**PISTACHIO**-The **P**r**i**mary **T**r**a**uma Care **C**ourse **I**mpact and **O**utcome study in Vietnam



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# **Background, rationale, and significance**

Road trauma is a major public health problem in Vietnam. In 2018 there were 23,000 victims of whom 8,200 died 1. It is the leading cause of death in people aged 15 to 44 years 2. The Vietnamese government has tried to remedy this situation. The mandatory wearing of motorcycle helmets legislation was implemented in 2007 resulting in a 16% reduction of road traffic head injury over a period of 3 months in 20 hospitals 3. The penalties for people who were accused of breaking traffic laws were also increased. Parliament has also approved a new law to show zero tolerance for alcohol while driving which is enacted in January 2020 4.

All these previous initiatives address the pre-hospital environment. As the pre-hospital trauma care system is rudimentary, most trauma victims are transported to the emergency department (ED) at local hospitals by private vehicles such as a motorcycle, taxi, or car. Therefore, trauma patients receive their initial treatment and triage on attendance at a hospital ED. If the level of injury is severe and beyond the scope of a particular hospital, the patient is transferred to a higher-level healthcare centre with more advanced facilities and equipment.

The Vietnamese healthcare system is built on a ‘pine tree’ model. A trauma centre has responsibility for various ‘satellite’ hospitals and receives severe trauma patients. In a satellite or frontline hospitals, the staff who first treat a trauma patient may be a surgeon, nurse, anaesthetist, or general practitioner who may not be trained in a trauma subspecialty. This warrants the need of trauma care training for frontline staff who have not yet received formal trauma management training.

Primary Trauma Care (PTC) education program has been developed and offered to emergency staff to improve the quality of management and outcomes for road trauma victims. Globally, PTC has been rolled out in 76 countries 5 6 over the last two decades. In sub-Saharan Africa, Pakistan and Palestine it was shown to improve learner’s knowledge and confidence in trauma management 7-9. In Vietnam, PTC was delivered in Viet Duc hospital (the largest trauma centre in Vietnam) in 2007 and 2012 by a group of Australian doctors, led by Professor Skinner and Dr. Hayden Perndt. It has also been delivered in other locations including Binh Dinh, Ha Long (2007), Ninh Binh (2012) and Ho Chi Minh City (2018) where it was well received by participants but never rigorously assessed 10-12.

A recent systematic review highlighted that the PTC course is applicable and useful to all health care workers and is of prime importance especially in regions of the world where there is a great shortage of medical personnel 13. The study also pointed out that almost all existing studies assessed knowledge and confidence using immediate post course questions 13. It is therefore difficult to ascertain whether these findings positively correlate with an overall improvement in trauma management and decrease in mortality rates.

To address this evidence gap we plan to conduct the PrImary Trauma cAre CourSe Impact and Outcome (PISTACHIO) study in Vietnam. We aim to establish whether or not PTC improves both short-term (health-workers’ knowledge, skill, and stated practice) and intermediate-term (trauma patient 24 hours, 30-day survival, length of hospital stay, total medical cost) outcomes. We plan to conduct the study in Ninh Binh and Thanh Hoa provincial hospitals. These front-line satellite hospitals are 70 and 120 km south respectively of Viet Duc hospital, the major trauma hospital in Hanoi.

This study will likely have a significant impact on trauma care in Vietnam because:

1. The pre-hospital first aid is not sufficiently performed in Vietnam, thus, the primary trauma care at emergency department plays crucial role in reducing the post-trauma morbidity and mortality 14 .
2. We plan to conduct this study at two representative satellite hospital emergency departments (ED) in which, ED doctors did not received formal trauma care training. The results of study will provide evidence for health policy makers and its adoption in the other healthcare facilities.
3. Our study will be potentially benefit other low- and middle-income countries which are similar context to Vietnam.

# **Objectives**

* 1. **Primary objective**:

To determine if PTC training will improve the knowledge and skill of emergency staff regarding road trauma care for patients.

* 1. Secondary objectives:

To determine whether PTC training will:

* Reduce the mortality rate of road trauma patients at 24 hours and 30 days.
* Improve quality of life at 30 days survival.
* Impact economic factors, including total number of days in hospital, number of days in intensive care unit, direct in-hospital medical costs.

# **Study design**

PISTACHIO is a prospective sequential intervention study that will reveal whether PTC may dually benefit participants (in-term of knowledge and skill improvements) and patient outcomes (morbidity and mortality reduction).

# **Hypothesis**

* 1. Primary hypotheses

Null hypothesis: a one-week PTC training will have no effect on knowledge, attitude, and practice of emergency staff of road trauma management.

Alternative hypothesis: a one-week PTC training will increase the knowledge, attitude, and practice of road trauma victims by emergency staff.

* 1. Secondary hypotheses

Null hypothesis: a one-week PTC training will have no benefit on patients’ outcomes including trauma cases morbidity, mortality (at 24 hours and 30 days), quality of life (at 30 days) and on economic factor such as: number of days in hospital/ICU, direct/indirect medical course.

Alternative hypothesis: a one-week PTC training will impact to

* Patients’ outcomes, including reduce the trauma cases morbidity and mortality at 24 hours and 30 days.
* Improve Quality of life at 30 days
* Reduce/increase direct and indirect medical courses

1. **End points**

Kirkpatrick training model 15 will be applied to explore the effect of PTC training program. This model has been used to evaluated a number of training programmes in other sectors such as obstetrics 16 17 and maternal and child health 18. Four levels of training program will be measured:

* Level 1 (Reaction): Participant’s reaction to the PTC course
* Level 2 (Learning): Learning-evaluate how knowledge, skill, and level of confident change with PTC course.
* Level 3 (Behaviour): Behaviour- measure the change in participant’s practice and whole trauma system in 2 local hospital.
* Level 4 (Result): Result-patient outcomes

In this study, the measurements from level 1 to level 3 will be considered as primary endpoint while secondary endpoint is equivalent to level 4.

## Primary endpoint

A week of PTC training will be conducted and assessed for both knowledge and skill by a validated pre- and post-course MCQ test 19 and performance scenarios. All healthcare-workers who work in ED will be offered the course. To facilitate teaching and evaluating procedures, we aim to divide participants into subgroups based on their background (doctor, nurse, student). The PTC program (including teaching and scenario part) for each subgroup will be adjusted to suit all participants. Each course, participant will be assessed for:

Reaction for course: using “self-questionnaire reaction” (see appendix 1)

* Knowledge: comparing pre-course and post-course MCQ test (see appendix 2).
* Attitude: comparing pre-course and post-course confidence level of trauma management (see appendix 3)
* Practice:
  + Compare pre and post: the level of competent in scenario section on models (see appendix 4)
  + Supervisors (2 trained staff) will be present in ED, using a checklist adapted from scenarios to check bed side. Comparing result of checklist before and after course (see appendix 5)
* The interviews to 3 key staffs in each hospital will be taken. It includes 1 pre-course and 3 post-course (1,6,12 months after intervention) This step aims to evaluate how trauma system change with the PTC training. The interview uses the prepared form (see appendix 6) and will be recorded with the consent of interviewees.

## Secondary endpoint

We will compare road trauma survival rates before and after our intervention in Ninh Binh and Thanh Hoa hospital over 6-month periods. This data includes trauma cases morbidity and mortality at 24 hours and 30 days.

## **Study population**

* 1. Inclusion criteria:

All alive consenting road trauma patients presenting to participating hospitals emergency departments.

* 1. Exclusion criteria

Patients who are:

1. Dead on arrival
2. Patient with minor injuries without any primary care
3. Patient or family members refuse consent.

## **Data collection**

Data will be collected on admission 1 day (directly) and 1 month (via telephone) which include: vital status, age, gender, types of injury (head, neck, thoracic, abdominal, limb or poly trauma), ISS, RTS 20 (see appendix 8), Quality of life using Vietnamese version EQ-5D-5L scale 21 via telephone (see appendix 8). The healthcare worker (Nurse, doctor) who is on duty each day will be trained for collecting 24 h data.

After discharge from hospital, the patient’s contact will be recorded for secondary survey after 30 days. Because of distance and mobile phone network availability, we will acquire at 3 contact numbers and addresses from the patient and their relatives preferably including at least one not cohabitating to reduce the risk of loss to follow-up. The Research Assistants (RAs) will take part in their role in term of collecting data via phone. 5 will be recruited and employed for project. 2 RAs in each provincial hospital, 1 AR in Hanoi will tract down all transferred patients. Separately, 5 RAs also will be trained for collecting data via phone.

All data will be collected by using CAPL apps on tablets. It will be checked daily by researcher/RA in Hanoi for the accuracy, if data is missing or misspelled, He/ She will be rechecked directly. The exclusion criteria will be applied with poor cases.

## **Plan for analysis**

The data will be collected using CAPL in which data can be converted to other software for analysis.The mean score of knowledge in MCQ test will be analysed by paired sample T-test to compare before and after the intervention. Meanwhile, Chi -square test will be used for comparison of the composition ratio. A level of P<0.05 will be considered as statistically significant. Data analysis will be performed by using STATA 15.0 (College Station, TX: StataCorp LLC) 22.

The 98 participants in the training course – the 38 participants (9 doctors and 20 nurses) from Ninh Binh and the 60 participants (20 doctors and 40 nurses) from Thanh Hoa – will, assuming 88 (90%) of both doctors and nurses complete the two-day course, provide adequate power to detect pre-post changes that are smaller in magnitude than those found in previous evaluations of PTC training courses. In respect of the three primary endpoints, there will be 90% power (two-sided alpha = 0.05 with one-third allocated to each endpoint) to detect:

1. An additional 1.9 correctly answered questions, on average, in a panel of 30 multiple choice questions targeting knowledge. This is smaller than the increase of 5.7 correctly answered questions post-course reported on average by Amiri et al23, Jawaid et al 24, Nogaro et al 25, Peter et al 26, Sadiq et al 27 and Alwawi et al 28 for similarly mixed clinical groups of participants. The estimated standard deviation of change was reported by Amiri et al 23, Peter et al 26 and Sadiq et al 26 27. The estimates ranged from 3.119 to 4.789. The top of the range value (4.789) was used for this calculation, and the following calculations for doctors and nurses separately. To control type 1 error in separate analyses for doctors and nurses, we will:
2. Test the null hypothesis for nurses only if the null hypothesis for all participants is rejected. In that case, we will have 90% power to detect a change of 2.3 in correctly answered questions, on average.
3. Test the null hypothesis for doctors only if the null hypothesis for all participants and the null hypothesis for nurses only are each rejected. In that case, we will have 90% power to detect a change of 3.7 in correctly answered questions, on average.
4. An increase of 2.2 points, on average, on a 40-point scale of clinical confidence in treating trauma (8 scenarios). This is smaller than the increase of 7.0 points post-course reported on average by Nogaro et al 25 and Peter et al 26 for similarly mixed clinical groups of participants. The estimate of standard deviation of change used in this calculation was 5.516, the value reported by Peter et al 26. The standard deviation of change was not reported by Nogaro et al 25 (See appendix 7). To control type 1 error in separate analyses for doctors and nurses, we will:
5. Test the null hypothesis for nurses only if the null hypothesis for all participants is rejected. In that case, we will have 90% power to detect a change of 2.7 points, on average.
6. Test the null hypothesis for doctors only if the null hypothesis for all participants and the null hypothesis for nurses only are each rejected. In that case, we will have 90% power to detect a change of 4.2 points, on average.

## **Health economic evaluation**

Health state utility values calculated from the EQ-5D-5L at 30 days combined with 30-day mortality will be used to calculate mean quality-adjusted life years for before versus after the PTC course.

The mean total length of hospital stays, length of stay in intensive care unit, and in-hospital medical costs derived from hospital billing for each patient will be estimated for before versus after the PTC course. Descriptive statistical analysis of before and after costs will be performed. Costs will be compared before vs. after.

Costs of running the course will be calculated. Total costs per patient (costs of running course plus direct medical costs.

Incremental costs per quality-adjusted life years gained will be calculated (difference in total costs per patient before PTC vs total costs per patient after PTC)/ (difference in QALYs before vs after PTC).

## **Ethical consideration**

This study will be conducted in accordance with the Declaration of Helsinki 1964 as revised in Edinburgh in 2000 and with the National Health & Medical Research Council Guidelines on Human Experimentation 29. The emergency staff (healthcare workers) and patients must be informed of the objectives, benefits, risks, and requirements of the study before obtaining consent from.

## **Timeline**

|  |  |  |
| --- | --- | --- |
| **Phase** | **Time** | **Activities** |
| *Preparation* | 10/2020 to 2/2021 | Ethics approval in UTAS and Vietnam |
| Financing settlement |
| Employment and training of RAs |
|  |  | Training all health-worker to fill questionnaire form (see appendix 8) |
| **I** *(pre-intervention)* | 3/2021 to 8/2021 | Collecting data |
| 3/2021 | The first interview |
| **II** *(intervention)* | 9/2021 | Pre-test and scenario |
| PTC course running (a week each hospital) |
| Post-test and scenarios |
| **III** (post-intervention) | 10/2021 | The second interview (1 month) |
| 10/2021-12/2021 | Data cleaning and first analysis |
| 01/2022 to 06/2022 | Collecting data |
| 3/2022 | The third interview (6 moths) |
| 07/2022 to 09/2022 | Final data cleaning and analysis |
| 10/2022 | The final interview (1 year) |

## **References**

1. Vietnamnet. Over 20 people die of traffic accidents per day in Vietnam 2019.

2. Passmore J. Road Safety in Viet Nam Issues, Successes & Challenges. In: WHO, ed. BJD Decade World Network Conference. Ho Chi Minh City, 2012.

3. Jonathon Passmore TN, Luong MA, Chinh ND, Nam NP. Impact of mandatory motorcycle helmet wearing legislation on head injuries in Viet Nam: results of a preliminary analysis. *Traffic Injury Prevention* 2010;11(2):202-06. doi: 10.1080/15389580903497121

4. Vnexpress. New law to show zero tolerance for alcohol while driving. [*https://evnexpressnet/news/news/new-law-to-show-zero-tolerance-for-alcohol-while-driving-3938645html*](https://evnexpressnet/news/news/new-law-to-show-zero-tolerance-for-alcohol-while-driving-3938645html) 2019

5. D. Wilkinson Rm. Primary Trauma Care. *Anaesthesia* 2007;62(1):61-64. doi: 10.1111/j.1365-2044.2007.05301.x

6. Ley Greaves RA WL, Wilkinson DA. Primary trauma care: a 20-year review. *Tropical Doctor* 2017;47(4):291-94. doi: 10.1177/0049475517704613 [published Online First: 2017 Apr 19.]

7. Marie-Caroline Nogaro HP, Noel Peter, Grace Le, David Oloruntoba, Godfrey Muguti, Christopher Lavy. . How useful are Primary Trauma Care courses in sub-Saharan Africa? *Injury* 2015;46:1293-98. doi: 10.1016/j.injury.2015.04.010 [published Online First: 2015 Apr 15.]

8. Masood Jawai AAM, Zubia Masood, Shams Nadeem Alam. . Effectiveness of the Primary Trauma Care Course: Is the outcome satisfactory? *Parkistan Journal Medicine Science* 2013;29(5):1265-68. doi: <http://dx.doi.org/10.12669/pjms.295.4002>

9. Abdulla Alwawi NA, Bahar Inkaya. The effectiveness of the primary trauma care courses in West Bank, Palestine: Are the outcomes acceptable? *Journal of Education and Practice* 2019;10(9):1-5. doi: 10.7176/JEP

10. Skinner M. Primary Trauma Care Course, 2007.

11. Skinner M. Primary Trauma Care Report: hanoi and Ninh Binh province 2012.

12. Skinner M. Primary Trauma Report at Cho Ray Hospital, 2018.

13. Kadhum M, Sinclair P, Lavy C. Are Primary Trauma Care (PTC) courses beneficial in low- and middle-income countries - A systematic review. *Injury* 2020;51(2):136-41. doi: 10.1016/j.injury.2019.10.084 [published Online First: 2019/11/05]

14. Shi XP QL, Chang YX, Li FL, Wang P. Shi XP, Qin LJ, Chang YX, Li FL, Wang P. Systemic analysis of pre-hospital trauma emergency treatment in Zhengzhou. *J Acute Dis* 2019;8(1):34-37.

15. Kirkpatrick DL KJ. Evaluating training programs: the four levels. San Francisco: Berrett-Koehler Publishers Inc, 2009:20.

16. Shoushtarian M, Barnett M, McMahon F, et al. Impact of introducing practical obstetric multi-professional training (PROMPT) into maternity units in Victoria, Australia. *Bjog* 2014;121(13):1710-8. doi: 10.1111/1471-0528.12767 [published Online First: 2014/04/23]

17. Calvert KL, McGurgan PM, Debenham EM, et al. Emergency obstetric simulation training: how do we know where we are going, if we don't know where we have been? *Aust N Z J Obstet Gynaecol* 2013;53(6):509-16. doi: 10.1111/ajo.12120 [published Online First: 2013/09/17]

18. Cullinane M, McLachlan HL, Newton MS, et al. Using the Kirkpatrick Model to evaluate the Maternity and Neonatal Emergencies (MANE) programme: Background and study protocol. *BMJ Open* 2020;10(1):e032873. doi: 10.1136/bmjopen-2019-032873 [published Online First: 2020/02/06]

19. PTC. Logistic-Manual, 2016.

20. Champion HR SW, Carnazzo AJ, Copes W, Fouty WJ. Trauma score. *Crit Care Med* 1981;9(9):672-76. doi: 10.1097/00003246-198109000-00015

21. Vu Quynh Mai HVM, Sun Sun, Kim Bao Giang, Klas Goran Sahlen. Valuing Health - Related Quality of Life: An EQ-5D-5L Value Set for Vietnam., 2018.

22. StataCorp. Stata Statistical Software: Release 15. College Station, TX: StataCorp LLC, 2017.

23. Amiri H, Gholipour C, Mokhtarpour M, et al. Two-day primary trauma care workshop: early and late evaluation of knowledge and practice. *Eur J Emerg Med* 2013;20(2):130-2. doi: 10.1097/MEJ.0b013e32835608c6 [published Online First: 2012/06/22]

24. Jawaid M, Ahmed Memon A, Masood Z, et al. Effectiveness of the Primary Trauma Care Course: Is the outcome satisfactory? *Pak J Med Sci* 2013;29(5):1265-8. [published Online First: 2013/12/20]

25. Nogaro MC, Pandit H, Peter N, et al. How useful are Primary Trauma Care courses in sub-Saharan Africa? *Injury* 2015;46(7):1293-8. doi: 10.1016/j.injury.2015.04.010 [published Online First: 2015/04/25]

26. Peter NA, Pandit H, Le G, et al. Delivering trauma training to multiple health-worker cadres in nine sub-Saharan African countries: lessons learnt from the COOL programme. *Lancet* 2015;385 Suppl 2:S45. doi: 10.1016/s0140-6736(15)60840-6 [published Online First: 2015/08/28]

27. Sadiq MA RK, Tariq N, Bashir EA. Impact of Primary Trauma Care Workshop On The Cognitive Domain of Final Year Medical Students. *Journal of Surgery Pakistan* 2018;23(2):64-67. doi: 10.21699/jsp.23.2.6

28. Alwawi A, Amro N, Inkaya B. The Effectiveness of the Primary Trauma Care Courses in West Bank, Palestine: Are the Outcomes Acceptable? *Journal of Education and Practice* 2019;10:105-09. doi: 10.7176/JEP/10-9-12

29. Helsinki Do. World Medical Association Declaration of Helsinki. In: WMA, ed., 1964.

# Appendices

## Appendix 1: Participant’s reaction to PTC self-questionnaire

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Age | Hospital | Position | Experience years |
|  |  |  | Doctor/Nurse |  |

Please circle to the extent in which you agree or disagree with the following statements

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Strongly Disagree** | **Somewhat Disagree** | **Neither Agree nor Disagree** | **Somewhat Agree** | **Strongly Agree** |
| **I was satisfied with the PTC course overall.** | 1 | 2 | 3 | 4 | 5 |
| **This course enhanced my knowledge of the subject matter.** | 1 | 2 | 3 | 4 | 5 |
| **The course was relevant to what I might be expected to do to (prevent, prepare for, or respond to) an emergency department.** | 1 | 2 | 3 | 4 | 5 |
| **This course provided content that is relevant to my daily job.** | 1 | 2 | 3 | 4 | 5 |
| **I would recommend this course to others.** | 1 | 2 | 3 | 4 | 5 |

## Appendix 2: MCQ test

Q1. Primary Survey should be performed

a. After a secondary survey

b. After rapid ambulance transfer of the patient to a Central Hospital

c. Only at the Central Hospital and not at the District Hospital

d. Within 2 to 5 minutes

e. Within 30 minutes.

Q2 The most common cause of airway obstruction in an unconscious patient is

a. A chest injury

b. A foreign body in the airway

c. The tongue falling to the back of the pharynx

d. A fractured larynx

e. A fractured mandible

Q3. The commonest type of shock in a trauma patient is

a. Cardiogenic shock

b. Haemorrhagic shock

c. Neurogenic shock

d. Septic shock

e. Anaphylactic shock

Q4. Management of a tension pneumothorax detected in the primary survey is

a. Decompression immediately

b. Decompression after chest x-ray confirmation

c. Decompression by chest drain insertion as part of the secondary survey

d. Decompression after anaesthetising the patient

e. Decompression when tracheal shift develops

Q5. The most reliable method of securing the airway is by using

a. Nasopharyngeal airway

b. Guedel’s airway

c. Laryngeal mask airway

d. Tracheal intubation

e. Oesophageal obturator airway

Q6. An early sign of compartment syndrome in a limb is a. Absent pulse b. Pain c. Pale colour d. Altered sensation e. Paralysis

Q7. What is the most likely cause of death following injury to a solid abdominal organ?

a. Haemorrhage

b. Infection

c. Peritonitis

d. Poor function or loss of function of the injured organ

e. Renal failure.

Q8 Which part of the child can be used to estimate the correct tracheal tube size?

a. Ear canal

b. Index finger

c. Nostril

d. Smallest toe

e. Thumb

Q9. In Inhalational injury airway swelling is suggested by

a. Electrical burns to the hands

b. Eye swelling from chemical splash

c. Flash burns to the face

d. Hoarse voice

e. Maxillofacial injury

Q10. An adult male assessed 30 minutes after a road traffic accident has a Glasgow Coma Score of 12/15, a BP of 130/80, a respiratory rate of 13. His right pupil is 5mm diameter with no reaction to light, his left is 3mm and reacting to light. He has a left hemiparesis. The most likely diagnosis is

a. Cervical spinal cord injury at C5

b. Diffuse axonal injury

c. Cerebral haematoma on the left side

d. Cerebral haematoma on the right side

e. Posterior fossa haematoma.

Q11. During transport, a trauma patient develops severe difficulty breathing, distended neck veins, diminished breath sounds on the right, cyanosis, and deviation of the trachea to the left. Vital signs are blood pressure; 60/40; respirations, 36 per minute; and pulse, 130 per minute. Which of the following is the most appropriate next step?

a. intubate the patient

b. needle decompress right chest

c. insert bilateral chest drains

d. perform a detailed exam

e. start an intravenous line

Q 12. The Secondary survey

a. Will identify haemodynamic instability

b. Looks for significant injuries that are not an immediate threat to life

c. Includes assessment of AVPU

d. Includes the establishment of intravenous access

e. Should be carried out even if the patient is deteriorating

Q13. Haemothorax

a. Is more common in non penetrating injury

b. Is associated with increased breath sounds on the affected side

c. Produces tracheal deviation

d. Can result in haemorrhagic shock

e. Always requires thoracotomy

Q14. An adult male with an obvious head injury is comatose. His BP is 170/100, pulse 50 bpm, respiratory rate 24pm. Which is the most likely diagnosis?

a. Hypovolaemia

b. Increased intracranial pressure

c. Drug overdose

d. Pain and anxiety

e. Spinal cord injury.

Q15. A 5 year old child has been struck by a car. She is unconscious with obvious head injuries. Her vital signs on arrival are BP 50/30, pulse 156 bpm, respiratory rate 40 pm. Her weight is estimated as 15 Kg. Initial fluid management is

a. Do not give fluids

b. Give normal saline 50mls bolus

c. Give normal saline 300mls bolus

d. Give O negative blood

e. Wait for cross-matched blood.

Q16. In a patient with greater than 20% by area burns

a. Fluids must be restricted to prevent renal failure

b. The depth of the burn is more significant in resuscitation than the area burned

c. Full thickness burns are more painful than superficial burns

d. Intubation should be avoided with airway burns

e. Crystalloid resuscitation to achieve a urine output of 0.5 to 1.0 mls per Kg per hour is the aim of fluid management.

Q17. In a pregnant trauma patient

a. The patient should be resuscitated in the right lateral position

b. Premature labour is unlikely

c. At 24 weeks the uterus is at the xiphoid cartilage

d. The foetus is less vulnerable as the uterus enlarges

e. Placental separation is an early consequence of blunt abdominal trauma

Q18. Increasing haemodynamic instability is treated by

a. Arrangement of transfer to a major hospital

b. Administering a crystalloid fluid bolus

c. Repeating the secondary survey

d. Performing a neurological examination

e. Administering analgesia using morphine

Q 19. In cervical spine injury

a. Cardiac changes are hypertension and tachycardia

b. Lower limb reflexes are preserved

c. Examination should be carried out in the neutral position

d. Diaphragmatic breathing is preserved in high cervical lesions

e. Assessment of the level of injury does not determine prognosis

Q20. Tracheal intubation must be considered when there is need to

a. Secure an open airway

b. Establish haemodynamic stability

c. Stabilise a cervical fracture

d. Treat a tension pneumothorax

e. Improve peripheral oxygenation in a spontaneously breathing patient.

## Appendix 3: pre- and post-course self-confidence form

## Pre-Course Confidence Matrix

Please put a ‘X’ in the box that best applies to you 1 = not confident at all 5 = completely confident

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | How confident do you feel in managing | 1 | 2 | 3 | 4 | 5 |
| A | A 5 year old child with a fractured pelvis |  |  |  |  |  |
| B | A 30 year old week pregnant woman with a fractured femur |  |  |  |  |  |
| C | A 25 year old man with a knife in his abdomen |  |  |  |  |  |
| D | A 60 year old female with 40 % burns |  |  |  |  |  |
| E | A 50 year old man unconscious with a fixed dilated pupil |  |  |  |  |  |
| F | A 20 year old male who is conscious but cannot move his legs |  |  |  |  |  |
| G | A 2 year old child with major haemorrhage from a traumatic amputation of his leg |  |  |  |  |  |
| H | A 50 year old man cyanosed from a tension pneumothorax |  |  |  |  |  |

## Pre-course Trauma management questions

|  |  |  |
| --- | --- | --- |
| 1 | What TWO things would you like to learn from this course? |  |
| 2a | What was the last trauma case that worried you? |  |
| 2b | How did you manage it? (25 words max) |  |
| 2c | What concerns did you have with this case? |  |
| 5a | How many trauma admissions per year (approximately) does your hospital manage? |  |
| 5b | How many trauma admissions per month (approx..) are you involved in managing? |  |
| 6 | How did you hear about the PTC course? |  |

## Post-Course Confidence Matrix

Please put a cross ‘X’ in the most appropriate column. 1 = not confident at all 5 = completely confident

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | How confident do you feel in managing | 1 | 2 | 3 | 4 | 5 |
| A | A 5 year old child with a fractured pelvis |  |  |  |  |  |
| B | A 30 year old week pregnant woman with a fractured femur |  |  |  |  |  |
| C | A 25 year old man with a knife in his abdomen |  |  |  |  |  |
| D | A 60 year old female with 40 % burns |  |  |  |  |  |
| E | A 50 year old man unconscious with a fixed dilated pupil |  |  |  |  |  |
| F | A 20 year old male who is conscious but cannot move his legs |  |  |  |  |  |
| G | A 2 year old child with major haemorrhage from a traumatic amputation of his leg |  |  |  |  |  |
| H | A 50 year old man cyanosed from a tension pneumothorax |  |  |  |  |  |

## Post-Course Trauma Management Questions

|  |  |  |
| --- | --- | --- |
| a | What is the most useful thing you have learned on this course? |  |
| b | What TWO things do you plan to change in your trauma management as a result of this course? |  |
| c | Thinking about the last trauma case that you worried you (described in the precourse questionnaire at the beginning of this course) would you change anything in your management? Please explain. |  |

## Appendix 4 Scenarios

**SCENARIO 1**

A 35-year-old man has fallen off his motorbike.

On arrival in hospital, he is yelling in pain but is now having difficulty in breathing.

|  |  |  |
| --- | --- | --- |
| ASSESSMENT | FURTHER INFORMATION | KEY POINTS |
|  |  |  |
| A | Upper airway obstruction signs | 1. Cervical spine |
|  | relieved by simple airway management | 2. Oxygen |
|  | Respiratory rate 28 / min | 3. Airway |
|  |  |  |
| B | Air entry left chest << right | Urgent needle |
|  | Percussion note left >> right | decompression |
|  | Trachea deviated to right | brings some relief |
|  | Tension pneumothorax |  |
|  |  |  |
| C | BP 120/80 | 1. IV line x2 |
|  | Heart rate 100 bpm | 2. Blood sample |
|  |  | 3. Fluid bolus |

During the assessment of the circulation, the airway becomes obstructed.

The patient is now quiet, not yelling out, bag mask ventilation +/- intubation

Diagnosis: Tension pneumothorax

Head injury

|  |  |  |
| --- | --- | --- |
|  | **KEY ANSWERS** | **Points** |
| **1** | Manual inline neck immobilization |  |
| **2** | Check airway & proceed to airway opening manoeuvre. Give O2 |  |
| **3** | Check breathing – Look , listen and feel – auscultation & percussion |  |
| **4** | Needle decompression 2nd intercostal space L side chest |  |
| **5** | Check BP, pulse, perfusion |  |
| **6** | IV access, take blood sample |  |
| **7** | Reassessment - back to ABC |  |
| **8** | Proceed to mask ventilation - consider endotracheal intubation |  |
| **9** | Neurological examination – AVUP, pupils |  |
| **10** | Call neurosurgeon; arrange CT scan or theatres for burr-hole as required |  |
|  | **TOTAL POINTS** |  |

**SCENARIO 2**

A 45 year-old woman is involved in a head-on collision in a car accident. She was not wearing a seatbelt. She arrives in hospital with dyspnea, difficulty in talking and complaining of right sided chest pain.

|  |  |  |
| --- | --- | --- |
| ASSESSMENT | FURTHER INFORMATION | KEY POINTS |
|  |  |  |
| A | Obstructed airway  (gurgling, snoring) | Cervical spine care  Jaw thrust |
|  | Respiratory rate 30x | Suction |
|  |  | Oxygen |
|  |  |  |
| B | No air entry on right side | Needle decompression |
|  | Trachea deviated to left | +/- chest tubes |
|  | Tension pneumothorax | results in |
|  |  | RR 16x |
|  |  | Able to talk again |
|  |  |  |
| C | BP 110/70 | Fluid bolus x2 |
|  | HR 110 bpm | Blood test |
|  |  | IV line x2 |
|  |  | Results in |
|  |  | BP 120/80 HR 90 |

Diagnosis: Fractured ribs + left tension pneumothorax

Cervical spine injury

|  |  |  |
| --- | --- | --- |
|  | **KEY ANSWERS** | **Points** |
| **1** | Manual inline neck immobilization |  |
| **2** | Check airway & proceed to airway opening manoeuvre |  |
| **3** | Clear airway with suctioning |  |
| **4** | Apply high flow oxygen |  |
| **5** | Assess breathing with auscultation and percussion |  |
| **6** | Identify and treat tension pneumothorax with needle thoracocentesis |  |
| **7** | Assess circulation – HR, BP, CRT |  |
| **8** | Insert 2 x IV cannulae & collect blood for x match |  |
| **9** | Fluid bolus x 2 |  |
| **10** | Secondary Survey |  |
|  | **TOTAL POINTS** |  |

**SCENARIO 3**

A 25-year-old man falls off motorbike at high speed, not wearing a helmet.

Arrives in hospital, gurgling, noisy shallow breathing, unconscious. Left thigh is swollen.

|  |  |  |
| --- | --- | --- |
| ASSESSMENT | FURTHER INFORMATION | KEY POINTS |
|  |  |  |
| A | Stops breathing during assessment | Cervical spine care |
|  |  | Airway support |
|  |  | Bag mask Ventilation |
|  |  | or intubate |
|  |  | Oxygen |
|  |  |  |
| B | Chest is clear | No chest injury |
|  | Air entry equal |  |
|  | Percussion equal |  |
|  |  |  |
| C | HR 110 | IV line 2x |
|  | BP 120/80 | Blood test |
|  |  | Fluid bolus |
|  |  |  |
| D | Pupils initially fixed + dilated | Consult Neuro- surgeon |
|  | Back to normal with Oxygen |  |
|  |  |  |
| E | Closed femur fracture loss | Replace blood |
|  |  | Immobilize/splint |

Secondary survey

Diagnosis: Head injury (diffuse axonal injury)

Fractured femur

|  |  |  |
| --- | --- | --- |
|  | **KEY ANSWERS** | **Points** |
| **1** | In line neck stabilization |  |
| **2** | Size for cervical collar |  |
| **3** | Clear airway |  |
| **4** | Support ventilation |  |
| **5** | Intubate patient |  |
| **6** | Check for chest injuries |  |
| **7** | IV line X 2 |  |
| **8** | Check AVPU |  |
| **9** | Check for dilated pupil |  |
| **10** | Immobilise leg |  |
|  | **TOTAL POINTS** |  |

**SCENARIO 4**

A 19 year-old man has been stabbed in the abdomen. On arriving in hospital, he is clutching his abdomen and complaining of severe abdominal pain.

|  |  |  |
| --- | --- | --- |
| ASSESSMENT | FURTHER INFORMATION | KEY POINTS |
|  |  |  |
| A | Airway clear | Oxygen |
|  | Cervical spine OK |  |
|  |  |  |
| B | Air entry diminished on the right | Chest drain |
|  | Percussion note dull on the right | blood >> |
|  | (Hemothorax) |  |
|  |  |  |
| C | BP 80/40 | IV line 2x |
|  | HR 120 | Blood test |
|  | Pale and sweaty | Fluid bolus x2 |
|  |  |  |
|  | No response to fluid | 1. Transfusion |
|  | still hypotensive | 2. Call surgeon |
|  |  | 3. Prepare operating theatre |

Diagnosis: Penetrating chest and abdominal trauma with life threatening haemorrhage

|  |  |  |
| --- | --- | --- |
|  | **KEY ANSWERS** | **Points** |
| **1** | Check airway |  |
| **2** | Give Oxygen |  |
| **3** | Chest auscultation and percussion |  |
| **4** | Insertion of chest drain – location : 5th intercostal, anterior to midaxillary line |  |
| **5** | Check HR and BP |  |
| **6** | IV access & samples for Hb and cross-match |  |
| **7** | IV fluid bolus |  |
| **8** | Start blood transfusion |  |
| **9** | Call for surgeon and preparation of theatre |  |
| **10** | Abdominal examination |  |
|  | **TOTAL POINTS** |  |

**SCENARIO 5**

A 26 year-old woman is shot in the neck. She arrives in hospital, conscious but with stridor and respiratory distress.

|  |  |  |
| --- | --- | --- |
| ASSESSMENT | FURTHER INFORMATION | KEY POINTS |
|  |  |  |
| A | Stridor | Oxygen |
|  | Difficulty in talking | Simple airway management |
|  | Hoarse voice |  |
|  |  |  |
| B | Air entry equal but soft |  |
|  | Chest clear |  |
|  |  |  |
| C | BP 120/80 |  |
|  | HR 110 |  |

During assessment of her circulation you notice the neck has become more swollen. There is increasing stridor and she now is unable to talk.

Surgical consultation for tracheostomy

Consider cricothyroidotomy

Do not attempt intubation

Diagnosis: Gunshot wound to larynx

|  |  |  |
| --- | --- | --- |
|  | **KEY ANSWERS** | **Points** |
| **1** | Manual inline immobilization of neck |  |
| **2** | Introduce yourself and talk to patient |  |
| **3** | Notice hoarse voice, air hunger, laboured respiratory effort |  |
| **4** | Give Oxygen by mask |  |
| **5** | Look, listen & feel: cyanosis, bil chest air entry, breathe sound. Feel trachea |  |
| **6** | Check pulse and BP |  |
| **7** | Access IV X 2. Take samples for: FBC, glucose, U&E, Cross-match. Start IV fluids |  |
| **8** | Cover gunshot wound with gauze. Notice swelling , subcutaneous emphysema |  |
| **9** | Perform cricothyroidotomy |  |
| **10** | Arrange theatre for surgical cricothyroidotomy / tracheostomy & surgical exploration |  |
|  | **TOTAL POINTS** |  |

**SCENARIO 6**

A 60 year-old woman is involved in a high speed car accident. She was wearing a seatbelt. On arrival in hospital she is groaning in pain. BP 90/70, HR 130, RR 28. She had cold hands and feet.

|  |  |
| --- | --- |
| ASSESSMENT FURTHER INFORMATION KEY POINTS | |
|  | |
| A | Soft, obstructed breathing Cervical spine care |
| management | Spits out Guedel airway if put in Oxygen Basic airway |
| B | Chest clear -- |
|  |  |
| C | BP 80/60, HR 140 IV line 2x |
|  | Blood for tests |
|  | Fluid bolus 2 L: |
|  | After 1 L --> |
|  | BP 110/70 HR 110 |
|  | After 2 L - -> |
| BP 120/80 HR 80 |  |
|  |  |
|  | Patient responds well to fluid bolus. |
|  |  |
| D | Now consciousness becomes normal |

Secondary survey: tender pelvis with crepitus on palpation

Diagnosis: Fractured pelvis

|  |  |  |
| --- | --- | --- |
|  | **KEY ANSWERS** | **Points** |
| **1** | Manual neck inline immobilization |  |
| **2** | Give Oxygen |  |
| **3** | Basic airway management – chin lift / jaw thrust |  |
| **4** | Check breathing – chest auscultation |  |
| **5** | Check HR and BP |  |
| **6** | Access IV and take samples for FBC and cross-match. Start IV fluids |  |
| **7** | Recheck HR and BP – further IV fluids |  |
| **8** | Conscious level - AVUP |  |
| **9** | Secondary survey – fractured pelvis – pelvic sling |  |
| **10** | Analgesia |  |
|  | **TOTAL POINTS** |  |

**SCENARIO 7**

A 15 year-old boy climbing a tree fell to the ground, landing on his head.

According to his family, he was initially conscious and complained of neck pain. Over the next 30 minutes he became unconscious. On arrival in hospital he had a right side seizure.

ASSESSMENT FURTHER INFORMATION KEY POINTS

A Obstructed breathing Cervical spine care

( snoring, some distress) Oxygen

Simple airway management

but may need intubation

B Shallow breaths Patient needs ventilatory assistance with a bag and mask

C BP 130/90 HR 100 IV access 2x

Blood tests

D Left pupil fixed + dilated Call neurosurgeon

Flexing to pain only Prepare burr-hole

Diagnosis: Left extradural hematoma

|  |  |  |
| --- | --- | --- |
|  | **KEY ANSWERS** | **Points** |
| **1** | Manual in line cervical spine immobilization |  |
| **2** | Clear airway & Open airway – chin lift |  |
| **3** | Give Oxygen |  |
| **4** | Look, listen and feel breathing - auscultation |  |
| **5** | Ventilation assistance . Consider intubation |  |
| **6** | Check circulation - BP , pulse and perfusion |  |
| **7** | IV access and take blood samples for FBC |  |
| **8** | AVUP and neurological examination |  |
| **9** | Call neurosurgeon - Arrange theatre for hematoma evacuation |  |
| **10** | Proceed to secondary survey |  |
|  | **TOTAL POINTS** |  |

**SCENARIO 8**

A 45 year-old factory worker is crushed by a container truck at work. He is brought into hospital with severe breathing difficulties.

ASSESSMENT FURTHER INFORMATION KEY POINTS

A Respiratory rate 40 Cervical spine care

Shallow breathing Simple airway management

Cyanosed Oxygen

B Bilateral wheeze and crepitation Needs intubation

Air entry << on right side for flail chest

Paradoxical movement on right anterior Analgesia

chest (flail chest) Drain blood from the right chest

Percussion note dull on right side

C BP 100/60 HR 140 IV access 2x

Blood tests

Good response to fluid Fluid bolus x2

Diagnosis: Crush injury with right sided flail chest and haemothorax

|  |  |  |
| --- | --- | --- |
|  | **KEY ANSWERS** | **Points** |
| **1** | Check response from head end |  |
| **2** | In line cervical spine immobilization |  |
| **3** | Look, listen and feel for breathing |  |
| **4** | Clear airway, Guedel’s airway |  |
| **5** | Give Oxygen |  |
| **6** | Right side chest tube |  |
| **7** | 2 I/V line access by 18 G cannula |  |
| **8** | I/V Fluids |  |
| **9** | Blood sample for cross match and FBC, Urea, sugar. |  |
| **10** | Analgesia |  |
|  | **TOTAL POINTS** |  |

**SCENARIO 9**

A 25 year old woman has been assaulted with a large heavy stick. On arrival in hospital she has extensive facial injuries, stridor and respiratory distress. She is cyanosed and is making groaning sounds.

ASSESSMENT FURTHER INFORMATION KEY POINTS

A Basic airway management does not Cervical spine care

relieve the airway obstruction Oxygen

Bag mask ventilation is difficult Suction, jaw thrust, Chin lift

Bag mask ventilation

Must intubate

B Chest: air entry normal

Breathing sounds OK

C BP 130/90 HR 110 IV line

Blood tests

Fluid bolus

D Pupils equal and normal response

to light

Open eyes to voice (remembers)

Localizes to pain

Secondary survey: swollen right humerus

Diagnosis: Facial fractures,

Moderate blood loss,

Fractured humerus

|  |  |  |
| --- | --- | --- |
|  | **KEY ANSWERS** | **Points** |
| **1** | Apply Oxygen |  |
| **2** | Basic airway management – Chin lift / Jaw thrust |  |
| **3** | Suction Airway |  |
| **4** | Bag mask ventilation |  |
| **5** | Requires intubation / Consider possible need for cricothyroidotomy |  |
| **6** | Requires sedation / anaesthesia / analgesia |  |
| **7** | C Spine care during intubation attempt – Manual in line stabilization |  |
| **8** | Assess breathing and circulation |  |
| **9** | Moderate hypovolaemic shock / IV access and fluid bolus |  |
| **10** | Proceed to secondary survey |  |
|  | **TOTAL POINTS** |  |

**SCENARIO 10**

A 70 year old man has been burnt in a house fire. It has taken 4 hours for the patient to reach hospital. On arrival, he is still dressed with a burnt area covering his chest and abdomen. He is groaning in pain and appears to be in respiratory distress. He is confused.

ASSESSMENT FURTHER INFORMATION KEY POINTS

A No facial or airway burns Oxygen

on inspection Airway managment

Respiratory rate 30 SpO2 88% on air

B Wheeze on auscultation

Air entry normal R = L

C BP 90/70 HR 130 IV access 2x

Cold periphery Blood tests

Fluid bolus

* good response

D Alert, oriented after oxygen

Secondary survey 30-40% burns Burns care Resuscitation

Tetanus Prophylaxis

Supportive treatment

Diagnosis: Burns 30-40% with inhalation injury to the lungs.

|  |  |  |
| --- | --- | --- |
|  | **KEY ANSWERS** | **Points** |
| **1** | Check for face, neck and upper airway burns |  |
| **2** | Check breathing pattern – Respiratory rate, auscultation, O2 Sats |  |
| **3** | Give Oxygen by mask |  |
| **4** | Check circulation – BP, pulse, perfusion |  |
| **5** | IV access, and take blood samples for FBC, E&E, glucose, cross-match |  |
| **6** | Give IV fluid boluses – check response |  |
| **7** | Secondary survey – exclude other injuries |  |
| **8** | Calculate % burn area |  |
| **9** | Calculate fluids requirement according to burn area. Attention to urine output |  |
| **10** | Attention to: burn care, tetanus cover, analgesia, supportive treatment |  |
|  | **TOTAL POINTS** |  |

**SCENARIO 11**

A 25 year-old man has been injured in an explosion and fire at a factory. He is on his way to hospital with facial burns and a chest injury.

ASSESSMENT FURTHER INFORMATION KEY POINTS

A Hoarse voice Cervical spine care

Burns around and in his mouth Oxygen

Carbonaceous sputum prepare for intubation

No stridor, RR 30

B Air entry: reduced on right Chest drain

Percussion dull on right Haemothorax Tender to palpation right chest Rib fractures

C BP 90/60 IV access 2x

HR 120 Blood for tests

IV Fluid

During assessment of circulation, patient develops increasing stridor. If he has not been intubated, return to A.

A Unable to talk, stridor Intubate if not already done

Respiratory distress

Diagnosis: Upper airway and facial burns with possible cervical spine injury

Right rib fractures and haemothorax

|  |  |  |
| --- | --- | --- |
|  | **KEY ANSWERS** | **Points** |
| **1** | Manual immobilization cervical spine |  |
| **2** | Check and prepare for intubation |  |
| **3** | Apply high flow oxygen |  |
| **4** | Assess breathing: auscultation and percussion |  |
| **5** | Identify and treat haemothorax with chest drain |  |
| **6** | Assess circulation: HR, BP, CRT |  |
| **7** | Insert 2 x IV cannulae; collect blood for X Match |  |
| **8** | Administer fluid bolus |  |
| **9** | Consider pain relief |  |
| **10** | Calculate fluids for next 24 hours |  |
|  | **TOTAL POINTS** |  |

**SCENARIO 12**

An 8 year-old boy is riding a bicycle and is hit by a car. He is brought to the hospital and is complaining of abdominal pain.

ASSESSMENT FURTHER INFORMATION KEY POINTS

A Airway clear, Respiratory rate 24 Cervical spine care.

Oxygen

B Air entry R = L

Percussion note R = L

Expansion R = L

Chest sounds normal

C BP 70/40 HR 140 IV line 2x

Periphery cold Blood for tests

Capillary return 4 seconds Fluid bolus 20ml/kg

* BP 80/60 HR 120

After next 20ml/kg

* 100/70 HR 90

Develops obstructed breathing and becomes drowsy while you are assessing C

A Obstruction relieved by airway, bag and mask

B Satisfactory

C Stable

D Fixed dilated pupil right side. Not responding to pain

Diagnosis: Blood loss from an unknown site. Right side extradural hematoma

|  |  |  |
| --- | --- | --- |
|  | **KEY ANSWERS** | **Points** |
| **1** | Cervical spine care |  |
| **2** | Give Oxygen |  |
| **3** | Notice cold peripheries |  |
| **4** | Check capillary refill |  |
| **5** | Give 20 ml/kg IV fluid bolus |  |
| **6** | Give 2nd IV fluid bolus |  |
| **7** | Relieve airway obstruction |  |
| **8** | Look at pupils |  |
| **9** | Keep patient warm |  |
| **10** | Take bloods for cross-match |  |
|  | **TOTAL POINTS** |  |

**SCENARIO 13**

A 26 year old, 30 week pregnant woman is involved in a motor vehicle accident. On arrival in hospital, she is complaining of abdominal pain.

ASSESSMENT FURTHER INFORMATION KEY POINTS

A Respiratory rate 20 Oxygen

Able to talk Cervical spine care

Complaining of dyspnea Left lateral position

B Air entry normal

Percussion normal

C BP 90/60 HR 140 IV line 2x

Blood for tests

Fluid bolus 2x

Blood pressure remains low

if not resuscitated in left lateral

position.

Good response to fluid

D Normal

Secondary survey Tender abdomen

Fundal height at xiphisternum

Fetal heart sounds are not heard

Diagnosis: Uterine trauma with placental abruption and separation

|  |  |  |
| --- | --- | --- |
|  | **KEY ANSWERS** | **Points** |
| **1** | Check airway and give Oxygen |  |
| **2** | Check cervical spine |  |
| **3** | Deviation of uterus to the left (left lateral position) |  |
| **4** | Check breathing: auscultation , percussion |  |
| **5** | Check circulation: HR and BP |  |
| **6** | IV access and take blood samples for Hb and cross-match |  |
| **7** | Give IV fluid bolus |  |
| **8** | Check response to fluid bolus: HR and BP |  |
| **9** | Abdominal examination |  |
| **10** | Call obstetrician |  |
|  | **TOTAL POINTS** |  |

**SCENARIO 14**

A 45 year-old male prisoner is stabbed in the back in a fight. He is unable to move his legs and is having problems breathing. He is complaining of pain in the right chest.

ASSESSMENT FURTHER INFORMATION KEY POINTS

A Able to talk with difficulty Oxygen

Airway is clear

B Air entry R < L Decompress right side

Percussion note R > L Tension pneumothorax

Trachea deviated to left

C BP 90/60 HR 120 IV access 2x

Blood for tests

Fluid bolus x2

BP becomes 90/60 HR 100

D Alert

Secondary survey Reflexes absent in lower limbs

Sensory level loss up to T8

Diagnosis: Spinal injury of T7-T8

Tension pneumothorax

|  |  |  |
| --- | --- | --- |
|  | **KEY ANSWERS** | **Points** |
| **1** | Manual inline neck immobilization |  |
| **2** | Introduce yourself & talk to patient. Notice clear airway but laboured breathing |  |
| **3** | Give Oxygen by mask |  |
| **4** | Look, listen & feel. Cyanosis, ↓ air entry R side chest . Feel trachea. Percussion. Auscultation |  |
| **5** | Decompress R side chest – wide bore needle in 2nd intercostal space, mid clavicular |  |
| **6** | Check pulse and BP |  |
| **7** | Access IV X 2. Take samples for FBC, glucose, U&E and cross-match. Start Ringers |  |
| **8** | Arrange formal chest tube thoracostomy |  |
| **9** | Chack disability – AVUP and neurological examination |  |
| **10** | Secondary survey – log roll. Wound examination, spine, sensory loss below T8 |  |
|  | **TOTAL POINTS** |  |

**SCENARIO 15**

A 32-year-old woman has fallen from a cliff on a remote island. It has taken 4 days for her to reach hospital. She has an obvious compound fracture of her left femur and a swollen left calf. The leg smells. She appears very confused.

ASSESSMENT FURTHER INFORMATION KEY POINTS

A Airway clear. Respiratory rate 30 Oxygen

Cervical spine care

B Chest normal

C BP 100/40 HR 120 IV access

Bounding pulse Blood tests

Temperature 39 Celsius Fluid bolus x2

Good response to fluid

D Confused

Secondary survey Pulseless, cold left foot Fasciotomy

Antibiotics

Diagnosis: Septic shock from compound fracture

Compartment syndrome left calf

|  |  |  |
| --- | --- | --- |
|  | **KEY ANSWERS** | **Points** |
| **1** | Check airway and breathing |  |
| **2** | Give Oxygen |  |
| **3** | Check pulse and BP |  |
| **4** | Access IV. Take samples for FBC, U&E, glucose and cross-match |  |
| **5** | Start IV fluids |  |
| **6** | Check conscious level - AVUP |  |
| **7** | Respond to fluids – HR< BP and conscious level |  |
| **8** | Secondary survey – notice fractured L femur, and cold – pulseless foot |  |
| **9** | Arranged theatre for fasciotomies |  |
| **10** | Start antibiotics and analgesia |  |
|  | **TOTAL POINTS** |  |

**SCENARIO 16**

A 4 year old girl has been run over by a car. She is brought into the Emergency department straight away. She is not breathing.

ASSESSMENT FURTHER INFORMATION KEY POINTS

A No breath sounds Cervical spine care

No chest movement Bag mask ventilation

Unable to ventilate Intubation

B After intubation, notice no chest Urgent needle

movement on right side Decompression

Percussion note resonant on right Chest drain for haemopneumothorax

Trachea deviated to left

C BP 60/50 HR 130 Intra-osseus needle

Capillary return slow Fluid bolus 2x

Unable to put in IV line

on 2 attempts

Good response BP 90/60 HR 100

D Now open eyes and biting ETT

Diagnosis: Head injury

Right haemopneumothorax

|  |  |  |
| --- | --- | --- |
|  | **KEY ANSWERS** | **Points** |
| **1** | Check response, airway, breathing |  |
| **2** | In line cervical spine immobilization |  |
| **3** | Bag mask ventilation |  |
| **4** | Endo tracheal intubation |  |
| **5** | Needle decompression R second intercostal space |  |
| **6** | Formal R Chest tube insertion |  |
| **7** | Intra osseous needle insertion |  |
| **8** | Collect blood sample for cross match, FBC, Sugar, urea |  |
| **9** | Fluid bolus |  |
| **10** | Secondary survey |  |
|  | **TOTAL POINTS** |  |

**SCENARIO 17**

A 40 year old man is the driver in a car accident. He was ejected from the car and was found 20 metres away. On arrival in hospital

ASSESSMENT FURTHER INFORMATION KEY POINTS

A Stridor and respiratory distress Cervical spine care

Loose teeth and blood on oral suction Oxygen

Simple airway management

Bag mask ventilation

Airway management is not effective

B Ventilation with bag mask not effective Attempt intubation

A Attempted intubation failed 2x

Now patient is cyanosed Cricothyrotomy

Plan: Follow with tracheostomy

Continue Primary Survey (ABCD)

|  |  |  |
| --- | --- | --- |
|  | **KEY ANSWERS** | **Points** |
| **1** | Basic airway management – Chin lift / Jaw thrust |  |
| **2** | Suction Airway |  |
| **3** | Requires intubation |  |
| **4** | Bag mask ventilation |  |
| **5** | C Spine care during intubation attempt – Manual in line stabilization |  |
| **6** | Requires cricothyroidotomy |  |
| **7** | Assess breathing and circulation |  |
| **8** | High risk of other internal injuries with ejection |  |
| **9** | IV access |  |
| **10** | Trauma X rays if possible – C Spine, Chest, Pelvis |  |
|  | **TOTAL POINTS** |  |

## Appendix 5: Checklist for clinical assessment

**Please fill the information in below table**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Pre-course | |  | | Post-course |
|  | |  | |  |
| Record number |  | |  | |
| Emergency dept |  | |  | |
| Date |  | |  | |
| Team number |  | |  | |
| Doctor |  | |  | |
| Nurses |  | | 1. | |
|  | | 2. | |
|  | | 3. | |
|  | | 4. | |

|  |  |
| --- | --- |
| I. Does Primary Survey/ Secondary Survey is undertaken | |
| Yes | No |
|  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| II. Tick × in to (Yes/No) column where relevant | | | |
|  | | Yes | No |
| 1 | Was the Cervical Spine stabilised (manual/collar) |  |  |
| 2 | Was oxygen administered/ a pulse oximeter probe attached? |  |  |
| 3 | Was the Airway assessed? (breathing or not, chest moving or not, obstructed sounds or not?) |  |  |
| 4 | Was the Breathing clinically assessed by looking (breath count) feeling (palpation of trachea, percussion of chest) and listening (auscultation)? |  |  |
| 5 | Was the Circulation assessed by measurement of heart rate and blood pressure? Was there an assessment the quality of the pulse, capillary return, and temperature of the peripheries? |  |  |
| 6 | Was blood taken for cross match and haemoglobin/haematocrit analysis? Was an IV infusion started? |  |  |
| 7 | Was an AVPU/GCS neurological assessment of Disability done? |  |  |
| 8 | Was the patient fully Exposed and assessed for other injuries? |  |  |
| 9 | Was a log roll performed to evaluate the full length of the spine? |  |  |
| 10 | After any intervention (e.g. insertion of an endotracheal tube, treatment of pneumothorax, rapid infusion of fluids) was the ABC reassessed? |  |  |
| Total point\* (yes=1 point, no = 0 point) | | /10 | |

## Appendix 6: Interview Questionnaire Form

*Record Number:*

|  |  |  |
| --- | --- | --- |
| **Hospital** | **Name** | **Position** |
|  |  |  |

|  |  |
| --- | --- |
| **Pre-course** | **Post-course** |
|  |  |

|  |  |  |
| --- | --- | --- |
| **N0** | **Q &A** |  |
| 1 | Q | How do you currently understand the way your hospital manages trauma patients? |
| A |  |
| 2 | Q | What are the strengths and weaknesses of this approach? |
| A |  |
| 3 | Q | Have there been any recent improvements in the way your hospital manages trauma patients? |
| A |  |
| 4 | Q | Within 3-6 months, has any training to your staff to manage trauma? Is this training sustainable? |
| A |  |
| 5 | Q | Do you measure the performance of the staff that manage trauma patients? |
| A |  |
| 6 | Q | Do you keep records of the way you assess and management trauma patients? |
| A |  |
| 7 | Q | Do you have any policies or procedures around trauma care? |
| A |  |
| 8 | Q | Is your ED trauma service integrated with other departments/hospitals? |
| A |  |
| 9 | Q | Do you have sufficient equipment to effectively deliver trauma care? |
| A |  |
| 10 | Q | What are the barriers and enablers to the delivery of quality trauma care? |
| A |  |
| 11 | Q | Do you have any other comments |
| A |  |

**Thank you for attending the interview!**

## Appendix 7: Calculation for primary endpoints

1. Changing in knowledge

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Authors | Locations | Participants | MCQ | Pre-couse | | Post-course | | Change in scores | | | SE |
| Mean | SD | Mean | SD | Change | SD | Z |
| Peter et al | 9 sub-Saharan countries | 330 doctors, nurses, clinical officers, other | 30 questions | 20,7 | 5,415 | 24,9 | 4,239 | 4,51 | 3,4171 |  |  |
| Sadiq et al | Islamabad, Pakistan | 100 medical students | 30 questions |  |  |  |  | 5,104 | 3,119 |  |  |
| Amiri et al | Tabriz, Iran | 64 doctors and junior doctors (students) | 30 questions | 18,84 |  | 26,72 |  | 7,785 | 4,789 |  |  |
| Nogaro et al | 7 African countries | 345 doctors, nurses, students, clinical officers | 30 questions | 21 |  | 26,1 |  | 5,12 |  |  |  |
| Jawaid et al | Karachi, Pakistan | 20 doctors | 30 questions | 19,53 |  | 253 |  | 5,53 | 6,9797808614 | 3,524 | 1,5607264474 |
| Alwawi, et al | West Bank cities, Palestine | 586 doctors, nurses, midwives (students) | 20 questions | 9,43 | 2,96 | 15,76 | 2,92 | 6,33 | 7,3954186975 | 20,72 | 0,3055019315 |

*Average= 5,71893*

1 *Results reported as percentages: pre-course 69 % (18,05%), post-course 83 % (14,13%) change 15 % (11,39%) greater improvement for non-doctors*

2 *Result reported as percentages: pre-course 7- %, post-course 87 %, change 17 % greater improvement for non-doctors*

3 *Estimated from medians*

4 *Estimated from Wilcoxon test-appears to be too high*

5 *Estimated from Z-value-appears to be too high*

Based on these results, a change in knowledge of around 5.7 additional correctly answered questions on average, with a SD of change in the range 3.119 to 4.789, can be expected on completion of the training course.

The calculation shows that if SD (change) = 4,789, the participants in Ninh Binh (39) and Thanh Hoa (60) provide 90% power to detect a change of just 1,6 additional correctly answered questions on average (much less than the increase of 5,7 that can be expected)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| alpha = | 0,016666667 |  |  |  |  |  |  |  |  |
| tails = | 2 |  |  |  |  |  |  |  |  |
| n = | 99 |  |  |  |  |  |  |  |  |
| Sample mean = | 1,8 |  |  |  |  |  |  |  |  |
| Population mean (hypothesised) = | 0 |  |  |  |  |  |  |  |  |
| Population SD (sample estimate) = | 4,789 |  |  |  |  |  |  |  |  |
| Cohen's d = | 0,375861349 |  |  |  |  |  |  |  |  |
| Non-centrality parameter λ = | 3,739773203 |  |  |  |  |  |  |  |  |
| Degrees of freedom df = | 98 |  |  |  |  |  |  |  |  |
| Critical value t\_crit = | 2,435768299 |  |  |  |  |  |  |  |  |
| beta = | 0,09838165 | This quantity was computed using Stata software | | | | | | | |
| power = | **0,90161835** |  |  |  |  |  |  |  |  |

1. Change in confidence

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Authors | Locations | Participants | Clinical confidence | Pre-course | | Post-course | | Chang in score | |
| Mean | SD | Mean | SD | Change | SD |
| Peter et al | 9 sub-Saharan countries | 330 doctors, nurses, clinical officers, other | 8 scenarios, self-rating 1 - 5 | 29,2 | 6,2 | 37,2 | 3,388 | 7,61 | 5,5161 |
| Nogaro et al | 7 African countries | 345 doctors, nurses, students, clinical officers | 8 scenarios, self-rating 1 - 5 | 28 |  | 34,8 |  | 6,82 |  |

Average = 7,2

1 *Results reported as percentages: pre 73% (15.5%), post 93% (8.47%), change 19% (13.79%). Greater improvement for non-doctors*

2 *Results reported as percentages: pre 73%, post 87%, change 17%. Greater improvement for non-doctors*

Based on these results, a change in clinical confidence of around 7.2 points on a 40 points scale, with a SD of change of around 5.516 points, can be expected on completion of the training course.

The calculation shows that if SD (change) = 5,516, the participants in Ninh Binh (39) and Thanh Hoa (60) provide 90% power to detect a change of just 1,8 additional correctly answered questions on average (much less than the increase of 7,2 that can be expected)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| alpha = | 0,016666667 |  |  |  |  |  |  |  |
| tails = | 2 |  |  |  |  |  |  |  |
| n = | 99 |  |  |  |  |  |  |  |
| Sample mean = | 2,1 |  |  |  |  |  |  |  |
| Population mean (hypothesised) = | 0 |  |  |  |  |  |  |  |
| Population SD (sample estimate) = | 5,516 |  |  |  |  |  |  |  |
| Cohen's d = | 0,38071066 |  |  |  |  |  |  |  |
| Non-centrality parameter λ = | 3,788023238 |  |  |  |  |  |  |  |
| Degrees of freedom df = | 98 |  |  |  |  |  |  |  |
| Critical value t\_crit = | 2,435768299 |  |  |  |  |  |  |  |
| beta = | 0,09038983 | This quantity was computed using Stata software | | | | | | |
| power = | **0,90961017** |  |  |  |  |  |  |  |

Amiri et al results:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Pre-course | Post-course | Change |
| Average | 18,84375 | 26,71875 | 7,875 |
| SD | 5,90995595 | 3,11916121 | 4,78920744 |

## Appendix 8: Case Record Form A1

**ID number: \_\_\_\_\_\_\_\_\_\_\_\_\_\_**

|  |  |  |
| --- | --- | --- |
| **Code** | **Question** | **Answers** |
| **Part A: General information of participants** | | |
| ID | Medical record ID |  |
| Time | Time of survey | 1. Before PTC course 2. After PTC course |
| Hoten | Full Name |  |
| Tuoi | Age (year) |  |
| Gioi | Gender | 1. Male 2. Female |
| A1 | Phone number  *(At least 2 phone numbers (i.e. patient and caregivers) are required* | 1.  2.  3. |
| A2 | Current living area | 1. Rural/mountainous 2. City/suburban |
| A3 | Marital status | 1. Single 2. Married 3. Divorce 4. Widowed 5. Other, please specify: |
| A4 | Educational attainment | 1. < Primary school 2. Secondary school 3. High school 4. Technical school/College 5. University (undergrad and postgrad) |
| A5 | Average income per month | 1. Less than VND 2.5 mil/month 2. From VND 2.5 – 5.0 mil/month 3. From VND 5 – 10 mil/month 4. From VND 10 – 20 mil/month 5. More than VND 20 mil/month |
| A6 | How long since you/they obtained your/their driving license? | 1. Less than 1 year 2. From 1-3 years 3. From 3-5 years 4. More than 5 years 5. Have not yet obtained driving license |
| A7 | How many times have you had violated the Law on traffic during last 6 months? | 1. Not at all 2. 1-3 times 3. 4-6 times 4. More than 6 times |
| A8 | Have you ever gotten traffic accident during last 6 months? *(including mild accident without injury)* | 1. Not at all 2. 1-2 times 3. 3-5 times 4. More than 5 times |

|  |  |  |  |
| --- | --- | --- | --- |
| **Part B: Information related to traffic accident** | | | |
| **Code** | **Question** | **Answer** |
| CĐ | **Diagnosis:** |  |
| B1 | Accident time | 1. \_\_\_\_\_\_\_\_\_*hour\_\_\_\_\_\_\_\_\_minutes* 2. *Date\_\_\_\_\_\_month\_\_\_\_\_year*\_\_\_\_\_\_\_\_\_ |
| B2 | Time admitted to Emergency Department of Provincial hospital | 1. \_\_\_\_\_\_\_\_\_*hour\_\_\_\_\_\_\_\_\_minutes* 2. *Date\_\_\_\_\_\_month\_\_\_\_\_year*\_\_\_\_\_\_\_\_\_ |
| B3 | Did you receive first aid by healthcare workers before hospital admission? | 1. Yes 2. No |
| B4 | If yes, which first aid measures have you received?  *(Multiple choices)* | 1. Canula 5. Intravenous infusion 2. Oxy 6. Neck fixation 3. Intubation 7. Limbs fixation 4. Drain |
| B5 | Reason for accident?  *(Multiple choices)* | 1. Due to others 2. Self-accident due to carelessness 3. Using alcohol or drugs before driving 4. Driving with high speed 5. Others (Please specify) ………………… |
| B6 | How did you/they get to the hospital? | 1. Ambulance (115 call service) 2. Taxi (cab) 3. Motorbike 4. Other (please specify) ………………… |
| B7 | Distance from the accident occur to the hospital? | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ km |
| B8 | Type of accident? | 1. Bicycle – Motorbike 2. Bicycle – Car 3. Motorbike – Motorbike 4. Motorbike – Car 5. Car – Car 6. Single vehicle 7. Others (Please specify) ………………… |
| B9 | Did you/they wear a helmet or fasten your/their seatbelt? | 1. Yes 2. No |
| B10 | Blood alcohol test result | 1. positive 2. Negative 3. Do not be taken |

|  |  |  |  |
| --- | --- | --- | --- |
| **Part C: Treatment at emergency department** | | | |
| **Code** | **Question** | **Answer** |
| C1 | Interventions and care received right after admitted to the emergency department?  (*Multiple choices*) | 1. Canula 6. Neck fixation 2. Oxy 7. Limbs fixation 3. Intub 8 Setup sonde tube 4. Drain 9. Blood transfusion 5. CPR 10. Setup IV transfusion |
| C2 | Imaging services where indicated?  (*Multiple choices*) | 1. Chest X – ray 2. Abdominal X – ray 3. Pelvis X – ray 4. Abdominal ultrasound 5. Head computed tomography 6. Abdominal computed tomography |
| **Code** | **Revised Trauma Score (RTS)** | **Results** | |
| C3.1 | Glasgow score | 1. 3 points 3. 9-12 points 2. 4-5 points 4. 13-15 points 3. 6-8 points | |
| C3.2 | Systolic blood pressure | 1. 0 mmHg 3. 76-89 mmHg 2. <50 mmHg 4. >90 mmHg 3. 50 – 75 mmHg | |
| C3.3 | Respiratory rate | 1. 0 breaths/mins 3. ≥ 30 breaths/mins 2. 1-5 breaths/mins 4. 10-29 breaths/mins 3. 6-9 breaths/mins | |
| C3 | **Total score** |  | |

**C4. Injury Severity Score (ISS)……………………….. score.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Region** | | **1** | | **2** | **3** | **4** | **5** |
| Head & neck | |  | |  |  |  |  |
| Face | |  | |  |  |  |  |
| Chest | |  | |  |  |  |  |
| Abdomen | |  | |  |  |  |  |
| Extremity | |  | |  |  |  |  |
| External | |  | |  |  |  |  |
| **Code** | **Results within first 24 hours** | | **Results** | | | | |
| C5 | Results of treatment within first 24 hours of admission? | | 1. Referral to operation room 2. Referral to higher level of injury centres 3. Referral to ICU 4. Referral to inpatient department 5. Too severe, family asked to discharge/death.   If patient died, how long since hospital admission to time of death. *(hours)……………..* | | | | |

**QUESTIONNAIRE FOR DATA COLLECTION ON PATIENTS AFTER 30 DAYS**

|  |  |  |
| --- | --- | --- |
|  | **Part D: Treatment results after 30 days since hospital admission** | |
| **Code** | **Content** | **Answer** |
| D1 | How was the treatment result after 30 days since hospital admission? | 1. Discharged (Improve or recover) 2. Continue with treatment at inpatient department 3. Continue with treatment at ICU 4. Referral to higher level for continued treatment 5. Too severe, family asked to discharge 6. Died. Date of mortality:……………………. |
| D3 | Length of stay at provincial hospital | 1. At inpatient department: ………………days 2. At ICU: ……………….. days |
| D4 | Length of stay at higher level of health facilities  ***(If any)*** | 1. At inpatient department: ………………days 2. At ICU: ……………….. days |

|  |  |  |
| --- | --- | --- |
|  | **Part E. EQ-5D-5L Questionnaires** | |
| **Code** | **Component** | **Results**  ***(circle on the answer that that best describes your health TODAY)*** |
| E1 | MOBILITY | 1. I have no problems in walking about 2. I have slight problems in walking about 3. I have moderate problems in walking about 4. I have severe problems in walking about 5. I am unable to walk about |
| E2 | SELF-CARE | 1. I have no problems washing or dressing myself 2. I have slight problems washing or dressing myself 3. I have moderate problems washing or dressing myself 4. I have severe problems washing or dressing myself 5. I am unable to wash or dress myself |
| E3 | USUAL ACTIVITIES *(e.g. work, study, housework, family or leisure activities)* | 1. I have no problems doing my usual activities 2. I have slight problems doing my usual activities 3. I have moderate problems doing my usual activities 4. I have severe problems doing my usual activities 5. I am unable to do my usual activities |
| E4 | PAIN / DISCOMFORT | 1. I have no pain or discomfort 2. I have slight pain or discomfort 3. I have moderate pain or discomfort 4. I have severe pain or discomfort 5. I have extreme pain or discomfort |
| E5 | ANXIETY / DEPRESSION | 1. I am not anxious or depressed 2. I am slightly anxious or depressed 3. I am moderately anxious or depressed 4. I am severely anxious or depressed 5. I am extremely anxious or depressed |