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Advance Trauma Life Support

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Abstract

According to World Health Organisation and centre for disease control more than 9 people die every minute from injuries or violence. Most of the death occurs due to road traffic accidents accounts for 1 million, with missed initial assessment around 8.1%-22% and with haemorrhage being missed around 30-40%[9]. This article reviews the literature regarding various treatment modalities of advance trauma life support while treating the road traffic victim from 1997-2018. Although ATLS has drawbacks, because of its simple principles it accepted all over the world for treating trauma victims on large scale. So the advance trauma life support should practice by the medical staff and students to decline the morality rates in road traffic accidents.

Keywords: Advance Trauma Life Support, airway, breathing, circulation, disability, environment, control hemorrhagic shock, un control hemorrhagic shock.

1. Introduction

Trauma is one the most common cause of death due to violence or road traffic accidents, as it is a diverse disease which requires time, critical decisions and skills influencing victim's survival rate. According to World Health Organisation and centre for disease control more than 9 people die every minute from injuries or violence. Most of the death occurs due to road traffic accidents accounts for 1 million, with missed initial assessment around 8.1%-22% and with haemorrhage being missed around 30-40%[9]. As the initial trauma system aims at training the medical personnel through the perceptive approach or didactic lectures is a failure in trauma setting. As these approaches does not focus on practical education and hands on skills. ATLS[R] has evolved in emergency trauma setting, highlights on the golden hour of trauma which draws a attention towards airway establishment, hemorrhage control, management of shock, positioning victim which are essential life saving measures requiring rapid intervention.

In November 1978 Dr James styner an orthopediac surgeon in association with the American College of Surgeons Committee on Trauma (ACSCOT) and The Committee on Trauma of the American College Of

Emergency Physician In Lincoln together proposed the Advance Trauma Life Support protocol [7].

Later it was adopted by The American College Of Surgeon in 1980 and they promoted it as international standard approach for treating trauma patients[15]. In 2006 and 2007 it is developed as vision and common language of trauma care by committee on trauma executive committee members[23].

Since the evolution of trauma systems become prognostic tools to quantify expected outcomes and methods for assessing end-points in trauma care. The development of trauma scoring systems has also provided a common language among clinicians for discussing the treatment and management of injuries.

In 1974, Teasdale and Jennett[17] proposed a practical scale for head injury assessment to eliminate arbitrary distinctions between consciousness and different levels of coma. Later 1976, the authors modified the original 14-point scale to a 15-point scale, adding a sixth point to the motor response group. A prospective multicenter study showed a correlation between mortality and a Glasgow Coma Scale score of <9 independent of volume of institution, mechanism of injury or treatment.

In 1981, Champion et al updated their Triage Index as the Trauma Score to include systolic blood pressure and respiratory rate. They presented the Trauma Score as a modified index of injury severity and proposed the use of the Trauma Score in combination with the Injury Severity Score, an anatomic index of injury severity and age.[24] This became known as the Trauma and Injury Severity Score.

Revised Trauma Score in 1989, Champion et al by eliminating capillary refill and respiratory expansion from the equation, noting that they were too difficult to assess in the field and developed the Triage Revised Trauma Score which had increased incidence in sensitivity and decrease in specificity.

ATLS course undergoes revision for every 4years by incorporating new content[24]. Recently wright etal level of evidence rating system was adopted by the ATLS which has more acceptances among physicians. It's core principles are rapid initial assessment or triage, primary and secondary survey, stabilization and transfer of victim along with radiographic diagnostic aid involving FAST (focused abdominal sonography in trauma) and CT scan (computed tomography)[18]. Advance Trauma Life Support provides modern approach for treating victim's threat to life first besides its principles[7].

As it is practiced in 60 countries and half a million clinicians trained in this course with well-established principles lead to the global expansion of Advance Trauma Life Support all over the world[24]. The high quality of care provided by ATLS^R in the systemic approach enables to overcome the hurdles in emergency setting. So the Advance Trauma Life Support should adopted by doctors, trainee, nurses and technicians in global health environment to save countless lives in trauma setting[7]. The trauma mortality declined to 15-20% in developing countries in last few decades by practicing the ATLS protocols. So this study undertaken to increase the awareness of ATLS^R practice by medical staff as mandatory for treating the road traffic victims to decrease the morbidity and mortality.

2. Discussion

The recent information provided by world Health Organization and Centre for Disease Control showed that more than nine people die every minute suffering from injuries or violence. Road traffic injuries alone cause more than 1 million deaths annually and an estimated 20-50 million deaths associated with significant injuries, are leading cause of death due trauma in worldwide. The era

of trauma scoring began in 1952 by De Haven based on light plane crashes.

An orthopaedic surgeon named James styner was piloting his plane, got crashed in rural cornfield of Nebraska where his wife and children got injured. The surgeons recognized the treatment provide at rural local hospital was inadequate and stated that "when I can provide better care in the field with limited resources than what my children and I received at the primary care facility, there is something wrong with the system and the system has to be changed."[7,37,38,39] A group of private practioners and doctors in Nebraska, the Lincoln medical education foundation and the Lincoln area mobile heart team nurses, with the help of the university of Nebraska medical Centre, the Nebraska state committee on trauma of the American college of surgeons and the south east Nebraska emergency medical services identified the need for training in advance trauma life support. It provides with basic knowledge necessary to:

Assess a patient's condition rapidly and accurately. Resuscitate and stabilize patients according to the priority. Determine whether a patient's needs exceed the resources of a facility and/or the capability of a provider. Arrange appropriately for a patient's interhospital or intrahospital transfer. Ensure that optimal care is provided and that the level of care does not deteriorate at any point during the evaluation, resuscitation or transfer process.

The content and skills presented in this course are designed to assist doctors in rendering emergency care for trauma victims. The concept of the "golden hour" emphasizes the urgency necessary for successful treatment of injured patients and is not intended to represent a fixed time period of 60 minutes.

The three underlying concepts of the Advance Life Support course has remained simple and standard which are initially difficult to accept: they are 1.Treat the greatest threat to life first. 2. The lack of definitive diagnosis should never impede the application of an indicate treatment. 3. A detail history is not essential to begin the the evaluation of a patient with acute injuries should be performed as time critical interventions for early assessment of injured patient, beside its principles.

The treatment of serious injured patients needs" intial assessment" as systemic approach and time which are crucial for managing the trauma patient. The following elements seen during the initial assessment includes Preparation, Triage, Primary survey (ABCDEs), Adjuncts to the primary survey and resuscitation, Consideration of the need for patient transfer, Secondary survey (head-to-toe evaluation and patient history), Adjuncts to the secondary survey, Continued post resuscitation monitoring and reevaluation with Definitive care.

The National Association of Emergency Medical Technicians' Prehospital Trauma Life Support Committee, in cooperation with the Committee on Trauma (COT) of the American College of Surgeons (ACS), has developed the Prehospital Trauma Life Support (PHTLS) course. PHTLS is similar to the ATLS Course in format, although it addresses the prehospital care of injured patients.

The primary survey encompasses the ABCDE's which are considered as well established principles of advance trauma life support in rendering the trauma care and identifies life-threatening conditions by adhering to this sequence. Failure to respond to these questions during triage suggests abnormalities in A, B, C, or D that warrant urgent assessment and management. During the primary survey, life-threatening conditions are identified and treated in a prioritized sequence based on the effects of injuries on the patient's physiology, because at first it may not be possible to identify specific anatomic injuries.

The golden hour of trauma was given by Dr late R. Adams Cowley founder of Baltimore's renowned shock trauma institute in 1975, stated that the first hour after injury will largely determine the survival of critically injured patients. As it highlights on need for rapid intervention, it was incorporated by Advance Trauma Life Support course[15].

These measures include airway maintenance techniques maneuvre's (chin lift, jaw thrust), oropharyngeal airway, nasopharyngeal airway, extra glottic and supra glottic airways (laryngeal mask airway, intubating laryngeal mask airway, laryngeal tube airway), multilumen esophageal airway, definitive airway measures (including surgical airway), and methods of providing supplemental ventilation.

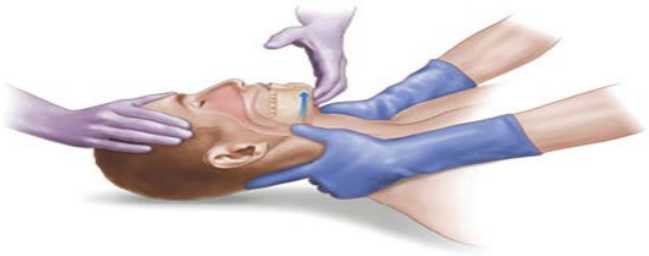


Figure 1.Chin lift procedure

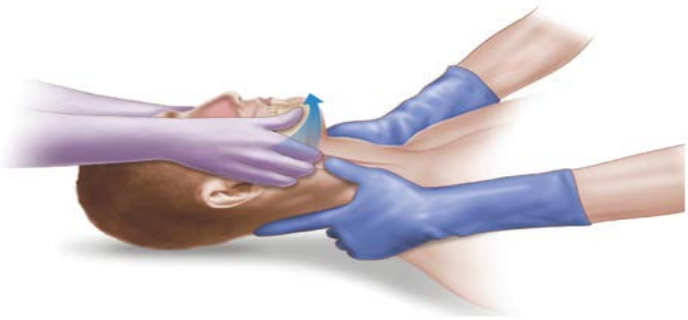


Figure 2. Jaw thrust procedure

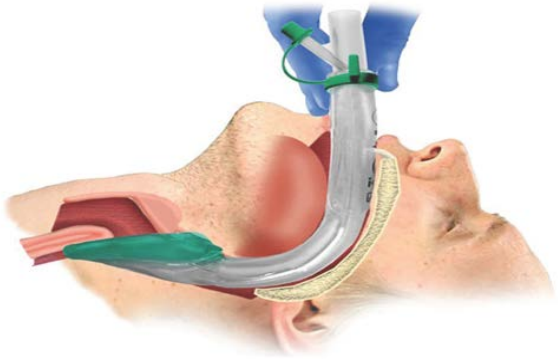


Figure 3. Laryngeal mask airway (LMA) and

Because all of these actions potentially require neck motion, restriction of cervical spinal motion is necessary in all trauma patients at risk for spinal injury until it has been excluded by appropriate radiographic adjuncts and clinical evaluation.

Predicting Difficult Airway Management: When such difficulties are encountered, skilled senior anesthesian should assist. The mnemonic LEMON is a helpful tool for assessing the potential for a difficult intubation.

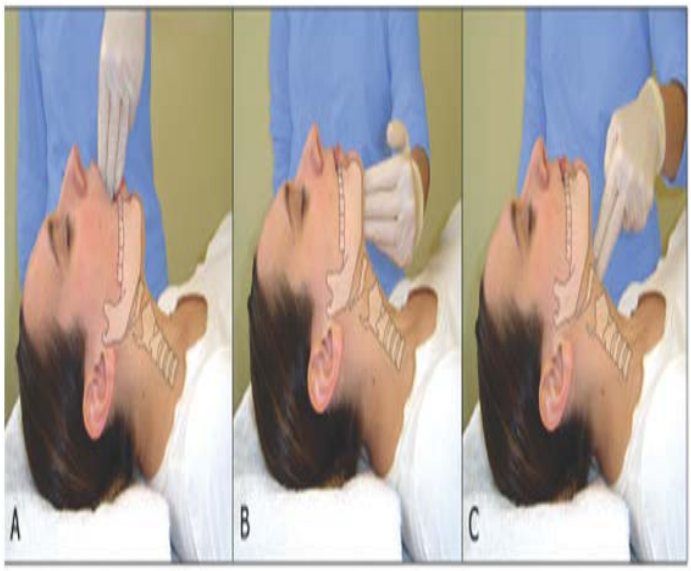


Figure 4. Lemon assessments for difficult intubation

Figure 5. Intubating laryngeal tube

The Eschmann Tracheal Tube Introducer (ETTI), also known as the gum elastic bougie (GEB), may be used when personnel encounter a problematic airway. Anesthesian's use the GEB when a patient's vocal cords cannot be visualized on direct laryngoscopy. In fact, using the GEB has allowed for rapid intubation of nearly 80% of prehospital patients in whom direct laryngoscopy was difficult.

Figure 6. Eschmanntracheal tube introducer

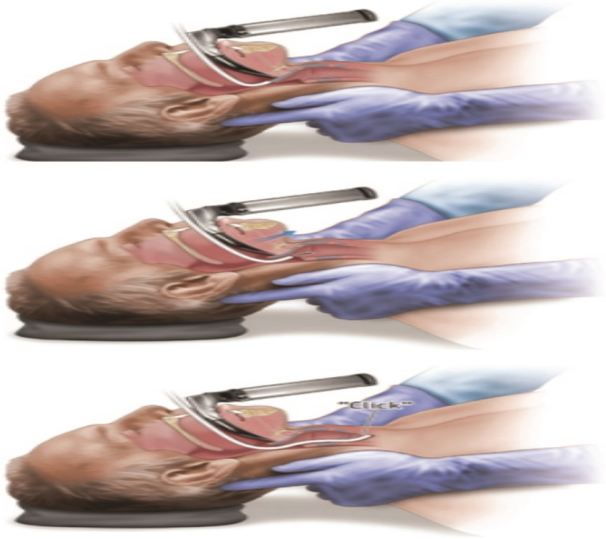


Figure 5. Insertion of the GEB designed to aid in difficult intubations.

The advance in airway maintenance is use of videolaryngeoscope and for paediatric patients the use of cuffed endotracheal tubes for all children except <1 year of age is recommended. Ventilation is managed in trauma patient by using reservoir face mask, nasal catheter, nasal cannula and non-breather mask. For effective breathing can be achieved by using bag-mask one person or two person technique along with this pulse oximetry is preffered to measure oxygen saturation.

The circulatory system should be addressed in multiple injured with the control of haemorrhage.The patient's response to initial treatment, coupled with the ruling out

the primary and secondary surveys, which usually provides sufficient information to determine the cause of shock . The most effective way of restoring adequate cardiac output, end-organ perfusion, and tissue oxygenation is to restore venous return to normal by recognising and stopping the source of bleeding. .

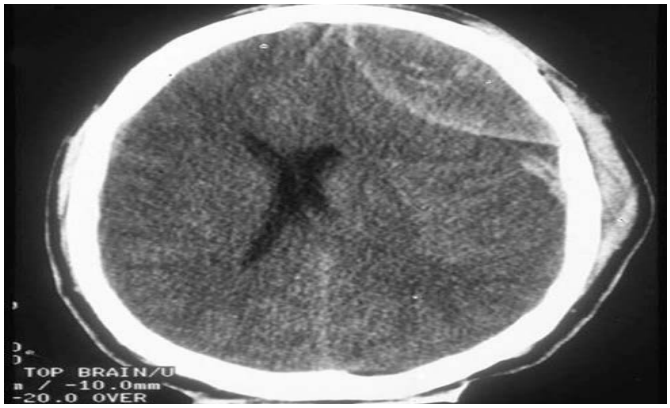
Clinical Differentiation of Cause of Shock: Selective secondary survey, such as chest and pelvic x-rays and focused assessment with sonography for trauma (FAST) examinations can confirm the cause of shock, but should not delay appropriate resuscitation.

Figure 6. Using ultrasound (FAST) to search for the cause of shock.

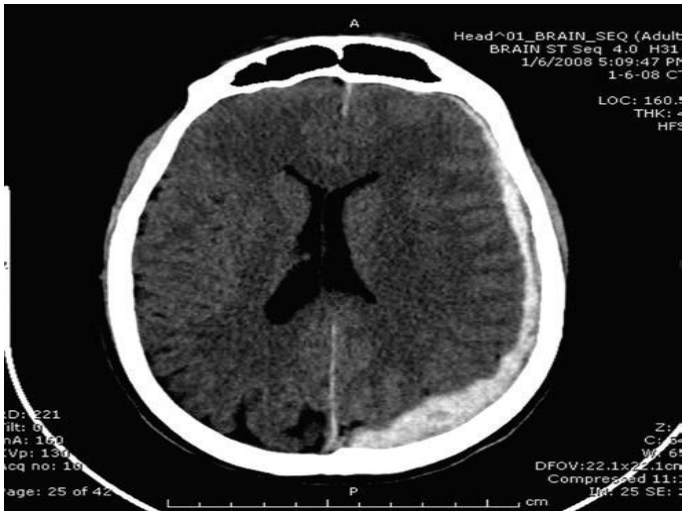
The shock follows a "lethal triad" of acidosis, hypothermia, coagulopathy combine together to form "biological first hit"[13]. According to M.perry etal[13] the haemorrhagic shock can be also classified as 2 types; they are control and uncontrol hemmoraghic shock. The control type can be arrested by identifying the bleeding source and occluded whereas uncontrol variety of shock temporarily arrested by hypotension, vasoconstriction and local thrombus formation. D stands for disability in ATLS which measures the neurological status of injured individual.This neurological evaluation establishes the patient's level of consciousness, pupillary size and reaction, lateralizing signs and spinal cord injury level.

The primary goal of traumatic brain injury (TBI) is to prevent secondary brain injury. Providing adequate oxygenation and achieving the blood pressure at a level to maintain normal brain perfusion to prevent secondary damage of brain and there improving patients outcome. The severity of injury and morphology are used as classifying heads injuries.

The Glasgow Coma Scale (GCS) score is used as an objective clinical measure of the severity of brain injury. CT scan should be obtained as neurosurgical intervention along with consultation of neurosurgeon



Epidural hematoma



Subdural hematoma

Classification of traumatic brain injuries

Severity	Mild Moderate Severe		GCS Score 13–15 GCS Score 9–12 GCS Score 3–8
Morphology	Skull fractures	Vault	linear vs. stellate Depressed/nondepressed
		Basilar	With/without CSF leak With/without seventh nerve palsy
	Intracranial lesions	Focal	Epidural
		Diffuse	Concussion Multiple contusions Hypoxic/ischemic injury Axonal injury

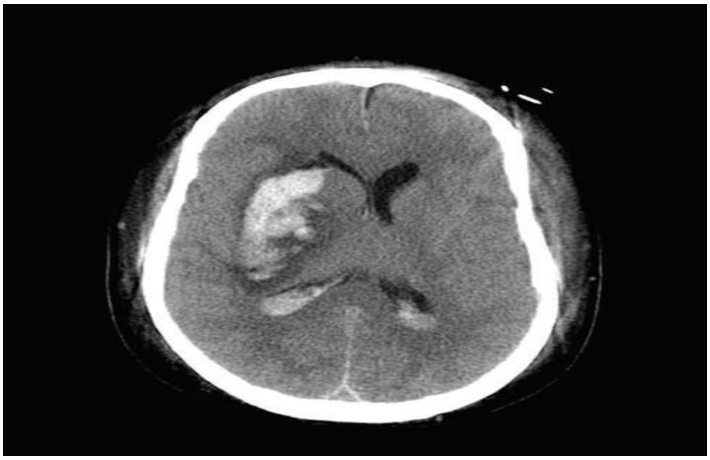
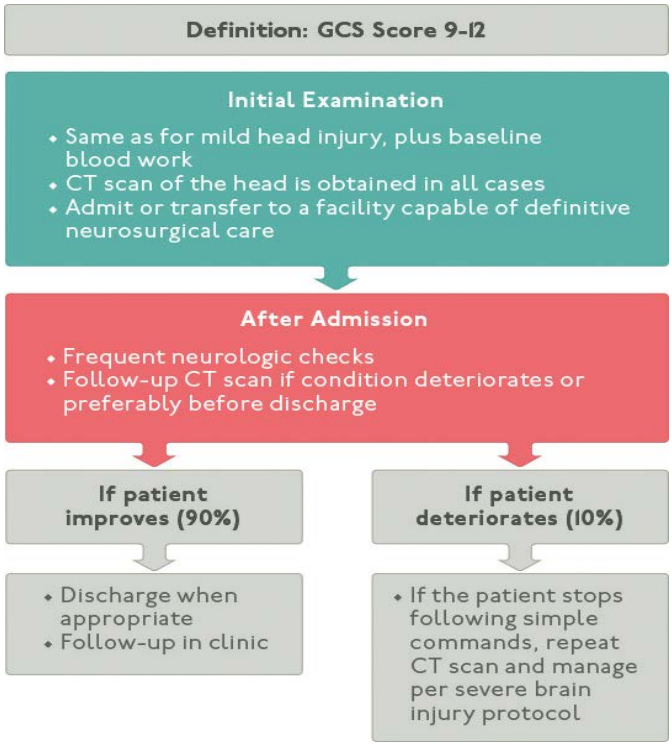
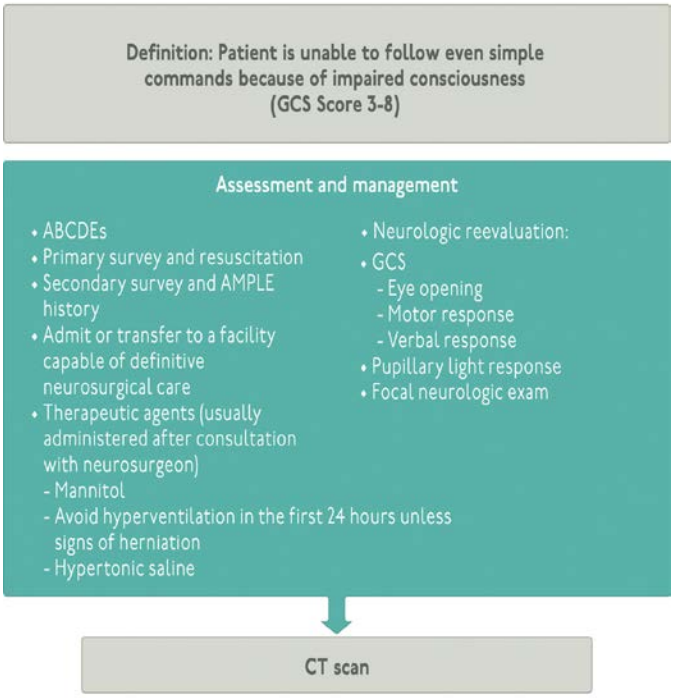


Figure 7. Ct scan of intracranial hematomas Right intraparenchymal hemorrhage with right to left midline shift and associated biventricular hemorrhages

The brain injury is graded based on glass coma scale score as minor with score of 13-15, moderate score 9-12 and severe score 3-8. By evaluating the GCS score, when there is right/left or upper/lower asymmetry, be sure to use the best motor response to calculate the score, because it is the most reliable predictor of outcome. However, the actual responses on both sides of the body, face, arm, and leg must still be recorded.



Flow chart 1. Algorithm for Initial Management of Moderate Brain Injury.



Flow chart 2. Algorithm for Initial Management of Severe Brain Injury.

When a patient demonstrates variable responses to stimulation, the best motor response elicited is a more accurate prognostic indicator than the worst response.Testing for doll's-eye movements (oculocephalic), the caloric test with ice water (oculovestibular), and testing of corneal responses are deferred to a neurosurgeon. Never attempt doll's-eye testing until a cervical spine injury has been ruled out. It is important to obtain the GCS score and perform a pupillary examination before sedating or paralyzing the patient, because knowledge of the patient's clinical condition is important for determining subsequent treatment.

Brain injuries are initially managed by intravenous fluids, blood and blood products, hyperventilation, mannitol, hypertonic saline, barbiturates and anticonvulsants. Brain surgeries also indicated in case of depressed skull fractures, penetrating brain injury and intracranial mass lesions. E in ATLS indicates exposure/environmental control of injured patient. During the primary survey, completely undress the patient, usually by cutting off his or her garments to facilitate a thorough examination and assessment. After completing the assessment, cover the patient with warm blankets or an external warming device to prevent him or her from developing hypothermia in the trauma receiving area. Warm intravenous fluids before infusing them, and maintain a warm environment. Hypothermia can be present when the patient arrives or it may develop quickly in the ED if the patient is uncovered and undergoes rapid administration of room-temperature fluids or refrigerated blood. Because hypothermia is a potentially lethal complication in injured patients, take aggressive measures to prevent the loss of body heat and restore body temperature to normal. The patient's body temperature is a higher priority than the comfort of the healthcare providers, and the temperature of the resuscitation area should be increased to minimize the loss of body heat. The use of a high-flow fluid warmer to heat crystalloid fluids to 39°C (102.2°F) is recommended. When fluid warmers are not available, a microwave can be used to warm crystalloid fluids, but it should never be used to warm blood products. The limitations of advance trauma life support is trained hospital staff lack evidence in improved trauma outcome related to systemic views[4.]currently there is no evidence exist that prognosis declines rapidly 60 minutes after trauma. Advance trauma life support trained individuals gain organisation skills, knowledge decline over period of 8 years if not practised. This support indicates need for recertification to update the candidate for every 4 years with recent advances in trauma management which are changed continuously depending upon new scientific evidence[1,22,40.]The ATLS course trained individuals reducing mortality and morbidity in trauma volume is still deficient because of attrition of skills.

The advance trauma care gives a positive impact on the care provide for injured patient in worldwide by organized and systemic approach through interactive skill station using human patient simulators[36] has gained students and doctors attention to practise the principles in trauma setting.

So this study undertaken to increase the awareness of ATLS^R practice by medical staff as mandatory for treating the road traffic victims to decrease the morbidity and mortality.

1. Conclusion

Advance trauma life support provides safe and reliable methods for immediate resuscitation of injured patient with providers' capabilities and available sources without deteroiation of evaluation process. Although it has drawbacks ,because of its simple principles it accepted all over the world for treating trauma victims on large scale .So the advance trauma life support should practised by the medical staff and students to decline the morality rates in road traffic accidents.

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