

鑽禧 紀盛

台灣麻醉醫學會60週年特刊

*Diamond Jubilee of the Taiwan Society of
Anesthesiologists-Special Issue for 60th Anniversary*

目錄 Contents

序言 Preface

理事長序 60週年誌	007
撰文：台灣麻醉醫學會 謝宜哲 理事長 Letter of Gratitude 60 th Anniversary	
編輯主委序 麻醉一甲子 回顧過去，展望未來	010
撰文：六十週年活動籌備委員會 簡志誠 主任委員 The 60 th Anniversary of Anesthesiology; Review the Past and Going Forward	

國外賀辭 Congratulations

【導讀】致力麻醉專業與國際接軌	014
撰文：國際學術交流委員會 鄭仁坤 主任委員 Introduction: Committed to Anesthesia Professional to Meet the International Trend	
◎ 世界麻醉醫師聯盟 (WFSA)	019
World Federation of Societies of Anesthesiologists	
◎ 韓國麻醉醫學會 (KSA)	021
Korean Society of Anesthesiologists	
◎ 泰國皇家麻醉醫師學院 (RCAT)	023
Royal College of Anesthesiologists of Thailand	
◎ 日本麻醉醫學會 (JSA)	024
Japanese Society of Anesthesiologists	
◎ 香港麻醉醫學會 (SAHK)	026
Society of Anaesthetists of Hong Kong	



歷任理事長 Presidents' Comments

台灣麻醉醫學會 (TSA)	
Taiwan Society of Anesthesiologists	
◎ 第二十二屆理事長 王志中 教授	028
Jhi-Joung Wang, 22 th President of TSA	
◎ 第二十四屆理事長 蔡玉娟 教授	033
Yu-Chuan Tsai, 24 th President of TSA	
◎ 第二十六屆理事長 范守仁 教授	040
Shou-Zen Fan, 26 th President of TSA	
◎ 第二十七屆理事長 廖文進 教授	043
Wen-Jinn Liaw, 27 th President of TSA	

麻醉歷史回顧 Historical Reviews

【導讀】安全的麻醉，成就完善的手術	048
撰文：台灣麻醉醫學會理事 范守仁 教授 Introduction: Safe Anesthesia Achieves Perfect Surgery	
◎ 台灣麻醉醫材淺述	051
An Introduction to Anesthesia Medical Devices in Taiwan	
◎ 麻醉藥品的沿革	059
The History of Anesthesia Agents	
◎ 麻醉機之發展演進	067
Development and Evolvment of Anesthesia Machine	

臨床麻醉 Clinical Practices

【導讀】承先啟後，繼往開來	076
撰文：台灣麻醉醫學會理事 汪志雄 教授 Introduction: From Old Story to New Era of Taiwan Anesthesia	
◎ 台灣心胸麻醉重鎮—臺大醫院麻醉部	079
撰文：邱敬棠、黃信豪、鄭雅蓉 Stronghold of Taiwan's Cardiothoracic Anesthesia —The Department of Anesthesiology, National Taiwan University Hospital	
◎ 顏顏麻醉—林口長庚紀念醫院麻醉部	088
撰文：黃潔文、黃樹欽、陳捷、高宜娟 Craniofacial Anesthesia —The Department of Anesthesiology, Chang Gang Medical Foundation, Linkou Branch	

◎ 心臟麻醉：享譽國際的卓越—振興醫療財團法人振興醫院麻醉部	095
撰文：周毅鵬	
Cardiac Anesthesia; An Excellent Technique Earns International Reutation	
—The Department of Anesthesiology, Cheng Hsin General Hospital	
◎ 擁有全國唯一的 2-T MRI 專用麻醉機—光田綜合醫院麻醉科	107
撰文：何始生	
Possessed exclusively 2-T Anesthesia Machine for MRI examination in Taiwan	
—The Department of Anesthesiology , Kuang Tien General Hospital	
◎ 健檢麻醉—新光吳火獅紀念醫院麻醉科	113
撰文：溫文馨、汪郁榮	
Anesthesia for Health Examination	
—The Department of Anesthesiology ,Shin Kong Wu Ho-Su Memorial Hospital	
◎ 長期積極投入社會服務—中山醫學大學附設醫院麻醉科	120
撰文：洪維德	
Actively Involved in Long-Term Social Services	
—The Department of Anesthesiology, Chung-Shan Medical University Hospital	
◎ 心臟麻醉：重視術後止痛—亞東紀念醫院麻醉部	126
撰文：林子玉、陸正威	
Cardiac Anesthesia; Emphasize Post-Surgical Analgesia	
—The Department of Anesthesiology, Far Eastern Memorial Hospital	
◎ 肝臟移植麻醉—高雄長庚紀念醫院麻醉科	133
撰文：黃佳絨	
Anesthesia for Liver Transplantation	
—The Department of Anesthesiology, Kaohsiung Chang Gung Memorial Hospital	
◎ 小兒心臟麻醉—高雄榮民總醫院麻醉部	138
撰文：賈元一、孫淑芳	
Pediatric Cardiac Anesthesiology	
—The Department of Anesthesiology, Kuohsiung Veterans General Hospital	
◎ 減重手術麻醉—義大醫院麻醉部	143
撰文：盧正淵、洪國全、譚炳恆	
Anesthesia for Bariatric Surgery	
—The Department of Anesthesiology, E-DA Hospital	
◎ 一顆都不能少：保護牙齒的對策—高雄醫學大學附設醫院麻醉部	150
撰文：程廣義、邱舜麗	
Not a Single Tooth Less: Strategies for Protecting Your Teeth	
—The Department of Anesthesiology, Kaohsiung Medical University Hospital	
◎ 深部腦刺激手術麻醉—花蓮慈濟醫院麻醉部	157
撰文：林真福、陳宗鷹	
Anesthesia for Deep Brain Stimulation Surgery	
—The Department of Anesthesiology, Hualien Buddhist Tzu Chi Hospital	

麻醉教育 Professionalism Educations

【導讀】麻醉教育邁入新的里程碑	166
撰文：專科醫師甄審委員會 徐永偉 主任委員	
Introduction: New Milestone in Anesthesia Education	
◎ 以教學研究實踐臨床卓越—臺北醫學大學附設醫院麻醉部	170
撰文：陳建宇、張淳昭、陳大樑	
Using Teaching & Research to Achieve Clinical Excellence	
—Department of Anesthesiology, Taipei Medical University Hospital	
◎ 走向國際優化醫師教育訓練—奇美醫學中心麻醉部	177
撰文：陳貞吟、謝介平	
Internationalized Teaching	
—Department of Anesthesiology, Chi Mei Medical Center	
◎ 麻醉住院醫師教育訓練之標竿—台北慈濟醫院麻醉部	182
撰文：袁懷璧、楊承憲、陳介綯、高銘章、黃俊仁	
A Benchmarking for Anesthesiologist Resident Training	
—The Department of Anesthesiology, Taipei Tzu Chi Hospital	
◎ 台灣麻醉護理現況與未來展望—台灣麻醉護理學會	191
撰文：楊惠如、張秀雲	
Current Status and Future Perspectives of Taiwan Association of Nurse Anesthetists	
—Taiwan Association of Nurse Anesthetists	

疼痛醫療 Pain Medicine

【導讀】疼痛處置	200
撰文：疼痛醫療委員會 洪至仁 主任委員、吳志成 醫師	
Introduction: Pain Management	
◎ 世界第一的疼痛整合照護中心—彰化基督教醫院麻醉部	203
撰文：謝宜哲、陳冠宇、劉玲均	
The Top Integrated Pain Management Center	
—The Department of Anesthesiology, Changhua Christian Hospital	
◎ 自控式止痛經驗分享—臺北榮民總醫院麻醉部	210
撰文：張光宜、鄒美勇	
The Use of Patient-Controlled Analgesia--Experience Sharing	
—The Department of Anesthesiology, Taipei Veterans General Hospital	
◎ 中西整合疼痛中心—臺北市立萬芳醫院麻醉科	218
撰文：戴裕庭	
Integrated Pain Management Center	
—The Department of Anesthesiology, Taipei Municipal Wanfang Hospital	

60 週年誌

台灣接受西方醫學已逾百年，1910 年代蘭大衛醫師在彰化基督教醫院已經開始使用氯仿做全身麻醉。歷經前輩胼手胝足，筆路藍縷，陸續投入麻醉專業，西元 1946 年臺大李光宜醫師糾集同道，創建了麻醉醫學會。翻開會史可以看到歷任理事長、理監事會披荊斬棘，慢慢開創天地，舉凡學會雜誌創建、國際會籍維護、永久會址設立、專科醫師制度建立、專業訓練引進、臨床暨基礎研究開展、專業工作權的維護、安全品質的提升、現代化教育專業的引進等等，不一而足。當我踏入麻醉時，麻醉醫學會剛過完 30 歲生日，轉眼間它進入了花甲要慶祝 60 週歲。

60 歲生日的麻醉醫學會，理監事會特別邀請了簡志誠教授在麻醉雜誌社協助下，率領新生代的菁英籌組 60 週年慶委員會，並依這個團隊構思下蒐羅了各大醫院麻醉科親撰稿件、各大耆老親留影留音要做這個時代的麻醉見證。我們可以看到各個醫院努力地要在專業領域、品質安全、醫學教育、專科研究上努力掙出一片天。相關功能委員會也寫下了歷史傳承的偉業，可以說學會能夠延續，正是因為熱心會員在學會各功能委員會中的無私奉獻與努力堅持，才能成其為學會。麻醉護理學會是我們的好朋友，她們當然不能在我們的生日缺席。我們也沒有忘記跟隨著我們一起成長的麻醉相關協力廠商，他們支持麻醉相關配備的提升與引進，也帶進儀器藥物新知，可以說少了這些好朋友，麻醉醫學會的成長會推遲一、二十年。60 週年慶的年會邀請世界麻醉醫師聯盟總裁親臨指導，也邀請國際友我麻醉學會理事長前來祝賀，希望他們也能刻印下永恆的賀辭。

不見天日的手術室內的麻醉醫師默默的關照著每一個病患生命。在 60 週年慶籌委會努力下，我們眾志成城寫下的這本 60 週年誌，也好似留下了一顆時空膠囊，會為我們這一群沉默的麻醉醫師留下歷史見證。再另一個 60 年，未來的麻醉醫師會知道我們這一代做過的努力。

台灣麻醉醫學會理事長

謝宜哲

麻醉品質 Quality Control

- 【導讀】堅持麻醉品質與安全 224
撰文：品質保證委員會 楊承憲 主任委員
Introduction: Insist on the Quality and Safety of Anesthesia
- ◎ 「安全是唯一的堅持，品質是持續的追求」團隊資源管理之個人化醫療—國泰綜合醫院麻醉科 228
撰文：郭書麟、洪聖惠
Continuously Pursue Patient Safety and Quality-- Team Resource Management is the Key to Personalized Anesthesia Care
—The Department of Anesthesiology, Cathay General Hospital
- ◎ 麻醉、改變與影響力：標靶控制輸注全靜脈麻醉—三軍總醫院麻醉部 236
撰文：呂忠和、吳之芾
Total Intravenous Anesthesia with Target-Controlled Infusion (TCI): The Change and Effects
—The Department of Anesthesiology, Tri-Service General Hospital
- ◎ 麻醉—甲子，安全品質 e 世紀—中國醫藥大學附設醫院麻醉部 243
撰文：陳坤堡、黃淑芬、高金英
The Model and Pioneer of Anesthesiology – China Medical University Hospital, A Hospital with e-Program and Secured Quality
- ◎ 品質提升與電子化—馬偕紀念醫院麻醉科 250
撰文：陳建全、林盈均、張人尹
Quality Improvement and Electronic Technology
—The Department of Anesthesiology, Mackay Memorial Hospital
- ◎ 優化麻醉品質管理系統提升麻醉安全保障—衛生福利部雙和醫院麻醉科 256
撰文：程毅君、羅博瀚、劉孟琦、劉桂蓉、王芷葳
Optimizing Anesthesia QC System for Improved Patient Safety
—Department of Anesthesiology, Taipei Medical University-Shuang Ho Hospital

科部沿革 Introduction of Organizations

- ◎ 臺中榮民總醫院麻醉部 266
撰文：洪至仁
The Department of Anesthesiology, Taichung Veterans General Hospital
- ◎ 國立成功大學醫學院附設醫院麻醉部 272
撰文：曾稼志
The Department of Anesthesiology, National Cheng Kung University Hospital

附錄 Appendix

- ◎ 麻醉大紀事 280
The Great Chronicle of Anesthesiology

Letter of Gratitude 60th Anniversary



Western medicine has been adopted in Taiwan for more than a hundred years. In 1910, Dr. David Landsborough began to use chloroform for general anesthesia at Changhua Christian Hospital. Our Society was founded by Dr. Li Kuang-Yi from National Taiwan University and fellow contemporaries in 1946. Our predecessors were highly dedicated to the profession of anesthesiology. History and records revealed that the presidents, directors, and supervisors of this Society strove towards expansion. Achievements include the creation of our own magazine, maintaining our global membership, establishing a permanent venue,

creating a system of medical specialists, introducing professional training, developing clinical, and basic research programs, safeguarding the professional licensing and certification systems, improving safety and quality, and bringing in the latest professional training. When I first entered the field of anesthesiology, Taiwan Society of Anesthesiologists had just celebrated its 30th birthday. Time passed by so soon and now we are celebrating its 60th anniversary today.

The board of directors and supervisors specifically invited Dr. Chien Chih-Cheng to organize the taskforce to celebrate the 60th birthday of the Society. With the support of the Acta Anaesthesiologica Taiwanica and the new generation of leading professionals, the 60th Anniversary Committee collected publications from the department of anesthesiology of various major hospitals. Leading figures and elders also provided their photographs and voice recordings as a testimony for the history of anesthesiology. From these articles we could see that various hospitals are working so hard to support this profession, ensure safety and quality, provide medical education, and pursue professional research. Functional committees were also part of the great historical heritage of our Society. Selfless contributions and devotion on the

part of passionate members in various functional committees allowed the Society to prosper and grow. Taiwan Association of Nurse Anesthetists (TANA) is also a close friend and an integral part for our birthday celebrations. Then there are also suppliers of products related to the practice of anesthetics who grew side-by-side with us. These suppliers improved and introduced relevant tools as well as new information on the latest instruments and drugs. Without their help, the growth of this Society would be delayed for at least 10 to 20 years. For our 60th Anniversary, we have specifically invited the President of the World Federation of Societies of Anaesthesiologists (WFSA) as well as presidents and directors of anesthesiology societies around the world to celebrate this occasion with us. We can look forward to their official letters commemorating this event.

Anesthesiologists are often silent works in the operating theater, caring for the lives of each patient. After the hard work of the 60th Anniversary Committee we accomplish this 60th Anniversary Special Edition. This publication shall serve as a time capsule, providing all dedicated anesthesiologists with a historical moment to remember by. In another 60 years' time, the future generation of anesthesiologists would read this Special Edition and appreciate the contributions made by our generation.

Yi-Jer Hsieh, M.D.

President, Taiwan Society of Anesthesiologists.

2016-July-22

麻醉一甲子 回顧過去，展望未來

恭喜台灣麻醉醫學會歡慶建會六十週年！

六十在西方是以鑽石作為代表，稱之為鑽禧之年；六十在中國更是個重要的數字，代表的是天干地支一個循環，也就是一個甲子，象徵了圓滿也意謂著開始，像是人生的分水嶺，是里程碑，也是轉捩點，可以回顧，更應該展望。過去六十年，累積許多為麻醉默默耕耘奉獻的前輩們筆路藍縷的努力，麻醉作為一個醫學專科，才得以成就今日的格局；因此，在此歷史性的一刻，台灣麻醉醫學會希望藉著這次六十週年特刊的編纂，為歷史留下記錄，也為下一階段的發展凝聚共識，繼往之外，也期待開來。

此次的六十週年特刊，除了傳統平面出版品外，特別增加了電子與影片的記錄，因此拍攝紀念影片並以影片記錄「台灣麻醉醫學會 60 週年暨 2016 年學術研討年會」等系列活動，希望生動地留下這一代麻醉人的身形英姿與言談笑語。遺憾的是囿於科技，還無法記載大家的「氣味」。無論平面或電子，特刊中對於麻醉各領域均有所著墨，內容不只期與讀者共享麻醉一甲子的光陰，更希冀能記載此階段的樣貌，故邀請各醫院自選特色主題加以描述其獨特性，藉此瞭解其發展

歷程及專業經驗，最後並附有大事紀供瀏覽與查檢。為了呈現完美的品質並收納充分的資訊，早從 2016 年二月起，就展開緊鑼密鼓的籌備工作，七月起更竭盡全力向前邁進，務求在甲子慶前夕完成。

回想編輯籌備過程中點滴，要感謝很多人的支持與參與，我們想先向來自世界各地的祝福表達謝意，同時感謝歷任理事長提供了珍貴照片及感言，與讀者共同回憶麻醉發展演進；還有各功能委員會主委提供導讀，引領讀者從更深入的角度認識學會的成長，以及各大訓練醫院主任及同道們提供完整的特色醫療介紹；最重要的是以上諸位投稿者的包容體諒，與審稿人不厭其煩的反覆審稿。當然還要特別謝謝這次辛苦的編輯團隊，郁榮、思穎、羅珊、郁君、張怡及書麟，大家辛苦了！因此，是這樣所有的人一起的努力，才成就此次六十週年特刊的樣貌，可以留予他年，細說夢痕。

過去的六十年是這樣過去了，走過的麻醉人留下了這樣的痕跡；現在還在走的麻醉人，就讓我們一起努力，讓麻醉景象一新，成就下一個更輝煌的六十年吧！

台灣麻醉醫學會六十週年活動籌備委員會主任委員

簡志誠 敬誌

The 60th Anniversary of Anesthesiology; Review the Past and Going Forward

Congratulations on the sixtieth anniversary of Taiwan Society of Anesthesiologists! In Western society, the diamond is the symbol for such occasion while in China, sixty years form an amazing sexagenarian cycle. No matter what, this is a very special time-point for us to look back the past 60 years as well as to set our vision for the coming cycle. At this memorable moment, the Society decides to write the chronicle of this expertise in this sixtieth anniversary special edition. This is certainly a way to thank the senior practitioners for their contribution, and is also a way to set consensus towards the future of Taiwan Society of Anesthesiologists.



This sixtieth anniversary special edition is presented as traditional hard copy publication and electronic version, the video clips taken from "Taiwan Society of Anesthesiologists' Sixtieth Anniversary and 2016 Symposium" are a record of prominent anesthesiologists of this generation, that transcends the bounds of technology limitations! Both the hard copy and electronic version provide information regarding anesthesiology practice: we not only introduce our history as pioneers in Taiwan, but share the thoughts and experience of the representatives of hospitals. The society chronicles are also provided for your reference. To ensure the best quality of information is shared, we started preparation from February 2016 and maximized efforts in July in order to complete the work before the major event.

We appreciate the support and involvement of fellow anesthesiologists, for their blessings from around the world, the photos and thoughts of prior presidents as historical records of anesthesiology. The guiding words from commission directors provide in-depth perspective in the development of society, and features introductions from the directors and fellow anesthesiologists from training institutions, and most importantly, the patient consideration of authors and the works of reviewers. We also appreciate the editors: Yu-Jung, Ssu-Ying, Lo-Shan, Yu-Chun, Chang-Yi and Shu-Lin, well done! The seamless teamwork is the key to success and it will tell our story to the future.

Sixty years have passed, and the pioneering anesthesiologists have made achievements. We as successors should not only keep up the momentum, but also to create another golden era!

Sixty Anniversary Event Planning Commission Chief,
Taiwan Society of Anesthesiologists

Chih-Cheng Chien, M.D., Ph.D.

國外賀辭
Congratulations

導讀：致力麻醉專業與國際接軌

撰文 / 鄭仁坤 (國際學術交流委員會主任委員、馬偕紀念醫院麻醉科主治醫師)

敬愛的麻醉先進與同道：

首先感謝大家過去在麻醉本業的努力與付出，讓我們在國內外皆獲得專業上的肯定與正面評價。此次適逢台灣麻醉醫學會六十週年紀念，日本麻醉醫學會 (Japanese Society of Anesthesiologists)、韓國麻醉醫學會 (Korean Society of Anesthesiologists)、香港麻醉醫學會 (Society of Anaesthetists of Hong Kong)、泰國皇家麻醉醫師學院 (Royal College of Anesthesiologists of Thailand) 與世界麻醉醫師聯盟 (World Federation of Societies of Anesthesiologists, WFSA) 紛紛來函表達誠摯的祝賀與繼續合作交流的意願。

我們學會在 50 年前即加入世界麻醉醫師聯盟，一直為其忠實成員。此次日本麻醉醫學會理事長 Prof. Sumio Hoka、韓國麻醉醫學會理事長 Dr. Kook Hyun Lee 與世界麻醉醫師聯盟理事長 Dr. David J. Wilkinson 特別提及我們在大型傳染病爆發 (如 2003 年 SARS 風暴) 與其他重大災害時 (如地震、高雄氣爆、八仙粉塵閃燃事件等) 所提供的專業醫療照護，這些都是根基於平日我們在組織培訓上 (包含麻醉、病人安全、疼痛處置和重症監護醫學) 一點一滴所做的努力。Dr. David J. Wilkinson 認為舊世代的醫院架構往往忽略了一個優秀麻醉醫生的價值，且常常給予比其他科別較少的尊重及待遇，這景況在全球已在改善中，他希望在台灣也是如此，並期許我們展望未來，莫自滿於現狀。不論是臨床服務或是學術研究，眼前仍有許多新的挑戰與有待學習成長新的領域，亟待我們去開拓並積極地培育年輕的研究人才，相信我們的努力將再一次贏得其他專業與醫療管理階層的肯定。

同時，為感念過去幾屆麻醉年會大家對於邀請國際學者來訪的努力及辛勞，我們特別從學會現有資料中，整理出過去幾屆麻醉年會受邀來台演講的外賓及其主辦單位 (見 16 頁表)，藉以緬懷過去的努力，以策勵未來。

Introduction: Committed to Anesthesia Professional to Meet the International Trend

Chairperson of International Academic Exchange Committee
Discipline Director of Anesthesiology, Mackay Medical College
Attending Physician, Department of Anesthesiology, Mackay Memorial Hospital

To all anesthesiologists and fellow physicians:

Thank you for your dedication and contribution to the field of anesthesiology. Your efforts have allowed us to secure recognition and positive feedback from various professionals in Taiwan as well as other countries. This is the 60th anniversary of the Taiwan Society of Anesthesiologists. We have received letters of congratulation from the Japanese Society of Anesthesiologists, Korean Society of Anesthesiologists, Society of Anaesthetists of Hong Kong, Royal College of Anesthesiologists of Thailand, and the World Federation of Societies of Anesthesiologists (WFSA) as well as their continued intent to work with us (as shown in the following list).

This Society joined the WFSA 50 years ago and we have always been a loyal and committed member. Professor Sumio Hoka, Chairman of the Japanese Society of Anesthesiologists, Dr. Kook Hyun Lee, President of the Korean Society of Anesthesiologists, and Dr. David J. Wilkinson, President of the WFSA have specifically mentioned the professional medical care that our Society has provided during large scale pandemics (such as the 2003 SARS epidemic) and other major disasters (such as earthquakes, gas explosion in Kaohsiung, and the Formosa Fun Coast explosion). These achievements were only made possible due to our commitment to providing training (that included topics such as anesthesia, patient safety, pain management, and critical care medicine) which gradually perfected our capabilities one step at a time. Dr. David J. Wilkinson believed that traditional hospital frameworks often fail to recognize the value of a skilled anesthesiologist. These professionals are often given less respect and pay compared to other fields of specialization. The good news is that this condition is being improved throughout the world, and he hopes that the same thing is happening in Taiwan as well. Dr. Wilkinson also hopes that our Society will stay true to our commitments and look towards the future. There are many challenges in clinical services



and academic research as well as new opportunities for learning and growth. These areas are eagerly waiting for development and we shall dedicate our efforts in the training of young researchers. We are confident that our efforts will be appreciated by people in other fields of specialty and medical management.

In order to commemorate past anniversaries and events of the Society, and to commend people's hard work and sacrifices in inviting researchers from around the world to Taiwan, we have organized this list of VIPs and the organizers (see Table) of annual celebrations from this Society's archives.

台灣麻醉醫學會歷年之年會活動

年份 Year	主辦單位 Organizer	大會會長 Meeting Chairperson	外賓 Guests	演講主題 Title of the Speech
2002	台北榮總 Taipei Veteran's General Hospita	陳國瀚 Kwok-Hon Chan	Philip D. Lumb (USA)	Dexmedetomidine as an Analgesic/Sedative in Critical Care
			Yuan-Chi Lin (USA)	Controversies in Pediatric Anesthesia
			Chingmuh Lee (USA)	Neuromuscular Pharmacology
			K. C. Wong (USA)	Physiologic Changes of Aging and Anesthetic Implications
2004	台北長庚醫院 Taipei Chang Gung Memorial Hospital	呂炳榮 Ping- Win Lui	Philip L. liu (USA)	What's new in American medical education?
			K. C. Wong (USA)	American anesthesia residency today
			F. A. Berry (USA)	Patient safety in anesthesia practice
			Randell Moore (Canada)	Death in the OR
			Letty M.P. Liu (USA)	Challenges in pediatric anesthesia
			Ging-Kuo Wang (USA)	Local anesthetic receptor in sodium channel
			Yuan-Xiang Tao (USA)	Synaptic MAGUK in anesthesia and analgesia
			A. P. Vakkuri (Finland)	Entropy monitoring
2005	台北醫學大學 Taipei Medical University	吳啟誠 Chi- Cheng Wu	Elmar Rudolph (Germany)	Goal-directed fluid management
			Fun-Sun Yao (USA)	Peri-op management of pacemakers and ICDs
			K. C. Wong (USA)	Legal aspects of anesthesia practice
			Charles Gomersall (UK)	Specialist training in intensive care
			Ru-Rong Ji (USA)	Neural and glial regulation of pain
			Joergen Viby Mogensen (Denmark)	Monitoring guidelines of NMB agents
			Arthur M. Lam (Canada)	Periop management of cerebral aneurysm
	奇美醫學中心 Chi Mei Medical Center	王志明 Jhi- Joung Wang	Chung-Yuan Lin (USA)	Role of low-flow system in cardiac surgery

(文接上頁)

年份 Year	主辦單位 Organizer	大會會長 Meeting Chairperson	外賓 Guests	演講主題 Title of the Speech
2006	成大附設醫院 National Cheng Kung University Hospital	蔡玉娟 Yu- Chuan Tsai	Thomas J. K. Toung (USA)	Hypertonic saline for cerebral edema
			Sven Albrecht (Germany)	Propofol and opioid in TCI
			David S. Warner (USA)	Peri-operative neuroprotection
			Toyo Miyazaki (Japan)	Systematic procedure for low back pain
			Chung-Yuan Lin (USA)	Ethical practice of anesthesiology
			Fun-Sun Yao (USA)	Anesthetic consideration of ischemia heart disease for noncardiac surgery
			Fun-Sun Yao (USA)	American board of anesthesiology certification and recertification
			David Ying-Chun Wang (USA)	Sono-guided regional nerve block
2007	花蓮慈濟醫院 Hualien Tzu Chi Hospital	石明煌 Ming- Hwang Shyr	Cheung-Chi Wai (UK)	Vocational training for anesthesiology in HK
			Marek Alexander Mirski (USA)	Peri-operative and ICU neuroprotection
2008	中國醫藥大學 China Medical University	吳世銓 Sai- Chuen Wu	Tong Joo Gan (UK)	Less invasive hemodynamic monitoring
			Sang Chul Lee (Korea)	Advances in interventional pain management
			Debra Anne Schwinn (USA)	Genetics and anesthesia
			Robert van Seventer (Netherlands)	Expanding the Boundary of Anesthesiology-Experience in Pain Management
2009	中國醫藥大學 China Medical University	陳坤堡 Kuen- Bao Chen	Takashi Asai (Japan)	Supraglottic airway
			Thomas Fuchs-Buder (Germany)	New advances in muscle relaxation management
			Thomas Schnider (Swiss)	Models in target control infusion
			Alexandru Gottlieb (USA)	Ansthesia for endovascular aneurysm repair
			Ching-Rong Cheng (USA)	Simulation-based teaching
2010	三軍總醫院 Tri-service General Hospital	廖文進 Wen- Jinn Liaw	James Arens (USA)	Patient safety
			Sang Chul Lee (Korea)	Ultrasonography in pain management
			Joachim Bold (Germany)	Fluid management for traumatic patients
			Chung-Yuan Lin (USA)	Close-circuit anesthesia
			Joseph Chiang (USA)	New types of pain therapy
			Michael Irwin (Hong Kong)	Fluid therapy and periop outcome
			Hidefumi Obara (Japan)	Anesthesia training by simulator
			Yoji Saito (Japan)	Regional anesthesia-where we will go?
			Yuan-Xiang Tao (USA)	mTOR: a new hope for opioid tolerance
			Christoph Hofer (Switzerland)	Monitoring of fluid responsiveness
2011	臺大附設醫院 National Taiwan University Hospital	孫維仁 Wei- Zen Sun	John Ulatowski (USA)	NA
			Thomas J. K. Toung (USA)	NA
2012	奇美醫學中心 Chi Mei Medical Center	王志明 Jhi- Joung Wang	Thomas Ebert (USA)	Volatile anesthetic and patient safety
			Daqing Ma (UK)	Abnormal brain after surgery

(文接上頁)

年份 Year	主辦單位 Organizer	大會會長 Meeting Chairperson	外賓 Guests	演講主題 Title of the Speech
2013	義大醫院 E-Da Hospital	譚炳恆 Ping-Heng Tan	Jae-Hyon Bahk(Korea)	Current Hemodynamic Monitoring Techniques
			Ru-Rong Ji(USA)	A new strategy to protect surgery-induced chronic postoperative pain
			Randolph Hastings(USA)	Deliberate Practice: How to become an Elite Expert in Anesthesiology
			Prof. Hendrick(USA)	Anesthesia improving Patients' outcome
2014	童綜合醫院 Tung's Taichung MetroHarbor Hospital	廖文進 Wen-Jinn Liaw	Klaus Gorlinger (Germany)	Peri-op coagulation management
			Shoichi Uezono (Japan)	Peri-op goal-directed therapy
			Toshiya Koitabashi (Japan)	Intra-op BIS monitoring
			Willem Scholten (Netherlands)	Psychotropic substance regulation
			Joseph Pergolizzi (USA)	Buprenorphine transdermal patch
2015	臺大附設醫院 National Taiwan University Hospital	鄭雅蓉 Ya-Jung Cheng	Michael Ishu Yang (USA)	Interventional pain management
			Lim Boon Leng (Singapore)	Training and education of anesthesiologists
			Daqing Ma (UK)	Anesthetics and techniques on cancer recurrence
2016	林口長庚醫院 Linkou Chang Gung Memorial Hospital	林志中 Chih-Chung Lin	David J Wilkinson (UK)	60 th Anniversary of the World Federation of Societies of Anesthesiologists (WFSA) - a review
			Matthew B. Weinger (USA)	Current Concepts and Practices in Anesthesia Patient Safety
			Jeff Gudin	NA
			外須美夫 Sumio Hoka (Japan)	Latest updates of the Japanese Society of Anesthesiologists
			李國賢 Lee Kook-Hyun (Korea)	Latest updates and exchange report of the Korean Society of Anesthesiologists
			Timothy A. Jackson (USA)	Double-Lumen Endotracheal Tubes and Difficult Airway Scenarios workshop
			Ronaldo V. Purugganan (USA)	Double-Lumen Endotracheal Tubes and Difficult Airway Scenarios workshop
			Jagtar Singh Heir (USA)	Double-Lumen Endotracheal Tubes and Difficult Airway Scenarios workshop

World Federation of Societies of Anesthesiologists, WFSA



Dear Dr Hsieh Yi-Jar,

For any person or organisation to celebrate a 60th Anniversary is a very special occasion and this is certainly true for the Taiwan Society of Anesthesiologists (TSA) as it moves towards its celebrations later this year. A sixtieth anniversary is a Diamond Anniversary which represents both wealth and a shape denoting great good fortune in feng-shui. The TSA is recognised as a major professional medical society within Taiwan and has been a focus in the sound teaching of anaesthesia, pain management and intensive care medicine.

When faced with severe epidemics, like the SARS outbreak of 2003, or natural disasters, like the recent earthquake, or major accidents, like the Formosa Fun Coast explosion last year, the TSA and its membership has been swift to save and support injured people. The good results following these tragedies demonstrates the training and organisation provided by the TSA.

Such examples however should not result in any degree of complacency or total satisfaction. It is important that learning continues and develops and that the skills acquired by highly trained anaesthesiologists are recognised by other medical specialities as well as by hospital management. Around the world older hierarchical structures within hospitals and operating theatres have often failed to recognise the value of good anaesthesiologists and this has been often associated with lower respect and salaries than other equivalently trained specialists. This is slowly changing around the globe and anaesthesiologists are being increasingly better regarded. We hope that this is the case in Taiwan.

The TSA joined the WFSA over 50 years ago and has been a loyal member and is much appreciated. All of the Board and Council of WFSA wish the Taiwan Society of Anesthesiologists the very best for this celebratory year and for the years to come. With very best regards

David J Wilkinson,
President, WFSA

世界麻醉醫師聯盟

謝宜哲醫師您好：

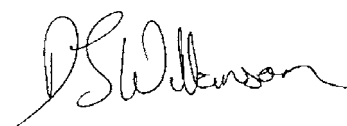
對任何人或任何組織而言，慶祝 60 週年絕對是非常特別的一刻，對台灣麻醉醫學會 (TSA) 更是如此，因為再過不久，它就要舉行 60 週年慶。六十週年紀念也就是所謂的鑽石紀念，在風水中代表財富與好運報到。TSA 是台灣公認的重要專業醫學協會，一直以來，重心都放在麻醉、疼痛管理與重症加護醫療的完整訓練。

面對嚴重流行病（如 2003 年爆發的 SARS 危機）、天災（如最近的地震）和重大事故（如去年的八仙粉塵閃燃事件）時，TSA 及其全體會員就會挺身而出，拯救並援助受傷民眾。這些天災人禍都未釀成嚴重後果，充分展現 TSA 的訓練和組織都十分健全。

但是，不應獲得些許成就便沾沾自喜、志得意滿。而是應該學習不輟，並讓麻醉醫師在受過豐富訓練後，所獲得的技術能夠獲得其他醫療專業人士與醫院管理人員的認同。在世界各地，醫院和手術室內部的舊式階級結構經常忽視優秀麻醉醫師的價值，這大多可歸因於麻醉醫師較不受人尊重，而且薪水也比其他同樣受過訓練的專業人士低。不過全球的風氣已經慢慢轉變，麻醉醫師也越來越受人重視，希望台灣當地也是如此。

TSA 在 50 多年前加入 WFSA，一直以來都是不可或缺的忠實會員。WFSA 全體人員祝福台灣麻醉醫學會在 60 週年及未來都能繼續蓬勃發展。

謹此



WFSA 總裁

2016 年 3 月 10 日星期四

Korean Society of Anesthesiologists, KSA

On behalf of the Korean Society of Anesthesiologists (KSA) and its 5,022 members, I extend heartfelt congratulations to you upon the celebration of the 60th anniversary of the Taiwan Society of Anesthesiologists (TSA).

Since its establishment in 1956 by pioneer researchers specializing in the field of anesthesiology, TSA has contributed to the advance of the anesthesiology of Taiwan. Also, TSA has actively promoted the academic application and development in a wide range of fields, and thereby, played a leading role for the growth of the clinical medicine in Taiwan. In the meantime, TSA has played a central role to overcome the global crisis, such as SARS in 2003 and Formosa Fun Coast explosion in 2015. In such a situation, greatest expectations from a variety of fields are upon TSA because of your wide range of human resources and knowledge as well as the latest research developments.

The advance of anesthesiology has been remarkable indeed for the last 60 years, and it has grown to be a field, which is indispensable for securing the safety and quality of life in today's medical care system. It has been told an anesthesiologist is required for approximately every 10,000 people. However, to promote anesthetic services that prioritize the safety of patients, active involvement of anesthesiologists in perioperative management is important.

Thank you again for the privilege and honor to address with a few words on this festive occasion. I would like to say heartfelt compliments to all members of the TSA who devoted themselves to its development, and also express my best wishes for TSA to continually carry out pioneering researches and the cultivation of young researchers as well as to contribute greatly to the development of the academic and scientific anesthesiology of the whole world.

Yours Sincerely,

Kook Hyun Lee, M.D., Ph.D.

President

The Korean Society of Anesthesiologists



韓國麻醉醫學會

謹代表韓國麻醉醫學會 (KSA) 及其 5022 名會員，向台灣麻醉醫學會 (TSA) 60 週年慶獻上最誠摯的祝福。

TSA 於 1956 年由專門研究麻醉領域的研究先驅創立以來，對台灣麻醉學的進步貢獻良多。此外，TSA 也極力促成各項領域的學術應用與發展，並因此在台灣的臨床醫療發展方面扮演繼往開來的重要角色。在此同時，TSA 對於克服許多全球危機也同樣功不可沒，例如 2003 年的 SARS 危機，以及 2015 年的八仙粉塵閃燃事件。在此情況下，由於 TSA 本身擁有豐富的人力資源、知識，以及最新的研究發展，因此社會大眾無不期許 TSA 能夠再創佳績。

過去 60 年來，麻醉學的進步有目共睹，已經逐漸成為現今醫療照護體制中維護生命安全與品質不可或缺的重要領域。據說，每 10000 人左右就需要一名麻醉醫師。然而，為了推廣視病人安全為第一優先的麻醉服務，就需要麻醉醫師主動投入手術期間的管理作業。

再次感謝讓我有幸能在這個慶祝場合說幾句話。我想誠摯地讚揚 TSA 的所有會員，他們對麻醉學的發展功不可沒，同時也衷心希望 TSA 能夠再創佳績，持續進行尖端研究，培育研究人才，並對全世界麻醉學的學術和科技發展做出偉大的貢獻。

謹此

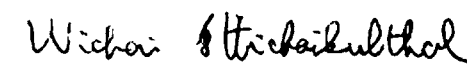


醫學士博士 Kook Hyun Lee
韓國麻醉醫學會 會長

Royal College of Anesthesiologists of Thailand, RCAT

On behalf of the Royal College of Anesthesiologists of Thailand, I would like to express a warmest congratulation and sincere best wishes on the 60th anniversary Taiwan Society of Anesthesiologists (TSA). Within 60 years, TSA has built up success to become an excellence institute leading a vital role in creating a standard platform about patient safety, education and crisis in medical management in Taiwan.

The Royal College of Anesthesiologists of Thailand is proud to be associated with the Taiwan Society of Anesthesiologists and look forward to continued collaboration between our institutions. May God continue to bless the Taiwan Society of Anesthesiologists and Taiwanese people.

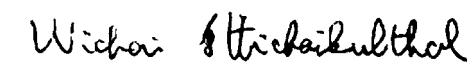


Assoc. Prof. Wichai Ittichaikulthol.
(President of the Royal College of Anesthesiologists of Thailand.)

泰國皇家麻醉醫師學院

謹代表泰國皇家麻醉醫師學院向台灣麻醉醫學會 (TSA) 60 週年慶獻上最誠摯的祝福。過去 60 年來，TSA 在台灣醫療管理的病人安全、教育和危機處理建樹頗多，使該機構在建立標準平台方面扮演極為重要的角色，在業界首屈一指。

泰國皇家麻醉醫師學院很榮幸能與台灣麻醉醫學會共事，並期待彼此的合作關係能夠延續下去。謹此誠摯祝福台灣麻醉醫學會與台灣全體民眾。



副教授 Wichai Ittichaikulthol.
(泰國皇家麻醉醫師學院院長)

Japanese Society of Anesthesiologists, JSA

Dear Prof. Chien, Chih-Cheng and Prof. Jsieh, Yi-Je,

As the president of Japanese Society of Anesthesiologists (JSA), I express my hearty congratulations to you for the 60th anniversary of Taiwan Society of Anesthesiologists (TSA). During the past 60 years, TSA has attained a lot of great success in providing safe anesthesia for surgical patients as well as comprehensive pain control for suffering patients in Taiwan. TSA has also performed great contributions to risk and crisis managements in your country, for example, protection of SARS patients from the contamination in 2003, and provision of manpower in the intensive care units and operating rooms at Formosa Fun Coast explosion in 2015.

I appreciate that members of TSA have directed sincere kindness and friendship to us Japanese anesthesiologists in order to establish safe anesthesia and sufficient pain control together not only in Asia but also in the world.

I wish you further progress in your achievement at anesthesiology and perioperative care.

Sincerely yours,

Sumio Hoka

Sumio Hoka, M.D., Ph.D.

President of Japanese Society of Anesthesiologists
Chair and Professor

日本麻醉醫學會

簡志誠教授和謝宜哲教授您們好：

身為日本麻醉醫學會 (JSA) 理事長，我衷心祝賀台灣麻醉醫學會 (TSA) 慶祝六十週年。過去 60 年間 TSA 在為手術患者提供安全麻醉及為台灣患者施行全面性疼痛控制方面，已達成許多重要成就；TSA 也為貴國在風險和危機處理方面做出巨大貢獻，例如 2003 年保護 SARS 患者避免汙染，以及 2015 年為八仙樂園粉塵閃燃事件提供加護病房及手術室人力。

誠摯感謝 TSA 成員對我等日籍麻醉科專家付出的真誠友情，讓我們不只能在亞洲，也能在全世界共同創造安全麻醉和充分的疼痛控制。

祝福您們在麻醉醫學和手術全期的照護方面能更進一步，取得突破性的成就。

順頌 時祺

外須美夫 (Sumio Hoka), M.D., Ph.D.
日本麻醉醫學會理事長

Society of Anaesthetists of Hong Kong, SAHK

Congratulations to the Taiwan Society of Anaesthesiologists on their 60th anniversary. I have been fortunate to visit Taiwan on a number of occasions over the years as well as interact and work with the anaesthesiologists there. I am also on the Editorial board of the journal.

Taiwan anesthesiologists provide a high international standard of perioperative care and have produced many top class clinicians and scientists. I am sure they will continue to do so as we all face continuous new challenges in the provision of health care and I wish them all the very best for the future!

Professor Michael G. Irwin MB ChB MD DA FRCA FCAI FANZCA FHKAM
President Society of Anaesthetists of Hong Kong
President Organising Committee WCA 2016

香港麻醉醫學會

恭喜台灣麻醉醫學會慶祝六十週年。我很榮幸在過去數年曾拜訪台灣參加一些活動，並與當地麻醉科專家互動和工作；我也曾擔任期刊編輯委員。

台灣麻醉科專家提供國際高標準的手術全期照護，並產生許多頂級的臨床專家和科學家。我非常確定他們將會繼續這麼做，因為我們都將持續面臨提供醫療照護的新挑戰；我祝福 TSA 未來一切如意！

艾明高 (Michael G. Irwin) 教授

香港麻醉醫學會理事長
2016 年世界麻醉專家學術會議 (WCA) 統籌委員會主席

歷任理事長 Presidents' Comments

第二十二屆理事長

王志中教授 *Jhi-Young Wang*22th President of the Taiwan Society of Anesthesiologists

茲以圖片故事，恭賀台灣麻醉醫學會成立 60 週年，大家辛苦了，我們共同努力！



2003 中華醫學會全國麻醉醫學年會，於大會前同仁同遊三峽。
Colleagues with the tour in Sanxia.(2003)



大陸中華醫學會全國麻醉醫學年會
2003 年 9 月 12 日 (武漢)
Annual National Conference for the Chinese Medical Association –
Society of Anesthesiologists
Date: September 12, 2003
Venue: Wuhan



大陸中華醫學會全國麻醉醫學年會，
本會會員受到 VIP 禮遇
2003 年 9 月 12 日 (武漢)
VIP reception for our Society's
members in the Annual National
Conference for the Chinese
Medical Association – Society of
Anesthesiologists
Date: September 12, 2003
Venue: Wuhan

美國麻醉學年會
2003 年 10 月 11 日
Annual Meeting of the American
Society of Anesthesiologists
Date: October 11, 2003



美國麻醉學年會
2003 年 10 月 11 日
舊金山漁人碼頭
Annual Conference of the American
Society of Anesthesiologists
Date: October 11, 2003
Venue: Fisherman's Wharf, San
Francisco

兩岸及美國華人麻醉同道聚餐
2003 年 10 月 11 日 (舊金山)
Banquet with anesthesiologists from
Taiwan, China, and the Chinese
American community
Date: October 11, 2003
Venue: San Francisco



中華醫學會全國麻醉醫學年會，大陸
兩岸麻醉同道相見歡
2004 年 9 月 11 日
Annual National Conference for
the Chinese Medical Association—
Society of Anesthesiologists, Joyous
Meeting of Fellow Anesthesiologists
from Taiwan and China
Date: September 11, 2004



第 13 屆世界麻醉醫師大會，期間
於巴黎聖母院合影
2004 年 4 月 17 ~ 23 日
13th World Congress of
Anesthesiologists
Date: April 17-23, 2004
Venue: Group photograph at the
Notre Dame de Paris

第 13 屆世界麻醉醫師大會，期間
於楓丹白露行宮合影
2004 年 4 月 17 ~ 23 日
13th World Congress of
Anesthesiologists, group
photograph at the Fontainebleau
Palace
Date: April 17-23, 2004



2006 年台灣麻醉年會
2006 年 9 月 23 ~ 24 日
台南大億麗緻
2006 Annual Conference of
the Taiwan Society of
Anesthesiologists
Date: September 23-24, 2006
Venue: Tayih Landis Hotel, Tainan

第二十四屆理事長

蔡玉娟教授

麻醉醫學會六十週年感言

回想 2006 年 10 月從第二十三屆理事長陳大樑教授接下學會職務，即著手編撰麻醉醫學會「五十週年紀念專刊」。當時主編鄒美勇教授，如今已是台北榮民總醫院麻醉部主任，為紀念專刊將原先「四十週年專輯」重新整理、編排，並邀請多位前輩撰稿，將台灣麻醉歷史更加真實的呈現。時光荏苒、歲月如流，一轉眼「六十週年」已至。

我有榮幸機緣參與領導第二十四屆理監事會，回顧當年麻醉醫療糾紛不少，且面臨賠償金額都是天價。為提供相關法律訊息及諮詢，特別新成立醫事法律委員會，由范國棟醫師擔任主任委員，提供醫事法律資訊，並與地方事務委員會主委的黃毓龍醫師（當時為國軍桃園醫院院長）協助會員有關醫療糾紛的處理。

有鑑於麻醉的醫療糾紛常與氣道處理有關，學會也經由何善台教授促成，經由美國 MD Anderson 的蔣樹德

教授的安排下，11 位學會代表在 2007 年 5 月參加在 MD Anderson Cancer Center 舉辦的困難氣道處置研習營。除了課堂上課、模型練習，還包括了 Cadaver 實體操作，這些種子教師也同時學習如何辦好困難氣道處置工作坊。同年九月並在國防醫學中心由廖文進教授負責舉辦學會第一次「困難氣道處置研習營」，並給予認證。之後學會每年舉辦這類課程，希望藉由教育面著手提升會員處理氣道最新的知識和技術。

2007 年在花蓮慈濟醫學中心舉辦年會，也是值得記錄的大事，學會成立第 51 年，第一次跨越中央山脈在東部舉辦。當年慈濟醫學中心麻醉部主任陳宗鷹教授（現已是副院長）以及石明煌院長所帶領的慈濟團隊，完美呈現精緻的會議內容。最令人印象深刻的是慈濟基金會宗教處謝景貴主任，分享國際賑災經驗，連與會的外賓 Prof.Marek Mirski(來自 Johus



2012 年台灣麻醉年會
2012 年 9 月 22 ~ 23 日
台南嘉南藥理大學
2012 Annual Conference of the Taiwan Society of Anesthesiologists
Date: September 22-23, 2012
Venue: Chia Nan University of Pharmacy & Science, Tainan City

Hopkins 醫學中心)，也來信提及慈濟文化所給予的感動。

在雜誌編輯委員會主任委員何善台教授的領導下，本會雜誌年年都獲得國科會的獎勵補助。2007 年底學會與 ELSEVIER 出版社完成簽約，2008 年雜誌全面改版，積極有計畫地逐年提升雜誌水平，短期目標先成為華人最優麻醉學雜誌，長期目標希望進入 SCI 雜誌。這個艱鉅的任務，尚未達成，仍有待後輩繼續努力完成。

2007 年初台灣高鐵通車，悄然改變我們的生活，而同時麻醉專業也面臨一些困境。牙科醫學會希望建立「牙科麻醉專科醫師」制度；婦產科醫學會也希望本會協助訓練產科醫師做減痛分娩。他們不約而同提出麻醉的需求，而當時麻醉專科醫師人力不足，在捍衛麻醉專業的時候，我們必須積極改變思維和態度。當時朱光興常務理事（高雄醫學大學麻醉部主任；現已在高雄市開業）代表學會積極奔走設法解決；臺大醫院陳李魁醫師也針對減痛分娩之問題著文建議。2008 年 5 月立法院召開「誰來鋪平身心障礙牙科麻醉診療坎坷路」公聽會，會前我們研擬應戰對策，從維護麻醉品質和提供麻醉人力支援論點切入，堅

定捍衛麻醉專業。朱光興醫師和吳世銓醫師（當時為中國醫學大學麻醉部主任）代表學會參加公聽會，之後也在朱益宏醫師（當時為中山醫院副院長及健保局醫審會委員）協助與衛生署及健保局斡旋下確保了會員權益，終於解除了危機。

為了維護本會會員參與重症醫療的權益，在重症照護委員會主任委員廖文進教授（現為童綜合醫院副院長）的強烈建議下，2007 年底理監事會議一致通過發行麻醉重症專科醫師證照。於 2008 年 3 月公佈辦法，首任甄審委員會由蔡勝國教授擔任，有 98 位會員通過甄審，同年本會正式進入重症專科醫師聯合甄審委員會，經過這些努力我們在重症加護醫療終有一席之地。

2008 年本會會員余廣亮醫師（現為屏東基督教醫院院長）獲得第 18 屆醫療奉獻獎。余醫師初期至馬拉威主要參與麻醉業務，後來參加馬國愛滋病防治計劃，推展「血庫計劃」、「接生婆訓練計劃」、「愛滋病彩虹門診」等工作，並建立愛滋病患者身分辨識系統，與美國 CDC、WHO 等國際組織進行合作計劃，在馬拉威默默地奉獻了五個年頭，至今每年仍到馬拉威服務。這種默

默服務奉獻的精神與胸懷，不僅是醫界楷模更是麻醉界之光。

除積極參與國際學術會議，學會也與臺大醫院合辦了超音波輔助區域麻醉及血管內導管置放國際研討會。兩岸學術交流也在王志中教授苦心與用心的經營下穩定的發展，當年中華醫學會麻醉學分會主委李樹人教授也相當珍視兩會之交流，他雖於兩年前過世，仍讓我們非常懷念。

還有要提的是在馬偕醫院陳建全主任的建議下，學會特別聘任的資訊委員會的總幹事楊承憲醫師，他雖不

是學會理監事成員，但願意付出寶貴的時間在網站更新上提供很多寶貴建議，並協助完成麻醉重大併發症暨死亡病例之線上登錄系統及推廣麻醉藥物標籤國際標準化，提升麻醉藥物使用的安全性。

行文至此恰聞日本熊本和厄瓜多爾強震（2016.4.16），深感人類之渺小，人生之無常。記錄下任內當時點點滴滴於學會六十週年感言，我們欣慰曾經如此努力的付出，也期許年輕一代繼續接棒，讓麻醉專業的明天更為美好！願大家共勉之！

Yu-Chuan Tsai

24th President of the Taiwan Society of Anesthesiologists

A Few Words for the 60th Anniversary of the Taiwan Society of Anesthesiologists

After taking over the directorship of the Society from the 23rd Director Dr. Chen Ta-Liang in October 2006, we immediately began compiling the 50th Anniversary Special Edition of our Society's publications. The Chief Editor was Dr. Tsou Mei-Yung who is now currently serving as

the chief of the department of anesthesiology in Taipei Veterans General Hospital. To commemorate our 50th Anniversary, we reorganized our 40th Anniversary Special Edition and invited many of our leading predecessors to submit articles on the history of anesthesiology in

Taiwan. Time went rapidly by and we are now celebrating our 60th Anniversary.

I felt deeply honored to be nominated as the leader of the 24th board of directors and supervisors of our Society. Back then, we were affected by a large number of medical disputes associated with anesthesiology, and the compensation fees demanded at that time were astronomical. In order to provide legal information and counseling, the Society established a Medical Law Committee and appointed Dr. Fan Kuo-Tung as its chair. The Committee offered information on medical law and worked with Dr. Huang Yu-Lung (then superintendent of the Military Taoyuan General Hospital) to help members of the Society in handling these medical dispute.

Since medical disputes of anesthetics were often related to airway management, the Society also appointed Dr. Ho Shan-Tai to form a 11-member delegate and worked with Dr. Joseph S. Chiang of MD Anderson to attend a difficult airway management workshop held at the MD Anderson Cancer Center in May 2007. In addition to courses, practice models, and cadaver operations, the seed instructors who participated in this workshop also learned about the means of organizing a proper difficult airway management workshop. In September of the same year, Dr. Liao Wen-

Chin was assigned to host the first Difficult Airway Management Workshop of the Society at the National Defense Medical Center. The Society then began to organize these workshops on a regular basis, hoping to educate our members on the latest knowledge and techniques of difficult airway management.

In 2007, we organized an annual meeting at the Hualien Tzu Chi Hospital. This was a memorable event as this was the first time that the Society organized an event on the eastern side of the Central Ranges since the Society's founding 51 years ago. The Tzu Chi Hospital medical team led by head of the department of anesthesiology Dr. Chen Tsung-Ying (now deputy superintendent of the hospital) and superintendent Shih Ming-Huang gave a number of well-designed meeting presentations. The most impressive of which was the presentation provided by director Hsieh Jing-Guei of the Religion Department of the Tzu Chi Foundation, who shared his experiences in international disaster relief efforts. Overseas VIP Prof. Marek Mirski (from Johns Hopkins Medicine) also provided a letter that provided a moving description of Tzu Chi culture.

Under the leadership of Dr. Ho Shung-Tai, chief of the editorial committee of the Society's publication *Acta*

Anaesthesiologica Taiwanica, we have received rewards and subsidies from the National Science Council every year. In 2007, the Society formally entered into an agreement with ELSEVIER and we completely reformatted our journal in 2008 as part of our active and systematic program for improving the journal's standards. Our short-term goal is to become the best professional journal on anesthetics in the Chinese-speaking world, and our long-term goal is to become an SCI journal. We have yet to achieve these goals, and would be counting on the younger generation to accomplish this for us.

The high-speed rail (HSR) system also became operational in 2007. This brought subtle changes to our lives, but the profession of anesthesiology also faced certain difficulties. The Association for Dental Sciences of the Republic of China hoped to establish the profession of dental anesthesiologists. The Taiwan Association of Obstetrics and Gynecology also hoped that our Society could support training programs on painless childbirth for obstetricians. These associations have voiced their needs for anesthesiologists. It also happened that the medical care sector was lacking in these professionals. While defending the professionalism of anesthesiology, we must also reform our

mindsets and attitudes. Director of general affairs Dr. Chu KS (then chief of the Kaohsiung Medical University department of anesthesiology; Dr. Chu now has his own practice in Kaohsiung City) took on many tasks to help the Society solve these issues. Dr. Chen Li-Kuei of National Taiwan University Hospital also wrote a paper on recommendations for painless childbirth. In May 2008, the Legislative Yuan held a public hearing on the question regarding the difficulties of dental and anesthetics diagnostics and treatment for the disabled. Prior to the hearing, legislators consulted our strategies and defended the profession of anesthesiology using the argument of safeguarding the quality of the medical practice and providing measures to solve the lack of human resources in the profession. Dr. Chu KS and Dr. Rick Wu Sai-Chuen (then head of the department of anesthesiology of China Medical University) represented our Society and attended these public hearings. Later, Dr. Chu Yi-Hung (then deputy superintendent of Chung Shan Hospital and member of the review committee of the National Health Insurance Administration) also defended the rights of our members by negotiating with the Department of Health and the National Health Insurance Administration, ensuring the successful conclusion of this crisis.



In order to safeguard the members of this Society and their rights to participate in critical medical care, Dr. Liao Wen-Chin, chairman of the critical care committee (now superintendent of Tung's Taichung MetroHarbor Hospital) actively pushed for a specialist license for critical care anesthesiologists. This was unanimously approved by the Society's board of directors and supervisors at the end of 2007. Relevant regulations were promulgated in March 2008 with Dr. Tsai Shen-Kuo appointed as the first chairperson of the review committee and a total of 98 members of the Society were qualified in the review process. The Society also formally established a joint review committee with critical care specialists during the same year. Such efforts helped ensure that we were able to secure a footing in critical and intensive care as well.

In 2008, Dr. Joseph Kwong-Leung Yu (current superintendent of Pingtung Christian Hospital), a member of our Society, received the 18th Medical Dedication Award. Dr. Joseph Yu first visited Malawi to provide anesthesiology services. He later participated in the Malawi AIDS Prevention Program and was pivotal in establishing the Blood Banks Project, Midwives Training Program, Rainbow Clinical Services for AIDS Patients, and

AIDS patient identification system. Dr. Joseph Yu also participated in numerous collaborative projects with the American CDC, WHO, and other international organizations. Having contributed five years of his life in providing medical services in Malawi, Dr. Joseph Yu still visits the country every year to offer his assistance. This spirit of contribution and services make Dr. Joseph Yu an angel in the field of anesthesiology, if not the entire medical profession.

In addition to participating in international academic meetings, the Society also worked with National Taiwan University to jointly organize international conferences on ultrasound-supported regional anesthesia and intravascular catheter placement. Dr. Wang Jhi-Joung was a dedicated supporter of cross-strait academic exchanges. The late Dr. Li Shu-Ren, who was chairperson of the Chinese Medical Association - Anesthesiologist, also placed great importance on the exchanges between the Association and our Society. However, Dr. Li passed away two years ago, and he is still dearly missed.

Another worthy mention would be Dr. Yang Cheng-Hsien, chairperson of the IT committee that we have specifically appointed under the recommendation of Chairperson Dr. Chen Chien-Chuan of

MacKay Memorial Hospital. Although Dr. Yang was not a director or supervisor of our Society, he was willing to contribute his valuable time and offered many useful recommendations on revising our official website. Dr. Yang also supported the establishment of the online registration system for severe complications and deaths resulting from anesthetics and promoted global standards in the labeling of anesthetics to improve the safety of using anesthetics.

The disastrous earthquakes at Kumamoto in Japan as well as Ecuador (April 16, 2016) remind us of the fragility and unpredictable nature of human lives. These are just some of my words for the 60th Anniversary of our Society. I was glad to be able to contribute towards its growth, and look forward to the younger generation in taking over our roles and create a better future for the profession of anesthetics. Let us celebrate our anniversary and work hard for a better tomorrow!



第二十六屆理事長

范守仁教授

出生日期：民國 45 年 10 月 15 日

畢業學校：台灣大學醫學院臨床研究所博士、台灣大學資訊管理研究所 EMBA 管理碩士

學會任期：民國 97 年 10 月至民國 99 年 10 月

重要工作成果：

- 1、積極爭取健保合理補助：在健保財務吃緊，論件計酬二代健保制度下，積極參與政府會議，除了內、外、婦、兒、急五大科外，爭取使得麻醉科為唯一被加成增加健保給付之次專科。
- 2、爭取專科醫師訓練員額，依公平原則分配於各訓練醫院：面對新制專科醫師訓練 PGY 制度的改革，麻醉科突破其他少數次專科，在沒有縮減情況下，還由原本的 50 名增加至 56 名醫師訓練員額。透過各理監事及功能委員會共同來加強制定專科醫師考試及訓練辦法之公平性與完整性，訓練更優良的專科醫師，提升醫療品質。
- 3、財務資訊透明化，學會永續經營及發展：改善財務平衡，持續維持健全的財務，將會址收回重新整理，有一個固定會址，鞏固本學會凝聚力及穩定性，秘書處人

員也能接續，會務推展更加順利完善。

- 4、持續提升麻醉學雜誌水準：推動麻醉學雜誌進入 SCI 期刊外，擬定辦法，鼓勵研究者，將優秀的文章投稿到本會雜誌。
- 5、推展國際及兩岸學術交流：麻醉學術交流日益頻繁，增加舉辦國內國際學術研討會場次，邀請國內外知名的專家學者來台演講，提升國際觀。



Shou-Zen Fan

26th President of the Taiwan Society of Anesthesiologists

Date of birth: October 15, 1956

Alma mater: Ph.D, Graduate Institute of Clinical Medicine, College of Medicine, National Taiwan University

EMBA., Department of Information Management, National Taiwan University

Term: October 2008 to October 2010

Major achievements:

1. Actively secured reasonable support for National Health Insurance payouts: As National Health Insurance (NHI) funds began to dwindle and enforcement of the case-by-case review of the second-generation NHI, the Society actively participated in government meetings to secure additional NHI payouts for anesthetics. Thus becoming the only medical specialty to receive these payments in addition to medicine, surgery, obstetrics and gynecology, pediatrics, and emergency medicine.
2. Secure more training positions for diplomates and adopt fair allocation to training hospitals: The new post-graduate year (PGY) training for diplomates was subject to reforms. Nevertheless, the field of anesthetics managed to avoid any slashing of training opportunities.

Instead, the number of training positions was increased from the original 50 to 56.

Every director, supervisor, and functional committee were committed to improving the fairness and integrity of regulations governing diplomate exam and training in order to ensure the training of quality anesthesiologists and improvement of medical quality.

3. Transparency of financial information as well as sustainable management and development of the Society: Financial balance was improved upon to maintain a healthy budget. Society HQ was restored to provide a permanent address to build cohesiveness and stability of the Society's development. The permanent site also allows personnel of the Secretariat's Office to handle various affairs and ensure successful implementation of the Society's affairs.
4. Continual improvements to the

Society's journal: Promoted Acta Anaesthesiologica Taiwanica as an SCI publication. Formulated regulations to encourage researchers in submitting and publishing quality research articles through our journal.

5. Promote international and cross-strait academic exchanges: Improved the frequency of academic exchange for anesthesiology and increased the number of local and international academic conferences in the field. Invited renowned experts and academicians from Taiwan and other countries to provide lectures to improve the Society's global vision.

第二十七屆理事長

廖文進教授

出生日期：民國 49 年 11 月 6 日

畢業學校：國防醫學院醫學系及醫學科學研究所博士班

學會任期：民國 101 年 10 月至民國 103 年 10 月

重要工作成果：

- 1、增設四功能委員會，包括「海峽兩岸交流委員會」、「鎮靜麻醉委員會」、「進階氣道教育訓練委員會」與「醫學模擬人委員會」，尤其末者專責擬真情境臨床技能教育與測驗事宜，深受學員肯定。
- 2、推動本會重症專科甄審，並開始正式發行麻醉重症專科醫師證書。其後，促使本會加入成為「重症專科醫師聯合甄審委員會」會員學會之一，確保本會會員權益

並奠立麻醉於重症領域之地位。

- 3、重建本會資訊網頁，並由委託會員操辦改由秘書處統籌管理，及建立新的住院醫師麻醉執行案例上傳與審核機制，改善報考專科醫師審查流程。
- 4、參與制訂醫策會醫美認證審查條文，並為從事醫美之非麻醉專科醫師人員設計與舉辦「鎮靜與氣道維護訓練課程」，提升病人安全，善盡社會責任。
- 5、爭取健保給付提升，使全身麻醉各項點數調整增加 2%，並爭取衛福部麻醉住院醫師訓練容額分配從 49 人增加至 54 人。
- 6、完成本會麻醉專科醫師訓練計畫認定基準，符合衛福部專科醫師訓練委員會 (RRC) 新制。
- 7、設立「台灣麻醉醫學會終身成就暨貢獻獎」，向本會滿二十年以



圖一：2013 年兩岸麻醉專家學術交流 20 週年於大陸天津中華醫學會麻醉學分會 (CSA) 年會合影。



圖二、三：2013 年兩岸學術交流 20 週年麻醉專家代表於天津 CSA 年會座談後合影。

11、收回永久會址辦公室，整修後開啟於本學會會址舉行理監事會議之先河。



圖四：2013 年兩岸學術交流 20 週年麻醉專家代表於台灣麻醉醫學年會會場合影。

上，並已逾法定退休年齡或已經退休之資深會員有特殊貢獻者，致上最高敬意。

8、主辦兩岸麻醉學術交流 20 週年紀念大會，增進兩岸互動情誼。

9、率先於本學會學術年會採用電子報到系統與電子海報論文發表。前者採單一窗口報到機制，降低排隊等候時間；後者則節能減碳，愛護地球。

10、率先於本學會理監事選舉採用電子記票系統，省時並降低錯誤，提升效率。

Wen-Jinn Liaw

27th President of the Taiwan Society of Anesthesiologists

Date of birth: November 6, 1960

Alma mater: Ph.D., Graduate Institute of Medical Sciences, National Defense Medical Center

Term: October 2012 to October 2014

Major achievements:

1. Added 4 functional committees, namely: (1) Cross-Strait Exchange Committee; (2) Sedation Anesthesia Committee; (3) Advanced Airway Management Training Committee; and (4) Medical Simulation Committee. The last committee was well received by the trainees as it was responsible for simulating actual clinical scenarios during technical training and assessments.
2. Promoting critical care specialist review, and began the issuance of professional licenses for critical care anesthesiologists. Encouraged this Society to be a member association of the Joint Review Committee for Critical Care Anesthesiologist to safeguard the rights and interests of this Society's members and establish anesthesiology as a key profession in critical care.
3. Reorganized the information webpage of this Society. Instead of commissioning

Society members, this task was allocated to the Secretariat. Also established an anesthetics case upload and review system for new resident officers to improve the review process of physicians who intend to apply for specialist examinations.

4. Participated in stipulating articles governing the certification and review of aesthetic medical practitioners for the Taiwan Joint Commission on Hospital Accreditation (TJHA), and provided Sedation and Airway Management Training courses for non-anesthesiologists in the practice of aesthetic medicine to promote patient safety and fulfill our social responsibilities.

5. Supported improvements to insurance payments so that various types of general anesthesia would be given 2% more points. Also supported the training capacity for Ministry of Health and Welfare (MOHW) anesthetics residents

from 49 to 54 individuals.

6. Completed the approval basis for the anesthesiologist training program of this Society in compliance with the new standards (RRC) adopted by the MOHW specialist training committee.
7. Established the Lifetime Achievement and Contribution Award of the Taiwan Society of Anesthesiologists. Individuals with outstanding contributions who have held membership of this Society for more than 20 years and have exceeded the legally stipulated age of retirement or senior members who have already retired would be provided with this award that represent the highest level of commendation from this Society.
8. Organized the 20th Anniversary Conference of Cross-Strait academic exchange in anesthesiology to promote Cross-Strait relationships.
9. First deployed an electronic sign-in system and publication of digital posters and papers for the Society's annual academic conference. The electronic sign-in system provided a single counter to receive guests, eliminated waiting lines, and helped conference attendants save time. The latter was a green attempt of energy saving and carbon reduction.
10. First deployed the electronic voting system for the elections of Society

directors and supervisors. This system saved time, reduced errors, and enhanced voting efficiency.

11. Recover the permanent site of the office and first of all hold board meeting in the institute of venue after renovation.

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Figure 1. The 20th Anniversary of the Cross-Strait Anesthesiologist Exchange Conference held in 2013. Group photograph at the Chinese Medical Association – Society of Anesthesiologist (CSA) at Tianjin, China.

Figure 2&3. Representatives of anesthesiologists at the 20th Anniversary of the Cross-Strait Exchange Conference in 2013. Group photograph at the Tianjin CSA after the conference.

Figure 4. Representatives of anesthesiologists participating in the 20th Anniversary of the Cross-Strait Exchange Conference. Group photograph at the conference venue of the Taiwan Society of Anesthesiologists.

麻醉歷史回顧

Historical Reviews

導讀：安全的麻醉，成就完善的手術

撰文 / 范守仁 教授 (台灣麻醉醫學會理事、臺大醫院麻醉部一般科主任)

2016 的今年適逢台灣麻醉醫學會一甲子年紀念，很榮幸受六十年會刊籌備會簡志誠主任委員邀請，為本刊撰寫導讀文。

時間過得很快，轉眼間，我從開始執行麻醉專科工作到現在，已經過了三十多年的光景，在這時代改變、術前訪視與麻醉衛教推行的世代，病人對於麻醉認知不再是一無所知，面對麻醉專科醫師時，都能提出相關的麻醉疑問以尋求解答。而麻醉工作最終的目的，其一就是希望讓外科順利完成手術，再者讓病人在安全舒適的狀態下接受手術、術後恢復快、預後更佳，所以在一場手術開始到結束，麻醉專科在每一個環節都佔了要角。

能順利完成一場手術，在麻醉的部分除了醫師的專業外，麻醉儀器、相關醫材及麻醉藥品，相對的也很重要。隨著科技進步，麻醉儀器、相關醫材一直推陳出新，而因應資訊電子化，麻醉機從機械式與半電子式發展成電子式全功能。手擠皮囊供氣演進

到氣體驅動風箱系統，再進步到唧筒式，供氣更精準；傳統喉頭窺鏡，發展成各種型態與尺寸的可視喉頭鏡，降低困難插管的比例；氣管內管從橡皮材質，發展成各種更佳更符人體工學的材質，避免氣管造成傷害；病人的生理徵象監測，由單一功能到模組化系統等改良進步，這些變遷正所謂的「良工之須利器，巧匠之待繩墨也」。優良的器材，方能成就更安全完善的手術。

雖然大家都是麻醉專科醫師，但我們對每天接觸的麻醉相關機器、醫材與藥品之發展沿革，其實並不盡然了解。在本次收錄的文章中，將麻醉的重要相關知識集結在這裡，內容囊括麻醉機器、麻醉醫材及麻醉藥品等三大類。潔昇興業股份有限公司則將麻醉機複雜的發展演進，用有條理而清楚的文字呈現；看過前茂企業股份有限公司對台灣麻醉醫材之淺述，執行臨床工作時，必能更加體會相關器材設備的不斷改良進步；而瑞士商艾

伯維藥品有限公司介紹麻醉藥品，透過淺顯易懂的文字，讓年輕一輩更快了解在不同的麻醉方式下，如何應用各類藥品之特性及效能。

台灣麻醉專科發展至今一晃眼已六十載。這麼長的年歲裡，麻醉前輩先進們使用簡易的器具材料執行麻

醉實為不易，而我們現今能擁有專業新進的資源，無論對病人或醫療端而言，都是相當幸福的。感謝麻醉產品廠商一起為病人麻醉安全努力，我們也該珍惜並善用這些前人的心血結晶。

Introduction : Safe Anesthesia Achieves Perfect Surgery

Shou-Zen Fan, M.D.
Board of Director, Taiwan Society of Anesthesiologists
General Director, NTUH

2016 is the 60th anniversary of the Taiwan Society of Anesthesiologists. I am proud to be invited by the chairman of the preparatory committee of the society, Mr. Chih-Cheng Chien, to write a preface for the 60th anniversary special issue.

As a specialist as an anesthesiologist for more than 30 years, I have witnessed the progress of this specialty. However, patients receiving anesthesia also demand more than the basic need of safety, but also asking more comfortable and pain-free recovery. In this case, the ultimate missions of an anesthesiologist not only limit to complete the surgery successfully, but also

provide a safe and comfortable environment for patients to receive anesthesia. The anesthesiologist plays an important role as a competent perioperative physician.

To complete a surgery, in addition to a knowledgeable anesthesiologist, advanced anesthesia apparatus, related medical devices and effective anesthetics are also very important. By the advance of technology, anesthesia apparatus have become electronic: from mechanical apparatus, semi-electronic style to automatic full-equipped machines. For example, the anesthetic machine has advanced from bags and then bellows



system to the current Piston. The traditional laryngoscope has advanced into full size video-assisted laryngoscope to reduce the difficulty of intubation. Moreover, the vital sign monitoring system was also advanced from single function to complex modules. These evolutions exemplify the traditional saying “An effective tool is necessary for good work”; that is, only excellent equipment can help achieve a successful operation.

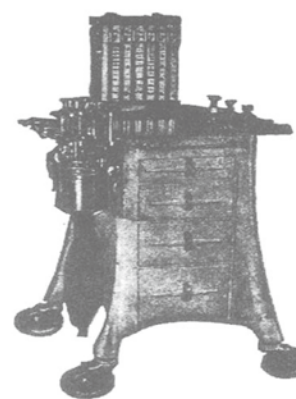
Although we all are anesthesiologists, we are not so familiar with the development or evolution of anesthesia apparatus, medical devices and medications. In this special issue, Jason's Medical Co. Ltd. used clear and itemized texts to describe the complex progression of anesthesia apparatus. Cemima Enterprise Co., Ltd. has made the hard lessons of anesthesia devices in Taiwan easy, so anesthesiologists could be more aware of the details of the apparatus and thereby excel clinical practice. AbbVie Inc. used easy to understand words to explain and introduce inhalational anesthetics, so the young doctors could rapidly apply such medications to clinical practice to maximize the property and optimize the efficacy of the drugs.

It was quite challenging for the senior anesthesiologists during the past 60 years

to practice with such simple devices. Now we are lucky to have more professional and advance devices, which are great benefits to both patients and the healthcare staffs. We thereby appreciate anesthesia products vendors for their efforts on patient safety improvement and provision of so many professional devices and effective anesthetics for our society.

台灣麻醉醫材淺述

拜科技之賜，隨著各種醫療器材不斷地研發與改良，麻醉臨床工作中所使用的相關器材與設備，皆有了長足的進步。本文略述一二，除了緬懷那段筆路藍縷的歲月，表達對前輩先進們的敬意之外，也對現今所擁有的各種先進資源更加心懷感激與珍惜。



圖一：民國 38 年由上海江灣運至台灣之全身吸入式麻醉機。

麻醉器材在台灣的演進，自民國 38 年政府遷台時，由上海隨國防醫學院來台那部無人會用的全身吸入麻醉機起，至今已超過半個世紀。回顧過去那段披荊斬棘的歲月，當時的麻醉器械極度地缺乏，麻醉劑也僅乙醚及 Pentothal 可用而已。有「台灣麻醉之父」尊稱的陸軍第一總醫院（現三軍總醫院前身）王學仕醫師所用的器具，還是由軍醫署庫房中找出的大型喉頭窺鏡，以及成人用橡皮氣管內管，惟因存放過久，又無人保管，橡皮甚軟，極易彎曲甚至阻塞。王學仕醫師在其「麻醉生涯三十年」文章裡

描述，當時用乙醚開放點滴麻醉法，真是十分困難，常在手術前一小時就得開始麻醉，麻醉中病人時睡時醒，喉口咯咯有聲，牙關經常緊閉，呼吸半通不通，瞳孔忽大忽小，脈搏時快時慢，真可謂盲人瞎馬，夜臨深池，如臨深淵，如履薄冰。麻醉一小時後，氣管內管有時仍不得其門而入，有時弄得血流滿口，間或牙齒脫落。有時



圖二：台灣麻醉之父王學仕醫師。



圖三：乙醚面罩，此為具有金屬網的面罩，可覆蓋數層紗布，將乙醚溶液點滴其上，行開放性乙醚麻醉，為最早期的麻醉方式。病人、麻醉醫師、手術醫師大家一起分享麻醉藥。

腹部脹大，放了半天，氣管內管變成食道內管，只得拔出，從頭開始。當時能夠一個小時內將管子插入氣管，已經是老天爺幫忙了。而也因為有這根管子的插入，國內胸腔外科才得以蓬勃發展，且有一日千里之勢。由此看來，這一氣管內管應居首功。

拜科技之賜，臨床麻醉工作隨著各種醫療器材的研發與改良，不斷朝向更安全與便捷的目標前進。時至今日，不論是麻醉藥物的供輸、呼吸控制、病患各種生理參數／血液動態的監測、氣道的處置管理及各種動／靜脈通路……等，皆有了長足的進步，不可同日而語。

臨床麻醉的主角--麻醉機，自當年的軍用全身吸入麻醉機以來，從簡單的手擠皮囊供氣演進至後來的氣體驅動風箱 (Bellow) 系統 (至今仍為部分廠家沿用)，再進步到精確快速的

唧筒 (Piston) 式供氣呼吸總成。現今最新機型之呼吸總成部分，更已達到 ICU 等級呼吸機效能，配備多種不同呼吸支持模式，可自動或手動調整／設定來因應多變的臨床狀況與需求，並進一步以渦輪 (Turbine) 驅動供氣，不但供氣更精確、快速，並能使麻醉藥物與新鮮氣體快速充分混和，達到最佳效能。

在病患生理監測方面，從最原始的一隻手擠壓供氣皮囊，另一隻按住呼吸面罩的手，還要騰出一隻手指按壓頸動脈檢查脈搏開始，各種生理監測技術不斷被發明並應用於臨床麻醉中。時至今日，心電圖、心跳、血壓、



圖四：民國 40 年陸軍第一總醫院 (現三軍總醫院前身) 借給臺大醫院之 OHIO 軍用全身吸入麻醉機。

呼吸、動脈血氧飽和、血液氣體分析、呼氣末氣體分析等，幾乎已是手術中的基本配置。各廠家也競相推陳出新，從單一功能到各式模組化系統、中央監視站等，使病患安全與監測愈加完善與便利。

配合各項血液動態監測，各種動／靜脈導管除了提供測量的通路，也是各種藥物、液體、血液製劑等進入人體的途徑。靜脈內輸液從早期的金屬針具，發展到周邊靜脈的套針導管 (IV catheter)，再演進到中心靜脈導管 (CVC)，給臨床處置帶來極大的便利。1980 年代，國內引進美國 ARROW 公司的一系列中心靜脈導管產品，能以 Seldinger 技術，藉由導引線將導管經皮置入中心靜脈，可安全、快速地建立一個壓力監測與大口徑的輸注通路。其他如肺動脈熱稀釋導管 (Swan-Ganz catheter) 的引進，不但使病患心輸出量得以測量，同時亦可取得病患左、右心的前負荷 (Preload) 與右心後負荷 (Afterload) 參數。

隨著醫學技術不斷精進，高齡人口也隨之增加，多重病因的病患日益增多，使得臨床處置更增複雜性。各種具特定監測目的的器材也應運而生，廣為使用且具重要地位者如下：

PiCCO 監測技術：90 年代後期，由德國研發的 PiCCO 監測技術被導入國內，不但能連續監測病患心輸出量，更能測量一系列心肺容積參數，甚至肺水容積量。將血液動態由壓力監測進一步擴展至容積監測管理，使得血液動態資訊更臻完整。

BIS 病患意識／麻醉深度監測：提供麻醉藥物對病患作用結果的直接參數，使得臨床上對麻藥劑量的控制能更趨理想，達到提升麻醉安全、避免麻醉中甦醒、節省用藥、術後恢復快、預後較佳等成效。

INVOS 腦部血氧飽和度監測：可評估病患腦部氧氣供應與消耗是否達到平衡，避免術中因血液動態改變等因素使腦部供氧不足，造成腦部缺氧甚至嚴重損傷。特別是在高風險病患接受危、重大手術時，腦部血氧監測提供了一個極佳的臨床參數。

在氣道管理方面，當初對胸腔外科手術蓬勃開展居功至偉的氣管內管，拜材料科學進步之賜，也從極易彎折阻塞的橡皮軟管，發展到今日各種極佳的材質。熱敏式材料讓管身具有極佳的支撐性以便於置入，置入後能因體溫而變得較為柔軟，以避免對氣管造成傷害。有些具鋼絲環繞的強

An Introduction to Anesthesia Medical Devices in Taiwan

Abstract

Thanks to advanced technology, various medical devices are being developed and improved. Devices and equipment used for anesthesiology are advancing accordingly. While celebrating the 60th anniversary of Taiwan Society of Anesthesiologists, we would like to take this chance to honor those predecessors who devoted themselves to the development of Anesthesiology in Taiwan.

Anesthesia devices have evolved in Taiwan. From the time when no one was able to use the inhalation anesthesia machine, half a century has elapsed since 1949. It came with National Defense Medical Center from Shanghai. Recalling the difficult times when anesthesia devices remained scarce, only ether and Pentothal were available as anesthetics. Recognized as “Father of Taiwan Anesthesiology”, H. S. Wang served as a doctor in Army First General Hospital (the former of Tri-Service General Hospital). Tools used by H. S. Wang were a laryngoscope and a rubber-coated endotracheal tube for adult found in the warehouse of Medical Department. These tools were left unattended so the rubber was very soft and prone to bending and even being blocked. In the article "Thirty Years of Anesthesia Career", Doctor H. S.

Wang stated that there was great difficulty in using ether open drip anesthesia. Anesthetic procedure usually started an hour prior to operation. For the duration of anesthesia, conditions such as creaking throat, clenched teeth, irregular respiration pattern, changing pupil sizes, and unstable pulse were observed. The effect of sedation was ambiguous and the treatment was pretty difficult. After an hour of anesthesia, insertion of endotracheal tube sometimes failed and caused mouth trauma. Besides, it might lead to esophageal intubation with swelled abdomen. Therefore, the tube had to be removed and the procedure had to be restarted. It was considered smooth if the endotracheal tube could be successfully inserted within one hour then. This procedure of intubation promoted the rapid development of domestic thoracic surgery.

化管身，甚至可以承受任意彎折、擠壓，使得部分特殊體位的手術也能順利進行。在管子前端加上了可充氣的氣囊，以有效地封閉氣道。氣囊型態也從原創的小容積氣囊，發展成高容積、低壓力氣囊，以進一步保護病患氣管壁。其後，雙腔支氣管內管應用於術中單肺通氣，亦使得心／胸外科手術能更進一步地蓬勃發展。在這期間，插管工具也從當年的大型喉頭窺鏡，發展成各種形態與尺寸的喉頭鏡。喉頭鏡葉片前端照明光源，亦從會發熱的燈泡進步為以光纖傳導。2003年，GlideScope 電子影像喉頭鏡引進國內，為插管帶來全新的視界，不但降低了困難插管的比例，也拉大了醫師與病患口鼻間的距離，降低醫護人員受感染的風險，可謂插管工具的全新紀元。其後的幾年，各種型態的影像喉頭鏡如雨後春筍般湧現，一時蔚為風潮，至今未衰。

術中輸血／輸液以及病患體溫維持與調控在臨床上也是一個影響預後極重要的課題。在病患需要緊急且大量輸血／輸液的情況下，Level 1 快速輸血／輸液加溫系統的引進，使得大量血袋來不及以熱水盆浸泡回溫的窘境得以解決。熱風式溫毯機、液體

循環式冰／溫毯機等，也給病患體溫管理帶來極大的方便。其他還有如經食道超音波的應用，使得心臟手術能更蓬勃地發展。隨著靜脈內麻醉的普及，各式輸液泵浦、空針泵浦、新型標靶控制輸液 (TCI) 系統等，也被廣泛地應用於臨床。

麻醉臨床工作中所使用的相關器材與設備林林總總，多不勝數，無法一一詳述。以上略舉數項，除了緬懷那段筆路藍縷的歲月，對前輩先進們一步一腳印走過的點點滴滴表達敬意之外，也期許臨床工作者及受惠病患對現今所擁有的各種先進資源更加心懷感激與珍惜。

Due to technological advances, anesthesia tends to be safe and convenient with developed and improved medical devices. To date, there has been significant improvement in delivery of anesthetics, respiration control, vital signs/hemodynamic parameters monitoring, airway management and various arterial/venous accesses.

Anesthesia machine, which plays a major role in anesthesiology, evolved from the previous military inhalation anesthesia machine operated by manual squeezing bladder. Such ventilator system is followed by the gas-driven Bellow system, which is still used by some vendors now. It has evolved into accurate fast Piston type ventilator system. Equipped with multiple ventilation modes, the latest model has achieved ICU level performance. It responds to changing clinical conditions and needs by automatic or manual adjustment/setting, and further supplies air in a Turbine driven manner. This makes ventilation more accurate and efficient, which assists in sufficient mixture of anesthetics and fresh air to achieve optimal performance.

Beginning from using one hand squeezing air supply bladder with another hand pressing respiratory mask, and at the same time, using one thumb to check carotid pulse, various patient monitoring

technologies have been invented. Nowadays, basic configurations during operation include electrocardiogram, heart rate, blood pressure, respiration, arterial oxygen saturation, blood gas analysis and end-expiratory gas analysis. Suppliers keep launching new products, from single functional monitoring systems to multiple modular systems and central monitoring stations, to ensure patient safety and monitoring system more mature and convenient.

In conjunction with hemodynamics monitoring, various arterial/venous catheters are used for not only measurement, but also medicine infusion accesses, solution and blood products. Intravenous infusion evolved from metal needle to peripheral intravenous catheter (IV catheter), and followed by central venous catheter (CVC). CVC provides much convenience to clinical management. In 1980's, a series of US-origin ARROW CVC products with Seldinger technology were introduced to Taiwan. Thus, physicians can insert catheter into central vein percutaneously, and establish a platform for pressure monitoring and large bore infusion safely and quickly. Introduction of other products like pulmonary artery thermodilution catheter (Swan-Ganz catheter) allows cardiac output, preload and afterload measurement.

Continuously advanced technologies, expansion of aging population, and increase of patients with multiple diseases lead to more complicated clinical management. Devices with specific monitoring purposes are generated consequently.

PiCCO Monitoring Technology: In late 1990's, Germany-origin PiCCO monitoring technology was introduced to Taiwan. It monitors not only cardiac output continuously, but also pulse contour cardiac output and lung water volume. Hemodynamics is extended from pressure monitoring to volume monitoring, yielding comprehensive hemodynamics information.

BIS Brain Monitoring System: BIS monitoring provides direct parameters of anesthetic effects, facilitating physicians to control anesthetic dose ideally. This contributes to anesthesia safety improvement, awareness reduction, economizing anesthetics consumption, recovery acceleration, and better prognosis achievement.

INVOS Cerebral/Somatic Oximetry: During operation, insufficient brain oxygen supply may be encountered due to hemodynamics change. Using INVOS to evaluate the balance between supply and consumption of brain oxygen could avoid the above issue, and prevent brain from hypoxia and even severe damage.

INVOS provides a perfect clinical reference especially for high-risk patients undergoing dangerous, major operations.

With respect to airway management, endotracheal tube plays an important role which booms thoracic surgery. It used to be easily kinked and occluded rubber tubes. And now with the improvement of material technology, various innovative materials are brought to play. Thermosensitive materials provide good support when insertion and avoid trachea damage because tube softens with body temperature after intubation. Integral stainless steel reinforcing wire provides a safe and kink resistant airway regardless of surgical positions. Air-filled cuff design seals airway securely. The form of cuff used to be low volume and transformed into high volume/low-pressure, which protects trachea wall better. Hereafter, double lumen endotracheal tube is applied to one lung ventilation during operation, which makes cardiothoracic surgery a leap further. Intubation tools, such as laryngoscopes, were bulky and now are handy and compact with a variety of forms and sizes. The illumination of the blade also upgrades from bulb to optical fiber. In 2003, with the introduction of Glidescope video laryngoscope system, it brought intubation to a whole new level. Not only reducing of difficult intubation but also providing safer

distance between physicians and patients, which decreases infection risk of clinicians. In the following years, diverse video laryngoscopes boom successively as a trend until now.

Transfusion/infusion and temperature management during operation are also vital variables of prognosis. When urgent and massive transfusion/infusion is needed, the introduction of LEVEL 1 Fluid Warming System provides great solution to the problem that massive blood bags cannot be warmed in time. Equator Convective Warmer makes temperature management much easier. Besides, the application of transesophageal echocardiography to cardiac surgery facilitates large-scale diversified development. With popularity of intravenous general anesthesia (IVG), various types of infusion pumps, syringe pumps, even novel target control infusion (TCI) systems are utilized widely by clinicians.

There are various devices and equipment used in clinical daily practice. The above listed are only for reference. We are confident that patients and clinicians will benefit from the prevailing technology. Meanwhile we look forward to more innovations and domestics to pave the road for a better anesthesia industry.

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Figure 1. Inhalation anesthesia machine from Shanghai in 1949.

Figure 2. Dr. H. S. Wang.

Figure 3. Ether open drip anesthesia mask.

Figure 4. OHIO military inhalation anesthesia machine of the Army First General Hospital (The former of Tri-Service General Hospital) was lent to NTU Hospital in 1951.

麻醉藥品的沿革

麻醉醫學直到十九世紀中期才漸漸為人們所重視而研究，是較晚進才開始發展的專業醫學。麻醉藥品及知識的演進，提供外科手術更佳的环境及許多疾病治療的可親與可近性；提升麻醉品質及病人安全，是目前提升醫療品質的重要議題。

麻醉的操作可以追溯到遠古時期，但是有關麻醉專業學科的主要進展，乃開始於十九世紀中期才漸漸為人們所重視，進而研究及建立相關資料。現代外科手術的進展不僅受制於對於疾病進程及解剖學的知識不足，也受限於缺乏安全可靠的麻醉技術。麻醉技術的進展起於吸入性麻醉，接著是局部和區域性的麻醉，最後是靜脈注射麻醉。

吸入性麻醉(Inhalation Anesthesia)

最先使用的全身性麻醉劑是吸入性麻醉劑：乙醚(ether)、笑氣(nitrous oxide)和氯仿(chloroform)。

乙醚首先在1540年由Valerius Cordus所製造出來，但是當時沒有把它當做是麻醉性藥品用在人類身上。直到西元1842年，Crawford W. Long

和William E. Clark才把它單獨使用在病人身上。四年後，即1846年十月十六日，William T.G. Morton在波士頓操作了第一個文獻上有記載使用乙醚的全身麻醉。

笑氣於1722年由Joseph Priestely所製造出來，但是它的麻醉性質直到1800年才被Humphry Davy所發現。1844年，Gardner QunicyColton第一個使用笑氣來當做麻醉氣體應用於人體，他示範了如何用笑氣進行麻醉，與會的牙醫師Horace Wells，也由此意會到可以用笑氣進行牙科手術麻醉。

氯仿是在1831年由Von Leibig, Guthrie和Soubeiran單獨製造出來，於1847年率先在臨床上被Holmes Coote使用為麻醉氣體。真正的臨床應用是由一位婦產科醫師James Simpson推廣，使得病人可以免於生產時分娩的疼痛。

直到 1960 年代早期，乙醚都保有全身性麻醉用標準氣體的角色，唯一能夠和乙醚相提並論的是環丙烷 (cyclopropane)，但由於這兩種藥物都有著高度的易燃性，已經被具有不可燃性質的氟基碳氫化合物所取代。halothane 發現於 1951 年，從 1956 年到 1980 年代，是最為廣泛於麻醉上應用的氣體。

近代，亞培陸續推出吸入型揮發性麻醉藥，於西元 1963 年推出 Penthrane(methoxyflurane)，1978 年推出 Ethrane，現今常用的 Forane 則是在 1982 年上市，百特公司則於 1993 上市 Desflurane。亞培於 1995 年上市 Sevoflurane。

局部和區域性麻醉 (Local & Regional Anesthesia)

現代局部麻醉的起源是創始於眼科醫師 Carl Koller。他在 1884 年示範使用古柯鹼局部塗抹來完成眼睛的手術麻醉。古柯鹼在 1885 年時已經由 Gaedicke 從古柯樹萃取出來，1860 年由 Albert Neimann 純化。1884 年，由外科醫師 William Halsted 證明且示範古柯鹼可以使用於皮內注射與

神經阻斷。Angust Bier 首先在 1898 年成功實行了第一例的脊髓麻醉。他也在 1908 年第一次描述了靜脈內注射的區域性麻醉。Procaine 在 1904 年由 Alfred Einhorn 所合成出來，Heinrich Braun 發現它可以當做局部麻醉劑臨床使用。Braun 也是第一位將 epinephrine 加入 procaine 中，使局部麻醉的效果得以延長。

硬脊膜外尾椎麻醉 (caudal epidural anesthesia) 開始於 1901 年的 Ferdinand Cathelin 和 Jean Sicard。腰椎的硬脊膜外麻醉則是在 1921 年由 Fidel Pages 首先提出，接著其它一些局部麻醉劑慢慢的也被引入臨床麻醉，相關藥物依序為 dibucaine(1930)、tetracaine(1932)、lidocaine(1947)、bupivacaine(1963)、ropivacaine(1996)、leovbupivacaine(1999)。

靜脈內注射麻醉 (Intravenous Anesthesia)

1855 年 Alexander Wood 發明皮下注射針筒和針頭之後，靜脈內注射麻醉便開啟了研究及發展大門，早期的靜脈內注射的藥劑包括有 chloral hydrate、氯仿和乙醚、嗎啡與哀若鹼

的混合劑。

巴比妥酸鹽在 1903 年由 Fisher 和 Von Mering 所合成。第一個被使用來做麻醉誘導的巴比妥酸鹽是 barbitol，直到 1927 年 hexobarbital 引入之後才用巴比妥酸鹽來當做誘導的技術，隨即廣為使用。亞培於 1934 上市 Thiopental，由 John Lundy 和 Ralph Waters 在臨床首例使用，且仍是最常見的麻醉誘導藥物。Methohexital 在 1957 年由 V.K. Stoelting 率先在臨床上使用，而且是現在唯一其它還可以用來做為麻醉誘導的巴比妥酸鹽。自從在 1957 年 chlordiazepoxide 合成之後，benzodiazepines-diazepam(1959)、lorazepam(1971)、和 midazolam(1976) 已經成為在藥物治療前、麻醉誘導和靜脈內注射鎮靜的常用藥物。

Ketamine 是第一個靜脈內注射藥物中，併有最少的心臟和呼吸抑制副作用的麻醉藥物。Etomidate 在 1964 年被合成出來，在 1972 年被公開發表使用。Propofol 是一種短效靜脈麻醉藥，作用迅速且維持時間短，在 1989 年通過 FDA 上市，是目前非常常用的靜脈內注射藥物。

肌肉鬆弛劑 (Muscle Relaxants)

在 1942 年 Harold Griffith 和 Enid Johnson 發現了箭毒 (curare) 的使用，是在麻醉藥品上的一個重要里程碑。箭毒 (curare) 可以使氣管內插管變得很容易，而且可以在手術中提供良好腹部肌肉的鬆弛。當有肌肉鬆弛劑的使用，我們可以不用加入大量的麻醉藥品來得到良好的肌肉鬆弛，即可讓手術順利進行。

Succinylcholine 是在 1949 年由 Bovet 所合成，在 1951 年公開發表使用，雖然它保有最佳肌肉鬆弛劑快速作用的好處，但偶而出現的嚴重副作用例如惡性高熱仍造成困擾，故仍需繼續研究是否有替代品，減少副作用發生的機率。

Pancuronium 於 1972 年上市使用，Vecuronium 及 atracurium 於 1980 年代相繼於臨床使用，最新一代及現今常用的肌肉鬆弛劑 mivacurium、rocuronium 及 cisatracurium 於 1990 年代陸續上市，並提供良好的手術肌肉鬆弛效果。

有關肌肉鬆弛劑的反轉劑 sugammadex 則於 1999 年合成，2008 年於歐洲上市開始臨床應用，解決更



多臨床困擾，帶給肌肉鬆弛劑臨床應用新的里程碑。

類鴉片物 (Opioids)

嗎啡在 1805 年被 Serturmer 從鴉片中萃取出來，接著被用來做靜脈內注射麻醉藥物。由於早期有關高劑量的類鴉片物引起併發症及病患使用後死亡的報導，使得麻醉科醫師相繼避免使用類鴉片物，而偏好使用單純的吸入性麻醉藥品。直到 1939 年 meperidine 的合成，方始類鴉片物在麻醉的領域中重拾重要性。

均衡麻醉 (Balanced anesthesia) 的觀念由 Lundy 和他的同仁所引入，且發展成為一個組合，包括 thiopental 的誘導、笑氣所致的記憶喪失、meperidine(或是其它有麻醉效果的藥物)來麻醉和箭毒負責肌肉鬆弛。

在 1969 年 Lowenstein 藉由引入高劑量的麻醉藥品可以完成麻醉的觀念，讓我們重燃類鴉片物麻醉藥品的興趣。fentanyl、sufentanil 及 alfentanil 也陸續上市，提供更多類鴉片物的臨床應用。

隨著經驗與技術的增長，可以減少在病人發生手術中甦醒和適當的抑

制手術中自主神經的反射，增進麻醉品質及病患安全。remifentanil 是一種新的快速代謝的類鴉片物，它具備特殊的代謝途徑，提供快速及超短效的類鴉片物的效果，開啟類鴉片物更多的臨床應用，讓更多類型手術麻醉得以順利進行。

以上為近代麻醉藥物演進的簡易介紹，麻醉藥品及知識的演進，提供外科手術更佳的环境及許多疾病治療的可親與可近性；提升麻醉品質及病人安全，是目前提升醫療品質的重要議題。我們期望麻醉醫學在未來能夠受重視，創造更多醫病共贏的福祉。

The History of Anesthesia Agents

Abstract

Anesthesiology only became an area of systematic research in the mid-nineteenth century, which was rather late compared to other medical specialties.

Advancements of anesthesia agents and knowledge provided surgery with a better environment and improved accessibility for the treatment of many diseases. Key topics for improving the quality of modern medical practice would include anesthesia quality and patient safety.

Anesthetics have been employed since ancient times. However, the study of anesthesiology as a field of medical science and numerous key advancements only began in the mid-nineteenth century, with numerous studies being carried out to establish relevant knowledge and information. Advancements in modern surgery are limited by the amount of knowledge we have about disease progress and human anatomy, as well as having access to safe and reliable anesthetics. The development of anesthetics started with inhalation anesthesia, followed by local and regional anesthesia, and finally progressing into intravenous anesthesia.

Inhalation Anesthesia

Inhalation anesthesia was the first type of anesthesia agents used. Examples include ether, nitrous oxide, and chloroform. Ether was first made by Valerius Cordus in 1540.

However, nobody used the chemical as an anesthesia agent in humans at that time. It was not until 1842 when Crawford W. Long and William E. Clark first administered ether on its own to their patients. Four years later, William T.G. Morton performed the first recorded general anesthesia with ether in Boston on October 16, 1846. Nitrous oxide, also known as laughing gas, was first made by Joseph Priestley in 1722. However, its anesthetic properties were only discovered by Humphry Davy in 1800. In 1844, Gardner Quincy Colton was the first to employ nitrous oxide as an anesthesia agent on humans, and provided a demonstration on using the gas to achieve anesthesia. Dentists such as Horace Wells who attended the demo realized the potential of the gas and began using nitrous oxide in performing dental anesthesia himself. Chloroform was developed independently by Von Leibig, Guthrie, and Soubeiran in 1831. It was first used clinically by Holmes

Coote as an inhalation anesthesia in 1847. True clinical application, however, was promoted by gynecologist James Simpson who employed the gas to help alleviate the patient's pain during childbirth.

In early 1960, ether has always been employed as a standard gas agent for general anesthesia. The only comparable alternative would be cyclopropane gas. However, both of these agents are highly flammable and were thus replaced by the non-flammable chlorofluorocarbon compounds. Halothane was discovered in 1951 and was one of the most widely used inhalation anesthesia from 1956 to 1980.

A number of new agents were also developed in recent years. Abbott Laboratories released inhaled and volatile anesthesia agents such as penthrane (methoxyflurane) in 1963 and ethrane in 1978. Forane, which is commonly employed in modern anesthetics, was first released in 1982. Desflurane was released by Baxter in 1993. Sevoflurane was marketed by Abbott Laboratories in 1995.

Local & Regional Anesthesia

Ophthalmologist Carl Koller was regarded as the founder of modern local anesthesia. In 1884, Dr. Carl demonstrated the use of cocaine rubbing in achieving local anesthesia for eye surgery. Cocaine was first extracted

by Gaedicke from the coca plant in 1885. The chemical was purified by Albert Neimann in 1860. In 1884, a surgeon named William Halsted proved and demonstrated that cocaine could be applied through subcutaneous injections and achieve anesthesia by blocking local nerves. August Bier was the first to successfully achieve spinal anesthesia in 1898. In 1908, Dr. Bier also described the use of intravenous injection to achieve regional anesthesia. Procaine was first synthesized by Alfred Einhorn in 1904. Heinrich Braun later found that the chemical could also be used as a local anesthesia in clinical applications. Braun was also the first to add epinephrine in procaine in order to extend the effects of local anesthesia. Caudal epidural anesthesia was first used by Ferdinand Cathelin and Jean Sicard in 1901. Lumbar epidural anesthesia was first proposed by Fidel Pages in 1921. This was followed by the gradual introduction of new local anesthesia agents in clinical applications, including dibucaine (first used in 1930), tetracaine (1932), lidocaine (1947), bupivacaine (1963), ropivacaine (1996), and leovbupivacaine (1999).

Intravenous Anesthesia

The development of the hypodermic syringe and needle by Alexander Wood in 1855 heralded new research and development for intravenous (IV) anesthesia. Early IV

anesthesia agents include chloral hydrate as well as mixtures of chloroform and ether as well as morphine and scopolamine. Barbiturates were first synthesized by Fisher and von Mering in 1903. The first barbiturate to be used as an inducer for anesthesia was barbital. It was not until 1927 with the introduction of hexobarbital that the chemical was employed in inducing techniques that became widely used afterwards. Abbott Laboratories then released Thiopental in 1934, with John Lundy and Ralph Waters using it for the first time. This chemical remained one of the most commonly employed anesthesia agents used for induction. V.K. Stoelting was the first to use Methohexital clinically in 1957. This chemical remains the only other barbiturate that could be used as an anesthesia agent for induction. After chlordiazepoxide was successfully synthesized in 1957, it was became one of the most common agents for pre-treatment, anesthesia induction, and intravenous anesthesia along with benzodiazepines-diazepam (developed in 1959), lorazepam (1971), and midazolam (1976). Ketamine was the first IV anesthesia agent with mild side effects of heart rate and breathing suppression. Etomidate was first synthesized in 1964 and a paper was published on its applications in 1972. Propofol is a short-term IV anesthetic with fast acting time

and short duration, and was approved for marketing and use by the FDA in 1989. Propofol is now one of the most commonly employed IV-delivered agent.

Muscle Relaxants

In 1942, Harold Griffith and Enid Johnson found the use of curare, and this discovery became an important milestone in the history of anesthesia. Curare can be used to simplify endotracheal tube and achieve excellent relaxation of abdominal muscles during surgery. The use of muscle relaxants meant that clinicians no longer had to apply large amounts of anesthesia agents to achieve the muscle relaxation needed for the surgical procedure to proceed. Succinylcholine was first synthesized by Bovet in 1949 and its use was first published in 1951. Despite providing the most rapid effect of muscle relaxation, it carried the risk of severe side effects such as malignant hyperthermia that is still causing problems in clinical use. More research will be needed to identify any replacement and reduce the incidence of side effects. Pancuronium was first marketed and used in 1972, while Vecuronium and Atracurium were used clinically in the 1980s. A new generation of muscle relaxants commonly employed today such as mivacurium, rocuronium, and cisatracurium were

released in the 1990s, and these agents offer excellent muscle relaxation for surgical applications. Sugammadex, an agent for reversal of neuromuscular blockade, was synthesized in 1990 and was used clinically in Europe in 2008. This was a new milestone development for the clinical applications of muscle relaxants by helping to overcome a number of clinical issues.

Opioids

Serturmer extracted morphine from opium in 1805 and the chemical found clinical application as an intravenous anesthesia. However, reports of complications and death of patients after administering high doses of opioids meant that many anesthesiologists began avoiding the use of these chemicals and instead relied on inhalation anesthesia. It was not until the synthesis of meperidine in 1939 that use of opioids began to grow once again. The concept of balanced anesthesia introduced by Lundy and his colleagues gradually evolved into the approach of using mixtures of different anesthesia agents. Such mixtures include thiopental as the induction agent to minimize memory loss caused by nitrous oxide, meperidine (or other anesthesia agents) to attain anesthesia, and curare for muscle relaxation. In 1969, Lowenstein introduced the technique of employing

high dosages of opioids to achieve total anesthesia. This rekindled our interest in such chemicals. Fentanyl, sufentanil, and alfentanil were also released, providing more options in the clinical applications of opioids. Growing experiences and technical proficiency helped reduce the risk of accidental awareness during general anesthesia (AAGA) and successfully suppress autonomic reflex dysfunction during surgery, thereby improving anesthesia quality and patient safety. Remifentanil is a new form of quick-acting opioid with a unique metabolic pathway that allows it to breakdown quickly in the system to provide quick and short-duration effects. This chemical provided additional clinical applications for opioids and allowed surgery-type anesthesia to be carried out successfully.

The information above briefly introduced the evolution of modern anesthesia agents. New anesthesia agents and knowledge of the science of anesthesia provided surgery with a better environment and improved accessibility for the treatment of many diseases. Key areas of modern medical quality improvement efforts would focus on improving quality of anesthesia agents and safety of the patients. We hope that anesthesiology will be regarded with greater importance in the future to benefit both medical health providers and patients.

麻醉機之發展演進



自古以來人類即發展出各種醫藥技術來面對生老病死等種種人生重大轉變。隨著知識的累積、智慧的增長以及各種科學技術的全面提升，面對現今各種疾病、創傷、老化等問題而需進行手術治療時，麻醉專科亦提供相同份量之專業知識以全程支援外科手術得以順利進行。現今最為普遍使用之麻醉方式為吸入式麻醉，其中氣體麻醉機擔任了重要角色。

自二十世紀初，麻醉機之雛形已成形，並沿用至今。五、六〇年代以來隨著麻醉概念的演進、要求，以及科技之突飛猛進，經過不斷的改良創新，已發展至先進之麻醉工作站，提供安全性、自動化、智能化，及預測功能。新的麻醉工作站利用先進之電子技術及電腦軟體，能提供更多複雜之功能，如多樣化通氣、吸入麻藥給

予方式、低流量或閉鎖麻醉。另外還能提供整合式之生理參數監測及記錄功能，全面提升術中麻醉之品質，並與麻醉資訊系統結合，對於後續病患資訊管理及統計分析研究等能有重大之作用。

麻醉機能夠輸送混合氣體及吸入性麻醉藥，藉以控制病患之睡眠或意識狀態以利手術之進行。其主要組件包括：(1) 來源氣體之減壓與管理、(2) 輸送氣體之調節與量測、(3) 麻醉氣體濃度之控制、(4) 呼吸迴路氣體流向管理及二氧化碳吸收器、(5) 手動或自動呼吸器、(6) 多餘廢氣之排放。而現今新一代的麻醉工作站更增加整合式生理監視器及麻醉資訊自動記錄系統。

回顧百年來，麻醉機由簡易之手動裝置到今日複雜多工且自動控制，其演進略述如下表：

麻醉機的演進	麻醉機型
1902 年，Dr. Charles K. Teter 及 Dr. William C. Teter 兄弟取得能同時使用氧氣、笑氣及乙醚三種氣體裝置之專利，一般認為這是第一款同時包含此三種氣體之麻醉設備，此功能成為當時麻醉機之標準配備，並沿用了二個世代。圖示為 1912 年 Teter 壓力調節麻醉裝置。	
Dr. Jay Heidbrink 改裝 Teter 麻醉裝置，成為最早可以控制氧氣、笑氣濃度之麻醉機，且廣泛用於牙科麻醉。於 1912 年成功申請 Heidbrink Anesthetizer 專利。	

1912 年，Gwathmey-Woolsey 研發可觀測 O ₂ /N ₂ O 氣流量之氣泡瓶。	
1917 年，英國麻醉師 Henry Boyle 將原先 Gwathmey 之設計改良成有氧氣、笑氣及乙醚揮發器，通稱 Boyle Bottle 之麻醉機，成為後來麻醉機之標準裝置。Boyle 麻醉機型繼續生產超過 50 年之久。	
1924 年，Dr. Ralph Waters 開發了 Waters CO ₂ Absorber。	
1927 年，Foregger 公司 Circle rebreathing system with CO ₂ Absorber。	
1952 年，Lucien E. Morris, M.D. - Copper Kettle 揮發器，分離迴路將已知麻藥量加入測得之氣流中，而能精確計算及校正輸出麻藥濃度，改善以往輸出濃度不穩定之問題。其銅質材料亦增加揮發之效率。	
1957 年，Cyprane 公司開發了首款給 Fluothane 專用之揮發器 Fluotec，其固定之刻度轉盤使輸出濃度易於檢視及調整，並於隔年改良，使能隨溫度改變做調整而補償其氣流，進而使輸出麻藥濃度趨於穩定之 Fluotec Mark2。	
Ohio Heidbrink Kinet-O-Meter DM4000 (1963) <ul style="list-style-type: none">現代麻醉機之基本模式。針狀流量控制閥及流量計，使氣體流量控制及量測方便容易。整合 CO₂ 吸收器之呼吸迴路。	
Ohio Heidbrink Kinet-O-MeterDM5000 <ul style="list-style-type: none">電子控制溫熱式揮發器，麻藥輸出穩定。揮發器連鎖裝置，避免同時開啟不同麻藥。	
Ohio Unitrol (60 年代末期～ 80 年代初期) <ul style="list-style-type: none">內含流量及溫度補償之麻醉藥揮發器，簡化麻藥輸出濃度控制。氣源供應失效警報。	
Ohio 30/70 Proportioner (1978) <ul style="list-style-type: none">首款調整氧氣 / 笑氣比例輸出之麻醉機，輸出氧氣濃度不會低於 30%，避免病患缺氧情況發生。簡化輸出之氧氣濃度及氣體流量控制方式。	
Ohio Modulus (1979) <ul style="list-style-type: none">整合模組式多功能麻醉機，主件可方便替換使用。內建氧濃度、氣道壓力及血壓監視器。內建多重安全機置及警報功能。上升式氣囊呼吸器，可觀察呼吸及管路漏氣狀態，方便、直接且安全有效。	
Datex-Ohmeda Excel SE(1995) <ul style="list-style-type: none">內建氧濃度、氣道壓力及呼吸容積監測之呼吸器，提高病患麻醉的安全性。新一代麻醉藥 Desflurane 及其揮發器，縮短麻醉及催醒時間，並降低副作用。	
Datex-Ohmeda Modulus SE (1995) <ul style="list-style-type: none">多種呼吸模式，適用於不同類型之病患需求。	

GE Datex-Ohmeda ADU (1995) <ul style="list-style-type: none">電子式揮發器，精準控制麻醉藥輸出。輸出氣體流量監測及數位顯示並輸出。精巧型二氧化碳吸收器，快速達到預期濃度。整合多功能生理監視器，隨時全面監看病患生理狀態。	
GE Datex-Ohmeda Aestiva (1997) <ul style="list-style-type: none">呼吸迴路整合於機體內，避免誤接、脫落、尖刺或夾傷。	
GE Datex-Ohmeda Aespire(2003) GE Datex-Ohmeda AespireView (2011) <ul style="list-style-type: none">縮小迴路容積，於低流量於快速達到預期濃度。	
GE Datex-Ohmeda Avance (2003) GE Datex-Ohmeda AvanceCS2 (2014) <ul style="list-style-type: none">電子化全功能麻醉工作站。數位式氣流控制。容積兼壓力控制呼吸，同步間歇控制呼吸，壓力輔助自發呼吸。整合多功能生理監視器，隨時全面監看病患生理狀態。直覺式操控介面，精簡易用。	
GE Datex-Ohmeda Aisys (2010) GE Datex-Ohmeda AisysCS2 (2014) <ul style="list-style-type: none">電腦化全功能麻醉工作站。電子式揮發器，精準控制麻醉藥輸出。數位式氣流控制，目標麻醉濃度及氧氣濃度控制，節省麻醉成本。容積兼壓力控制呼吸，同步間歇控制呼吸，壓力輔助自發呼吸。整合多功能生理監視器，隨時全面監看病患生理狀態。直覺式操控介面，精簡易用。麻醉導航系統。	

相較於早期麻醉設備，現代麻醉機除了功能先進及使用便利外，更增加智能管理及安全機置與規範，避免人為疏失，使病患及醫護人員免於受傷害。麻醉醫護應提高對麻醉機整體之瞭解，麻醉科部應定期檢查保養及

使用前測試操作人員對其熟練度，正確使用並熟習麻醉機，方能提高麻醉品質及麻醉安全，對麻醉醫療有所助益。

* 部份資料摘自
Wood Library-Museum of Anesthesiology
(<https://www.woodlibrarymuseum.org>)

Development and Evolvement of Anesthesia Machine

Since ancient times, human beings have developed various medical technologies to face important life changes, such as birth, aging, different types of diseases, deaths and so on. With accumulated knowledge, promoted intelligence and various comprehensively improved scientific technologies, as surgery is necessary to cure different types of diseases and solve aging issues, anesthesia specialty also provides equivalent expertise to support surgical operations so they can be carried out smoothly. The most popular method of delivery for anesthesia used today is by inhalation, in which anesthesia machines play an important role during surgical operations.

Since the beginning of the 20th century, prototypes of anesthesia machines have been formed and used. Since the 1950's and 60's, anesthesia has evolved to meet the increasing demands and requirements. Technologies have advanced greatly, and advanced anesthesia workstations have been developed through continuous improvement and innovation in order to provide safety, automation, intelligence and predictability.






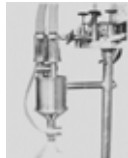

The new anesthesia workstation utilizes advanced electronic technologies and computer software to provide more complex functions, such as diversified insufflation, inhalation narcotic administration, low flow or atresia anesthesia. In addition, integrated physical parameter monitoring and recording functions may be provided to improve quality of anesthesia during different types of surgery, and can be combined with anesthesia information systems that can affect greatly on subsequent patient information management, statistical analysis and etc.









Anesthesia machines can deliver mixed gases and inhalation narcotics as to control sleep and consciousness of patients and allow for surgical operations to be conducted smoothly. The major components include (1) pressure reduction and management of source gas, (2) regulation and measurement of delivered gas, (3) control of concentration of anesthesia gas, (4) management of gas flow direction of respiration loop and carbon dioxide absorber, (5) manual or automatic respirator, and (6) discharge of excessive






exhaust gas. Furthermore, the latest anesthesia workstation adds an integrated physical monitor and anesthesia information automatic recording system.

Over the past century, anesthesia

machines have evolved from simple manual devices to modern, complex, multiplexed and automatic control systems as outlined below:

Anesthesia Machines	Figure
In 1902, Dr. Charles K. Teter and Dr. William C. Teter, the 2 brothers obtained a patent for a device capable of using oxygen, nitrous oxide and ether simultaneously, which was regarded as the first anesthesia equipment to contain these 3 gases simultaneously. Such a function became a standard capability of anesthesia machines at that time, and has been used for two centuries. In this figure, Teter, a pressure regulation anesthesia apparatus used in 1912 is shown.	
Dr. Jay Heidbrink retrofitted the Teter anesthesia apparatus to produce the earliest anesthesia machine that could control concentrations of oxygen and nitrous oxide, and were used for dental anesthesia widely. In 1912, the patent for the Heidbrink Anesthetizer was successfully secured.	
In 1912, Gwathmey-Woolsey developed a bubble bottle capable of observing O ₂ /N ₂ O gas flow.	
In 1917, Henry Boyle, a British anesthetist, improved the original Gwathmey design to result in a volatilizer with oxygen, nitrous oxide and ether, commonly known as the Boyle Bottle anesthesia machine. This became a standard apparatus for the resultant anesthesia machine. Production of the Boyle anesthesia model ran for more than 50 years.	
In 1924, Dr. Ralph Waters developed the Waters CO ₂ Absorber.	
In 1927, the Foregger Company created a Circle rebreathing system with CO ₂ Absorber.	
In 1952, Lucien E. Morris, M.D. proposed making a Copper Kettle volatilizer, in which a separate loop adds a known amount of narcotic to measured air flow to calculate and accurately correct the concentration of output narcotic, and improve existent issue of unstable output concentration. Its copper material also increases volatilization efficiency.	

In 1957, the Cyprane company developed Fluotec, the first Fluothane dedicated volatilizer. Its fixed scale dial allows output concentration to be viewed and adjusted easily, and which was improved to produce the Fluotec Mark2 the following year, which is capable of adjustment with changed temperature and compensation for its air flow, such that the output narcotic concentration tends to be more stable.	
Ohio Heidbrink Kinet-O-Meter DM4000 (1963) <ul style="list-style-type: none"> Basic mode of modern anesthesia machine. Spicule flow control valve and flow meter, which makes gas flow and measurement convenient to used and easy to control. Respiration loop integrating CO₂ absorber. 	
Ohio Heidbrink Kinet-O-MeterDM5000 <ul style="list-style-type: none"> Electronically controlled warm-hot volatilizer with stable narcotic output Volatilizer interlocking apparatus capable of preventing different narcotics from opening simultaneously. 	
Ohio Unitrol (late 60's - early 80's) <ul style="list-style-type: none"> Narcotic volatilizer with flow and temperature compensation, capable of simplifying control of narcotic output concentration. Power supply failure alarm. 	
Ohio 30/70 Proportioner (1978) <ul style="list-style-type: none"> First anesthesia machine for adjusting oxygen/nitrous oxide proportion with output oxygen concentration no less than 30% to prevent patient suffering from hypoxia. Method simplifying control of output oxygen concentration and gas flow. 	
Ohio Modulus (1979) <ul style="list-style-type: none"> Integrated modular multi-functional anesthesia machine with parts which can easily be replaced. Built-in oxygen concentration, airway pressure and blood pressure monitor. Built-in multiple security mechanism and alarm functions. Ascent air bag respirator capable of observing respiration and pipe leakage in convenient, direct, safe and effective manner. 	
Datex-Ohmeda Excel SE (1995) <ul style="list-style-type: none"> Respirator with built-in oxygen concentration, airway pressure and respiration volume monitoring capability, which improves the safety of using anesthesia. Desflurane, a new generation of narcotic, and its volatilizer, capable of reducing anesthesia and waking time and reducing side effects. 	
Datex-Ohmeda Modulus SE (1995) <ul style="list-style-type: none"> Multiple respiration modes applicable to various types of patient requirements. 	

GE Datex-Ohmeda ADU (1995) <ul style="list-style-type: none"> Electronic volatilizer capable of controlling narcotic output. Output gas flow monitoring / digital display and output. Compact carbon dioxide absorber capable of achieving expected concentration rapidly. Physical monitor with integrated functions to monitor physical condition of patients comprehensively. 	
GE Datex-Ohmeda Aestiva (1997) <ul style="list-style-type: none"> Respiration loop is integrated with the machine to avoid incorrect pressing, detachment, stab or clamp injuries. 	
GE Datex-Ohmeda Aespire(2003) GE Datex-Ohmeda AespireView (2011) <ul style="list-style-type: none"> Loop volume is reduced to achieve expected concentration with low flow and high speed. 	
GE Datex-Ohmeda Avance (2003) GE Datex-Ohmeda AvanceCS2 (2014) <ul style="list-style-type: none"> Electronic full-functional anesthesia workstation. Digital air flow control. Respiration control with volume and pressure, synchronous and intermittent respiration control, pressure assisted spontaneous respiration. Physical monitor with integrated functions to monitor physical condition of patients comprehensively. Intuitive control interface which is compact and easy to use. 	
GE Datex-Ohmeda Aisys (2010) GE Datex-Ohmeda AisysCS2 (2014) <ul style="list-style-type: none"> Computerized full-functional anesthesia workstation. Electronic volatilizer capable of controlling narcotic output. Digital air flow control, target anesthesia concentration and oxygen concentration control for reducing anesthesia cost. Respiration control with volume and pressure, synchronous and intermittent respiration control, pressure assisted spontaneous respiration. Physical monitor with integrated functions to monitor physical condition of patients comprehensively. Intuitive control interface which is compact and easy to use. Anesthesia navigation system. 	

Compared to early anesthesia equipment, modern anesthesia machines are becoming easier to operate and have advanced functions that include intelligent management and safety regulation mechanisms to avoid human errors and to prevent patients and nurses from being harmed. Overall understanding of anesthesia machines is very important. It is necessary for the anesthesia department at all hospitals to do maintenance check on all their anesthesia machines on a regular basis, and to make sure all the operators are familiar with the anesthesia machines and to use them correctly. This will improve not only the quality but also the safety of anesthesia and anesthesia medications.

* Partial data are sourced from
Wood Library-Museum of Anesthesiology
(<https://www.woodlibrarymuseum.org>)



臨床麻醉 Clinical Practices

導讀：承先啟後，繼往開來

撰文 / 汪志雄 教授 (台灣麻醉醫學會理事、國泰綜合醫院麻醉科主任)

今年適逢台灣麻醉醫學會創立 60 週年，各訓練醫院均發文回顧各院麻醉科之特色與其麻醉工作的發展歷史，承先啟後，鑑往知來；對於參與其中的麻醉工作者，尤其是年輕後進的醫師有著更重大的意義：了解為何而麻，為誰而麻，且麻醉不再只是麻醉。從以下各院之心情分享就很明顯地知道台灣醫療之進展，尤其是外科方面的進步，麻醉科居有幕後極重要之貢獻，而台灣麻醉醫學會在推展各種麻醉教育與手術全期之統籌，當然是功不可沒。

台灣麻醉醫學會創立於西元 1956 年，我有幸也在同年出生，那時名稱是中華民國麻醉學會。如同臺大麻醉部所述，早期台灣麻醉是由外科醫師來執行，但隨著外科手術的進展與複雜化，必須要有專業的醫師專注於麻醉，以維護病人安全與手術的成功。台灣最早的麻醉醫師是王學仕醫師 (台灣麻醉之父)，承三總外科學系主任張先林教授指示由外科轉麻醉，赴美進修專研麻醉，回國後在三軍總

醫院 (前陸軍第一總醫院) 成立第一個台灣麻醉科。後臺大外科林天祐醫師自美留學歸國，因拓展複雜的胸腔外科手術迫切需要麻醉醫師協助，於 1952 年間邀請王學仕醫師幫助執行麻醉，而開啟了臺大醫院麻醉部的歷史。

中華民國麻醉學會在民國 70 年頒發了第一批的麻醉學家證書，也就是現在的麻醉專科醫師。縱觀各個麻醉專科訓練醫院之重大成就，不外乎心臟手術、各種器官的移植手術、減重手術、進而目前最夯的達文西機械手臂手術、微創手術、經皮主動脈瓣置換手術、beating heart surgery、non-intubated video-assisted thorocscopy surgery 等。各項之內視鏡檢查與處置、牙科治療之舒眠麻醉及健檢麻醉之需求，雖然檢查與手術本身並非困難，但仍需麻醉醫師介入協助，以完成高品質的醫療服務。

因應現今醫學的快速進展與病人的需求，麻醉專科醫師都必須有極靈敏的嗅覺，要洞燭機先，當手術或操

作檢查醫師提出任何要求時，我們都早已準備好了。至於急救時之緊急氣道插管處置，在許多醫院更是需要麻醉科醫師參與其中。當然其中也有許多艱困危險的時期，我們義無反顧地挺身而出，如參與 SARS 之醫療戰役便讓許多麻醉醫師永難忘懷，而記憶猶新的八仙粉塵閃燃事件中之先期急救、創傷清創手術麻醉、疼痛控制，與慢性疼痛之治療等，麻醉醫師也參

與甚多。

麻醉醫師大多的時候都是默默工作的幕後功臣，當然，成功不必在我，但我們也可以主動走出自我，成為寫歷史的主角，而不是配角。我們可以是一個全人、全方位的醫師，TRM 和 ERAS 的 coordinator，甚或是 team leader，就讓我們仔細地，慢慢地看下去，期許我輩寫出下一甲子的精彩麻醉故事。

Introduction: From Old Story to New Era of Taiwan Anesthesia

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This year marks the sixtieth anniversary of the Taiwan Society of Anesthesiologists; each anesthesiologists training institute provides a review of features and history of their department evolving and development, and their future goals, which shape the development continuum. These provide guidance for new comers, for what and whom are we for the anesthesia community; anesthesia is not only practicing the anesthesia but the awareness of anesthesiologists. The messages from each hospital clearly define the crucial role of anesthesiologists in

Taiwan's medical advancement, especially in surgery. Moreover, the Taiwan Society of Anesthesiologists has been the key element in anesthesiology education and integration of surgical patient care.

The Taiwan Society of Anesthesiologists was established in 1956, also my birth year, and was known as The Society of Anesthesiologists of Republic of China. As coined by National Taiwan University Hospital Anesthesiology, early anesthesia practice was carried out by surgeons, but the advancement and complexity of surgical



台灣心胸麻醉重鎮 ——臺大醫院麻醉部

撰文 / 邱敬棠 住院醫師、黃信豪 醫師、鄭雅蓉 主任

臺大麻醉部於1962年6月正式獨立設科，50餘年來，本院在心胸手術方面居於全國的領導地位，歷年來陸續完成了多項全國第一的手術案例，如全國第一例的心臟移植及第一例成功的肺臟移植。前輩們不但在臨床上累積豐富的心胸麻醉經驗，也奠定臺大作為心胸團隊重鎮的基礎。長年來秉持著本院臨床、研究、教學三者並重的理念，也鼓勵主治醫師積極指導住院醫師進行各項臨床研究，並且逐步完善住院醫師及麻醉護理師的教學計劃，積極培養麻醉後進。

近幾年來，由於本院兒童醫療大樓的啟用、心血管中心的建置和達文西系統的建置，本院在成人及兒童的心血管疾病的治療及照護上有了更多樣性的發展。臺大麻醉部將秉持積極創新的理念繼續努力，希望能為台灣的心胸麻醉發展，貢獻一分心力。

臺大麻醉的源起

台灣早年手術均由開刀醫師施行自己執行麻醉業務，本院外科林天祐醫師於1951年底自美留學歸國，因拓展複雜的胸腔外科手術迫切需要麻醉醫師協助，因此於1952年間，在當時國防醫學院王學仕醫師幫助下，開啟臺大醫院麻醉的歷史。

1953年，李光宜醫師自丹麥完成聯合國世界衛生組織支援開發中國家專業醫師之訓練回國，即專門負責本院麻醉工作。之後於1957年林溟鯤醫師及1961年趙繼慶醫師相繼學成返國服務，彼時臺大醫院共有三位麻

醉主治醫師及一位住院醫師石全美醫師。於是在1962年6月臺大醫院麻



圖一：臺大麻醉科第一張主治醫師合照，西元1967年，攝於臺大醫院舊院區。人物：前排左起為林溟鯤教授、李光宜教授、趙繼慶教授、後排左起為林長春醫師、林完生醫師。

approaches necessitated of a fully responsible anesthesiologist to ensure patient safety and success operation. Dr. S.S. Wang, the father of Taiwanese anesthesiology, entered the field as a surgeon on the instructions by Professor S.L. Chang, the director of Tri-Service General Hospital Surgery at the time. After his anesthesiologist training in the United States, Wang returned and established the first anesthesia department at Tri-Service General Hospital (known as "Armed Force First General Hospital" at the time). Dr. T.Y. Lin a surgeon of National Taiwan University Hospital's later completed his training and returned to Taiwan. His surgical team asked for fully responsible anesthesiologists for helping him to develop complex thoracic surgeries. In 1952, Wang was invited as an anesthesiologist and led to the birth of the Department of Anesthesiology of National Taiwan University hospital.

The Society of Anesthesiologists of Republic of China issued the first anesthesiologist certificates in 1981, and now are known as anesthesiology specialists. According to each training institute, the great achievements include heart, organ transplantation, weight reduction, and the most recent popular da Vinci surgical system, mini-invasive surgeries, percutaneous aortic valve replacement, beating heart surgery, non-intubated video-assisted thorocscopy surgery, and more. Moreover, anesthesiologists are

also required in endoscopic exams and procedures, deep sedation for dental treatment and etc. These procedures are relatively simple, but anesthesiologists are still required to ensure a quality and safety service.

Consider the rapid advancement of modern medicine and patient needs, anesthesiologists should take initiative to be well-prepared at any time for physicians and surgeons for their prompt needs. Also, in many institutions, anesthesiologists are required for the endotracheal intubation at emergency care and life saving episodes. Anesthesiologists also offered their effort without hesitation at difficult times, such as the SARS pandemic and the recent Formosa Fun Coast explosion, in which considerable provided at the earliest emergence, wound debridement, pain control and further chronic pain management.

Anesthesiologists are seldom the most prominent roles, and have faith in the importance of teamwork in successful clinical practice. However, we anesthesiologists can and should be the main actors/actresses in the story: our expertise is more holistic, multi-faceted and allows us to become the coordinator in TRM and ERAS practice or even team leaders. Medicine will continue and advance, and we anesthesiologists as a medical profession are going to be the beacon guiding the way to the next 60-year legacy.

醉科正式成立，為本院麻醉醫學的發展奠下基石。經過近六十年的發展，目前已發展出疼痛、一般、婦幼、心胸等四個次專科，連同加護病房團隊，日益壯大與精緻化。

心胸手術的發展

臺大醫院外科部一直是台灣心臟手術的前鋒。自 1956 年完成首例心臟手術—二尖瓣交聯切開術後，更於 1964 年完成全國首例直視下開心手術。1970 年代起，在外科洪啟仁教授的帶領之下，培養後進並成立專屬的外科加護病房，使臺大醫院在心臟

手術的發展更上一層樓。1973 年，臺大完成全國首例冠狀動脈繞道手術，1987 年完成全國第一例心臟移植手術。目前臺大醫院一年約有上千例心臟及大血管手術，而麻醉部於這些手術中，累積了相當豐富的心臟麻醉照護經驗。

1995 年，姚繁盛醫師自美引進最新的術中經食道超音波 (TEE) 檢查技術，讓麻醉醫師在心臟手術中，能更進一步的掌握心臟的狀況，之後的十年，包含蔡勝國、王明鉅等醫師的努力，心臟麻醉全面進入 TEE 的時代，所有的住院醫師都受到完整心臟超音波的訓練。2012 年，臺大醫院成立心

血管中心，整合了心臟內外科、手術室、心導管室、心臟加護病房，為心臟病患提供全方位的照護。

除了成人心臟手術外，小兒先天性複雜性心臟病手術一直是心臟手術中最為困難的手術。由比較簡單的心房、心室中膈缺損修補，到困難的法洛氏四合症矯正手術、大動脈轉位矯正手術等，臺大醫院心臟外科一直在台灣醫界處於領先的地位。1994 年臺大心臟外科完成全國首例成功的 Norwood 氏手術，乃先天性複雜性心臟病兒童的治療上一項極為重要的里程碑。而這其中，臺大麻醉部的醫護人員在手術中提供完善的麻醉照護，對手術的成功有不可或缺的功勞。

在 2008 年臺大兒童醫療大樓啟用後，更整合了小兒心臟科、小兒心臟外科、麻醉科、手術室、小兒心導管室及加護病房等單位，以期能夠提供小兒心臟病童更全面的整合式照護。目前，臺大醫院每年約有 300 例各式的小兒心臟手術，在黃啟祥醫師的努力之下，不但累積了極為豐富的小兒心臟麻醉經驗，豐富了小兒心臟麻醉與 TEE 的教學，每年也吸引許多外院麻醉醫師來本院參訪。

除了心臟血管的手術，近幾年來

心導管手術的發展也日新月異，心胸麻醉的挑戰日增。除了早期的冠狀動脈氣球擴張術、支架放置外，臺大醫院還積極發展血管腔內主動脈瘤修復手術 (EVAR)、經導管主動脈瓣膜植入 (TAVI)、心房及心室中膈閉合器置放 (ASD and VSD occluder)、經皮心導管左心耳封堵器置放 (LAA occluder)、經導管肺動脈瓣膜植入 (TPVI) 等技術。年輕的心胸麻醉小組成員如黃信豪、鄭孝良、石博元、王憶嘉、劉映汝等醫師加入，進一步提供高品質的麻醉照護，讓各類新發展的心導管術



圖二：臺大麻醉部主治醫師合照，西元 2014 年，攝於臺大醫院東址大樓門口。



圖三：心臟手術中，麻醉醫師利用 TEE 監測評估心臟功能，並指導住院醫師。



圖四：於心導管室內執行麻醉照護，並以 TEE 監測心臟，協助完成病人的治療。



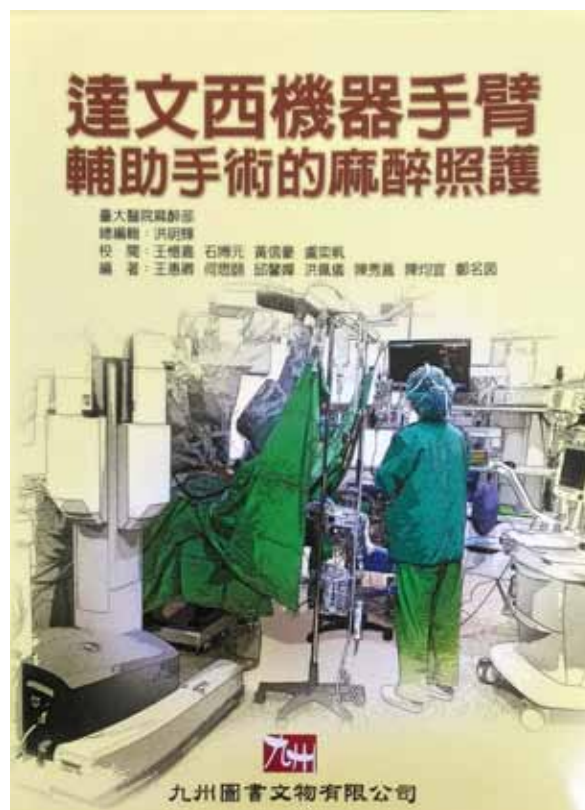
圖五：不插管胸腔鏡手術麻醉實境。

式能順利完成，病人恢復得更加快速。

胸腔外科手術的進展，乃於 1960 年代由外科林天祐教授開啟，先後完成臺大的第一例開胸切肺手術及食道切除手術，迄今約有五十多年的歷史。在這期間，引進了支氣管內管阻隔管組 (endobronchial blocker) 及雙腔氣管導管 (double lumen endotracheal tube) 置放等技術，以滿足手術中單側肺通氣的需求，也輔以胸椎硬脊膜外麻醉、全靜脈麻醉等方法，提供病人及手術醫師安全有效的手術麻醉照護。在團隊努力下，李元麒教授於 1995 年完成第一例肺臟移植手術。近幾年來，更因為考量到胸腔鏡手術的普及，麻醉應導入更保護性、符合生理的麻醉方式，在鄭雅蓉、洪明輝醫師與胸腔外科陳晉興醫師積極合作之下，發展不插管胸腔鏡手術麻醉，提升了圍術期恢復和術後的滿意度，至今發表了約 20 篇學術論文，吸引

各洲團隊前來交流，可謂成果豐碩。胸腔麻醉團隊如蕭柏妮、王曼玲等醫師的加入，不管在肺臟移植、食道手術、氣道手術的發展，均日趨完整與堅實。

2012 年起，臺大醫院手術室建置了達文西系統，開始發展機器手臂手術，心胸外科當然也不曾缺席。由於機器手臂手術為一較新式的手術方式，且各科手術對麻醉照護的需求又不盡相同，臺大麻醉部除了派人至他院參訪，學習經驗外，也自主發展本院多方向的麻醉照護。經由本部的麻醉護理師和麻醉醫師共同努力，將



圖六：本部同仁合力編撰完成的，機器手臂手術麻醉照護書籍。

各專科機器手臂麻醉照護的要點編寫成冊，於 2016 年出版。以期將臺大麻醉部對機器手臂手術麻醉照護的經驗，提供給各界參考。

未來展望

心胸麻醉實為所有大手術的基礎。承繼豐富且具挑戰性之心胸手術團隊的傳統，臺大麻醉部累積了大量且多樣的麻醉照護經驗，並不吝提供

給國內國外的麻醉醫護同仁分享與討論。為因應越來越複雜且多樣的心胸手術，臺大麻醉部於 2009 年起，新增心血管暨胸腔麻醉科，希望透過主治醫師責任制及主治醫師專科化，讓負責心胸麻醉的醫師能在合理的工作量之下，有更多的機會及時間來熟悉心胸手術的麻醉，以期能提高整體的麻醉照護的品質，並且能以積極創新的精神為台灣的心胸麻醉做出更多的貢獻。

Stronghold of Taiwan's Cardiothoracic Anesthesia

The Department of Anesthesiology, National Taiwan University Hospital

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Abstract

The Department of Anesthesiology at the National Taiwan University Hospital was independently established in June of 1962. For over 50 years our hospital have assumed leadership position nationwide for cardiac and thoracic surgeries, and have completed many nation's first procedures, such as Taiwan's first heart transplantation and first successful case of lung transplantation. Our pioneers have not only accumulated rich experience in cardiothoracic anesthesia, but also solidified the foundation of NTUH as the leading cardiothoracic institution in Taiwan. In following our hospital's vision of achieving clinical, research and teaching excellences, we encourage our attending physicians to conduct various clinical research, and we

have gradually improved teaching plans for our resident physicians and anesthetic nurses to train future experts in anesthesia. In recent years, we have made several advances in the treatment of care of adult and pediatric cardiovascular diseases, such as the opening of the NTUH Children and Women building (now NTUH Children's Hospital)、NTUH Cardiovascular Center and the introduction of Da Vinci System. The Department of Anesthesiology will continue to contribute to the development of Taiwan's cardiothoracic anesthesia through innovation and hard work.

Origin of Anesthesia at NTUH

In the early days of Taiwan, the same doctor who performed the surgery often performed anesthesia. One of the doctors at our hospital, Dr. Tien Yu Lin, who returned to Taiwan at the end of 1951 from the United States, realizing that complex thoracic surgery needed the assistance of dedicated anesthesiologists, thus collaborated with Dr. Hsueh Shih Wang from the National defense Medical Center in 1952 to lay the groundwork for the anesthesia legacy of NTUH.

In 1953, Dr. Kuang Yi Li completed the specialist training program by the World Health Organization for developing countries in Denmark, and returned to Taiwan to take charge of the anesthesia operation in our hospital. Subsequently, Dr. Ming Kun Lin and Dr. Chi Ching Chao also completed their training and returned to Taiwan in 1957 and 1961, respectively. At the time, the NTUH has 3

attending anesthetic physicians at NTUH and a resident physician, Dr. Chuan Mei Shih. In June of 1962, the Department of Anesthesiology was officially established at NTUH, which laid the groundwork for development of anesthesiology in our hospital. After nearly 6 decades of development, the department has expanded into four sub-sections on pain, general, maternal/children and cardiothoracic anesthesiology, along with an entire team of intensive care ward.

The Development of Cardiothoracic Surgery

The Department of Surgery at NTUH has always been a pioneer in cardiac surgery in Taiwan. After completing the first cardiac surgery in Taiwan in 1956 – the mitral valve incision, the department also completed the first open heart surgery in 1964. Since the 1970s, under the leadership of Prof. Chi Jen Hong from the Department of Surgery,

we started training of future specialists and established a dedicated intensive care ward for surgery. In 1973 the NTUH completed the first Coronary Artery Bypass Grafting surgery, and in 1987 the first case of heart transplantation. Currently there are more than a thousand cases of cardiac and major blood vessel surgeries at NTUH annually and the Department of Anesthesiology have gained vast amount of experiences on cardiac anesthetic care through these procedures. In 1995, Dr. Fan Sheng Yao introduced then-advanced trans-esophageal echocardiography (TEE) from the U.S., allowing anesthesiologists to better grasp the conditions of the heart during surgery. In the following decade, through the efforts of physicians like Dr. Sheng Kuo Tsai and Dr. Ming Chu Wang, TEE was fully adopted for all cardiac surgery, and all resident doctors in the department of anesthesiology received complete training on cardiac ultrasound diagnosis. In 2012, the NTUH Cardiovascular Center was established, which integrated the surgical and internal medicine sections of cardiology, operating rooms, catheter room and intensive care units, providing comprehensive care for cardiac patients.

Other than adult cardiac surgeries, complex congenital cardiac surgery is one of the more difficult surgical procedures.

From simpler procedures such as atrial and ventricular septal defects repair, to the more difficult procedures such as the total correction of Tetralogy of Fallot and corrective surgery for transpositions of great arteries, NTUH's Department of Cardiac Surgery always takes the leading position in Taiwan. The first Norwood Procedure successfully completed by NTUH in 1994 was an important milestone for treatment of children with congenital heart defects. In this surgery, our members have been invaluable to the success of the surgery by providing comprehensive anesthesia care during the procedure. After the opening of the Children and Women Building in 2008, the hospital integrated pediatric cardiologist, pediatric cardiac surgeon, anesthesiologist, operating rooms, pediatric catheter room and intensive care units together to provide a more holistic, integrated care for children with congenital heart diseases. Currently, the hospital conducts about 300 cases of pediatric cardiac surgeries annually. Through the efforts of Dr. Chi Hsiang Huang, we have not only accumulated abundant experience on pediatric cardiac anesthesia, but also enriched the teaching on pediatric cardiac anesthesia and TEE, attracting many anesthesiologists from other institutions to come and learn.

Along with the cardiovascular surgery,

the development of cardiac catheterization has also advanced rapidly, but at the same time creating more challenges for cardiothoracic anesthesia. In addition to the early development of balloon angioplasty and stent placement, the NTUH has also dedicated great efforts in developing techniques like endovascular aneurysm repair (EVAR), transcatheter aortic valve implantation (TAVI), placement of occluders for atrial septal defect (ASD) and ventricular septal defect (VSD), Left Atrial Appendage Occluder (LAA occlude) and transcatheter pulmonary valve implantation. With new members like Dr. Hsin Hao Huang, Dr. Hsiao Liang Cheng, Dr. Po Yuan Shih, Dr. Yi Chia Wang and Dr. Ying Ju Liu, our cardiothoracic team has gained fresh blood and it is able to provide better and higher quality anesthesia care, allowing the successful completion of the various cardiac catheterization procedures and faster recovery for our patients.

Prof. Tien Yu Lin first initiated advancement of thoracic surgery at NTUH during the 1960s, which began with the first thoracotomy and first esophageal resection more than 50 years ago. In the years that followed, we introduced new technology like the endobronchial blocker and double lumen endotracheal tube to meet the requirement for one lung ventilation during

surgical procedures, as well as employing methods like thoracic epidural anesthesia and total intravenous anesthesia for safe and effective surgical anesthesia care. Assisted by the team, Prof. Yuan Chi Li completed the first lung transplantation procedure in 1995. Recent advances and popularization of video-assisted thoracic surgery (VATS) called for anesthetic methods that more protective and meets with physiological requirement. Under the collaboration of Dr. Ya Jung Cheng, Dr. Ming Hui Hung and Dr. Chin Hsing Chen from Thoracic Surgery, the team developed non-intubating VATS anesthesia, and improved the perioperative recovery and post-surgical satisfaction of the patient. The team has also published over 20 scientific papers and attracted medical teams from all over the world to come to our hospital for experience exchange. With the addition of new members like Dr. Po Ni Hsiao and Dr. Man Ling Wang, the thoracic anesthesia team has matured even more in the advancement of lung transplantation, esophageal and airway surgeries.

Since 2012, the NTUH Operation Room has installed the Da Vinci surgical system and has begun to develop robotic arm surgery. The division of cardiothoracic surgery also joined in the efforts to perfect this technique. As robotic assisted surgery is a novel surgical method and the

requirement for anesthesia care varies from divisions to divisions, we made the efforts to develop a comprehensive anesthesia care for the robotic assisted surgery, sending personnel to visit other institutions and gather experiences. Our anesthesiologists and anesthesia nurses also worked together to publish a guidebook on anesthesia care for robotic assisted surgery in 2016, disseminating our experiences in robotic assisted surgery anesthesia care for other institutions to learn from.

Future Perspectives

Anesthesia of cardiothoracic surgery is the basis for all major surgeries. The Department of Anesthesia at NTUH has accumulated extensive experience in anesthesia care, inheriting the rich experience and challenging traditions of the cardiothoracic surgical team, and never one to shy away from sharing these experiences with the anesthesia colleagues both domestic and foreign. Responding to the increasingly complex and diverse cardiothoracic surgeries, the Department of Anesthesia has added the division on cardiovascular and thoracic anesthesia since 2009, hoping that, through implementing specialization and responsibility system of attending physicians, our physicians

in charge of cardiothoracic anesthesia can have more time and opportunity to familiarize themselves with the anesthesia techniques, under reasonable workloads. We hope to improve the overall quality of anesthesia care and to contribute more for the development of thoracic anesthesia in Taiwan with innovate spirits and creativity.

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Figure 1. The first group photo of the attending physicians of NTUH's Department of Anesthesiology. Photographed in the old NTUH campus, circa 1967.

Persons in the photo: from the left of front row are Prof. Ming Kun Lin, Prof. Kuang Yi Li and Prof. Chi Ching Chao. From the left of back row are Dr. Chang Chun Lin and Dr. Wan Sheng Lin.

Figure 2. Group photo of the attending physicians of NTUH's Department of Anesthesiology, circa 2014. Photo taken at the front door of the NTUH East Site building.

Figure 3. During a heart surgery, anesthesiologist uses TEE to monitor and evaluate cardio functions, and instructs the resident physicians.

Figure 4. Anesthesia care in the cardiac catheterization room. TEE is used to monitor the heart condition and assist in completing the treatment for patient.

Figure 5. On site with non-intubating VATS anesthesia care.

Figure 6. Guide book on robotic assisted surgery anesthesia care published by our colleagues.

顱顏麻醉

—— 林口長庚紀念醫院麻醉部

撰文 / 黃潔文 主治醫師、黃樹欽 主治醫師、陳捷 主治醫師、高宜娟 麻醉部婦幼麻醉科主任

林口長庚紀念醫院麻醉部成立於 1976 年。除麻醉服務量為全國居冠外，也擁有多項全國第一的指標，如第一個訂定及執行麻醉監視標準、第一例成功肝臟移植手術麻醉等。本院擁有世界級顱顏中心，執行了全國九成以上唇顎裂病患手術麻醉，累積豐富的顏面異常手術麻醉及困難氣道處理經驗，為國際唇顎裂病患手術麻醉的重要教學中心。

發展背景

長庚顱顏整形外科的發展歷程，最早源於 1979 年加拿大多倫多病童醫院醫療團來台示範教學新的手術與麻醉技術。台北長庚唇顎裂暨顱顏中心於 1981 年成立，1982 年指派黃潔文醫師遠赴加拿大跟隨 Dr. D.J. Steward 學習小兒麻醉及兒童顱顏外科手術麻醉。1998 年長庚顱顏中心移至林口長庚，2008 年移至桃園長庚迄今，已成為世界著名唇顎裂照護中心。

除了多次協助國外複雜顱顏畸形患者與海外義診等人道援助外，至今培養出將近 400 位來自世界各地的外科醫師、齒顎矯正醫師、麻醉醫師、語言老師、護理師、與社會工作師。並於 2000 年開始舉辦長庚唇顎裂論

壇，對提升第三世界唇顎裂與顱顏治療水準，佔國際重要地位。

經過三十多年發展，感念前輩無私的教導及對社會的反饋，除歡迎各醫院派員觀摩學習外，於 1998 年開始更積極參與國際義診活動。因認同「給他魚吃，不如教他如何抓魚」的理念，也協助羅慧夫顱顏基金會代為訓練其他國家的顱顏麻醉人員。

國內院際交流：臺大、慈濟、萬芳、亞東、北醫……等。

國際義診活動：越南、柬甫寨、寮國、菲律賓、山西、深圳、汕頭、青島、印尼、緬甸、蒙古國、多明尼加。

國際人員代訓：越南、柬甫寨、菲律賓、新加坡、泰國、土耳其、中國(內蒙、深圳、汕頭、山西)、緬甸、蒙古國。

現況

目前本院執行了全國九成以上唇顎裂病患手術麻醉，對於先天頭顱顏面異常手術麻醉及困難氣道處理累積豐富臨床經驗，處理各項顱顏問題之麻醉例如：

一、先天顱顏畸形如唇顎裂、小耳症、半邊小臉症或萎縮、眼距過寬、顱縫提早骨化或癒合(craniosynostosis)。

二、正顎手術(Orthognathic Surgery)、顱顎關節疾患及顏面骨塑形美容。

三、顱顏腫瘤及胎記(血管或淋巴瘤)或神經纖維瘤。

四、骨骼纖維變性或手術後、放射治療後造成之顏面變形。

五、創傷性異常及五官歪曲畸形。

以上各種顱顏手術，除了要與手術醫師充分配合發揮團隊合作外，麻醉常會遇到各種症候群之呼吸道維持及潛在或真正困難插管挑戰的問題。其次有些手術困難度很高，必須合併神經外科手術，耗時且有大量出血與失溫的問題，如何建立術中通暢的輸液路徑、使用完善的監視系統、詳實

的手術前麻醉詳估以及與家屬溝通十分重要。術後顏面腫脹導致的呼吸問題要密切觀察，拔管或帶管到加護病房照顧的策略決定也是挑戰。重點歸納如下：

一、困難插管的麻醉挑戰：例如許多先天性症候群如 Pierre Robin sequence、Stickler syndrome、Treacher Collins syndrome、velocardiofacial syndrome、Down syndrome、Klippel-Feil syndrome 都可能合併唇顎裂，而必須在嬰幼兒時期接受手術。或是 craniofacial dysostosis (如 Crouzon、Down、Apert、Pfeiffer、Carpenter syndrome) 等顏面骨骼發育不良需要手術時，若無法即時順利插管，可先放置喉頭罩或調整頭部擺位以改善給氧，甚至事前便計劃用光纖鏡插管。麻醉前訪視對這類先天性症候群、多重心肺神經等異常亦要先行知悉。

二、大量失血的問題：有些顱顏畸形手術需要與神經外科醫師合併開刀，除術前詳細的評估，因為手術較耗時，常規準備的監視系統外，要增加各式侵入性監視儀，以隨時分析，及時輸血或輸液等。術中需降低顱內壓與血壓以減少失血量與避免腦水

腫，並要注意保溫及術後送加護病房的拔插管問題。

三、減少或防止併發症的產生，避免在麻醉時可能發生缺氧或插管失敗，各種急救人員及設備要完整，以維安全麻醉。

未來展望

一、醫療精緻化：對唇顎裂及顱

顏畸形患者的治療追求品質進一步的改善。

二、推展顱顏相關的醫學研究：如實證醫學、組織工程、醫學影像……等。

三、醫療技術的傳承與發展：引進新式兒童呼吸道處理工具及影像導航系統等。

Craniofacial Anesthesia

The Department of Anesthesiology, Chang-Gang Medical Foundation, Linkou Branch

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Abstract

The Department of Anesthesiology, CGMH-Linkou Branch was established in 1976. This department not only provides the largest volume of services among all anesthesiology departments, but also has won multiple No.1 honors, including the 1st Center to establish and implement monitoring criteria for anesthesia, and the 1st Center to achieve a successful surgical anesthesia in a liver transplantation. CGMH is equipped with a world-class Craniofacial Center and has performed over 90% of surgical anesthesia for patients with cleft lip and palate. As a result, the Craniofacial Center in CGMH has become an important international training center for medical personnel involving treatments for patients with cleft lip and palate due to its rich experience in surgical anesthesia for patients with craniofacial dysostosis and difficult airways.

Backgrounds

The development of craniofacial surgery in CGMH originated from the novel surgical and anesthesia demonstration made by a Canadian Medical Team “The Hospital for Sick Children or SickKids” in 1979. The Craniofacial Center in CGMH-Taipei Branch was subsequently established in 1981, and Dr. Chieh-Wen Huang was

assigned to learn from Dr. D.J. Steward in Canada in pediatric and pediatric craniofacial anesthesia in 1982. The Craniofacial Center was transferred to CGMH-Linkou Branch in 1998 and then to the Taoyuan Branch in 2008. Now the Craniofacial Center in CGMH has become the leading craniofacial caring center worldwide. The Center not only performs multiple humanitarian operations on



圖一：麻醉準備及擺位。



圖三：1998年越南阿福接受顱顏重建手術前後對照。



圖二：困難氣道。



圖四：義診照片。

internal patients with complex craniofacial deformities or overseas volunteer medical services, but also trains almost 400 international medical personnel (such as surgeons, orthodontists, anesthesiologists, speech therapists, registered nurses and social workers). To improve the quality of healthcare for patients with cleft lip and palate or craniofacial dysostosis in the 3rd world, CGMH started to host cleft lip and palate forum in CGMH in 2000, which has become a leading forum worldwide.

After 30 and more years of development, the Craniofacial Center in CGMH not only welcomes observations or fellowship applications from other hospitals, but also actively participates in international volunteer medical services since 1998 to acknowledge the selfless training and social achievements made by senior practitioners. Besides, by upholding the concept of "Give a man a fish and you feed him for a day. Teach him how to fish and you feed him for a lifetime.", the Craniofacial Center in CGMH also assists Noordhoff Craniofacial Foundation in anesthesiologist training coming from other countries.

National inter-hospital activities: National Taiwan University Hospital, Buddhist Tzu Chi medical Foundation, Taipei Municipal Wanfang Hospital (Managed by Taipei Medical University),

Far Eastern Memorial Hospital and Taipei Medical University hospital.

International volunteer medical services: Vietnam, Cambodia, Laos, The Philippines, Shanxi, Shenzhen, Shantou, Qingdao, Indonesia, Myanmar, Mongolia and Dominican Republic.

International Medical Personnel Training: Vietnam, Cambodia, The Philippines, Singapore, Thailand, Turkey, China (Inner Mongolia, Shenzhen, Shantou, Shanxi), Myanmar, Mongolia.

Current Status

Our hospital has performed up to 90% of surgical anesthesia for patients with cleft lip and palate at present. Therefore, we have accumulated rich experience in solving problems such as anesthesia for congenital craniofacial dysostosis or difficult airway. The examples are as follows:

1. Congenital craniofacial dysostosis, including cleft lip and palate, microtia, hemifacial microsomia or dystrophy, ocular hypertelorism, and carnio-ossification or craniosynostosis.
2. Orthognathic Surgery, tempor-mandibular disorders and plastic surgery for facial bones.
3. Craniofacial tumors and birthmarks (hemangioma or lymphoma) or

neurofibromatosis.

4. Myelofibrosis or post-surgical/post-radiotherapy facial deformities.
5. Traumatic abnormalities and distort facial deformity.

In addition to excellent teamwork between the surgeon and the assistants, there may be various airway symptoms or potential/actual intubation challenges to overcome to achieve successful anesthesia in a craniofacial surgery. Furthermore, some difficult surgeries may be involving massive bleeding along with hypothermia and thus require neurological surgery techniques. In this case, a smooth transfusion pathway, a comprehensive monitoring system, a detailed and accurate pre-surgical anesthesia evaluation and the communication with the family during surgery are very important. In addition, not only does facial swelling-caused respiratory issues require close supervision, but also decision making and strategies for extubation/intubation care in the ICU are quite challenging. We hereby summarize the key points to a successful craniofacial surgery as follows:

1. Difficulties in anesthesia intubation: Many congenital syndromes such as Pierre Robin sequence, Stickler syndrome, Treacher Collins syndrome, velocardiofacial syndrome, Down syndrome or Klippel-Feil syndrome may

incorporate cleft lip and palate and thus require surgical interventions as early as in infancy. If anesthesia intubation fails in surgeries for craniofacial dysostosis (e.g. Crouzon, Down, Apert, Pfeiffer, Carpenter syndrome), a laryngeal mask airway (LMA) or head positioning adjustment can be performed to improve oxygenation. A prepared fiberoptic intubation plan can be useful as well. Therefore, pre-surgical anesthesia evaluation is critical to help us be aware of these congenital syndromes or multiple cardiopulmonary/neurological abnormalities.

2. Massive bleeding: Certain surgeries for craniofacial dysostosis may require the assistance of neurological surgeons. In addition to detailed pre-surgical evaluation, regular monitoring system along with various invasive monitoring systems are also required to achieve real-time analysis, prompt blood/fluid transfusion due to long operation time. Moreover, it is also important to reduce intracranial and blood pressure during the surgery to ameliorate bleeding and avoid brain edema. Body temperature maintenance as well as post-surgical extubation in the ICU are also essential.
3. To diminish or prevent complications from occurrence and oxygen deprivation



or intubation failure during anesthesia, an emergency response team along with required facilities should be well-prepared to achieve safe anesthesia.

Future Perspectives

1. Refine Healthcare to further improve the quality of treatment for patients with cleft lip and palate and craniofacial dysostosis.
2. Promote craniofacial-related medical research such as evidence-based medicine, tissue engineering or medical imaging.
3. Continue and develop the legacy of medical techniques, including the introduction of new airway kits for children and image-guided navigation system.

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Figure 1. Prepare for anesthesia and positioning.

Figure 2. Difficult Airway.

Figure 3. Photos of Vietnamese A-Fu before and after received the craniofacial reconstruction surgery in 1998.

Figure 4. Photos of volunteer medical consultation.

心臟麻醉：享譽國際的卓越

—— 振興醫療財團法人振興醫院麻醉部

撰文 / 周毅鵬 部主任

振興醫院自 1967 年開院，在麻醉醫學會創立者前輩王學仕先生規劃指導下，結合各方資源，建立麻醉科，並逐漸轉型成綜合型區域教學醫院。

麻醉部備有先進的設備，如全新麻醉機、各種精密生命監測儀，及配備多台食道心臟超音波監測以因應特殊開心、換心手術之麻醉，並提供協助國內外多所醫院培訓心臟麻醉及超音波操作訓練，以此為本院麻醉部麻醉專科醫師教學訓練特色。

發展背景

振興醫院自 1994 年 8 月延聘三軍總醫院魏崢醫師及心臟麻醉專科醫師周毅鵬醫師，於本院組成心臟醫療小組，隨麻醉業務量急劇增加，歷屆院長均極為重視及大力支持麻醉科，麻醉科於 2012 年 5 月 1 日擴展為麻醉部，由原科主任周毅鵬升任麻醉部主任。

麻醉部除擁有包括麻醉專科醫師與護理師所組成的專業服務陣容，並陸續增購先進的設備，如全新麻醉機及各種精密生命監測儀，因應特殊開心、換心手術之麻醉；配置麻醉深度測儀，每間心臟手術室均配備食道心臟超音波監測心臟手術中情形，另有心臟內科熊名琛醫師於麻醉中從旁協

助指導及教學，即時經由食道心臟超音波診斷術中情形，提供心臟外科醫師即時之醫療處置為特色。

現況

振興醫院心臟醫療團隊不斷在技術與設備方面自我要求與提升，麻醉部亦因應心臟醫療團隊手術配合參與心臟麻醉，麻醉部除配合心臟移植小組施行換心手術麻醉外，亦配合執行各項心臟外科手術麻醉執行，如：冠狀動脈繞道手術麻醉、不停跳冠狀動脈繞道手術麻醉、各類心臟瓣膜修補及置換手術麻醉、主動脈剝離手術麻醉、新式主動脈支架置放手術麻醉，周邊動靜脈手術麻醉、心室輔助器置放麻醉等，心臟醫療團隊樹立了國內

心臟醫療品質的指標，屢創醫療新紀錄與成就，因此吸引了許多海內外病患前來求治。

醫療科技日新月異，為提供病患更多樣、更有效、更安全的治療，心臟外科手術走向精緻化、低侵襲性及小切口的手術的時代來臨，於 2013 年 3 月結合心臟內、外科、麻醉科與心臟超音波等專家通力合作完成第一例「經導管人工主動脈瓣膜植入術」Medtronic CoreValve TAVI 手術。並截至 2016 年 4 月底已完成 150 例以上「經導管主動脈瓣膜植入術」(TAVI) 患者麻醉，病患平均年齡 83 歲，其中年齡最高者為 101 歲，對麻醉技術

亦是有相對性的挑戰。近日心臟手術麻醉亦協助運用心臟超音波完成「二尖瓣膜夾」(MirtaClip) 手術麻醉再度挑戰另一種針對高齡化瓣膜性心臟疾患新的麻醉服務。

未來展望

本部除醫療服務外，並有實習醫師與 PGY1 醫師之教學，以及本院住院醫師及接受院外醫師之心臟麻醉訓練，培育優秀心臟麻醉醫療人才，同時參與學會各項繼續教育與研討會，以提升醫療層次，增進病患麻醉之品質與安全。

麻醉部心臟手術大事紀

- ◆ 1967 年成立振興復健醫學中心因收容小兒麻痺殘障兒童，為提供醫療手術與復健救援，成立麻醉科，麻醉病患以小兒麻痺矯正之肢體手術為主。
- ◆ 1994 年 8 月延聘三軍總醫院魏崢醫師及心臟麻醉專科醫師周毅鵬醫師，於本院組成心臟醫療小組，9 月完成本院第一例開心手術麻醉，12 月完成本院第一例心臟移植手術麻醉。

- ◆ 1996 年 5 月心臟醫療小組與台南人工心臟研究中心合作成功完成全亞洲首例人工心臟置換手術麻醉，人工心臟為台灣自製的「鳳凰七號」。振興醫院與臺灣人工心臟研究中心，手術在八十五年五月二十一日晚間十點展開，整個麻醉及手術在二十二日清晨四時完成。
- ◆ 1996 年 6 月 9 日完成第二例全人工心臟置換，並於 6 月 23 日為同一患者完成心臟及腎臟移植手術麻醉，成為世界第一位接受全人工心臟後，又接受心臟及腎臟移植成功之病例。
- ◆ 1997 年在花蓮慈濟醫院、台北榮總和空中警察等合作下，跨院為一名主動脈剝離危急患者施行手術困難的主動脈剝離 Bentall 手術麻醉。
- ◆ 1997 年 9 月本院率先完成第 100 例心臟移植手術及麻醉，打破全台及亞洲紀錄。
- ◆ 2000 年完成冠狀動脈手術新突破—心臟不停跳冠狀動脈繞道手術 300 例麻醉。
- ◆ 2000 年完成世界首例「自體心臟移植」手術麻醉，運用自體心臟取出修補左心室破裂再移植回去。
- ◆ 2004 年創下心臟移植麻醉新里程碑—心臟離體 13 小時移植成功，此為世界最長紀錄。
- ◆ 2009 年 2 月增設心臟外科麻醉專用手術室共 5 間，其中包括了全台第一間複合式手術室。將多軸式血管攝影系統及手術室整合，提供極佳的手術室無菌感染控制（頂級 HEPA100000 空氣感染防護系統），並配置 3D 心臟超音波即時提供術中心臟情形，讓病患可以在同一空間內完成影像檢查及手術，從而避免患者多次麻醉和轉運可能帶來的風險，以達到病人安全及提升手術成功率。
- ◆ 2009 年 5 月舉辦心臟麻醉醫學會第四屆會員大會暨學術研討會。

◆ 2010 年與越南軍方排名第一的 103 總醫院合作，在越南當地完成越南第一例成功的心臟移植麻醉，手術不需輸血，術後兩小時脫離呼吸機。

◆ 2011 年 3 月 麻醉部首次同時針對移植三心臟執行麻醉，12 小時內完成三心臟手術及麻醉。

◆ 2012 年 5 月 麻醉科擴展為麻醉部，由原科主任周毅鵬升任麻醉部主任。麻醉部之下分為心臟麻醉科、一般麻醉科與疼痛科三個科別。

◆ 2012 年 5 月高雄醫學大學附設醫院麻醉科醫師至本部接受心臟麻醉及超音波訓練。

◆ 2012 年 8 月寧波市第九醫院麻醉科主任至本部接受心臟麻醉及超音波交流及培訓。

◆ 2012 年 10 月國泰醫療財團法人國泰綜合醫院麻醉科住院醫師至本部接受心臟麻醉及超音波訓練。

◆ 2013 年 4 月接受戴德森醫療財團法人嘉義基督教醫院主任及護理師至本部接受心臟麻醉及超音波訓練。

◆ 2013 年 10 月結合心臟內、外科、麻醉科與心臟超音波等專家通力合作完成第一例 Medtronic CoreValve TAVI 手術。

◆ 2013 年 11 月接受醫療財團法人徐元智先生醫藥基金會亞東紀念醫院麻醉科住院醫師至本部接受心臟麻醉及超音波訓練。



圖一：麻醉部完成越南第一例成功的心臟移植麻醉。

◆ 2014 年 2 月山東省勝利油田中心醫院麻醉科主任至本部接受心臟麻醉及超音波交流及培訓。

◆ 2014 年 11 月江蘇省淮安市第二人民醫院麻醉科主任至本部接受心臟麻醉及超音波交流及培訓。

◆ 2015 年 5 月台北馬偕醫院遣派第三年住院醫師至本部學習心臟麻醉及超音波訓練。

◆ 2016 年 4 月底心臟團隊已完成 150 例以上「經導管主動脈瓣膜植入術」(TAVI) 麻醉，平均年齡八十三歲，其中年齡最高者為一〇一歲，其成果居亞洲之冠。

◆ 2016 年 4 月完成首例 TAVR，90 歲孀因原有主動脈豬瓣膜嚴重功能喪失，經導管置入人工主動脈瓣於原有之豬瓣內，手術成功。

◆ 2016 年 5 月 1 日完成經導管「二尖瓣膜夾」(Mirta Clip) 手術麻醉案例。

麻醉部心臟麻醉相關重要儀器購置

◆ 1994 年 12 月陸續購置經食道彩色心臟超音波系統共 4 台（HP SONO 5500、Philips SONO 7500 以及多平面式 360 度經食道小兒心臟超音波儀探頭）。

◆ 1999 年購置麻醉深度測定儀。

◆ 1999 年購置病患自控式止痛器，開始病患自控式止痛服務。

◆ 2003 年陸續購置纖維式支氣管鏡 OLYMPUS（LF-TP 粗、LF-GP 中、LF-DP、細 2 組）共 4 組。

◆ 2005 年 5 月陸續購置經食道 3D 彩色心臟超音波系統（Philips IE-33）共 2 台。



圖二：經食道 3D 彩色心臟超音波系統（1）。 圖三：經食道 3D 彩色心臟超音波系統（2）。

- ◆ 2013 年 8 月購置腦部血氧飽和測定儀（COVIDIEN INVOS5100C）成人與兒童雙頻。
- ◆ 2014 年 6 月購置靜脈顯示燈（AV-400 液晶靜脈定位器），工作輸液站（Fresenius Kabi Vial）。
- ◆ 2015 年購置區域神經麻醉阻斷及中心靜脈注射移動式彩色超音波，及專用於 E-NMT Module 神經肌肉監測模組。
- ◆ 2015 年購置多平面式 360 度 3D 經食道小兒心臟超音波儀探頭。
- ◆ 2016 年 1 月購置麻醉深度監視系統儀。

Cardiac Anesthesia

The Department of Anesthesiology, Cheng Hsin General Hospital

Yi-Pen Chou, M.D.

Director, Department of Anesthesiology

Abstract

Cheng Hsin General Hospital was opened in 1967. In addition, under the guidance of the Founder of Taiwan Society of Anesthesiologists (Dr. Hsueh-Shih Wang) and the joint resources from the society, the Department of Anesthesiology was established. After the establishment, our hospital has gradually become a comprehensive regional teaching hospital.

The Department of Anesthesiology is equipped with advanced facilities such as a brand new anesthesia apparatus, all kinds of sophisticated vital sign monitors and multiple transesophageal echocardiography to meet the requirements of special cardiac surgeries as well as anesthesia for heart transplantation. In addition, based on the featured anesthesia services provided by our anesthesiologists in our hospital, our department also provides training programs of anesthesia for cardiac surgeries and echocardiography to multiple national and international hospitals.

Backgrounds

Cheng Hsin General Hospital invited Dr. Jeng Wei (from Tri-Service General Hospital) and Dr. Yi-Pen Chou (Cardiac Anesthesiologist) to join our team since August, 1994, and subsequently Dr. Wei's Heart Center was established. Due to the drastic growth of business, all of our previous superintendents attached very great importance to our department and meanwhile were very supportive. Consequently Division of Anesthesiology

officially became the Department of Anesthesiology on May 1st, 2012, and the original Head of the Division Dr. Yi-Pen Chou was also promoted as Director of the department.

The Department of Anesthesiology not only consists of a professional team including anesthesiologists and registered nurses, but also has purchased advanced equipment such as a brand new anesthesia apparatus and all kinds of sophisticated vital sign monitors. Moreover, the department is equipped with monitors for cerebral

state index (CSI, indicator of the depth of anesthesia) and multiple transesophageal echocardiography to meet the requirements of heart transplantation and to supervise real-time situations of cardiac surgeries. Furthermore, Dr. Ming-Chon Hsiung of Department of Cardiology's guidance and assistance to cardiac surgeons based on the analysis of transesophageal echocardiography during anesthesia for cardiac surgeries has become featured medical services of our hospital.

Current Status

Dr. Wei's Heart Center in Cheng Hsin General Hospital not only has constantly upgraded techniques and equipment, but also is quite self-disciplined about the pursuit of brilliance. Therefore, the department is able to meet the requirements of cardiac surgeries (e.g., anesthesia for CABG, OPCAB, heart valve repair or replacement, EVAR, endografting, PAOD/PVD and LVAD placement) as well as heart transplantation. As a result, Dr. Wei's Heart Center has created several national models of medical services for cardiac patients. The center also sets multiple new records and achievements and thus becomes a very promising heart center for national and international cardiac patients.

Medical technology changes rapidly with time. To provide more diverse, more efficient and safer treatment to the patients, cardiac surgeries have become more and more sophisticated, and hence open a new era of minimally invasive approach. In March, 2013, experts in Department of Cardiology, Cardiac Surgery, Anesthesiology and Echocardiography collaborated together and accomplished the 1st "Medtronic CoreValve TAVI Surgery". By the end of April, 2016, our hospital accomplished more than 150 anesthesia procedures for TAVI Surgery. The average age of patients received this procedure was 83 years, and the oldest patient was 101 years old. We are proud of our accomplishment due to the great challenges of performing anesthesia on very elderly population. Lately our anesthesia techniques for cardiac surgeries have advanced and are ready for another challenge; that is, to assist the population with senile heart valve diseases called "MirtaClip" through echocardiography.

Future Perspectives

In addition to medical services, our department also provides residency and PGY1 training as well as cardiac anesthesia training for our residents and doctors from

other hospitals. Our goals are to cultivate excellent cardiac anesthetists and participate in all continuous training programs and seminars to improve our medical services and the quality and safety of anesthesia.

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Figure 1. Department of Anesthesiology completed the first successful anesthesia for cardiac transplantation in Vietnam.

Figure 2. 3D Color Transesophageal Echocardiography (1).

Figure 3. 3D Color Transesophageal Echocardiography (2).

Chronicle of Events Regarding Cardiac Surgery in Department of Anesthesiology

- ◆ In 1967, Cheng Hsin General Hospital was established to receive children with poliomyelitis and provide surgical as well as rehabilitation services. In addition, Division of Anesthesiology was also founded to support anesthesia for children required limb correction surgeries.
- ◆ In August 1994, cardiac surgeon Dr. Jeng Wei and cardiac anesthesiologist Dr. Yi-Pen Chou from Tri-Service General Hospital were invited to join Cheng Hsin General Hospital. They subsequently established a cardiac transplantation task force (Dr. Wei's Heart Center), accomplished the first open heart surgery and the first cardiac transplantation at Cheng Hsin General Hospital in September and December in the same year, respectively.
- ◆ In May 1996, our cardiac task force and Tainan Artificial Heart Research Center jointly accomplished anesthesia for the first artificial heart (Phoenix No. 7, made in Taiwan) replacement in Asia. The surgery started at 10 pm on May 21st, 1996 performed jointly by Cheng Hsin General Hospital and Taiwan Artificial Heart Research Center. The entire anesthesia and surgery were completed successfully at 4 am on May 22nd, 1996.
- ◆ On June 9th, 1996, our hospital accomplished the 2nd total artificial heart replacement surgery. Surprisingly, the same patient received anesthesia for cardiac and renal transplantation surgeries on June 23rd, which consequently made the patient become the first successful case worldwide receiving cardiac and renal transplantation after

receiving total artificial heart surgery.

- ◆ In 1997, our cardiac task force successfully performed a challenging anesthesia for Bentall Procedure on a critical patient with aortic dissection under the joint cooperation with Hualien Tzu Chi Hospital, Taipei Veterans General Hospital as well as National Airborne Service Corps, MOI.
- ◆ In September 1997, our hospital broke national and Asian Records and firstly accomplished the 100th cardiac transplantation and anesthesia.
- ◆ In 2000, we created a new era in coronary surgery by accomplishing 300 anesthesia for off-pump coronary artery bypass surgeries.
- ◆ In 2000, we have accomplished the first anesthesia for “autologous heart transplantation (i.e. took out the heart, repair ruptured left ventricle and then grafted back the repaired heart)” worldwide.
- ◆ In 2004, we have set a new milestone in anesthesia for cardiac transplantation, i.e. a successful and the longest 13-hour off-pump cardiac transplantation all over the world.
- ◆ In February 2009, our hospital newly established total of 5 operating rooms exclusive for cardiac surgery and anesthesia, including the first composite operating room nationwide. The compositing operating room consists of a multi-axis system for interventional angiography, an excellent sterile control (top-class HEPA100000 system), and a real-time 3D echocardiography to update heart conditions during the surgery, so surgeries and imaging examinations can be completed in the same room without exposing patients to the risks of multiple anesthesia or transportation, and consequently elevate patient safety as well as success rate of the surgery.
- ◆ In May 2009, our hospital hosted the 4th Annual Meeting and Academic Conference of Cardiac Anesthesiologists.
- ◆ In 2010, we collaborated with the best military hospital in Vietnam, 103 General Hospital, on a cardiac anesthesia case. That was the first successful anesthesia for cardiac transplantation in Vietnam. The procedure did not require blood transfusion and the recipient was successfully weaned from respirator two hours after surgery.
- ◆ In March 2011, the Division of Anesthesiology firstly performed anesthesia for three heart surgeries simultaneously and completed the procedures successfully in 12 hours.
- ◆ In May 2012, the Division of Anesthesiology was expanded as Department of Anesthesiology, and the Head of the Division, Dr. Yi-Pen Chou was promoted as

the Director of Department of Anesthesiology. Three divisions such as cardiac anesthesia, general anesthesia as well as pain control were subject to Department of Anesthesiology.

- ◆ In May 2012, anesthesiologists from Division of Anesthesiology, Kaohsiung Medical University Chung-Ho Memorial Hospital applied for cardiac anesthesia and sonography training in our department.
- ◆ In August 2012, Head of Division of Anesthesiology from the NO.9 Hospital of Ningbo City came to our department for mutual communication and cardiac anesthesia and sonography training.
- ◆ In October 2012, residents from Division of Anesthesiology, Cathay General Hospital came to our department for cardiac anesthesia and sonography training.
- ◆ In April 2013, Director and registered nurses from Division of Anesthesiology, Ditmanson Medical Foundation Chia-Yi Christian Hospital came to our department for cardiac anesthesia and sonography training.
- ◆ In October 2013, our hospital accomplished the first Medtronic CoreValve TAVI procedure through jointly cooperation between specialists from Department of Cardiology, Department of Cardiac Surgery, Department of Anesthesiology, and cardiac sonography.
- ◆ In November 2013, residents from Division of Anesthesiology, Far Eastern Memorial Hospital came to our department for cardiac anesthesia and sonography training.
- ◆ In February 2014, Head of Division of Anesthesiology from the Shengli Oilfield Central Hospital in Shandong Province came to our department for mutual communication and cardiac anesthesia and sonography training.
- ◆ In November 2014, Head of Division of Anesthesiology from the 2nd People's Hospital of Huai'an City in Jiangsu Province came to our department for mutual communication and cardiac anesthesia and sonography training.
- ◆ In May 2015, MacKay Memorial Hospital sent their 3rd residents to our department for cardiac anesthesia and sonography training.
- ◆ Until the end of April in 2016, Dr. Wei's Heart Center has accomplished more than 150 anesthesia for TAVI Procedure, which was the best accomplishment in Asia. The average age of recipients was 83 years old, when the oldest was 101 years old.
- ◆ In April 2016, we performed the first TAVR case for a 90-year-old female who had

severe porcine aortic valve defect. After replacing with a video-assisting artificial aortic valve, the procedure was very successful.

◆ In May 1st, 2016, our department accomplished anesthesia for MirtaClip Procedure.

Important Facilities Purchase and Establishment for Cardiac Anesthesia in Department of Anesthesiology

◆ In December 1994, our hospital has purchased 4 Color Transesophageal Echocardiography (HP SONO 5500 and Philips SONO 7500 along with a multi-plane and 360° TEE probe for children) in succession.

◆ In 1999, we purchased a monitoring device for measuring the depth of anesthesia.

◆ In 1999, we purchased Patient Controlled Analgesia (PCA) apparatus to provide PCA services.

◆ In 2003, our hospital procured total of 4 sets of OLYMPUS Flexible Fiberoptic Bronchoscopy (1 LF-TP thick, 1 LF-GP medium and 2 LF-DP thin) in succession.

◆ In May 2005, we also bought total of 2 sets of 3D Color Transesophageal Echocardiography (Philips IE-33) in succession.

◆ In August 2013, we bought a double-frequency Cerebral/Somatic Oximeter (COVIDIEN INVOS 5100C) to apply to children and adults.

◆ In June 2014, our hospital purchased a digital vasculature display apparatus (LED AccuVein AV-400) and an infusion workstation (Fresenius Kabi Vial).

◆ In 2015, our department procured a portable color sonography for local nerve block anesthesia and central venous catheter insertion, and an exclusive E-NMT Module.

◆ In 2015, our department purchased a multi-plane, 360°, 3D TEE probe for children.

◆ In January 2016, we have bought a monitoring system to supervise the depth of anesthesia.

擁有全國唯一的 2-T MRI 專用麻醉機 —— 光田綜合醫院麻醉科

撰文 / 何始生 主任

光田綜合醫院(前身仁聲醫院)於1913年由王銅鐘醫師創立，歷經百餘年。早期以內兒科為主。到第二代以一般外科為主，尤以膽管手術著名。當時手術麻醉多由外科醫師兼任或由外科助手為之，所使用的麻醉機為EMO (Epstein and Macintosh of Oxford) drawover ether vaporizer。歷年來不僅完成許多海線第一的高難度心臟手術成功案例，也成功為高齡百歲人瑞進行手術麻醉，2007年更成功在小兒加護病房為體重僅700克的早產兒進行心臟手術麻醉。並擁有全國唯一的2-T MRI專用麻醉機。

發展背景

1913年王銅鐘醫師創立「仁聲醫院」(光田綜合醫院之前身)，歷經王毓麟博士、王乃弘博士三代院長百餘年來的用心經營，迄今病床數達一千三百餘床，員工數達一千九百餘人，相關體系涵括：弘光科技大學、弘光附設老人醫院、清泉醫院、通霄光田等，為台灣中部地區的民眾的健康服務。

光田綜合醫院第一代是以內兒科為主，至第二代以一般外科為主，尤以膽管手術著名(圖-1 1946年手術照片、圖-2 1946當時所使用的麻醉機)，目前第三代，醫院規模涵蓋衛福部所訂定的24個專科。

本院麻醉科於1984年由翟財鈞

主任成立，歷經楊文龍主任，現由何始生醫師擔任主任職務。本科業務涵蓋臨床麻醉、急救和急、慢性疼痛治療等，且為麻醉專科醫師訓練醫院。本科擁有堅強的麻醉醫療團隊，除能提供一般手術麻醉服務外，更能在跨科別審慎評估病人身體狀況後，精準的執行特殊或高難度的手術麻醉，除心臟手術、老人手術、小兒手術及重症手術等麻醉照護外。歷年來不僅完成許多海線第一的高難度心臟手術成功案例，也成功為高齡百歲人瑞進行手術麻醉，2007年更成功在小兒加護病房為體重僅700克的早產兒進行心臟手術麻醉。

本院麻醉科特色，此特色亦為海線唯一。如近年來發展胸腔手術不插管全身麻醉；與胃腸科合作，利用

射頻作介入性治療酒精性胰臟炎病患疼痛問題；與神經外科合作利用射頻解決下背痛問題；更與癌症中心合作，提供癌症病患疼痛治療，如 intrathecal/epidural port implantation、buccal carcinoma prosopalgia pain management 等，均獲得良好成效。2011 年底更引進 2-T MRI 專用麻醉機 (圖 -3 MRI 專用麻醉機)，為台灣中部以北能提供 MRI 檢查時麻醉作業之醫院。

在沒有 MRI 專用麻醉機的年代時要如何處理需要做 MRI 的病患？

這部份病患可以分為兩區塊來說，可自主呼吸的及需要使用呼吸器的。前者比較簡單，會躁動的，給予輕度的 sedation 便可。至於觀察病患的呼吸，一般都是在病患胸口上放一紙杯，醫護人員在控制觀察室內觀察便可。目前有一些可在 MRI 攝影室內使用的生理功能監視器可使用。至於無法自主呼吸需要使用呼吸器的，只有兩種方式處理，一是由病患家屬在攝影室內操作 Ambu bag (人工急救甦醒球、人工甦醒器)，另一則由醫護人員在攝影室內操作 Ambu bag。但無論是家屬或醫護人員操作，往往都會使操作者心生憂懼，擔心自己會不

會因此受到身體上的損害，而醫院也因此可能被病患家屬及醫護人員所質疑，導致要說服其人工操作 Ambu bag 時可能需耗上解說的心力甚至破壞彼此間的信賴關係。

實際上關於磁場對人體的影響，有的專家認為每個細胞都有正負兩極，而磁鐵提供了改變生理組織的磁力，因此對於像是增進血液的循環會有效果，而間接認為磁鐵對人有保健作用，但需注意其中有些專家是磁療保健品廠商有所利益相關。而物理專家多認為磁場對人體原本的生理狀態是一種干擾，會產生副作用。美國在二戰結束後曾做過人體實驗，發現人處於超高強度的磁場中之後，很多人都出現生理上的異常，具體內容在網路上可搜得詳細資料。無可否認高磁場的確對人體有一定負面影響，不過會產生副作用的磁場其強度遠超出 MRI 範圍，因此在安全範圍內，短時間的暴露在 MRI 磁場中實際上並沒有明顯的損害。

目前所有醫療院所都強調，在所有放射科的醫療設備中，核磁是最安全的，人們不用害怕磁場。話雖如此，但病患家屬及醫護人員卻不以為然。會說為何我要做這個工作？所以光田

醫院為了不讓醫護人員及病患家屬有所困擾，引進 MRI 專用麻醉機，如此一舉解決一般麻醉機無法在 MRI 檢查室內使用的困境，不僅避免了醫療端的解說心力損耗，也更加提升病患與醫護人員的安全。

未來展望

光田綜合醫院是台灣歷史最悠久的非集團私人超大型的區域醫院，有百年的歷史，著重於醫療品質與創新服務。在整體而言，雖然在設備與人力上比不上醫學中心，但我們會向準醫學中心的方向邁進，成為區域醫院的龍頭。

Possessed Exclusively 2-T Anesthesia Machine for MRI Examination in Taiwan

The Department of Anesthesiology in Kuang Tien General Hospital

Galen Cheesang Ho, M.D.
Chief of Anesthesia Department/Director of IRB Committee

Abstract

Kuang Tien General Hospital (predecessor: Jen-Sheng Hospital) was founded by Dr. Tung-Chung Wang in 1913 and it has over a hundred years of history. In the early stage, the business at Kuang Tien General Hospital was based on Internal Medicine



圖一：1924 年手術照片。



圖二：1924 時所使用的麻醉機。



圖三：MRI 專用麻醉機。

and Pediatrics. Later on, the hospital became a general surgery hospital, especially for bile duct biliary tract surgery. At that time, the surgeon or the surgical assistant usually performed peri-operative anesthesia, and the anesthesia machine was called EMO (Epstein and Macintosh of Oxford draw-over ether vaporizer). In those years, Kuang Tien General Hospital provided many first successful in cure, even over 100 years old patient surgery. In 2007, Kuang Tien General Hospital even successfully performed cardiac surgery and anesthesia on a 700-gram premature baby in NICU. Currently Kuang Tien General Hospital is the only hospital equipped with an anesthesia machine exclusively for MRI.

Backgrounds and Current Status

Kuang Tien General Hospital (predecessor: Jen-Sheng Hospital) was founded by Dr. Tung-Chung Wang in 1913. After more than a hundred years of careful operation made by three-generation of superintendents Dr. Yu-Lin Wang and Nai-Hung Wang, Kuang Tien, General Hospital consists of up to 1300 beds and more than 1900 staff members nowadays. Beside Kuang Tien General Hospital, the associated groups of the mega-corporation consist of Hung Kuang University, and Hung Kuang University Affiliated Aging Care Hospital, Ching Chyuan Hospital and Tong Saio Kuang Tien Hospital. All of the affiliations are built to provide services to the population live in Middle Taiwan.

The first generation of medical services provided by Kuang Tien General

Hospital was based on internal medicine and pediatrics, and the second generation of service was based on general surgery, the biliary tract surgery was especially famous (Figure 1. Surgery in 1946; Figure 2. Anesthesia machine used in 1946). Now the 3rd generation of Kuang Tien General Hospital is composed of 24 specialties in accordance with the regulations made by MOHW at present.

Director Tsai-Chun Ti established the Department of Anesthesiology in Kuang Tien General Hospital in 1984, followed by Director Wen-Long Yang, and now Director Cheesang Ho leads the department. Our department provided includes clinical anesthesia, acute/chronic pain management as well as specialty training for anesthesiologists. In addition to anesthesia for high technique surgery and high risks patient surgery, we not only have

a solid anesthesiologist team to provide anesthesia, but also have precise medical service or delicate skills to fulfill difficult surgical anesthesia after a multidisciplinary evaluation on patient's physical condition. After all these years, Kuang Tien General Hospital has not only successfully accomplished many first in cure and high difficult surgeries, but has also successfully performed anesthesia on a centenarian. In 2007, Kuang Tien General Hospital even successfully performed cardiac surgery and anesthesia on a 700-gram premature baby in NICU.

The medical services provided by the Department of Anesthesiology are exclusive and effective. They include non-intubation anesthesia for thoracic surgeries; radiofrequency intervention pain management for patients with alcoholic pancreatitis (collaboration with Department of Gastroenterology) and low back pain (collaboration with Department of Neurological Surgery), pain management for patients with cancers (collaboration with Department of Oncology) such as intrathecal/epidural port implantation and buccal carcinoma prosopalgia pain management. In addition, Kuang Tien General Hospital is the only hospital in Northern and Middle Taiwan imported an 2-T anesthesia machine exclusively for MRI

in the end of 2011 (Figure 3. 2-T anesthesia machine exclusive for MRI).

How does one perform anesthesia on patients requiring MRI examination before the invention of anesthesia apparatus exclusively for MRI?

This can be explained in two parts: first, patients who have spontaneous breathing and the second, patients require ventilator. The former is easier. For patients who have spontaneous breathing but with agitation, they can be given mild sedation. As to the observation of breathing pattern, usually we put a paper cup on the top of the patient's chest and the medical staff could observe the movement of the cup in the control center. Currently some of the patient monitors supervision in the MRI imaging room is available. We can either train the family or ask the medical staff to operate the Ambu bag in the imaging room. But no matter who is going to operate on the Ambu bag, the quality of anesthesia may be affected by the fear of the operator (being afraid of causing damages in MRI room) or be questioned about the safety (the anesthesiologist may need to explain or convince families or other medical staff to perform it, which is not only time-consuming, but also destroys the confidence in each other).

In fact, the influences of magnetic



field on human body are controversial. Some believe that it can be positive due to its magnetic force to physiological tissues, which may improve circulation and thus is equipped with healthcare effects. However, some experts may have conflicts of interests with the sponsor. On the contrary, some physicists are convinced that magnetic field may interfere with the original physiological condition of human body and cause side effects, and thus, it is harmful to human beings. After World War II, some human subject research was done in the US, and the results showed that many people suffered from physiological abnormalities after being exposed to an intense magnetic force field. You may find detailed information online. Therefore, it is undeniable that intensive magnetic force field has certain negative impacts on the human body and thus should be avoided. However, the harmful intensity is actually much higher than the intensity generated by MRI; hence, exposure to MRI in a short period is within the safety range and does not cause any significant damage.

All of the hospitals or medical institutes claim that among all facilities used in the Department of Radiology, MRI is the safest equipment. That is, we should not be concerned about magnetic field, but we should be concerned about radiology.

Even so, family and medical staff may still not believe the evidence and refuse to take the treatment. In order to avoid this kind of dispute, Kuang Tien General Hospital has imported an anesthesia apparatus exclusively for MRI. As a result, all the challenges regarding performing anesthesia in the MRI imaging room are thereby solved. Not only can time-consuming explanations be avoided, but also the safety of family and healthcare staff members are well-protected.

Future Perspectives

Kuang Tien General Hospital is a non-foundational, private and large-scale regional hospital, which has over a hundred year of history and focuses on the quality of healthcare and innovative services. In general, even though our facilities and manpower are not medical center-level, we aim to become the leading regional hospital in Taiwan and plan to become a medical center in the near future.

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Figure 1. Surgery in 1924.

Figure 2. Anesthesia machine used in 1924.

Figure 3. 2-T Anesthesia machine exclusive for MRI.

健檢麻醉

——新光吳火獅紀念醫院麻醉科

撰文 / 溫文馨 研究醫師、汪郁榮 住院醫師

近年來民眾對於健康檢查意識抬頭，期望有舒適的檢查過程。很多民眾排斥腸胃鏡檢查是因疼痛與恐懼，新光醫院於2004年三月開始引進無痛腸胃鏡的檢查，以opioid類藥物中的Alfentanil為主要止痛，搭配Midazolam與小劑量的propofol，提供高品質抗焦慮和失憶的效果，是推展旅遊醫療健檢的重要功臣，並有一系列品管指標精進品質。

發展背景

健康檢查在近年來愈來愈受到國人的重視，各家醫療單位的健康檢查中心也紛紛成立，民眾對於健康檢查意識抬頭，不僅希望藉由健康檢查達到早期發現疾病治療的目的，也期望有一個舒適的檢查過程。

麻醉科在健康檢查的醫療中便扮演了提供民眾舒適檢查的重要角色。過去腸胃鏡清醒檢查的過程常讓民眾感覺到疼痛、不安，也是導致很多民眾排斥腸胃鏡檢查的最大原因，連帶排斥其他健檢套餐。而無痛腸胃鏡檢查藉由靜脈給予鎮靜止痛藥物來減輕受檢者的疼痛恐懼，以利於檢查順利進行。這十幾年來不管是健康檢查成套的無痛腸胃鏡檢查或是一般門診的

自費無痛腸胃鏡檢查均已成為趨勢。

現況

新光醫院的健康檢查中心於2004年三月開始引進無痛腸胃鏡的檢查，一開始每月約有將近兩百人次的健檢病人接受無痛腸胃鏡的檢查，成長到目前每月平均約有五百至七百人次以上，而這尚未包含一般門診及住院的無痛腸胃鏡檢查。

自2005年健檢無痛腸胃鏡即已達到近五千人次，自2008年迄今每年均維持穩定的七千多人次，而近三年的門診及住院無痛腸胃鏡則均維持五千多人次。這些無痛腸胃鏡健檢人數的成長與穩定來自於健康檢查中心以及麻醉科的充分合作，除了硬體設

備的更加進步，如提供病檢分離的檢查環境，將健檢所需的檢查設備集中於健檢中心內，和醫院其中檢查單位分開而獨立運作，讓受檢者不必來回奔波於醫院不同單位間，也讓健康的健檢來賓和醫院病患可以分別接受醫院的檢查，避免交叉感染。在軟體部分兩方的合作讓整個健檢的流程能夠相當順利的進行，提供接受健檢的民眾可以在舒適安全的環境下順利流暢的完成所有檢查。

新光健康檢查中心更積極推廣觀光醫療，帛琉總統、「大陸首善」陳光標、緬甸華裔首富及許多知名藝人均曾來新光健檢。在 2012 年，外籍人士到院健檢人次逼近千次，平均金額為 21,000 元。外籍人士主要檢查項目為一日腸胃鏡檢查與正子斷層造影健康檢查，佔外籍健檢量 40% 以上，而前者的品質正是十分仰賴麻醉。

無痛腸胃鏡檢查的健檢病人除了腸胃鏡檢查外，通常還會結合其他非常多樣的檢查，本院麻醉科人員會與健檢中心人員溝通每個民眾的檢查流程，確保檢查過程動線的流暢，減少民眾等待的時間。

在無痛腸胃鏡所使用的藥物選擇上，以短效、恢復迅速的藥物為主。

目前新光醫院無痛腸胃鏡檢查中，主要選擇以 opioid 類藥物中的 Alfentanil 為主要止痛藥物，起效快，作用持續時間短。對呼吸頻率和經肺泡供氧的抑制作用僅持續數分鐘，比 Fentanyl 短。搭配 Benzodiazepine(BZD) 類藥物則主要是以 Midazolam，提供抗焦慮和失憶的效果，減低病人因檢查的不安與恐懼，而比起其他的 BZD 類，Midazolam 有較短的半衰期及不具活性代謝物，也更適合希望讓病人迅速恢復的腸胃鏡檢查中使用。除了上述兩類藥物的使用外，搭配小劑量的 Propofol 使用，以提供更高品質的無痛腸胃鏡檢查。

即使健檢麻醉在麻醉領域中相對屬於低風險的麻醉，新光麻醉科仍高度重視、提供最安全的檢查環境。除了麻醉之前由麻醉專科醫師進行完整麻醉評估，在檢查過程中以和開刀房中同等規格配備的完整監視系統監測病人的生命徵象，急救設備及藥物也完全備妥，全程有麻醉專科醫師在旁監控整個過程及給藥。檢查過程中麻醉科醫師、麻醉護理師、健康檢查中心護理師、腸胃科醫師、腸胃鏡室護理師通力配合，做好良好溝通，麻醉科醫護也能根據施做檢查醫師表示還

需要的操作時間和是否需要切片、內視鏡是否正在通過刺激度較大的地方等來即時調整藥物劑量。

本科對每個個案均會做電訪關心個案後續狀況以及麻醉滿意度，每個月也都會針對健檢麻醉做品質管理會議檢討，包括 Alfentanil、Midazolam、Propofol 的個別以及平均用量統計，檢討是否有用藥量特別大的個案以及該個案的後續甦醒狀況及滿意度；健檢個案滿意度未達滿分者(4 分) 檢討其不滿意的原因；已做完麻醉評估者因故而取消之原因是否與麻醉科相關等，特殊狀況者會在全科品管會議上提出個案檢討報告，提出注意事項或改進方案。

新光健檢中心在 2011 年獲得生策會國家品質標章證書、2013 年醫策會健康檢查品質認證、2015 年遠見雜誌所舉辦之全台 426 家醫療院所及 46 家健檢診所進行業界互評票選，榮獲第二名，高品質的麻醉都是幕後功臣。

未來展望

健檢麻醉可說是小而精緻的藝術，看似簡易的麻醉過程，由於受檢者有較高的期待與要求，且能非常直

接感受到麻醉品質的水準，影響整個健檢中心的宣傳與醫院的營收，因此整個麻醉從術前評估乃至追蹤電訪都需要有縝密的規劃、良好的執行，在小地方也不能疏忽。

新光醫院的健檢麻醉有著完善的品質與安全管理，我們也將持續進行高品質指標、定期每月檢討，並讓全科麻醉科醫師均熟悉作業流程、與健檢醫師做良好搭配與溝通，使整個無痛腸胃鏡檢查麻醉的品質更臻完善。

圖一：麻醉護理師正在確認病患資料與專科醫師的術前麻醉評估，準備麻醉藥物。



圖二：執行無痛腸胃鏡時，一位麻醉護理師在病人頭側給予氧氣以及監視呼吸狀況，一位麻醉專科醫師在旁適時給予麻醉鎮靜藥物。



圖三：健檢中心有專屬恢復室，監視及急救設備比照開刀房術後恢復室。

Anesthesia for Health Examination

The Department of Anesthesiology, Shin Kong Wu Ho-Su Memorial Hospital

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Abstract

In recent years, a comfortable inspection process is expected due to the rise of public awareness for health examinations. Many people refuse to receive gastroscopy/colonoscopy because of the pain and fear. Shin Kong Wu Ho-Su Memorial Hospital introduced painless gastroscopy/colonoscopy in March, 2004. We provided opioids such as Alfentanil as the primary painkiller in conjunction with Midazolam as well as small dose of propofol to achieve high-quality effects of anti-anxiety and amnesia. As a result, painless exams became a significant attraction of medical tourism, and a series of quality control indexes were thereby developed to improve the service.

Backgrounds

The public has drawn increasing attention to health examination lately, and consequently more and more health examination centers are established in various medical institutes. Due to the rise of public awareness for health examination, early detection along with early intervention as well as a comfortable inspection process has become the primary goals of receiving health examination.

The Department of Anesthesiology plays an important role in satisfying such goals. Previously traditional gastroscopy/

colonoscopy often caused pain and discomfort and consequently became the major reason for rejection. As a result, the public might be against other health examination package services. However, the obstacle has been removed lately by adopting painless gastroscopy/colonoscopy. Intravenous administration of sedative painkillers not only can relieve pain and reduce fear, but also facilitates smooth and successful examination procedures. Therefore, painless gastroscopy/colonoscopy has become the main project in health examination package services or outpatient clinic at one's own expenses.

Current Status

The Health Examination Center in Shin Kong Wu Ho-Su Memorial Hospital introduced painless gastroscopy/colonoscopy since March, 2004. At the beginning, there was approximately 200 persons monthly receiving painless gastroscopy/colonoscopy service. Now the volume of the service has grown up to about 500~700 persons per month, and the persons that received such service at outpatient clinic or during hospitalization is not included.

To 2005, the volume of the service was up to approximately 5000 persons annually, and the volume steadily increased to 7000 persons or more annually from 2008 to date. In addition, the volume of outpatient and hospitalized painless gastroscopy in the past three years were constantly about 5000 persons or more. The growth and stability of the service volume not only resulted from the successful cooperation between health examination center and the department of anesthesiology, but also from the improvement of environmental settings such as separate designate areas for either treatment or health screening. All of the facilities required for health examination thereby are assembled inside of the center, where is an independent area from other units or laboratories in the hospital, so

subjects receiving health examination services will be able to complete all screenings in one place. In that case, not only unnecessary traveling back and forth between departments can be avoided, but also cross-infection between subjects and patients can be prohibited. As to software, a successful mutual collaboration between health examination center and department of anesthesiology facilitates the progress of health screen; people receiving health exams thereby can complete the entire service under a comfortable and safe environment.

In addition, the Health Center in Shin Kong Wu Ho-Su Memorial Hospital has actively promoted medical tourism in recent years. The President of Republic of Palau, "The Best Philanthropist" Mr. Guang-Biao Chen in China, the richest Chinese in Myanmar and many other celebrities all had come to our hospital for health examination. In 2012, foreign subjects in Shin Kong Wu Ho-Su Memorial Hospital for health exam has approached almost a thousand persons, and the average expense per person is NT\$ 21,000 dollars. Health examination services chosen by foreign subjects are primarily one-day gastroscopy/colonoscopy or PET scan ($\geq 40\%$), and the satisfaction toward former service greatly depends on the quality of anesthesia.

Usually, subjects would receive other diverse checkups along with painless

gastroscopy/colonoscopy. Therefore, our anesthetist and health center staff go through all the examination procedures for the individual subject to assure the fluency of screening process and to reduce waiting time. As to narcotic drug options for painless gastroscopy/colonoscopy, short-acting or rapid-onset drugs are preferred. Currently opioid such as Alfentanil is the primary painkiller used for painless gastroscopy/colonoscopy in Shin Kong Wu Ho-Su Memorial Hospital due to its fast-acting and short-lasting mechanism; that is, respiratory depression for only a few minutes (which is shorter than Fentanyl). In conjunction with Benzodiazepine (BZD) such as Midazolam primarily, the combination can achieve the effects of anti-anxiety and amnesia and thereby reduce the level of discomfort and fear of the subject. Unlike other BZD, Midazolam has a shorter half-life and inactive metabolites, and thus is more suitable for gastroscopy/colonoscopy due to its short-acting mechanism. In addition to previous two types of drugs, the use of those incorporating with small dose of Propofol is available for more high-quality painless gastroscopy/colonoscopy. Although the risk of anesthesia for health examination is comparatively lower than that for other purposes, our department still aims at providing the safest environment for our clients. In addition to the comprehensive

evaluation performed by an anesthesiologist prior to anesthesia, an all-inclusive monitoring system, emergency equipments as well as medications that are the same class as those in the OR are provided in the center during the entire examination process. Moreover, an anesthesiologist is on standby to supervise the overall process and drug administration. Besides, excellent communication between anesthesiologist, nurse anesthetist, registered nurse in health examination center, gastroenterologist, and gastroenterology nurse is also required. For example, the anesthetist should be able to adjust the dose of anesthesia accordingly based on the duration of the procedure, the requirement of biopsy or the working area of the endoscopy.

Our department not only conducts an afterward telephone interview to follow-up the condition and satisfaction toward anesthesia of individual case, but also discuss about the outcome of the service such as the statistics regarding individual and average consumption of Alfentanil, Midazolam or Propofol, or special cases that required extra doses of anesthesia, and the follow-up recovery as well as case satisfaction toward our services in a monthly quality control meeting for anesthesia used in health examination. In addition, we also discuss about the reasons led to any unsatisfactory rating among subjects

who gave lower grades (less than 4 points) in the satisfaction survey, or reasons for cancelation related to our department among subjects who have received an evaluation prior to anesthesia. Furthermore, case report regarding special conditions is also discussed on the quality control meeting to establish precautions or improvement plans accordingly.

The Health Examination Center in Shin Kong Wu Ho-Su Memorial Hospital has received SNQ Certification issued by IBMI in 2011, Health Check-up Program Certification issued by Joint Commission of Taiwan in 2013, and has won the 2nd place of Top Health Examination Center in Taiwan voted by peers (including 426 medical institutes and 46 health examination centers) in 2015 (the survey was held by Global Views Magazine). Our high-quality anesthesia service was the crucial link to all of the honors.

Future Perspectives

Anesthesia for a health examination is a delicate art. Anesthesia procedures, which seem to be easy and simple, actually require well-organized plans and excellent execution due to high expectations and demands from subjects. In addition, the quality of anesthesia directly affects the reputation of the health examination center and thus has

a great impact on the publicity of the center and the revenue of the hospital. In this case, from pre-surgical evaluation to follow-up telephone interview, a well-organized plan along with excellent execution is required in every detail during the entire anesthesia procedure. The Health Examination Center in Shin Kong Wu Ho-Su Memorial Hospital is equipped with complete and exceptional anesthesia techniques as well as safety management procedures. We aim to continue this high-quality service and regular monthly multidisciplinary discussion by helping all anesthesiologists be familiar with SOP and maintain good teamwork with the physicians in health examination center, so the service quality of entire painless gastroscopy/colonoscopy can be exceptional.

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Figure 1. A nurse anesthetist is checking patient data as well as pre-surgical evaluation made by the specialist and preparing narcotic drugs accordingly. Figure 2. A nurse anesthetist provides oxygen supplement and monitors patient's respiratory status at the cephalic end of the bed during painless gastroscopy and colonoscopy. An anesthesiologist is standby and gives sedatives to the patient accordingly.

Figure 3. The Health Examination Center is equipped with an exclusive recovery room, so all of the patients who had painless gastroscopy/colonoscopy are sent to this room for resting and recovery immediately after examination. The facilities for monitoring and emergent treatment in the recovery room are the same quality as those in the Operation Recovery Room. A nurse anesthetist is assessing the recovery status of a patient.



長期積極投入社會服務 —— 中山醫學大學附設醫院麻醉科

撰文 / 洪維德 麻醉科主任、教師成長中心主任

中山醫學大學附設醫院麻醉科雖成立較晚，但社會服務的觀念在科成立後很早就開始，特別對弱勢團體患者的口腔保健，取得了很好的服務成果。未來本科對既有的特色將持續努力改進，以在社會服務上追求最好的呈現。

發展背景

本校以「中山牙科專科學校」開始，前董事長周汝川博士本著「醫人、醫病，要醫心」的校訓，及照顧牙科患者的人文關懷理念下，在 1990 年麻醉科成立後即指示口腔醫學部及麻醉科對弱勢團體要提供足夠的口腔醫療照顧。

1995 年麻醉科及口腔醫學部成立身心障礙口腔治療團隊，口腔醫學部到安養中心及啟智教養院上課，衛教及做簡單的口腔保健服務並克服困難，安排需要牙齒照顧且不能合作的身心障礙患者到院治療，並寫計劃向衛生署尋求支持及肯定。麻醉科則提出麻醉安全需求及藥物的準備，並以病人安全為最高原則。

經衛生署同意並補助設立智殘障牙科特別門診後，隨即在 1997 年於口腔醫學部診療台開始對口腔有問題

的身心障礙患者治療的麻醉業務，由初期的每週一次，麻醉方法採用吸入性麻醉機 (World Seven)：給予氧氣加上氧化亞氮合併靜脈注射方式，使牙科醫師可以安心治療身心障礙患者的



圖一：智殘障牙科特別門診。



圖二：World Seven 吸入性麻醉機。

口腔問題，此項服務在前兩年大約服務了 200 名患者。

期間我們經由統計研究發現，靜脈及吸入性麻醉方法對於患者的呼吸道的安全沒有很好的保護作用 (Ref 1)，再經由呼吸道的研究分析，我們認為喉頭罩吸入性麻醉方式可能可以改善患者術中呼吸道的合併症，並且沒有氣管插管所造成術後合併症 (Ref 2)。

1999 年口腔醫學研究中心大樓啟用後，口腔醫學部增加「身心障礙患者門診治療區」，設立三間牙科診療室，配合麻醉機及麻醉標準監視配備，週一至週五上午皆由麻醉醫療團隊服務身心障礙的患者。麻醉方式由靜脈麻醉改為喉頭罩的麻醉方式，因為特殊需求患者牙齒口腔保健常需沖洗牙齒，所以喉頭罩全身麻醉仍有術

中造成吸入性肺炎發生的疑慮。而選擇氣管插管是可以預防術中吸入性肺炎的機會。

在對術後生活品質的調查後，發現氣管插管與喉頭罩麻醉兩者對於患者的生活品質並不會造成嚴重的影響，因此隨後麻醉方法大部分皆為氣管插管全身麻醉 (Ref 3.4)。對於如何改善氣管插管麻醉後的患者照顧，我們也不斷的研究來改善我們的照顧品質 (Ref 5)。

2010 年 3 月起：前董事長更指示要對居家老人口腔問題提供服務，口腔醫學部則依任務編組進行在宅口腔醫療照顧，對困難到院的居家老人提供簡易的口腔保健及處置，對於需要進一步處置的老人則安排送至本院接受麻醉並治療。



圖三：牙科診療室及麻醉恢復室。



圖四：特殊需求者牙科醫療服務示範中心。

現況

2011 年口腔醫學部獲選為中部唯一「特殊需求者牙科醫療服務示範中心」，業務量加重，平均年服務量約 8 百位患者，到 2015 年底，已麻醉服務 1 萬 5 千人次以上身心障礙及特殊需求的牙科患者。二十年來，特殊需求者牙科醫療在執行的經驗告訴我們：

- 一、以病人安全為第一考量。
- 二、患者要在當日恢復並回家或照顧機構。
- 三、當日患者麻醉及口腔處置後的生活品質，包括飲食睡眠及生活作息不要受影響。

未來展望

本科在台灣麻醉界 60 年的麻醉史中，起步相對較晚，但對於特殊需求者牙科醫療的社會服務一直大步前進。在醫院及口腔醫學部的支持下，穩定並持續的擴大，未來對既有的特色將持續努力改進，追求以最好的呈現來服務患者。

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Actively Involved in Long-Term Social Services

The Department of Anesthesiology, Chung Shan Medical University Hospital

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Abstract

Although the Department of Anesthesiology, Chung Shan Medical University Hospital was established late, the concepts of social services were initiated right after the establishment of the department. We even created great outcomes to the oral health of disadvantage groups. In the future, our department will continue improving our featured services and strive to present the best outcomes to social services.

Backgrounds

Based on the concepts of “Holistic care; physical, touching and Spiritual concern” (now the school motto) and the idea of providing humanity care to patients with oral health issues, the university was established as Chung Shan Dental Junior College by former President Dr. Chou Ju-Chuan. In 1990, after the Department of Anesthesiology was established, the Department of Stomatology and Department of Anesthesiology were assigned to provide sufficient oral healthcare services to disadvantage groups. In 1995, the Department of Anesthesiology and Department of Stomatology assembled

a oral health care team to provide services for patients with special needs. The Department of Stomatology not only started health education and simple oral health care service in Nursing Homes and Education and Nursing Institutions, but also overcame challenges and arranged patients with disabilities to be transported to the hospital for special dentistry treatment. Besides, the department also applies for subsidiary supports from the Ministry of Health and Welfare by writing grant applications. Based on the top principle of keeping patient's safety, Department of Anesthesiology has listed safety requirements for anesthesia procedures and prepared corresponding anesthetic drugs.

After the establishment of the Special Dentistry Clinic for Patients with Physical or Intellectual Disabilities was approved and subsidized by the Ministry of Health and Welfare, Department of Stomatology subsequently started the anesthesia services for patients with oral health issues and disabilities in 1997. At the beginning, the anesthesia service was provided once weekly by using an inhalation anesthesia machine (World Seven): oxygen plus nitrous oxide in conjunction with intravenous anesthesia, so the dentist was able to manage oral health issues for patients with disabilities smoothly. The service volume was up to approximately 200 persons in the first two years. However, after statistical analysis, we have found that inhalation anesthesia in conjunction with intravenous approach might raise safety concerns for patients during the procedure (Ref 1). Moreover, the results also revealed that laryngeal mask airway might be the solution to diminish respiratory complications during the procedure without causing post-surgical complication induced by endotracheal intubation (Ref 2).

In 1999, the Oral Health Medical Research Center Building was opened, Department of Stomatology established three dentistry consultation rooms for the additional "Clinic for Patients with

Intellectual or physical Disabilities" . The clinic provided anesthesia service to patients with disabilities every Monday to Friday morning with standard anesthesia machines and monitoring equipment. In addition, a laryngeal mask airway was used to replace the conventional intravenous anesthesia. However, general anesthesia using a laryngeal mask airway may lead to aspiration pneumonia during the surgery because patients with special needs are required to rinse their mouth and brush their teeth very often to maintain oral health. On the contrary, endotracheal intubation can significantly reduce the possibility of aspiration pneumonia. Interestingly, we have found that neither laryngeal mask airway nor endotracheal intubation have significant negative impact on patient's quality of life. Endotracheal intubation thereby became the most common anesthesia manner for patients required for Dental care (Ref 3,4). As to post-anesthesia care, we constantly conduct studies to improve the quality of care or service (Ref 5).

The former Hospital President further requested us to provide oral health services to home-based elderly since March, 2010. To accomplish this goal, Department of Stomatology was allocated to several subgroups based on assignments and then provided home-based oral health care.

For the home-based elderly who have difficulties in traveling to the hospital, we provide simple oral health care and treatment; but for those who require further management, we arrange suitable transportation plans and help them obtain anesthesia and corresponding treatment in the hospital.

Current Status

After the Department of Stomatology was selected as the only "Oral Health Center for Special Needs" in Middle Taiwan in 2011, our services demand doubled, that is, the average volume of service load annually was about 800 persons. Until the end of 2015, we have provided anesthesia services for approximately 15,000 or more dental patients with physical or intellectual disabilities or special needs. From the past 20 years of experience in dental treatment for special needs, we have learned that:

1. Patient's safety has always been the 1st priority.
2. The goal is to help the patient recover and let the patient be able to go home or care institute on the treatment day.
3. The quality of life after receiving treatment, including diet, sleep or daily activities should not be affected by the

anesthesia or oral therapy.

Future Perspectives

Our department has rather young experience in the history of 60-year old anesthesia specialty in Taiwan, but our social services of dental health for special needs have been improving significantly. With the support of CSMUH and the Department of Stomatology, our service has been stable and growing continuously. We aim to continue improving our featured services and devote to offer the best performance on special needs dental patients.

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Figure 1. Special Dental Clinic for Patients with Intellectual and Physical Disabilities.

Figure 2. World Seven Inhalation Anesthesia Machine.

Figure 3. Dental Consultation Room and Anesthesia Recovery Room.

Figure 4. Oral Health care Center for Special Needs.

心臟麻醉：重視術後止痛 ——亞東紀念醫院麻醉部

撰文 / 林子玉 部主任、陸正威 心臟麻醉科主任

朱樹勳院長於 1999 年到任後便積極發展核心專長 3C2T1M1N，其中之一的心臟血管醫學自此蓬勃發展。

亞東在 2000 年 1 月 18 日即開始執行台北縣第一例開心手術，於 2001 年完成世界首例「三心人」心臟移植麻醉成功，2006 年完成全球首例馬凡氏症候群病患二次主動脈置換術麻醉成功，2010 年台灣首例全內視鏡達文西冠狀動脈繞道手術麻醉成功，目前已完成逾五千例開心手術麻醉。在外科發展微創手術的同時，麻醉風險並不會減低，期望能攜手並進。

發展背景

亞東紀念醫院於西元 1981 年在板橋創設，台北縣約有四百萬人口，卻沒有一家醫院具備執行開心手術之能力，因此遠東集團徐旭東董事長特聘國內開心權威臺大醫院朱樹勳教授接掌亞東醫院。朱院長於 1999 年到任後便積極發展核心專長 3C2T1M1N，核心專長之一的心臟血管醫學自此蓬勃發展。

亞東在 2000 年 1 月 18 日即開始執行台北縣第一例開心手術，由於並沒有專門的心臟麻醉醫師，在初期是以與臺大醫院建教合作的模式，由臺大的心臟麻醉醫師支援並指導心臟手術麻醉的進行，直至 2001 年林子玉

醫師自臺大醫院麻醉部完成訓練進入亞東紀念醫院後，亞東才開始有專責的心臟麻醉醫師。

深知「無外科即無麻醉，無麻醉即無外科」的林醫師，一方面加強與外科醫師的雙向溝通，不斷地與外科醫師一同成長、一同解決問題，一方面仍維持與臺大的建教合作關係，不斷地招募新血加入，讓亞東麻醉科在穩定中成長茁壯。

亞東醫院自 2000 年執行第一例開心手術後，至 2003 年已迅速累積至一千例，顛峰時期兩間開刀房在白天可以完成五台開心手術，在如此快速的步調下，心臟麻醉必須要非常的有效率，但是病人安全並不能因此被犧牲。林子玉醫師利用所謂 fast-track

的麻醉方式，讓大部分開心手術的病患可在手術結束後十五分鐘內拔管（成果已發表於台灣麻醉學雜誌）。在經食道心臟超音波的輔助下，林醫師及王明鉅教授發現以內視鏡取大隱靜脈有近兩成的病患會發生二氧化碳栓塞（發表於〈The Journal of Thoracic and Cardiovascular Surgery〉），利用二氧化碳減壓的方法，二氧化碳栓塞的發生率可減少一半以上，此重要發現也發表於〈The Annals of Thoracic Surgery〉。

為了達成亞東醫院「持續提升醫療品質」的宗旨及「創新」的精神，

亞東麻醉部積極的解決病患的疼痛問題。以冠狀動脈繞道手術為例，曾有文獻指出病患術後被慢性疼痛困擾的比例可高達五成左右，而以正胸開的心臟手術為例，由於其術後疼痛常因未達嚴重程度而被忽略，但若急性疼痛沒有及時的妥善處理，疼痛由急性演變成慢性的機率極高。

針對心臟手術病患的疼痛問題，我們首先以病患自控式止痛的方法來解決，雖然止痛的效果還不錯，但病患噁心嘔吐的機率將近一半，為了降低噁心嘔吐的機率，我們在原本純嗎啡的配方中加入了兩種止吐藥，成功

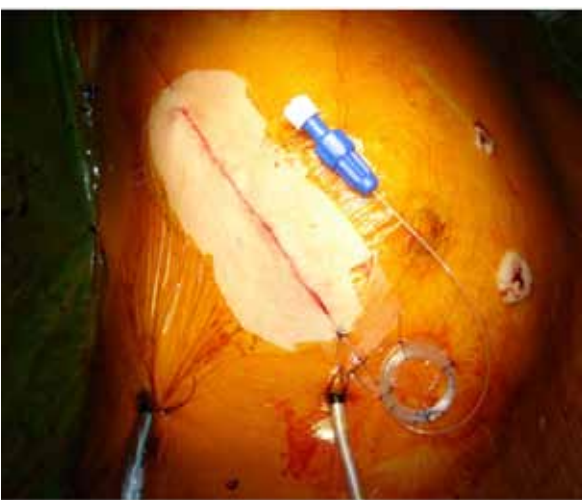


圖一：由左至右：林子玉主任、朱樹勳院長、王明鉅教授、邱冠明副院長。



圖二：微創開心手術。

地將噁心嘔吐的機率降到一成以下，成果發表於歐洲麻醉學雜誌。另病患自控式止痛雖對正胸開的心臟手術有效，但對側胸開的止痛效果不佳，我們輔以皮下置入導管的方式持續給予局部麻醉劑，不但成功地降低側胸傷口的急性疼痛，也顯著地降低了慢性疼痛的程度，成果發表於＜The Journal of Thoracic and Cardiovascular Surgery＞。而為了證明此種止痛方



圖三：微創傷口皮下持續浸潤局部麻醉劑。

式的安全性，我們也設計了相關的動物模式來驗證，並發表於＜Annals of Plastic Surgery＞。

現況

截至目前亞東已完成逾五千例開心手術麻醉，當中不乏各種罕見手術，包括世界首例的三心人心臟移植麻醉成功。隨著全球心臟手術的趨勢，本院的心臟手術亦以微創為大宗，甚至能有引領此潮流之地位，其中冠狀動脈繞道手術以不停跳的方式佔八成以上，而瓣膜手術有近八成是以非正胸開的微創方式進行。

麻醉監測也從對全部的心臟手術病患置放肺動脈導管，改變成依病患的狀況選擇多模式的術中監測，包括非侵襲性的腦血氧監測、較低侵襲性

的動脈波型分析血液動力監測及中心靜脈血氧監測等等，並以目標導向治療 (goal-directed therapy) 進行術中處置。

而術中處置的重點也從心臟保護，延伸到其他器官的保護，包括腦保護、腎臟保護及肺臟保護等。以腦保護為例，目前本院心臟手術病患術後永久性中風的發生率為 1.3%，遠低於國際文獻統計的機率。

展望未來

外科與麻醉科皆為「六大皆空」

Cardiac Anesthesia; Emphasize Post-Surgical Analgesia

The Department of Anesthesiology, Far Eastern Memorial Hospital

Tzu-Yu Lin, M.D.* Cheng-Wei Lu, M.D.**

*Chief of Department of Anesthesiology **Chief of Division of Cardiac Anesthesia

Abstract

Superintendent Shu-Hsun Chu actively promoted a core specialty 3C2T1M1N since his assumption of duty in 1999, and cardiovascular medicine was then thriving afterward.

Far Eastern Memorial Hospital performed the first open heart surgery in Taipei County on January 18th, 2000, completed the first successful “three heart

person” cardiac transplantation and anesthesia worldwide in 2001, accomplished the first global secondary aortic aneurysm replacement and anesthesia for a patient with Marfan Syndrome in 2006, and finished the first successful Da Vinci Assisted CABG and anesthesia in Taiwan in 2010. More than 5000 open heart surgeries have been accomplished in our hospital at present. We aim to reduce the risks of anesthesia simultaneously when progressing minimally invasive surgical techniques.

Backgrounds

Far Eastern Memorial Hospital was funded at Banqiao in 1981. At that time, approximately 4 million people lived in Taipei County, but none of the hospitals in the county were performing open heart surgeries. Therefore, the President of Far Eastern Group Mr. Douglas Hsu specially invited the open heart expert Professor Shu-Hsun Chu in National Taiwan University Hospital to serve in Far Eastern Memorial Hospital. Superintendent Shu-Hsun Chu actively promoted core specialty 3C2T1M1N since his assumption of duty in 1999, and cardiovascular medicine was then thriving afterward.

At the beginning, without a full-time anesthesiologist, Far Eastern Memorial Hospital done the first open heart surgery in Taipei County since January 18th, 2000 with the collaboration of National Taiwan University Hospital; that is, anesthesia for cardiac surgery was performed under the support and guidance of the anesthesiologist

from NTUH. Far Eastern Memorial Hospital started to have a full-time cardiac anesthesiologist even since Dr. Tzu-Yu Lin has completed his training in Department of Anesthesiology, NTUH in 2001 and joined Far Eastern Memorial Hospital. Dr. Lin is deeply aware of the close relationship between the Department of Surgery and Department of Anesthesiology, and thus not only continuously emphasizes on the mutual communication, learns novel knowledge and solves problems together with surgeons, but also maintains the collaboration of NTUH and constantly recruits new colleagues. As a result, the Department of Anesthesiology in Far Eastern Memorial Hospital has grown up steadily afterward.

Since the first open heart case in 2000, until 2003 Far Eastern Memorial Hospital had performed up to 1000 cases. Sometimes there were five open heart surgeries performing in two operating rooms during the day. At that time cardiac anesthesia was requested to be very efficient to meet the requirement of workload. However, our

hospital still considered patient's safety the first priority under such busy schedule. Dr. Tzu-Yu Lin used the so-called fast-track anesthesia to allow most of the patients being awaken and extubated within 15 minutes after cardiac surgery (the results were published in Journal of Taiwan Society of Anesthesiologist). Under the guidance of transesophageal echocardiography, Dr. Lin along with Professor Ming-Jiuh Wang found that there were nearly 20% of patients suffered from CO₂ embolism in endoscopy-assisted saphenous vein harvest (the data was published in The Journal of Thoracic and Cardiovascular Surgery), and with CO₂ decompression, the incidence of CO₂ embolism could be reduced more than half. Such significant results were published in The Annals of Thoracic Surgery.

To accomplish the goal of “continuously improve the quality of medical services” and the spirit of “innovation”, the Department of Anesthesiology, Far Eastern Memorial Hospital actively solve pain issues for patients. For example, there might be up to 50% of patients received CABG suffering from chronic pain. Moreover, post-surgical (median sternotomy) pain is often overlooked due to insignificant pain (not up to severe level). However, it is highly possible for acute pain to develop

into chronic pain if proper management is not performed in time. Although PCA is with great analgesic effect and thus becomes the first choice for patients underwent cardiac surgery, half of the patients suffer from nausea or vomiting. To reduce the side effects of nausea or vomiting, our department has added two antiemetics in the original pure morphine formula, which is a great success and thereby reduces the side effects to less than 10%. The results were published in the Journal of European Anesthesiology. In addition, PCA is only effective on median sternotomy, but ineffective on lateral thoracotomy. However, a subcutaneous catheter supplement local analgesics not only successfully relieves the acute pain of the wound, but also significantly reduces the level of chronic pain. The results were published in The Journal of Thoracic and Cardiovascular Surgery. We also conducted related animal studies to test the safety of such pain management maneuver, and the results were published in the Annals of Plastic Surgery.

Current Status

So far, Far Eastern Memorial Hospital has performed more than 5000 open heart surgeries including challenging cases such

as the first “three heart person” cardiac transplantation worldwide. To meet the trends of global open heart surgeries, nowadays cardiac surgeries in our hospital are mainly minimally invasive surgeries. Our hospital even excelled in the technique and became the leading hospital nationwide. For example, among all open heart cases, off-pump CABG were up to 80% or more, and nearly 80% of valve surgeries were performed with minimally invasive techniques (rather than median sternotomy). In addition, anesthesia monitoring was changed from pulmonary artery catheters for all patients in cardiac surgeries to multimodal monitoring including non-invasive brain oximeter, less invasive pulse contour-derived cardiac output, and central venous oxygen saturation, etc. The perioperative management was guided by goal-directed therapy. Moreover, the key points of peri-operative management were from cardiac protection to be extended to other organs such as brain, kidney and lungs, etc. Take brain protection into account, currently the incidence of permanent stroke in post-cardiac surgery patients is 1.3% in our hospital, which is much lower than the statistics in international statistics.

Future Perspectives

Due to fewer and fewer people serving in the Department of Surgery and Anesthesiology, cardiac surgeons are forced to advance their minimally invasive surgical techniques to avoid being eliminated by the market. However, reducing the surgical wound is not only the challenge for cardiac surgeons, but also the challenge for anesthesiologists. Under some circumstances, the risk of anesthesia may be even greater. Therefore, the responsive ability of the anesthesiologist is certainly challenged. Despite similar surgeries and the same anesthesia protocol, different patient may have different response. Hence, an individualized and goal-directed therapy is the goal for our department; hopefully we will achieve the goal of perioperative optimization and help the patients to pursue their best well-being.

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Figure 1.From left to right: Director Tzu-Yu Lin, Superintendent Shu-Hsun Chu, Professor Ming-Jiuh Wang and Vice Superintendent Kuan-Ming Chiu.

Figure 2.Minimally Invasive Cardiac Surgery.

Figure 3.Continuous local and subcutaneous anesthetic infiltration for minimally invasive wound.

肝臟移植麻醉 ——高雄長庚紀念醫院麻醉科

撰文 / 黃佳絨 主治醫師

自 2000 年起肝臟移植手術在高雄長庚已成為例行常規手術，由最初每周 1 例現已增為每周 3 例。而本院麻醉科也於 2005 年正式成立肝臟移植麻醉團隊，近年在麻醉科與外科合作下，2002 年完成華人首例活體雙肝移植，2005 年獲國家生技醫療品質金獎，2013 年完成台灣首例超減體積肝移植。20 年多來已累積肝臟移植手術達 1500 例，活體肝臟移植手術五年存活率高達 98%，為世界各國之冠。

發展背景

陳肇隆教授是台灣及亞洲肝臟移植的開拓者，1984 年完成亞洲首例成功的肝臟移植手術，並率先採用腦死亡定義，促成台灣在 1987 年達成亞洲第一個腦死亡器官移植立法，造就台灣器官移植醫學的蓬勃發展。1992 年陳肇隆教授回到南台灣高雄長庚紀念醫院服務，結合本院各科專業人士成立肝臟移植團隊，本科系則由姚文聲教授主導，1994 年完成台灣首例兒童活體肝臟移植，1997 年完成全球首例未輸血活體肝臟移植，1999 年完成台灣首例成人活體肝臟移植。

同時以醫療不藏私的理念，積極協助國內外醫學中心發展肝臟移植，並熱心投入醫援國際，豐富的臨床經驗已然為國內外肝臟移植麻醉的標

竿，更是國內外醫師學習肝臟移植麻醉的首選醫院之一，國內院際交流不勝枚舉，已完成多位國際人員代訓圓滿傳承。國際醫療傳承包括：菲律賓、越南、中國大陸、瓜地馬拉、新加坡、白俄羅斯等國。

現況

自 2000 年起肝臟移植手術在本院已成為例行常規手術，由最初每周 1 例現已增為每周 3 例。而本科也於 2005 年正式成立肝臟移植麻醉團隊，由最初的姚文聲教授及張克儉醫師胼手胝足，至今已有 10 位醫師加入及 2 位專業護理師，負責術前麻醉訪視、術中照護、術後疼痛控制，客製化專業服務。

本院設有肝臟移植加護病房，專

責照顧肝臟移植病患。麻醉團隊也在密切的術後訪視中不斷交流學習求進步，同時支援各項侵入性醫療處置。肝臟移植團隊每周一例行舉辦術前研討會，各科專家會診分析個案，商討對策。每周四讀書會議則為新知分享，求新求變。

姚文聲教授領軍的肝臟移植麻醉臨床研究成果斐然，屢屢在國際移植研討會中曝光，在國際期刊中發表，至今已有近 220 篇著作刊登，每年皆有醫師代表出席國際相關會議，增廣見聞擴大視野。

由於肝臟移植手術耗時且伴隨有大量出血與失溫的問題，目前照護策略主要包括：

- 一、雙主治醫師專責照護。
- 二、手術室溫度獨立調控，制定體表包護和溼式乾式溫毯使用之照護準則。
- 三、建立足夠輸液管路，與血庫及捐血中心密切聯繫，掌握血品數量，手術室內有血品專用冰箱掌握時效。

醫學日新月異，器材藥品推陳出新，外科技術不斷精進成長，作為肝臟移植標竿醫院之一的我們，也不斷接受挑戰，包括 ABO 血型不合肝臟

移植、肝腎移植等。

未來展望

高雄長庚肝臟移植麻醉團隊成立已超過 10 個年頭了，筆路藍縷，病患的健康重生就是我們最大的驕傲與鼓勵！我們將一本初衷繼續堅持守護！希望藉此實力持續發展國際醫療，繼續醫療外交之路。

Anesthesia for Liver Transplantation

The Department of Anesthesiology, Chang Gung Medical Foundation, Kaohsiung Branch

Chia-Jung Huang, M.D.
Attending Physician

Abstract

Liver transplantation has become a routine procedure in Chang Gung Medical Foundation, Kaohsiung Branch since 2000, and the volume of service is from 1 case to 3 cases weekly. The anesthesiology team for liver transplantation was officially established in 2005. Lately with the cooperation between Department of Anesthesiology and Department of Surgery, the first live dual liver transplantation was accomplished in Chinese patient in 2002. In 2005, our hospital has won SNQ Golden Award. In addition, we have successfully completed the 1st size-reduced liver transplantation in Taiwan in 2013. We have accomplished up to 1500 cases of liver transplantation in the past 20 years, and the 5-year survival rate of live liver transplantation is up to 98%, which is the top worldwide.

Backgrounds

Professor Chao-Long Chen is the pioneer of liver transplantation in Taiwan and Asia. He has accomplished the 1st successful liver transplantation in Asia in 1984, and is also the first to advocate the definition of brain death, and thereby contributes to the legislation of the Brain Death Transplantation Act firstly in Taiwan and Asia in 1987. By doing so, transplantation medicine in Taiwan was thriving. In 1992, Professor Chao-Long Chen went back

to Southern Taiwan and served in Chang Gung Medical Foundation, Kaohsiung Branch. A liver transplantation composed of multidisciplinary professions was then established, and Professor Wen-Sheng Yao served as the department leader. In 1994, our hospital has completed the 1st pediatric live liver transplantation in Taiwan, a global first live liver transplantation without transfusion in 1997, and the 1st live adult liver transplantation in Taiwan in 1999.

We hold a selfless attitude and actively assist national and international medical

centers to accomplish independent and successful liver transplantations. Moreover, our passion toward international salvage medical services and enriched clinical experience has become the benchmarking of national and international anesthesia for liver transplantation. Our hospital is even one of the top preferred hospitals nationally and internationally for anesthesia training for liver transplantation. Therefore, inter-hospital interactions are numerous and our hospital has completed multiple training programs for international trainees. International fellowship includes: The Philippines, Vietnam, China, Guatemala, Singapore, and Belarus, etc..

Current Status

Liver transplantation has been a routine procedure in our hospital since 2000, and the volume of service is from 1 case to 3 cases weekly. The anesthesiology team for liver transplantation was officially established in 2005. At the beginning, Professor Wen-Sheng Yao and Dr. Ko-Chien Chang devoted themselves to this team and performed/processed every detail in person. Now the team is equipped with 10 physicians and 2 nurse practitioners, who are responsible for pre-anesthesia interview, perioperative care, post-surgical pain

management and customized healthcare.

Our hospital also consists of a specific ICU for patients underwent liver transplantation. The anesthesia team not only continues learning and interacting closely from the post-surgical reviews, but also participates in various invasive medical services. The liver transplantation team has a routine pre-surgical meeting on every Monday to consult with various healthcare experts and discuss with resolutions. Furthermore, the team also hosts a book reading every Thursday to share new knowledge and update new information.

The research results conducted by the anesthesia team for liver transplantation and led by Professor Wen-Sheng Yao were marvelous. The clinical/research results were published in international transplantation conferences or international prestigious journals. There are approximately 220 articles published, and physicians attend international conferences on behalf of the team annually to broaden the view and experience of the team.

Due to time-consuming, heavy bleeding and hypothermia, current healthcare policies for liver transplantation include:

- 1) Dual attending physician policy.
- 2) Independent temperature control in the OR, and the establishment of healthcare

SOPs regarding surface protection and wet/dry warm blanket.

- 3) The establishment of transfusion line, close contact with blood bank and blood donation center, be aware of the inventory of blood product and an exclusive refrigerator for blood product in the OR to improve blood transfusion efficiency.

Medical devices and medicaments are upgraded with time, so do surgical techniques. For being one of the benchmarking hospitals for liver transplantation, we are prepared for challenges constantly, including liver transplantation with blood type (ABO) mismatch or liver and kidney transplantation.

Future Perspectives

The anesthesia team for liver transplantation in Chang Gung Medical Foundation, Kaohsiung Branch has been established for more than 10 years! We have overcome many challenges and are dedicated to service; hence, patient's health and recuperation is our greatest proud and achievement! We are committed to this work based on the founding spirit and develop international medical services to extend the horizon of our care!

小兒心臟麻醉

——高雄榮民總醫院麻醉部

撰文 / 賈元一 主任、孫淑芳 護理師

兒童心臟麻醉是麻醉中具有極高風險及挑戰性的領域，本院麻醉部與兒童心臟外科相互合作，提供南部地區心臟病童一流的醫療水準，存活至成年並得到良好的生活品質。其中包括許多全國之冠記錄，如經由右心房及肺動脈切口以矯正法洛氏四合症成功率達 97%，兒童先天性心臟病「心室中隔切損」之外科矯正麻醉手術成功率達 98.3% 等等，麻醉部同仁將持續努力精進。

發展背景

開院至今，高雄榮總麻醉部心臟血管手術麻醉人數已超過一萬人次，兒童先天性心臟病手術麻醉的質與量更有傲人的成績。

1、麻醉部與心臟外科團隊合作在郭樹民主任研究成功經由右心房及肺動脈切口以矯正法洛氏四合症，成功率達百分之九十七，冠於全國。

2、兒童先天性心臟病「心室中隔切損」之外科矯正麻醉手術成功率

達百分之九十八點三，乃全國之冠。

3、支援兒童心臟內科放置經股靜脈之心房中膈缺損 Occluder 及自動去顫器。

天性心臟病方面：如心房或心室中隔缺損、法洛氏四重症等較常見的先天性心臟手術麻醉，每年平均約一百多台。其他複雜性先天性心臟病的矯正手術麻醉、如大動脈轉位、主動脈窄縮、左心發育不全、及單一心室階段性手術，本院可以算是南台灣地區複雜性先天性心臟病手術麻醉首屈一指。

麻醉部與兒童心臟外科相互團隊合作，提供台灣南部地區心臟病童一

流的醫療水準，讓先天性心臟病的病童都能存活至成年，並得到良好的生活品質。

現況

先天性心臟病種類繁多，統計顯示，心室中隔缺損 (Ventricular Septal Defect) 約佔 31.2%，法洛氏四重症 (Tetralogy of Fallot) 佔 22%，開放性動脈導管 (patent ductus arteriosus) 佔 9.9% 大動脈轉位 (transposition of great arteries) 佔 5.6%，心房中膈缺損 (atrial septal defect) 佔 1.1%，三尖瓣閉鎖 (tricuspid atresia) 佔 0.6%，其它包括



圖一：2010.07.15 高雄榮民總醫院麻醉部全體同仁 背景：高雄榮民總醫院開刀房 提供者：麻醉部



圖二：2016.04.14 高雄榮民總醫院麻醉部全體同仁 背景：高雄榮民總醫院開刀房 提供者：麻醉部

肺動脈瓣狹窄及閉鎖，主動脈瓣狹窄及主動脈異常，肺靜脈回流異常，Ebstein 氏異常，殘存動脈幹，先天僧帽瓣異常及主動脈肺動脈窗等。

近年來，體外循環技術、手術方法及小兒麻醉技術與知識的進步，大部分的心臟病患皆能在嬰兒期，甚至新生兒期即能早期接受手術治療，且有相當顯著的治療效果。在執行小兒心臟手術麻醉時，常常須面臨新生兒甚至早產兒未成熟的器官與成人不同的生理變化與對麻醉藥物的反應，除此之外呼吸道的建立及維持、生命監測系統的設制以及麻醉全期的照護更是一大挑戰，但本部也都能一一克服

並提供完善的麻醉醫療。

未來展望

一、積極參與國際醫療，發展麻醉醫療相關學術研究。

二、促進全民健康，配合政府醫療政策之公立醫院。

三、支援影像式先天性心臟病的診斷與治療。

四、配合小兒外科發展及提升非心臟手術的麻醉水準。

※ 主要參考出處來源：高雄榮總 10 週年院慶特刊、高雄榮總 20 週年院慶特刊。

such as over 97% success rate on correcting Tetralogy of Fallot through incision of the right atrium and pulmonary artery, and 98.3% success rate on surgical correction of the pediatric congenital heart disease “ventricular septal defect”. Our colleagues will strive to improve ourselves and to provide even better care.

Backgrounds

Since the establishment of our hospital, we have provided anesthesia services for over 10,000 patients of cardiovascular surgery, and we have achieved exemplary results in both quality and quantity for anesthesia of congenital pediatric cardiovascular surgery.

1. Dr. Shu Min Kuo, Director of the Department of Cardiovascular Surgery, successfully achieved correction of Tetralogy of Fallot through incisions of right atrium and pulmonary artery. Our department collaborated with the Department of Cardiovascular Surgery to achieve 97% success rate for the procedure nationwide.
2. We also achieved 98.3 % success rate on corrective surgery of the congenital pediatric cardiovascular disease “ventricular septal defect”, which also is top nationwide.
3. We supported the Pediatric Cardiology in inserting the Occluder for atrial septal defects via femoral vein and automatic defibrillator.

In the aspect of congenital for surgical anesthesia of common congenital heart diseases such as atrial or ventricular septal defects and Tetralogy of Fallot, our department performed on average over 100 procedures annually. For complicated congenital heart surgery like transposition of great arteries, coarctation of the aorta, hypoplastic left heart syndrome and staged procedures for single ventricle defect, our hospital is one of the most advanced and experienced in Southern Taiwan for these complicated congenital heart surgical anesthesia procedures.

The Department of Anesthesiology and Pediatric Cardiovascular Sugery work in collaboration to provide first-rate medical care for children with congenital heart diseases in Southern Taiwan, ensuring their survival to adulthood and good quality of life.

Current Status

There are many types of congenital heart diseases. Statistics have shown that

Pediatric Cardiac Anesthesiology

The Department of Anesthesiology, Kaohsiung Veterans General Hospital

Yuan-Yi Chia, M.D.* Shu-Fang Sun, M.D.**
*Chief, Department of Anesthesiology **Therapist

Abstract

Pediatric cardiac anesthesiology is a high risk and highly challenging sub-field of anesthesiology. Our Department of Anesthesiology works together with the Department of Pediatric cardiovascular surgery to provide first-rate medical care for children with heart disease in Southern Taiwan, ensuring their survival to adulthood and maintenance of good quality of life. We also have made many national records,

ventricular septal defect accounted for about 31.2%, 22% for Tetralogy of Fallot, 9.9% for patent ductus arteriosus, 5.6% for transposition of great arteries, 1.1% for atrial septal defect, and 0.6% for tricuspid atresia. Other diseases include pulmonary atresia and stenosis, aortic stenosis and abnormalities, anomalous pulmonary venous return, Ebstein's Anomaly, persistent truncus arteriosus, congenital mitral valve abnormality, and aortopulmonary window.

Due to recent advances in extracorporeal circulation, surgical methods and knowledge and techniques of pediatric anesthesia we have been able to provide significant treatment results for most patients at infant and even newborn phases. When performing pediatric cardiac surgical anesthesia, we are constantly faced with challenges of immature organs and physiological conditions of the newborns and even premature born infants, which are vastly different from adults. Other challenges include responses to anesthetic agents, establishing and maintaining airways, vital sign monitoring system and care during all phases of anesthesia. However, we have been able to overcome these obstacles and offer comprehensive anesthetic care for our patients.

Future Perspectives

1. To actively participate in global medicine and academic research on anesthetic medical care.
2. To promote health of the public and as a public hospital that collaborates with medical policies of the government.
3. To support image-based diagnosis and treatment of congenital heart diseases.
4. To collaborate with Pediatric Surgery in developing and raising the anesthesia quality of non-cardiac surgeries.

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Figure 1.Group photo of the Department of Anesthesiology at Kaohsiung Veterans General Hospital.(2010.07.15)

Figure 2.Group photo of the Department of Anesthesiology at Kaohsiung Veterans General Hospital.(2016.4.14)

Provided by: Department of Anesthesiology

減重手術麻醉 —— 義大醫院麻醉部

撰文 / 盧正淵 主任、洪國全 主治醫師、譚炳恆 部長

義大醫院成立於 2004 年 2 月，成立之初旋即籌設特色醫療，其中包括本院國際減重暨糖尿病手術中心，本中心具有國際認證，是國際級的減重醫學中心。中心發展至今已有多項首創，在此予以整理記錄，同時分享減重手術麻醉經驗。

發展背景

義大國際減重暨糖尿病手術中心在集團林義守創辦人與義大醫院陳宏基、杜元坤院長全力支持下誕生、成長。義大醫院有國際級的國際減重暨糖尿病手術中心，是首家通過亞太地區減重認證的醫學減重中心，符合減重手術卓越中心的國際認證 (ICE)。

從 2005 年 8 月黃致錕醫師至義大醫院一般外科任職，並完成義大醫院第一例胃繞道手術開始，至 2008 年 2 月義大醫院減重手術已超過三百例。黃主任於 2009 年 3 月亞太外科醫學會暨台灣外科醫學會年會發表：1. 單一傷口經臍減重手術、2. 超級肥胖病患之減重手術成果，乃是世界首例單一傷口經臍無疤痕胃繞道手術。2011 年 7 月舉行義大醫院首創新式減

重手術記者會『胃束帶摺疊手術』。2014 年 7 月舉行硬脊膜外麻醉記者會，首創減重手術清醒麻醉，同年又舉行 300 公斤亞洲第一胖男減重記者會。

2015 年 4 月蔡明憲主任 / 副教授完成義大醫院首例左右臟器相反情形下，微創胃切除繞道手術。2016 年 5 月蔡主任團隊完成中南部首例第四代機器人手臂胃切除手術。

現況

過重及病態肥胖的比率在台灣及世界各國均逐漸增加，一般估計約有 15 ~ 20% 的台灣人屬於過重或肥胖，其比率雖遠低於美國，但是近年來肥胖比率仍有逐漸增加趨勢，間接造成許多慢性疾病，甚至死亡。

根據世界衛生組織對過重和肥胖的定義如下：身體質量指數等於或大於 25 時為過重。身體質量指數等於或大於 30 時為肥胖。肥胖症定義為身體質量指數介於 30 到 39，而病態性肥胖則是指身體質量指數大於 40。一般來說身體質量指數越高，越有可能罹患相關的慢性疾病，如糖尿病、高血壓、睡眠呼吸暫停、高血脂、冠心病等。當病態肥胖個人有上述疾病的一種或多種，其死亡風險增加，生活品質也會受到嚴重的影響。特別是亞洲人種，即使 BMI 較低，罹患慢性

疾病的機會仍會大增，因此亞太減重外科醫學會提出 $BMI \geq 32 \text{ kg/m}^2$ 並已合併有因肥胖引起之疾病或 BMI 超過 37 kg/m^2 ，對健康已經形成危害時，即應考慮接受減重手術的治療。對多數嚴重肥胖的病人而言，手術治療是唯一被證實長期有效的減重方法。

（資料來源：義大國際減重暨糖尿病手術中心網頁 <http://oilcut.weebly.com/>）

中心減重手術迄今已超過三千台，而相關麻醉業務也有一些經驗可與大家分享，接受減重手術的病人在呼吸道上較易出現困難插管的情形，

而術後病患也較容易有血氧濃度下降，呼吸功能不足的情況出現，另外根據我們的統計數據，我們的病人有 34.8% 合併糖尿病、32.7% 合併高血壓、12.7% 合併高尿酸、91.4% 合併脂肪肝或肝炎、76.0% 合併高血脂。因而此類病患對麻醉醫療人員是較為特別的挑戰，早期過度肥胖的病患（ $BMI > 50 \text{ kg/m}^2$ ）在手術結束後，會送病患進加護病房觀察一晚，讓病患在恢復之後才拔管，然而有少數病患因為體重太重，再加上需要約束，以致於有褥瘡的出現。隨著麻醉醫療人

員經驗的增加，再加上對於拔管與後續的照護越來越成熟，目前病患僅在特殊的狀況下才進加護病房觀察，褥瘡發生比例也隨之減少。另外透過精密的術中輸液調控，我們成功讓這類的病患術中不置放導尿管，以鼓勵病患術後及早下床走動，減少靜脈栓塞的風險。

在十年的減重麻醉中，我們也發現極少數的病患在術後有嚴重聲音沙啞的狀況，這些病患後來都確診為杓狀軟骨脫位，雖然插管麻醉本身即是一個危險因子，但我們不排除因為



圖一：2013 年台灣麻醉醫學年會，由義大醫院麻醉部主辦，假高雄義大世界皇冠假日酒店舉行。左起依序為北榮何善台副院長、大陸學者李樹人教授與曾因明教授、義大杜元坤院長、奇美王志中副院長、廖文進理事長、義大譚炳恆部長。



圖二：2014 年義大醫院首創減重手術清醒麻醉法，即硬脊膜外麻醉，圖為國際減重暨糖尿病手術中心黃致錕主任在病人清醒下，執行減重手術。

此類病患術中都需要放置粗口徑的口胃管（orogastric tube）以協助外科醫師進行手術，極有可能在放置的過程中，或長時間置放進而導致杓狀軟骨的受損，目前在麻醉部的標準作法即是在目視的情況下放置口胃管，另外手術結束後，也儘早移除口胃管。

未來展望

儘管減重手術的相關知識領域仍在持續蓬勃發展，但不可否認的是，

微創減重手術已逐漸成熟，各家減重中心所追求的目標也逐漸由發展新的手術術式，轉為更加重視手術中的安全性及舒適性，麻醉角色在此也越顯重要。未來中心將發展特色醫療，套裝化減重療程，行銷國際，為病人提供更高端的科技醫療，更堅強的醫護團隊以及更優良的醫療環境。

Backgrounds

Bariatric & Metabolic International (B.M.I.) Surgery Center of E-DA Hospital was established under the full support of the Founder of E-DA Group, Mr. Yi-Shou Lin and Superintendents of E-DA Hospital, Dr. Hung-Chi Chen and Yuan-Kun Tu. Bariatric & Metabolic International (B.M.I.) Surgery Center in E-DA Hospital is an international and firstly certified medical weight reduction center in the Asia-Pacific Area. The center is also an excellent weight reduction surgery center certified by ICE.

Dr. Chih-Kun Huang, who served in the Department of General Surgery and accomplished the 1st gastroenterology bypass surgery in E-DA Hospital since August 2005, completed over 300 cases of bariatric surgeries in E-DA Hospital until February 2008. Director Huang also published the following results in the annual meeting of Taiwan and Asia-Pacific Surgical Association in March 2009: 1. Single-wounded transumbilical bariatric surgery and 2. The first worldwide single-wounded, transumbilical scar-free gastroenterology bypass bariatric surgery for a morbidly obese patient. In July 2011, E-DA Hospital held a press conference regarding the novel bariatric surgery called a “Lap Band”. In July 2014, E-DA Hospital held another

press conference to introduce awake anesthesia during bariatric surgery through epidural anesthesia. In the same year, E-DA Hospital held one more press conference to announce a successful weight reduction record for the heaviest male patient (BW: 300 kg) in Asia.

In addition, in April 2015, Director/Associate Professor Ming-Hsien Tsai accomplished the first minimally invasive gastric volume reduction and gastroenterology bypass surgery in a patient with situs inversus totalis in E-DA Hospital. Afterward, Director Tsai's team finished the first robot-assisted gastric volume reduction surgery in Middle and Southern Taiwan in May 2016.

Current Status

Currently the percentage of overweight and pathological obese in Taiwan and in the world is gradually increasing. Generally speaking, approximately 15-20% of Taiwanese is estimated to be overweight or obese. Even though the statistic is far lower than the value in the US, the percentage of obese people in Taiwan has been gradually increasing lately and thus leads to morbidities or even mortalities caused by chronic illness.

According to the definition of

Anesthesia for Bariatric Surgery

The Department of Anesthesiology, E-DA Hospital

Cheng-Yuan Lu, M.D.* Kuo-Chuan Hung, M.D.** Ping-Heng Tan, M.D., Ph.D.***
*Department Director **Attending Physician ***Chief, Department of Anesthesiology

Abstract

E-DA Hospital was founded in February 2004. At the beginning of establishment, E-DA Hospital aimed to focus on featured medical services, including Bariatric & Metabolic International (B.M.I.) Surgery Center. This center is certified by several international associations/accreditations, and has become an international weight reduction medical center. There were many pioneering records created in this center. We hereby summarize and share our experience in anesthesia for weight reduction surgeries with the public.

overweight and obese published by W.H.O., overweight is indicated by a body mass index (BMI) equal to or larger than 25; BMI equal to 30 or more is classified as obese. Obese is indicated in people with BMI between 30 and 39, and those who have BMI greater than 40 are classified as pathologically obese. Usually the higher the BMI is, the more possible it is to suffer from related chronic diseases such as diabetes, hypertension, sleep apnea, hyperlipidemia and coronary diseases. If a patient who is pathological obese has one or many of the previous diseases, his/her risk of death is greatly increased, and his/her quality of life is severely compromised. Particularly in Asians, even people with lower BMI have a significant chance to suffer from chronic diseases. Therefore, the Asia-Pacific Society for Metabolic and Bariatric Surgery has proposed that patients with $\text{BMI} \geq 32 \text{ kg/m}^2$ in conjunction with diseases caused by obesity, or patients with $\text{BMI} > 37 \text{ kg/m}^2$, which is lethal to health, should consider receiving bariatric surgery. For most patients with severe obesity, surgical procedures have been proven the only effective and long-term bariatric method. (Reference: Bariatric & Metabolic International (B.M.I.) Surgery Center in E-DA Hospital, please refer to website at <http://oilcut.weebly.com/>)

To date, the center has completed over 3000 bariatric surgeries, and thus there are a few tips regarding surgical anesthesia to share with the public. Patients receiving bariatric surgeries may have greater chances to have airway difficulties for intubation, and their post-surgical oxygenation may drop drastically and lead to respiratory insufficiency. In addition, according to our statistics, 34.8% of our patients had conjunct diabetes, 32.7% of them had conjunct hypertension, 12.7% of them had conjunct hyperuricemia, 91.4% of them had conjunct fatty liver or hepatitis, and 76.0% of them had hyperlipidemia. In this case, anesthesia for this type of population is more challenging to anesthesiologists. Previously, after bariatric surgery, patients with severely obesity ($\text{BMI} > 50 \text{ kg/m}^2$) would be sent to ICU for intensive observation overnight and the patient would be extubated after fully recovery. However, some of the patients might develop pressure sores due to heavy weight and restraint. With the accumulation of anesthesia experience and the familiarity of extubation and follow-up healthcare, patients only need to be observed in the ICU under special circumstances, and the incidence of bed sore is decreased accordingly. Moreover, a precise peri-operative infusion can successfully prevent

patients from needing foley, thus, encouraging early mobility after surgery and reducing the risks of DVT.

During the previous ten years of bariatric anesthesia, we also discovered that a few patients might suffer from severe hoarseness after the surgery, who were further diagnosed with arytenoids dislocation. Although intubation itself is a risk factor, we could not rule out the fact that the placement of a thick orogastric tube (to facilitate the surgery) might be the reason to damage the arytenoids during the process or long-term placement. Currently the SOPs in our department have changed to place orogastric tube with visual assistance, and the orogastric tube will be removed as early as possible once the surgery has been completed.

Future Perspectives

Although knowledge regarding bariatric surgeries is still growing, we cannot deny that the technique and market of minimally invasive bariatric surgery has been developed. Therefore, the goals of bariatric surgery center have been switched from developing novel techniques to emphasizing safety and comfort during the procedure. As a result, anesthesia for such surgery is becoming more and more important. Our

center aims to provide featured medical services such as a package bariatric program to meet the requirements and trends of international market. Furthermore, we aim to provide high-end medical technology, a more solid healthcare team and a better medical service environment to become more competitive for the market.

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Figure 1. 2013 Annual Meeting of Taiwan Society of Anesthesiology is hosted by the Department of Anesthesiology, E-DA Hospital at E-DA Royal Hotel. From left to right: Vice Superintendent of TPEVGH, Dr. Shan-Tai Ho; visiting scholar from China, Professor Shu-Jen Li and Professor Yin-Ming Tseng; Superintendent of E-DA Hospital, Dr. Yuan-Kun Tu; Vice Superintendent of Chi-Mei Medical Center, Dr. Chih-Chung Wang and Chairperson Wen-Chin Liao; Director of E-DA Hospital, Dr. Bing-Heng Tang.

Figure 2. E-DA Hospital first created awake anesthesia, or epidural anesthesia, for weight reduction surgery in 2014. The photo indicated weight reduction surgery conducted by Director Chih-Kun Huang of Bariatric & Metabolic International (B.M.I.) Surgery Center when the patient was awake.

一顆都不能少：保護牙齒的對策

——高雄醫學大學附設醫院麻醉部

撰文 / 程廣義 主任、邱舜麗 麻醉護理督導

高醫麻醉部有悠久的歷史傳統與現代化的人文思維。舉凡麻醉科部應有的工具器材與醫療配備等，均能與時俱進，與其他醫學中心一起大步向前。其中，困難氣道處置的問題是醫院內醫護人員常會面對且需立即處理的急症問題。因此，高醫麻醉科部就針對如何防止氣道處置失敗或氣道處理成功卻造成病人牙齒受傷及組織受損的情況，提出詳盡對策。

發展背景

利用影像輔助系統在麻醉中進行呼吸道氣管內管置管，順利建立人工氣道的時代已到臨了。而同時由於高齡病人的增加，其牙齒狀況多不理

想，如何減少牙齒受損，仍然是麻醉醫師日常須面對的問題。高醫麻醉部重視病患牙齒議題，在保護病人牙齒方面有一套流程，並延伸此議題使用新形態的插管工具於不同手術的病人，這些影像輔助插管工具不僅是針

對困難插管的利器，更在本科部的牙齒處置上有相輔相成的效果。

現況

本院接受手術的病人在麻醉照會時，須檢查牙齒的健康狀況以及氣道相關解剖位置的評估。若評估牙齒有異常狀況時，則病人需會診牙科、口腔外科以進一步評估牙齒的狀態是否需要保護、再固定、或是需要移除。有了與病人事先足夠的溝通，再輔以強固牙齒的方式（如金屬線固定牙齒、印模塑土、牙套），並且以照相方式提供佐證，將相關的病人牙齒資料遞送給開刀房內的麻醉醫護人員以警示病人牙齒狀況，這不僅能讓麻醉醫護快速且確實地了解病人牙齒狀況、減少了醫療處置時牙齒傷害的問題，也因有佐證，減少後續病患因自身原有牙齒問題而質疑或衍生醫療糾紛。

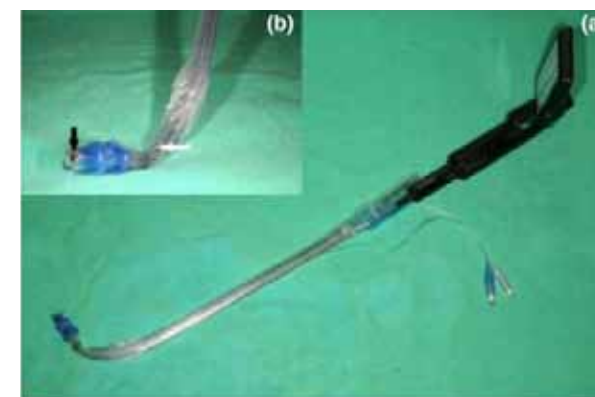
在高醫執行此牙齒的品質改善方案後，病人接受麻醉期間牙齒受損的比率由原先的 0.108% (26/24137) 降到 0.009% (2/20870)。除了病態牙齒的固定外，熟練精良的插管工具是減低發生困難氣道處置發生的重要步驟，

積極的運用影像輔助系統工具也能避免不必要的牙齒損傷。由此，本科部進一步的積極運用影像系統工具於困難氣道處置的病人，這也是本科部麻醉醫師必要的訓練與再教育過程。新形態的插管工具已由傳統的直接目視 Macintosh laryngoscope 使用，進步到可利用「照像鏡頭前置喉鏡片」增進視野的 video laryngoscope 及可調整視野角度的 video stylet。

目前高醫麻醉部經常性地使用 GlideScope® 進行 double lumen endobronchial tube 的置管，發現經由此方法的改進提高了此種氣管內管成功的置放，並發表成果於國際期刊。同時，也廣泛地使用可調整視野角度的 Trachway® (video stylet) 於一般麻醉民眾。雖然 Trachway® 的使用需要有段學習的歷程，本科同仁仍對於這些新的醫療工具充滿了興趣，積極練



圖一：高醫麻醉部於術前麻醉照會室之氣道評估。



圖二：Trachway 插管通條置入雙腔氣管內管的支氣管腔。

習，且都有正向的使用評價。再由此也衍生出以 Trachway® 放置 double lumen endobronchial tube 以及 double curve endotracheal tube 鼻管放置的新方法，且在國際期刊上得到極大的迴響。

雖然科技與日俱進，仍有些麻醉醫師認為不需要額外的插管工具就可以成功的處置病人氣道而不會損傷牙齒，而這樣的固有思想需要有足夠的進階教育推廣新知以扭轉既定的觀念。因此本科部固定舉辦進階氣道處置會議以達到推廣與教學的目的，這對培養年輕醫師們對於正確氣道處置是非常重要的，比如指派曾光毅醫師統籌院內氣道處理之臨床實務與教學研究等事務，以及周笑華教授於模擬人中心進行之氣道處置教育訓練均深獲實習醫學生好評。經過多次的內部教學檢討與使用心得的討論，高醫麻

醉部全員均已熟悉影像系統帶來的方便性與高效率。誠如英文諺語所說 “If you can not beat em, join em.”

未來展望

積極並持續與牙科醫師和口腔外科醫師合作，建立快速照會系統和模式，減低病人病態牙齒於插管時的干擾，以及加強口腔衛生照護的觀念於泛外科醫師們及接受手術的民眾。我們將加強科際之間的整合並進一步提升研究品質，持續病人氣道資料的建立與儲存，將能提供學界改善插管有關的氣道損傷、提早找出潛在影響氣道建立的因子。

在教育推廣方面，將持續定期進行 Advanced Airway Management 教育訓練以提升麻醉醫護同仁的素質，期望氣道處理的問題未來會在優質化的臨床氣道處置以及良好的氣道教學環境中，逐步的消滅。

Not a Single Tooth Less: Strategies for Protecting Your Teeth

The Department of Anesthesiology, Kaohsiung Medical University Hospital

Kuang-I Cheng, M.D.* Shun-Li Chiu**

*Director of the Department of Anesthesiology **Nursing Supervisor

Abstract

The Department of Anesthesiology of Kaohsiung Medical University Hospital (KMUH) has a long historical tradition as well as the modern people-first mindset. Each tool or instrument in the Department of Anesthesiology is aligned with the advanced technology that keeps pace with other medical centers. Difficult Airway management is the most commonly complicated issue that anesthesiologists have encountered and need to resolve immediately. The KMUH Department of Anesthesiology provides stratified strategies to protect unhealthy teeth no matter how airway difficulty is confronted.

Backgrounds

Using video systems to assist endotracheal intubation has been a new tide in our department to establish airway patency during operation. Anesthesiologists are confronted with a large number of elderly patients with unhealthy teeth and the dental issues become a major problem to solve. Our department provides strategies to prevent the unhealthy tooth from trauma or iatrogenic injury. In addition,

registered nurses and doctors in our department are interested in carrying out research associated with specific intubation procedures for patients undergoing major surgeries. Using video-assisted intubation devices in our department not only provides an advanced technique to improve complicated difficult airway management but also protect patients' teeth from trauma or improper impact on teeth inducing dental damage.



圖三：周笑華醫師插管教學課程。

Current status

Patients who undergo surgery under either general anesthesia or regional anesthesia should visit our pre-anesthesia consultation clinic for further evaluation of the state of dental health, airway anatomy involved with the process of intubation. If any unhealthy tooth is identified, then the patient is transferred to the department of dentistry or oro-surgery to evaluate whether the tooth should be protected, secured, or removed. After obtaining patient consent, teeth securing methods such as using metal wires fixation, impression molds, or denture would be executed if needed and the peri-procedures of teeth photos taken to provide supporting information. The patient's dental data is then delivered to advise the anesthesiologists in their responsibility for the patient in the operating room and allow them to make a quick decision to further reduce dental injuries perioperatively. The availability of photographic evidence also reduces subsequent problems or medical disputes arising from existing dental issues of the patients.

After carrying out this quality improvement program, perioperative teeth injury rates in the KMH decreased from 0.108% (26 out of 24,137 cases) to 0.009% (2 out of 20,870 cases). In addition to

discovering and securing diseased teeth, proficiency in various intubation devices is also very important to reduce the incidence of complications while carrying out difficult airway manipulations. In our department, we encourage the colleagues who intubate patients using video devices to mitigate unexpected dental injury and request anesthesiologists to develop expertise in this field. Therefore, the resident learning course of using video devices to assist intubation has been on the training schedule and the teachers (anesthesiologists) are required to be familiar with the advanced technology.

In the KMH Department of Anesthesiology, a video laryngoscope GlideScope® has been demonstrated to efficiently implement double-lumen endobronchial tube intubation, and this technique validated improved intubation conditions by shortening intubation time and increasing intubation success rate. These findings have also been published in international medical journals. In our department, some anesthesiologists favor using the Trachway® (video stylet) with an adjustable field of vision for general anesthesia.

Although it takes time to learn the novel technology and a training course may involve much time in becoming an expert in using the Trachway®, anesthesiologists and

residents are all greatly interested in this field and have provided positive feedback on its use. All this feedback will become the topic of clinical research in the near future. New intubation techniques for double-lumen endobronchial tube and double-curve endotracheal tube using Trachway® were also developed. Results have been published in international journals and responses in the anesthesiology field from other scholars have been obtained.

Despite the advanced technology evolving in our department, there are a number of doctors in southern Taiwan who still believe that they have the abilities to successfully handle difficult airway cases without using supplementary intubation tools and without incidence of dental injuries. Such out-of date beliefs can only be reversed and transferred to a forward-looking mindset through adequate and advanced level training. Therefore, we introduced regular advanced airway management lecture courses in order to advocate and educate medical personnel on these new technologies.

The advanced techniques and novel concepts are delivered to young physicians through proper training courses. For example, Dr. Kuang-Yi Tseng was assigned to execute training courses for junior residents in KMH and took responsibility

for airway management related clinical research. Professor Siu-Wah Chiu was also assigned as an instructor on airway management to teach clerks and interns at the Human Simulation Center. These training sessions received high positive scores from medical interns. In our department, following many discussions on approvals and challenges in video laryngoscopy and video stylet practices, the use of video devices has brought about a positive attitude for convenient and efficient manipulation in difficult airway cases. As the old saying goes: "If you can't beat them, join them."

Future Perspectives

To promote dental health care and spread out the importance of perioperative dental health to surgeons and patients undergoing surgery, anesthesiologists should closely collaborate with dentists or oro-surgeons to set up a rapid response in oral consultation and integrate with other departments as a whole. Furthermore, we intend to upgrade our research qualities and quantities by integrating other specialists and establish airway-related database storage. We are looking forward to providing some innovative techniques or novel concepts to improve the incidence of successful

intubation and prevent risk factors from damaging teeth or airways. We will introduce regular training courses on Advanced Airway Management to improve the abilities of anesthesiologists, residents, and registered nurses in difficult airway management and gradually decrease difficult airway-related adverse events.

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Figure 1: Pre-surgery airway analysis in the anesthesia meeting conducted by the KMUH Department of Anesthesiology.

Figure 2: Assembly of the Trachway tube into the bronchial lumen of the double-lumen endotracheal tube.

Figure 3: Intubation training course taught by Professor Siu-Wah Chau.

深部腦刺激手術麻醉 —— 花蓮慈濟醫院麻醉部

撰文 / 林真福 主任、陳宗鷹 教授

花蓮慈濟醫院麻醉部是宜花東地區唯一的一所麻醉專科訓練醫院。秉持著本院的醫療宗旨「人本醫療、尊重生命」，本院麻醉部除了執行一般醫學中心的各種麻醉及疼痛技術以外，亦肩負起許多特殊國內及國際醫療手術個案麻醉，包括連體嬰分割、嚴重脊椎矯正手術等。另外，本部也針對深部腦刺激手術發展出最不影響腦部微電極記錄的全身麻醉技術。

發展背景

30 年前慈濟證嚴法師體會東部民眾就醫不便、因病而貧，決心籌建慈濟醫院。在醫療資源及人力匱乏的環境下，歷經百轉千折，慈濟醫院終於在證嚴法師堅定的毅力下，在 1986 年 8 月矗立於花蓮市。花蓮慈濟醫院麻醉部亦於同年成立，初期由臺大醫院麻醉醫師支援。歷經 30 年，在歷任麻醉部主任和同仁的努力下，不僅

能執行各項專科手術麻醉及疼痛治療，並持續為台灣醫護界訓練出優秀的麻醉專科醫師及麻醉護理師。

在慈濟基金會的國際人道救濟下，花蓮慈濟醫院接受許多國內罕見醫療個案轉介，需要困難的手術矯正及治療，包括「河馬人」巨大型齒顎質瘤 (Gigantiform cementoma) 切除手術、纖維性再生不良 (Desmoplastic fibroma) 切除手術、象腿手術、連體嬰分割手術等案例，均在醫學上獲得



圖一：連體嬰分割與麻醉。

成功，其中河馬人個案更被國際媒體英國 BBC 與 Discovery 專案報導。

本院亦是國內執行嚴重僵直性脊椎炎矯正手術的中心，已成功執行超過 100 件手術案例，最嚴重的脊椎變形反折甚至達 200 度。

深部腦刺激手術 (deep brain stimulation) 是可以改善巴金森氏症、肌躍症合併肌張力不全 (myoclonus-dystonia) 等病症的病患生活品質及減少藥物使用的侵入性治療。精確的刺激器放置定位需依賴術中腦部微電極記錄，因此大部分的手術過程都必須

在病患清醒 - 鎮靜 - 清醒的交替狀態下執行，如何處理病人的心理壓力、術中配合度和手術部位疼痛對於麻醉醫護人員皆是很大的挑戰。

花蓮慈濟醫院已成功執行約 200 例深部腦刺激手術，而且絕大部分都在病患接受全身麻醉且相對舒適的過程中完成，在提升病人手術舒適度的同時也不影響腦電極的記錄，成功完成手術。

現況

嚴重僵直性脊椎炎矯正手術麻醉

脊椎彎曲超過 100 度以上的矯正手術通常需要分階段執行，包括髖關節置換及脊椎融合矯正等。對麻醉而言，這類手術最大的挑戰是病人一般皆合併有肺功能受限，甚至發生肺纖維化的變化，麻醉前必須精確評估患者的心肺功能。術前建立人工氣道需要進階氣道工具及完整的麻醉計畫，尤其是在短時間內必須接受多次氣道插管及拔管，更是需要麻醉部團隊的合作才能順利完成。

病患擺位也需要多方考量，需要做額外保護，避免特殊姿勢擺位時的局部組織壓迫，而極端變形部位的固

定及擺位亦可能導致血循和呼吸生理上的不良影響，這些都需要更嚴密的術中監測。額外的術中特殊監測項目包括神經根傳導監測 (SSEP)、手術導致的神經損傷判讀、大量失血時使用 thromboelastography 進行大量血品輸注監測等。

深部腦刺激手術麻醉

長期以來，接受這類手術對麻醉人員及病患本人來說都是很大的挑戰，尤其是腦部微電極記錄 (microelectrode recording) 非常容易受麻醉藥物及周圍環境機器操作而影響其監測及判讀。因此在很多醫學中心是採用反覆清醒 - 鎮靜 (awake-asleep) 方式進行。

本院麻醉與神經醫學中心經過不斷的討論和溝通，發展出手術全程病患接受全身麻醉的方式。這類病人因慢性神經系統病變，需要長期服用相關藥物控制病情，因此術前除了要掌握病人的生理狀況外，對病人服用的藥物所可能造成與麻醉藥交互作用、或是會抑制腦神經刺激反應等都需要瞭解。

病患在接受麻醉前已裝置好定位頭架，因此一旦遇到困難氣道建立，會更增加挑戰性，在不影響頭架移位亦不增加病人在清醒下插管下的緊張痛楚，本院是採用 trachway 輔助插管。

術中使用的監測系統複雜性較高，除了常規的血循性測量以外，腦電波、SSEP、體溫計、MAC 值等都



圖二：嚴重僵直性脊椎炎矯正手術擺位與麻醉。



圖三：深部腦刺激手術 (DBS) 與插管全身麻醉。



圖四：深部腦刺激手術 (DBS) 全身麻醉與神經監測。

是必備的系統。這些監測系統除了可避免術中及術後發生併發症，也可更精準掌握不影響腦電極記錄的麻醉深度，在腦部電極記錄發生困難時麻醉科醫師可隨時提供手術醫師必要的參考數據以調整刺激器定位。在這些高度的臨床合作及不斷的溝通下，本院不僅提供這類患者極高的手術成功率，並且有效的降低病患的焦慮及手術醫師在術中的壓力。

未來展望



圖五：極重度先天性膝反曲矯正手術。

除了精進前述本科部之特色麻醉以外，本科部將持續在以下目標努力，這些目標之達成不僅能讓前述之嚴重僵直性脊椎炎矯正手術麻醉與深部腦刺激手術麻醉更為順暢，更是讓所有手術麻醉之品質提升。

一、持續加強麻醉專科醫師及麻醉技術護理師訓練品質，培育更多的優秀臨床麻醉專業人員。

二、發展重點手術麻醉次專科化，包括心血管及腦神經麻醉，以提升麻醉照護品質。

三、整合各相關臨床科室，落實全方位疼痛照護，包括急、慢性疼痛治療、介入性疼痛治療、安寧疼痛控制、預防性疼痛措施等。

四、推動週術期醫學 (perioperative medicine)，將麻醉照護範圍擴展到手術的各個時期，把麻醉可能發生的不良反應減少至最低程度，並提供適當的器官保護作用。

五、開辦進階麻醉技術培訓計畫，包括術前術中心臟超音波檢查、血循系統監測等，提供麻醉學員有系統性的學習進階麻醉監測觀念與技術。

六、推展急症麻醉 (acute care anesthesia) 觀念，培養急症麻醉專科

人才以早期介入急症救治麻醉，提升救治成功率及減少器官功能性損傷。

七、提升學術研究風氣和水準，

帶動前瞻創新性麻醉醫療技術和知識發展，並與國內外學術單位交流，以達到接軌頂尖醫學中心之醫療品質為目標。

Anesthesia for Deep Brain Stimulation Surgery

The Department of Anesthesiology, Hualien Buddhist Tzu Chi Hospital

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Abstract

The Department of Anesthesiology at Hualien Buddhist Tzu Chi Hospital is the only anesthesiology training institution in Eastern Taiwan. With the mission of "humanism-based medicine and respect for life", this Department not only performs the anesthesia and pain techniques of standard medical centers, but involves in the procedures for special domestic and international cases such as conjoined twin separation and the correction of serious spinal problems. Also, this Department developed the generalized anesthesia technique for deep brain stimulation (DBS) that causes minimal effect on microelectrode recording.

Backgrounds

Thirty years ago, Tzu Chi's Dharma Master Cheng Yen found the residents in Eastern Taiwan have difficulty in accessing medical resources and they remained at a relatively low economic status because of poor

health. It was then she decided to prepare and build Tzu Chi Hospital. Although the medical resources and manpower was very limited, in August 1986, Buddhist Tzu Chi Hospital was completed in Hualien City. Anesthesiology was also established that year and was supported by National Taiwan

University Hospital staff. With thirty years of effort and development, this Department is currently capable of performing anesthesia for specialty procedures and pain treatment, and continues to train new anesthesiologists and nurses.

To provide humanitarian assistance in cooperation with Tzu Chi Foundation, this hospital has accepted the referral of rare domestic cases requiring highly challenging operation, including gigantiform cementoma ("hippopotamus face") excision, desmoplastic fibroma excision, elephantiasis operation and conjoined twin separation. These cases were medically successful, and the "hippopotamus face" was recorded and reported by British media BBC and Discovery.

This hospital is also the center for correcting serious ankylosing spondylitis. More than a hundred operations have been successfully done. The most serious disfigurement seen is a curvature of 200-degrees.

DBS is an invasive treatment used to improve quality of life and to reduce medication use in Parkinson's disease and myoclonus-dystonia. Precise stimulator deployment and positioning relies on the recording by the microelectrode in the brain, suggesting that most of the surgical processes are to be performed in repeated

aware-asleep cycles. The management of patients' stress, cooperation and surgical site pain is challenging for anesthesiologists and nurses. This hospital has successfully completed approximately two hundred DBS procedures, mostly performed when patients were under general anesthesia and relatively comfortable. The electrode recording was not affected by the measures taken to maintain patient comfort. Operations were successful.

Current Status

Anesthesia for the Correction of Serious Ankylosing Spondylitis

A stepwise approach is usually required for cases with spinal curvatures of 100-degrees or larger and includes hip replacement and spinal fusion surgery. For anesthesiologists, the most challenging part is that these patients are typically complicated with pulmonary function limitation or even pulmonary fibrotic changes. Accurate cardiopulmonary function assessment is required before administering anesthesia. Pre-operative establishment of artificial airway requires advanced airway tools and comprehensive anesthesia plan, and the anesthesiology team is especially important for multiple endotracheal tube insertion

and removal. Patient positioning is no less important: additional protection is required to avoid pressure on local tissue and the immobilization and positioning of extreme disfigurement site can lead to adverse circulatory and respiratory effects. These require stringent surveillance during the operation. Additional surveillance of interest during operation includes nerve root conduction monitoring (such as SSEP), interpretation of neural injuries arising from operation, and the use of thromboelastography in monitoring large volume transfusion.

Anesthesia for DBS

This kind of operation has been a major challenge for anesthesiologists and patients, microelectrode recording is especially challenging because it is easily affected by analgesics and surrounding environment and devices, which can lead to inaccurate monitoring and interpretation. Therefore, repeated awake-asleep cycles are used in several medical centers. With much discussion and information sharing, the Anesthesiology and Neurosurgery of this hospital developed an approach where patients receive general anesthesia throughout the procedure. As these patients are subject to long-term treatment for chronic nervous system pathologies,

anesthesiologists should not only monitor physiologic parameters, they should also understand the possible interaction between their current medication and analgesics, or the possible inhibitory effect of medications on cranial nerves. Patients are mounted with the positioning headstock, which makes the difficult airway establishment more challenging. To avoid headstock displacement as well as the stress and pain associated with intubation under aware state, this hospital applies trachway-assisted intubation.

The monitoring systems used during operation are more complicated, where EEG, SSEP, thermometer and MAC value is necessary. These systems help prevent complications during and after operation, discover the degree of sedation not affecting microelectrode recording more accurately. When difficulty is encountered in said recording, anesthesiologists can provide surgeons with the data required to adjust stimulator position. Good cooperation and communication not only guarantee high success rate, but reduce patient anxiety and surgeon stress.

Future Perspectives

This Department will continue the improvement of current special approaches

and emphasize the following elements that streamline the anesthetic procedures for serious ankylosing spondylitis correction and DBS, and even improve the quality of overall anesthetic practice in surgery:

1. Continue the improvement of anesthesiologist and nurse training to ensure the professionalism of specialists.
2. Develop sub-specialties for surgical anesthesiology, such as cardiovascular and neurosurgery, to improve care quality.
3. Integrate the clinical sections and rooms for acute and chronic pain treatment, intervention pain treatment, palliative pain control and others.
4. Develop peri-operative medicine to extend anesthetic care to the overall operation, which minimizes possible anesthesia-related adverse reactions and provides adequate visceral protection.
5. Provide advanced anesthetic technique training such as echocardiogram before and during operation as well as circulatory monitoring for systemic learning of anesthetic monitoring and its techniques.
6. Promote acute care anesthesia to train specialists for early anesthetic intervention and following treatment to improve treatment success rate and to reduce functional visceral damages.

- 7 Lead academic research and the development of prospective and innovative anesthetic technique and knowledge as well as information sharing with domestic or foreign academic units to align ourselves as a top-tier medical center.

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Figure 1. Conjoined twin separation and anesthesia.

Figure 2. Positioning and anesthesia for the corrective procedure of serious ankylosing spondylitis.

Figure 3. Deep brain stimulation (DBS) and intubation under general anesthesia.

Figure 4. Deep brain stimulation (DBS) general anesthetic and nerve monitoring.

Figure 5. Corrective procedure for extremely serious congenital genu recurvatum.

麻醉教育 Professionalism Educations

導讀：麻醉教育邁入新的里程碑

撰文 / 徐永偉 (專科醫師甄審委員會主任委員、馬偕紀念醫院淡水開刀房主任)

2016 年是台灣麻醉醫學會設立 60 週年紀念。回顧 60 年來的歷史，有幾件重要的政策推動，可說是麻醉教育的重要里程碑。

首先是 1986 年編訂麻醉科住院醫師訓練大綱，為專科醫師訓練的標準奠定了基礎；其次是 2005 年開始推動住院醫師學習登錄制度，確保了住院醫師訓練的質量；然後是 2015 年衛福部推動的「專科醫師訓練計畫認定委員會 (Residency Review Committee, RRC)」，架構住院醫師培育計畫，健全了住院醫師培育制度。

近年來醫學教育越來越受重視，許多麻醉專科訓練醫院伴隨評鑑的需求，以及新的教學觀念與評估方法的引進，投注許多資源於麻醉的教學訓練上，醫學教育儼然成為醫院內的熱門學科。如果檢視 RRC 的麻醉科專科醫師訓練計畫認定基準，我們不難發現其精神強調的是能力導向的醫學教育 (Competency-Based Medical Education, CBME)。訓練醫院必須按照 RRC 的規定，制定學科

的核心課程，同時也要求做到責任分層及漸進，也就是住院醫師需要有直接的臨床經驗及責任分層；隨著年資增加而責任漸增，能力漸進。而在執行 CBME 的實務面上，最基本需要考慮的項目，包括要訓練什麼、如何訓練、在何時訓練，以及如何評估學習成效。整體而言，RRC 制度的推動，確保了住院醫師訓練計畫的品質，同時也清楚指引各訓練醫院在培訓專科醫師的過程中，該努力與該注意的方向。所以 RRC 制度，無疑是帶領我們邁入麻醉教育的新里程碑。

在各醫院所撰寫的 60 週年紀念文稿裡，有數家醫院特別分享他們在教學訓練上的特色，很值得推薦給大家閱讀並參考。

台北慈濟醫院在教學訓練上頗具口碑，他們分享結合電腦資訊、情境模擬及團隊資源管理 (TRM) 訓練，以提供住院醫師多元化的學習。我們都了解，現今因為病人意識的抬頭，病人安全的種種要求，以及住院醫師工時的規定，限縮了住院醫師臨床麻

醉學習的時間與機會。幸好近年來資訊科技的進步，擬真情境設備與訓練的普及，彌補了住院醫師在處理麻醉危急重症經驗的不足，同時情境模擬也已經被證實是團隊訓練的最佳教學方式。關於情境模擬訓練，麻醉醫學會理監事會於 2012 年決議通過，自 2016 年起，擬真情境考試正式納入麻醉專科醫師甄審考試，用於評估學員的臨床技能。

臺北醫學大學附設醫院麻醉部則分享以教學研究實踐臨床卓越，透過優質化的教學品質，提升與蓬勃學術的發展。北醫麻醉部特別將麻醉教育做為一項專業來發展，透過專責教學的「教學長」，落實教師專責與分工，該訓練計畫在 2015 年 RRC 評鑑中，得到許多肯定，獲得全國第一名之殊榮。

在麻醉護理師的養成教育方面，目前各訓練醫院紛紛開辦麻醉護理師訓練班，但養成教育並未標準化。為提升麻醉護理養成教育品質，台灣麻醉護理學會希望能將麻醉護理師的養成教育標準化，同時促成台灣麻醉護理教育正式學制化，以提升麻醉護理師素質，進而提升病人安全。嘉義基督教醫院麻醉部也分享了護理師臨床

專業能力認證制度，建立專門屬於麻醉護理師的臨床專業能力進階制度，以促進麻醉專業護理的研究與發展，及提升臨床麻醉照護品質。

回首過往，60 年來靠著大家共同的努力，台灣麻醉界在許多領域上，領先其他專科醫學會，期盼大家肩負起承先啟後的使命，讓麻醉教育訓練成為其他專科的標竿。



Introduction: New Milestone in Anesthesia Education

Yung-Wei Hsu,

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Director of the Operating Room, Mackay Memorial Hospital Tamshui Branch

2016 is the 60th anniversary of the Taiwan Society of Anesthesiologists. Reviewing the past 60 years of history, there were several important policies promulgated and then became milestones of anesthesiology in Taiwan.

First, was the outlines for anesthesiologist residency training established in 1986, which then became the foundation of specialist training. Second, was the learning registration system for residents in 2005, which aimed to assure the quality and quantity of residency training. Last, was the Residency Review Committee (RRC) system promoted by the MOHW in 2015, which constructed the framework of residency training and cultivation perfectly.

Medical education has been taken into account more and more seriously. Along with the requirements of hospital accreditation, novel concepts and evaluation methods, more and more resources are invested for anesthesia training. Nowadays medical education has become the popular specialty in the hospital. If we review

the standards for RRC anesthesiologist specialty training, we could realize that the main concept is to focus on Competency-Based Medical Education (CBME). In other words, according to the regulations made by RRC, anesthesia training hospitals must have a core training program as well as responsibility stratification or advancement system; that is, residents should have clinical experience along with specific duties based on the seniority. The responsibility of the resident will be increasing according to seniority and capacity. As to the practice of CBME, the basic elements include what to train, how to train, when to train, and how to evaluate the learning effectiveness. Overall, the promotion of RRC system not only assures the quality of resident training, but also guides future directions and goals of the training program. Therefore, the RRC system is no doubt the new milestone of anesthesia training.

In this special 60th anniversary issue, some hospitals have specifically shared their training programs, which are worthy

to read and take it as a reference.

The anesthesiology training in Taipei Tzu Chi Hospital is well-known. They not only integrate computerized information, simulation and TRM training, but also provide multidisciplinary learning opportunities for residents. We all understand that to meet the safety requirements of patients and working hour limits of residents due to the popularity of patient rights and labor rights, the training hours and opportunities for residents are limited at present. Luckily with the advancement of IT, the equipment of simulation training is more popular and accessible, which compensates residents' insufficiency of experience in acute or critical care. In addition, simulation has been proved to be the best teaching strategy for group training. Therefore, the executive committee meeting of the Taiwan Society of Anesthesiologists in 2012 has decided that, starting from 2016, the simulation-based examination will become an official exam for anesthesiologist to evaluate their clinical skills.

The Department of Anesthesiology, Taipei Medical University Hospital has introduced their excellent teaching, research and clinical practice. They have improved and encouraged academic advancing through optimizing training quality. For

example, the Department of Anesthesiology in TMUH focuses on the professional development of anesthesiology. They not only assign "education director" to be responsible for anesthesia training, but also specify dedicated and divided duties. Such training project was confirmed and awarded 1st place of the RRC accreditation in 2015.

As to the training program for nurse anesthetists, currently the standardized training program is still missing. To improve the quality of anesthesia training, the Taiwan Association of Nurse Anesthetists aims to officially standardize and systemize anesthesia training to enhance nurse anesthetist professionalism and the safety of the patients. Besides, the Department of Anesthesiology, Chia-yi Christian Hospital has shared their professional clinical certification system for nurse anesthetists. Hopefully the exclusive clinical promotion system for nurse anesthetists will promote the research and development of nurse anesthesia and improve the quality of anesthesia nursing.

Looking back, the past 60 years of achievements relied on everybody's efforts, so anesthesiology could excel many other specialties in medical filed. Hopefully we can carry on the responsibility and aim to allow anesthesiology become the benchmark specialty in Taiwan.

以教學研究實踐臨床卓越

——臺北醫學大學醫附設醫院麻醉部

撰文 / 陳建宇 教學長、門診麻醉科主任；張淳昭 一般麻醉科主任；陳大樑 麻醉部主任

近年來，北醫附醫策略性推行「人才的網羅與培育」、「教學的優質與專業化」、「研究頂尖計畫」等任務，發展「教研」作為臨床卓越基礎。首先，麻醉專科醫師增加至 12 人，協助成員深造；其次，指派專責教學的「教學長」落實「教師專責與分工」，視「麻醉教育」為一項專業來發展；第三，結合不同團隊，導入多元教學評量工具，如 ACCESS MEDICINE、Healthcare Matrix、Reflective Portfolio 等，又以 ACGME Milestones Project 與國際接軌。最後，跨團隊進行頂尖研究，延聘專任臨床研究員，爭取國家型計畫，發展後設研究分析 (Meta-analysis) 落實以實證為本之醫療照護 (Evidence-based healthcare)。

發展背景

臺北醫學大學附設醫院麻醉科，於 1976 年醫院啟用時即獨立成科。草創之初，麻醉業務主要由臺大醫院黃芳彥、石全美等醫師兼任支援。隨著外科手術的發展及醫院擴建，麻醉團隊茁壯成長步入教學醫院之規模。其訓練之對象，已不單侷限於科部內之麻醉技術員與住院醫師，近年更擴及國內外超過二十多所機構之交換住院醫師、研究生和醫學生等，成為亞洲麻醉學術與學員交流的重鎮之一。

陳大樑教授自從 1998 年與 2006 年，分別開始擔任醫學系麻醉學科與北醫附設醫院麻醉科主任後，即推行「人才的網羅與培育」、「教學的優

質與專業化」以及「研究頂尖計畫」等主要任務，以突破北醫作為一個傳統區域型教學醫院的限制。時逢 2007 年第三醫療大樓落成，在院方的大力支持下，陳教授帶領麻醉團隊進行全面更新相關硬體設備，更前瞻性地擴編人力與鼓勵進修。將原有的 5 位專任麻醉專科醫師增加至 12 人外，更積極爭取醫院資源，協助科內同仁發展，如支持陳建宇赴英國攻讀醫學倫理教育博士；林朝順、李元文、張懷嘉、藺瑞安、蔡曉倩、謝明惠與林輝醫師分別攻讀醫學資訊、藥理、分子生物與公共衛生領域的博士學程，目前科內共 8 位醫師擁有教育部部定教職；更積極提升科部麻醉技術員學術專業能力，全面啟動專業能力分級。

現況

為追求教學的優質化與專業化，北醫麻醉科採取了三個策略。

首先是落實「教師專責與分工」。除了設立導師制度與執行教學分工外，科內指派具備教學熱忱且願意投入教學研究與創新的中生代主治醫師，來擔任的「教學長」一職，負責規劃所有課程設計與管理教學行政，並在院方管發部門支持下，將教學工作正式納入院內與科內薪資重分配之機制裡，此舉不但徹底改善「教學沒有 PPF」的窠臼，更將「麻醉教育」推向一門專業領域來發展。

其次是「在地與全球化的教學」，結合雙和與萬芳另兩家附屬醫院，每月舉行「教學研究聯席會」，強化同儕學習與良性競爭；在醫學模擬測驗上，擴大合作對象至臺大與亞東醫院；導入多元教學評量工具，如線上教學的 ACCESS MEDICINE、以醫療品質為導向檢視核心能力的健康照護矩陣 (Healthcare Matrix)、強化人文素養與技能學習的 Reflective Portfolio 等；至於在接軌全球化麻醉教育的努力上，我們導入了美國 ACGME Milestones Project 作為未來住院醫師訓練計畫之

學習能力指標，並著手進行在地化之工作，期能系統性地提升麻醉教育的品質，能與國際接軌。

最後則是期許發展「教學成效研究」，自 2014 年以來，本科每年都會將所做出的教學創新轉化為學術成果，發表於麻醉醫學年會與台灣醫學教育年會中，未來更會朝向刊登在醫學教育期刊而努力。

在發展頂尖研究上，以跨團隊合作分享的精神，打破過去孤軍奮戰與封閉領域的研究型態，致力開拓跨領域的學術研究新典範。除了持續要求年輕主治醫師與住院醫師，投入跨團隊 (生藥所與醫科所) 麻醉藥物與毒理實驗室研究外，更延聘專任臨床研究員，爭取國家型計畫來發展大型資料庫研究。系統性地探討不同外科手術類別與病人共病症之相關性，提升對外科病人預後之評估與圍術期照顧，並在短短四年內發表了共計 43 篇文章，且 4 次獲得全校優秀論文獎，文章分別刊登在外科排名第一之 Annals of Surgery (IF: 8.33)，風濕免疫領域第一之 Annals of Rheumatic Diseases (IF: 10.38)，還有兩篇在 Diabetes Care (IF: 8.42)。

此外，團隊更致力發展後設研



究分析 (Meta-analysis)，分別訓練住院醫師、醫學生與技術員從臨床提問開始，發展出研究題材並進行系統性分析與資料統整，不但落實以實證為本之醫療照護 (Evidence-based healthcare)，提升醫療照護品質，更可完成學術論文發表，近兩年就有兩位住院醫師因發表此類文章 (皆刊登在 IF>3 之期刊) 而晉升主治醫師。除了實驗室與資料庫研究外，臨床試驗、教學成效研究亦是積極拓展的研究領域，旨在實踐「教研為臨床卓越基礎」。

未來展望

透過優質化的教學品質，提升與蓬勃的學術發展，北醫麻醉部在 2015 年醫策會 Residency Review Committee (RRC)，住院醫師訓練中心評鑑中，獲得全國第一名之殊榮。我們並不以此為滿足，期許團隊能以美國 Mayo Clinic 為師，從一間私人診所發展成為醫學中心的典範，持續以創新、卓越、團隊、尊重等核心價值為標竿，繼續在教學、研究與臨床表現上，朝頂尖之目標邁進。

Using Teaching & Research to Achieve Clinical Excellence

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Abstract

“Talent recruitment”, “teaching program optimization” and “top research incubation” have been strategically adopted in the past decade by the Department of Anesthesiology, Taipei Medical University Hospital to achieve our vision of clinical excellence. The faculty has been first expanded up to 12 anesthesiologists and further assigned each staff to diverse field of subspecialty/academia. Secondly, a “teaching chief” was chosen and empowered to allocate the multifarious educational tasks anticipated nowadays. That is to say, we regard teaching of anesthesia as one of the “subspecialties” in anesthesia. Thirdly, we introduce various teaching and assessing tools, such as ACCESS MEDICINE, Healthcare Matrix, and Reflective Portfolio to facilitate interdisciplinary practice, and also catch up with international trends by implementing ACGME Milestones Project. Last but not least, we target top research and achieve evidence-based healthcare by recruiting multidisciplinary teams as well as full-time clinical research fellows, applying for national research projects, and directing meta-analysis.

Historical Backgrounds

The Department of Anesthesiology was established independently in 1976 when Taipei Medical University Hospital (TMUH) was opened. At the beginning, the operation of anesthesia was supported by Dr. Fang-Yen Huang and Dr. Chuan-Mei Shih of National Taiwan University

Hospital. By the development of surgical techniques as well as the expansion of the hospital, the business of the department gradually grew up to the scale of a teaching hospital. Therefore, the trainees are no longer limited to anesthetists or residents inside the department. On the contrary, the training programs have been opened to national and international personnel



臺北醫學大學醫附設醫院麻醉部團體照。

originating from over twenty institutes, including exchanged residents, graduate students and medical students. As a result, the Department of Anesthesiology, Taipei Medical University Hospital has become an important medical center for anesthesiology training and academic exchange in Asia.

Professor Ta-Liang Chen served as Director of Department of Anesthesiology, School of Medicine, Taipei Medical University (TMU) and Director of Department of Anesthesiology, TMUH since 1998 and 2006, respectively. His primary assignment was to lead TMUH from a traditional regional teaching hospital to a top national medical center by practicing “talent recruitment and cultivation”, “teaching program optimization and specialization” and “top research incubation”. When the 3rd medical building was opened in 2007, with the support of TMUH, Professor Chen further updated related hardware facilities for the anesthesia team, prospectively expanded manpower and encouraged more staffs pursuing advance training. By doing so, he recruited 7 more anesthesiologists (from 5 to 12), more actively asked for hospital resources, and encouraged department staffs continuing advance training. Now Dr. Chien-Yu Chen has PhD degree in medical ethics and education in the United

Kingdom; and Dr. Chao-Shun Lin, Dr. Yuan-Wen Lee, Dr. Huai-Chia Chang, Dr. Jui-An Lin, Dr. Hsiao-Chien Tsai, Dr. Ming-Hui Hsieh and Dr. Fai Lam have their PhD degrees in medical informatics, pharmacology, molecular biology and public health. In addition, 8 physicians in the department are Ministry of Education-certified faculties at present. Lately, the department has focused on academic and professional competence improvement of anesthesiologists to initiate an overall anesthesia proficiency grading system.

Current Status

To pursue teaching program optimization and specialization, the Department of Anesthesiology, TMUH has adopted three strategies. First is to emphasize “specialties and teamwork”. In addition to the tutor system and specialization, the department has assigned a middle-aged attending physician, who is enthusiastic and devoted to teaching and research, to serve as a “teaching chief”. The teaching chief is responsible for all the design and administrative management of training programs, and also should officially introduce teaching assignments as one of the key factors deciding payroll distribution in the department and the

hospital. The strategy not only breaks the stereotype of “teaching has no PPF”, but also leads “anesthesia education” to a direction of specialty. Second is to implement “localized and global teaching program”. TMUH has a monthly “joint teaching & research seminar” with other two adjunct hospitals (Shuang-Ho and Wan-Fang) to reinforce peer-learning and healthy competition. For medical simulation assessments, TMUH has cooperated with NTUH and Far Eastern Memorial Hospital to introduce online teaching program such as ACCESS MEDICINE, to inspect medical quality-oriented core ability such as Healthcare Matrix, and to reinforce humanities and technology learning tools such as Reflective Portfolio. As to the effort on improving global anesthesia education program, TMUH has imported the US ACGME Milestones Project as the indexes of learning abilities for future resident training programs. Furthermore, TMUH is also practicing on localized training projects and expecting such training plan would systemically improve the quality of anesthesia training and consequently meet international standards. Last is to quantify “the outcomes of teaching and research”. Starting from 2014, this department has transferred teaching innovation into academic results and

subsequently published the outcomes on annual anesthesiology or medical education conferences in Taiwan. Hopefully these results will be further published in prestige medical education journals.

In terms of top research incubation, TMUH has halted the former research attitude of working alone or working in a limited area and turned into developing open and multidisciplinary research projects/models along with the spirit of teamwork and sharing. In this case, not only are young attending physicians and residents required to devoted to multidisciplinary (biopharmaceuticals and medical sciences) narcotic and toxicology studies, but also full-time clinical researchers are recruited to apply for national large-scale database projects. As a result, TMUH not only has systemically discussed the relevance between different surgical types and patient comorbidities and enhanced the evaluation abilities on surgical patient prognosis and perioperative care, but also published 43 articles in prestige international journals in a short 4-year period. Moreover, 4 of these even won excellent dissertations at school, and subsequently were published in Annals of Surgery (IF: 8.33, ranking: 1st in surgery), Annals of Rheumatic Diseases (IF: 10.38, ranking: 1st in Rheumatology and Immunology), and Diabetes Care

(IF: 8.42), respectively. In addition, the department has also devoted to applying the results of meta-analysis to the training program. For example, the training starts from assisting residents, medical students and anesthesiologists in developing clinical questions, and then progressing to research topic establishment, performing systemic review and data analysis. By doing so, not only evidence-based healthcare can be achieved, the quality of healthcare can be improved, but also academic articles can be published efficiently. In the past two years, two residents had practiced such strategy and consequently published articles (both were in journals with IF>3) and then were promoted as attending physician. Therefore, in addition to laboratory and database studies, we also aim to explore clinical trials or teaching outcome research and carry out the idea of “using teaching & research to achieve clinical excellence”.

Future Perspectives

By optimizing the quality of training and improving and encouraging academic development, Department of Anesthesiology, TMUH has won the 1st place of National Residency Training Center in 2015 issued by the Residency Review Committee (RRC), Joint Commission of

Taiwan. However, we are not complacent about our current achievements. Instead, we look forward to learning from the Mayo Clinic in the US and becoming a role model of medical center. Moreover, we aim to achieve the ultimate goal of becoming a top medical center by supporting core values such as innovation, excellence, teamwork and respect, and excelling at teaching, research and clinical performance.

走向國際優化醫師教育訓練 —— 奇美醫學中心麻醉部

撰文 / 陳貞吟 部長、謝介平 移植科主任

本部對住院醫師的教學以「人」為本，以學習和紮實訓練為首要考量，而非以「人力運用」為考慮重點，有合理值班安排，令其有快樂的心情學習和服務病人。本部重視國際化教學，除搭配本部研究三大方向「臨床研究」、「資料庫研究」、「基礎研究」進行，更輔導住院醫師撰寫研究案與出席國際學術會議，達到國際化教學與培訓目的。

發展背景

奇美醫院（原逢甲醫院）麻醉科成立於1968年。於2000年通過醫學中心評鑑暨教學醫院評鑑，於2007年改制為麻醉部，目前共有二十五名主治醫師。

奇美醫學中心麻醉部秉持著以病人為中心的服務理念，長期以來極為注重「幸福醫院」的理想，也就是分享的快樂。自1989年開創了所有麻醉作業及院內24小時駐診值班皆由



圖一：主治醫師與住院醫師共同參加2015歐洲（德國）麻醉年會。

主治醫師親自執行之先例後，醫護同仁一向以工作支援、合作無間著稱，直至今日的茁壯期，皆以「幸福」的追求為目標。

現況

教學方面－「國際化教學」

升格醫學中心後，近年住院醫師和PGY皆滿招。本部主治醫師有部定教職者近50%，已成為南台灣麻醉住院醫師培育的重要醫院。在眾人齊心耕耘下，榮獲2012年院內教學技巧競賽主治醫師組第一名。迄今，本部教學以「人」為本，以學習和紮實訓練為首要考量，而非以「人力運用」為考慮重點。對住院醫師的入門教學，由主治醫師排出為期二至三月的核心課程，並專案指派主治醫師一

對一指導，且有合理值班安排，令其有快樂的心情學習和服務病人。

自 2000 年王志中教授加入奇美團隊，帶起本院研究風氣，目前有王志中副院長的疼痛實驗室，開放國外人員至本院進修學習的機會。另外，陳貞吟主任的營養與疼痛臨床醫學研發，褚錦承主任之大型資料庫研究，邢中熹主任之功能基因暨體細胞素研究等，亦為近年來研究成果之源頭，本部 SCI 論文近三年每年皆 40 篇以上，2014 年與 2015 年獲奇美醫院傑出研究獎 (2013 年 International Journal of Epidemiology，影響係數 9.197；2015 年 Anesthesiology，影響係數 6.168)。

本部研究，採「臨床研究」、「資料庫研究」、「基礎研究」三方向進行，輔導住院醫師撰寫研究案，自 2014 年起每年住院醫師都順利獲得研究經費一案。為達國際化教學與培訓目的，科部每年組織發表團隊，由各分科主任帶團 (成員有資深、資淺主治醫師、住院醫師與護理人員)，讓所有住院醫師於訓練期間完成以下三項要求至少各一次：(1) 出席歐洲或美國麻醉會議與論文發表；(2) 參訪大陸醫學中心等級醫院與論文發表；(3) 參與院方支援海外醫療援助作業，拓展國際視野，深化受訓經歷。2014 年本部住院醫師獲得「台灣麻醉年會臨床研究類海報第一名」，並在台灣南

區麻醉危症處理競賽 OSCE 第二名。

未來展望

一、深化住院醫師受訓課程，優化臨床麻醉教育訓練與醫療服務。

二、組織團隊，落實研究教學與

國際發表，帶領科部走向國際，實踐國際化教學。



圖三：麻醉部團隊參加 2015 上海東方麻醉醫學會。

Internationalized Teaching The Department of Anesthesiology, Chi Mei Medical Center

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Abstract

Teaching in our residency program is based on the concept of “spirit of humanity” with the goals of learning and solid practice instead of the “application of human resources” concept. In addition, a flexible duty schedule keeps trainees’ spirits happy and amicable to learning; thus, they are willing to provide quality medical services to patients. The major three domains of research in our department include clinical research, database research and basic research. Our department’s aim is to provide internationalized teaching. Moreover, we emphasize residency training for research project writing and international conference participation to achieve the goals of internationalized teaching and training.

Backgrounds

The Division of Anesthesiology in Chi Mei Medical Center (originally Feng

Chia Hospital) was established in 1968 and was reclassified as the Department of Anesthesiology in 2007, long after being accredited as a medical center and teaching



圖二：2015 年 9 月住院醫師與主治醫師會談餐敘後合照。

hospital in 2000. Currently there are 25 attending physicians in our department.

The Department of Anesthesiology in Chi Mei Medical Center adheres to the concept of patient-centered services and has focused on the idea of being a “happy hospital” for a long time. In 1989, Chi Mei Medical Center started a precedent that all anesthesia procedures and 24-hour duty calls must be performed by the attending physician personally and all of the healthcare staff must support each other and cooperate harmonically. This well-known policy has lasted to date. Importantly, the goal of “pursuing happiness” has never changed.

Current Status

Teaching-“International Teaching”

Since being recognized as a medical center, the opportunities for residency training and PGY in our hospital have been astronomical. Approximately 50% of our attending physicians also serve on academic faculties, which make our hospital an important center for anesthesiologist residency training in Southern Taiwan. Because of constant efforts to upgrade the program, our department was awarded 1st prize for the 2012 Chi Mei Medical Center teaching technique competition in attending

physician groups. To date, our teaching is still based on the spirit of humanity and the goals of learning and solid practice rather than the application of human resources concept. The residency training for beginners consists of a 2-3 month core program is organized by an appointed attending physician to conduct one-on-one training. In addition, a reasonable duty schedule for the residents keeps trainees in a good mood for learning. Hence, the residents are willing to provide quality medical services to patients.

Since beginning his tenure at Chi Mei Medical Center in 2000, Professor Jhi-Joung Wang has encouraged the spirit of research. Currently, Vice Superintendent Jhi-Joung Wang owns a pain research laboratory, which is available to foreign researchers for related training. Moreover, the R&D related to clinical nutrition and pain management conducted by Minister Jen-Yin Chen, the large scale database research conducted by Director Ching-Cheng Chu plus the functional genome as well as the cytokine research conducted by Director Chung-Hsi Hsing, all represent the fruitful research outcomes in recent years. As a result, the SCI articles published by our department have numbered more than 40 articles annually over the past three years. Therefore, our department has been

awarded the Excellent Research Prize of Chi Mei Medical Center in 2014 and 2015 (The IF of International Journal of Epidemiology in 2013 was 9.197; and the IF of Anesthesiology in 2015 was 6.168).

Research in our department focuses on three main domains: clinical research, database research and basic research. Due to training for research project writing, our residents have successfully applied for research budgets since 2014. To achieve the goals of internationalized teaching and training, our department has been divided into several publication subgroups led by an individual group leader (head of division) each year. The group members consist of senior & junior attending physicians, residents and nursing staffs. All of the residents are required to meet the following three requirements at least once during their residency training to expand their international horizon and increase work-related experience: (1) Attend and publish on Euroanesthesia or the ASA annual meeting, (2) Visit medical center-level hospitals in China and publish on China meetings and (3) To participate in international volunteer medical services hosted by our hospital. In 2014, our residents were awarded the 1st poster prize in the “Annual Meeting of Taiwan Society of Anesthesiologists, Category of Clinical

Research” and have won 2nd prize on the critical care competition of OSCE in Southern Taiwan.

Future Perspectives

1. Aim to provide a healthy and happy medical environment and internationalized teaching atmosphere.
2. Develop smart medicine and optimize anesthesia services.
3. Emphasis on anesthesiology and pain research.

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Figure 1. The attending physician and resident in our department participated in 2015 Euroanesthesia in Germany.

Figure 2. A group photo of Department of Anesthesiology, Chi-Mei Medical Center. (2015.09)

Figure 3. Department of Anesthesiology participated in 2015 OCAP in Shanghai.

麻醉住院醫師教育訓練之標竿 ——台北慈濟醫院麻醉部

撰文 / 袁懷璧 主治醫師；楊承憲 主治醫師、醫品中心主任；陳介綯 主治醫師、臨床麻醉科主任；高銘章 主治醫師、疼痛科主任；黃俊仁 麻醉部主任、教學部主任

台北慈濟醫院啟業至今，麻醉部雖僅十年歷史，但成長迅速卓然有成，主治醫師陣容堅強，各有專才，無論是麻醉品質、資訊管理系統、住院醫師訓練、重症麻醉相關研究及疼痛治療業務均有卓越特色與成果，其中在住院醫師訓練計畫方面尤具特色，除包括有實驗室訓練及國外醫學研討會論文發表外，且要求每位住院醫師於完訓前均有 SCI 期刊之原始論文發表，期望未來成為國內麻醉住院醫師教育訓練標竿及首選醫院之一，朝一流醫學中心邁進。

發展背景

2009 年台北慈濟醫院由麻醉科改制為麻醉部，黃俊仁醫師為首任部主任並兼任醫院教學及研究相關單位主管，便戮力於麻醉部醫護人員之教育，不但成立麻醉專屬實驗室及重

症 / 麻醉研究團隊，多方延攬學有專才的主治醫師，協助主治醫師進修升等，並積極規劃住院醫院訓練課程，結合電腦資訊、情境模擬及團隊資源溝通處理訓練，提供住院醫師多元化的學習，逐步展現成果至今，已由起始只有零星短期住院醫師訓練，到現

在每年固定招收 2 位住院醫師，於住院醫師之訓練已建立良好口碑。

現況

一、目前麻醉部內有 14 位專職主治醫師 (1 位教授、5 位助理教授、3 位博士班在職)，7 位住院醫師 (R1 至 R4)，師資陣容堅強，各自學有專長 (包括氣道處理、心臟麻醉、神經麻醉、婦幼麻醉、疼痛及資訊管理等)，提供住院醫師多元良好的學習環境及資源。

二、麻醉部晨會每日固定有當日高風險麻醉病患術前評估檢討，並追蹤報告前日高風險麻醉病患之麻醉過程及結果，此外並設定 20 個麻醉、重症及疼痛相關之主題，每 2 年循環，每月就同一主題輪流由一位主治醫師負責於每日晨會安排各種相關之 journal reading / book reading 及 review discussion 等教學。此外，每月有 2~3 次 QA 報告討論，每月亦固定有一次 EBM 實證醫學報告討論及 morbidity / mortality 討論；另每週五中午亦有固定疼痛醫學討論。

三、本部住院醫師訓練計畫非常完整紮實，除一般應有的訓練 (含疼

痛訓練) 之外，每位住院醫師在完訓前均規劃有外訓機會，除心臟麻醉、小兒麻醉、急救加護訓練外，尚可視住院醫師個別需求，依其計畫書自由選擇外訓醫院及其他專業項目。

四、本部在黃俊仁部長領導下，除擁有麻醉專屬實驗室並成立堅強研究團隊、重症照護相關議題為團隊最重要的研究主軸，包括以細胞實驗、動物實驗及臨床實驗模式，研究臨床相關重症 (敗血性休克、失血性休克、缺血再灌流、肺部高壓) 之創新療法與其可能機轉。

此外團隊亦投入大型資料庫數據分析，探討各式疾病之風險因子，也利用系統性回顧與統合性分析來探討臨床各式醫療之優劣，2009 年至今，團隊於國際及國內各重要醫學期刊已發表 57 篇學術論文。

在這樣優越的研究環境下，所有住院醫師至少有兩個月的實驗室訓練 (R2、R3 各一個月)，分別從事細胞 / 動物實驗或資料庫數據分析、系統性回顧等研究，並至少會有一次以上機會將自己的研究成果，由醫院補助至國外醫學研討會發表論文 (第一作者) 的經驗，且要求於畢業前須完成一篇 original article，並成功刊登發



圖一：2016 年 3 月台北慈濟醫院麻醉部大合照 (醫院公傳室提供)。

表。此外，每位住院醫師於 R2 升 R3 時，均在主治醫師的指導下，成功申請為院內計畫主持人。

本部第 2 年住院醫師陳楚婷醫師於 2015 年 10 月在美國聖地牙哥 ASA 年會發表壁報論文，亦是國內於國際學術研討會發表論文中最年輕的住院醫師。截至目前為止，歷年完訓之住院醫師亦均有 SCI 期刊 original paper 之發表。

五、本部於 2009 年由麻醉科改制為麻醉部時，即設立疼痛科，發展至今，已有五位專任主治醫師及一

位特聘主治醫師（汪志雄教授）執行疼痛診治，並聘有一位護理師專門負責疼痛相關業務。專用設備方面，擁有 2 台超音波、1 台 C arm X 光機、1 台無線電頻週波生成儀及一間疼痛專屬治療室，手術室亦固定每週有兩個時段從事介入性疼痛治療，是國內陣容最龐大、設備最齊全的團隊之一。於 104 年統計門診年服務量達 3725 人次，全院初診病人近 300 例，X 光導引治療近 250 例，超音波導引注射 1587 例。

目前週一至週五均設有疼痛門

診，特色包括與腫瘤科合作，開設腫瘤疼痛特別門診；網羅復健科醫師加入疼痛門診行列，提供病人肌肉骨骼疼痛治療，增生療法及相關復健服務，真正做到 multidisciplinary treatment。在此優異條件下，住院醫師訓練除包括固定急、慢性疼痛控制 course 外，每週固定有疼痛會議討論，及疼痛門診跟診，並指導住院醫師於手術病患及慢性疼痛病患進行各式超音波引導神經阻斷術（如 interscalene block、axillary block、TAP、femoral block、adductor canal saphenous block, popliteal block 及 ankle block 等），進行各種急、慢性疼痛治療。

六、本部麻醉資訊管理系統非常完備，麻醉部建有一套自有的應用知識管理系統 (wiki.tzuchi.taipei)，內容豐富，方便同仁隨時查詢及管理所有麻醉相關應用知識、guideline、品管活動成果、每日高風險麻醉以及術後追蹤報告等，所有住院醫師每年均需參與不同麻醉品質相關專案計畫，並將專案計畫成果製作成壁報，於每年麻醉醫學會年會發表。近 5 年 (2010-2015 年) 於年會發表品質相關壁報論文超過 30 篇，質量優冠全台。

七、麻醉部還建有線上麻醉相

關題庫、利用題庫中考題，每週定期考核住院醫師，或於某些主題教學時進行前測後測，以評估住院醫師學習成效，每位住院醫師均有各自的 portfolio 學習歷程檔案，除記錄學習歷程，亦作為住院醫師能力評量及年度評核升等之參考依據，每位住院醫師每年均需對全體主治醫師提出升等報告演講、說明一年來的學習成果及未來計畫。

未來展望

一、在既有之重症研究基礎下，加強住院醫師疼痛相關之基礎研究及各類臨床研究訓練，提升學術研究之多元性。

二、運用 TRM(Team Resource Management) 概念及各種資訊工具輔助教學，建立各種情境標準作業流程，加強住院醫師臨床訓練。



圖三：黃俊仁部長於實驗室指導住院醫師進行實驗（黃俊仁部長提供）。



圖二：2015 年 9 月住院醫師合照（莊淨為住院醫師提供）。

三、加強住院醫師教學能力，成為初階及進階臨床教師，培養成為教學型主治醫師，未來分別從事 PGY 及跨科別之教學活動。

四、利用本部堅強疼痛師資陣容及齊全的疼痛設備及業務，加強住院醫師各種急、慢性疼痛相關訓練，成

為一流疼痛中心 (multidisciplinary pain management center)。

五、結合研究、臨床、教學及疼痛等多元訓練，期許未來能成為麻醉住院醫師教育訓練之標竿及住院醫師訓練首選醫院之一。

Backgrounds

In 2009, the Division of Anesthesiology was restructured to the Department of Anesthesiology in Taipei Tzu Chi Hospital; Dr. Chun-Jen Huang was appointed the first Director of Department of Anesthesiology and Chief of Department of Medical Teaching & Research. Since then, Director Chun-Jen Huang has been devoted to reinforce training for healthcare professionals in Department of Anesthesiology, establish an exclusive research laboratory and team for critical care/anesthesia, recruit talented attending physicians and encourage their advanced education and promotion. In addition, he not only actively planned for training programs in conjunction with IT, simulation and TRM, but also encouraged diverse learning for residents. To date, from a very short and only a few months training, the training program for residents has become a preferred program and had public praise by recruiting two residents annually.

Current Status

1. Currently there are 14 full-time attending physicians (1 professor, 5 assistant professors and 3 PhD students) and 7 residents (including R1 to R4) in

the Department of Anesthesiology. Therefore, we have a strong faculty with diverse professions (including airway management, cardiac anesthesia, neuroanesthesia, women and pediatric anesthesia, pain management and IT) to provide a great learning environment and resources for residents.

2. The Department of Anesthesiology routinely hosts a high-risk anesthesia case report in daily morning meeting to discuss about the patient's pre-surgical evaluation and follow up the anesthesia progress and results of the previous patient. In addition, the department has scheduled a two-year journal reading / book reading and review discussion from 20 topics about anesthesia, critical care and pain management, and attending physicians take turns to host the morning training activity. Moreover, 2~3 times of QA discussion as well as 1 EBM and morbidity /mortality report are also scheduled monthly. A pain management forum is scheduled on every Friday noon as well.

3. The training program for residents in our department is solid and comprehensive. In addition to regular training (including pain management), the resident also has opportunities to be trained in other hospitals or professions for cardiac

A Benchmarking for Anesthesiologist Resident Training

The Department of Anesthesiology, Taipei Tzu Chi Hospital

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Abstract

From opening to date, the Department of Anesthesiology in Taipei Tzu Chi Hospital has grown up rapidly and had great achievements in a short ten-year period. Our hospital not only has strong faculty and talented attending physicians, but also achieves excellent and featured goals of anesthesia quality, MIS system, resident training, critical care / anesthesia-related research and chronic pain management. Moreover, our resident training program has become a leading project due to its laboratory training and international medical conference/journal requirement. All residents trained in this center are required to publish at least one original article in SCI journals. We aim to become a national benchmarking and preferred hospital for anesthesiologist and resident training as well as a leading medical center nationwide.

anesthesia, pediatric anesthesia, EMT training and others based on his/her own wish and choice in their study protocol.

4. Under the leadership of Director Chun-Jen Huang, we not only have an exclusive anesthesia laboratory, but also have a solid research team for critical care-related topics, including cellular, animal and clinical studies for innovative therapies and underlying mechanisms (e.g., septic shock, hemorrhagic shock, ischemia-reperfusion and pulmonary hypertension). In addition, the team not only has participated in a large-scale database analysis to discuss the risk factors of various diseases, but also has applied systemic review and meta-analysis to discuss the advantages/disadvantages of clinical practice manners. From 2009 to date, our team has published 57 articles in national and international prestige journals. Due to the excellent academic/research training, all residents had at least 2 months laboratory training (one month in R2 and one month in R3, respectively) for cellular/animal experiments or database analysis as well as at least once international conference participation (publish their own research outcomes as the 1st author) granted by the hospital. All residents are required to publish 1 original article in an national/

international prestigious journal before the end of the training. Furthermore, under the supervision of an attending physician, each resident should apply for a research project in our hospital as the principal investigator between R2 and R3 residency training. For instance, Dr. Chu-Ting Chen, the 2nd-yr resident of our department, who is also the youngest resident publishing an academic article in international conference, has published her research results in ASA annual meeting at San Diego in October, 2015. So far, all of the residents have published original articles in SCI journals at the end of their residency training.

5. When the Division of Anesthesiology was restructured as the Department of Anesthesiology in 2009, a Division of Pain Management was also established simultaneously. To date, there are 5 full-time attending physicians, 1 specially invited attending physician (Professor Chih-Hsiung Wong) and 1 registered nurse serving for pain management. As to professional facilities, the Division of Pain Management is equipped with 2 ultrasounds, 1 C arm X-ray, 1 radiofrequency generator and 1 exclusive pain management room. In the OR, there are two fixed period only for interventional pain management weekly.

Therefore, our hospital has the largest professional team and owns the most comprehensive facilities nationwide. Our volume of service was up to 3725 persons in 2015, and the 1st-visit cases were up to 300 persons. Among the cases, X-ray-guided therapy was nearly 250 persons and ultrasound-guided injection was approximately 1587 persons. Currently the schedule of pain management clinic is from Monday to Friday, including multidisciplinary treatment such as special clinic for patients with oncological pain (collaboration with the Department of Oncology), and pain management/prolotherapy/rehabilitation-related services for patients with musculoskeletal problems (collaboration with Department of Physical Medicine and Rehabilitation). Under such excellent conditions, our residents not only can be trained for acute/chronic pain management courses, but also can participate in routine pain management meetings/clinics for ultrasound-guided nerve block (e.g., interscalene block, axillary block, TAP, femoral block, adductor canal saphenous block, popliteal block and ankle block) in patients with surgeries and chronic pains.

6. Our department is equipped with a comprehensive anesthesia IT system.

The built-in applied knowledge control system (wiki.tzuchi.taipei) consists of rich information for colleagues to search and learn anesthesia-related knowledge, guidelines, QC results, daily high-risk anesthesia and post-surgical follow-up report. In addition, all of the residents are required to participate in different anesthesia QC projects annually and publish their research results on a poster for Taiwan Society of Anesthesiologists Annual Meetings. Our department has published more than 30 articles in the past 5 years (2010-2015), which the quality and quantity are both the top among all hospitals nationwide.

7. The Department of Anesthesiology has also established an online exam pool to test residents weekly before and after certain training topics to evaluate the learning efficiency. In addition, each resident has their own portfolio to record their learning process, which can also be the reference for their performance inspection and annual promotion accreditation. Every resident must give a promoting talk regarding their learning outcomes in the past year and future plans to all attending physicians annually.



Future Perspectives

1. Reinforce pain-related basic research and all sorts of clinical study training for residents to improve the diversity of academic research on the basis of existing critical research.
2. Apply the concept of Team Resource Management (TRM) and information tools to assist teaching, establish SOPs for all clinical contexts, and reinforce clinical training for residents.
3. Reinforce training programs for teaching abilities of residents and goals of becoming an initial and advanced clinical teacher, and emphasize on the cultivation of teaching-based attending physicians, so residents can participate in PGY and interdisciplinary teaching activities in the future.
4. Our strong professional background of faculty and comprehensive equipment and operation for pain management may help reinforce pain-related training (e.g. for acute and chronic pain) for residents and thus become a leading and multidisciplinary pain management center.
5. The combination of diverse training programs such as research, clinical practice, teaching and pain training may help our hospital become a

benchmarking and top preferred training center for anesthesiologist and resident in the future.

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Figure 1. A group photo of Department of Anesthesiology, Taipei Tzu Chi Hospital in March, 2016 (provided by the PR Office).

Figure 2. A group photo of residents in September, 2015 (provided by resident Ching-Wei Chuang).

Figure 3. Director Chun-Jen Huang was directing residents doing experiments (provided by Director Chun-Jen Huang).

台灣麻醉護理現況與未來展望 ——台灣麻醉護理學會

撰文 / 楊惠如 (TANA 常務理事)、張秀雲 (TANA 常務理事)

麻醉護理師是接受麻醉者的全程安全守護天使。麻醉護理人員在台灣協助麻醉醫師提供全民既安全又經濟的麻醉醫療照護已將近 60 年之久，麻醉護理師在在各種麻醉的醫療程序中全程以嚴謹的態度提供符合安全又具關懷的護理專業照護，因此是麻醉醫師在臨床上很重要的工作伙伴。



Taiwan Association of Nurse Anesthetists 簡稱 TANA

設計：簡潔有力明瞭・承先啟後

目的：公平・公正・服務全人類為宗旨

Blue 一顆冷靜的頭腦

Green 象徵和平、生命力、承先啟後

White 純潔無瑕、出污泥而不染

Hands 象徵協助者的角色，服務人類；

一雙巧手，保護病人免於受傷害

圓圈 象徵地球 Global 國際全球團結・和諧

發展背景

台灣自 1958 年開始辦理麻醉護理人員訓練班，首屆訓練班是由台北榮民總醫院委託國防醫學院辦理，當時以美國麻醉護士學會（AANA）之教材為藍本，進行為期一年的訓練教育，結訓後頒發訓練證書，為當時台灣主要之麻醉照護人力來源。

麻醉護理人員最早的专业團體是

「中華民國麻醉醫學會護士協會」，於 1976 年成立，從屬於麻醉醫學會之下運作。於 1999 年遵照人民團體法，修正當時『會中有會』之錯誤，由涂麗玉護理長擔任發起人，成立獨立自主之學術組織—「台灣麻醉護理學會」作為代表全台灣 3000 多名麻醉護理人員的專業代表團體，同時也是全國麻醉護理人員永遠的忠心代言人，並以「促進麻醉護理相關之學術

研究，提升專業教育及健康照護品質，增進國際交流」為宗旨；每年提供獎學金予在職進修之麻醉護理人員，並鼓勵與麻醉照護相關之學術發表；定期舉辦學術演講及研討會，協助會員經驗之交流合作，培養訓練及繼續再教育。以「發展具實証基礎之護理研究，提供病人全方位的麻醉護理」為願景。

為避免國內非醫師的麻醉護理從業人員的專業職稱紊亂，造成醫護不和諧與民眾產生錯誤認知，特於 2013 年與台灣麻醉醫學會協商後，由衛生福利部正名台灣麻醉護理從業人員之專業職稱應為「麻醉護理師」。

現況

麻醉護理師的職責涵蓋整個麻醉週期，為麻醉全期提供完整的高品質照護的第一線照護者，各期職責如下：

一、麻醉前期：

麻醉護理師必須於麻醉專科醫師的指導下，協助執行麻醉前訪視，與病人溝通其需求，初步評估其整體健康狀況，與麻醉醫師共同討論並擬定適當的麻醉護理措施。也必須於麻醉專科醫師的指導下，協同跟病人解釋

麻醉流程，降低病人的憂慮與恐懼，同時讓病人的身心狀況能對麻醉做好最佳的準備。

二、麻醉手術期：

麻醉護理師提供手術病人安全、舒適的麻醉環境，例如：每日例行的麻醉機器校正與相關藥品、用物準備，提供保暖措施與心理支持，讓病人在手術室裡仍然能感受到護理照護的溫暖。麻醉護理師運用各種麻醉技能，提供安全與品質兼顧的麻醉照護，在手術中，麻醉護理師對病人的各項生理徵象與心理狀態，提供全程的密切監視與判斷，迅速通知麻醉醫師異狀，並且正確即時處理各種狀況，使病人受到最完善的麻醉照護。



圖一：麻醉護理師在麻醉中，提供就醫民眾全程密切監測與即時照護，是維護麻醉安全的第一線防守員。

三、麻醉後恢復期：

在部分醫療機構裡，麻醉護理師直接負責病人在麻醉後恢復單位的照護工作，持續監測病人的生理徵象，並協助麻醉醫師，迅速處理各項術後的合併狀況，以利於病人順利的由麻醉狀態中恢復。

四、其他麻醉照護相關的程序：

在其他各項需要麻醉的治療或檢查程序中（例如：血管攝影診斷與治療、核磁共振攝影檢查、心血管攝影與支架置入術、與各項無痛內視鏡檢……等等），麻醉護理師遵守麻醉專科醫師指示，依照專科個別的需求，提供適當的麻醉照護，以協助檢查與治療程序的順利完成。

五、手術後的急性疼痛期：

當病人使用自控式止痛時，仍需要持續的專業評估與教導，才能達到最好的療效，麻醉護理師會直接到病房，負責評估與處理每個病人的疼痛問題，教導病人正確的止痛知識與各種輔助療法。在慢性的疼痛處理中，因為麻醉護理師對疼痛與藥物的了解與熟悉，所以非常適合擔任整個止痛小組的協調者，讓整個醫療團隊共同為病人提供最好的疼痛緩解照護。

未來展望

目前台灣各麻醉專科醫師訓練醫院紛紛開辦麻醉護理師訓練班，但對於麻醉護理師的養成教育並未標準化，因此麻醉護理師的訓練教學品質差異甚大，為提升麻醉護理養成教育品質，及未來與國際護理教育接軌等目標，「台灣麻醉護理學會」已加入國際麻醉護理聯盟 (International Federation of Nurse Anesthetists; IFNA)，成為正式會員國，目標為藉



圖二：由麻醉專科醫師與麻醉護理師組成的麻醉團隊，可提供就醫民眾既安全又經濟的麻醉醫療與照護。

由西方先進國家的經驗與資源，希望促成台灣麻醉護理教育正式學制化，以提升台灣麻醉護理師素質，進而提升麻醉病人安全。

麻醉護理師在台灣協助麻醉專科醫師提供麻醉照護服務，擔任病人的麻醉安全守護者已將近一甲子之久。麻醉護理師是台灣進階護理師(Advanced Practice Nurse)的先驅者之一，麻醉護理師之所以能延續這麼久，主要是能提供高品質的麻醉專業護理服務，並維護病人的安全權益。其服

務範圍不只局限於手術個案，更涵蓋各專科的病人，且服務對象包含各年齡層與各種健康狀況的個案，因此麻醉護理人員必須運用全領域的麻醉知識、技術、藥物與科技來提供麻醉照護。麻醉護理師與麻醉專科醫師的組合是目前全球公認最佳的麻醉照護團隊，因為麻醉專科醫師與麻醉護理師的搭配能同時控制成本，與維持麻醉照護的品質，提高就醫者對醫療費用的可負擔性，增加醫療的可近性，讓更多的民眾共享有限的醫療資源。

Abstract

Nurse anesthetists are the guardian angel of people under anesthesia. In Taiwan, nurse anesthetists have assisted anesthesiologists to provide safe and economical anesthesia for nearly sixty years. Nurse anesthetists play an important role during the entire anesthesia in a rigorous attitude. Therefore, nurse anesthetists and anesthesiologists are very important partners at clinical practice.

Backgrounds

The nurse anesthetist training program in Taiwan started in 1958. The first training course was hosted by National Defense Medical Center, which was entrusted by Taipei Veterans General Hospital. The one-year training course was based on the teaching materials published by American Association of Nurse Anesthetists (AANA) in the US; trainees who completed the training course were certified as nurse anesthetists. This was the primary human resource for anesthesia care in Taiwan. The earliest professional group of nurse anesthetists called “Nurse Association for Anesthesiology, R.O.C.” was founded in 1976, which was subject to Taiwan Society of Anesthesiologists. According to Civil Associations Act, “an association shall not be subject to another association”; therefore, the Head Nurse Mrs. Li-Yu Tu served as a founder and established an independent academic organization

called “Taiwan Association of Nurse Anesthetists (TANA)” in 1999.

TANA then became a professional representative group for more than 3,000 nurse anesthetists in Taiwan. It nationally advocates for nurse anesthetists. The goals of the association are to “encourage nurse anesthesia-related research”, “improve the quality of specialty training and healthcare” and “facilitate global interaction”. Each year, TANA offers scholarships for nurse anesthetists who engage in advanced studies, and encourages academic publications related to nurse anesthesia. Moreover, the TANA hosts academic lectures, seminars, training programs and further educational courses regularly to facilitate members’ experience exchange and cooperation. The ultimate goal is to achieve the vision of “EBM-nursing research and a comprehensive nurse anesthesia”.

Concerning various professional titles of non-physician anesthesia personnel

Current Status and Future Perspectives of Taiwan Association of Nurse Anesthetists

Taiwan Association of Nurse Anesthetists

Hui-Ju Yang* Hsiu-Yun Chang**

*Executive Director of TANA **Executive Director of TANA



Taiwan Association of Nurse Anesthetists (TANA)
Design: Precise and clear, inherit the past and create the future
Objectives: To be fair, to pursue justice, to service all mankind
Blue A cool head
Green Represent peace, vitality and creativity
White Pure, flawless, and undefiled
Hands Represent aids to serve people;
A skilled hand to protect patients from harm
Circle Represent the Earth, globalization, unity and harmony



who have nursing background may cause disputes between physicians and nurses, even might be misunderstood by the public, TANA had discussed and negotiated with Taiwan Society of Anesthesiologists (TSA) about a suitable unified title. After two associations reached a consensus on it in 2013, the Ministry of Health and Welfare formally announced that the official professional title of nursing staff providing anesthesia services in Taiwan should be “nurse anesthetists”.

Current Status

The duty of a nurse anesthetist covers the entire anesthesia course. To provide high-quality nursing care as a first-line caregiver, at each phase of anesthesia, a nurse anesthetist should be able to take up the following duties:

1. Pre-anesthesia phase: A nurse anesthetist is required to follow the order of an anesthesiologist, to assists in pre-anesthesia interviews/evaluations and to discuss with patients about their needs/expectations. Moreover, a nurse anesthetist should conduct the preliminary physical evaluation, discuss with the anesthesiologist about the overall health conditions of the patient, and then jointly make a proper anesthesia

intervention. Besides these, under the supervision of the anesthesiologist, a nurse anesthetist has to explain the steps of anesthesia procedures to the patient to reduce anxiety and fear, in order to help the patient be physically and psychologically well-prepared to face the coming anesthesia.

2. Peri-anesthesia phase: A nurse anesthetist provides a safe and comfortable environment for anesthesia. For example, a nurse anesthetist performs routine daily anesthesia apparatus calibration, prepares drugs and materials for anesthesia, and provides warming facilities and psychological support, so patients would feel protected and cared in the operating room. In addition, a nurse anesthetist can apply various anesthesia skills to provide safe and quality anesthesia care. During the surgery, a nurse anesthetist not only provides an entire close monitoring and determination based on the vital signs and psychological status of the patient, but also informs the anesthesiologist immediately about reportable events and provides correct and instant managements to solve problems, so that the patient is well-protected and processed during the anesthesia.

3. Post-anesthesia (Recovery) phase: In some medical institutes, a nurse

anesthetist is directly responsible for the patient care in the post anesthesia care unit (PACU). The nurse anesthetist has to constantly monitor the vital signs of the patient and assists the anesthesiologist to rapidly solve various post-anesthesia and post-surgery complications, in order to the patient recover from the anesthesia smoothly and successfully.

4. Other anesthesia related procedures: Among other treatments or examination procedures required for anesthesia (e.g., diagnosis and treatment through angiography, MRI, angiocardiology and stenting, or various painless endoscopy, etc.), in order to facilitate the completion of examination and treatment, a nurse anesthetist should follow the orders of the anesthesiologist and provides adequate anesthesia nursing care based on individual requirements of different specialties.

5. Post-surgical acute pain phase: When patients are under PCA treatment, a constant professional evaluation and education is still required to achieve the best efficacy. The nurse anesthetist has to go to the ward to perform pain management, evaluate the severity of pain of each patient, help them learn to use pain management devices and teach them how to apply complimentary

methods to ease the pain. In the chronic pain management team, the nurse anesthetist is the best member to serve as a team coordinator due to his/her knowledge about all pain management therapies and medications.

Future Perspectives

Currently anesthesiologist training hospitals in Taiwan also organized nurse anesthetist training programs. However, the program contents were not standardized and the quality between different hospitals was rather different. To improve the quality of training programs for nurse anesthetists and to meet the requirements of international nursing programs, TANA has joined the International Federation of Nurse Anesthetists (IFNA) and become an official country member. By learning from the experience and resources of Western advanced countries, we aim to officially systemize the nurse anesthetist training, to improve the quality of service provided by nurse anesthetists, and to further enhance the safety of anesthetized patients.

Nurse anesthetists in Taiwan have assisted anesthesiologists in anesthesia healthcare and have become the safety guard of anesthesia patients for almost 60 years. A nurse anesthetist is one of the

pioneers among Advanced Practice Nurse. The main reason that the system of nurse anesthetists can last for so long is that nurse anesthetists are able to provide high-quality and professional nursing anesthesia care, and we are the first-line staff to protect patients' rights and interests. Our service is not limited to surgical cases; patients from other departments are also included. In addition, as patients are of all ages and different physical conditions, nurse anesthetists are required to apply comprehensive anesthesia knowledge, technique, medication and technology to their practice. The well-recognized and the best anesthesia care team worldwide is composed of anesthesiologists and nurse anesthetists. Such a team can not only control the cost of medical service and maintain the quality of healthcare, but also make medical expense more affordable to patients and increase the accessibility of medical services. As a result, more people can share limited medical resources.

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Figure 1. Nurse anesthetist, the 1st-line protector of anesthesia safety, provides overall close supervision and real-time care for the patient.

Figure 2. The anesthesiology team composed of anesthesiologists and nurse anesthetists provide safe and economic anesthesia service and care to the public.

疼痛醫療 Pain Medicine

導讀：疼痛處置

撰文 / 洪至仁 (疼痛醫療委員會主任委員、台中榮總麻醉部主任)、吳志成 (台中榮總疼痛科主任)

在早期台灣疼痛的處置主要是為了緩解急性疼痛，尤其是手術後疼痛為主，這時期麻醉醫師負責了由靜脈或硬脊膜外腔導管給予鴉片類藥物的病患自控式止痛 (patient controlled analgesia, PCA)。逐漸地 PCA 的服務在各醫院發展成以麻醉醫師為主的專責團隊，甚至於發展出多樣化的管理，提升了 PCA 的照護品質，讓麻醉醫師的照護角色進一步由手術中延伸到手術後。

時至今日，手術後疼痛處置在各醫院仍是麻醉醫師負責的重要任務之一。麻醉醫師近年合併了超音波或神經刺激器輔助，利用神經阻斷緩解急性疼痛，讓各式手術後急性疼痛處置更多樣化、也更能依手術特性作個人化調整。相對於急性疼痛處置，台灣在慢性疼痛處置早期的發展著實遭遇不少阻礙跟挑戰。例如大眾甚至於多數醫師常對慢性疼痛病人有所誤解、缺乏良好治療方式、鴉片類藥物和神經性疼痛藥物的缺乏，以及政府對於鴉片類藥物在慢性疼痛病人的使用多

所限制，都使早期的疼痛處置發展困難。

早期的諸多治療方式例如椎管內給藥，甚至只有麻醉醫師在執行。幸而在何善台教授、孫維仁教授及簡志誠教授等麻醉前輩的持續努力下，鴉片類藥物在慢性疼痛處置的使用才能逐漸受到政府的重視和支持。鴉片類藥物在癌症病人的疼痛處置也因黃安年教授等前輩持續於安寧學會推廣和繼續教育，讓癌症末期病人才能更減少疼痛，落實真正安寧，較沒有痛苦地走完人生最後一哩路。

慢性疼痛的處置除了藥物的給予外，近期更著重發展介入性的處置。借助超音波、神經刺激器或其他影像輔助，能讓介入性處置更精準定位，疼痛醫學會的林嘉祥理事長便是麻醉醫師積極投入此領域之代表人物，並獲得卓越的成就。除了各自領域的專長，慢性疼痛需要跨專科及跨領域的多模式合作才能達到全面及周延性的處置。因此，各醫學中心的麻醉部也漸發展出跨專科及跨領域與其他專科

的合作模式，甚至擁有包括心理、營養、社工及藥師等非醫療專科的疼痛整合照護中心，並獲得相關國際認證與肯定。

麻醉醫師因為臨床業務的特性，包括手術中、後期疼痛處置需求以及憑藉對止痛藥物尤其是鴉片類藥物

的了解，與神經解剖學上例如對脊椎神經和周邊神經的熟稔，在推升台灣疼痛治療的發展實具有不可磨滅的角色和地位。期許未來麻醉醫師除了自身領域的精進外，能持續投入疼痛處置，作為醫學界急、慢性疼痛處置的中流砥柱。

Introduction：Pain Management

Chih-Jen Hung* Chih-Cheng Wu**

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In its early stages, pain management in Taiwan primarily focused on acute pain relief, especially for post-surgical pain, and thereby anesthesiologist usually prescribed opioids in patient controlled analgesia (PCA) through implanting intravenous or epidural catheters. Later, the service of PCA gradually became the exclusive prescription made by anesthesiologist teams in every hospital. To establish e-management and improve the quality of PCA health care, the services provided by anesthesiologists were extended from peri-operative procedures to post-surgical recovery.

To date, post-surgical pain management is still one of the primary

goals for anesthesiologists. Recently anesthesiologists have learned to combine ultrasounds or neurostimulators to block nerves and thus relieve acute pain. As a result, post-surgical pain management has become more diverse and individualized based on the characteristics of the surgery.

Relative to acute pain management, there were quite a few challenges and obstacles when dealing with chronic pain in early stage in Taiwan. For example, the public, and even most of the physicians, held a stereotypical impression of patients with chronic pain. With the added lack of good therapeutic regimen, opioids and narcotics for neurological system as well



as the restrictions of opioids prescription due to governmental laws or regulations, the development of pain management in early days of medical treatment were quite difficult.

Previously, many therapeutic methods such as epidural anesthesia were only performed by anesthesiologists. After the constant promotion and efforts contributed by senior experts such as Professor Shan-Tai Ho, Professor Wei-Jen Sun and professor Chih-Cheng Chien, the Government gradually became supportive of the application of opioids in chronic pain management. In addition, due to Professor An-Nien Huang's efforts on the promotion and continuous education in hospice care, opioids can also be prescribed to patients with cancer to relieve their drastic pain and thereby achieve the real purpose of hospice care. As a result, patients with cancers are able to live their last minute in peace and pain-free.

In addition to narcotics, chronic pain management also includes interventional procedures. Ultrasound- neurostimulator- or other imagine-assisted interventional procedures can localize the lesion site more precisely and thus achieve the goal of pain relief. The Chairperson of Taiwan Pain Society, Dr. Chia-Hsiang Lin is an example of devotion in this area

and has achieved excellent outcomes. In addition to individual specialties, chronic pain management requires collaboration between multidisciplinary specialties to achieve a comprehensive and extensive therapeutic goal. Therefore, the Department of Anesthesiology in individual medical centers has gradually developed a collaboration mode between multidisciplinary specialties and departments. Some hospitals even have an international certified integrated healthcare center for pain management composed of nonmedical specialty personnel, including psychologists, dietitians, social workers and pharmacists.

Due to the features of clinical businesses, anesthesiologists are required to have the knowledge about peri-operative and post-surgical pain management, narcotics (especially opioids), and the anatomical locations of neural system (e.g. spinal cord and peripheral nerves). In summary, anesthesiologists are critical in promoting pain management policies. Therefore, in addition to anesthesiology specialty, anesthesiologists are expected to play an important role in pain management in the future and thus have become a pillar for acute/chronic pain management.

世界第一的疼痛整合照護中心 —— 彰化基督教醫院麻醉部

撰文 / 謝宜哲 部主任、陳冠宇 主治醫師、劉玲均 臨床心理師

彰化基督教醫院是一間有百年歷史的醫院，蘭大衛醫師為彰化基督教醫院的創始者，也是彰基麻醉創始者。2015 年彰基領先全國，推動疼痛整合照護計畫。彰基疼痛整合照護中心是全台第一個在麻醉部底下設置有一位心理師的疼痛控制中心、也是全台第一個真正跨醫療跨領域的疼痛整合照護團隊，為慢性疼痛患者量身打造完整治療計畫，關懷患者生理、心理、心靈的各類需求。2016 年通過全世界第一個美國本土外完整的 CCPC-pain 評鑑。

發展背景

依據國際標準推估，台灣至少應有百萬慢性疼痛病患。2015 年，彰化基督教醫院領先全國，在麻醉部下設立台灣第一個完整的慢性疼痛整合照護中心，服務對象為所有慢性頑固性疼痛患者，舉凡纖維肌痛症、各類神經病變性疼痛、頑固性下背痛、慢性胰臟炎……等等。此照護整合了疼痛科、精神科、復健科醫師，搭配臨床心理師、藥師、社工師、物理治療師、營養師、護理師及關懷師，提供給慢性疼痛患者身、心、靈各方面的照護。2016 年 4 月 21 日，再以幾近零缺點成功通過 JCI CCPC (Clinical care program certification) Pain management 的國際認證，這是全世界第一個 (美

國本土以外) 完整的以「疼痛照護」通過的計畫。



圖一：彰基第一部麻醉工作車。

現況

彰基疼痛整合照護中心是全台第一個在麻醉部底下設置有一位心理師的疼痛控制中心、也是全台第一個真正跨醫療跨領域的疼痛整合照護團隊。團隊核心成員包括了臨床心理師、藥師、護理師、物理治療師、營養師、社工師、關懷師、精神科醫師、復健科醫師、疼痛科醫師，輔佐成員則包括了護理部、麻醉部的護理長、資訊部、醫品部等。每位病患在參加計劃後的初次評估就要先與前述 10 位團隊核心成員一一會談，這個過程往往歷時 5～6 個小時，每位團隊成員要詢問慢性疼痛病患各式量表、寫下評估內容、寫下小結、寫下各職類照護計畫。

疼痛科醫師要檢查、診斷，寫下疼痛治療目標，並藉由 DIRE score 評估使用管制藥品的適當性。精神科醫師除了根據心理師完成的量表，評估其焦慮與憂鬱等精神狀況，提供適當的藥物治療；也複評其疼痛藥物使用合理性。復健科醫師要為病患設下功能照護目標，並由物理治療師評估關節活動度及肌肉力量然後協助病患制定復健與運動計畫。藥師針對病患

現有處方評估其藥物認知及遵從性和使用藥物之交互作用，並對病患用藥做出適當的指導。營養師分析測量其身體組成成分、提供營養諮詢。社工主要評估病患人際關係及支持系統並針對其照顧需求提供適當公共資源協助。關懷師提供病患靈性治療。護理師提供病患疼痛衛教。心理師評估病患疼痛詳細狀況 (BPI；Brief Pain Inventory)、憂鬱篩檢量表、焦慮篩檢量表、匹茲堡睡眠品質量表等。個管師安排病患與各職類團隊成員之會談時間，並且提供心理治療服務。

在病患進入此疼痛照護計畫並完成各職類評估後，團隊要在 1～2 週內開會，至少要花一小時為這位病患詳盡討論，再由主持人做出總結，製作完整照護計畫。接著病患每次回診還會由醫師、心理師持續追蹤病患病程與問題解決的進度。

在團隊的努力及患者的配合，一個月的追蹤使患者睡眠品質已有顯著提升，而數個月後患者的憂鬱及焦慮也呈現下降的趨勢，漸次達成團隊為病患設立的功能回復目標。

彰基疼痛照護團隊是一個以「愛」為出發點的照護團隊，每位成員因為有愛，所以可以不厭其煩花無

數次、無數分鐘來回答、解決病患的問題；因為有愛，所以可以站在病患的立場來設想，作出全人照護。

未來展望

誠如評鑑委員所說，這是全世界 (美國本土以外) 第一個用完整的「疼痛照護」作目標來申請 JCI CCPC 認證的照護計畫。我們創造了好幾個台灣第一以後又多了一個世界第一的責任與壓力。團隊的核心價值、團隊的日常運作不會改變，會改變的則是我們新增的榮譽與責任。



圖二：彰化基督教醫院慢性疼痛整合照護團隊。

無論國語或台語，「疼」的另一個意義也意謂著「愛」，我們疼痛照護團隊是這樣子疼愛我們的病患，今後也將繼續保有優良傳統及耶穌基

督愛人的精神，提供最優質的疼痛照護，造福全國百姓。

The Top Integrated Pain Management Center

The Department of Anesthesiology, Changhua Christian Hospital

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Abstract

Changhua Christian Hospital is a century-old hospital founded by Dr. David Landsborough III, who is also the founder of the Department of Anesthesiology. In 2015, Changhua Christian Hospital occupied the first place nationwide for promoting an Integrated Pain Management Plan. In addition, The Integrated Pain Management Center in Changhua Christian Hospital not only is the first pain control center subject to the Department of Anesthesiology and equipped with a psychologist, but also the first multidisciplinary integrated healthcare team for patients with chronic pain in Taiwan. Therefore, our hospital aims to tailor an integrated regimen for patients with chronic pain to fulfill their comprehensive demands (e.g., in physiological, psychological and spiritual aspects) of the patients. Our hospital is also the first hospital outside of the US that has passed a complete CCPC-pain accreditation.

Backgrounds

According to international standards, the estimated amount of patients with chronic pain in Taiwan is at least a million

persons. In 2015, Changhua Christian Hospital occupied the first place in Taiwan for establishing an Integrated Pain Management Center subject to Department of Anesthesiology. The targets of the

center include all patients with chronic and resistant pain such as fibromyalgia, various neuropathic pain, chronic intractable lower back pain and chronic pancreatitis. The integrated team involves pain management physician, psychiatrist, and rehabilitation physician along with clinical psychologist, pharmacist, social worker, physical therapist, dietitian, registered nurse and care worker, who can provide a comprehensive care (including body and soul) to patients with chronic pain. Our hospital was successfully certified by an international organization for a JCI CCPC (Clinical care program certification) Pain management project on April 21, 2016 with a nearly perfect record, which was also the first (outside of continental US) approved comprehensive “pain management” project worldwide.

Current Status

The Integrated Pain Management Center in Changhua Christian Hospital not only is the first pain control center subject to the Department of Anesthesiology and equipped with a psychologist, but also the first multidisciplinary integrated pain management team in Taiwan. The core members of the team consist of clinical psychologist, pharmacist, registered nurse,

physical therapist, dietitian, social worker, care worker, psychiatrist, rehabilitation physician, and pain management physician, where the assistant members include head nurses of nursing department and department of anesthesiology, staff of IT department and medical quality committee. For individual patients, it is required to be reviewed by ten of the aforementioned core members respectively after their participation in the project for the initial evaluation. The interview process usually takes 5-6 hours because every team member has their own questionnaires, scales, assessments or summaries to complete based on the response of the patients with chronic pain in order to develop an individualized caring plan accordingly.

For pain management physicians, a careful checkup, diagnoses, goals or a DIRE score should be made to assess the appropriateness of prescribing narcotics. For psychiatrists, a proper prescription should be made based on the assessment completed by the psychologist assessing patient's levels of anxiety and depression. Furthermore, the psychiatrists should also review the rationality of their prescriptions on narcotics constantly. For rehabilitation physicians, setting goals of function re-establishment and rehabilitation/exercise plans for the patients based on the ROM



and MMT assessment results made by the physical therapist are required. For pharmacists, an evaluation regarding current prescriptions, patient's awareness and compliance, and possible interactions between other drugs should be made carefully to create a suitable guidance for patient medication. For dietitians, body composition analysis and nutritional consultation are the primary tasks. For social workers, their primary goals are to evaluate interpersonal relationship and the support system available to the patients, and provide public resource assistance based on the needs of the patients. In addition, care workers aim to provide spiritual guidance, and registered nurses are focusing on pain education. As to psychologists, they can evaluate the detailed pain status by using Brief Pain Inventory (BPI), Depression Screening Scale, Anxiety Screening Scale, and PITTSBURG SLEEP QUALITY INDEX (PSQI). In the meantime, a case manager can arrange separate interview schedules with individual team members for the patient and provide psychological counseling.

All of the team members should have a one-hour meeting to discuss about the patient with 1-2 weeks after the patient has participated in the pain management plan and completed individual interviews. At the

end of the meeting, the chairman may make a summary and create a comprehensive care plan accordingly. In the follow-up visits, the psychiatrist and the psychologist will still follow the progress of the prognosis and the status of the problem solving.

With the team's effort and patient's cooperation, the results showed that the quality of sleep of a patient at one-month follow-up is significantly improved. In the meantime, the anxiety and depression levels of a patient several months afterward also declined. Hence, the functional recovery goal of the patient set by the team has been gradually achieved.

The pain management team in Changhua Christian Hospital is a healthcare team based on "love". Therefore, individual team member are willing to spend time to answer the questions or solve the problems for the patient due to their care and love for the patient. In addition, because of their love, the team members are willing to think in patient's shoes and thereby provide holistic healthcare.

Future Perspectives

As to the comments made by the accreditation committees, our hospital is the first (outside of the continental US) hospital applying for JCI CCPC Certification

by using a comprehensive "pain management" plan. We not only have created several Taiwan No. 1 records, but also are responsible for becoming World No. 1. General speaking, the core values and routines of the team may not change, but our responsibilities for the new honors shall not stop. Our staffs have been following senior staffs' steps, practicing the core values of Changhua Christian Hospital (i.e., love the land, love people, love God and love yourself) and thereby develop a unique "Changhua Christian Hospital Spirit" based on the beliefs of "selfless devotion" and "humble service". Moreover, because of this unique industry culture, the team members have the same goals of developing a comprehensive regimen for patients with chronic pain and fulfilling various demands of the patients, including physiological, psychological and spiritual aspects. As a result, patients with chronic pain neither needs to suffer from the hopeless illness nor need to bear with the boring treatment alone. Instead, the plan can help patients regain daily functions, relieve pain and thus improve their quality of life. In phonetics, "Teng (疼)" represents "pain" as well as "love" in both Mandarin and Taiwanese. In conclusion, by continuing the excellent tradition and the spirit of God, our pain

management team takes good care of our patients, provides the best pain management and benefits the public out of "love".

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Figure 1. The 1st anesthesia working station in Changhua Christian Hospital.

Figure 2. Integrated Healthcare Team for Patients with Chronic Pain.

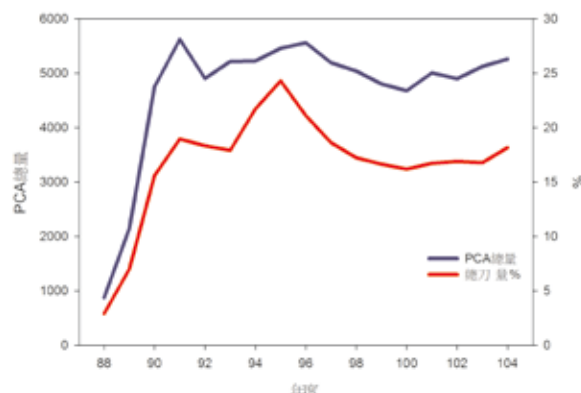
自控式止痛經驗分享 ——臺北榮民總醫院麻醉部

撰文 / 張光宜 主治醫師、鄒美勇 部主任

臺北榮總麻醉部自控式止痛服務廣受各界好評，我們的堅持與努力亦獲得不少獎項肯定，研究成果豐碩，合計發表 32 篇相關原著論文。未來將朝臨床、品管、研究與人才培育等四方向全力以赴，全面提升本院疼痛治療水平。

發展背景

自控式止痛 (Patient-controlled analgesia, PCA) 是主要手術後疼痛控制的主流治療方法之一，相較於一般手術後常規或需要時使用的止痛藥治療有更好的療效與更高的病人滿意度。臺北榮民總醫院於民國 88 年成立術後止痛小組開始推廣自控式止痛，早期專責成員僅有 1 位麻醉技術員與 1 位藥師，由主治醫師開立處方。89 年底成立疼痛控制小組並由胡新實醫師接手擔任組長，進行相關教學、訓練、門診、會診等業務的整合與推動，90 年 3 月鄒美勇主任加入疼痛控制小組，專責成員進一步擴編至 3 位麻醉技術員與 3 位藥師。民國 104 年配合醫院無痛醫院發展目標，正式成立疼痛治療科，預計在不久的將來成立疼痛中心。



圖一：各年度 PCA 總量與佔麻醉手術比例。

現況

本院自控式止痛業務從民國 88 年開辦以來即廣受各界好評，不論是病人、家屬乃至醫療團隊都對自控式止痛的療效讚譽有加，業績成長迅



圖二：94 年 PCA 工作圈成員。



圖三：PCA 工作圈獲得臺北榮總醫療品質暨病人安全審議委員會全面品質管理競賽特優獎。

速，翌年即突破兩千例以上，第三年就達到近五千例的水準。各年度自控式止痛總量與佔有麻醉手術比，從民國 90 年起，近 15 年來本院每年接受自控式止痛總數的平均值為 5115 人次，約佔有麻醉手術 18.2%。給藥方式主要有兩種，一種是經靜脈給藥，另一種則是硬脊膜外給藥，目前兩種給藥方式的比例約為 3:1。不論科別、給藥方式與藥物類型，病人使用後感到滿意或非常滿意的比率皆超過八成



圖四：PCA 工作圈獲得第六屆全國法制再造工作圈競賽銀斧獎。

以上。自控式止痛屬自費項目，為本單位醫療收入的重要來源之一，相關收入約佔部門總收入的一成，對單位與醫院的財務有相當大的貢獻。

由於本院使用自控式止痛病人數量龐大，病歷與處方資料的建立和追蹤訪視記錄產生了大量的臨床資料，鑑於資訊科技發達與電子病歷發展的趨勢，電子資料庫的建立有其價值與必要性，從民國 93 年起即由鄒美勇主任主導開始建立本單位的 PCA 電子資料庫，94 年更以相關發展經驗率領疼痛控制小組成員組織 PCA 工作圈，以『建置以「行動網際網路設備為基礎」精進病患自控式止痛 (PCA) 之安全品管監測暨資料擷取系統』為主題，參加臺北榮總醫療品質暨病人安全審議委員會舉辦之全面品質管理競賽，經委員會評定為特優，並於 95 年代表國軍退除役官兵輔導委員會參加經建會舉辦的第六屆全國法制再造



圖五：PCA 工作圈獲得第七屆全國醫療品質提升競賽進階組醫品銅獎。



圖六：製作 PCA 護理指導光碟。

工作圈競賽榮獲銀斧獎，同年底參加第七屆全國醫療品質提升競賽亦獲得進階組醫品銅獎。為了提供病人更正確、即時的自控式止痛衛教，本單位特別與臺北護理健康大學和華杏出版機構合作製作 PCA 護理指導光碟，



圖七：99 年本院提案制度競賽佳作。

圖八：100 年醫療品質改善突破系列熱心獎。

讓病人在初入院階段即可透過醫院電視系統收看相關衛教內容，了解自控式止痛服務內容與注意事項。考量讓使用自控式止痛病人在不同單位轉換過程中的疼痛治療能無縫接軌，本單位與恢復室及外科病房合力推動「提升醫療照護人員交接班之品質標竿團隊」計畫，成果得到財團法人醫院評鑑暨醫療品質策進會評審委員的青睞，獲選為 2011 醫療品質改善突破系列熱心獎。

學術方面，從民國 89 年起已累積發表相關同儕審查論文 32 篇，其中 SCI 論文 22 篇，影響係數 (Impact factor, IF) 大於 5 以上者有 4 篇，其他非 SCI 論文 10 篇。在民國 99 年本院自控式止痛開辦 10 年後出現黃金交叉，SCI 論文累計篇數正式超越非 SCI 論文，研究成果豐碩，相關內容可參考圖九。未來將進一步結合醫院的電子病歷系統與更多合作單位，擷取更多有價值的資訊共同進行更深入的跨團隊整合性研究工作。

未來展望

本院未來將朝著四個方向持續努力精進。在臨床治療方面，由疼痛

治療科主導病人治療計畫的訂定與追蹤，將自控式止痛推廣，結合個人化資訊系統提供病人使用自控式止痛的即時訊息，以提高處理反應效率與療效。在品質管理方面，透過醫療資訊

系統的升級納入更多管理資訊，並建立相關評估指標，藉由動態指標的長期追蹤發現並分析可能問題，提出改善方案並持續觀察其成效。在研究方面，將臨床治療結合醫學工程與生物

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圖九：臺北榮總麻醉部自控式止痛相關原著論文集。

註：IF 值參考 2014 年版的期刊引用報告 (Journal Citation Reports, JCR)
Note: IF data is derived from 2014 Journal Citation Reports (JCR).

資訊領域的專家進行跨領域的合作研究，並以研究成果回饋改善臨床治療模式。在人才培育方面，改善績效提供投入誘因，積極培養年輕富潛力之疼痛醫學人才，精進軟硬體設備並全

力促成跨科部疼痛醫療團隊合作。從臨床、品管、研究與人才培育等四方面的結合，全方位提升本院自控式止痛治療水平，嘉惠更多病患。

necessity. We started to promote the use of PCA immediately after the establishment of pain management group in 1999. At the beginning, there was only one full-time anesthetist and one full-time pharmacist responsible for the operation of PCA by following the prescriptions of the attending physician. In the end of 2000, a pain management group was completely established and Dr. Jenkin-S Hu served as the team leader. The integration and promotion of associated business such as teaching, training, clinics or consultations were then implemented. In March, 2001, Director Mei-Yung Tsou officially joined the team, so the full-time team members were extended to 3 anesthetists and 3 pharmacists. To meet the goal of becoming pain-free hospital, a department of pain management was officially established in 2015. A pain management center will as well be established in the near future.

Current Status

The service of PCA in our hospital has been praised by the public since 1999. The business increased rapidly due to the praise from the patients, family or other medical teams. The volume of PCA service was up to 2000 persons or more in the 2nd year, and reached nearly up to 5000 persons in

the 3rd year. The average ratio of annual volume of PCA service to total surgeries required for anesthesia in each year since 2001 was 18.2%; that is, the annual volume of average PCA service in our hospital from the past 15 years was 5115 persons each year. There were two primary administration pathways for narcotics, one was through intravenous pathway, and the other was epidural anesthesia. Currently the ratio between the two pathways is approximately 3 : 1. Regardless of departments, administration pathways and drug forms, more than 80% of patients felt satisfied or were greatly satisfied about their anesthesia. The service of PCA is optional; patients who desire to use the service must use it at their own expense, which becomes one of the important financial resources to the hospital. The income of the service is about 10% of the total revenue, which contributes greatly to the institute and the hospital.

Many patients in our hospital have used the PCA system, and thereby a large amount of clinical data, such as medical records, prescriptions and follow-up records has been created. In view of the development of IT and electronic medical records, it is required to establish an electronic database. A team led by Director Mei-Yung Tsou started to establish an

The Use of Patient-Controlled Analgesia-- Experience Sharing

The Department of Anesthesiology, Taipei Veterans General Hospital

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Abstract

The service of patient-controlled analgesia (PCA) provided by Department of Anesthesiology, Taipei Veterans General Hospital is extensively welcomed by the public. Our efforts on the continuance of the service have been affirmed by many certifications and honor. In addition, we had fruitful research results and published 32 original articles in prestigious journals. By combining all efforts on four developmental priorities such as clinics, quality control (QC), research and talent cultivation, we aim to enhance our PCA service efficacy in all aspects to benefit more patients.

Backgrounds

Patient-controlled analgesia (PCA) is one of the mainstream therapeutic approaches

to control post-surgical pain, and it also has a better efficacy and higher patient satisfaction level relative to regular pain killers used in general surgeries or upon

institutional electronic PCA database in 2004. Furthermore, by elaborating related working experience, a PCA workgroup based on pain management team members was established in 2005. We used the project "The establishment of 'mobile internet equipment-based' monitoring and data collection system for improving the safety of PCA service in patients" for the contest of overall QC hosted by the Medical Quality and Patient Safety Committee in Taipei Veterans General Hospital, and the project won the Premium Prize. Subsequently we joined the 6th National Legal Reestablishment Workgroup Contest (hosted by Council for Economic Planning and Development) on behalf of the Veterans Affairs Council with the same project in 2006, and we won the Silver Ax Prize. In the end of the same year, our department participated in the 7th National Medical Quality Improvement Contest and won Bronze Medal in the Advanced Group. To provide more accurate and real-time PCA education, our department worked with National Taipei University of Nursing and Health Sciences and Farseeing Publishing Group and jointly produced a DVD of PCA Nursing Guidance, so patients could understand the service of PCA and precautions, and learn about PCA through video system in the hospital at the stage of

initial admission. In addition, to facilitate the transition of pain management for patients using PCA between different departments, our department, recovery room and surgical ward jointly promote the project "A quality benchmarking team to improve shifts of healthcare professionals". As a result, our project found favor in the Joint Commission of Taiwan Committees' eyes and was selected for an enthusiastic award in Breakthrough Series in 2011.

As to academic results, we have published 32 peer-review articles since 2000, 22 of them are SCI articles, and 4 articles have impact factor (IF) greater than 5. Ten in 32 are non-SCI articles. Ten years after the use of PCA (2010), the amount of our SCI publications have officially exceeded the amount of non-SCI articles, which indicated that our research results were rather fruitful. Please refer to Figure 9 for related information. We plan to merge current database with electronic medical record system to create more valuable information, and collaborate with more institutes to conduct more profound multidisciplinary and integrated research work in the future.

Future Perspectives

Our hospital will focus on four directions in the future. In clinical treatment, the Department of Pain Management will lead the development and follow-up of therapeutic plans for patients, promote PCA, and combine personal information system with real-time PCA system to enhance management efficiency and therapeutic efficacy of PCA. In quality control, our hospital aims to update MIS system to collect more information for management, establish relative assessment indexes, and perform long-term follow-up and analyze possible issues by using dynamic indexes. In academic research, we will combine clinical therapy with medical engineering and bioinformatics, recruit associated experts to conduct multidisciplinary collaborative research, and use the research results on clinical therapy improvement. In talent cultivation, we intend to enhance performance, provide attractive opportunities, actively cultivate young and promising experts in pain management area, upgrade hardware and software facilities, and do our best to facilitate multidisciplinary team work for pain management. In summary, by combining all efforts on clinics, QC, research and talent cultivation, we aim to

enhance our PCA service efficacy in all aspects to benefit more patients.

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Figure 1: Total PCA as a proportion of total anesthetized surgery throughout the years.

Figure 2: Members of the PCA Circle in 2005.

Figure 3: PCA Circle winning an excellence award from the Total Quality Management Competition organized by the Medical Quality and Patient Safety Review Committee of Taipei Veterans General Hospital.

Figure 4: PCA Circle winning the 6th National Administrative Re-engineering Task Force – Silver Axe Award.

Figure 5: PCA Circle winning the 7th National Healthcare Quality Improvement Competition – Advanced Medical Quality – Bronze Award.

Figure 6: Creating the PCA Nurse Instructions CD.

Figure 7: Works of excellence with the 2010 system proposal competition.

Figure 8: Passion Award for the 2011 Healthcare Quality Breakthrough Series Model (BTS).

Figure 9: Total number of peer reviewed papers related to PCA that have been published throughout the years.

中西整合疼痛中心 ——臺北市立萬芳醫院麻醉科

撰文 / 戴裕庭 主任

萬芳醫院中西整合疼痛中心成立於民國 100 年，由麻醉科、復健科、中醫科、神經內、外科、骨科、精神科、放腫科等十四位主治醫師與多位疼痛個案管理師，共同組成跨團隊的醫療小組，替長期、慢性的病人提供身、心靈方面的整合照護治療。由於不同專長之專科醫師使進入疼痛門診的病人有更多的選擇與多元的服務，可使病人的疼痛獲得控制或解決。由於治療成效良好，病人數從初期每月的 197 人次，快速上升至目前的每月 1,322 人次，是目前全國規模最大的中西醫整合疼痛中心。

發展背景

萬芳醫院在 1997 年開幕，1998 年疼痛門診邀請臺大孫維仁教授看診，1999 年疼痛門診改由陳大樑主任看診，之後因陳主任外調台北市立聯合醫院而停診，直到 2010 年疼痛門診由賴彥均醫師重新看診，鑑於過往經驗，單一疼痛門診無法長久，因此於 2011 年 1 月成立「中西整合疼痛中心」，由麻醉科、復健科、中醫科、

神經內、外科等六位醫師與一位個案管理師組成，為了服務更多民眾且增加門診的多元化，至 2016 年 6 月為止，共有十一位主治醫師與多位個案管理師，組成跨團隊醫療小組，替長期、慢性的病患做身心靈方面的治療。

現況

一、收案標準：



圖一：2011 年元旦，中西整合疼痛中心開幕。



圖二：2011 年疼痛中心開幕初期醫師介紹。

圖三：2011 年 6 月 6 日中西整合疼痛中心醫師合照。



因疼痛問題，來看疼痛門診的民眾，在報到時先填寫疼痛量表問卷後再看診，其疼痛指數 (VAS) 大於四分者予收案。

二、分析收案資料顯示：

2016 年 1 月至 5 月總收案數為 549 人，其中緩解有 368 人，持續中有 181 人，其中電話未接有 32 人，不願再返診有 29 人，不願再返診包含：在住家附近的診所做復健或到其他醫院治療等。

三、持續治療率的計算公式：

(收案數 - 電話未接 - 不願再返診個案數) / 收案數 * 100%

計算出的持續治療率 = (549 - 32 - 29) / 549 = 88.89%

其中已緩解占 368 / 549 = 67.03%，持續追蹤中占 181 / 549 = 32.97%。



圖四：2015 年疼痛中心重新整建後醫師介紹。

未來展望

預定目的或規劃達成之目標

透過不同領域，專科醫師的會診與討論，持續治療率由原本 2011 年 1 ~ 12 月的 74%，截至 2016 年 1 ~ 5 月的 88.89%，上升 14.89%。

完成之工作項目及成果、效益

一、在候診區張貼追蹤流程圖海報，以利民眾了解在疼痛中心就診與其他門診不同之處。

二、定時於看診 3 ~ 5 天進行電話訪問，對於疼痛緩解狀況不理想或服藥有問題者給予衛教，若疼痛小於

四分可予結案；未結案者，一個月後再予電訪，積極替疼痛未緩解或未改善病人做疼痛科別轉介。

三、積極跨科討論，舉行月會與跨團隊討論及和大家意見為病人做處理，增加不同專長專科醫師進入疼痛門診使我們的病人擁有更多選擇與服務，讓病人在更短時間疼痛獲得控制或是解決病人疼痛問題。

四、各醫師自訂課程為大家上課，報告處理成功案例，利於各專科醫師在遇到相同問題時，可適當轉介病人。

五、製作各科醫師專長介紹表，利於跨團隊治療參考。

and spiritual aspects) for patients with acute and chronic pain. Physicians with different specialties not only provide more diverse options and services for patients in the center, but also help patients control or relieve pain in a shorter period. Because of the successful and excellent cure rate, the volume of service in our center ascends rapidly from the original 197/month to 1,322/month at present, which makes our center the biggest Integrated Pain Management Center nationwide.

Backgrounds

Taipei Municipal Wanfang Hospital was opened in 1997. The pain management center in Wanfang Hospital invited Professor Wei-Jen Sun who was from NTUH to join the team in 1998, but the primary attending physician in the center was changed to Director Ta-Liang Chen in 1999. The pain management clinic was discontinued due to the transfer of Director Chen to Taipei City Hospital, and then resumed by Dr. Yen-Chun Lai in 2010. In view of previous situation (i.e., a single pain management clinic that did not last for long), our hospital has established an "Integrated Pain Management Center" in January, 2011 comprising 6 physicians and 1 case manager from several departments such as anesthesiology, physical medicine and rehabilitation, Traditional Chinese Medicine, Neurology and Neurology, Neurological Surgery. To serve more patients and broaden the diversity of the clinic, until June 2016, our center has invited 11 attending physicians

and multiple case managers to organize a multidisciplinary team providing physical, psychological and spiritual services to patients with acute and chronic pain.

Current Status

1. Inclusion criteria: Patients coming to our center for pain management will answer a pain questionnaire at registration and then receive the medical services at the clinic. Patients with VAS larger than 4 points are eligible.
2. The analytical results showed that total number of eligible case was 549 persons between January and May in 2016; patients reported to have relieved pain were 368 persons; patients reported to have persistent pain were 181 persons; unanswered cases were 32 persons; patients who were reluctant to return for follow-up visit were 29 persons. Reluctant patients included patients who chose to receive rehabilitation nearby or receive treatment in other hospitals.
3. The calculation formula for compliance

Integrated Pain Management Center

The Department of Anesthesiology, Taipei Municipal Wanfang Hospital

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Abstract

The Integrated Pain Management Center in Taipei Municipal Wanfang Hospital was established in 2011, and consisted of a multidisciplinary medical team comprising 14 attending physicians and multiple case managers for pain management from the following departments: Anesthesiology, Rehabilitation, Traditional Chinese Medicine, Neurology, Neurological Surgery, Orthopedics, Psychiatry and Radiology. The center provides integrated healthcare services (including physical, psychological

rate:

(the number of eligible case-the number of unanswered-the number of reluctant to return for follow-up)/ the number of eligible case *100%

The calculated compliance rate = (549-32-29)/549=88.89%

Pain relief rate: 368/549=67.03%, and pain persistent rate: 181/549=32.97%

Future Perspectives

• Target Goals or Goals Intend to Achieve

Through the consultations and discussions provided by specialists in different areas, the compliance rate was elevated from 74% (January ~December in 2011) to 88.89% (to January ~May, 2016), which increased about 14.89%.

• Achieved Items, Outcomes and Benefits

1. Post introductory follow-up procedures at the waiting area for the public to understand the differences between Integrated Pain Management Center and other clinics.
2. Conduct regular telephone interview 3-5 days after the clinic to educate patients with imperfect pain relief or those have queries regarding medication. The case will be closed when the pain scale of the patient is less than 4 points. For those open cases, another telephone

interview will be conducted again one month later to actively provide referral consultation for patients with unrelieved or unimproved pain.

3. Active cross-department discussions, monthly meetings, multidisciplinary seminars, group opinions are all welcome to improve patient management. In addition, invite physicians with different specialties joining the center to provide more diverse options and services, so patients may be able to control or relieve pain in a shorter period.
4. Physicians arrange specialty training courses for healthcare professionals from different specialties and report successful cases to facilitate proper patient referral when encounter similar clinical situations.
5. Produce specialty introduction tables as references for multidisciplinary team work.

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Figure 1. 2011.01.01 Opening of Integrated Pain Management Center.

Figure 2. 2011 Physician Introduction at the Opening of Integrated Pain Management Center.

Figure 3. 2011.06.06 Group Photo of Physicians in Integrated Pain Management Center.

Figure 4. 2015 Physician Introduction after the Renovation of Integrated Pain Management Center.

麻醉品管 Quality Control

導讀：堅持麻醉品質與安全

撰文 / 楊承憲 (品質保證委員會主任委員、台北慈濟醫院麻醉科主治醫師)

麻醉乃是風險最高的醫療行為之一，所以麻醉醫師特別重視病人安全，也一直在病人安全方面扮演推動者的先驅角色。除了注重病人安全，麻醉科在醫療品質方面的改善也是不遺餘力，不管是臨床醫療品質指標或是異常事件通報改善，麻醉專科在台灣地區都是最早推動實施的醫療專科。在臨床實務上更有許多值得學習的範例，例如雙和醫院麻醉科雖然成立才短短八年時間，但不論在麻醉品質或病人安全方面就已經有完整的制度及令人欽佩的成果。

國家品質標章 (SNQ, Symbol of National Quality) 是由國家生技醫療產業策進會在 2004 年成立的有關生技醫療的國家級品質標章，堅持品質與安全比什麼都重要。2005 年中國醫藥大學附設醫院麻醉部就以「麻醉病人安全與品質維護」為主題獲得標章認證。2007 年及 2015 年三軍總醫院麻醉部也兩度以「標靶控制輸注之全靜脈麻醉」獲得國家品質標章。而三總除了將 TCI 全靜脈麻醉技術擴展至

各類手術麻醉，還出版 TCI 實用手冊作為教材，並結合臨床實際觀摩及高擬真模擬教學方式，積極推廣此麻醉技術至全國。而 TCI 全靜脈麻醉的優勢也符合國際手術周期照護的趨勢，例如加速手術後恢復計畫 (Enhanced Recovery After Surgery, ERAS) 中所建議的使用短效麻醉藥物及預防術後噁心嘔吐。另一方面國泰綜合醫院麻醉科針對 EARS 則是採取個人化的全期醫療照護，讓病人的麻醉手術經驗更為舒適，而其關鍵是強調醫療團隊的合作與溝通。國泰醫院自 2008 年即開始推行團隊資源管理 (Team Resource Management, TRM)，並將團隊合作技巧推廣應用於麻醉實務，此外還以異常事件為基礎改編成模擬案例，以高擬真模擬人系統進行團隊合作訓練。

美國的 Anesthesia Patient Safety Foundation 鼓勵臨床應使用麻醉資訊管理系統 (Anesthesia Information Management System, AIMS)，因為可以提升麻醉病人安全並有助於相關臨床研究。台灣很多醫院的麻醉科部目

前也正積極引進 AIMS，而過程中有許多困難需要克服。馬偕紀念醫院麻醉科很早就推動品管資料的電子化，其麻醉品管資料庫的使用經驗已超過十年，並在 2014 年以「麻醉指標雲端管理系統」獲得醫策會醫療品質獎的「智慧醫療類」標章，近兩年則進一步推動麻醉相關表單的電子化。值得一提的是，中國醫藥大學附設醫院麻醉部自 2013 年開始設計與推行麻醉資訊管理系統，只花了兩年時間就完成全面 e 化，並在 2015 年以「麻醉 e 化整合照護及智慧管理」也榮獲醫策會的「智慧醫療類」標章，同時成功申請「麻醉智慧整合系統」及「麻醉前評估系統」的專利，這其中有很多特色是值得大家學習參考的。

除了前述幾家醫院麻醉科部的努力與成就外，台灣麻醉醫學會及其他所有麻醉醫師將持續以提升麻醉品質與病人安全為己任，希望民眾也能重視麻醉安全、尊重麻醉專業，政府亦應重視麻醉，合理給予麻醉專科應有之資源，而台灣麻醉界即使在受限的資源下，也會盡力達到國際的醫療水準。



Introduction: Insist on the Quality and Safety of Anesthesia

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Anesthesia is one of the medical practices with the highest risk. Anesthesiologists consider patient safety a priority and have been pioneers in this expertise. Anesthesiology not only emphasizes patient safety, but takes the initiative in medical quality improvement through clinical quality indicators or abnormal event reporting and correction. Here are some good clinical practice examples: Anesthesiology of Shuang-Ho Hospital was established just eight years ago yet it has a complete system for patient safety and has made achievements.

The Symbol of National Quality was created by the Institute for Biotechnology and Medicine Industry (IBMI) in 2004 to highlight the importance of quality and safety. In 2005, the Anesthesiology Department of China Medical University Hospital was certified with the topic of "maintaining safety and quality for patients receiving anesthesia". In 2007 and 2015, the Anesthesiology Department of Tri-Service General Hospital (TSGH) was also certified

with "target-controlled total intravenous anesthesia". TSGH widely applied TCI-based total intravenous anesthesia in all kinds of operations, and published a TCI manual that is combined with clinical probation and simulated learning for nationwide promotion. The advantages of TCI-based parenteral anesthesia align with the trend of global peri-operative care, for example, short-effect anesthesia and the prevention of post-operative nausea and vomiting as recommended by Enhanced Recovery after Surgery (ERAS). The Anesthesiology Department of Cathay General Hospital applied individualized all-around care as an ERAS-based approach to improve comfort in patients' operation and anesthesia experience, where the cooperation and communication in the medical team is stressed. Since 2008, team resource management (TRM) has been adapted by Cathay General Hospital and the team cooperation is applied in anesthesiology practice. Abnormal events were used to develop simulated clinical

context for related training.

The United States Anesthesia Patient Safety Foundation encourages the application of the Anesthesia Information Management System (AIMS) in clinical setting because it improves anesthesia patient safety and facilitates clinical research. Many anesthesiology departments in Taiwan are introducing AIMS and many difficulties are yet to be conquered. The Anesthesiology Department of Mackay Memorial Hospital has worked to transform quality information into electronic form for a long time, with its anesthesia quality database operated for more than ten years and awarded with HQIC "Smart Medicine" Symbol by Joint Commission of Taiwan in 2014. Recently, anesthesiology sheets are also transformed into electronic form. It is worth noting that the Anesthesiology Department of China Medical University Hospital started the design and implementation of anesthesia information management system since 2013 and the system took only two years to complete. In 2015, "Electronic Anesthesia Care Integration and Smart Management" was also awarded with HQIC "Smart Medicine" Symbol by Joint Commission of Taiwan, and even acquired the patent of "Smart Anesthesia Integration System" and "Pre-anesthesia Assessment System". These

provide much for reference.

In addition to the efforts and achievements of these anesthesiology departments, the Taiwan Society of Anesthesiologists and all anesthesiologist practitioners consider the continuous improvement of service quality and patient safety their mission. We hope that the general public will pay more attention on anesthesia safety and expertise, and the governmental bodies are to recognize the crucial role of anesthesiologists by ensuring the availability of necessary support. Lastly, Taiwanese anesthesiologists will still align themselves to international standards even with limited resources.

「安全是唯一的堅持，品質是持續的追求」 團隊資源管理之個人化醫療 ——國泰綜合醫院麻醉科

文 / 郭書麟 主治醫師、洪聖惠 品質管理中心副主任

麻醉品質是手術安全非常重要的一環，其中無縫的跨專業合作及有效的團隊溝通更是減少醫療失誤，增加手術安全、麻醉品質與促進術後恢復的關鍵點。推動團隊合作訓練乃國泰綜合醫院的特色醫療，因應目前 PFM 評鑑方法推動 Patient-centered 的個人化「Enhanced Recovery After Surgery (ERAS)」全期醫療照護，讓病患麻醉手術經驗更為舒適。

發展背景

病患接受手術的過程中，麻醉不單是治療重要環節之一，也是醫療行為中最具跨專業合作與高風險的步驟。在不同照顧者之間的轉換，如何維持醫療照護品質，減少不必要的資

訊誤差，所仰賴的不只是消極使用 SOP、checklist，或是病人辨識及手術部位標記；應是更積極地加強醫療團隊間的合作，有效正確進行成員間的溝通，才能達到病人、醫院及醫護團隊三贏的終極目標。

根據過去文獻實證結果，醫療團

隊合作的好壞會影響醫療品質及病人的預後與安全，自 2009 年開始，國際間開始有較多關於醫療團隊合作的研究，IOM(Institute of Medicine) 亦建議，應發展跨部門的團隊訓練模式，以提升醫療體系安全，是故醫療界導入團隊訓練，已成為重要的趨勢。

國泰麻醉科以提升醫療品質與病人安全為核心價值，以推廣團隊合作為品質促進策略。自 2008 年開始推行團隊資源管理 (Team Resource Management, TRM)，麻醉團隊也於早期就加入相關工作推動，從理論建構基礎，到模擬實務運作，自醫學教育扎根，奠定穩固的基石，藉由良好的團隊合作，達到卓越醫療品質與病人安全的目標。

現況

發展本土化標準套裝教材

自 2007 年起與中華航空公司合作導入組員資源管理訓練 (Crew Resource Management, CRM)，並於 2008 年整合組員資源管理與 Team STEEPS，以衛福部指引之病人安全目標，結合國家政策、醫療時事與臨床案例，聯合幾家指標醫院發展適合台

灣醫療界使用的團隊資源管理教材，採小班制雙師教學。麻醉團隊亦積極要求全員參與團隊合作教育訓練。

活化實務推動，將理論與臨床結合

自 2009 年起，全院各單位陸續展開實務推動，將團隊合作技巧應用於作業實務當中，其中在麻醉團隊行之有年的措施包括：

- ◎ I'm SAFE 於每日晨會：檢視單位人員身心狀況，以確保員工身心狀態安全。
- ◎ 重難症術前 Brief：如心臟外科與麻醉團隊術前一天常態討論。
- ◎ 晨會 Brief：彙報術前門診篩選高危病人及 CUS 病例討論。
- ◎ 應用 ISBAR 於交班：結構式口頭交接模式、ISBAR 單位間交接查核表等標準化交接工具。

以上各措施都是用以確保照護品質的維持。



圖一：每日晨會 - 員工健康關懷。



圖二：團隊資源管理 - 模擬訓練（一）。

圖三：團隊資源管理 - 模擬訓練（二）。



高擬真團隊合作訓練

團隊於實地進行訓練，以更貼近工作現場實務。模擬空間內設有 METI 醫學模擬人系統 (Hi-Fidelity Medical Simulator-SimMan®)，藉由 HPS 軟體與模擬人的連線，可以模擬各種醫療情境，包含四肢脈搏的變化、生理監測系統、聽診呼吸音、心音、腸音及血壓，也可從事插管、電擊、胸管引流、氣胸減壓及藥物的給予等侵入性處置，實際模擬臨床上病人可能出現的各種狀況。訓練過程中教師利用電腦軟體設定教案，於演練時依學員表現做及時動態調整。

以異常事件為基礎之客製化教案研發

為使麻醉團隊能經由過去經驗中學習，避免類似錯誤再發生，教案由院內病人安全異常事件通報系統中篩選出與團隊合作（例如溝通不良）有

關之案例，以異常事件為架構改編 (adverse event- based)，並彙整單位常見問題與衝突、結合重要病人安全政策（如：病人辨識、交接班、手術安全查核、藥物安全、管路安全……等與麻醉相關議題），依團隊合作訓練之四大模組 (Team Structure & Leadership、Situation Monitoring、Mutual Support、Communication)，融合團隊合作技巧，依單位特性及需求發展，以任務導向學習 (task oriented) 之客製化模擬案例。教案內容包括臨床情境、角色、學習目標與學習重點、所需設備與環境等。每案撰寫完成均經教師群試演 (pilot practice) 後，再修正成為標準化教案。

麻醉手術團隊師資群

本科師資團隊長年積極參與國內外相關會議、訓練，擔任相關學會委員及會員（如台灣擬真教育學會、急診模擬醫學會等），以提升師資能力。多年來積極延攬年輕教師加入師資團隊，經院內訓練合格之後，由院長親自授予教師證書。具有豐富團隊資源管理教學經驗，常應各界邀請演講及輔導。

- 師資團隊：汪志雄主任、郭書麟醫師、李欣恩醫師、黃姐護理長、王春銀護理長、雷宜芳護理長、王時傑主任及陳樞鴻主任

未來展望

國泰綜合醫院麻醉團隊推行團隊資源管理，以航空界的經驗，結合實務與人因科學，整合資源，掌握世界趨勢，前瞻推動 Patient-centered 的個人化「Enhanced Recovery After Surgery (ERAS)」全期醫療照護，希望貢獻如下：

一、臨床照護面

運用多方面改善臨床措施，強化術前準備、精確術中控制、優化術後恢復及持續出院關懷。讓病人在手術麻醉上有更佳的體驗，提升術後恢復品質。

二、醫院管理面

經由縮短住院時間，減少手術併發症，達成有效的成本控管。



圖四：重大手術術前討論。

Continuously Pursue Patient Safety and Quality— Team Resource Management is the Key to Personalized Anesthesia Care

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Abstract

Quality of perioperative anesthesia care is the critical link to successful surgery. Successful multidisciplinary cooperation and effective team communication are keys to reduce medical errors, increase surgical safety and quality of anesthesia, and facilitate post-surgical recovery. In order to ensure the surgical anesthesia comfort, Cathay General Hospital focuses on teamwork training to facilitate patient-centered personalized full-term perioperative care and initiates the enhanced recovery after surgery (ERAS) program.

Backgrounds

During surgery, quality anesthesia is the key link to effective treatment, and multidisciplinary cooperation is particularly important for high risk procedures. By using of SOP and checklist for patient recognition/surgical site labeling, the transition between caregivers, maintenance of healthcare quality, and limited unnecessary informatics bias can be achieved. To achieve the ultimate goal of multi-wins among patient, hospital

and healthcare team, active cooperation between multidisciplinary healthcare teams and effective communication among team members should be reinforced.

Based on previous studies, the quality of healthcare and prognosis and safety of patients are depending on the quality of cooperation among healthcare teams. Increasing number of studies involving international healthcare teamwork were noticed since 2009. According to the recommendations of IOM (Institute of Medicine), the induction of

multidisciplinary teamwork training in the medical industry has become an important trend to promote the patient safety of healthcare system.

The core values of our anesthesia department of Cathay General Hospital are quality anesthesia and patient safety, therefore, our strategy is to advocate teamwork. Team Resource Management (TRM) was proposed and activated since 2008 in Cathay General Hospital, and our anesthesia team had joined the promotion initiative activities in the early stage. To achieve the goal of excellence of anesthesia quality and patient safety, Cathay General Hospital not only promoted both simulation and clinical practice, but also emphasized on basic medical education as well as successful teamwork to establish solid foundation.

Current Status

Establish Our Standardized Training Kit

Cathay General Hospital has collaborated with China Airlines to introduce the Crew Resource Management (CRM) since 2007, and integrated CRM with Team STEEPS in 2008. By combining national policies, healthcare news and clinical cases among several indexed hospitals; the goal is to

achieve patient safety indicated in the MOHW guidelines and develops our own TRM training kit. In addition to small class size and dual-trainer system, full active participation is required to achieve teamwork training in our anesthesia team.

Facilitate Clinical Activities and Put Theory into Clinical Practice

Related training such as applying teamwork techniques in our daily clinical practice has begun in individual unit in our hospital since 2009. Procedures have been implemented in our anesthesia team for years including,

- Daily morning meeting called “I’M SAFE” : This is to inspect the physical and mental conditions of individual staff member to assure all of the members are safe and sound for work.
- Briefs prior to critical surgeries: for example, a regular joint meeting held by the Departments of cardiovascular surgery and Anesthesiology one day before surgery.
- Morning brief: for those high risk patients screened at pre-anesthesia clinics prior to surgery and CUS case discussion will be discussed at the morning meeting in details.
- Staff applies iSBAR in brief between shifts: use standardized shift tools such

as structural and oral communications as iSBAR shift checklist to complete multidisciplinary team shift.

All of the above strategies are to assure the quality of perioperative anesthesia care.

Simulation Teamwork Training

The teamwork training is executed in simulated clinical context. During the simulation training, a METI medical simulator system (Hi-Fidelity Medical Simulator-SimMan®) along with the HPS software can mimic all kinds of medical scenarios such as pulse changes in the four limbs, physiological monitoring system, breathing/heart/bowel sound auscultation and blood pressure measurement, or provide practice on invasive procedures including intubation, defibrillation, chest tube insertion, pneumothorax decompression and drug administration to simulate actual clinical emergencies. Trainer is able to set clinical situations by using computer programs and modifies the context based on real-time performance of the trainee during the practice.

Develop a Customized Training Program Based on Reportable Events

In order to learn from previous mistakes and prevent similar errors from reoccurrence, the training program for the anesthesia

team is usually developed based on adverse events on patient safety or teamwork-related accidents (e.g. poor communication). As a result, the adverse event-based training not only summarizes common problems and conflicts, but also can coordinate issues regarding patient safety (anesthesia-related topics such as patient recognition, duty shift, surgical safety inspection, drug safety and breathing circuit security). Moreover, the training program is also a task-oriented and customized simulation, which may include four major models in teamwork training (i.e., Team Structure & Leadership, Situation Monitoring, Mutual Support and Communication) incorporate teamwork techniques for specific institute features and demands. In this case, the training plan should consist of clinical context, role-play, learning objectives/goals and required instruments/environment. The draft will be amended to standardized training after pilot practice.

Expert Trainers in Surgery-Anesthesiology Team

Trainers in our anesthesia department are actively participate in international and national conferences or training programs serving as committee members (e.g., Taiwan Society for Simulation in Healthcare or TSSACM) to improve our teaching

proficiency. Cathay General Hospital has been actively recruiting young subspecialty trainers to join the expert team for years; all the trainers who have passed the in-hospital training obtained trainer certificate by superintendent in person. Therefore, our trainers are all equipped with rich teaching experiences in TRM and are also invited to give talks or counseling frequently by other medical centers and hospitals.

- Expert Team: Director Chih-Shung Wong, Dr. Shu-Lin Guo, Dr. Sing-Ong Lee, Head Nurse Ta Huang, Head Nurse Chun-Yin Wang, Head Nurse Yi-Fang Lei, Director Shih-Chieh Wang and Director Shu-Hung Chen.

Future Perspectives

To coordinate clinical practice and human factor sciences, integrate resources, pursue international trends and promote full-term healthcare for patient-centered personalized Enhanced Recovery After Surgery (ERAS), our anesthesiology team of Cathay General Hospital embraces the experience from aviation industry and encourages TRM. Hopefully, the following goals will be achieved in the near future.

1. Aspects of clinical care

To achieve a better quality of surgical anesthesia and post-surgery recovery,

the team intends to improve clinical procedures, emphasize pre-surgical preparation, advance surgical control and accuracy, optimize post-surgical recovery, and continue follow-up after discharge.

2. Aspects of hospital management

To ameliorate surgical complications and achieve effective capital control, the team intends to shorten patient hospital stay.

3. Aspects of medical education

The team intends to examine regular healthcare procedures based on the standards of evidence-based medicine and provides rational therapies to patients.

Communication is the key to quality of healthcare and patient safety. We will continuously promote multidisciplinary teamwork, practice ERAS and emphasize teamwork to establish safe and quality anesthesia.

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Fig 1: Daily morning meeting called “I'M SAFE”

Fig2: Team Resource Management- Simulation Training part1.

Fig3: Team Resource Management- Simulation Training part2.

Fig 4: Briefs prior to critical surgeries.

麻醉、改變與影響力：標靶控制輸注全靜脈麻醉

——三軍總醫院麻醉部

撰文 / 呂忠和 主治醫師、吳之芾 部主任

標靶控制輸注全靜脈麻醉具降低溫室效應環保考慮，且可縮短甦醒拔管時間。「感謝用心的醫師們人道的為病患考量，醫生們小小的改變，竟為病患帶來大大的福祉，相信造福別人，就是造福自己。」這是病人家屬在接受 TCI 全靜脈麻醉後以「麻醉、改變與影響力」為題寫給我們的感謝函，未來我們將持續精進推廣此優質麻醉技術。

發展背景

2005 年台灣引進 TCI (Target-Controlled Infusion) 標靶控制輸注幫浦，為一部電腦根據內建之藥物的藥物動力學與藥效學等公式，預測藥物在血中及腦中的濃度，自動調節輸注速度，在短時間內達到設定的目標濃

度，同年三軍總醫院麻醉部即開始使用 TCI 全靜脈麻醉於臨床。相較於目前國內外廣泛使用的吸入性氣體麻醉，TCI 全靜脈麻醉具有降低溫室效應的前瞻性環保考慮，並且可以縮短甦醒拔管所需時間而促進麻醉醫療品質提升，2007 年本科即以此麻醉技術得到國家品質標章的肯定。

TCI 全靜脈麻醉相較於氣體麻醉具有下列三項優勢：

第一、麻醉誘導時根據病人失去意識時之濃度及年齡即可推知麻醉後甦醒所需時間，進而擬訂個別病人之麻醉計畫。

第二、縮短甦醒與拔管時間，具有手術室管理經濟效益。

第三、降低術後噁心嘔吐發生機率，及拔管時較穩定的心跳血壓生理變化，有效提升麻醉照護品質，且符合目前國際趨勢。如 Enhanced Recovery After Surgery 加速手術後恢復改善計畫中之使用短效麻醉藥物及預防術後噁心嘔吐發生，以及 Perioperative Surgical Home 中之縮短甦醒與拔管時間及增加手術室利用率。

由於 TCI 麻醉的快速甦醒特質，更有病人家屬稱此麻醉技術為「謝謝麻醉」：手術結束，病人幾乎是清醒狀態，好像沒有經過麻醉一般，可以當場謝謝為其開刀及麻醉的醫師。

現況

執行率與團隊合作

目前 TCI 全靜脈麻醉技術執行率約為每日全身麻醉量的 36%。且已擴展至各類手術麻醉(婦科、神經外科、肝臟移植麻醉、一般外科、心臟血管外科、胸腔外科、眼科、耳鼻喉科、口腔外科、大腸直腸外科及骨科手術等麻醉)，並與健康管理中心，腸胃內科及小兒科合作執行腸胃鏡健檢，內視鏡逆行性膽胰管造影術及早期胃癌黏膜剝離術，與神經內科合作執行深腦部刺激術，與神經外科合作執行清醒開顱手術，及與胸腔外科合作執行無插管胸腔鏡手術等醫療業務。

發展本土標準化範本

為了確保 TCI 全靜脈麻醉技術臨床應用的安全性及品質，我們將過去的使用經驗，常見問題與解答及各類手術案例集結成 TCI 實用手冊中英文



圖二：2007年SNQ國家品質標章證書。

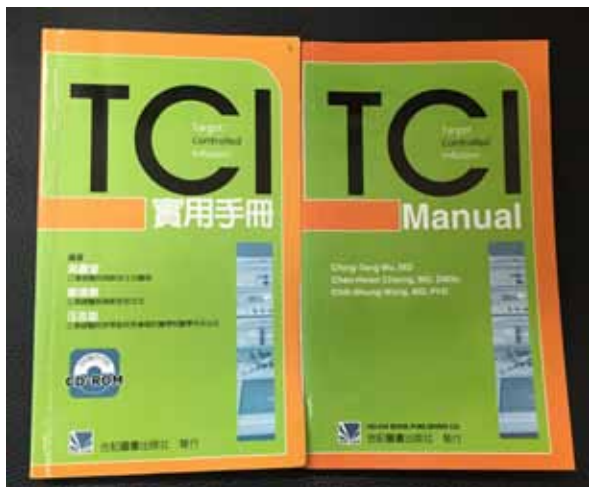


圖三：2015年SNQ國家品質標章證書。



圖一：三軍總醫院麻醉部大合照。

圖四：TCI 全靜脈麻醉實用手冊（中英文版）。



版出版，一方面作為臨床實際操作及教育訓練的標準化範本，另一方面也讓有興趣學習此麻醉技術的麻醉同道能減少摸索學習的時間，讓更多手術病人都能接受此優質的麻醉技術。

國際級執行標靶控制輸液全靜脈麻醉之示範及訓練中心及學術成果

2008 年三軍總醫院麻醉部舉辦全國首次之實況示範 TCI 全靜脈麻醉課程，2009 年開始舉辦 TCI 全靜脈麻醉訓練課程，以我們出版的 TCI 實用手冊為範本教材，並結合臨床實際觀摩學習與討論及高擬真模擬教學方式，積極推廣此優質麻醉技術至全國，目前訓練完成的麻醉醫護人員的滿意度調查皆高達百分之百，並且持續至各醫學會、醫學中心及醫院演講及示範。2009 年國際級標靶控制輸注大師

Professor Schnider 受邀蒞臨本部參訪指導並肯定我們的技術與世界同步，2010 年菲律賓麻醉醫學會理事長亦率其學會成員蒞臨本部參訪學習此技術。

本部目前發表 9 篇 TCI 全靜脈麻醉相關醫學論文，在質與量上皆為國內之冠，且針對 TCI 全靜脈麻醉技術相較於吸入性氣體麻醉可以縮短甦醒與拔管時間的論文數目前為世界之冠 (6/11)，亦證實 TCI 全靜脈麻醉相較於氣體麻醉具有前文述及之三項優勢。



圖五：TCI 全靜脈麻醉訓練課程合影。



圖六：菲律賓麻醉醫學會理事長及其會員蒞臨本部參訪合影。

Total Intravenous Anesthesia with Target-Controlled Infusion (TCI): The Change and Effects

The Department of Anesthesiology, Tri-Service General Hospital

Chueng-He Lu, M.D.* Zhi-Fu Wu, M.D.**

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Abstract

By reducing recovery and intubation time, total intravenous anesthesia with TCI is a green technique with environmental protection efficiency to decrease greenhouse effects. A family member of a patient received total intravenous anesthesia with TCI once wrote us a thank you letter titled "Anesthesia: The Changes and the Effects" stating that: "I'm grateful for the doctor's patient-centered and humanity-based treatment. A small change makes a big difference, which brings us great benefits. I believe that this great technique not only will benefit the patients, but also will benefit the public in the future." In the future, we aim to continue advancing and actively promoting such excellent technique to benefit more surgical patients.

Backgrounds

In 2005, a Target-Controlled Infusion (TCI) system, a PK and PD built-in computer that can estimate drug levels in the blood and brain and automatically modify infusion rate of narcotics and thus achieves target concentration in a short period, was first imported in Taiwan. In the same year, Department of Anesthesiology, Tri-Service General Hospital started to apply the technique of total intravenous anesthesia

with TCI to clinical settings. In comparison with the commonly used technique nationwide and worldwide, inhalation anesthesia, total intravenous anesthesia with TCI is a green technique with prospective environmental protection efficiency to reduce greenhouse effects. It not only can reduce recovery and intubation time, but also can promote the quality of anesthesia. Therefore, our department was certificated with SNQ by applying this anesthesia technique in 2007.



Total intravenous anesthesia with TCI has three advantages comparing with inhalation anesthesia:

First is to estimate recovery time and develop individualized anesthesia plan for the patient by calculating the level of narcotics when the patient is completely sedated and the age of the patient. Second is to reduce recovery and intubation time, so the economic performance of OR management can be enhanced. Third is to reduce the probability of post-surgical vomiting or nausea, so the vital signs during and after extubation can be stabilized and consequently improve the quality of anesthesia care effectively to meet the international requirements at present. For example, an improvement project called “Enhanced Recovery After Surgery” is using short-acting narcotics to prevent the patient from post-surgical nausea and vomiting; and another plan called “Perioperative Surgical Home” is aiming to reduce recovery and intubation time to increase the turnover rate of the OR.

Due to the characteristics of quick recovery, family of the patient received TCI anesthesia once called such technique as a “grateful anesthesia”. A patient awakens almost immediately after the surgery feeling as if having never underwent any anesthesia procedures, so they can express

their appreciation to the surgeon and anesthesiologists immediately.

Current Status

Implementation Rate and Team Work

Currently the implementation rate of total intravenous anesthesia with TCI is approximately 36% of daily systemic anesthesia, and the technique has been used extensively in all kinds of surgical (gynecology, neurosurgery, liver transplantation, general surgery, cardiovascular surgery, thoracic surgery, ophthalmology, ENT, oral surgery, colorectal surgery and orthopedics) anesthesia. Moreover, this technique is also applied to the following medical businesses: with health examination center, Department of gastroenterology and Department of pediatrics for gastroscopy/colonoscopy, endoscopic retrograde cholangio-pancreatography (ERCP) and endoscopic submucosal dissection for early gastric cancer; with department of neurology for deep brain stimulation; with department of neurosurgery for awake craniotomy; and with department of thoracic surgery for non-intubated video-assisted thoracoscopic surgery.

Publish a Localized and Standardized

Manual

To assure the safety and quality of the techniques of total intravenous anesthesia with TCI in clinical application, we have integrated previous user experience along with common Q & A and various surgical examples into a TCI Manual (in both English and Chinese). Hopefully this manual not only can be a standardized textbook for clinical practice and education, but also can help anesthetists or persons interested in learning such anesthesia technique be familiar with the technique faster, so more surgical patients can be benefited from this excellent anesthesia technique in the near future.

The Academic Outcomes of Becoming an International Demonstration and Training Center for Total Intravenous Anesthesia with TCI

In 2008, Department of Anesthesiology, Tri-Service General Hospital hosted the first real-time national demonstration of total intravenous anesthesia with TCI. Subsequently the department started to host training courses for total intravenous anesthesia with TCI since 2009. We used our publication TCI Manual as the demonstration textbook in conjunction with clinical observation and simulation-based education to actively promote such

excellent anesthesia technique nationwide. Currently, the results of a satisfaction survey targeting trained anesthetists reached perfect scores. We continue hosting lectures or demonstrations in individual medical associations, medical centers and hospital. In 2009, the international TCI Master Professor Schnider was invited to our department for visiting and lecturing, and our TCI technique was affirmed to be the worldwide excellence level. In 2010, the Chairperson of Philippine Society of Anesthesiologists and the members were visiting our department for learning TCI techniques.

So far, our department has published 9 medical articles regarding techniques of total intravenous anesthesia with TCI, which the academic achievement is the top in both quality and quantity nationwide. In addition, the numbers of our articles published in international journals comparing the effects on reducing recovery and intubation time between total intravenous anesthesia with TCI and inhalation anesthesia is ranked top worldwide (6/11). We hereby confirm that total intravenous anesthesia with TCI has three advantages mentioned previously relative to inhalation anesthesia.

Future Perspectives



Continue Advancing

1. Increase the budget to purchase more TCI systems and make TCI become standardized anesthesia system for individual OR in Tri-Service General Hospital.
2. Apply the technique of total intravenous anesthesia with TCI to awake craniotomy, non-intubated video-assisted thoracoscopic surgery, cardiac surgery and pediatric anesthesia.
3. Continue publishing anesthesia research outcomes to international journals.

Future Direction

1. Use new recovery-40 questionnaire to continue supervision and improve the quality of recovery after receiving total intravenous anesthesia with TCI.
2. Encourage inter-hospital collaboration to jointly develop and advance the techniques of total intravenous anesthesia with TCI.
3. Become the global demonstration and training center for total

intravenous anesthesia with TCI.

A family member of a patient received total intravenous anesthesia with TCI once wrote us a thank you letter titled "Anesthesia: The Changes and the Effects" stating that: "I'm grateful for the doctor's patient-centered and humanity-based treatment. A small change makes a big difference, which brings us great benefits. I believe that this great technique not only will benefit the patients, but also will benefit the public in the future." In the future, we aim to continue advancing and actively promoting such excellent technique to benefit more surgical patients.

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Figure 1: Group photo at the Tri-service General Hospital department of anesthesiology.

Figure 2: Symbol of National Quality (SNQ) certificate of 2007.

Figure 3: Symbol of National Quality (SNQ) certificate of 2015.

Figure 4: TCI Manual for Applying Total Intravenous Anesthesia (English and Chinese versions).

Figure 5: Group photo for the TCI intravenous anesthesia training course.

Figure 6: Group photo with the President and members of the Philippine Society of Anesthesiologists (PSA) who visited the headquarters of the Taiwan Society of Anesthesiologists.

麻醉一甲子，安全品質 e 世紀 —— 中國醫藥大學附設醫院麻醉部

撰文 / 陳坤堡 部主任、黃淑芬 麻醉護理師、高金英 資深行政助理

本院肝臟移植手術為台灣移植案例第二多之醫院，透過精湛的手術與優質的麻醉，讓這些嚴重度高的病患術後存活率達到甚高水平：首年存活率超過 90%，三年存活率超過 80 %。

本科部自 2013 年 9 月開始設計與推行麻醉電子病歷，2015 年榮獲第 16 屆醫療品質獎（智慧醫療類智慧醫院組）、「麻醉智慧整合系統」及「麻醉前評估系統」並已通過專利申請。未來期望以「麻醉 e 化整合照護及智慧管理」系統之完整資料庫，分析產生實證研究資料成果，創造公共利益並提升社會福祉。

發展背景

中國醫藥大學附設醫院麻醉部成立於 1980 年，迄今本院麻醉總人次突破 60 萬例，在這 36 年的麻醉歷程中，努力於提供病人安全與高品質的麻醉服務，因此在臨床、教學與研究佔舉足輕重之地位。除了一般麻醉以外，更積極協助醫院發展各種器官



圖一：2002 年中部首例活體肝臟移植。

移植手術，其中肝臟移植手術為台灣移植案例第二多之醫院，雖然病況嚴重但術後存活率高：首年存活率超過 90%，三年存活率超過 80 %。

現況

肝臟移植麻醉成就斐然

本院各項麻醉種類豐富，並積極發展各種器官移植手術麻醉，早在 2001 年就進行本院第一例肝臟移植手術，迄今每年有超過 120 例之活體肝臟移植手術麻醉，總計累積病例超過 700 例，為台灣肝臟移植案例第二多之醫院，這些困難度極高之重症病人，透過手術團隊精湛的手術與麻醉團隊優質的麻醉，80% 肝臟移植病人

術後加護病房入住時間少於 24 小時，15% 病人手術中不需輸注紅血球、10% 病人手術中不需要輸注任何血液製品，並有高術後存活率：首年存活率超過 90%，三年存活率超過 80 %。

【安全與品質】榮獲國家品質標章

本院自 1980 年創院以來，不斷網羅優秀麻醉醫師，並積極培育訓練麻醉專科醫師為麻醉界注入新血。在硬體設備上不斷增購新型儀器設備，提供醫師與病人良好的麻醉醫療品質。



圖二：榮獲 2005 年國家品質標章。

為提升麻醉品質於 2001 年率先成立「麻醉品質維護小組」，由專責護理師負責術後病人訪視，並定期於科部會議中檢討改進。2005 年以「麻醉病人安全與品質維護」為主題，以病人安全目標為管理策略，榮獲國家生技醫療產業策進會國家品質標章。

2015 年在超過 3 萬個麻醉病人

中，ASA I 佔 24%、ASA II 佔 46%、ASA III 佔 26%、ASA IV 佔 3%、ASA V 佔 0.31%、ASA VI 佔 0.02%，重症病人已超過百分之二十五，在重症比例如此高之下，更顯著需品質維護以提升麻醉醫療照護品質。

【e 化與智慧管理】榮獲醫策會智慧醫療類標章獎

為迎接醫療進入 e 化的世紀，近期我們努力於麻醉電子病歷的設計與推行。以醫學中心來說其困難點在於複雜度高的麻醉需數種儀器的監測，且臨床服務業務區域甚廣，因此要全面推動麻醉病歷電子化十分艱鉅。



圖三：20151209 智慧醫院。



圖四：第 16 屆醫療品質獎 (智慧醫療類智慧醫院組)。

本科部自 2013 年 9 月開始設計與推行，由陳坤堡部長親自領軍規劃，由本部醫師、護理師與資訊室人員組成推動小組，分四個階段推動，經過兩年的努力，於 2015 年 10 月 1 日全面 e 化，同年以「麻醉 e 化整合照護及智慧管理」榮獲第 16 屆醫療品質獎 (智慧醫療類智慧醫院組)。

「麻醉智慧整合系統」及「麻醉前評估系統」申請專利並已獲通過。其整體創新與突破擁有以下特色，是我們引以為傲的：

一、單一介面設計：全方位電子麻醉記錄單，易於查閱及操作。

二、數據自動傳輸：多種廠牌機型數據整合，立即呈現自動傳輸，減少重複查詢及人工抄寫的時間。

三、運用行動裝置：簡化流程，降低工作量。

四、雲端 APP 運用：建立 APP 軟體，病人可雲端輸入個人病史，APP 並有專門麻醉衛教專區，病人可以得到文字與影音之衛教。

五、門診區提供互動式裝置：提升醫師看診效率，縮短病人麻醉前門診候診時間。

六、自動計價設計：由麻醉記錄過程自動計價，避免漏帳。

七、警示功能提醒：體溫異常；麻醉「高風險族群」；過敏史及過去病史；文字顏色警示區隔；輸血利用 Barcode 機核對血袋，資料不符時警示窗提醒；記錄單異動權限。

八、資訊即時掌握：即時查閱病人麻醉中狀況。

九、電子病歷安全：設計限制使用者權限。



圖五：中國醫藥大學附設醫院麻醉部團體照。

未來展望

中國醫藥大學附設醫院麻醉部未來展望期望以「麻醉e化整合照護及智慧管理」系統之完整資料庫，作為

臨床研究統計數字之依據，分析產生實證研究資料成果，可預期對病人及醫療院所，創造公共利益並提升社會福祉。

Backgrounds

The Department of Anesthesiology in China Medical University Hospital was established in 1980. To date, the total volume of anesthesia services in our hospital has officially gone higher than 600,000 persons. During the past 36 years of anesthesiology development, we devoted ourselves to patient safety and high quality of anesthesia service. Therefore, our hospital has occupied a leading role in clinic, teaching and research among colleague hospitals providing similar services. In addition to general anesthesia, our department also actively assists CMUH developing organ transplantations. For example, CMUH has performed the second most number of cases of liver transplantation in Taiwan. The post-surgical survival rate of these critically ill patients are above average; that is, the 1-year survival rate is over 90%, and 3-year survival rate is more than 80 %.

Current Status

Excellent Achievement in Anesthesia for Liver Transplantation

Our department is able to support various anesthesia for different surgeries, and we are also focusing on developing anesthesia for organ transplantation actively. In

2001, we have performed the first liver transplantation in CMUH. To date, there are more than 120 live liver transplantations performed in CMUH annually. In addition, the total number of patients received live liver transplantation in our hospital is already more than 700 persons, which made CMUH the second hospital performed the most cases of liver transplantation in Taiwan. Through sophisticated surgical techniques and excellent quality of anesthesia, 80% of patients received liver transplantation stay in ICU for less than 24 hours, 15% of them do not require RBC transfusion during the surgery, and 10% of them do not require any peri-operative blood product transfusion. Moreover, the survival rates of these critically ill patients are rather high. That is, the 1-year survival rate is over 90%, and 3-year survival rate is more than 80 %.

Our "Security and Quality" has Won SNQ Award

Since the opening in 1980, our hospital constantly recruits excellent anesthesiologists and actively cultivates talents to consolidate our service team. As to hardware, our anesthesiologists continuously purchase new facilities to provide good quality of anesthesia to the patients.

The Model and Pioneer of Anesthesiology -China Medical University Hospital, A Hospital with e-Program and Secured Quality

Kuen-Bao Chen, M.D.* Shu-Fen Huang** Chin-Ying Kao***

*Chief, Department of Anesthesiology **Anesthesia Nurse ***Executive Assistant

Abstract

Our hospital has performed the second most number of cases of liver transplantation in Taiwan. Through sophisticated surgical techniques and excellent quality of anesthesia, the post-surgical survival rate of these critically ill patients are above average; that is, the 1-year survival rate is over 90%, and 3-year survival rate is more than 80 %.

We started to design and promote electronic anesthesia medical record since September, 2013. Our program was awarded by the 16th Healthcare Quality Improvement Campaign (Smart Healthcare, Smart Hospital) in 2015. In the same year, our patent rights to "Integrated System of Smart Anesthesia" and "Pre-anesthesia Evaluation System" was approved. In the future, we aim to use the comprehensive database "Integrated Healthcare and Smart Management of e-Anesthesia" as a statistical reference of clinical research and thereby analyze the outcome of EBM. Hopefully it will create public interests and enhance social welfare to the patients and medical institutes.

To improve the quality of anesthesia, our hospital took the lead and established an “Anesthesia QC Team” in 2001. A full-time registered nurse is responsible for reviewing post-surgical patients and proposes improvement plan in the department meeting regularly. In 2005, our hospital was awarded SNQ due to our management strategy on patient's safety based on the project “Patient's Safety and the Maintenance of Anesthesia Quality.”

In 2015, more than 30,000 patients underwent anesthesia in our hospital, and the 24% of them were classified as ASA I, 46% of them were classified ASA II, 26% of them were classified as ASA III, 3% of them were classified as ASA IV, 0.31% of them were classified as ASA V, and 0.02% of them were classified as ASA VI. That is, more than 25% were in critical conditions. In this case, a focus on anesthesia quality is specifically important for this population.

The program “e-Anesthesia and Smart Management” was Awarded in Healthcare Quality Improvement Campaign for Smart Healthcare

To welcome a new era of e-anesthesia, we have devoted to the design and promotion of electronic anesthesia medical record ever since. The challenge for a medical center is that a complex anesthesia procedure

requires multiple monitors, and the responsible area of clinical service is rather huge. Therefore, it is quite challenging to promote an overall electronic anesthesia medical record.

Our department started the design and promotion plans since September 2013. Our Director Kuen-Bao Chen served as a team leader, led our physicians, registered nurses and IT staffs to form a facilitation group, and conducted the program in four stages. After two years efforts, our hospital was completely paper-free (becoming an e-hospital) on October 1, 2015, and was awarded in the 16th Healthcare Quality Improvement Campaign for our program called “Integrated Healthcare and Smart Management of e-Anesthesia” (Smart Healthcare, Smart Hospital) in the same year.

The patent rights of “Integrated System of Smart Anesthesia” and “Pre-anesthesia Evaluation System” have been approved. The overall system is composed of innovation and breakthrough features that we are proud of:

1. Single interface design: A comprehensive electronic anesthesia record, easy to review and operate.
2. Automatic data transmission: To integrate data from multiple devices (or from different company models)

and transmit the data immediately and automatically to improve the efficiency of searching and hand copying.

3. The application of mobile devices: To simplify the process and reduce workload.
4. The application of cloud app: Create apps for patients to key in personal medical history to the cloud. In addition, the apps are equipped with an exclusive anesthesia education (including texts and videos) section for patients to access.
5. Interactive devices at the clinics: To improve the efficiency of medical services and to reduce waiting time for anesthesia.
6. Automatic pricing: The cost of anesthesia is calculated automatically during the entire procedure to reduce the error of omission.
7. Alert function: For people with abnormal body temperature, “high risk populations,” people with allergy or past history; for isolation (depending on letter/color codes), to alert data mismatch (e.g. verify the barcodes on the blood bag and patient hand ring before transfusion), and to limit the access to all records.
8. Real-time information: Reviewing real-time condition during anesthesia.
9. The security of electronic medical record: User's right is limited.

Future Perspectives

In the future, we aim to use the comprehensive database “Integrated Healthcare and Smart Management of e-Anesthesia” as the statistical reference of clinical research and thereby analyze the outcome of EBM. Hopefully it will create public interests and enhance social welfare to the patients and medical institutes.

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Figure 1. The first live liver transplantation in central Taiwan in 2002.

Figure 2. 2005 SNQ Award.

Figure 3. 2015/12/09 Smart Hospital.

Figure 4. The 16th Healthcare Quality Improvement Campaign (Smart Healthcare, Smart Hospital).

Figure 5. Group Photo.

品質提升與電子化

——馬偕紀念醫院麻醉科

撰文／陳建全 主任、林盈均 總醫師、張人尹 總醫師

馬偕麻醉科的使命是提供高品質的醫療服務、教學訓練與醫學研究。為維持良好的品質，每個案例在麻醉後都會登錄，事後分析、檢討並改善。馬偕品質資料庫已電子化逾十年，其他麻醉相關表單亦逐年電子化，藉此達到提升照護品質、增進病人安全、加強流程效率、促進團隊溝通、減輕麻醉技師負擔與友善環境無紙化的願景。

發展背景

安全與品質向來是麻醉的首要目標，為提升病人的照護品質，良好的品質管理系統不可或缺。馬偕麻醉科的品質資料庫為科內同仁獨立建置之系統。此品質管理系統對麻醉醫護人員照顧病人的品質有顯著的提升效

果，更是全國首見的一套專業麻醉醫療品質資料庫。由於系統設計十分優異，許多醫院也直接移植此套系統使用中。此套麻醉指標雲端管理系統參加第十五屆醫療品質獎—智慧醫療類榮獲品質指標標章，再次展現其深度與精度。

現況

品質資料庫

這套系統由科內所有同仁共同努力與維護，使用已逾十個年頭，龐大的資料量提供每月、每季、每年統計的來源，以數據化方式持續監控各個品質項目。品質項目總共有46項，包含術中和術後的各種併發症。科內同仁會參考品質資料庫的資料，定期開會、檢討、研擬改善方案，經歷無數次流程改善的循環，使本品管資料庫

圖二：麻醉記錄電子化衍生出即時中央監控站功能，在院內網路所及處均可持續關注病人狀況。



在擴充的同時持續精緻並符合現況，為病人安全與品質提升盡心盡力。

麻醉相關表單電子化

接續品質資料庫的建置，馬偕也著手規畫麻醉記錄單的電子化，藉由全面電子化來達到提升照護品質、增進病人安全、加強流程效率、促進團隊溝通、減輕麻醉技師負擔與友善環境無紙化的目標。我們的特色如下：

一、系統整合：從術前評估訪視、術中麻醉記錄表單、術後訪視單、術後疼痛控制訪視單、術中術後品質管理系統到麻醉計價單生成，這一串連式的整合，使資料得以完整呈現，使缺漏狀況降至極低，使記錄前後一致且不需重複輸入，找尋相關資料均能迅速精確。

二、系統自動帶入：舉凡基本資料、術前檢查、病史診斷、雲端藥

歷等資料都有自動匯入相關欄位的功能，減少手動鍵入的需求、避免輸入錯誤的可能性、提升病歷完整度與完成效率。術前評估部分開發病人填寫頁面，可自動匯入醫師評估的頁面，特殊麻醉註記則自動匯入排程，讓所有與刀人員皆能共同注意；術中麻醉狀況依定義自動勾選品質管理選項做



圖三：麻醉指標雲端管理系統。由同仁開發的品質指標資料庫歷經多年的演變，累積龐大數據做為分析改善的依據，亦於第十五屆醫療品質獎—智慧醫療類榮獲品質指標標章。



圖一：新版麻醉品質指標記錄輸入畫面。



為記錄、訪視與事後檢討的依據；術中麻醉方式等資料亦會帶入術後訪視單的相對應欄位，讓訪視人員可以立即瞭解病人狀況，加速評估與衛教過程。

三、智慧化評估：術前評估系統針對疾病嚴重度提供即時定義，避免記憶落差影響評估結果；同時依據病人與醫師勾選的內容，自動推估各項風險值、需要注意事項及特殊交班事項，杜絕忙碌中出錯的可能性。

四、警示系統：術前評估系統面對醫師點選有絕對禁忌症的麻醉處置時會自動跳出警示視窗做為提醒，若病人為高風險病人，更會在排程做記號呈現，並以明顯的方式在評估頁面上做提醒。術中麻醉記錄有異常檢查值的自動警示、藥物種類與劑量異常的警示，以及輸入完整度的警示，做為全方位的提醒。

五、跨時間、跨單位溝通與交班：術前評估系統有對內（麻醉人員）交班的設計與對外（外科團隊）提醒的機制，以簡訊及彈跳視窗做為媒介。術中麻醉記錄則整合跨單位交班系統，方便雙方能手持同樣的資料進行溝通，提升病人安全。

六、即時麻醉資訊掌握：透過院內網路，麻醉人員可以遠端連線觀看

各個開刀中病人的麻醉記錄單，即時掌握病人狀況。

未來展望

藉由品質資料庫與電子麻醉表單的結合，透過不止歇的追求，讓記錄、計帳趨於臻美，是我們共同的目標。憑藉持續改善品質與效率的過程，累積豐富經驗是不變的堅持。我們相信精準、確實、完整、即時的資訊與記錄是品質的根基，結合多年的統計與新擴增的大量數據更是提升病人安全與照護品質的原動力，這都將促使我們更堅定地邁步向前。



圖四：第十五屆醫療品質獎—智慧醫療類榮獲品質指標獎章獎狀與現場簡介實況。

Quality Improvement and Electronic Technology

The Department of Anesthesiology, Mackay Memorial Hospital

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Abstract

Our mission is to provide high quality of medical service, education/training and research. To ensure such quality, each case is registered after practice for future analysis, review and improvement. An electronic quality database has been applied by Mackay Memorial Hospital for over ten years, and anesthesia-related sheets have been made into electronic form to improve care quality, patient safety, work efficiency and team communication, and to reduce the burden on nurse anesthetists and paper consumption in order to align with the environmental-friendly policy.

Backgrounds

Safety and quality are the primary goals of anesthetic practice, and good management is crucial for improving care quality. The quality management system(QMS) of Department of Anesthesiology, Mackay Memorial Hospital is solely created by Department staff. This QMS significantly improves patient care, and is the first professional anesthesiology database for quality purposes. The system is outstanding and was directly adapted by several hospitals. This cloud anesthesia indicator system acquired quality indicator awards in

the smart indicator of 15th HQIC, proving its versatility and accuracy.

Current Status

Quality Database

Maintained by anesthesiology staff, this system has been adapted for over ten years; its large data size provides monthly, seasonal and annual statistics for digitalized quality surveillance. There are forty-six quality items, including the complications took place during and after operation. With the data from the quality database, department staff hold routine meeting to

review and make better plans. Countless improvements have been made to expand the system more detailed for better patient safety and service quality.

Anesthesia Information Management System

In addition to the quality database, Mackay Memorial Hospital made anesthesia records into electronic form as an effort to improve care quality, patient safety, work efficiency and team communication, and reduce the burden on nurse anesthetists and paper consumption in order to align with the environmental-friendly policy. Our features include the following:

1. Integrated system: Pre-operative assessment, anesthesia record, post-operative visit sheet and pain control visit sheet, quality-assurance system during and after operation, and the generation of anesthesiology quotation sheet, are integrated to provide accurate and comprehensive information. It avoids incomplete documentation and to reduces the need of repeat insertion, and achieves rapid and accurate searching of related information.
2. Automatic access: Demographic data, pre-operative examination, past medical history, National Health Insurance PharmaCloud system are automatically

accessed from the system to reduce manual insertion which may lead to errors. It also improves completeness of medical record and work efficiency. In part of patient information sharing, which automatically access assessment from physician, is developed for pre-operative assessment. Anesthesia-related remarks are automatically access to inform the operation room staff. Indicators of Quality-assurance are automatically selected based on anesthesia status and predefined criteria to provide the basis for recording, visit and future review. Visiting personnel will be immediately provided with patient condition to facilitate assessment. Further education with the anesthetic approach were automatically inserted into the corresponding columns of post-operative visit sheet.

3. Smart assessment: Pre-operative assessment system provides real-time identification of disease severity, which prevents from any bias caused by memory gap, and provides risk estimation, items needing attention and shifting notes to eliminate problems arising from busyness.
4. Warning system: When physicians select the anesthesia approach that is absolutely contraindicated, a warning

message is shown. For high-risk patients, the schedule is marked as a clearly visible reminder in the assessment page. The operative anesthesia record is designed, in a comprehensive fashion, with warning mechanism for abnormal examination values, drug types and/or dosage, and the completeness of inserted information.

5. Real-time interdisciplinary communication and shifting: Pre-operative assessment system provides shifting (internally for anesthesiologists) and reminder (for surgical team) via SMS or pop-up window. Intraoperative anesthesia record is integrated into an interdisciplinary shifting system to allow these personnel communicate with identical information for improved patient safety.
6. Availability of real-time anesthesia information: Institutional intranet allows anesthesiologists to access the anesthesia record of each patient during operation for real-time information.

Future Perspectives

Combining quality-assurance database with electronic anesthesiological sheets is one of the approaches in our endless pursuit of perfect recording and financing. While we continue quality and efficiency

improvement, we do not alter our faith in practical experience. We believe that accurate, reliable, comprehensive and real-time information and recording is the basis of quality. Years of statistical data and new data is the driving force of patient safety and care quality and will lead us toward our goals.

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Fig.1 Screen shot of new anesthetie quality indicator selection system.

Fig.2 Real-time central console derived from electronic anesthesiology record provides access of patient condition at anywhere institutional intranet is available.

Fig.3 Cloud-based anesthetic indicator management system: Internally developed quality database evolved and large amount of historical data is available for defining goals of improvement. This system was granted with quality indicator award of smart indicator 15th HQIC.

Fig.4 Certification of inherit Quality indicator smart Medicine and the conference site of 15th HQIC.

優化麻醉品質管理系統提升麻醉安全保障 —— 衛生福利部雙和醫院麻醉科

撰文 / 程毅君 主任、羅博瀚 主治醫師、劉孟琦 主治醫師、劉桂蓉 技術組長、王芷葳 秘書

麻醉安全是手術病人最基本的保障，在安全的前提下才能進一步提供高品質的服務。雙和醫院麻醉科在業務發展的同時，即同步建立單位內品質管理的架構與流程，目前已建置 20 項與麻醉照護相關的標準作業規範，以及 12 項的恢復室照顧基準，期待在一致的作業基礎下能夠減少錯誤發生的機率。

此外，我們在手術麻醉的全期建立了多項監測指標，透過長期固定的資料蒐集與趨勢觀察，來推動改善計畫，並廣泛的運用 PDCA、RCA、FMEA、TRM、以及 HVA 等品質管理工具，來提升麻醉品質與病人安全，過去七年以來已持續推動壓瘡防治、減少低體溫、降低手術後噁心嘔吐、與火災防範等十餘項品質改善專案。

發展背景

麻醉是高度專業的學門，知識與技術是病人安全的必備條件。但除了這些技能外，尚需要有多面向的管理與規範，例如藥品管理、儀器設備管理、衛材管理、作業流程標準化、異常事件管理、文件管理、教育訓練、與病人安全文化之落實等，才能進一步邁向高品質的境界。除了這些之外，醫療團隊之間的互動與溝通亦是重要的環節與關鍵，因此如何讓不同單位之間的轉換或照顧者之間的轉換能夠無縫接軌，有賴一個穩定且良好的溝通機制，藉由充分且密切的團隊合作，才能邁向高醫療品質的目標。

醫療品質管理是醫療風險管理的

一環，惟有透過完善的管理機制，方能由錯誤中學習到經驗，由失敗中找到改進的方向。本科依循著醫院的宗旨與願景，秉持提升麻醉品質與病人安全的目標，逐步完善管理的架構。

在指標部分，我們藉著「由上而下的指標監測」與「由下而上的異常事件通報」來達到管理的目的。指標的項目涵蓋手術前、中、後期三個階段，監測的範圍也擴及手術室外之麻醉業務，例如死亡率、併發症發生率、手術重返率、區域麻醉後副作用或合併症、全身麻醉後副作用或合併症、以及各項軟硬體問題等。

在異常事件部分，我們鼓勵通報，強調不究責、不處罰的文化，對重大事件亦建立即時處理的機制，目

前已建立了約 40 項的通報項目，讓錯誤的經驗變成學習教案，以知識共享的概念提醒全科同仁，避免相同問題再次發生。

現況

一、麻醉科品質管理架構

本科品質管理架構依麻醉工作流程設定管理指標或異常事件通報項目，定期於每月第三週與第四週的品管討論會及死亡與併發症討論會中檢討。對於跨單位的重大案例，則在每兩個月舉辦的全院圍術期會議中討論。

二、異常事件管理

對於異常事件的處理，本科訂有標準流程，並依嚴重度矩陣 (SAC-Severity Assessment Code) 之分級作處理。對於 1 級或 2 級之重大事件則執行 RCA(根本原因分析, Root Cause Analysis) 根本原因分析，例如恢復室重插管、輸血錯誤、以及過敏反應等案例；而對於數量多但嚴重度不高的事件，則以 PDCA(戴明循環, Plan-Do-Check-Action) 進行改善，例如低體溫、氣管插管後喉嚨痛、皮膚壓瘡等。

三、參與手術室行政效率之改善



圖一：品質指標管理流程圖。

手術室團隊包含麻醉科醫護、外科系參與手術之醫師與技師（包含醫學生）、手術室護理同仁、清潔與傳送人員等，每個單位甚至每個人都掌控一部分可能影響流程順暢與否的關鍵點。明訂各責任區塊後各司其職，經定期檢討改善，方能減少時間浪費，以提高效率。其中 A1~A3 為麻醉科需要負責與改善的部分：



圖二：手術流程圖。

四、危機管理

除了醫療品質指標外，我們也重視員工與環境安全。過去運用了 FMEA(失效模式與效應分析, Failure Mode Effective Analysis) 與 HVA(脆弱度分析, Hazard Vulnerability Analysis) 做了危害物質 (Cidex) 與火災 (熄燈演習) 等風險事件之預防與管理。

五、發展麻醉資訊系統

資訊與數據的正確蒐集是問題分

析的基礎，全面資訊化後才能忠實呈現原貌。

本科中長程規劃如下：

- ◎ 除麻醉記錄單外，其餘表單皆進入電子化，如諮詢單、術後訪視記錄單、品管記錄單、疼痛控制記錄表、以及恢復室記錄等。
- ◎ 建立資料庫，具搜尋、擷取、分析等功能。
- ◎ 大數據分析與研究，見圖四電子麻醉紀錄單。

六、培訓與教育

品質管理需要實務的培訓與學習，特別是品管手法與工具的應用，例如 QC 新舊七大手法、RCA、HVA、或 FMEA 等，適當的運用可以提升管理效率並做有效的分析。

本科重視教育訓練與師資的培育，目前已有多名主管完成醫策會團

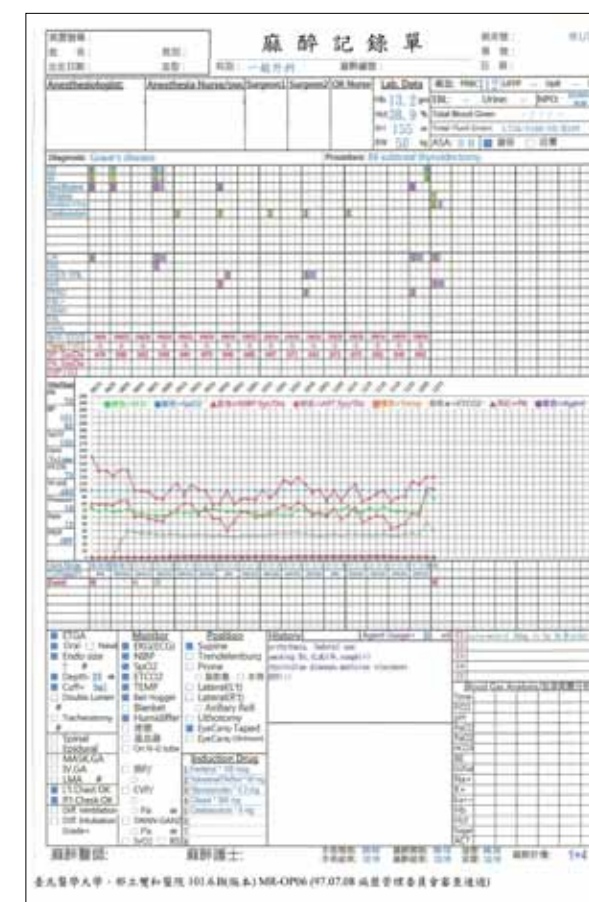
結果	死亡	極重度傷害	重度傷害	中度傷害	無傷害或輕度傷害
頻率					
數週	1	1	2	3	3
一年數次	1	1	2	3	4
1-2年一次	1	2	2	3	4
2-5年一次	1	2	3	4	4
5年以上	2	3	3	4	4

圖三：嚴重度矩陣分級，資料來源：財團法人醫院評鑑暨醫療品質策進會。

隊資源管理師資營或實踐營之資格、統計管制圖訓練 (Statistical Process Control)、本院 RCA 工作坊之培訓、以及初階 / 高階品管圈之課程等，期待藉由主管能力的成長，帶動病人安全文化之風氣，達到提升醫療品質與病人安全的目標。

未來展望

品質改善永無止境，雙和醫院麻醉科成立僅八年，仍有很大的學習努力空間，無論在人員素質、臨床服務、



圖四：電子麻醉紀錄單。

教學研究、或品質管理上，均需投入更多的心力，未來將依短、中、長期目標，一步一腳印地努力，設定之目標如下：

一、人才培育層面

人員素質是提供高水準醫療與高品質服務的基礎，未來除招募適當的醫療團隊外，將投入資源致力於人才之培育。

二、教育訓練層面

人文關懷與結構式情境教學是未來的方向，本科將以六大核心能力的精神來設計教案與課程，廣泛運用 i-Stan 模擬假人來訓練實習醫學生、住院醫師與護理人員。

三、臨床服務層面

提升麻醉諮詢完成率與諮詢滿意度，並加強交班制度與團隊溝通機制，更落實麻醉計畫之執行；積極改善臨床照顧品質，提升服務精緻度。

四、醫學研究層面

持續投入實證研究，以系統性之設計深入分析，並廣泛應用於臨床照顧措施，提升照護素質。

五、邁向醫學中心之水平

標竿醫學中心之教學、研究與臨床服務，截長補短，邁向高水平之境界。

Optimizing Anesthesia QC System for Improved Patient Safety

Department of Anesthesiology, Taipei Medical University-Shuang Ho Hospital

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Abstract

Anesthesia safety is a fundamental safeguard for patients undergoing surgeries, and that will make high quality medical service possible. Along with the development of clinical anesthetic services in our hospital, the structure and process of quality control had been established at the same time. Twenty anesthesia-related standard operating procedures and twelve recovery room care standards had been set up to achieve consistent process and rules of anesthetic management, in order reduce malpractice or mistakes as possible. In the meanwhile, we selected several important indicators throughout perioperative period for long-term monitoring and subsequent improvement plan. Appropriate quality control tools selection will be very helpful in managing system problems, such as Plan-Do-Check-Action (PDCA), Root Cause Analysis (RCA), Failure Mode Effective Analysis (FMEA), Team Resources Management (TRM) and Hazard Vulnerability Analysis (HVA). Within past seven years, we illustrated and engaged in over 10 projects for continuous improvement, such as prevention of pressure sores, hypothermia, post-operation nausea and vomiting, fire prevention, and etc.

Backgrounds

Anesthesia is a highly professional scientific field, and both knowledge and techniques are assumed as essential elements for patient safety. Besides, many associated

aspects of management are directly related to the excellence of medical quality, such as pharmacy, equipment, devices, materials, standardized operating procedure, abnormal event reporting system, file management, staff education and training, and the

culture of patient safety. In addition, good cooperation and communication between different departments is absolutely necessary to ensure the clinical practice perfect.

Quality control in medical service is an important part of institutional risk management, and a comprehensive and healthy system will provide a chance to learn from non-promising results or errors. Our department takes a stepwise approach to achieve a safe organization, just as our hospital mission and vision. The indicators "surveillance (descending pathway)" and "abnormal event reporting (ascending pathway)" are initiated to facilitate

management of anesthetic quality control. Indicators include those of preoperative, intraoperative, and postoperative stages, and the surveillance also extends to the anesthesia service outside the operation room, such as mortality and complication rate, re-operation rate, side effects associated with regional and general anesthesia, as well as other software and hardware problems. For abnormal events, we encourage self-reporting and emphasize the policy of "no blame, no punishment, and immediate response" principle. Approximately forty quality items have been established in the past 8 years, and all the experience of medical events are shared

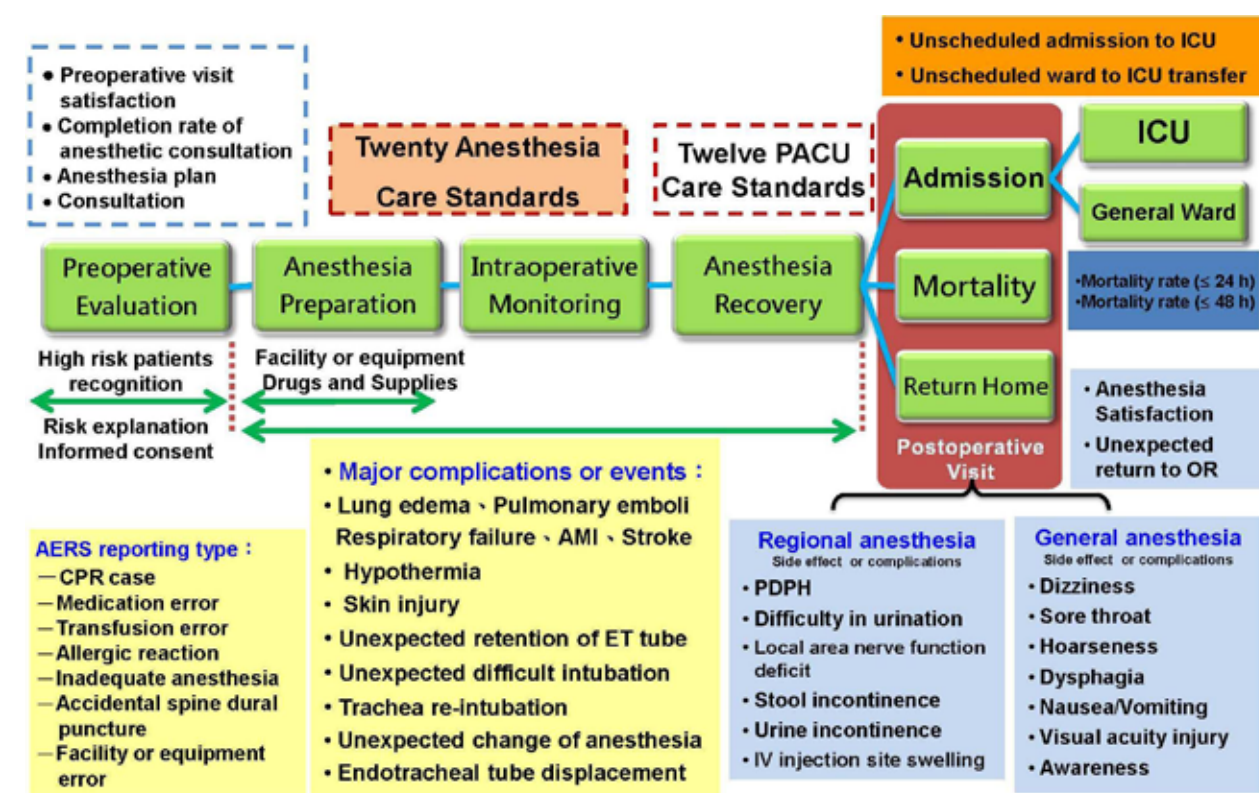


Figure 1. Quality indicators management flowchart.

with our colleague to avoid the repeated mistakes.

Current Status

1. Organization of Anesthesia Quality Management

The infra-structure of quality management in anesthetic department was setup according to the process of clinical work. Anesthetic indicators and adverse events were reviewed routinely in the QC meeting as well as mortality and morbidity conferences, which were held in the third and fourth week of each month respectively. Furthermore, major and serious complications involving multiple departments would be discussed in perioperative conferences every two months. The interdisciplinary problems or process will be re-examined at that time.

2. Abnormal Event Management

In our Department, we have standard procedures for managing abnormal events by using the Severity Assessment Code (SAC) as grading criteria. RCA is initiated for class 1 or 2 (significant) major events, such as re-intubation in recovery room, transfusion error or allergic reactions. For frequent events with minor injury, they are usually traced and reviewed with

Deming cycle (PDCA). (e.g. hypothermia, sore throat after endotracheal intubation, pressure sores, and etc.)

Severity Assessment Code (SAC)

Outcome	Death	Extreme	Major	Moderate	Minor or Insignificant
Frequency					
Frequent (almost certain)	1	1	2	3	3
Probable (likely)	1	1	2	3	4
Occasional (possible)	1	2	2	3	4
Uncommon (unlikely)	1	2	3	4	4
Remote (rare)	2	3	3	4	4

Figure 2.SAC- Severity Assessment Code, From: Joint Commission of Taiwan.

3. Operation Room Administration Improvement

Multi-discipline team is devoted to the safety of each surgery. The operation team includes anesthesiologists, nursing anesthetists, surgeons, surgical assistants, circulating and scrub nurses, cleaning and transfer personnel and so on. Each unit or individual might play an important role in a successful surgery. Every mission is assigned and routinely reviewed to avoid time wasting and to improve efficiency. In the diagram below, department of anesthesiology takes the responsibility of A1~A3:

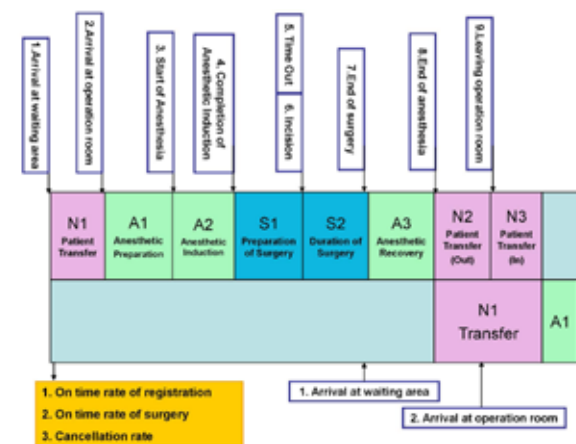


Figure 3.Operation flowchart.

4. Risk Management

Besides medical quality indicators, we also emphasize staff and environmental safety. Risk prevention and management was ensured with FMEA- and HVA-based exercise for hazardous substances (Cidex) and fire (light-off exercise).

5. Development of Anesthesia Information System (AIS)

Correct information and data collection is the basis of problem analysis, and the reliability and accuracy of such information and data is secured by a comprehensive information system.

The long-term plans of our Department include the following:

1. All charts other than the Anesthesia Record, such as preoperative consultation sheet, post-operation visit record, QC record, pain control record and recovery room record, are made into electronic

form.

- 2.Establish a database with searching, extraction, analysis and other features.
- 3.Big data analysis and research.

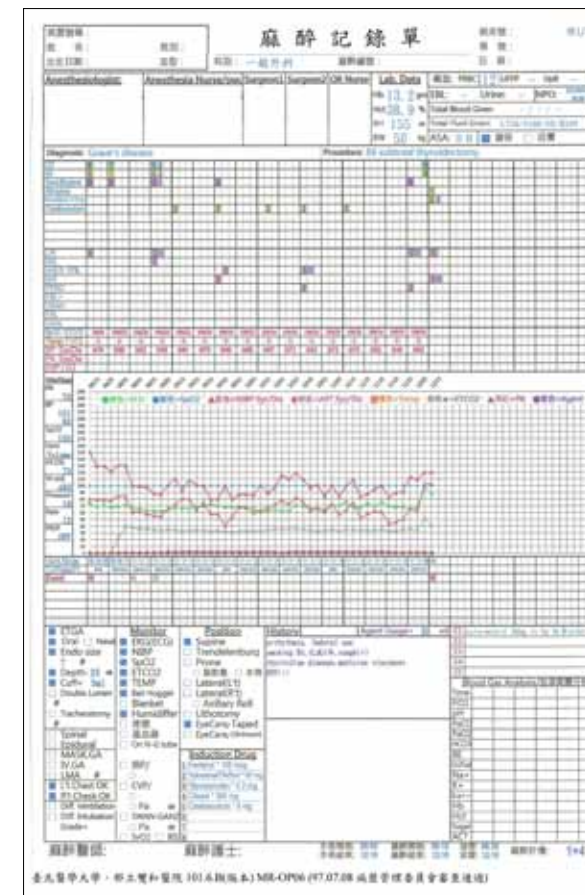


Figure 4.Electronic Anesthesia record.

6. Training and Education

Quality control requires practice-based training and learning, especially quality control approach and tool application, for example, seven innovative/traditional QC approaches, RCA, HVA or FMEA. Appropriate utilization helps facilitate management efficiency and effective analysis. This Department emphasized

the importance of education and faculty training. Several staff have completed the team resource management (TRM) faculty training of Joint Commission of Taiwan, Statistical Process Control (SPC), RCA workshop training, and starter/advanced QC cycle education. It is expected that the improvement of managers' skills will promote patient safety and the quality of medical service.

Future Perspectives

Quality improvement never ends. Shuang-Ho Hospital was established just eight years ago and it still has great potential to make progress in staff expertise, clinical service, education, research or quality management. A stepwise model containing short-, middle- and long-term goals is applied and includes the following:

1. Staff Training

Staff quality is the basis of high level medical service. Adequate resources will be provided to build medical team and continuous training.

2. Education and Training

Humanistic solicitude and simulating education are becoming the new trend. We will design educational material and curriculum and widely apply i-Stan simulator training for medical students,

residents and nurses.

3. Clinical Service

We will try the best to improve pre-anesthetic visit completion rate, patient satisfaction, hand-over mechanism, and team communication in order to formulate an appropriate anesthetic plan. Also, aggressive attitude and prompt effort will be initiated in improving clinical care quality and making the service more delicate.

4. Medical Research

We plan to pay more attention in evidence-based research and systemic review, and then apply such results into clinical practice to improve quality of service.

5. Medical Center as a Goal

Our goal is targeting to the level of medical center in the models for education, research and clinical services. We look forward to sustainable and persistent improvement.

科部沿革 Introduction of Organizations

臺中榮民總醫院麻醉部

撰文 / 洪至仁 主任

臺中榮民總醫院（以下簡稱中榮）是位於臺中市西屯區大肚臺地上的一家「醫學中心」級公立醫院，隸屬國軍退除役官兵輔導委員會。成立於1982年7月1日，原為『臺北榮民總醫院臺中分院』。中榮為中部地區唯一公立醫學中心，擔負著培養與訓練醫師重大的責任外，也期許維持高品質的麻醉以維護病患安全，並從事試驗與研究新式麻醉藥劑、麻醉技術和止痛方法以更提升麻醉與止痛的品質。

發展背景

中榮麻醉科1982年成立時，由甫完成沙烏地阿拉伯醫療支援任務的左海生醫師擔任科主任，從整理單位環境到採買各項儀器設備，從無到有且樣樣齊全、井然有序，終於在1982年10月31日正式開幕營運。開幕第一個月，麻醉人數為五十一人次，隨著業務邁入軌道，業務量漸次繁重，次年麻醉人數已呈十倍以上成長。

初期手術室有十六間，因人員不足，僅有十二間手術室運作，十八位

麻醉護理人員加上五位麻醉醫師，每日早上七點上班就進入手術室準備，晚上也常常需要加班，每天工作逾十個鐘頭。因人手不足，遂於1984年9月15日招訓中榮第一期麻醉訓練班，共五十四名學員，為期一年的麻醉訓練，於1985年9月結訓。中榮留用二十七名，其餘分發至北榮。隨著業務日趨增加，至今中榮麻醉護理人員已擴編為九十二名。

現況

1988年7月11日，中榮改制升格為「行政院國軍退除役官兵輔導委員會臺中榮民總醫院」。1989年7月1日麻醉科改為獨立科，成為一級單位。

2013年11月，配合國軍退除役官兵輔導委員會組織調整，中榮麻醉

科在歷經4位科主任的領導之後，升格為麻醉部，並下設一般麻醉科、婦幼麻醉科、心胸麻醉科與疼痛科，共4個次專科。

中榮麻醉部在歷任院長、副院長及各級長官指導下逐步發展，完成中部地區第一例成功的肝臟移植麻醉、完成ECMO的台灣第一個動物實驗。在中台灣，中榮麻醉部率先應用硬脊膜外止痛術於手術後疼痛患者、脊椎內注射嗎啡治療癌症疼痛患者；並常規使用食道超音波於開心手術麻醉的麻醉部，皆創中部地區麻醉的先驅。目前積極發展超音波神經阻斷術，提供疼痛門診病患更完善的治療，並且協助高風險病患的麻醉與術後止痛；一般麻醉科與婦幼麻醉科致力於高風險病患之圍手術期病人安全與品質提升，心胸麻醉科與心臟血管中心合作，積極發展小傷口心臟手術。

重要成就

一、1984年3月3日協助完成中台灣首例屍腎換腎手術。

二、1991年成立「肝臟移植麻醉小組」，選派優秀成員赴美國芝加哥大學，學習肝臟移植麻醉一個月，於同年7月17日協助完成中南部首例

《麻醉儀器回顧》



圖二：創院時採購之麻醉機。



圖三：1996年採購之賓士級麻醉機。



圖四：肺組織含水量監測儀。



圖五：1991年採購之ECMO儀器。



圖六：早期的電擊器。



圖七：早期的TOF機器。



圖八：中榮麻醉部第一台心臟超音波。



圖九：科技日新月異，儀器也隨之升級，中榮麻醉部的麻醉機已由最陽春的機型升級為頂級Drager Perseus A500麻醉機。



圖一：台北榮總台中分院麻醉技術人員訓練班第一期結訓留影。

肝臟移植手術。

三、1991 年推行「長期心肺體外循環生命支持術」，即利用心肺循環機及薄膜狀血氧交換器 (ECMO)，長期支持心肺功能，維持生命，亦可用於肝臟移植。

四、自 2005 年 12 月本院泌尿外科開始實行達文西機器人輔助手術，達文西機器人輔助手術對麻醉科是極大之挑戰，必須克服長時間的頭低擺位以及氣腹對生理帶來的影響，術中如何維持平穩的生命徵象與麻醉深度需要長時間的經驗累積，在麻醉部與泌尿外科合作下，至 2015 年 04 月 10 日共完成 1223 例。

五、經導管置入主動脈瓣置換手術 (TAVI) 在麻醉部與心臟內科、心臟外科合作下已完成 15 例。

未來展望

臺中榮總麻醉部為中部唯一一家公立醫學中心，臨床工作部分，致力提升麻醉服務績效、促進麻醉品質及病人安全，共創臺中榮總永續發展。教學部分，與臨床技能中心合作，藉由模擬人訓練情境，鼓勵麻醉護理人員以及住院醫師參與，目前已舉辦過

經食道 / 胸外心臟超音波工作坊，反應熱烈，未來朝麻醉危機處理與醫療團隊溝通的方向邁進，持續精進醫學教育。

The Department of Anesthesiology, Taichung Veterans General Hospital

Chih-Jen Hung, M.D.
Director, Department of Anesthesiology

Abstract

Taichung Veterans General Hospital ("TCVGH") is a public medical center governed by the Veterans Affairs Council and is located on Dadu Terrace, Xitun District, Taichung City. It was established on July 1 1982 and named "Taipei Veterans General Hospital, Taichung Branch". As the only public medical center in mid-Taiwan, TCVGH is responsible for physician training, it aims to maintain quality anesthetic practice for patient safety, and improve the quality of anesthesia and pain relief through studies and researches on new analgesics, anesthetic techniques and pain relief methods.

Backgrounds

TCVGH Anesthesiology was led by Dr. Hai-Sheng Tso, who returned from Saudi Arabia medical support mission and took the initiative in spatial design and utilization as well as equipment/device procurement. In the first month of operation, fifty-one person-times received anesthesia. The workload continued to rise and it grew to more than ten times when compared to the previous year.

In the beginning, sixteen operation rooms were deployed with only twelve running because of the lack of manpower.

Eighteen nurses and five anesthesiologists made themselves ready in operation room at 7 a.m. and they usually worked over-time: more than ten hours a day. To improve manpower availability, the first anesthesiologist training of this hospital was held on September 15 1984. Fifty-four students received a year of training and graduated in September 1985. TCVGH retained twenty-seven and the other half was assigned to Taipei Veterans General Hospital. Due to increased workload, there are ninety-two anesthesiology nurses in TCVGH now.



Current Status

On July 11 1988, the previous Taichung Branch was promoted to "Taichung Veterans General Hospital" and was governed by the Veterans Affairs Council, Executive Yuan. On July 1 1989, Anesthesiology was promoted to an independent primary division unit.

In November 2013, Anesthesiology was promoted to a department in the reorganization of the Veterans Affairs Council and includes four subspecialties: Clinical Anesthesiology, Pediatric, Obstetric & Gynecologic Anesthesiology, Cardiothoracic Anesthesiology and Pain Medicine.

TCVGH Anesthesiology continued to develop under the instruction of superintendents, deputy superintendents, and was the first institution in Mid-Taiwan to successfully perform liver transplantation anesthesia and animal ECMO experiment. In Mid-Taiwan, TCVGH was the first to apply epidural anesthesia to post-operative pain patients, intraspinal morphine injection for cancer-related pain, and routinely apply esophageal ultrasound for open-heart surgery anesthesia. We are currently developing ultrasound nerve blocking to provide a more complete treatment portfolio for pain medicine and to assist

in the anesthesia and post-operative pain relief of high-risk patients. The divisions of Clinical Anesthesiology and Pediatric, Obstetric & Gynecologic Anesthesiology are committed to the improvement of peri-operative patient safety and service quality for high-risk individuals, while Cardiothoracic Anesthesiology cooperates with Cardiovascular Center.

Key Achievements

1. March 3 1984: Assisted in the first cadaveric kidney transplantation in Mid-Taiwan.
2. In 1991, established "Liver Transplantation Anesthesia Team" and sent members of high performance to the U.S. Chicago University for one-month anesthetic technique training. On July 17 of the same year, the team provided support in the first liver transplantation in Middle and Southern Taiwan and was successful.
3. In 1991, promoted "prolonged extracorporeal life support" with cardiopulmonary bypass and extracorporeal membrane oxygenation (ECMO) to provide prolonged cardiopulmonary support and life maintenance. This can also be used for liver transplantation.

4. Since December 2005, the Urology of this hospital started applying da Vinci surgical system in operation. This is a great challenge to Anesthesiology as the physiological changes associated with patient positioning and pneumoperitoneum require much attention. Much experience is required to maintain stable vital sign and sedation. As of April 10 2015, a total of 1223 cases were done by the cooperation team of Anesthesiology and Urology.
5. Fifteen cases of transcatheter aortic valve implantation (TAVI) have been completed by the cooperation team of Anesthesiology, Cardiology and Cardiac Surgery.

Future Perspectives

As the only public medical center in Mid-Taiwan, TCVGH is committed in improving anesthetic performance and quality as well as patient safety, and becoming a sustainable medical institution. In terms of education, we work with Clinical Skill Center and establish training context with simulated patients. The involvement of Anesthesiology nurses and residents is encouraged. Our transesophageal/transthoracic echocardiogram workshop was successful and we will continue the

development on the education of anesthesia risk management and medical team communication.

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Figure 1.A Photo of the first anesthetic technician training of Taipei Veterans General Hospital, Taichung Branch.

Figure 2. Anesthetic device procured at foundation.

Figure 3. "Mercedes Benz"-class device procured in 1996.

Figure 4. Pulmonary tissue moisture monitor.

Figure 5. ECMO device procured in 1991.

Figure 6. Early defibrillator model.

Figure 7. Early TOF device.

Figure8. The first echocardiogram of TCVGH Anesthesiology.

Figure9. Devices are improved with technology. The early model is now replaced to the top-grade Drafer Perseus A500.

國立成功大學醫學院附設醫院麻醉部

撰文 / 曾稼志 主任

國立成功大學為百年傳統優良大學，為一包含理、工、文、商、管及醫各學院之完全大學。本院是台南地區後送手術中心，也是移植手術重點醫院。因此本部除需支援各類型麻醉包含新生兒及成人複雜心臟手術麻醉外，心、肝、肺、腎各種器官移植之麻醉也是本部所擅長。

教學為本院成立之源，也是本部創院來最重要傳承。本部配合醫學院教學理念，重視人文素養及醫學倫理精神，期望培養出既是科學家也是社會公民的優秀麻醉醫師。

發展背景

國立成功大學為百年傳統優良大學，早年以工學院為主幹，逐步發展成完全大學，包含理、工、文、商及管理各學院，在醫學院及附設醫院成立後更加完整，本校優勢在所有學院均坐落在由東寧路、前鋒路、東豐路及林森路圍成大學城之中，已成為學術、研究、教育之中心。

教學為本院成立之源，也是本部創院來最重要傳承。所以本部配合醫學院教學理念，以訓練有人文素養及醫學倫理精神，並有豐富的醫學知識、良好的溝通能力、能利用科學方法解決問題，以及具有終生學習的態度，期望培養出既是科學家也是社會公民的優秀麻醉醫師。

現況

本院是台南地區後送手術中心，也是移植手術重點醫院。因此本部除需支援各類型麻醉包含新生兒及成人複雜心臟手術麻醉外，心、肝、肺、腎各種器官移植之麻醉也是本部所擅長。我們的疼痛中心，更精通各種疼痛之處理，尤其以射頻燒灼 (RFA) 處理困難疼痛更為麻醉界之翹楚。

民國 77 年 6 月 12 日國立成功大學醫學院附設醫院開幕，麻醉學科及麻醉部亦於同年成立。首任主任為張傳林教授，以拓荒者的精神來開拓南部地區的麻醉醫學，為外科手術病人

提供安全麻醉的保障，進而提升外科醫療品質。當時只有 4 位醫師、10 位護士即將麻醉科成立起來，於民國 77 年 6 月 20 日於本院開第一例手術，迄今每年手術病例不斷增加，目前每月已逾 2500 例，其麻醉品質，有目共睹。

在張教授的傳承下，歷經蔡玉娟副教授、曾稼志副教授、劉彥青副教授擔任部主任，均秉承堅持醫學倫理的要求。醫學中心應維護醫療制度提高醫療品質，兼顧教學，非醫師不宜從事醫療行為，醫護應分工合作，各司其職。麻醉工作應由醫師親自執行，為了要堅持此一理念，在當時，



圖一：1988 年 06 月成大醫學中心創院紀念及當時醫院前景以及麻醉同仁。



圖二：1998 年 06 月成大醫學中心創院紀念及手術房實景以及麻醉同仁。



圖三：2004 年 06 月成大醫學中心創院壹拾陸年及醫學院希波克拉底誓言陶壁以及麻醉同仁。

本院是全台灣唯一做到醫師親自執行麻醉工作的教學醫院。唯有如此才能落實維護醫療制度，提升麻醉與外科醫療品質，否則不但於法不合，而且難以延攬到優秀的麻醉醫師人才。在成大醫院麻醉部成立 29 年來，由於堅持此一理念，才得使外科同仁安心的去發揮他們專長，成功的完成各種困難的外科手術，其中麻醉醫師實功不可沒。

蔡玉娟主任更落實院訓以病人為中心的理念，於 92 年 7 月建立疼痛治療室，為疼痛病患建立一個治療疼痛的理想環境。麻醉術前門診於 98 年 5 月在院方的支持下開辦，這不僅是額外提供病友與家屬了解麻醉安全資訊之窗口，亦提升病友對手術麻醉之滿意度，同時增進手術效能，減少不必要之檢查，抑減醫療浪費。



圖四：成大醫學中心全景，宏偉壯觀的醫學院正門以及後方醫院大樓，歷三十年如新，為創院院長黃崑巖教授親自監造。

曾稼志主任以心臟麻醉為專長，帶動高危險麻醉發展，成功支援成大移植手術之發展，並引入腦神經監測系統，提升臨床麻醉醫療之水準。且特別重視教學，首創送資深住院醫師到美國康乃爾醫學中心，學習重症醫療。

劉彥青主任擴大麻醉部規模，發展基礎研究，目前已有完整基礎醫學研究室，乃未來可以提供基礎麻醉醫學發展之重要基石。

未來展望

一、結合各學門專長持續發展高危險、高難度之麻醉。

二、建構優良學習環境，讓青年學者找到導師及機會，成為有人文素養的優良麻醉醫師。

三、持續推動成大多樣化氛圍，開拓青年視野，加速創新發展。

The Department of Anesthesiology, National Cheng Kung University Hospital

Alex, Chia-Chih Tseng, M.D.
Director, Department of Anesthesiology

Abstract

With one-century of history, National Cheng Kung University (NCKU) is a complete university system of science, engineering, art, commerce, management and medicine schools. This hospital is the hospitalist and surgical center and a key institution for transplantation. Besides the generalized practice as well as the complicated heart surgeries for neonates and adults, this Department also excels at the clinical practice related to heart, liver, lung and kidney transplantation.

Education is the mission of this hospital and is the core value of this Department. This Department aligns with the foundation of medical school, respects humanism and medical ethics, and expects the anesthesiologists from the Department excel at science and community service.

Backgrounds

In the early stage of its centennial development, engineering was the backbone of NCKU, it was later developed into a university with science, engineering, art, commerce, management and other schools, and the system becomes more complete with the medical school and university hospital. This university has the advantage of having the whole campus within the "university zone" surrounded by Dongning Rd., Qianfeng Rd., Dongfeng Rd. and

Linsen Rd. and has become regional academic, research and educational center.

Education is the mission of this hospital and is the core value of this Department. This Department aligns with the foundation of medical school to train anesthesiologists as scientists and community elites that respect humanism and medical ethics, are knowledgeable in medicine expertise, possess good communication skills, solve problems using scientific methods, and value lifelong learning.

Current Status

This hospital is the referral surgical center in Tainan area and the key institution for transplantation. Besides the generalized practice for neonates and adult complicated heart surgeries, this Department also excels at the practice related to heart, liver, lung and kidney transplantation. NCKU's pain center excels at pain management, especially radiofrequency ablation (RFA) for refractory pain.

On June 12 1988, National Cheng Kung University Hospital started operation, with Anesthesiology and Department was established in the same year. Professor C.L. Chang, the first department director, was a pioneer of anesthesiology in southern Taiwan, ensuring anesthesia patient safety and quality surgical practice. This Department started with four anesthesiologists and ten nurses, and participated the first operation on June 20 1988. The number of cases is on steady growth and more than 2500 operations are done monthly. This demonstrates this Department's quality practice.

Following the direction led by Professor Chang, Associate Professor Y.J. Tsai, Associate Professor C.C. Tseng, Associate Professor Y.C. Liu also addressed the importance of medical ethics. Medical

center should maintain profession integrity, improve service and education quality, and restrict clinical behavior to physicians. Physicians and nurses should abide and fulfill their roles. Analgesics should be administered by physicians, and this hospital is the only educational hospital requiring physicians to carry out such procedures themselves. This is required to maintain profession integrity and to improve service quality, and is essential for conformance and a positive factor for recruiting better anesthesiologists. For twenty-nine years, the Anesthesiology Department of NCKU Hospital faithfully has respected such value to provide surgical staff a reliable operation environment, allowing them to complete the most challenging missions.

As a department director, Tsai established pain management room in July 2003 as a demonstration of patient-centered practice, providing a better environment for pain control. Pre-operative anesthesiology clinics were established in May 2009 with the support of hospital authority, providing another channel for patients and their family to acquire anesthesia safety information, which improves service satisfaction and operation efficiency, reducing unwanted examinations and medical resource wasting.

As a department director and heart anesthetic specialist, Tseng led the

development of high-risk of anesthetic practice and supported the institutional development in transplantation. He also introduced cranial nerve monitoring system to improve clinical anesthesiology. He put emphasis on education and sent senior residents to Weill Cornell Medical College to learn critical care medicine.

As a department chief, Liu expanded the Department and took the initiative in fundamental research, paving the way to further anesthesiology research.

Future Perspectives

1. Interdisciplinary cooperation for developing high-risk, difficult anesthetic practice.
2. Create an environment that facilitates learning and allows young scholars to find mentors and opportunities to become an excellent anesthesiologists value humanism.
3. Continue promoting profession diversification in NCKU, widening the vision of younger generation and facilitating innovation and development.

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Figure 1. The Establishment Day of National Cheng Kung University Hospital in June 1988. The front view of the hospital and colleagues that worked in

Division of Anesthesiology.

Figure 2. The Establishment Day of National Cheng Kung University Hospital in June 1998. The photo of operating room and colleagues that worked in Division of Anesthesiology.

Figure 3. The 16th Anniversary of National Cheng Kung University Hospital in June 2004. Colleagues that worked in Division of Anesthesiology took a group photo in front of the ceramic wall with Hippocratic Oath in School of Medicine.

Figure 4. The panorama of National Cheng Kung University Hospital, including the magnificent main entrance of School of Medicine and the rear hospital building. The hospital was built under the supervision of Founding Superintendent Professor Kun-Yen Huang and the view is timeless over thirty years.



附錄 Appendix

麻醉大紀事 The Great Chronicle of Anesthesiology

清道光

清道光 27 年 (1847)	⌚ Sulphuric ether 傳入中國，Dr. Parker 首次於中國使用乙醚全身麻醉手術。
清道光 28 年 (1848)	⌚ 氯仿傳入中國。

清光緒

清光緒 13 年 (1887)	⌚ Cocaine 已被當作局部麻醉劑使用。
清光緒 15 年 (1889)	⌚ 在中國發生第一宗因西方麻醉方式而死亡的案例，一名小孩死於心臟衰竭。
清光緒 17 年 (1891)	⌚ 在中國發生第一個因 Cocaine 中毒的案例，患者為一個四個月大的嬰兒。

中華民國

民國 7 年 (1918)	⌚ Cocaine 為 Trpocaine 所取代。
民國 10 年 (1921)	⌚ 洛克菲勒基金會 9 月於北京投資四千五百萬美元，建立北京協和醫院，成為中國第一流醫學中心，當年協和醫院應用之麻醉仍以乙醚及笑氣為主，當時麻醉工作由 Mrs. Mary Loucks 擔任。
民國 17 年 (1928)	⌚ 在中國開始使用 Novocaine 執行尾椎阻斷術。
民國 26~34 年 (1937~1945)	⌚ 八年抗戰當時麻醉劑仍以乙醚、氯仿，間或使用氯化乙烷；抗戰末期美援之 Sodium pentothal 大量使用為全身麻醉劑。
民國 31 年、34 年 (1942、1945)	⌚ 台灣第一位女醫師蔡阿信於溫哥華 Vancouver 總醫院，跟麻醉學家 Freeze 醫師學習三個月麻醉醫學，之後於美國 Columbia 大學及 Presbyterian 醫院再學習三個月麻醉課程，是台灣第一個有專業訓練過的麻醉專家醫師，但未於台灣執行麻醉業務。
民國 35 年 (1946)	⌚ 艾世助教授赴美研習麻醉學，為本國首位研習麻醉學之公費留學生之一。
民國 40 年 (1951)	⌚ 有「台灣麻醉之父」尊稱的王學仕醫師於陸軍第一總醫院由外科轉而專攻麻醉科。當時麻醉使用氣管內管插入法 (Endotracheal intrbation)，促使國內胸腔外科之蓬勃發展。
民國 41 年 (1952)	⌚ 三軍總醫院成立麻醉科 (國內第一個成立之麻醉科)。
民國 42 年 (1953)	⌚ 臺大醫院成立麻醉科。
民國 43 年 (1954)	⌚ 國內麻醉同業 2 月首次召開麻醉臨床討論會。 ⌚ 國內首次應用肌肉鬆弛劑 (Muscle Relaxants)，第一次應用 Succinylcholine 上氣管內管，並續用箭毒素以維持肌肉之鬆弛。
民國 44 年 (1955)	⌚ 國內第一間麻醉後恢復室創立。
民國 45 年 (1956)	⌚ 臺大醫院麻醉科自外科獨立出來 (國內最早獨立之麻醉科)。

(文接上頁)

民國 45 年 (1956)	⌚ 國內第一個麻醉團體「中華民國麻醉學會」12 月成立。 ⌚ 台灣麻醉史上發生首件因使用乙醚麻醉而發生爆炸之案例。
民國 47 年 (1958)	⌚ 第一批正式接受專業訓練的麻醉科護士誕生 (台北榮民總醫院委託國防醫學院代訓麻醉護士訓練班)。
民國 48 年 (1959)	⌚ 台北榮民總醫院成立麻醉科。
民國 50 年 (1961)	⌚ 麻醉醫學會雜誌 1 月創刊。
民國 51 年 (1962)	⌚ 臺大醫院使用神經鎮靜止痛法 Neuroleptanalgesia 麻醉。
民國 53 年 (1964)	⌚ 在曾清楷教授推廣下，「硬脊膜外麻醉法」臨床上已被廣泛使用。
民國 53 年 (1964)	⌚ 成為「世界麻醉醫學會」正式會員國。
民國 55 年 (1966)	⌚ 於低流量麻醉法使用笑氣及氧氣麻醉。
民國 56 年 (1967)	⌚ 加入「亞澳麻醉醫學會」成為會員國。 ⌚ 高雄醫學院附設醫院成立台灣第一所疼痛科門診。
民國 57 年 (1968)	⌚ 完成國內首創腎臟移植手術，開啟國內器官移植手術麻醉時代。
民國 60 年 (1971)	⌚ 中華民國麻醉醫學於 6 月首次選出麻醉學家，頒發「麻醉學家證書」，共計七位。
民國 64 年 (1975)	⌚ 「中華民國麻醉學會」改名為「中華民國麻醉醫學會」。 ⌚ 「麻醉學會雜誌」改名為「麻醉學雜誌」。
民國 65 年 (1976)	⌚ 成立麻醉護士協會，於三軍總醫院研究大樓電化教室舉行成立大會。 ⌚ 長庚醫院首創麻醉次專科之設立。
民國 67 年 (1978)	⌚ 張傳林教授將芝加哥大學林重遠教授的「低流量閉鎖循環麻醉術」及「心臟麻醉術」引進國內。 ⌚ 趙繼慶醫師完成全國也是亞洲首例腹部坐骨三肢連體嬰之分割手術麻醉。
民國 71 年 (1982)	⌚ 臺大醫學院成立國內第一個麻醉醫學博士班。
民國 72 年 (1983)	⌚ 成立中部地區麻醉醫學會臨床研討會。
民國 73 年 (1984)	⌚ 中華民國麻醉醫學會與美國麻醉學會 (ASA) 開始交流契機，雙方交換出版品。 ⌚ 完成亞洲首例肝臟移植手術之麻醉。
民國 75 年 (1986)	⌚ 麻醉學雜誌 5 月獲得國際組織 ISDS 准予登記為國際雜誌，表示本雜誌已達國際水準。 ⌚ 趙繼慶教授發明雷射針灸法。

附錄 Appendix

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民國 77 年 (1988)	<p>㊦ 衛生署公告施行「麻醉科專科醫師甄審原則」，同時依據醫師法第七條規定，委託中華民國麻醉醫學會辦理初審工作；麻醉科專科醫師制度從此正式施行。</p> <p>㊦ 因受中國的阻撓及排擠，中華民國麻醉醫學會更改世界麻醉醫學會登記之英文名稱。</p>
民國 78 年 (1989)	<p>㊦ 成立中華民國疼痛醫學會，首任理事長為曾清楷教授。</p>
民國 79 年 (1990)	<p>㊦ 成立南部地區麻醉醫學會臨床研討會。</p>
民國 81 年 (1992)	<p>㊦ 召開中美麻醉安全研討會。</p>
民國 82 年 (1993)	<p>㊦ 衛生署通令公私立各級醫院，有關全身麻醉專用藥劑僅能由麻醉專科醫師處方及指導使用。</p> <p>㊦ 中華民國麻醉醫學會主辦「兩岸麻醉醫學教育研究和應用之比較研討會」，邀請大陸著名麻醉學者十五名來台參觀及演講，為當時規模最大的兩岸專科學術交流活動。</p> <p>㊦ 衛生署委託中華民國麻醉醫學會辦理專科醫師訓練醫院評鑑等事宜。</p>
民國 83 年 (1994)	<p>㊦ 中華民國麻醉醫學會正式取得舉辦第十屆 (1998 年) 亞澳麻醉醫學大會的資格。</p>
民國 84 年 (1995)	<p>㊦ 「麻醉學雜誌」首次榮獲「行政院國家科學委員會獎助國內學術研究獎勵類優良期刊」獎，並獲獎狀及補助金三十萬元。</p> <p>㊦ 衛生署公告修正「手術及麻醉同意書」格式，並分為「手術同意書」與「麻醉同意書」，定於 85 年 7 月 1 日起實施。</p> <p>㊦ 100 張病床以上的綜合醫院，如未有麻醉及放射線專任專科醫師者，依醫院之設置標準管理，其名稱不得使用「某某綜合醫院」。</p> <p>㊦ 台灣第一個為麻醉醫師設計之全球資訊網路設立，由臺大醫院范守仁醫師設計。</p>
民國 85 年 (1996)	<p>㊦ 「麻醉學雜誌」再度獲得「行政院國家科學委員會獎助國內學術研究優良期刊」獎勵類優良期刊獎，且獲獎狀及補助金額三十萬元。</p> <p>㊦ 衛生署同意醫院評鑑中，有關麻醉部份將邀請麻醉學專家參與。</p> <p>㊦ 中華民國麻醉醫學會、台灣麻醉品質促進會及許添財、陳光復立委召開「台灣麻醉品質公聽會」，討論如何提升台灣手術麻醉之品質與安全性。</p> <p>㊦ 中華民國麻醉醫學會召開「台灣地區麻醉安全嗎？」記者招待會，以期喚起社會大眾對麻醉安全之重視。</p> <p>㊦ 完成全亞洲首例人工心臟置換手術麻醉，人工心臟為台灣自製的「鳳凰七號」。</p>
民國 86 年 (1997)	<p>㊦ 由本會會員捐款成立之麻醉網站開始運作，以服務社會大眾和會員，名稱為「台灣麻醉醫學全球資訊網」(www.anesth.org.tw)。</p> <p>㊦ 鑑於國內麻醉專業的不受重視和品質不齊，由本會部分會員發起成立「中華民國麻醉安全保障協會」，由黃兆德醫師任首屆理事長，並協助本會督促政府和社會大眾重視麻醉安全和品質，並確立麻醉之專業權。</p>

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民國 87 年 (1998)	<p>㊦ 「第十屆亞澳麻醉醫學大會」由譚培炯教授任大會會長。</p> <p>㊦ 本會決議將「每年每名專任依專科醫師執行麻醉數不得超過 2000 例」列為申請評鑑醫院之必要條件，以突顯麻醉安全和專業的重要性。</p> <p>㊦ 本會配合高雄市政府衛生局辦理「麻醉醫療品質訪查」造成社會迴響。</p> <p>㊦ 衛生署與本會專家共同參與「麻醉監視標準及病人安全研討會」以呼應社會之需求。</p>
民國 88 年 (1999)	<p>㊦ 全身麻醉之專業權於 2 月公佈、9 月實施。</p> <p>㊦ 衛生署委託本會設計麻醉記錄之統一格式。</p> <p>㊦ 藥政處與本會聯繫成立 Dantrolene 預立為孤兒藥及公佈北中南東各地緊急狀況能取得之醫學中心。</p> <p>㊦ 為提高國人對麻醉安全之認知，舉辦海報設計比賽。</p> <p>㊦ 修改本會英文名稱為「Taiwan Society of Anesthesiologists」。</p> <p>㊦ 於全台各地成立麻醉人力資源網，因應麻醉專業權和安全品質之需求。</p> <p>㊦ 本會雜誌第三度獲國科會「優良期刊獎」。</p> <p>㊦ 亞洲首例國際合作分割肝臟移植，與香港大學接力完成。</p>
民國 89 年 (2000)	<p>㊦ 麻醉學雜誌第四度獲國科會「優等期刊獎」。</p> <p>㊦ 本會會員成立「中華民國心臟麻醉醫學會」，由蔡勝國教授任首屆理事長。</p> <p>㊦ 完成世界罕見之「成人型先天性主動脈阻斷病患之冠狀動脈繞道手術」。</p> <p>㊦ 完成世界首例「自體心臟移植」手術麻醉。</p>
民國 90 年 (2001)	<p>㊦ 本會會員組團前往昆明作兩岸麻醉專業和疼痛專業之交流。</p> <p>㊦ 本會雜誌第五度獲國科會「優良期刊獎」，且為生物醫學期刊第八名。</p> <p>㊦ 世界首例「三心人」心臟移植麻醉成功。</p> <p>㊦ 世界首例孕婦捐肝活體肝臟移植。</p>
民國 91 年 (2002)	<p>㊦ 內政部台內社字第 0910038567 號函，公告中華民國麻醉醫學會更名為台灣麻醉醫學會。</p> <p>㊦ 行政院衛生署衛署醫字第 0910073844 號函，修正麻醉專科醫師訓練課程綱要，並決議醫師如於訓練期間由其他科別轉入，提出與麻醉科專科醫師訓練程綱要所列訓練項目相關之訓練內容者，最高可承認為一年麻醉科訓練資歷。</p> <p>㊦ 本會雜誌第六度獲國科會「優良期刊獎」，且為生物醫學期刊第五名。</p>
民國 91 年 (2002)	<p>㊦ 11 月台北縣北城醫院發生護士將肌肉鬆弛劑 Atracurium 當成 B 肝疫苗注射造成七名新生兒受害，其中一名死亡。本會及時提出糾正，並於 12 月 3 日於立法院由立委蘇盈貴召集召開公聽會，與會人員有王志中、陳大樑、朱光興、孫維仁、林宗仁及曾瀧永醫師等，引起社會眾多迴響及主管機關的重視。</p>

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民國 92 年 (2003)	<div><div>⌚</div><div>進行台灣麻醉大體檢，發現台灣麻醉專科醫師嚴重缺乏，每位麻醉醫師之工作量太大，其工作量遠超過美國、日本、香港、新加坡及菲律賓。</div></div> <div><div>⌚</div><div>麻醉專科醫師以台北縣最為缺乏，每十八萬人口才有一位麻醉專科醫師，而台灣各縣市平均為 3.7 萬人口有一位麻醉專科醫師。</div></div> <div><div>⌚</div><div>3 月 12 日香港爆發非典型肺炎 (SARS) 其原始發生地為中國廣東鄉下。SARS 疫情很快蔓延世界各國包含台灣，而台灣的麻醉醫師無怨無悔地迅速肩負起抗 SARS 的任務，至第一線協助插管等緊急醫療救援工作，對 SARS 之疫情控制，病患之救治提供了卓越的貢獻。</div></div> <div><div>⌚</div><div>設立台灣麻醉醫學會學會獎，其中分為榮譽會員獎、卓越獎座獎、傑出研究獎及青年學術獎。</div></div> <div><div>⌚</div><div>由麻醉醫學會秘書長完成台灣「麻醉併發症暨死亡病例」問卷調查報告，總共收集了 81 家各類型之醫院資料，其中醫學中心 10 家、區域醫院 31 家、地區醫院 40 家。結果發現麻醉相關之死亡率在台灣為十萬分之十七，比起鄰國日本十萬分之一高出甚多。麻醉醫師人力仍然不足，重大併發症最常發生的場所為手術室內 (70%)、恢復室 (10%) 和其他地點 (20%)。</div></div> <div><div>⌚</div><div>第一屆榮譽會員獎得名單為歷任之麻醉學會理事長，卓越獎座獎得主為何善台教授，傑出研究獎得主為陳大樑教授，青年學術獎得主為楊寧正副教授。</div></div> <div><div>⌚</div><div>召開北、中、南「麻醉安全研討會」。</div></div> <div><div>⌚</div><div>9 月，由王志中理事長率團共 10 餘位會員應邀前往大陸武漢出席大陸麻醉年會，並發表多篇論文及大會演講。</div></div> <div><div>⌚</div><div>10 月，由王志中理事長率團共 20 餘位會員赴美國舊金山參加美國麻醉學年會，並發表論文。</div></div> <div><div>⌚</div><div>麻醉學雜誌經評定，榮獲九十二年度「行政院國家科學委員會將助國內學術研究優良期刊」優等期刊獎，並獲頒獎牌乙個及獎助款新台幣參拾伍萬元整。</div></div> <div><div>⌚</div><div>本會函行政院衛生署，並通過孤兒藥 Danteolene 為國內醫學中心必須備藥，並支援鄰近醫院。</div></div> <div><div>⌚</div><div>本會請 King Net 國家網路藥典將麻醉上使用的神經肌肉阻斷劑 NMBA 和肌肉酸痛常用的藥物分開，以免混淆。新光醫院設置術前麻醉評估門診，為全國第一個由麻醉專科醫師於病患手術麻醉前說明評估的門診，大幅提高病人的安全與麻醉的品質。</div></div>
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民國 93 年 (2004)	<div><div>⌚</div><div>從本年度起健保改總額給付制度，醫院之利潤再度受到壓縮。</div></div> <div><div>⌚</div><div>二版健保支付標準草案出爐，其中外科之相對漲幅高達 100% 以上，其他科部則相對被調降，麻醉給付也同時受害。本案雖經全體理監事多次和健保局溝通洽談，但皆無力改變健保局的決策。因此，可預見國內麻醉環境將日趨惡化，病患就醫安全及醫療品質將成為日後努力的方向。</div></div> <div><div>⌚</div><div>本會加入衛生署計畫，建置麻醉安全作業環境，並提出多種麻醉記錄表單的統一格式樣本。</div></div> <div><div>⌚</div><div>本會加入國衛院之計畫探討國內麻醉環境，提出麻醉環境惡化之各項事實供衛生署作為將來施政的參考。</div></div> <div><div>⌚</div><div>4 月，由王志中理事長率團近 50 位會員參加於巴黎舉行之第十三屆世界麻醉醫學會，會中有三位本會會員應邀演講，並擔任座長。</div></div> <div><div>⌚</div><div>由麻醉醫學會曾劍英秘書長完成台灣「麻醉併發症暨死亡病例」問卷調查報告，總共收集了 78 家各類型之醫院資料，其中醫學中心 15 家、區域醫院 40 家、地區醫院 23 家。並建議由麻醉醫學會成立『麻醉重大併發症暨死亡病例審查委員會』，以便案例的判讀是否精確，以及統計全國每年之結果。</div></div> <div><div>⌚</div><div>本會敦請行政院儘速提出前瞻性的麻醉醫療政策，以期大幅改善病患手術就醫安全及提升麻醉醫療品質。</div></div> <div><div>⌚</div><div>衛署公告修正新版「麻醉同意書」格式並推行之。</div></div> <div><div>⌚</div><div>本會行文衛生署對於「Dantrolene」，建議增加備藥醫院，及過期藥費由主管機關吸收。</div></div> <div><div>⌚</div><div>為邁向國際化及投稿便利性，將麻醉學雜誌投稿模式改為 E-mail 方式投稿。</div></div> <div><div>⌚</div><div>撰寫且發行第二版的台灣麻醉醫療回顧與展望。</div></div> <div><div>⌚</div><div>2004 年榮譽會員獎得主為黃芳彥副院長，卓越獎座獎得主為呂炳榮教授，傑出研究獎得主為汪志雄教授，青年學術獎得主為簡志誠教授。</div></div> <div><div>⌚</div><div>8 月在台北召開記者會，公佈 91 年、92 年台灣麻醉之相關死亡率報告，呼籲主管機關應注重民眾就醫安全，希望主管機關提出一套可大幅改善現狀的麻醉醫療政策，建置優良的麻醉醫療環境，也藉此做了一次非常成功且廣泛的民眾教育。</div></div> <div><div>⌚</div><div>創下心臟移植麻醉新里程碑——心臟離體 13 小時移植成功，此為世界最長紀錄。</div></div>
民國 94 年 (2005)	<div><div>⌚</div><div>提倡「麻醉全人照護」概念，希望漸進地使原本位於二線的麻醉工作逐漸移向一線，更能把麻醉專業人員的教育訓練及品質管理進行全面規範。</div></div> <div><div>⌚</div><div>實施住院醫師登錄系統，提升日後的專科醫師訓練素質，並為日後增設技術模擬考試做準備。</div></div> <div><div>⌚</div><div>開辦麻醉護士專業正規的教育制度，設立麻醉護理高等教育 (大學部與研究所)。</div></div> <div><div>⌚</div><div>設立惡性高熱 0800 通報與支援服務系統。</div></div> <div><div>⌚</div><div>建立財務稽核會計制度，對學會財務有外部專業會計師協助認證查核。</div></div>

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民國 95 年 (2006)	<ul style="list-style-type: none">㊦ 舉辦「台灣麻醉醫學會五十週年慶暨學術研討會」由蔡玉娟教授擔任大會會長。㊦ 「麻醉學雜誌」獲得「行政院國家科學委員會補助國內學術團體推廣業務計畫」補助金額五十萬元。㊦ 衛生署規定麻醉專科醫師繼續教育學分由舊制改為新制 (須在 6 年內達到 180 學分) 。㊦ 編撰「台灣麻醉五十年回顧」紀念專刊。㊦ 全球首例馬凡氏症候群病患二次主動脈置換術麻醉成功。
民國 96 年 (2007)	<ul style="list-style-type: none">㊦ 三軍總醫院以「使用標靶控制輸液之全靜脈麻醉」獲「SNQ 國家品質標章」，為國內第一個獲此殊榮麻醉專科。
民國 97 年 (2008)	<ul style="list-style-type: none">㊦ 制定新版專科醫師訓練醫院評鑑準則：由陳大樑教授為學會編撰，從過去注重硬體條件，轉為注重訓練計畫、課程、教學資源等偏重軟體項目的評估，並配合衛生署在訓練容額上做適當分配。㊦ 完成 97 年度麻醉重大併發症暨死亡病例調查，包括 19 家醫學中心，52 家區域教學醫院，34 家地區教學醫院。㊦ 雜誌在本年度與 Elsevier 出版社合作並完成改版，已爭取到國科會的補助，邀請世界各地知名學者擔任編輯委員，提升麻醉學雜誌的水平。
民國 98 年 (2009)	<ul style="list-style-type: none">㊦ 三軍總醫院舉辦亞洲首次之現場實況 TCI 全靜脈麻醉示範。㊦ 「麻醉學雜誌」獲得「行政院國家科學委員會補助國內學術團體推廣業務計畫」補助金額五十四萬元。
民國 99 年 (2010)	<ul style="list-style-type: none">㊦ 與越南軍方排名第一的 103 總醫院合作，在越南當地完成越南第一例成功的心臟移植麻醉，手術不需輸血，術後兩小時脫離呼吸機。
民國 100 年 (2011)	<ul style="list-style-type: none">㊦ 主辦麻醉專科醫師甄試，參考以色列作法於考試中試辦情境模擬測驗，創各醫學會先例，奠立日後於 2016 年正式將情境模擬測驗納入專科醫師甄試項目之基石。㊦ 與婦產科醫學會等其他單位合辦「醫療事故預防及補償國際研討會」。㊦ 健保政策委員會協辦醫療事故之預防及不責難補償制度國際研討會。

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民國 101 年 (2012)	<ul style="list-style-type: none">㊦ 功能委員會新設置王志中主委之「海峽兩岸交流委員會」、賈元一主委之「鎮靜麻醉委員會」、周安國主委之「進階氣道教育訓練委員會」、鄒美勇主委之「模擬醫學委員會」，使學會的功能運作更順暢更貼近會員的需求。㊦ 本會正式加入重症聯甄會，與重症醫學會、急救加護醫學會、胸腔醫學會、外科醫學會、急診醫學會成為聯甄會的一員，未來可辦理聯甄繼續教育學分課程。㊦ 理事長范守仁醫師代表參加衛生署舉辦「專科醫師人力發展政策研討會」。㊦ 品質安全委員會楊承憲主委代表出席醫策會「醫療品質與病人安全聯席會」。㊦ 101 年 10 月 27 日假三軍總醫院第三演講廳 & 臨床技能訓練及測驗中心 (OSCE) 舉辦。開啟麻醉醫學會為非麻醉醫師執行藥物鎮靜與氣道處置訓練之嶄新業務，並為國人接受醫美之醫療安全盡一份社會責任。
民國 102 年 (2013)	<ul style="list-style-type: none">㊦ 7 月發文健保局「全身麻醉時若面臨困難插管，或單肺呼吸之氣管內管定位，使用支氣管鏡來協助插管」增定專用申報碼及其支付點數。㊦ 完成本年度台灣麻醉醫學會麻醉醫師職場及工作安全滿意度調查。
民國 103 年 (2014)	<ul style="list-style-type: none">㊦ 台灣麻醉醫學會正式搬遷至固定會址辦公 (台北市大安區羅斯福路三段 271 號 4 樓之 3) 。㊦ 2014 年台灣麻醉醫學會終身成就貢獻獎得主：王學仕教授、何維柏教授、曾清楷教授、李德譽教授、譚培炯教授、魏志濤教授。㊦ 廖文進理事長代表學會至紐西蘭參加世界麻醉 2014 年會。
民國 104 年 (2015)	<ul style="list-style-type: none">㊦ 於學會網站新增醫學倫理專區。㊦ 104 年度開始訓練醫院評鑑改由 RRC 新制辦法，目前已加入 OSCE 考官要求給各訓練醫院配合，預計 105 年以後包括麻醉相關品質指標、Dantrolene 存量等也會訂定相關要求訓練醫院遵守。㊦ 「麻醉學雜誌」獲得「行政院國家科學委員會補助國內學術團體推廣業務計畫」補助金額五十萬元。㊦ 6 月 27 日，八仙樂園派對粉塵閃燃發生事故，台灣的麻醉醫師於第一線協助緊急醫療救援工作，分秒戮力地搶救生命，積極參與傷者清創及植皮手術麻醉及術後疼痛控制，盡力搶救傷者。
民國 105 年 (2016)	<ul style="list-style-type: none">㊦ 2 月 6 日，高雄美濃地震重創台南，當地麻醉醫師積極投入災害醫療救援工作。㊦ 編撰「鑽禧紀盛：台灣麻醉醫學會 60 週年特刊」。

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鑽禧紀盛：台灣麻醉醫學會 60 週年特刊
簡志誠等編著；張怡、郭書麟、汪郁榮 執行主編
初版 臺北市：台灣麻醉醫學會，2016【民 105】
288 面；21x29.7 公分 -(醫學叢書 ;001)
ISBN：978-986-83762-2-9 (精裝)
1. 台灣麻醉醫學會 2. 醫學史 3. 麻醉 4. 台灣

416.50933

105014574



鑽禧紀盛：台灣麻醉醫學會 60 週年特刊

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編輯顧問：羅珊

編輯秘書：陳思穎、謝郁君

出版發行：台灣麻醉醫學會

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郵政劃撥戶名：台灣麻醉醫學會

郵政劃撥帳號：01105113

出版製作：大康出版社

文創出版型態設計・木雕鑲嵌封面製作

總監／李翠瑩；主編／鄧以慧；美術／蕭彥伶；木雕創製／吳健維；鑲嵌設計／陳政耀

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電話：(02) 23628872 傳真：(02) 23626189

初版一刷：2016 年 10 月

精裝定價：新台幣 1,200 元

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