(13) 麻醉醫學教育的展望與創新

Medical Education in Anesthesiology: Future and Innovation

時 間:114年6月28日(星期六)08:20~12:00

地 點:臺北榮民總醫院 三門診九樓創新沙龍

08:20-08:30	Opening Remarks	張文貴部長 Wen-Kuei Chang
	座長:黃獻皞 部長 (Hsien-Hao Huang)	
08:30-08:55	醫學教育的專業發展:從在地化邁向國際化 Professional Development in Medical Education: From Localization to Internationalization	張玉喆教授 Yu-Che Chang
	座長:曹正明 主任 (Cheng-Ming Tsao)	
08:55-09:20	麻醉里程碑 2.0:臨床能力委員會中教師回饋的比較 Milestone 2.0: A Comparison of Teachers' Feedback in Clinical Competency Committees	陳建宇主任 Chien-Yu Chen
	座長:林世斌 主任 (Shih-Pin Lin)	
09:20-09:45	術前麻醉風險評估:由預測式人工智慧、數位孿生到生 成式人工智慧的運用 Anesthesia Risk Assessment: From Predictive Artificial Intelligence and Digital Twins to Generative Artificial Intelligence	褚錦承教授 Chin-Chen Chu
	座長:宋俊松 主任 (Chun-Sung Sung)	
09:45-10:10	心臟麻醉人才養成:如何透過核心能力教育締造臨床卓越 Training Cardiac Anesthesiologists: How Competency-Based Education Shapes Clinical Excellence	陸正威部長 Cheng-Wei Lu
10:10-10:30	Coffee Break	
	座長:丁乾坤 主任 (Chien-Kun Ting)	
10:30-10:55	台北榮總麻醉部臨床能力委員會經驗分享:從六大核心能力 到里程碑與可信賴活動 From the six competencies to milestone & EPA – Experience sharing from the CCC of Department of Anesthesiology, Taipei Veterans General Hospital	郭怡敏醫師 Yi-Min Kuo
	座長:鄭宏煒 醫師 (Hung-Wei Cheng)	
10:55-11:20	彌合學習落差:透過結構化回饋提升麻醉住院醫師訓練 Bridging the Gap: Enhancing Anesthesiology Residency Training with Structured Feedback	王曼玲醫師 Man-Ling Wang

座長:陳品堂 部主任 (Ping-Tarng Chen)

11:30-11:45 透過擬真情境提升麻醉安全與臨床決策:住院醫師與麻護的 顏睿誼醫師 雙軌培訓 Jui-Yi Yen Enhancing Anesthesia Safety and Clinical Decision-Making through Simulation: A Dual-Track Training for Residents and Nurses

11:45-12:00 Closing Remarks

張文貴部長 Wen-Kuei Chang

Professional development in medical education: From localization to internationalization

醫學教育的專業發展:從在地化邁向國際化

Yu-Che Chang

張玉喆

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Global medical education is facing various transformational challenges, including faculty development difficulties, the implementation of competency-based training, and the need for global standardization. Addressing these challenges requires a research-driven approach, with Medical Education Research (MER) serving as a cornerstone for innovation and continuous progress. This talk will apply educational and socio-cultural theories to analyze the current landscape and outline potential solutions, enhancing participants' understanding of the significance of professional development in medical education.

Establishing Communities of Practice (CoP) plays a pivotal role in the professional development of clinical educators. By fostering knowledge sharing, mentorship, and professional identity formation, CoPs help bridge the gaps between education, research, and clinical practice, ultimately cultivating experts and leaders who can facilitate the translation of localized initiatives into broader educational advancements.

Additionally, this talk will illustrate collaborations at micro (institutional), meso (national), and macro (international) levels, demonstrating how local educational practices can expand into international partnerships. Resources and funding for medical education and medical education research serve as key drivers in this process, enabling innovative teaching models, faculty development programs, and cross-border research collaborations. With appropriate investment, MER can drive systematic reforms, enhance institutional capacity, and establish strong academic networks, contributing to the global advancement of medical education.

Ultimately, participants will gain insights into how leveraging medical education research and strategic funding can foster innovation, enhance faculty development, build CoP, and promote international collaboration in medical education, addressing the evolving needs of modern healthcare training.

Milestone 2.0: A comparison of teachers' feedback in clinical competency committees

麻醉里程碑 2.0: 臨床能力委員會中教師回饋的比較

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Background: Since 2016, Taipei Medical University Hospital (TMUH) has initiated the implementation of the Clinical Competency Committee (CCC) and the Milestone Project to optimize residency training. With the advancement of Milestone 2.0, the application of Harmonized Milestones (HM) has been increasingly emphasized. Nevertheless, clinical teachers' feedback on HM has demonstrated heterogeneity and significant discrepancies compared to Non-Harmonized Milestones (NHM) (Edgar, Roberts & Holmboe, 2018). This study aimed to compare the differences in clinical teachers' feedback between HM and NHM.

Methods: We analyzed the Clinical Competency Committee (CCC) Milestone Progress Reports of anesthesiology residents at Taipei Medical University Hospital (TMUH), with a primary focus on data collected since the implementation of Milestone 2.0. Our study assessed both the quantity and quality of teacher feedback within these reports, utilizing the teachers' Feedback Evaluation Scale (TFES) (Ocak & Karafil, 2020) to systematically evaluate the feedback provided.

Results: This study analyzed 1,150 faculty feedback items from 25 anesthesia resident progress reports (2022-2024). Harmonized Milestone (HM) feedback averaged significantly fewer words than Non-Harmonized Milestone (NHM) feedback (38.4 vs. 44.9, p < 0.01), with no variation among HM. Using the Teacher Feedback Evaluation Scale (TFES), structured feedback (SF) was optimal, negative feedback (NF) was least effective: SF (HM 45.4%, NHM 66.7%), NF (HM 56.6%, NHM 33.3%). HM feedback showed reduced depth and quality, impacting anesthesia resident development.

Conclusion: We found that clinical teachers provided significantly less feedback, both quantitatively and qualitatively, for Harmonized Milestones (HM) versus Non-Harmonized Milestones (NHM). This necessitates targeted faculty development to enhance HM implementation. Despite limitations in generalizability due to sample size and setting, resident HM progress relies on detailed faculty feedback training, moving towards establishing workshops or focused practical sessions, incorporating simulation-based training, case-based discussions, and peer-to-peer feedback to enhance clinical teachers' ability to provide effective feedback on Harmonized Milestones.

Anesthesia risk assessment: From predictive artificial intelligence and digital twins to generative artificial intelligence

術前麻醉風險評估:由預測式人工智慧、數位孿生到生成式人工智慧的運用

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The integration of artificial intelligence (AI) into anesthesia risk assessment has introduced transformative advancements, combining predictive AI, digital twins, and generative AI to enhance clinical decision-making and patient safety. This presentation outlines a framework for anesthesia risk evaluation, leveraging these technologies to streamline preoperative assessments and improve outcomes. Predictive AI identifies patient-specific risks and formulates personalized anesthesia plans, while digital twin technology creates virtual patient models to simulate physiological responses to various anesthesia strategies. Generative AI automates the generation of risk assessment reports and personalized recommendations, significantly improving efficiency.

The generative AI framework evaluates multiple risk factors, including cardiac, pulmonary, renal, and anesthesia-specific risks, using validated tools such as the ASA-PS classification, Revised Cardiac Risk Index, Lung Injury Prediction Score, and Apfel PONV Score. Generative AI demonstrated superior efficiency, producing risk assessments 125 times faster than human anesthesiologists, with a high concordance rate (76%) between AI and human evaluations. Additionally, the integration of electronic preoperative assessment forms and anesthesia visit systems digitized workflows, ensuring seamless communication and documentation.

Clinical implementation has shown high satisfaction rates among anesthesiologists (91.09% 5-star ratings), underscoring the system's reliability and utility. This pioneering work represents a global first in anesthesia, with no comparable systems currently available. By combining predictive, digital twin, and generative AI technologies, this framework establishes a new standard for anesthesia risk assessment, offering a scalable and efficient solution for diverse surgical procedures.

Training cardiac anesthesiologists: How competency-based education shapes clinical excellence

心臟麻醉人才養成:如何透過核心能力教育締造臨床卓越

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The evolution of medical education necessitates a paradigm shift from traditional instructor-centered training to a learner-centric, competency-based framework. This transformation is particularly critical in cardiac anesthesia, where practitioners must integrate knowledge, technical skills, and professional attitudes to meet the growing expectations of society. Competency-based medical education (CBME) provides a structured and outcome-driven approach to training, ensuring that learners acquire and demonstrate essential clinical competencies at various stages of their professional development.

CBME frameworks commonly employ two key models: Milestones and Entrustable Professional Activities (EPAs). Milestones delineate progressive competency levels, providing a clear roadmap for trainees, while EPAs define specific professional tasks that a learner can be entrusted with at different stages of supervision. Implementing these frameworks within cardiac anesthesia training allows for individualized learning pathways, objective assessments, and a more flexible timeline for skill acquisition.

To cultivate excellence in cardiac anesthesia, a well-structured CBME program must align with the core competencies required in the field, such as perioperative patient care, intraoperative monitoring, advanced imaging interpretation, and critical care management. The integration of structured assessments, clinical competency committees, and program evaluation ensures that training outcomes align with the evolving needs of healthcare systems. By embracing a competency-based approach, we can enhance the proficiency and readiness of future cardiac anesthesiologists, ultimately advancing patient care and surgical outcomes in cardiac medicine.

From the six competencies to milestone & EPA: Experience sharing from the CCC of department of anesthesiology, Taipei Veterans General Hospital

臺北榮總麻醉部臨床能力委員會經驗分享:從六大核心能力到里程 碑與可信賴活動

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Contemporary medical education adheres to the framework of the six core competencies established by the Accreditation Council for Graduate Medical Education (ACGME), encompassing patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice. The milestone-based assessment approach helps structure training based on a resident's stage of development, ensuring that residents at different levels achieve the corresponding learning goals. Additionally, to enhance the assessability of medical education, the concept of Entrustable Professional Activities (EPAs) has been gradually introduced in recent years, serving as a key tool to bridge core competencies with clinical practice.

Here, we share the residency training experience of the Department of Anesthesiology at Taipei Veterans General Hospital. Beginning with traditional case logging, we utilized existing assessment tools—including the Objective Structured Clinical Examination (OSCE), Direct Observation of Procedural Skills (DOPS), Case-Based Discussion (CbD), Mini-Clinical Evaluation Exercise (mini-CEX), 360-degree feedback, and In-Training examination (ITE)—integrating milestone-based grading to develop a residency training and evaluation model aligned with the EPA framework. This approach not only enhances the standardization and objectivity of assessments but also ensures that residents' clinical competency development aligns with the requirements of modern medical education.

Bridging the gap: Enhancing anesthesiology residency training with structured feedback

彌合學習落差:透過結構化回饋提升麻醉住院醫師訓練

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In clinical anesthesiology education, residents frequently encounter learning gaps in procedural confidence, clinical decision-making, and team communication. Traditional feedback methods are often informal, delayed, or ambiguous, which limits their impact on learning. This presentation introduces structured feedback as a practical and evidence-based strategy to enhance educational outcomes in anesthesiology training programs.

I will begin by outlining three core feedback models: the Situation-Behavior-Impact (SBI) model, the Pendleton model, and feedforward principles. Each will be illustrated through case-based applications in airway management, regional anesthesia, and intraoperative crisis response. These models promote timely, specific, and learner-centered feedback—practices that align with the higher tiers of the Learning Pyramid, such as "practice by doing" and "teaching others," where knowledge retention is most effective.

In addition, this session introduces a faculty development framework designed to help anesthesiology educators adopt and sustain structured feedback practices. Key components include targeted workshops, simulated feedback exercises, peer coaching, and digital tools to reinforce feedback as a routine part of clinical teaching.

By bridging the gap between clinical performance and educational expectations, structured feedback empowers both learners and teachers. It encourages reflective practice, supports adaptive clinical thinking, and cultivates a feedback-rich learning environment that promotes lifelong learning and enhances patient safety.

Enhancing anesthesia safety and clinical decision-making through simulation: A dual-track training for residents and nurses

透過擬真情境提升麻醉安全與臨床決策:住院醫師與麻護的雙軌培訓

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Simulation-based training has become an integral part of anesthesiology education, allowing practitioners to experience high-risk, low-frequency events in a controlled and structured environment. At Taipei Veterans General Hospital, we have developed a dual-track simulation program tailored to both anesthesiology residents and nurse anesthetist trainees, addressing the specific needs of each group.

For anesthesiology residents, simulation scenarios focus on crisis recognition, diagnosis, and decisionmaking, emphasizing leadership, communication, and coordination with the surgical and anesthesia teams. The training prepares them for real-life emergencies and aligns with the national anesthesiology board exam requirements.

For nurse anesthetist trainees, the emphasis shifts toward early recognition of complications, patient assessment, medication preparation, and hands-on execution of interventions. Using high-fidelity simulation, trainees practice managing eight key anesthesia-related crises, including malignant hyperthermia, massive transfusion reactions, difficult airway management, and hemodynamic instability. The structured training, combined with expert-guided debriefing and competency-based assessment, enhances their preparedness for real-world challenges.

Through years of experience in simulation training, we have observed that structured, high-fidelity scenarios help bridge the gap between anesthesia trainees and experienced nurse anesthetists, improving both technical and non-technical skills. This experience-sharing session aims to provide insights for institutions training anesthesia personnel, highlighting how tailored simulation programs can enhance patient safety and team efficiency in perioperative care.