. Patrick Bindels, MD, PhD
3. Prof. Dr. Matthijs de Hoog, MD, PhD
4. Prof. Dr. Stephanie Klein Nagelvoort-Schuit, MD, PhD
5. Prof. Dr. Marise Born, PhD

6. Prof. Dr. Fred Paas, PhD
7. Dr Jerome Rotgans, PhD
8. Dr. Margot van Wermeskerken, PhD
9. Prof. Dr. Jan van Saase, MD, PhD

Honorary members

1. Prof. Dr. Geoff Norman, PhD
2. Prof. Dr. Henk Schmidt, PhD
3. Prof. Dr. Ir. Axel Themmen
4. Prof. Dr. Els Berns

Societal impact

Dr. Laura Zwaan was invited as a member of a working group the Healthcare Inspectorate to development of a risk profile and quality indicator for diagnostic safety in hospitals.

Dr. Laura Zwaan was invited to an interdisciplinary expert meeting to develop models and tools to provide feedback in the diagnostic process (St Petersburg, FL, USA).