

Who should be responsible from cardiac surgery intensive care? From the perspective of a cardiac anesthesiologist/intensive care specialist

*Kalp cerrahisi yoğun bakımdan kim sorumlu olmalı?
Kardiyak anesteziyolog/yoğun bakım uzmanı bakış açısından*

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ABSTRACT

Cardiovascular intensive care unit serves the most complicated and selected patient group in the third-level intensive care units. There has been always a debate as to which clinician would lead the treatment process in the intensive care unit for these patients which require a multidisciplinary approach. Considering operating rooms as primary working areas of surgery has caused intensive care units to be of secondary importance. Therefore, the assignment of cardiac anesthesiologists in the intensive care unit would imply sharing of responsibility, provision of multidisciplinary treatment, and immediate application of the advances in anesthesiology-intensive care unit branches in cardiovascular intensive care units.

Keywords: Cardiac surgery; cardiovascular surgery training; intensive care.

ÖZ

Kalp damar yoğun bakım ünitesi, üçüncü düzey yoğun bakım ünitelerinin en karmaşık ve özellikli hasta grubuna hizmet vermektedir. Multidisipliner yaklaşım gerektiren bu hastalarda yoğun bakım ünitesinde tedavi sürecine hangi klinisyenin önderlik edeceği hep bir tartışma konusu olmuştur. Cerrahinin esas çalışma alanının ameliyathaneler olarak görülmesi, yoğun bakım ünitelerinin ikinci planda kalmasına neden olmaktadır. Bu nedenle, kardiyak anesteziyologlarının de yoğun bakım ünitesinde görev alması; sorumluluğun paylaşılması, multidisipliner tedavi yaklaşımlarının ve anestezi-yoğun bakım ünitesi dallarındaki gelişmelerin kalp damar yoğun bakım ünitelerinde ivedilikle uygulanabilmesi anlamına gelecektir.

Anahtar sözcükler: Kalp cerrahisi; kalp damar cerrahisi eğitimi; yoğun bakım.

Changes in clinical practice and patient profile in today's practice on one hand, and new legislation and regulations on the other have created several challenges in the operation of cardiovascular intensive care units (CVICUs). Unlike patients in general intensive care units (ICUs), patients in the CVICUs are those who are exposed to physiological effects of circulation out of the body and who have a higher number of comorbidities, high risk scores, and older mean age. This complex patient group requires multidisciplinary approach for 24 hours a day and seven days a week.^[1]

Considering common practice worldwide, this treatment approach has been adopted by heart

surgeons, since the day that cardiac surgery has begun in Europe and the United States with contributions of general ICU specialists, practitioner nurses, and residents. General ICU specialists (Board Certified Intensivists) are physicians who attend further training with variable duration on pediatrics, internal medicine, anesthesia, and surgery. In studies designed for quality development and improvement as of 1990s in the Society of Critical Care Medicine (SCCM), which is one of the prestigious institutions for intensive care worldwide, the presence of an educated-certified specialist on 24/7 basis has been recommended in ICUs.^[2] Since the early 2000s, the availability of a



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board certified specialist in the ICU has been set as a requirement for the hospital quality by the Leapfrog Group which established the conditions for hospital quality,^[3] and presence of a full-time ICU specialist has been reported to have favorable effect on morbidity and mortality.^[4] Several studies, to date, have shown that this approach reduces the utility of blood transfusions in cardiac ICUs, need for mechanical ventilation, and the length of hospital stay.^[1,5]

This has, however, created a discussion platform for particularly cardiac ICUs. The studies which addressed to the question of “Which is more effective in postoperative care, heart surgeons or non-surgical certified ICU specialists?” compared expected mortality, catheter infections, ventilator-related pneumonia, utilization of blood and blood products, length of ICU stay, and drug consumption, and reported a reduced length of hospital stay and drug consumption under the management of heart surgeons.^[6]

On the other hand, cardiac anesthesiologists performing ICU care, although they are not certified intensivists, have reported that the candidates attending ICU education program do not face with specific problems of patients in the CVICU, and cardiac anesthesiologists possess education degree on research development and practice on perioperative care.^[3] Fast-track protocols, guidelines for the transfusion of blood products, new analgesic approaches, spinal cerebrospinal fluid drainage, and perfusion protocols have been put into practice by these trained and dedicated clinicians. Most of these approaches start in the operating room and continue in the postoperative period.^[3]

Other than anesthesiologists, ICU specialists have reported that early and acute circulatory and respiratory management of patients undergoing cardiac surgery is an extension of intraoperative procedures.^[7] Following cardiovascular surgery, 75 to 80% of patients are discharged from the ICU within 24 to 48 hours.^[7] High-risk patients undergoing multiple procedures, advanced age, the presence of comorbidities in the preoperative period, and cases with organ dysfunction following surgery require multidisciplinary approach, as other patients in the ICU. It is generally suggested that this can be provided only by ICU specialists.^[7]

In an attempt to sustain their leadership, heart surgeons have reported that team leaders must be aware of the details of the procedures performed and anticipated outcomes.^[8] Postoperative ICU is in the nature of cardiovascular surgery residency training and a surgeon is trained on this care along the course

of surgical residency. The patient leaves his/her life in the hands of the surgeon and expects the surgeon to be master during the postoperative care. In addition, the Foundation for the Advancement of Cardiothoracic Surgical Care (FACTS) has been established for the purpose of rendering cardiac surgery intensive care a distinctive area of education and sharing due to multidisciplinary nature of the area, and the Cardiothoracic Surgical Critical Care conferences were initiated in 2004.^[8,9] In 2008, the American Board of Thoracic Surgery recognized that cardiothoracic intensive care required skills and fund of knowledge that were unable to be fulfilled by specialists that received an ICU certificate from other branches, highlighting the importance of ICU in heart surgery.^[10] In recent years, there has been a tendency toward launching cardiovascular ICU training certification program.^[10,11]

Given the latest situation in the United States, postoperative care providers in cardiac surgery patients comprised of heart surgeons, anesthesiologists, ICU specialists who received surgical or medical training, residents or acute care nurses, and residents of general surgery, medical intensive care, anesthesia or emergency medicine.^[12] Adult and pediatric cardiologists are also one of the most important parts of the ICU team, particularly for close follow-up for patients with hemodynamic instability following complex pediatric cardiac surgery.

In Europe, the multi-national declaration published by the quality improvement group of the European Society of Intensive Care Medicine (ESICM) designated ICU directors as physicians who received extra-training on post-anesthesia ICU, internal medicine or surgical training and who spend full time or at least 75% of their time in the ICU.^[13]

In general, a certified ICU specialist is available in the ICUs in Europe, and mostly anesthesiologists lead postoperative patient care in cardiovascular ICU, by discussing the patient with surgical and medical teams. A 24-hour-care in cardiothoracic ICUs is provided by junior and mid-senior level physicians from anesthesia and surgical branches.

However, restriction in working hours of physicians and residents stated in the European Work Time Directive in 2009 has resulted in an increased number of night shifts of cardiovascular surgery residents in several countries, particularly in the UK.^[14] Due to complaints of the residents on the lack of sufficient time for surgical training due to ICU shifts at night and at weekends, a new model has been piloted in several centers. This model subjected nurse practitioners to

a more extensive training to evaluate and examine patients, to manage postoperative complications in the early period, to prescribe drugs, to provide advanced life support, and to open sternum, and most events were, hence, resolved on the phone. This strategy has shifted the physicians to work on an on-call basis. The effects of this model on hospital outcomes, costs and work order have been investigated, and favorable effects have been reported.^[14] This study has reverberated globally and has been criticized by senior cardiac surgeons for reducing time spent by junior physicians in the ICU, which would limit competency of these physicians, and that this model would not reduce costs due to the fact that trained practitioners in many European countries receive salary as low as junior physicians.^[15] In addition, emergency re-sternotomy has been reported to be one of the most challenging situations in the practice of cardiac ICU, and this may pose certain problems regarding the patient's safety in an era of minimally invasive approaches and would abolish the trust between the patient and the surgeon based on the agreements and consents.^[16-18]

However, some authors have found the study favorable and suggested that intensive care training of the cardiovascular surgery residents would not remain insufficient, when a properly structured education program is used.^[18] This study has drawn attention to the content of cardiovascular surgery training in Europe and the importance of switching to a standardized competency-based education system across all European countries has been brought into question.^[19]

According to 2016 data of the Turkish Society of Cardiovascular Surgery, cardiovascular surgical procedures are currently performed at 264 centers in Turkey including 62 university hospitals, 70 training and research hospitals, and 127 private hospitals.^[20] Intensive care units in these centers are largely managed under the responsibility of cardiovascular surgeons with consultation supports from other branches including anesthesia. Patients with a prolonged need of intensive care are passed on to general ICU or reanimation units.

Considering legal regulations, the items of ICU directive related to CVICUs define that at least three cardiovascular surgery specialists shall be made available in CVICUs (Item 9), and a specialist from the relevant branch from ICUs of other departments is assigned as the responsible specialist (Item 17/a).^[21] However, considering the nature of the branch (the surgeons preference to be in the operating room), this task is accomplished by visits with certain intervals and assignment of junior/senior residents instead of

full-time availability of a specialist who completed his/her training.

Until recently, three centers in Turkey (Türkiye Yüksek İhtisas Hospital, Dr. Siyami Ersek Thoracic and Cardiovascular Surgery Training and Research Hospital, Kartal Koşuyolu Yüksek İhtisas Training and Research Hospital) provided education on cardiac anesthesia with particular focus on anesthesiology and reanimation before completing the program. Among these centers, intensive care following cardiovascular surgery is provided under the responsibility of the Department of Anesthesiology only in Dr. Siyami Ersek Cardiovascular Surgery Center for many years and one academic member and one specialist are always available in the ICU. This allows sharing knowledge and experience between specialties and provision of a comprehensive and effective treatment to the patients.

In previous years, residents of cardiovascular surgery and anesthesia were assigned full-time in the ICUs; however, an overall decline in the number of residents and resident anesthesiologists not being assigned in branch hospitals interrupted training of resident anesthesiologists. With the initiative of the Turkish Ministry of Health, education protocols have been signed between these centers and general hospitals providing residency training on anesthesiology, and resident anesthesiologists matching these positions were planned to undergo training on thoracic and CVICU as part of their training program. This will, therefore, render anesthesiology and reanimation training a qualified residency program with good command on cardiovascular intensive care.

Why is it important to make cardiac anesthesiologist available in CVICU?

The use of short-acting sedative hypnotics and opioids has become a widespread practice, changing anesthesia protocols to allow early extubation as the first step of early recovery protocols which have been increasingly adopted in heart surgery within the past decade.^[12] Currently, early recovery is preferred for the patient comfort and effective use of the resources of ICU.^[22] The use of protective peri- and postoperative ventilation strategies with new ventilator operating modes and increasing disposal of ultrasonographic imaging studies of the lungs by anesthesiologists/intensivists for early diagnosis are critical landmarks of advancements to reduce respiratory complications in the ICUs.^[23]

In addition, pulmonary artery catheterization which was extensively used in early periods of cardiac

surgery has not lost its popularity and replaced mostly by less invasive methods. The concept of functional hemodynamic monitorization to predict which patients would response better to the treatment has been put into practice by anesthesiologist/intensivists, and continuous monitorization of cardiac output, pre- and after load of the ventricles using analysis of arterial pressure waves, has been introduced.^[24] Echocardiography is one of the main diagnostic tools used to guide diagnosis and treatment in cardiac surgery. This method can be continuously used perioperatively and as a bedside procedure in the ICU and it provides real-time data. Transesophageal echocardiography training also becomes increasingly more important in the practice of anesthesiologists and intensive care specialists.

Another important issue is that this method allows early diagnosis and prevention of complications in the ICU following cardiac surgery. In particular, continuous monitorization of cerebral and somatic oxygenation using near-infrared spectroscopy (NIRS) is critical to detect neurological complications. As one of the most common problems in the ICU, postoperative delirium can be also recognized early with the use of sedation scales and delirium scales. Several studies have shown that dexmedetomidine, an alpha-agonist which is widely used in the practice of anesthesiology, reduces delirium following cardiac surgery, thereby, allowing early extubation.^[25,26]

Furthermore, bleeding and transfusion management are other major issues in cardiac surgery. In early 2000s, perioperative blood transfusion was shown to increase in-hospital and late mortality rates apart from its known side effects, and the concept of patient blood management has been introduced by an anesthesiologist, Prof. Aryeh Shander, MD, FCCM, FCCP.^[27] A collaborative work of the Turkish Society of Anesthesiology and Reanimation, Turkish Society of Thoracic and Cardiovascular Anesthesiology and Intensive Care, and Turkish Ministry of Health has a significant impact on the adoption of this approach gradually in Turkey.

On the other hand, subspecialty training is provided on intensive care since 2012 with the approval of this branch as a sub-specialty in Turkey.^[28] Possibly with the new legal drafts, the responsibility of all third-level ICUs will be passed on to a specialist holding a subspecialty certificate as an obligation. Even so, CVICUs should remain in a distinct category. Due to the nature of this specialty, surgeons prefer spending more time in the operating room, while ICUs emerge as an area with increasing importance. As a solution, we suggest that CVICU training must be included in

the education program of the intensive care specialists with interviews and protocols between the associations, or an ICU certification program must be established similar to that in the United States.

In conclusion, sharing of responsibility in the operating room is as important as sharing responsibility in the intensive care unit considering that heart surgery is a team work. Assignment of cardiac anesthesiologists in the intensive care unit implies sharing of responsibility as well as immediate application of the advances in anesthesiology-intensive care unit branches in cardiovascular intensive care units. Cardiovascular intensive care units would be more efficient and successful in terms of patient care and outcomes, with the management of cardiovascular intensive care units by an intensive care unit team involving definitely a cardiac surgeon and a cardiologist, under the leadership of a cardiac anesthesiologist with experience on intensive care.

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