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Trauma intensive care unit (TICU) at Hamad General Hospital

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EDITORIAL

Trauma is a leading cause of mortality and morbidity worldwide, and thus represents a great global health challenge. The World Health Organization (WHO) estimated that 9% of deaths in the world are the result of trauma.[1] In addition, approximately 100 million people are temporarily or permanently disabled every year.[2] The situation is no different in Qatar, and injury related morbidity and mortality is increasing in the entire region, with road traffic collisions (RTCs) being the most common mechanism.[1]

It is well recognized now that trauma care provided in high-volume, dedicated, level-one trauma centers, improves outcome. Studies have also looked at what are the components of a trauma system that contribute to their effectiveness[2]. However, in general, it usually implies a high-volume of cases, dedicated full-time trauma qualified professionals, a solid pre-hospital system, a multidisciplinary team, and excellent rehabilitation services.

Similarly, critically injured trauma patients managed in a dedicated trauma intensive care unit (TICU), has been shown to improve outcomes, especially for polytrauma patients with traumatic brain injury (TBI).[3] In fact, the American College of Surgeons (ACS) Committee on Trauma requires verified

trauma centers to have a designated ICU, and that a trauma surgeon be its director.[4] Furthermore, studies have shown that for TBI, it is not necessary for this ICU to be a neurocritical care unit, but rather it should be a unit that is dedicated to trauma, that has standardized protocols for TBI management.[5,6] In fact, the outcomes are better in the latter, with lower mortality in multiple-injured patients with TBI, when admitted to a TICU (versus a medical-surgical ICU or neurocritical care unit).[3] These benefits were shown to increase, with increased injury severity. The proposed reason for this is thought to be due to the associated injuries being managed better.[7]

The aim of this editorial is to describe the TICU at Hamad General Hospital (HGH), at Hamad Medical Corporation (HMC), including a comparison of its data and outcomes with other similar trauma centers in the world. The Qatar Trauma Registry, as well as previous publications from our Trauma Center,[1,8] were used to obtain HGH TICU and worldwide Level-1 Trauma Center standards, respectively.

With respect to HGH, the TICU is part of an integrated trauma program, the only level-1 trauma centre in Qatar. It provides the highest standard of care for critically-ill trauma patients admitted at HGH, striving to achieve the best outcomes, excellence in evidence-based patient care, up to date technology, and a high level of academics in research and teaching. This integrated program includes an excellent pre-hospital unit, emergency and trauma resuscitation unit, TICU, trauma step-down unit (TSDU), inpatient ward, and rehabilitation unit.

The new TICU is a closed 19-bed unit, that was inaugurated in 2016, is managed 24/7 by highly qualified and experienced intensivists (9 senior consultants and consultants), along with 24 well-trained and experienced associate consultants or specialists, and fellows and residents in training, as well as expert nursing staff (1:1 nurse to patient ratio) and allied health professionals (respiratory therapists, pharmacists, dieticians, physiotherapists, occupational therapists, social workers, case managers, and psychologists). It is supported by all medical and surgical subspecialty services.

It is equipped with the latest state-of-the-art technology and equipment, including 'intelligent ventilators", neuro-monitoring devices, ultrasound, point-of-care testing such as arterial blood gas and rotational thromboelastrometry (ROTEM), and video airway devices.

The TICU is a teaching unit, linked to the HMC Medical Education department, with presence of fellows, and residents (see below for details). Medical students (Clerkship level) from Weill-Cornell Medicine Qatar also complete a one-week rotation in the TICU, as part of their exposure to critical care. The first batch of clerks from Qatar University College of Medicine are expected to start rotating in the TICU soon.

The Trauma Critical Care Fellowship Program (TCCFP) is an ACGME (Accreditation Council for Graduate Medical Education) fellowship that was established over seven years ago. To date, over 40 physicians from both within, and out of, the trauma department have completed the program. Up to seven fellows, including international candidates, are trained each year. A number of physicians have succeeded in gaining the European Diploma of Intensive Care Medicine (EDIC). The program continues to attract many applicants from various specialties including surgery, anesthesia, and emergency medicine. An increasing number of international physicians from Europe and South America have expressed interest in applying for our fellowship. The first

international fellows are likely to join us from early 2020.

Residents (from general surgery, ER, ENT, plastics, orthopedics, and neurosurgery) rotate (one to three months' rotations) in the TICU, and are actively part of the clinical team.

There were 568 admissions to the TICU in 2018. The patients admitted were either mainly polytrauma patients with varying degrees and combinations of head, chest, abdominal, pelvic, spine, and orthopedic injuries, or isolated-TBI. Of these patients, 378 were severely injured with an injury severity score (ISS)[9] greater than 16.

According to previously published data from our Trauma Centre,[1,8] our mortality rates (overall approximately 6-7%, as well as when looked at in terms of early and late deaths) compare favorably with other trauma centers around the world, when looking at similarly sized retrospective studies.

The TICU continues to be an active member of the Critical Care Network of HMC.[10] This network involves all of the ICU's in all the HMC facilities. The main processes that the TICU is presently involved in as part of this network are: patient flow, clinical practice guidelines, evaluation and procurement of technologies, HMC sepsis program, and in general, taking part in any process that pertains to critical care at HMC.

A number of quality improvement projects are being undertaken in the TICU. Examples of such projects include:

- Decreasing rates of infection in TICU
- Score-guided sedation orders to decrease sedation use, ventilator days and length of stay
- Reducing blood taking and associated costs
- Sepsis alert response and bundle compliance
- Medical and surgical management of rib fractures

A multidisciplinary team of physicians, nurses, and allied health professionals participate in these projects, and meet once a month to review all projects.

Similarly, many research projects are taking place in the TICU, in coordination with the Trauma Research program, and often in collaboration with other departments (local and international). Examples of some of the research projects include:

- The "POLAR" study (RCT on Hypothermia in TBI)[11]
- B-blockers in TBI (RCT-ongoing)
- Tranexamic acid (TXA) for bleeding in trauma (RCT-ongoing)

The team is also involved in conducting systematic reviews in relation to the role of transcranial doppler in TBI,[12] sepsis in TBI patients (ongoing), self-extubation in TBI patients,[13] safety and efficacy of phenytoin in TBI (ongoing), and optic nerve diameter for predicting outcome in TBI (submitted).

The TICU at HGH is a high-volume, high acuity unit that manages all the severely injured trauma patients in Qatar. It is well staffed with highly trained and qualified personnel, and utilizes the latest in technology and state-of-the-art equipment.

It performs very well, when compared to other similar units in the world, and achieves a comparable, or even lower mortality rate.

With continued great support from the hospital, corporation administration, and Ministry of Public Health, the future goals of the TICU will be to maintain and improve upon the high standards of clinical care it provides, as well as perform a high quality and quantity of research, quality improvement initiatives, and educational work, in order for it to be amongst the best trauma critical care units in the world.

Keywords: trauma, intensive care unit, Hamad General Hospital, Hamad Medical Corporation, Doha, Qatar

Ethical Approval

Permission to share the data presented in this editorial has been obtained from the HMC Trauma Section.

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