



Components	Information					
1. Division/ Department	 Anaesthesiology & Perioperative Medicine / Surgical Intensive Care Medicine / Respiratory & Critical Care Medicine 					
2. Title of Programme	Fellowship Training in Intensive Care Medicine (12 Months Max)					
3. Relevant Registrations	 Temporary Registration with Singapore Medical Council (SMC) Training employment pass application with Ministry of Manpower, Singapore (MOM) (upon successful Temporary Registration with Singapore Medical Council) 					
4. Overview 4.1 Background information	Singapore General Hospital (SGH) is the nation's largest academic medical center, renowned for its excellence in healthcare, research, and education. Our Intensive Care Medicine Fellowship programme is specifically designed to equip physicians with advanced skills and knowledge required to excel in the multifaceted field of critical care medicine.					
	The fellowship spans 12 months, combining clinical rotations, research, and educational activities. Fellows can rotate through each of the specialized ICUs (Surgical, Medical, Neuroscience, Cardiothoracic, Cardiology and Burns), gaining hands-on experience and comprehensive training in managing complex critical care conditions.					
	Fellows are expected to play an integral role in the ICU team, under the guidance of our experienced faculty. Responsibilities include:					
	 Providing direct patient care, managing both acute and complex cases with a multidisciplinary team. Participation in daily rounds, contributing to patient management plans. Supervision and teaching of residents, medical students and other allied healthcare practitioners, fostering a culture of interprofessional learning and mentorship. Engagement in procedural skills training, enhancing competencies in critical care procedures. 					
	Regarding pursuit of scholarly activities, fellows are encouraged to conduct or participate in clinical research or quality improvement projects, present findings at national and international conferences and engage in a wide range of educational activities, including workshops, seminars, and simulation-based training, to further enhance their knowledge and skills.					
4.2 Goal/ aim(s)	Upon completion of the fellowship, graduates will be adept at managing critically ill patients, leading multidisciplinary teams, conducting meaningful research, and contributing to the advancement of intensive care medicine. Our goal is to mold not only competent and skilled critical care physicians but also visionary leaders, innovative researchers, and compassionate educators who will shape the future of intensive care medicine globally.					





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	Aims:				
	 Clinical excellence and patient care Develop mastery in the diagnosis and management of a broad spectrum of critical illnesses across different specialties, ensuring fellows can provide compassionate, evidence-based and patient-centered care. Enhance procedural skills in critical care techniques, such as advanced airway management, central venous catheterization, arterial cannulation, bedside ultrasonography and hemodynamic monitoring. Foster a holistic approach to patient care, emphasizing the importance of communication with patients and their families, especially in decision making and end-of-life discussions. Leadership and tearnwork Cultivate leadership skills necessary for effective team management, including conflict resolution, team coordination and decision-making under pressure. Prepare fellows to lead multidisciplinary teams. Promote a culture of safety and quality improvement in the ICU. Research and innovation Encourage innovation in critical care practices, technologies, and methodologies. Education and mentorship Develop educators and mentors who can effectively pass on their knowledge and skills to learners, contributing to ongoing education within the community. Encourage lifelong learning, professional and personal development. 				
4.3 Duration	12 months				
4.4 Hyperlinks/URL Sites	https://www.sgh.com.sg/patient-care/specialties-services/surgical-intensive-care				
5. Target Audience	Doctors with post-graduate degree in Anaesthesiology, Medicine, or Intensive Care Medicine.				
5.1 Pre-requisite /eligibility requirement(s)	 General requirements for Temporary Registration for training (required by SMC): A basic medical degree from an accredited medical university or medical school Passed the relevant national licensing examination in the country of conferment of conferment of basic degree, where applicable Evidence of at least 12 months houseman-ship / internship with a certificate of satisfactory completion of houseman-ship or equivalent Been registered as a medical practitioner in the country where he is currently practising Been certified to be of good standing by the Medical Council or the relevant national authority 				





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	Note : The doctor should be in active clinical practice (and been registered as a medical practitioner in the countries of practice) for the 3 years preceding the application for medical registration in Singapore.					
	 In addition to the above criteria, Clinical Fellows must: a) Have a minimum of 3 years working experience as a medical officer (or equivalent) b) Fulfil English Language requirements of SMC if the medium of instruction for the basic medical qualification is <u>not</u> in English c) Preferably have obtained a postgraduate diploma or medical degree in his country or overseas d) Be sponsored by (i) the government, or (ii) regional health authority or (iii) an appropriate institution in the home country. For (d)(iii), the doctor must be on current full-time employment (40 hours or more per week) with the sponsoring institution. As a Clinical Fellow, the doctor will be allowed to be involved in patient care and make entries in patients' case note, communicate care plans to patients and fellow healthcare professionals, and perform procedures under <u>direct</u> supervision or Level 1 supervision under SMC's Supervisory Framework. Department's requirement, if any (only for Clinical Fellow in this subspecialty): Post-graduate degree in Anaesthesiology, Medicine or Intensive Care Medicine					
6. Learning Objectives	By the end of fellowship, the fellow should be able to:					
	 Demonstrate comprehensive understanding and proficiency in diagnosing and managing a wide array of critical illnesses, including complex cases across different specialties. Develop and implement comprehensive management plans for critically ill patients, including pharmacological and non-pharmacological therapies, while considering ethical and legal implications. Perform critical care procedures with high competence, including but not limited to airway management, mechanical ventilation central and arterial line placements, point-of-care ultrasonography, and advances life support techniques. Apply principles of evidence-based medicine to clinical decision-making, integrating latest research findings into patient care strategies. Communicate effectively with patients, families, and the multidisciplinary healthcare team, demonstrating empathy, respect, and professionalism. Lead and collaborate within multidisciplinary teams, fostering a culture of mutual respect, shared goals, and patient-centered care. Participate in educational activities of fellow healthcare providers of various disciplines (students, medical, nursing, respiratory therapy, physiotherapy, and pharmacy etc.), effectively transferring knowledge and skills in critical care medicine. Conduct or contribute to clinical research or quality improvement projects, demonstrating an ability to formulate research questions, design studies, analyze data, and interpret results. 					





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	 Demonstrate high standards of professionalism, including accountability, integrity, and ethical conduct in all aspects of patient care and professional interactions. Navigate ethical dilemmas in critical care, making informed decisions that respect patient autonomy, legal standards, and cultural considerations. Pursue continuous professional development, identifying personal learning needs, and engaging in lifelong learning to advance skills and knowledge in intensive care medicine. 			
7. Course/Training Syllabus	 Cardiovascular Physiology, Pathology, Pathophysiology, and Therapy Shock (hypovolemic, neurogenic, septic, cardiogenic) and its complications Myocardial infarction and its complications Cardiac rhythm and conduction disturbances Indications for and types of pacemakers Pulmonary embolism-thrombus, air, fat, amniotic Pulmonary edema-cardiogenic, noncardiogenic Cardiac tamponade and other acute pericardial diseases Acute and chronic life-threatening valvular disorders Acute aortic and peripheral vascular disorders, including arteriovenous fistulas Acute complications of cardiomyopathies and myocarditis Vasoactive and inotropic therapy Pulmonary hypertension and cor pulmonale Complications of angioplasty Principles of oxygen transport and utilization Hemodynamic effects caused by ventilatory assist devices Thrombolytic and anticoagulant therapy Perioperative management of patient undergoing cardiovascular surgery Recognition, evaluation, and management of hypertensive emergencies and urgencies Congenital heart disease and the physiologic alterations with surgica repair Noninvasive methods of cardiac output assessment (i.e., aortic Doppler indicator dilution techniques, etc) 			
	 a. Acute respiratory failure including acute respiratory distress syndrome and acute hypercapnic failure b. Status asthmaticus c. Smoke inhalation, airway burns d. Aspiration e. Chest trauma (e.g., flail chest, pulmonary contusion, rib fractures) f. Bronchopulmonary infections including bronchiolitis g. Upper airway obstruction 			
	 g. Near drowning h. Bronchopleural fistulas i. Pulmonary mechanics and gas exchange j. Oxygen therapy k. Hyperbaric oxygenation l. Mechanical ventilation 			





Components	Information		
	 i. Pressure and volume modes of mechanical ventilators, as well as advanced modes ii. Indications for and hazards of mechanical ventilation iii. Barotrauma and volutrauma iv. Criteria for extubation and weaning techniques v. Extracorporeal membrane oxygenation vi. Permissive hypercapnia vii. High-frequency oscillatory ventilation m. Airway maintenance i. Emergency airway management ii. Endotracheal intubation iii. Tracheostomy, open and percutaneous v. Long-term intubation vs. tracheostomy n. Ventilatory muscle physiology, pathophysiology, and therapy, including polyneuropathy of the critically ill and prolonged effect of neuromuscular blockers o. Pleural diseases i. Empyema ii. Pleural effusion iii. Pneumothorax iv. Hemothorax p. Pulmonary hemorrhage, and hemoptysis furic oxide and prostaglandin therapies Positional therapy (i.e., prone position, rotational therapy) Interpretation of chest radiographs and correlation with clinical status Renal failure: Prerenal, renal, and postrenal Derangements secondary to alterations in osmolality and electrolytes c. Acid-base disorders and their management d. Principles of renal replacement therapy and associated methodologies (hemodialysis, peritoneal dialysis, ultrafiltration, continuous arteriovenous hemofiltration, and continuous veno-venous hemofiltration) e. Drug dosing in renal failure f. Rhabdomyolysis g. Systemic diseases that involve the kidney (thrombotic thrombocytopenic purpura, hemolytic uremic syndrome)		
	 Central Nervous System Physiology, Pathology, Pathophysiology, and Therapy 		
	 a. Coma Metabolic, traumatic, infectious, mass lesions, vascular-anoxic or ischemic, drug induced Assessment and prognosic 		
	 b. Hydrocephalus and shunt function and dysfunction c. Psychiatric emergencies 		
	 d. Perioperative management of patient undergoing neurologic surgery e. Brain death evaluation and certification f. Diagnosis and management of persistent vegetative states 		





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	 g. Management of increased intracranial pressure, including intracrania pressure monitors h. Status epilepticus i. Neuromuscular diseases causing respiratory failure j. Traumatic and nontraumatic intracranial bleed k. Traumatic brain injury l. Axonal shear injury m. Neuromuscular blockade: Use, monitoring, and complications 						
	5. Metabolic and Endocrine Effects of Critical Illness						
	a. Nutritional support i. Enteral and parenteral ii. Evaluation of nutritional needs including indirect calorimetry						
	 6. Endocrine a. Disorders of thyroid function (thyroid storm, myxedema coma, sick euthyroid syndrome) b. Adrenal crisis and insufficiency (primary and secondary) c. Disorders of antidiuretic hormone metabolism d. Diabetes mellitus and diabetic emergencies e. Pheochromocytoma f. Electrolyte disorders including Na, K, Mg, Ca, PO4 g. Glucose management 						
	7. Infectious Disease Physiology, Pathology, Pathophysiology, and Therap						
	 a. Antibiotics Antibiotics Antibacterial agents including aminoglycosides, penicillin, cephalosporins, quinolones, and newer emerging classes of antibiotics Antifungal agents Antituberculosis agents Antituberculosis agents Antiviral agents Antiviral agents Antiviral agents Antiviral agents Agents for parasitic infections b. Infection control for special care units Isolation and reverse isolation Sepsis definitions (sepsis, septic shock) Tetanus Hospital-acquired and opportunistic infections in the critically ill Adverse reactions to antimicrobial agents ICU support of the immunosuppressed patient Acquired immunodeficiency syndrome Transplant Oncologic Infectious risks to healthcare workers Evaluation of fever in the ICU patient 						
	8. Physiology, Pathology, Pathophysiology, and Therapy of Acute						
	a. Acute defects in hemostasis						
	b. Anticoagulation; fibrinolytic therapyc. Principles of blood component therapy						





Components	Information					
	 d. Acute hemolytic disorders including thrombotic microangiopathies e. Acute syndromes associated with neoplastic disease and antineoplastic therapy f. Sickle cell crisis and acute chest syndrome g. Plasmapheresis h. Prophylaxis against thromboembolic disease i. ICU-acquired anemia 					
	 9. Physiology, Pathology, Pathophysiology, and Therapy of Acute Gastrointestinal, Genitourinary, and Obstetrical-Gynecologic Disorders Perioperative management of surgical patients Postoperative complications including fistulas, wound infection, and evisceration Acute pancreatitis with shock Upper gastrointestinal bleeding, including variceal bleeding Lower gastrointestinal bleeding Toxic megacolon and pseudo-obstruction syndromes (i.e., Ogilvie's) Acute perforations of the gastrointestinal tract Ruptured esophagus Acute inflammatory diseases of the intestine Acute and fulminant hepatic failure Drug dosing in hepatic failure Stress ulcer prophylaxis 					
	 10. Physiology, Pathology, Pathophysiology, and Therapy of Acute Genitourinary Disorders a. Obstructive uropathy, acute urinary retention b. Urinary tract bleeding 					
	 11. Physiology, Pathology, Pathophysiology, and Therapy of Acute Gastrointestinal, Genitourinary, and Obstetrical-Gynecologic Disorders a. Placenta previa and abruption b. Peripartum cardiomyopathy c. Toxemia of pregnancy, amniotic fluid embolism, HELLP (hemolysis, elevated liver function tests, and low platelet count) syndrome, ovarian hyperstimulation d. Hydatidiform mole 					
	 12. Environmental Hazards a. Drug overdose and withdrawal b. Temperature-Related Injuries c. Envenomation d. Altitude sickness e. Decompression sickness f. Biological and chemical terrorism g. Radiation exposure 					
	13. Immunology and Transplantation					





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	 a. Principles of transplantation (organ donation, procurement, preservation, transportation, allocation, implantation, maintenance of organ donors, national organization of transplantation activities) b. Immunosuppression c. Organ transplantation: Indications preoperative and postoperative care d. Transplant-related infectious disease 				
	14 Troume Burne				
	 14. Irauma, Burns a. Initial approach to the management of multiple system trauma b. Central nervous system trauma (brain and spinal cord) c. Skeletal trauma, including the spine and pelvis d. Chest trauma, blunt and penetrating e. Abdominal trauma, blunt and penetrating f. Crush injury g. Burns h. Electrical injury 				
	 15. Monitoring, Bioengineering, Biostatistics a. Prognostic indexes, severity, and therapeutic intervention scores b. Invasive hemodynamic monitoring c. Assessment of cardiac function and derived hemodynamic variables d. Noninvasive hemodynamic monitoring e. Electrical safety f. Thermoregulation g. Central nervous system brain monitoring h. Respiratory monitoring i. Metabolic monitoring 				
	16. Ethics, Legal issues, and End-of-life care				
	 a. Ethical decision and consent issues b. End-of-life decision making and care c. Futility, foregoing life-sustaining treatment, and Do-Not-Resuscitate Orders d. Major ethical principles e. Advanced Medical Directives, Living Wills, Power of Attorney 				
	17. Administration and management				
	 a. Physical design, environment, organization, standards, and staffing models for the ICU b. Effective record keeping c. Patient triage and resource allocation d. Team building and management e. Patient safety, quality, workflow, and systems improvement processes f. Cost effectiveness in financial management g. Information technology in the ICU 				
	18. Disaster Management / Health hazards to staff				
	 a. Contagious diseases/bioterrorism b. Mass traumatic casualty situations c. Attacks using hazardous materials (HAZMAT) 				





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8. Training Method	Method of Supervision: Clinical Fellow will be supervised at all times by a SMC-approved supervisor from Department of Surgical Intensive Care or Department of Respiratory & Critical Care Medicine, SGH only.				
	Job rotation within SGH and to other institutions: Name of training department(s): 3. SGH, Surgical Intensive Care 4. SGH, Respiratory and Critical Care Medicine 5. SGH, Neurosurgery 6. SGH, Neurology 7. SGH, Anaesthesiology 8. SGH, Plastic, Reconstructive & Aesthetic Surgery 9. SGH, Renal Medicine 10. NHCS, Cardiology 11. NHCS, Cardiothoracic Surgery Frequency / duration of rotation • SICUL (SCH, Surgical Intensive Care)				
	 SICU (SGH, Surgical Intensive Care) – 4 months MICU (SGH, Respiratory Critical Care Medicine) – 4 months Electives – 4 months to choose from: a) NICU (SGH, Neurosurgery / Neurology) b) Burns ICU (SGH, Plastic, Reconstructive & Aesthetic Surgery) c) SGH Anaesthesiology d) SGH Renal Medicine e) CCU (NHCS, Cardiology) f) CTSICU (NHCS, CTS) 				
	Educational Activities:				
	Clinical multidisciplinary rounds The fellow will round with the multidisciplinary team and participate in all bedside clinical activities including history taking, physical examination, ordering and interpreting of investigations, performance of bedside procedures and organization of the management plan. He will also supervise the junior residents and participate in bedside teaching and discussion. Collaborative learning via interactions with nurses, pharmacists, respiratory therapist, physiotherapists, and other healthcare professionals during the clinical rotations enrich fellows' understanding of team-based care.				
	Simulation-based training Fellows will have the opportunity to participate in lab-based and in situ simulation sessions to help fellows develop quick decision-making skills, clinical judgement, and team leadership in emergency situations.				
	Quality rounds The fellow will be involved in organization and presentation of the quality management rounds of the units' mortalities and morbidities. In addition, the fellow will have an opportunity to participate in quality improvement projects as available.				





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	 Teaching rounds The fellow will be involved in organization and presentation in teaching rounds such as the Grand Ward Rounds, Rehabilitation rounds and Palliative rounds. Didactic sessions The fellow will participate in regular didactic sessions, such as Journal Clubs and department-based teaching, with faculty from the intensive care community. In addition to being a participant, he/she will have the opportunity to present and lead these sessions. Fellows are also given opportunities to teach junior residents and medical students, enhancing their educational skills and reinforcing their own knowledge. Critical care courses / workshops The fellow will have the opport, advanced cardiac life support, fundamental critical care support, point of care ultrasonography, focused echocardiography, advanced ventilator management, bronchoscopy, extracorporeal blood purification, extracorporeal membrane oxygenation etc.				
8.1 Night Duties Requirement	Night duties required, to be discussed with fellow and will depend on the fellow's desired learning outcomes				
8.2 Running of Clinics Requirement	No running of Clinics required				
9. Assessment and Evaluation	 Clinical Fellow will need to demonstrate their proficiency level based on the following competencies: 1) Patient Care a. Gather essential and accurate information about the patient. b. Counsel patients and family members c. Make informed diagnostic and therapeutic decisions. d. Prescribe and perform essential medical procedures. e. Provide effective health management, maintenance, and prevention guidance 2) Medical Knowledge a. An investigative and analytical approach to clinical problem solving and knowledge acquisition. b. An ability to apply medical knowledge to clinical situations. c. An ability to teach others 				
	 3) Practice-Based Learning and Improvement a. investigate and evaluate patient care practices. b. appraise and assimilate scientific evidence, and c. improve the practice of medicine 				





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	 4) Interpersonal and Communication Skills a. Create and sustain a therapeutic relationship with patients and families. b. Work effectively as a member or leader of a health care team 5) Professionalism a. Demonstrating Professional Conduct and Accountability b. Demonstrating Humanism and Cultural Proficiency c. Maintaining Emotional, Physical, and Mental Health, and Pursuing Continual Personal and Professional Growth 6) Systems-Based Practice 					
	 a. Work effectively in various health care delivery settings and systems relevant to their clinical specialty b. Coordinate patient care within the health care system relevant to their clinical specialty c. Incorporate considerations of cost awareness and risk/benefit analysis in patient care d. Advocate for quality patient care and optimal patient care systems e. Work in interprofessional teams to enhance patient safety and improve patient care quality. f. Participate in identifying systems errors and in implementing potential systems solutions 					
9.1 Assessment approaches	 Formative assessment: Regular evaluation between Clinical Fellow and Supervisor / Head of Department Reflective journal- logbook recordings of training activities Summative assessment: Periodical assessment reports as required by Singapore Medical Council Feedback: End-of-training feedback form as required by Singapore Medical Council End-of-training feedback session with SGH-PGMI 					
9.2 Evaluation Process9.2.1 General overall grading system	The general overall grading system evaluates the Clinical Fellow's performance upon completion of the fellowship programme. All Clinical Fellow will be given a general overall grading status at the end of the fellowship programme based on the grading criteria requirements incorporating the six competencies based knowledge, skills and performance that Clinical Fellow must demonstrate throughout the programme.					
	Grading Description Grading Criteria Status Requirements					
	CMP Completes the programme • Fellow completed at least 9 months of training and achieves					





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			all competencies of the training program.	
	USP	Unsatisfactory performance	• Fellow completed at least 9 months of training but is not able to achieve the competencies of the training program.	
	DCP	Did not complete the programme	• Fellow is not able to complete at least 9 months of training.	
	WDN	Withdrawn from the programme	• Fellow has consistently demonstrated poor performance throughout the training period, demonstrates misdemeanour, misconduct or medical negligence.	
9.2.2 Options for Clinical Fellow who was graded with a (USP) for unsatisfactory performance	A remediation plan will be developed to help the fellow attain the core competencies.			
9.3 Criteria for Early Termination	 The attachment programme will be terminated early on the ground of the Clinical Fellow's poor performance, misdemeanour, misconduct, negligence or breach of any terms stipulated or referred to in the Fellowship Letter of Offer and Institution Terms and Conditions. The Clinical Fellow may also request to terminate the attachment programme for reasons such as serious illness or other personal obligations. The institution will review all requests for early termination with the Clinical Fellow and the Supervisor / Head of Department. 			
10. Course Administration	Type of Certification: Certificate of Training			
	Training Fee: S\$3,000 (before prevailing GST) per month			
	Programme Funding source: Self-funded			
11. Number of Clinical Fellow to be accepted at any one time	3			





