European Association of Cardiothoracic Anaesthesiology

Application for Hosting EACTA Cardiothoracic and Vascular Anaesthesia Fellowship Programme

1. Fellowship Information

Basic Fellowship in Cardiothoracic and Vascular Anaesthesia

Advanced Fellowship in Cardiothoracic and Vascular Anaesthesia

2. Institution Name

Vita-Salute San Raffaele University, Milan, Italy

Address: Via Olgettina Milano 60

Website: https://www.unisr.it/en/

Country: Italy | City: Milano

3. Chair Name

First name: Alberto | Last name: Zangrillo

Email: zangrillo.alberto@hsr.it | Phone:

4. Programme Director

First name: Giovanni | Last name: Landoni

Board Certification(s): MD 1996, Anesthesiologist and Intensive Care Specialist 2000

Title/Affiliation: Prof

Number of original publications: 412

EACTA membership: Yes | If yes, membership's number: 1321

ESA membership: Yes | If yes, membership's number: 17339

Societies membership: Yes | If yes, membership's number:

Email: landoni.giovanni@hsr.it | Phone:

Mailing Address | Fax:

Street: via olgettina 60

Country: Italy | Region: Milano

Zip code: 20132

Will the Programme director devote sufficient time to provide substantial leadership to the programme and supervision for the fellows?

Yes

Will the Programme director review the fellows' clinical experience logs at least quarterly and verify completeness and accuracy?

Yes

Does the national/international regulatory authority(s) recognizes the institutional CTVA Fellowship Programme?

No | If yes, please explain:

Completion of the programme will be acknowledged by the Department of Anaesthesia and Intensive Care at the host centre in junction with European Association of Cardiothoracic Anaesthesia (EACTA) Candidate's requirements

Yes

5. Candidate's requirements

The candidates must be board certified or board eligible according to European residency programme standards

Yes

Language requirements: B2 | Comments:

Specific requirements towards the attending fellow:

The fellow must be proficient in Italian language (B2 LEVEL is required). If the candidate is proficient in English or in Spanish (B2 LEVEL is required) he will be asked to study and learn Italian within the first 8 weeks after the beginning of the fellowship.

6. General Programme Information

Aims, goals and objectives of the Fellowship Programme

Aim of the Fellowship Programme is to train anaesthesiologists of any country of origin, religion or gender who have finished their residency training to become proficient in cardiothoracic and vascular anaesthesia. The fellows will have the opportunity to gain extensive experience in the fields of cardiac, thoracic and vascular anaesthesia and intensive care medicine. After completion of the programme, they will be able to work independently as consultants in cardiac, thoracic and vascular anaesthesia.

Preferred Duration: * Of note, the training period should not be interrupted by frequent and/or prolonged periods of secondment to other divisions / departments.

Preferred Programme Training: Start: Month / Day | End: Month / Day

Number of Positions Per Year: 5 basic, 3 advanced | Type of fellowship training available: Clinical / Clinical Research

If clinical, will the fellows be allowed to work with the patients under supervision: Yes / No

Comments: Yes, the fellow will have for the first three months of training, a close supervision from the mentor and later on close supervision from faculty.

Offered Advamced Training: Yes

7. Faculty

CTV Anaesthesia Faculty - Research Interest and/or Clinical Expertise. *** Please, list at least three names.**

Name	EACTA member	Certification in Cardiothoracic and Vascular Anaesthesia	Additional Qualifications	Email address	Contact address
Alberto Zangrillo	Yes		Prof		
Giovani Landoni	Yes		Prof		
Fabrizio Monaco	Yes	yes			
Martina Crivellari	Yes	yes			
Anna Mara Scandroglio	Yes / No	no			
	Yes / No				
	Yes / No				
	Yes / No				
	Yes / No				
	Yes / No				
	Yes / No				
	Yes / No				
	Yes / No				
	Yes / No				
	Yes / No				
	Yes / No				

Publications lists of the faculty's members in PubMed

Landoni G = 417 publications in PUBMED Zangrillo A = 380 publications in PUBMED

8. Resources Check if each of the following is available at the host centre.

Resources	Yes / No	Number / Number per week
Total cardiothoracic and vascular ward beds	Yes	30
Number of ICU beds dedicated to CTV patients	Yes	14
Is there an emergency department in which cardiothoracic patients are managed 24 hours a day?	Yes	
An adequately designed and equipped post-anaesthesia care unit for cardiothoracic patients located near the operating room suite?	No	
Is there monitoring and advanced life support equipment representative of current levels of technology?	Yes	
Hybrid Operating Rooms	Yes	1
Cardiac Operating Rooms	Yes	3
Thoracic Operating Rooms	Yes	1
Vascular Operating Rooms	Yes	2
Catheterisation Labs	Yes	2
Electrophysiology Labs	Yes	3
Pulmonology Labs	Yes	1
Interventional Vascular Suits	Yes	1
Separate CVICU Facility	Yes	14
Animal Laboratory for research purposes	No	
Outpatient Clinic for perioperative evaluation of patients undergoing cardiothoracic and vascular procedures	No	
24-hours acute pain service available for patients undergoing cardiac, thoracic and vascular procedures n / week	Yes	
Meeting Rooms	Yes	
Classrooms with visual and other educational aids / n	Yes	
Study areas for fellows / n	Yes	
Office space for faculty members and fellows / n	Yes	
Diagnostic facilities n / week	Yes	7
Therapeutic facilities n / week	Yes	7
24-hour laboratory services available in the hospital n / week	Yes	7
Cardiac stress testing n / week	Yes	5
Cardiopulmonary scanning procedures n / week	Yes	5
Pulmonary function testing n / week	Yes	5
Computers and IT support n / week	Yes	7
Appropriate on-call facilities for men and women n / week	Yes	5

9. Clinical Skills and Responsibilities

Will your Programme offer a 12-24 months of fellowship education in fundamental clinical skills of medicine relevant to the practice of CTVA? Yes

If yes, for each rotation or experience below, specify the duration (in months, four weeks = one month) during the 12-24 months of education in fundamental clinical skills.

Caring for inpatients in	Number of performed produces/year
Cardiac Surgery using CPB	1,200
Cardiac Surgery without CPB	200
Minimally-Invasive Cardiac Procedures	20
Interventional Cardiac Catheterization (e.g. TAVI, Mitraclip, ASD)	333
Electrophysiology Lab (e.g. mapping, ablation, pacemakers, ICDs)	3000
Robotic Cardiac Surgery	
Heart, Lung, and Heart/Lung Transplants	
ECLS, ECMO, VAD Procedures	150
Echocardiography Lab	2000
Thoracoscopic Surgery	300
Pulmonary Resection	300
Oesophageal Surgery	200
Tracheo-Bronchial Surgery	20
Interventional Pulmonology Procedures	100
Major Vascular Procedures	800
Neurological monitoring during major vascular surgery	100
Interventional Vascular Procedures	300
Acute and Chronic Pain Management for CTV patients	1100
Basic Research	
Clinical Research	always
Rotaions in	**Number of performed produces/year**
Cardiac anaesthesia	150 cases / 7 month for basic + 3-6 month for advanced
Thoracic anaesthesia	70 cases / 1.5 month + 3-6 month for advanced
Anaesthesia for major supra-inguinal vascular procedures	50 cases / 1 month + 3-6 month for advanced
Trans-esophageal and trans-thoracic echocardiography	50. cases / 0.5 month
Medical or surgical Critical Care Rotation	1 month + 3-6 month for advanced
Inpatient or outpatient cardiology	
Inpatient or outpatient pulmonary medicine	
Extracorporeal perfusion technology (CPB, ECMO,Nova-Lung.)	10 - 15 cases / 0.5 month
Paediatric cardiothoracic anaesthesia	
Basic Research	
Clinical Research	always

Will all fellows entering the CTVA Programme complete each of the fundamental clinical skills of requirements?

If no, explain: Yes

In the clinical anaesthesia setting, including nights and weekends, will faculty members at any time direct perioperative CTVA care, involving fellows, for more than two anaesthetizing locations simultaneously?

If Yes, describe: No

Clinical Responsibility: Preoperative evaluation, intra operative and post operative assesment to the patients undergoing cardiothoracic and vascular surgery and interventional procedures in theatres, the catheter labs and

List any other rotations (along with their duration, in months) offered in the Programme to augment fellows' learning.

N/A

Will advanced subspecialty rotations reflect increased responsibility and learning opportunities? Yes

Maximum Time in Non-Clinical Activities: 1 day week

10. Financial Statement

An employment contract will be signed with the candidate		Yes	
Accommodation options are provided		No	
Transportation/travel options are provided		No	
Monthly Salary	Amount		Currency

This opportunity is not funded by the centre	Yes	Source of financial support for the candidate:	Educational grant
		Others	scholarship, own center

11. Educational and Academic Programme

Didactic Sessions

Will faculty members' attendance be monitored?	Yes
Will fellows' attendance be monitored?	Yes
Will attendance be mandatory for faculty members?	Yes
Will attendance be mandatory for fellows?	yes
Who of the following will provide content at conferences? Check all that apply.	Yes
Anaesthesiology faculty members from this department	Yes
Anaesthesiology faculty members from other sites	Yes
Non-anaesthesiologists from the primary clinical site	Yes
Non-anaesthesiologists from the participating sites	Yes
Visiting faculty members	Yes
Drug/industry representatives	no
Fellows	Yes
Others (specify): Click here to enter text.	

What will be the frequency of the following educational topics in the programme's schedule?

	Weekly	Bi-weekly	Monthly	Quarterly	Semi-annually	Annually
Critical care appraisal of the literature (i.e., journal club)	No	No	No	Yes	No	No
Quality improvement (M&M, QA)	No	No	No	Yes	No	No
Board review (e.g., oral exams, keywords)	No	No	No	No	Yes	No
Grand rounds	No	No	Yes	No	No	No

Other (specify) Click here to enter text.

Formal Course Work Available in

Extra-Institutional Educational Conference Support: EACTA, SMART, INTERCEPT and EUROELSO meeting will be considered (not granted)

In the Previous 5 Years, Fellows were 1st or 2nd Author On:

Abstracts		Peer-Reviewed Journal Articles	8
Book Chapters		Other Publications	
Dedicated Research Time			

In the Previous Year, Fellows present an oral or poster presentation in a national or international meeting: yes

The Opportunioty for Exchange with other training facilities: No

Patient Care — CanMEDS competency framework

Competency Area / Skills	Settings/ Activities	Assessment Method(s)
1. Basic Training		
1. I. General patient assessment and risk estimation		
Assessment of patients based on physical examination and history with use of appropriate laboratory tests and examinations. Level C	Every day assesment of next day patients.	Faculty members.
Scores evaluation, e.g., physical status in accordance with American Society of Anesthesiologists (ASA). Level D	Evaluating patients in the pre anesthesia chart, acording to ASA and EUROSCORE II.	Faculty members.
Airway evaluation. Level C	Evaluating patients in the pre anesthesia chart, acording to MP.	Faculty members.
Interpretation and limitations of peri-operative monitoring, including invasive and non-invasive cardiac function tests, pulmonary function tests, blood gas analysis, common radiological imaging, coagulation tests, liver and renal function tests, endocrine function tests, and drug monitoring. Level C	Evaluating patients in the pre anesthesia chart.	Faculty members.
Selection and planning of the individual anesthesia technique. Level C	Planing perioperative plan, for patients scheduled for next day. According to clinical history.	Faculty members.
Postponement or cancellation of surgery decision making. Level C	Evaluating and performing a discussion about pros and cons.	Faculty members.
Participation in multi-disciplinary (morbidity) conferences. Level C	Involving the fellow in clinical rounds with different specialties.	Faculty members.
Pre-operative fasting, pre-medication and adaptation of pre-operative drug therapy. Level C	Following and discussing hospital guide-lines.	Faculty members.
1. II. Anesthesia management – cardiac surgery		
Workplace preparation following environmental safety measures and checklists. Level C	Following and discussing hospital guide-lines.	Faculty members.
Use of technical and medical equipment, inclusive advanced hemodynamic monitoring, neuromonitoring, coagulation monitoring and basic peri-operative TEE. Level C	The fellow will learn to perform ROTEM analysis, cell saver technology and the utility of TEE for hemodynamic monitoring.	Faculty members.
Provision of safe induction, maintenance, and emergence from anesthesia. Level C	The fellow will be supervised during all the procedure, the fellow will be in charge of performing the induction plan.	Faculty members.
Defibrillation, cardioversion. Level D	The fellow will be advised how AND WHEN to perform the defibrillation and cardioversion.	Faculty members.
Transvenous pacemaker insertion and modes of action; use of a temporary pacemaker. Level C	The fellow will manage the PM on the emergence of CPB and in the cath lab, as well as its insertion.	Faculty members.
Central and peripheral venous (ultrasound-guided) access and peripheral arterial catheterization, pulmonary artery catheterization, arterial blood gas collection, and gastric tube insertion. Level D	The fellow will be teach how to be proficient in the insertion of different vascular accesses, under the use of USG.	Faculty members.
Blood salvage and transfusion. Level D	The fellow will be advised how to decide which therapy is better for each patient, and discuss other options.	Faculty members.
Organ systems and hemostasis homeostasis maintenance throughout cardiac surgery procedures. Level C	The fellow will be advised how to decide which therapy is better for each patient, and discuss other options.	Faculty members.
Interpretation of point-of-care coagulation monitoring such as rotational thromboelastometry (ROTEM) and thromboelastography (TEG). Level C	The fellow will learn how to interpret and perform each the ROTEM analysis.	Faculty members.
Management of patients on cardiopulmonary bypass. Level C	The fellow will learn the CPB principles, and how to manage complications during CPB (clot CPB), and emerge of it in complicate and non - complicated settings.	Faculty members.
Diagnosis and management of intraoperative critical incidents including. Level C - allergic reactions, anaphylaxis, - gas embolism, aspiration pneumonia and pneumothorax, - hypoxia, hypercarbia, hypoventilation, hyperventilation, high ventilator peak inspiratory pressures, - hypertension (systemic / pulmonary), hypotension, arrhythmias, myocardial ischemia, cardiac failure, cardiopulmonary resuscitation, - oliguria, anuria, - intra-operative blood gas and electrolyte disturbances, - intra-operative awareness, - adverse blood products transfusion reaction, - coagulopathy and excessive bleeding	The management and diagnosis of intraoperative incidents/ complications, will be addressed during the basic training by the fellow side by side with a faculty member, after the intervention the topic will be reviewed and discussed by the fellow and the faculty member.	Faculty members.

Management of patient transport to and from the intensive care unit (ICU). Level C	The fellow will intervene in the transport of every patient managed during his training, during this activity the fellow will learn how to deliver and manage the patient under this special situations.	Faculty members.
Consideration of ethical and medico-legal aspects. Level C	The fellow will learn ethical considerations in the management of critical care patients.	Faculty members.
1. III. Anesthesia management – thoracic surgery		
Bronchoscopic examination to verify the position of a lung-separation device and to confirm the correctness of the bronchus to be stapled and the patency of the other bronchi. Level C	Following and discussing hospital guide-lines.	Faculty members.
Provision of safe induction, maintenance, and emergence from anesthesia in patients undergoing thoracic surgery of varying complexity, including airway management, the decision of which drug to use, one-lung ventilation technique, and management of intraoperative adverse events. Level C	Following and discussing hospital guide-lines.	Faculty members.
Management of most common peri-operative critical incidents and complications including: Level C - bronchospasm, - hypoxemia, hypercapnia, - pneumothorax.	Following and discussing hospital guide-lines.	Faculty members.
One-lung ventilation with a double-lumen tube. Level C	Following and discussing hospital guide-lines.	Faculty members.
One-lung ventilation with other techniques (e.g., Arndt blocker, EZ blocker). Level B	Following and discussing hospital guide-lines.	Faculty members.
Postoperative pain management, including epidural and paravertebral analgesia. Level C	Following and discussing hospital guide-lines.	Faculty members.
Additional techniques in pain management (e.g., epidural analgesia, truncal blocks, multimodal analgesic techniques). Level B	Following and discussing hospital guide-lines.	Faculty members.
1. IV. Anesthesia management – major vascular surgery		
Pre-operative assessment, risk stratification and medical management of vascular patients. Level D	Every day assesment of next day patients.	Faculty members.
Provision of safe induction, maintenance, and emergence from anesthesia in patients undergoing vascular surgery of varying complexity, including airway management, the decision of which drug to use, hemodynamic management, and management of intraoperative adverse events. Level C	The fellow will be supervised during all the procedure, the fellow will be in charge of performing the induction plan.	Faculty members.
Management of the most common perioperative critical incidents and complications including Level C - acute kidney injury, - neurological insults, - paraplegia, - post-reperfusion syndrome.	The management and diagnosis of intraoperative complications, will be addressed during the basic training by the fellow side by side with a faculty member, after the intervention the topic will be reviewed and discussed by the fellow and the faculty member. Also the fellow will lear about CSF drainage and MEPs.	Faculty members.
Management of elective and emergency open abdominal aortic aneurysms (AAA) and AAA repair. Level D	The fellow will learn the basic of AAA anesthetic management and haemodynamic monitoring.	Faculty members.
Management of carotid endarterectomy, angioplasty, or stenting. Level D	The fellow will be in charge of the anesthetic plan for carotid endarectomies and angioplasties, and how to perform intraoperative neuro monitoring.	Faculty members.
1.V. Post-operative care/ Critical care		
Physical examinations and patient assessment (e.g., respiratory and peristaltic sounds, temperature gradient capillary refill). Level D	The fellow will be part of the critical care team, to asses patients and learn: monitoring, mechanical ventilation, weaning, shock management.	Faculty members.
Applying sedation, general anesthesia, multimodal analgesia. Level D	The fellow will learn the sedation protocol and how to utilize the CAM evaluation assessment score.	Faculty members.
Management of the airways, inclusive of emergency intubation. Level D	The fellow will be part of the emergency anesthesia team to become proficient in difficult and rapid sequence induction.	Faculty members.
Central venous, peripheral venous, arterial catheters, and pleural drains insertion using aseptic techniques. Level D	The fellow will lear how to perform invasive procedures under aseptic conditions.	Faculty members.
Gastrointestinal tube insertion. Level D	The fellow will lear how to perform invasive procedures under aseptic conditions.	Faculty members.
Airway maneuvers inclusive of suction of endotracheal secretions, tracheotomy (percutaneous), bronchoalveolar lavage and sampling. Level D	The fellow will lear how to perform invasive procedures under aseptic conditions.	Faculty members.
Invasive ventilation including prone position ventilation and weaning strategies. Level D	The fellow will learn in the ICU and PACU how to apply weaning strategies.	Faculty members.
Delivery of continuous positive pressure ventilation and non-invasive ventilation. Level D	The fellow will learn how and when to perfom a non invasive ventilation.	Faculty members.
Hemodynamic stabilization and management, inclusive of pacing, cardioversion, defibrillation, advanced and basic life support, vasoactive and inotropic therapy, advanced cardio-vascular monitoring. Level B	The fellow will learn to manage PM and the vasoactive/inotropic therapy during different clinical situations.	Faculty members.
Volemia management and fluids administration. Level D	The fellow will lear how to manage fluids.	Faculty members.
Management of blood product transfusion and coagulopathies correction. Level D	The fellow will lear how to administer blood products and interpret blood coagulations analysis.	Faculty members.
Renal replacement therapy and acute renal failure. Level B	The fellow will learn how to manage a patient with acute/chronic renal failure.	Faculty members.
Identification of relevant pre-existing co-morbidities. Level D	The fellow will learn no identify comorbidities and manage the patient accordingly	Faculty members.
Responding to trends in physiological variables. Level D	The fellow will learn to apply cardiovascular physiological knowledge.	Faculty members.
Patient transportation inter- and intra-hospital. Level B	The fellow will intervene in the transport of every patient managed during his training, during this activity the fellow will learn how to	Faculty members.
Arterial and central venous line cannulation (ultrasound-guided). Level D	The fellow will be teach how to be proficient in the insertion of different vascular accesses, under the use of USG.	Faculty members.
Myocardial infarction, pulmonary embolism, tamponade, hypovolemia. Level D	The fellow will learn concepts and therapy management.	Faculty members.
Assessment of intravascular volume status. Level C	The fellow will be advised how to decide which therapy is better for each patient, and discuss other options.	Faculty members.
Recognition of substantial pericardial or pleural effusion. Level B	The fellow will become proficient in the diagnosis of pericardial and pleural effusions.	Faculty members.
1. VI. Basic peri-operative echocardiography		
Basic levels of peri-operative TEE and lung and vessel ultrasonography as performed in the operating room. Level C	The fellow will learn basic and advanced principles of TEE.	Faculty members.
Performance of the recommended number of peri-operative echocardiography exam according to EACVI / EACTA certification guidelines. Level D	The fellow will be advised of performing at least 120 TEE cases.	Faculty members.
1. VII. Anesthesia management – interventional procedures in cardiology		
Safe induction of, maintenance of, and emergence from anesthesia in patients undergoing interventional cardiac procedures, including the decision of which drug to use, ventilation techniques, management of airways and management of intraoperative adverse events. Level C	The fellow will be part of the cath lab team, him will learn how to perform a safe induction, monitoring and manage complications.	Faculty members.
Sedation for invasive procedures in cardiology. Level D	The fellow will be part of the anesthesia interventional team, him will learn how to perform a safe induction, monitoring and manage complications.	Faculty members.

Sedation and anesthesia outside the operating theatre, also considering the local organization and the specific patients and procedures. Level D	The fellow will be part of the cath lab team, him will learn how to perform a safe induction, monitoring and manage complications.	Faculty members.
1. VIII. Extracorporeal perfusion management		
Providing the theoretical background of extracorporeal circulation and associated subject areas, including: Level D - Anticoagulation monitoring and management. - Cardioprotective measures (cardioplegia, hypothermia). - Acid-base management (alpha-stat vs. pH-stat). - Management of complications, e.g., air entry, CPB failure.	The fellow will review all the basic principles of extracorporeal perfusion, an apply them during the perioperative management of patients.	Faculty members.
2. Advanced training		
In cooperation with the local Program Director, after the completion of the basic training, the fellow can design the advanced training to include any or a combination of the following options.		
2. I. Anesthesia management – cardiac surgery		
Clinical management of patients with pericardial diseases. Level D	The fellow will be involved in more specific aspects of cardiovscular disease management.	Faculty members.
Management of cardiomyopathy patients and of those with congenital and acquired valvular heart disease, electrophysiological disturbances, congenital heart disease, heart failure, infectious and neoplastic cardiac diseases. Level D	The fellow will learn aspects about congenital cardiovascular disease and how are managed from the anesthesiology perspective.	Faculty members.
2. II. Anesthesia management – thoracic surgery (as described previously, as well as the followings:)		
Alternative ventilation techniques in thoracic surgery (e.g., jet ventilation). Level D	The fellow will be involved in more specific aspects of thoracic surgery management.	Faculty members.
Principles of postoperative chronic pain management. Level D	The fellow will be involved in more specific aspects of thoracic surgery management.	Faculty members.
2. III. Anesthesia management – major vascular surgery (as described previously, as well as the followings:)		
The use of rapid ventricular pacing (RVP) during deployment of the stent for TEVAR. Level B	The fellow will learn how to perform a rapid pacing duirng TAVI interventions.	Faculty members.
Pain management for patients undergoing vascular procedures. Level B	The fellow will learn how to administre epidural, paravertebral and ESP block and post op management.	Faculty members.
Anesthesia for peripheral vascular procedures. Level C	The fellow will learn how to manage complex vascular interventions.	Faculty members.
Care of patients undergoing limb amputation. Level D	The fellow will learn how to manage diabetic patients and to manage limb amputation anesthesia.	Faculty members.
Pain management, with particular reference to critical limb ischemia. Level B		
2.IV. Post-operative management/ Critical care (as described previously, as well as the followings:)		
Interpretation of invasive and non-invasive cardiovascular monitoring. Level D	The fellow will learn to interpret invasive monitoring PAC and arterial line, and non invasive monitoring.	Faculty members.
Use of inotropes and vasodilators. Level D	The fellow will learn how to administer correct dose of vasodilators.	Faculty members.
Management of intra-aortic balloon counter pulsation and other mechanical circulatory support devices. Level C	The fellow will learn, indications and management of IABP.	Faculty members.
Detection of problems occurring with extracorporeal circulation management. Level C	The fellow will have the oportunity to learn, more specific aspects of extracorporeal circulation.	Faculty members.
Anesthesia for procedures in intensive care, including emergency resternotomy, re-intubation, tracheostomy or cardioversion. Level D	The fellow will learn principles of emergency resternotomy and intra operative cardiac arrest.	Faculty members.
Principles and management of chest drains. Level D	The fellow will lear to manage chest drains.	Faculty members.
2. V. Advanced perioperative echocardiography (as described previously, as well as the followings:)		
2. VI. Heart and/or lung transplantation		
Central venous pressure invasive arterial monitoring, pulmonary artery catheter insertion and interpretation. Level D	The fellow will learn to interpret invasive monitoring PAC and arterial line, and non invasive monitoring.	Faculty members.
TEE for monitoring of left and right ventricular function and diagnosis of primary graft dysfunction / failure. Level C	The fellow will learn basic and advanced principles of TEE.	Faculty members.
Insertion and management of thoracic epidurals Level D	The fellow will learn how to manage a thoracic epidural.	Faculty members.
2.VII. Organizational module		
Communicating effectively with patients and their families. Level D	The fellow will be advised how to communicate efficiently with patients.	Faculty members.
Communicating effectively with surgical colleagues. Level D	The fellow will be advised how to communicate efficiently with surgeons.	Faculty members.
Communicating with the intubated patient. Level D	The fellow will be advised how to communicate efficiently with the intubated patient.	Faculty members.
Recognizing the need for senior help. Level D	The fellow will be advised and assessed to call for help when need it.	Faculty members.
Maintaining accurate clinical records. Level D	The fellow will learn the hospital protocol to manage clinical records.	Faculty members.
Presentations at departmental meetings. Level D	The fellow will be encouraged to prepare presentations.	Faculty members.
Participation in multi-disciplinary clinical audits. Level C	The fellow will be part of clinical audits.	Faculty members.
Commitment to continued professional development. Level D	The fellow will be advised to achieve his personal goals.	Faculty members.
2.VIII. Research module		
Ability to help design a clinical or basic science research project or part of it as a member of the investigative team. Level D	The fellow will be part of various research projects.	Faculty members.
Ability to help complete an ethics application. Level C	The fellow will learn to communicate with the ethics department.	Faculty members.
Ability to discuss basic statistical approaches. Level C	The fellow will be part of journal sessions.	Faculty members.
Ability to consent, recruit, and follow up research participants according to regulatory frameworks. Level C	The fellow will be part of the field team.	Faculty members.
Ability to help analyze data. Level C	The fellow will be part of the statistical analysis department.	Faculty members.
Ability to contribute to disseminating study results in abstracts, presentations and publications. Level C	The fellow will be encouraged to prepare presentations and attend the EACTA metting.	Faculty members.

Medical Knowledge

Indicate the activity(ies) (lectures, conferences, journal clubs, clinical teaching rounds, etc.) in which residents will demonstrate knowledge in each of the following areas. Also indicate the method(s) used to assess competence.

Area of Knowledge	Settings/ Activities	Assessment Method(s)
1. Basic Training		
1.I. General patient assessment and risk estimation (Level A)		
Physiology of the heart, the circulatory system and the respiratory system. Basic knowledge of embryological development of cardiac, thoracic and vascular structures.	The fellow will be advised to read Kaplan cardiac anesthesia book first chapters, and netter images to refresh basic knowledge or cardiac and thoracic anesthesia.	Oral discussion and writing evaluations
Pre-operative invasive and non-invasive assessment of cardiac diseases and interpretation of results including electrocardiogram (ECG), chest X-ray, echo-cardiography, cardiac stress testing, coronary angiography, cardiac magnetic resonance imaging (cMRI), and computer tomography (CT).	The fellow will be advised to refresh the basics of diagnostics tools used in cardiac surgery, also will be advised to ask any pertinent questions to the radiology or cardiology department.	Oral discussion

Pre-operative pulmonary evaluation and interpretation of the results, including arterial blood gas and acid-base analysis, pulmonary function tests, oximetry and thoracic imaging.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion and writing evaluations
Patient information and informed consent including medico-legal aspects, appraisal of discernment and consent capacity.	The fellow will attend bioethics basic course.	Oral discussion
Principles of risk and outcome assessment and relevant scoring systems (e.g., EuroSCORE).	The fellow will be advised to review in detail EUROSCORE II and discuss the utility and significance of it.	Oral discussion
1. II. Anesthesia management – cardiac surgery (Level A)		
Knowledge of anesthetic agents and their effects on cardiac function and in patients with cardiac diseases.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Principles of intraoperative pharmacology and relevant medication, including positive inotropes, chronotropes, vasoconstrictors, vasodilators, and anti-arrhythmic agents.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Principles of patient blood management, including specific diagnostic tools, application of relevant medication and blood products.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Principles of basic hemodynamic monitoring and relevant techniques, such as arterial pressure measurement, central venous pressure.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Principles of relevant neuromonitoring techniques (e.g., processed electro-encephalography (pEEG), near-infrared sonography (NIRS), somato-sensible evoked potentials (SSEP), motor evoked potentials (MEP).	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Principles of conventional cardiopulmonary bypass techniques. Principles of myocardial preservation. Effects of cardiopulmonary bypass on human physiology, organ function, and pharmacology.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Basic principles of common procedures in cardiac surgery, such as coronary artery bypass grafting (CABG).	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
1. III. Anesthesia management – thoracic surgery (Level A)		
Principles of pulmonary evaluation as described previously, and basic knowledge in the interpretation of results from pulmonary function tests, lung perfusion testing and CT.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Knowledge of the bronchial anatomy.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Knowledge about relevant anesthetic agents and their effects in patients with lung diseases.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Principles of intraoperative pharmacology and relevant medication, including bronchodilators and steroids.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Basic principles of common procedures in thoracic surgery (mediastinoscopy, video-assisted thoracoscopic surgery (VATS), open lung resection, pneumonectomy).	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Basic principles of endoscopic pulmonary procedures, such as bronchial stenting and endoscopic lung volume reduction (ELVR).	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
1. IV. Anesthesia management – major vascular surgery (Level A)		
Knowledge of peri-operative management for vascular patients undergoing vascular interventions, including anesthetic choices, perioperative monitoring, and risk identification.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Basic principles of the peri-operative management of lumbar drainage for aortic interventional procedures.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Basic principles of spinal cord protection during surgical and interventional aortic procedures.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Basic principles of neuromonitoring.	The fellow will be part of the critical care team, to asses patients and learn: monitoring, mechanical ventilation, weaning, shock management.	Oral discussion
1. V. Post-operative care/ Critical care (Level A)		
Scoring systems in the ICU (e.g. the Sequential Organ Failure Assessment (SOFA), the Simplified Acute Physiology Score (SAPS), the Confusion Assessment Method (CAM)-ICU).	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Etiology, pathophysiology, diagnosis and treatment plans / bundles according to international standards for specific critical conditions in cardiothoracic and vascular surgery patients.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Circulatory failure (heart failure, shock, cardiorespiratory arrest, cardiac arrhythmias, ischemic heart disease, pulmonary embolism, bleeding complications, vasoplegia).	The fellow will be part of the critical care team, to asses patients and learn: monitoring, mechanical ventilation, weaning, shock management.	oral discussion
Anaphylaxis.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Respiratory failure, including adult respiratory distress syndrome (ARDS), pulmonary edema, pneumothorax, pneumonia.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion

Acute kidney injury and failure.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Gastrointestinal failure, peritonitis, pancreatitis, liver failure, non-occlusive mesenteric ischemia (NOMI).	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Neurological failure (delirium and coma, cerebral ischemia and bleeding).	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Airway and chest injuries.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Aortic injuries.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Infectious diseases (systemic inflammatory response syndrome (SIRS) and sepsis, including sepsis bundle strategy).	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Coagulation disorders (disseminated intravascular coagulopathy (DIC), heparin resistance, heparin-induced thrombocytopenia, severe bleeding, transfusion reaction).	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Equipment and apparatus (equipment design, physics, standards, limitations; e.g. non-invasive and invasive postoperative ventilation, continuous renal replacement therapy devices, non-invasive and invasive hemodynamic monitoring).	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Indication, contraindication, drug selection, complications: sedation, anesthesia, analgesia, neuromuscular relaxation, nutrition.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Multimodal and pre-emptive analgesia concepts.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Weaning and extubation criteria.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Transfer and discharge criteria.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Indications for and application of extracorporeal circulation in intensive care patients for cardiac and / or respiratory support (e.g., ECMO).	The fellow will be part of the critical care team, to asses patients and learn: monitoring, mechanical ventilation, weaning, shock management.	Oral discussion
1. VI. Basic peri-operative echocardiography (Level A)		
Principles of basic theory of peri-operative cardiac echocardiography according to the European Association of Cardiovascular Imaging (EACVI) / EACTA process of certification for TEE.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
1. VII. Anesthesia management – interventional procedures in cardiology (Level A)		
Basic principles of common procedures in interventional cardiology, such as coronary angiography, ablation, transcatheter aortic valve replacement (TAVR), and mitral / tricuspid clipping with relevant complications.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Procedural sedation guidelines from the European Board of Anaesthesiology (EBA)/ European Society of Anaesthesiology (ESA).	The fellow will be part of the critical care team, to asses patients and learn: monitoring, mechanical ventilation, weaning, shock management.	Oral discussion
Monitoring and capnography use according to the safety recommendations from EBA.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
1. VIII. Extracorporeal perfusion management (Level A)		
Basic principles of extracorporeal perfusion.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Types of extracorporeal circuits, e.g., cardiopulmonary bypass (CPB), extracorporeal membrane oxygenation (ECMO).	The fellow will be part of the critical care team, to asses patients and learn: monitoring, mechanical ventilation, weaning, shock management.	Oral discussion
Types, composition and mechanisms of cardioplegic solutions.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Cardioprotective measures.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
Safety recommendations for extracorporeal circulation from the European Board of Cardiovascular Perfusion (EBCP).	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	Oral discussion
2. Advanced training		
2. I. Anesthesia management – cardiac surgery (Level A)		
Principles of advanced hemodynamic monitoring and relevant techniques, such as use of the pulmonary artery catheter, continuous cardiac output monitoring and measurement.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	**Oral discussion**
Principles of modified cardiopulmonary bypass (minimized CPB, left-heart CPB) and the off-pump revascularization technique.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	**Oral discussion**
Principles of advanced procedures in cardiac surgery and clinical management of affected patients (valve surgery and thoracic aortic surgery, including ascending, transverse, and descending aortic surgery with circulatory arrest).	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	**Oral discussion**

Principles and state of the art of mechanical support including intra-aortic balloon pumps, and extracorporeal membrane oxygenation.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	**Oral discussion**
Current state of temporary and long-term mechanical circulatory support (ventricular assist devices, total artificial hearts).	The fellow will be part of the critical care team, to asses patients and learn: monitoring, mechanical ventilation, weaning, shock management.	**Oral discussion**
Principles of use of inhaled pulmonary vasodilators (nitric oxide (NO), prostaglandins).	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	**Oral discussion**
Principles of fast-track surgery.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	**Oral discussion**
2.II. Anesthesia management – thoracic surgery (Level A)		
Principles of common procedures in thoracic surgery (open and thoracoscopic lung resections, robotic lung resection, lung volume reduction surgery, mediastinoscopy, pneumonectomy).	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	**Oral discussion**
Principles of diagnostic and interventional bronchoscopic surgery (lung volume reduction, bronchopulmonary lavage; endoscopic, rigid fiber optic and laser resection; bronchial stenting and sealing).	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	**Oral discussion**
Principles of peri-operative management of esophageal surgery for varices, neoplastic, colon interposition, foreign body, stricture, and tracheoesophageal fistula.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	**Oral discussion**
2. III. Anesthesia management – major vascular surgery (Level A)		
Knowledge of perioperative management of TEVAR and EVAR.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	**Oral discussion**
Knowledge of the principles of perioperative management of lumbar drainage for aortic interventional procedures.	The fellow will be part of the critical care team, to asses patients and learn: monitoring, mechanical ventilation, weaning, shock management.	**Oral discussion**
Excellent knowledge of the principles of spinal cord protection during surgical and interventional aortic procedures.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	**Oral discussion**
Excellent knowledge of the principles of cerebral function monitoring.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	**Oral discussion**
2. IV. Post-operative management/ Critical care (Level A)		
Knowledge of cardiac and thoracic physiology.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	**Oral discussion**
Postoperative cardiac critical care, including analgesia, sedation and ventilation.	The fellow will be part of the critical care team, to asses patients and learn: monitoring, mechanical ventilation, weaning, shock management.	**Oral discussion**
Postoperative care and analgesia after thoracic surgery.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	**Oral discussion**
An understanding of the management of cardiac pacing modes.	The fellow will be part of the critical care team, to asses patients and learn: monitoring, mechanical ventilation, weaning, shock management.	**Oral discussion**
An understanding of extracorporeal membrane oxygenation and other devices used for mechanical circulatory support.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	**Oral discussion**
2. VII. Advanced perioperative echocardiography (Level A)		
Advanced level of knowledge in peri-operative cardiac echocardiography according to the EACVI/ EACTA process of certification guidelines.	The fellow will be advised to read daily, research literature form peer reviewed journals, books and interesting lectures given by faculty member, program director and meetings held on the hospital. The assistance to this sessions will be 2-3 times monthly.	**TEE certification**
2. VIII. Heart and/or lung transplantation (Level A)		
Understanding of the physiology and clinical presentations of end-stage heart and lung disease and surgical options for their management.		
Understanding of the principles of heart transplantation and clinical management of affected patients.		
Knowledge of current limitations of organ transplantation and efforts to increase the suitable donor pool.		
Understanding of the multidisciplinary nature of patient evaluation and listing for transplantation.		
Knowledge of the principles of donor optimization, management and allograft retrieval.		
Knowledge of the principles of ex-vivo heart and lung perfusion.		
Understanding of the physiology of the denervated organ.		
Understanding of the surgical conduct of heart transplantation and knowledge of intra-operative and immediate postoperative care, including stability of induction, ventilation, oxygenation, hemodynamic support, and allograft and noncardiac organ protection.		
Understanding of primary graft dysfunction and indications for mechanical circulatory support.		
Understanding of the surgical options for lung transplantation, including minimally invasive lung transplantation and various intraoperative extracorporeal support mechanisms.		
Knowledge of intra-operative and immediate postoperative care, including protective ventilation, oxygen delivery, hemodynamic support, indications for inhaled NO and other pulmonary vasodilators, allograft and non-pulmonary organ protection.		

Knowledge of the principles of primary lung dysfunction and conservative and extracorporeal treatment options, including indications for and techniques of ECMO.		
Understanding of immunosuppressive regimens and the role of postoperative infections and sepsis.		
2. IX. Research module (Level A)		
Principles of clinical trials, including design, end points, inclusion / exclusion criteria, reporting requirements.	Lessons will be given by the tutors and program director regarding the basic structure of randomized clinical trials.	**Fellow participation in local RCTs, Multicentre Studies, Papers Publications and Abstracts Submissions to Anaesthesia Meetingsn**
Understanding of Good Clinical Practice (GCP) requirements for clinical research involving patients.	Lessons and online literautre.	**Oral discussion**
Understanding of European and specific national ethics frameworks, including research ethics applications, clinical regulatory frameworks and hospital site-specific assessment.	The fellow will be part of a research team, which will learn which are the specific European guide line.	**Oral discussion**
Principles of sample size and study power determinations and basic statistical evaluation	Journal club, one morning a month.	**Fellow participation in local RCTs, Multicentre Studies, Papers Publications and Abstracts Submissions to Anaesthesia Meetingsn**
Principles of patient and data confidentiality agreements.	Bioethics course, organized by our institution for two months one afternoon a week.	**Oral discussion**
Understanding tools for data collection, analysis and reporting.	The fellow will be advised to be part of research teams, and get himself involved during all the phases of the research. To participate in data analysis, review articles, special articles. Also to perform meta analysis and participate in educational sessions.	**Oral discussion**
Principal international basic science priorities in the field of cardiac anesthesia.	Journal club, one morning a month.	**Oral discussion**
Ethics and practicalities of biological sample collection, storage and biobanking	Bioethics course, organized by our institution for two months one afternoon a week.	**Oral discussion**
Principles and ethics of scientific publishing.	The fellow will be part of a research team, which will be part of the summiting and review phase.	**Fellow participation in local RCTs, Multicentre Studies, Papers Publications and Abstracts Submissions to Anaesthesia Meetingsn**

12. Assessment

The Programme Director will evaluate each fellow every 3 months: Yes

Assessment tools

360-degree evaluations	Yes	Clinical skills evaluations	Yes
Personal reports from the faculty	Yes	Self-assessment by Fellow	Yes
Learning goals for the next three months	Yes	Feedback from Fellows	Yes
A logbook will be available	Yes	Reports of Evaluation will be available	Yes

The Programme Director will give an appraisal for each fellow every 3 months	Yes
The faculty and trainee should agree a joint evaluation both fellow's progress and the training programme, and devise a plan for addressing any perceived difficulties or deficiencies.	Yes
Training programmes should encourage fellows to provide a written confidential evaluation of the programme.	Yes
External evaluation / assessment will be held as per EACTA regulations	Yes
The centre will be able to maintain a register of those fellows who have entered and successfully completed a training programme in order to continue its accreditation as a training centre	Yes
There will be regular opportunities for Fellows to provide confidential written evaluations of the faculty and program to the EACTA Education Chair	Yes
Periodic evaluation of patient care (quality assurance) is mandatory. Subspecialty trainees in cardiac, thoracic, and vascular anesthesia will be involved in continuing quality improvement and risk management.	Yes
Trainees in cardiac, thoracic and vascular anesthesia will actively participate in the periodic evaluation and reassessment of the Fellowship training goals and objectives	Yes
Should unforeseen circumstances arise such as personal conflict between a Fellows and tutors, this should be reported immediately to the Chair of the Education Committee.	Yes
At the end of the training period, the centre would acknowledge in writing successful completion of a fellow training.	Yes

13. Practice-based Learning and Improvement

1. Briefly describe one planned learning activity in which fellows engage to: identify strengths, deficiencies, and limits in their knowledge and expertise (self-reflection and self-assessment); set learning and improvement goals; and identify and perform appropriate learning activities to achieve self-identified goals (life-long learning).

The plan is to perform multi-source feedback along with all the tutors in charge, in which the fellow will acknowledge the progress achieved during the months of training. The process will be done in both practical and knowledge fields. The discussion/evaluation part will be done through clinical cases, in which the fellow will have to address every aspect from evaluation, diagnosis, and treatment. As part of the plan, the fellow will also have the opportunity to attain his own learning goals.

2. Briefly describe one planned quality improvement activity or project that will allow the fellows to demonstrate an ability to analyse, improve and change practice or patient care. Describe planning, implementation, evaluation and provisions of faculty support and supervision that will guide this process.

The fellow will be invited to address and challenge the relationship between the conduct of anesthesia care and his daily practice and prescriptions with the classic quality index in use in our institution: time to extubation, total blood loss, troponin level, and renal function, pain level. The fellow also will be challenged by simulation scenarios, in which the fellow will demonstrate his ability to analyze and solve different scenarios. The planing of this activity will be assigned to a tutor by the program director.

3. Briefly describe how fellows will receive and incorporate formative evaluation feedback into daily practice

There is an informal debrief at the end of each theatre session and each fellow meets with their educational supervisor regularly to receive feedback. We will appraise each fellow formally as per once every 6 months. They will undergo informal appraisal by their educational tutor every 4 months. The goals to achieve during every stage of the training will be specific and concrete, attaining a more precise and realistic evaluation.

4. Briefly describe one example of a learning activity in which fellows engage to develop the skills needed to use information technology to locate, appraise, and assimilate evidence from scientific studies and apply it to their patients' health problems. The description should include:

During the fellowship, the fellow will be asked to attend educational sessions, given and organized by the hospital institution. For example, every year is programed the intensive cardiac care, in which the fellow will learn technicalities as impella position or intra aortic balloon pump management. These activities and knowledge are for grate value for the fellow, will be applied during training.

5. Briefly describe how fellows will participate in the education of patients, families, students, fellows, and other health professionals.

The fellow will participate in the preop visit held the night before surgery where the patient and family are informed of the scheduling of the operating day. During ICU rotations, the fellow will be asked to explain the follow-up scheduling at ICU discharge to patient, family and staff (including the therapeutic modifications and concerns about physiologic changes). The fellow will be involve in the education and training or residents and medicine students, in OR and class lectures.

14. Interpersonal and Communication Skills

1. Briefly describe one learning activity in which fellows demonstrate competence in communicating effectively with patients and families across a broad range of socioeconomic and cultural backgrounds, and with physicians, other health professionals, and health-related agencies.

The fellow will participate in the preoperative / pre-anesthesia clinic and will be involved in the information process toward patients and families. Also, the fellow will be encouraged to use his second or third language to help foreigner patients.

2. Briefly describe one learning activity in which fellows demonstrate their skills and habits to work effectively as members or leaders of a health care team or other professional group. In the example, identify the members of the team, responsibilities of the team members, and how team members communicate to accomplish responsibilities.

The fellow will be asked to participate in the daily OR scheduling meeting. This reunion is held by the head of OR, head of cardiac anesthesia and head of cardiac surgery. The fellow will be invited to plan according to department priorities and structure availability. Selecting the cases for morning and afternoon shifts, having in mind any possible emergency case.

3. Briefly describe how fellows will be provided with opportunities to act in a consultative role to other physicians and health professionals related to clinical information systems.

During the ICU rotations, the fellow will be part of a multidisciplinary team (cardiologist and anesthesiologist, nurse assistants, perfusionist vascular and cardiac surgeons), also during the management of every patient the fellow will need to interact with other consultants, to adress patient-specific issues.

4. Briefly describe how fellows will be provided with opportunities to maintain comprehensive, timely, and legible medical records, if applicable

The fellow will have full access / credentials to the preop clinic and inpatients electronic records.
During OR rotations, the fellow will be asked to fill in the written operating summary and handover for cardiac cases.
During ICU rotations the fellow will be asked to fill in the daily observations and to maintain a comprehensive written medical file.
In addition, the fellow will be responsible for the quality of the medical letters and mailings for general practitioner, surgeons and cardiologists.

5. Briefly describe how fellows will maintain a comprehensive anaesthesia record for each patient, including evidence of pre- and post-operative anaesthesia assessment, an ongoing reflection of the drugs administered, the monitoring employed, the techniques used, the physiologic variations observed, the therapy provided as required, and the fluids administered.

The fellow will be asked to follow the routine procedure for the quality and comprehensiveness of anesthesia records. In our institution, we utilize the GALILEO, which is a software that records every aspect of the management of the patient, from vital signs to fluid administration and urine output.

6. Briefly describe how fellows will create and sustain a therapeutic relationship with patients, engage in active listening, provide information using appropriate language, ask clear questions, provide an opportunity for comments and questions, and demonstrate sensitivity and responsiveness to cultural differences, including awareness of their own and their patients' cultural perspectives.

The anesthesiology team of our institution is routinely and deeply involved in all stages of the patient operating path from preop evaluation, OR care, ICU care, ward care to discharge. This involvement offers daily opportunities to engage in patient / physician interaction. In addition we routinely care for patients with different cultual / cultural differences ; we also routinely care for non italian national patients.

15. Professionalism

Briefly describe the learning activity(ies), other than lecture, by which fellows demonstrate a commitment to carrying out professional responsibilities and an adherence to ethical principles, including: compassion, integrity, and respect for others; responsiveness to patient needs that supersedes self-interest; respect for patient privacy and autonomy; accountability to patients, society, and the profession; and sensitivity and responsiveness to a diverse patient population, including to diversity in gender, age, culture, race, religion, disabilities, and sexual orientation

As described above, professionalism is based on the involvement of the anesthesiology team including the fellow in all stages of the perioperative care. Also, the fellow will be invited to a bioethics program, heald for two months one day a week. During this course, the fellow will learn or refresh ideas about the management of the patient as a human being and topics as and holistic management of death.

15. Systems-based Practice

1. Describe the learning activity(ies) through which fellows achieve competence in the elements of systems-based practice: working effectively in various health care delivery settings and systems, coordinating patient care within the health care system; incorporating considerations of cost-containment and risk-benefit analysis in patient care; advocating for quality patient care and optimal patient care systems; and working in inter-professional teams to enhance patient safety and care quality

The fellow, as a member of the anaesthesiology team, should show competencies in working with the various health care delivery settings and systems, coordinating patient care within the health care system with paying attention to the cost-containment and risk-benefit analysis in patient care.

2. Describe an activity that fulfils the requirement for experiential learning in identifying system errors and implementing potential systems solutions.

The fellow will be asked to attend SMART meeting, in which discussions about safety, mortality and systematic errors are discussed. Also attending the aneshtesia - surgery epidemiologic meetings.

16. EACTA Site Visit (for 1-day)

Dates proposed for the visit (at least 3) 00/00/2020 or 00/00/2020 or 00/00/2020

I hereby accept the regulations of the Hospital Visiting especially to take in charge the travel costs and the hotel accommodation of the 2 reviewers on the most reasonable base

Yes

Other comments

To be completed by the Head of department or the authorised deputy.

Please fill in all required fields and send to eacta@aimgroup.eu

San Raffaele Scientific Institute Cardiothoracic and Vascular Anaesthesia and Intensive Care Fellowship

Period and Aims of the Fellowship

The Cardiothoracic Anaesthesia Fellowship at the San Raffaele Scientific Institute in Milan is offered in two complementary levels of training: one year of cardiothoracic and vascular (CTVA) anaesthesia, and an optional second year of CTVA advanced training. The fellow who aims both levels of training, has the opportunity for 24 continuous months of training.

Aim of the Fellowship Programme is to train anaesthetists who have finished their residency training to become proficient in cardiothoracic and vascular anaesthesia.

The candidates must be board certified or board eligible according to European residency programme standards, and must be proficient in Italian language (B2 LEVEL is required). If the candidate is proficient in English or in Spanish (B2 LEVEL is required) he will be asked to study and learn Italian within the first 8 weeks after the beginning of the fellowship.
The fellows will have the opportunity to gain extensive experience in the fields of cardiac, thoracic and vascular anaesthesia and intensive care medicine. After completion of the programme, they will be able to work independently as consultants in cardiac, thoracic and vascular anaesthesia.
The fellowship programme in Milan is organized and directed by the local head of cardiothoracic anaesthesia and intensive care (Prof. Dr. Alberto Zangrillo), by the director of the research centre for intensive care and anaesthesiology (Prof. Giovanni Landoni), the head of cardiovascular anaesthesia (Dr. Fabrizio Monaco), the head of cardiothoracic and vascular intensive care (Dr. Anna Mara Scandroglio), and Dr. Martina Crivellari as programme directors. Completion of the programme will be acknowledged by the Department of Anaesthesia and Intensive Care at the San Raffaele Scientific Institute in junction with European Association of Cardiothoracic Anaesthesia (EACTA). In particular, criteria for EACTA certification will be determined and communicated before the start of the Fellowship and their fulfilment will be mandatory in order to receive the joint certification (San Raffaele Scientific Institute and EACTA). A logbook for all clinical activities and a final examination are planned.

Obligation of the Fellow

The fellow has to: 1. gain knowledge in anatomy and pathophysiology of cardiac diseases, 2. to plan a perioperative anaesthesia plan and to safely execute it, 3. to manage and interpret correctly diagnostic tools and take advantage of them in the care of patients, 4. to understand intra operative neurophysiology

monitoring, be familiar with cardiopulmonary bypass and mechanical support systems and 5. to perform a complete transoesophageal echo cardiogram examination. The program includes pre-, intra- and postoperative care of patients undergoing cardiac, vascular, thoracic operation, transcatheter ablation of ventricular or supraventricular arrhythmias, percutaneous or transapical treatment of structural heart disease. Also, the program expects from the fellow to be proficient in non - technical skills, communication collaboration, managerial and leadership skills.

The Fellow takes part in the clinical routine as well as in clinical conferences with the Departments of Anaesthesiology and Intensive Care, of Cardiology, of Cardiac Surgery of Vascular Surgery, of Thoracic surgery and of Arrythmology. The fellow is trained in transoesophageal echo cardiography by formal courses and teaching in the operating room and intensive care unit: the fellow is expected to perform at least 120 TEE examination per year. The fellow takes part in preparation and presentation of case conferences. The didactic curriculum is provided through lectures and conferences and allows the fellow to acquire the knowledge to care for the patients. In addition, academic projects including preparation and publication of review articles, book chapters, manuals for teaching or clinical practice, clinical research or other academic activities are offered and strongly encouraged. The fellow is responsible for the documentation of the cases and TEE examinations done during his fellowship.

Logbook

The fellows are required to record all the activities performed during their training, in the form of a logbook. This should include: anonymous record of patients managed during the fellowship, record of TEE examinations performed, summaries of the three -monthly feedback.

Evaluation

The fellow’s progress will be evaluated and discussed with the fellow every 3 months by the programme director and the division heads, using a standardized form. The fellow’s professional attitude, fund of knowledge, and clinical judgment will be assessed as well as his/her practical skills, social competence and efficiency for patient management and critical analysis of any relevant clinical situation. Feedback will be given. The fellow will be involved in programmes of quality assurance and risk management. At the end of the training period, the fellow will receive a testimonial. We will motivate the fellow to attain EACVI/EACTA TEE certification following him/her during the all process.

Faculty

The division heads and the programme directors have a large experience in cardiothoracic and vascular anaesthesia, for details please see the attached CVs. Prof Landoni is responsible for the fellowship programme and will direct it in accordance with the following co-directors: the local head of cardiothoracic anaesthesia and intensive care (Prof. Dr. Alberto Zangrillo); ; the in charge of the intensive care (Dr. Mara Scandroglio), the head of cardiac anaesthesia (Dr. Fabrizo Monaco); a senior anaesthetist with extensive expertise in TEE (Dr. Martina Crivellari). They will devote sufficient time to provide substantial leadership to the programme and supervision for the trainees. In addition to the primary coaches of the fellow, further senior members of the cardiothoracic and vascular anaesthesia and ICU team serve as faculty, clinical teachers and coaches for the fellows in daily clinical practice (Drs. MG Calabrò, M De Luca, N Di Tomasso, AL Di Prima, G Fano G, E Fominskiy, A Franco, G Frau, C Gerli, G Melisurgo, M Mucchetti, M Pieri, M Licheri, S Ajello). The Division of Cardiothoracic and Vascular anaesthesia consists of over 20 consultants who are specially trained in cardiothoracic and vascular anaesthesia and intensive care and some of them in perioperative transoesophageal echocardiography.

Resources

The San Raffaele Scientific Institute is one of the leading private scientific research institutes in Italy, recognized by the Italian Ministry of Health as a Research Hospital. At the same time, with almost 30,000 surgical procedures per year it is a high volume surgical centre. It comprises both clinical and research activities, conducted by a highly specialized and qualified staff with 1,357 beds and a research institute with around 1,600 basic, clinical and translational scientists. San Raffaele integrates its research with the education and training activities conducted within the Vita-Salute San Raffaele University which comprises the faculties of medicine, psychology and philosophy and provides specialized post graduate courses, residency programs in various medical specialties, and international PhD programs.

The San Raffaele Scientific Institute is located in Milan and is one of the most important cardiac, vascular and thoracic vascular surgical centre in Italy. It has a high level of medical care with a twenty--four--seven emergency department, operating rooms which are all adequately designed and equipped for the management of cardiothoracic and vascular surgery patients and four intensive care units for neurosurgical patients (6 beds), cardiac surgical patients (14 beds), medical/general surgical patients (8 beds) and COVID-19 patients. Staff physicians are all board certified in their medical specialty and have extensive experience in cardiovascular and pulmonary diseases, echocardiography including transoesophageal echocardiography, clinical cardiac electrophysiology, cardiac, thoracic and major vascular surgery such as in the management of patients undergoing heart structural disease correction with transapical or percutaneous approach. The monitoring and advanced life support equipment is representative of current levels of technology. There are facilities which are readily available at all times to provide prompt laboratory measurement pertinent to the care of cardiothoracic and vascular surgical patients as well as prompt non-invasive and invasive diagnostic and therapeutic cardiothoracic procedures. These include but are not limited to echocardiography, cardiac

stress testing, cardiac catheterization, electrophysiological testing and therapeutic intervention, cardiopulmonary scanning procedures and pulmonary function testing.

Overall, the fellow will have the opportunity to work in the 3 cardiac surgery theatres, 3 hybrid rooms for invasive cardiological procedures, 2 operating theatres for vascular and thoracic surgery, 14 ICU beds.

Cardiac Surgery

The Department of Cardiovascular and Thoracic Department at the San Raffaele Scientific Institute performs over 1300 adult cardiac procedures per year including TAVI and MitraClip. The Chief surgeons are Prof Ottavio Alfieri, Prof Francesco Maisano, Prof Michele De Bonis and Prof Alessandro Castiglioni.
Recent activities per year included 1496 hospitalization, 1360 cardiac surgery procedures including:
Mitral Valve repair 420
Tricuspid Valve repair 92
Aortic Valve repair 12
Aortic Valve replacement 327
Mitral Valve replacement 197
Revascularization-Bypass 226
MitraClip 55
Transapical/Transaortic/Transaxilary TAVI 15
Tranfemoral Tavi 65
Ventricular assistance device 9
Ascending aorta 120.
(REDO surgery 175)

General Brief description of the of the Cardiac Surgery Unit	The Cardiac Surgery Unit of the San Raffaele University Hospital represents a high quality centre for the treatment of cardiac diseases. About 1300 open heart procedures are performed every year, involving the most wide range of cardiac pathologies. The Unit is a national and international reference centre for the mitral valve repair, for surgical treatment of atrial fibrillation and congestive heart failure, for coronary beating-heart surgery. Minimally invasive approaches and new technologies are widely used.
Key competence	Adult cardiac surgery. Mitral valve repair. Minimally invasive technique (Heart port). Surgical ablation of atrial fibrillation. Mechanical assistance for congestive heart failure. Team work with other specialities in the Cardio-Thoracic-Vascular Department. New treatments, devices and alternative routes. Participation in national and international clinical trials. Preclinical trials validation and cooperation with Univertsity research centres and animal facilities. Cost/benefits approach orientation with local and national institutions.

Facilities	• Engineering laboratories for preclinical studies and bench testing, in vitro and ex vivo study validation • Laboratory of Echocardiography, equipped with modern equipment (three-dimensional echocardiography, post-elaboration data centre) • 38 beds in hospital, including 18 fully monitored for semi-intensive therapy • Support of post-operative intensive care unit (Prof. Alberto Zangrillo) with 14 beds equipped with the latest cardio-circulatory and respiratory technological assistance • Outpatient's clinic for pre and post-operative evaluation, for heart failure, for surgery of arrhythmias, for valvular surgery • Animal facility laboratory for research on mice, rats, rabbits, pigs, sheep and ovine

Lead Physicians	**Surname**, **Name:** Alfieri Ottavio, Francesco Maisano, De Bonis Michele, Castiglioni Alessandro.

Interventional Cardiology

The Division of Cardiovascular and Thoracic Department at the San Raffaele Scientific Institute also covers the interventional cardiology theatre. Last year a total of 3427 procedures were performed, including 333 cardiac structural interventions with the presence of anaesthetists (205 TAVI, 31 MitraClip, 66 ASD/PFO closure and 31 LAA closure). The fellow will be involved and trained in the management of these procedures.

Thoracic Surgery

Part of the fellowship programme is the anaesthetic management of adult patients undergoing thoracic surgery. In the Hospital, over 900 thoracic operations per year are performed which includes video-assisted thoracoscopic surgery (n=300), open procedures (n=300), oesophageal surgery (n=200), trachea-bronchial surgery (n=20) and about 100 interventional bronchoscopy procedures under general anaesthesia.

Electrophysiology Unit

The Electrophysiology Unit treats patients with all types of arrhythmia and is a centre of excellence for the treatment of ventricular arrhythmias in patients with and without structural heart disease.

These procedures (n=160 in 2018) are often targeted at patients with hemodynamic instability and in 2018 a total of 24 periprocedural extracorporeal supports were provided for these patients (2 IABP, 1 IMPELLA, 18 ECMO, 22 VAD).

Vascular Surgery

The Department of Vascular Surgery covers all major vascular procedures. In 2018 more than 2500 procedures, including open surgery and endovascular treatment of thoracic and abdominal aortic disease, carotid stenosis, peripheral arterial disease, renal and visceral vessel occlusion, thoracic outlet syndrome,

deep venous thrombosis and superficial venous insufficiency. The leading activity of the Department is the treatment of thoracoabdominal aortic aneurysms, with about 100 cases of open repair and 25 cases of endovascular repair performed every year. The research is mainly focused on the evaluation of organ protection protocols during thoracoabdominal aortic surgery, the application of new endovascular strategies for the treatment of acute type B aortic dissection, and the development of new endovascular devices (fenestrated and branched stent-graft) for the thoracoabdominal aorta and the aortic arch.

Anaesthesia

Cardiac Anaesthesia

Fellows are trained to provide perioperative anaesthetic management for patients with severe cardiopulmonary pathology. The cardiac surgeries are the following: coronary artery bypass surgery (CABG) both on cardiopulmonary bypass as well as on a beating heart, heart valve surgery (especially mitral surgery), aortic reconstruction requiring deep hypothermic arrest, thoracic aortic aneurysm repair and aortic dissection repair.

Adequate exposure and experience are provided in the management of adult patients for cardiac pacemaker and automatic implantable cardiac defibrillator placement and surgical treatment of cardiac arrhythmias. There is exposure also to techniques such as percutaneous aortic valve replacement and mitral valve intervention.

Fellows also gain experience in perioperative medical (anaesthetic) management of the cardiac patient, including management of intra-aortic balloon pumps (IABP) and ventricular assist devices (VAD), post-operative ICU care, point-of-care coagulation testing, blood transfusion medicine, electrophysiology, and transthoracic echocardiography.

As for transfusion policy at our institutions, allogenic blood products are administered according to a specific protocol Rotem guided. Packed red cells (PRC) are transfused to maintain haemoglobin value >8 g/dL in the overall population and >10 g/dL in patients with hemodynamic instability or severe cardiac or pulmonary complications. Fresh frozen plasma (FFP) are used for the treatment of active bleeding. Platelet concentrates are used in case of active bleeding and platelet count $< 50x10^9$/L. The transfusion rate in our centre is low as documented by several international multicentre randomized trials performed over the years. Point of care coagulation test are currently being implemented.

In addition, fellows will be involved in the management of patients treated with VV- and VA-ECMO. All the activities in the Cardiothoracic Intensive Care Unit will be supervised by Dr. Maria Grazia Calabrò, Dr. Anna Mara Scandroglio, Dr Evgeny Forminsky.

Fellows will receive proper theoretical and practical training both for basic and advanced TEE. Each patient undergoing cardiac surgery is receiving pre- and postsurgical transoesophageal examination. The fellow will perform and document the TEE examinations with increasing independence and review each examination

with a senior echocardiographer. We'll motivate him to attend the EACTA Echo and follow the EACTA accreditation process. The local referees for accreditation are: Dr. Eustachio Agricola, Dr. Fabrizio Monaco and Dr. Martina Crivellari. The TEE training will be therefore based on the understanding of the basic principles of ultrasound and learning of basic skills of TEE (physics, standard views for examination, Doppler principles and quantification etc). As soon as the fellows master the basic skills, TEE training will continue with advanced applications of intraoperative TEE including assessment of valvular function, 3D, AQ for assessment of ventricular function, Stress and Strain, Tissue Doppler).

Thoracic and Vascular Anaesthesia

Clinical work of fellows includes anaesthetic management of adult patients undergoing thoracic and vascular surgery. Fellows are trained to manage different types of thoracic surgeries, including video-assisted thoracoscopic surgery (VATS), open thoracotomy, and robotic surgery. Fellows achieve expertise in different techniques of lung isolation and ventilation, including the use of double-lumen endotracheal tubes, bronchial blockers, fibreoptic bronchoscopy, and jet ventilation.

Advanced Monitoring and Invasive Techniques

The complex nature of cardiothoracic surgery necessitates extra training to acquire the skills needed to be a cardiothoracic and vascular anaesthesia consultant. Fellows are trained to achieve expertise in the advanced monitoring techniques including invasive blood pressure measurement, arterial blood gas analysis, cardiac output monitoring and central venous oxygen saturation.
Finally, invasive procedures completed by the cardiothoracic anaesthesiology fellows include arterial line placement (femoral, axillary, brachial, radial), central venous cannulation (internal jugular, subclavian, femoral), pulmonary artery catheter placement, transvenous pacemaker placement, thoracic epidural catheter positioning, intrathecal lumbar catheter positioning for cerebrospinal fluid drainage fibreoptic endotracheal tube placement, 2D/3D transoesophageal echocardiography and ultrasound guidance of vascular access.

Intensive Care

The Hospital has three (four including the COVID-19 ICU) intensive care units for neurosurgical patients (6 beds), cardiac surgical patients (14 beds) and medical/general surgical patients (8 beds). The "cardiac" and the "general" ICU manage the:

- cardiac-thoracic-vascular patients
- VV-ECMO patients for refractory hypoxaemia in ARDS patients and VA-ECMO patients for severe cardiac dysfunction (either admitted from the emergency department or referred from other centres or in-hospital emergencies). Over 100 patients receive ECMO every year in our Institute.
- patients with mechanical devices (IABP, IMPELLA, VAD, total artificial heart)

Fellows will follow all the activities of the ICUs under the supervision of senior specialists.
Overall, the team, the environment and the skills are similar to those described above for the anaesthesiologic part.

Structure of the Fellowship Programme

The Fellowship

First year (Basic CTVA training)
During the first year of the Fellowship, the Fellow is directly supervised and gets a 1:1 supervision with a senior cardiac consultant.

Arrival and first week
- Welcome and introduction,
- Institutional orientation and health insurance compilation
- Completing Basic course about safety and health condition on the job

First week to 4th week
During this time period there will be a basic assessment of communication capacities and clinical knowledge, and there will be a final decision for the fellow to continue or go back home.

1st Month to 7th Month
- Cardiac anaesthesia
- Familiarization in cardiothoracic and vascular anaesthesia, coached mainly by the programme directors or division heads
- Clinical duties as a member of the cardiac team for standard cardiac procedures (isolated CABG, aortic and mitral valve replacement), under supervision. Minimum of 100 cases CPB in which 30% cases different from CABG
- Daily participation in ward rounds and preop anaesthesia clinic-acquisition of basic and advanced echocardiographic knowledge (books, media, course, teaching in the operating theatre)
- On – call duties, under supervision
- Research activities
- Acquisition of basic TEE skills. The fellow learns to obtain the 20 standard views

8nd -9th Month

- Thoracic anaesthesia

- Clinical duties as a member of the thoracic team for standard thoracic procedures under supervision. Minimum of 25 cases.
- Planning of participation in a national or international cardiac and thoracic conference. Participation in the Annual Meeting of EACTA in one of the two fellowship years.

10th Month

- Vascular anaesthesia

- Clinical duties as a member of the vascular team for standard thoracic procedures under supervision. Minimum of 25 cases.
- Planning and presentation of clinical case conference
- On – call duties, under supervision

11th Month

- Intensive care medicine

- Clinical duties as a member of the ICU-PACU team for standard management and care of post operative cardiac, vascular and thoracic patients.-
- Daily participation to intensive care ward rounds and preop anaesthesia clinic
- Self consistent TEE examination (Pre - and postoperatively) under bedside supervision
- On – call duties, under supervision

12th Month

- Final approach

- Clinical duties as a member of the cardiac team for standard and advanced cardiac procedures, including transcatheter aortic valve implantation (transapical / transfemoral), aortic valve bypass and anterolateral mitral valve repairs / replacements), under supervision
- Extracorporeal perfusion training
- Self-consistent clinical duties as junior anaesthesia consultant in elective cardiac, thoracic and vascular surgical patients
-Self consistent TEE examination
- On – call duties as a junior consultant, together with a backup senior consultant
- Continuous medical education in the field of cardiac, thoracic and vascular anaesthesia
- Presentation of a case at the clinical case conference once every 6 months

Second year of the fellowship (Advanced CTVA training program)

The Fellow will focus on the activity of the cardiac surgery ICU (14 beds) and the general ICU (8 beds) and to the management of VV-ECMO, VA-ECMO patients, and those with mechanical devices (IABP,

IMPELLA, VAD, total artificial heart). Fellows will follow all the activities of the ICUs under the supervision of senior specialists.

The second year of training is given in a modular fashion, being cardiac surgery the main topic of training, also includes thoracic advanced training and vascular advanced training. There are optional modules, which are 3-6 months length duration as: intensive care of adult cardiothoracic and vascular patients and the research module.
To obtain the advanced training certificate, the fellow must complete the practical part logbook and obtain the TEE certification from EACVI.

Cardiac advanced training

- Learning in advanced haemodynamic monitoring, mechanical circulatory support as management of VV-ECMO, VA-ECMO patients, and those with mechanical devices (IABP, IMPELLA, VAD, total artificial heart), pulmonary hypertension and fast track heart surgery.

Thoracic advanced training

- Protective one-lung ventilation, bronchial blockers, ultrasound-guided blocks and regional techniques.

Vascular advanced training

- Perioperative risk stratification and management, emergency open aortic surgery and TEVAR and EVAR procedures.

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