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EVALUATION ON PATIENT TRIAGING PATHWAY STRATEGY GUIDELINES FOR CASES WITH ELIPIDAE BITE DURING COVID-19 PANDEMIC AT EMERGENCY DEPARTMENT

^{i,*}Zainul Ikhwan Ahmad Khusairi, ⁱⁱNor Aroma Abu Bakar, ⁱⁱⁱKomalah Raman,
ⁱⁱⁱⁱMohammad Nasir Abdul Kudus, ^vMuhammad Hafiz Mohd Nafiri, ^{vi}Norhayati Hamzah &
^{vi}Haslinda Ismail

ⁱEmergency and Trauma Department, Taiping Hospital, Perak, Malaysia

ⁱⁱImam Abdulrahman Bin Faisal Hospital, Dammam, Saudi Arabia

ⁱⁱⁱOpen University Malaysia, Kelana Jaya Centre, Selangor, Malaysia

^{iv}Klinik Kesihatan Bagan Datuk Perak, Malaysia

^vKMC Medical Centre, Ipoh, Perak, Malaysia

^{vi}Pantai Hospital Ipoh, Perak, Malaysia

*Corresponding author. E-mail: drzikhwanbest@gmail.com

ABSTRACT

Emergency department (ED) typically practicing a triage system to classify patients into priority levels. Triage system is commonly used in crowded emergency rooms to determine which patient should be seen and treated immediately. Therefore, the objective of this study was to evaluate the effectiveness of triaging pathway strategies guidelines for critical cases seen in the Emergency Department during the COVID-19 outbreak. Emergency Department, Taiping Hospital is practicing triaging system which consist of two divisions; case with respiratory symptoms (SARI) and case with no symptom of respiratory impairment (NON SARI). One case report was selected to answer the study objectives. A patient with snake bite which presented at Emergency Department, Taiping Hospital with symptoms of numbness at bitten hand and complaint of difficulty to open the eyes and tachycardia noted. However, no shortness of breath or difficulty in breathing was reported. COVID-19 rapid screening was done and patient were treated under Red Zone (Non SARI). Luckily patient survived and was stable with no reaction observed after Neuro Polyvalent Antivenom 50cc in 500cc normal saline in one hour commenced. This case report proved that patient triaging pathway strategy guidelines provided was effectively practiced by paramedic during managing critical cases at Emergency Department during COVID-19 outbreak. Researchers also recommended that other Emergency Department should be advised to practice an effective and appropriate triaging pathway strategy guideline to save patient's life.

Keywords: *Triaging system, COVID-19 epidemic, Critical cases, SARI (Severe Acute Respiratory Infection), Emergency Department*

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Introduction



Hospitals consist of departments, traditionally called wards, especially when they have beds for inpatients, when they are sometimes also called inpatient wards. Hospitals may have acute services such as emergency department or specialist trauma centre, burn unit, surgery, or urgent care. These might then be backed up by more specialist units such as Emergency department, Cardiology, Intensive Care Unit, Paediatric Intensive Care Unit, Neonatal Intensive Care Unit, Cardiovascular Intensive Care Unit, Neurology, Oncology, Obstetrics and Gynaecology and Maternity ward. So did the hospital where the author worked for. The hospital provides various facilities. Nevertheless, the author himself was posted at the Emergency Department.

The emergency department is very synonymous with various issues related to service complaints provided by health care workers such as waiting times, length of stay and overcrowding in the health care system provided in most developed countries now a day. These ED issues are multifactorial in nature and require further evaluation in an attempt to provide consistent, adequate health care to each patient (Blackwell & Kaufman, 2002). Basically, Emergency Departments provide care for patients who may have an urgent need for medical, surgical or other care. Emergency departments may also provide services for patients returning for further care, or for patients waiting to be admitted to a ward. About one in four presentations to emergency departments ends with the patient being admitted to hospital.

According to Johanna (2016), an Emergency Department (ED) required different equipment and different approaches than most other hospital divisions. Patients frequently arrived with unstable conditions, thus must be treated quickly. They might be unconscious, and information such as their medical history, allergies, and blood type might be unavailable. ED staff were trained to work quickly and effectively even with minimal information.

Emergency department (ED) typically used a triage system to classify patients into priority levels. However, most triage systems do not specify exactly how to route patients within the assigned triage levels, hence, decision makers in EDs often have to use their own discretion to route patients (Blackwell & Kaufman, 2002). Thus, ED staff must also interact efficiently with pre-hospital care providers such as EMTs, paramedics, and others who are occasionally based in an ED. The pre-hospital providers may use equipment unfamiliar to the average physician, but ED physicians must be expert in using (and safely removing) specialized equipment such as traction splints required special procedures. Among other reasons, given that they must be able to handle specialized equipment, physicians can now specialize in emergency medicine, and EDs employ many such specialists.

Meanwhile, 'triage' refers to the evaluation and categorization of the sick or wounded when there are insufficient resources for medical care of everyone at once (Stoppler & Shiel, 2014). In mass casualty situations, triage is used to decide who is most urgently in need of transportation to a hospital for care (generally, those who have a chance of survival but who would die without immediate treatment) and whose injuries are less severe and must wait for medical care. Triage is also commonly used in crowded emergency rooms and walk-in clinics to determine which patients should be seen and treated immediately.

Trauma triage at Taiping Hospital was used for trauma assessment while prioritizing patients for treatment or transport according to their severity of injury (Stoppler & Shiel, 2014). Primary triage



was carried out at the scene of an accident and secondary triage at the casualty clearing station at the site of a major incident (Table 1).

| ZONE | TYPE OF CASES |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RED ZONE | <p>A. GENERAL</p> <ul style="list-style-type: none"> i. Respiratory arrest ii. Cardiac Arrest - There are Witnesses. iii. Acute Myocardial Infarction iv. Heavy bleeding (Uncontrolled) v. Cervical Injury vi. Severe head injury and memory loss vii. Open Chest Wound / Abdominal / Stomach Injury. viii. A terrible shock ix. Respiratory tract fire x. Tension Pneumothorax xi. Complications of medical problems: Obstetrics / Heart / Diabetes / Seizures / Hyperthermia / Hypothermia / poisoning xii. Fracture of the joint with the pulse cannot be detected in the involved part xiii. Bone fracture in the thigh (femur). xiv. High Fever: Temperature 40.5 Celsius <p>B. TRAUMA AND INJURY</p> <ul style="list-style-type: none"> i. Severe injuries to multiple parts of the body (Polytrauma) ii. Body burns > 10% (Sensitive body parts) iii. Inhalation Injury (Inhalation of heat) iv. Fracture of the lower part of the body (Long Bone fracture) v. Suicide attempt vi. Taking drugs in excessive doses vii. Severe injuries and memory loss viii. Road accident injuries (Impact >20 mph) ix. Falling from a height exceeding 2 meters (>20 feet) x. Electric shock <p>C. NON-TRAUMA / INJURY</p> <ul style="list-style-type: none"> i. Severe chest pain of any cause ii. Severe shortness of breath including cases of asthma iii. Heart failure (acute Myocardial Infarction) iv. Renal Colic |



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|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <ul style="list-style-type: none">v. Severe gastroenteritisvi. GIT (Gastro-Intestinal Tract) Bleedingvii. Severe back pain (Lower Back pain)viii. Terminally Ill Patientix. Abdominal pain / including severe urinary retentionx. Severe dizziness / fainting / seizuresxi. Coma patientsxii. Chocking (chocking) |
| YELLOW ZONE | <p>A. GENERAL</p> <ul style="list-style-type: none">i. Back injury with or without spinal cord injuryii. Moderate blood loss @ 2pintsiii. Serious body part burnsiv. Open fractures or multiple fracturesv. Stable abdominal injuriesvi. Eye injuries (Open wounds-preferredvii. Taking excessive but stable medication <p>B. INJURY</p> <ul style="list-style-type: none">i. Upper limb fracture / dislocation.ii. Various skin surface wounds.iii. Burns @10%.iv. Sprains / Muscle cramps.v. Insect/animal stings/bites.vi. Mild lacerations.vii. Foreign object: Ear / Nose / Throat. <p>C. NON-TRAUMA / INJURY</p> <ul style="list-style-type: none">i. Fever that requires critical attention.ii. Moderate abdominal injuries.iii. A large skin infection (Cellulitis / Urticaria).iv. Acute eye / ear infection.v. Acute headache/pain: Requires immediate treatment. |



| | |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| GREEN ZONE | ALL NON-CRITICAL CASES |
| | i. Non-serious injuries. The patient is conscious and able to speak and is sane. |
| | ii. Disturbed health requires immediate treatment, but the patient is stable and able to walk. Example: Fever, diarrhea, cough. |
| | iii. The patient is injured but can still walk to get treatment. |
| | iv. The patient can be sent to the hospital in a sitting position. |
| | v. Example: Wound with bleeding less than 500ml, Closed fracture, bone of hand, arm or finger; head injury that does not cause unconsciousness. |
| | vi. Minor injuries. |

Table 1. Trauma Triage Zone Classifications (normal triaging pathway)

Triage was repeated prior to transport away from the scene and again at the receiving hospital. The primary survey aimed to identify and immediately treat life-threatening injuries and was based on the 'ABCDE' resuscitation system:

- i. A: Airway control with stabilization of the cervical spine.
- ii. B: Breathing.
- iii. C: Circulation (including the control of external hemorrhage).
- iv. D: Disability or neurological status.
- v. E: Exposure or undressing of the patient while also protecting the patient from hypothermia.

In February 2020, COVID-19 appeared in Malaysia, spreading initially in Petaling Jaya, Selangor and Kuala Lumpur town. As the disease spread, the neighbouring regions were quickly affected and, for this reason, Malaysian government was forced, on March 17, 2020, to designate the whole country as a single Red Zone, declaring national lockdown (MOH, 2020). In the following weeks, other European nations and USA also progressively adopted lockdown strategies in an attempt to contain the pandemic.

Within a few days, Emergency Departments (EDs) were involved in the crisis caused by the Covid-19 pandemic, having to manage not only cases of severe respiratory failure, but also a large number of patients with mild symptoms. In addition to the regular admission of patients, this caused overcrowding in many EDs across the country including ED Taiping Hospital. Apart of Covid-19 that had lock us down all around the world with every single medical personal effected in aspect of emotion and self-worried in treating the disease, we also encountered the other normal emergency cases especially in ED such snake bite.

At ED Taiping Hospital setting, the Red Zone were divided into two (2) compartment which was Red Zone-Non-SARI (severe acute respiratory illness) or Red Zone-SARI (Appendix 2-Chart B). Routinely all snake bite patient were managed in normal Red Zone where Antivenom also was



initiated prior to ward admission. The idea of Red Zone (SARI) was created to handle all kinds of patient that had problem with lung or airways compromise so that all intervention such as Oxygen flow, Non-Invasive ventilation procedure or intratracheal intubation could be managed safely by medical personal. Same goes to snake bite case, causing neurotoxicity which commonly lead to acute respiratory failure secondary to neurotoxic snake bite. Where should this patient triaged to and where the exact safe place to locate this patient. In this case study we tried to highlight the pathway that was applied in our ED setting Hospital Taiping.

Case Report

16 years old with no comorbid, was bitten by a snake of which he was later found on the ground near his home compound. The incidence took place at 10 pm a day prior to ED visit. He found the snake under a staircase, caught, and played with it by holding its neck. The snake subsequently bites at his left index finger. Nothing was done to the bitten area. No tourniquet applied. Patient arrived at ED around 6.45am in the next day with symptoms of numbness of the bitten hand and progressively difficult to open his eyes. No shortness of breath or difficulty in breathing. He described the snake as a thumb size, length around half meters. The patient described the snake via eBook Land Snake of Medical Significance in Malaysia as 'Ular Ketam Batu'. He showed other symptoms such as sleepiness and general myalgia.

On examination, noted tachycardic with rate of 124 bpm. Blood pressure was normotensive with respiratory rate of 20. Spo2 under room air maintained 99% with no temperature documented. Tender over the bitten site with pain score of 4/10. Noted bilateral ptosis. Pupil were reactive both eyes. Other cranial nerve examinations were normal. Airways were patent with clear lung examination. Final diagnosis was made as Malayan Krait Bite with systemic envenomation. Patient was referred from Hospital Gerik to Hospital Taiping for further management. He was triage to Red Zone (NON-SARI) after Covid-19 clearance was done. No RTK or PCR swab test done for him.

He then started with Neuro Polyvalent Antivenom 50cc (5 vials) in 500cc normal saline in 1 hour. He was stable all along the time and no drug reaction encountered. He then was admitted to general medical ward for further observation. The bilateral ptosis was improved along the Antivenom administration. Patient was place in red zone non-SARI area while the whole processes took place. The history clerking especially the recent traveling, the close contact with any COVID-19 patient or any accidental respiratory symptom all along the time had been elicited and clarified.

Discussions

Case Study Summary

Patient with snake bite especially those required Antivenom must be closed surveillance in ED. There have two possibilities which are patient is coming with respiratory compromise where patient will be send into Red Zone- SARI for further airway management including the need of intubation. There were two possibilities where patient with respiratory compromise would be sent to Red Zone-SARI for further airway management including the need of intubation. Another situation was a patient from any red spot case related to COVID-19 patent or he himself might have a close contact to any positive



patient. All this patient that included in these criteria will be send to Red Zone-SARI for management. All the patients inclusive into these criteria would be sent to Red Zone-SARI for management. Despite of the paramedics felt unpleasant moment being in the hot, crowded respiratory zone with full of PPE applied but this was the only way to protect ourselves along with saving the patients. In this case study, the patient suffered from systemic envenomation secondary to Malayan Krait snake bite and presented with bilateral ptosis however there was no respiratory component although patient might develop to respiratory failure as time went on. This patient was kept in normal Red Zone-Non-SARI with close monitoring while administrating the Antivenom. Patient also had filled up the COVID-19 Screening clearance questionnaire that made him managed into normal Red Zone.

The similar study conducted by Turcato et al., (2020) which purposely to evaluate the inclusion of pre-triage during the COVID-19 outbreak. The researchers stated that, in March 2020, the structure of the ED at Merano General Hospital (Italy) was modified, with the introduction of a '*pre-triage protocol*' to divide patients according to the risk of infection. The performance of pre-triage was evaluated for sensitivity, specificity, and negative predictive value (NPV). From 4th to 31st March, 2,279 patients were successively evaluated at the pre-triage stage. A total of 257 were discharged directly from pre-triage by triage out or home quarantine and none has subsequently been hospitalized. About 2022 patients admitted to ED, 182 were allocated to an '*infected area*' and 1840 to a '*clean area*'. The proportion of patients who tested COVID-19 positive was 5% and, of these, 91.1% were allocated to the infected area. The pre-triage protocol demonstrated sensitivity of 91.1%, specificity of 95.3% and NPV of 99.5%. In addition, none of the healthcare workers was infected during the study period. Pre-triage can be a useful tool that, if standardized and associated with a change in the structure of the ED, can limit the spread of infection within the ED, optimize ED resources and protect healthcare workers.

In general, the findings of these both studies proved that effective Patient Triage Pathway Practice can help save the lives of patients as well as reduce and prevent Coronavirus transmission methods in accordance with work standards and policies set by WHO.

Conclusion

Triage in ED is a decision-making process that classifies patients according to their need for emergency treatment and optimizes ED resources (Johanna, 2016; Turcato et al., 2020). During an epidemic, it is the first contact between the patient and the hospital and can play a crucial role in identifying the risk of infection in patients and limiting the spread of the infection within the hospital and among healthcare workers.

In late December 2019, a new public health crisis emerged as an outbreak of pneumonia-like respiratory infection from Wuhan, China. The World Health Organization (WHO) (2020) named this infection as severe acute respiratory syndrome Coronavirus 2 (SARS CoV 2) and declared it as Coronavirus disease 2019 (COVID-19). Within 2 months, by the end of February 2020, every nation across the globe reported cases of Coronavirus infection. Rapid human to human transmission led COVID-19 to become a global medical emergency, and therefore, the WHO declared COVID-19 a pandemic on March 11, 2020 (Stewart, 2020).

The situation of this pandemic had made all the hospitals in the world congested and busy especially units involving critical patient management such as ICU, Operation Room, and no



exception the Emergency and Trauma Department looks like a disaster. Accordingly, the department involved indirectly had to modify the emergency management system according to the circumstances. Therefore, the emergency department of the study hospital has also held a compartment which is Red Zone-SARI (severe acute respiratory illness) or Red Zone Non-SARI for cases that do not have acute respiratory signs and symptoms. However, for non-positive cases COVID-19 which at the same time has signs and symptoms with respiratory problems such as poisoning due to venomous snake bites has become an issue for paramedics to plan patient management. It is clear that effective clinical pathway management can save patients and prevent the spread of the virus to other individuals including paramedics in ED.

Study Suggestions

This study suggests that all patients with SARI criteria should be placed in the Red Zone-SARI for further patient management. This is to ensure that patients are given prompt treatment to save lives for emergency cases even if the patient is unsuspected COVID-19. Therefore, the researcher also suggested that all emergency departments in other hospitals should also be sensitive in this issue and not only focus on positive COVID-19 patients but should wisely prioritize cases that also required emergency treatment such as patients with snake bite and other cases emergency.

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