

Setting Up of First Heat Stroke Unit in a Tertiary Care Hospital of North of India: A Prospective Study from April-June 2024

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Abstract

Aim of the Study: Preparedness of hospital to deal with illness occurring because of impact of heat wave.

Material and Method: A team of doctors were assigned the task of setting up of heat stroke unit and training of doctors, staff and nurses within a short span of time.

Analysis: The challenges and difficulties of procurement of items is studied. Also new protocols as per the need of the hospital were formulated for managing victims of heat related illness. It was easier to train doctors and staff nurses as compared to the other allied staff like Multi Tasking Staff (MTS), and security guards.

Results: All hospitals should have a dedicated heat stroke unit for managing heat related illnesses in future. All doctors and staff to be trained in managing such patients. Prevention & spreading awareness of Heat related illnesses is also responsibility of staff of Heat stroke unit.

Keywords: Cold water immersion; TACO method; Rectal temperature; Algorithm; Protocols; Half and full training manikin.

INTRODUCTION

Why is the need for a separate dedicated Heat stroke Unit?

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The global climate change has impacted temperatures all over the world.

There is increase in global average temperature from July 2023 to May 2024 by 1.52-degree C, in comparison to preindustrial and 1901-2020 era.¹

Large parts of south east Asia faced blistering heat waves that have reached over 125-degree F.²

In India at least 24 people died on 31 may 2024 in Bihar and Odisha and many Delhiites faced water shortage.³

Warnings had been issued by government to the public and steps taken for strengthening health systems preparedness for heat-related illnesses, guidelines on Emergency cooling for severe heat related illnesses and guidelines for autopsy findings in heat related deaths.^{4,5}

Therefore, a heat stroke unit was inaugurated on 8th May 2024 by officials of Health ministry in a tertiary care centre in north India.



Heat stroke, the most severe heat illness, is identified by three key signs: exposure to high heat and humidity, a core body temperature of 40.5°C (105° F) or higher and mental changes like mild confusion or impaired consciousness. Heat stroke is also a silent killer, and victims can begin to fall ill hours after exposure to sun. India's National Centre for Disease Control calls heat strokes a "life-threatening" condition with a mortality rate of 40-64%.⁴

Heat waves killed more than 25,000 people between 1992 and 2019, according to official figures.⁶

Prerequisite of a Heat Stroke unit

1. It should be located in the Emergency of the hospital.
2. It should have a dedicated ICU facility with ventilator, defibrillator, monitor with rectal core temperature and skin temperature monitoring facility.
3. Crash cart with all the emergency drugs.
4. Room should be fully air-conditioned.
5. Ceramic tubs and immersion tubs to manage high temperatures by cold immersion technique.
6. Ice-boy which is a ice-making machine with capacity of making 250 kg ice in 24 hours.
7. Source of high flow of water to fill ceramic / inflatable tubs in 2 minutes (250 Liters).
8. Tarpaulin (125 GSM) thickness.

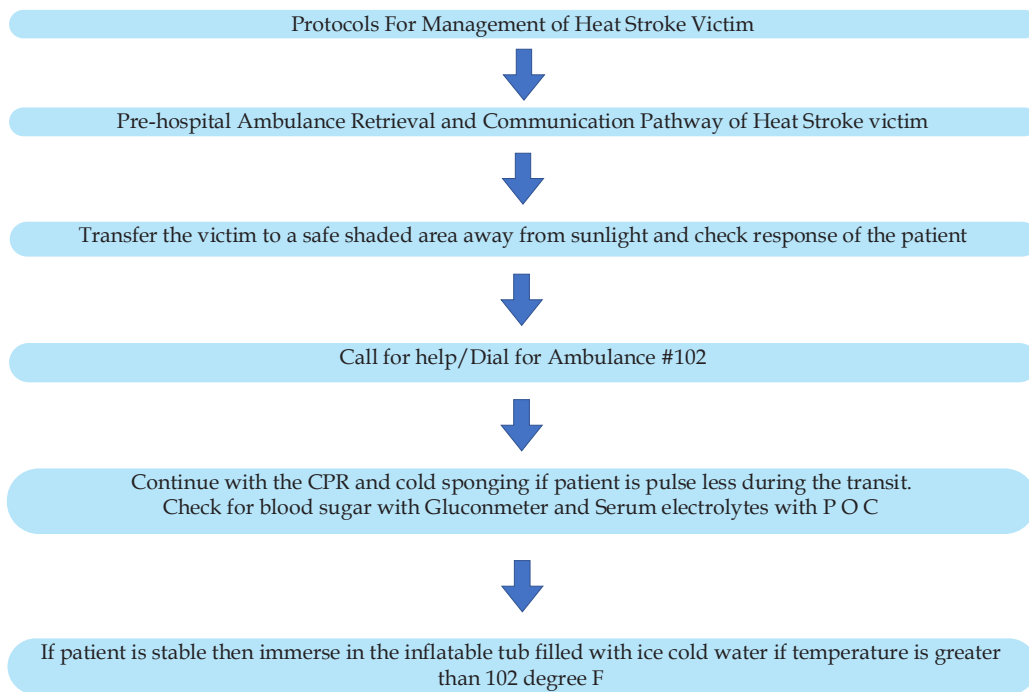
9. Half and full manikin (water resistant) for training purpose.
10. For demonstrating Cold water immersion technique, TACO method and demonstration of measurement of skin /rectal and ice-cold water temperature.
11. Nodal officer for hyperthermia responsible for awareness, management, uploading of census and training the trainers inside the hospital.
12. Protective wind cheater for staff working inside the cold environment.
13. Point of care investigations like Complete haemogram, complete metabolic profile, serum electrolytes, blood sugar, PT/INR, serum creatinine-kinase, Troponin, CPK MB NCCT head and Ultrasound facility.
14. ACLS Ambulances and Management of Heat Stroke Unit.

Following items to be kept in the Ambulances

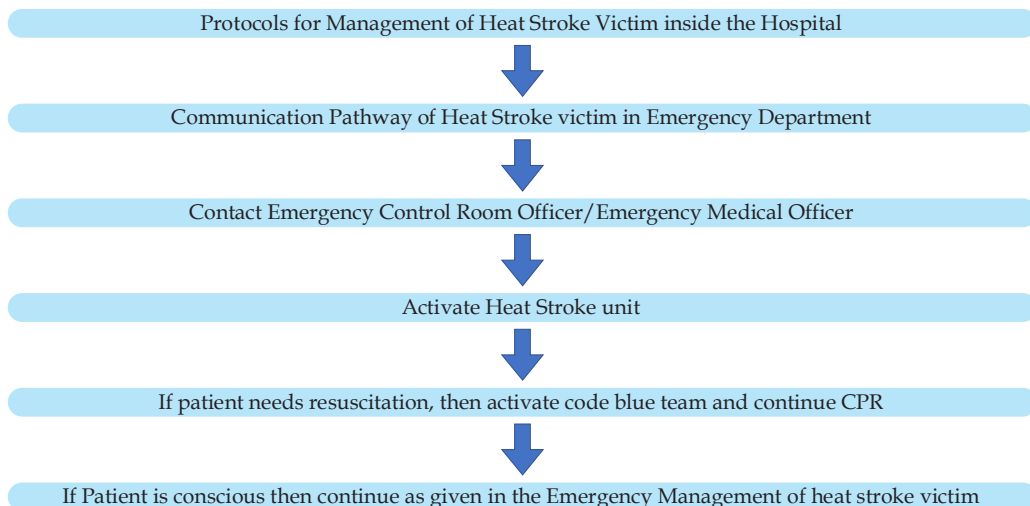
Cotton Bed Sheets 1) Sponge 2) Drinking water bottles 3) Cold water Spray 4) IV Fluids NS, RL 5) ORS 6) IV Cannula-20'', 22'' 7) Tegaderm 8) Syringes 9) Alcohol swabs 10) Ice pack 11) Dead body cover 12) Inflatable tubs for both adult and paediatric age group 13) Thermometer 14) Ice box 15) Glucometer 16) In addition to check all ACLS ambulance equipment including airways, emergency drugs, defibrillator, monitor and ventilator.

Institute therapeutic active cooling measures^{4,5}

Flow Chart 1



Flow Chart 2



Flow Chart 3

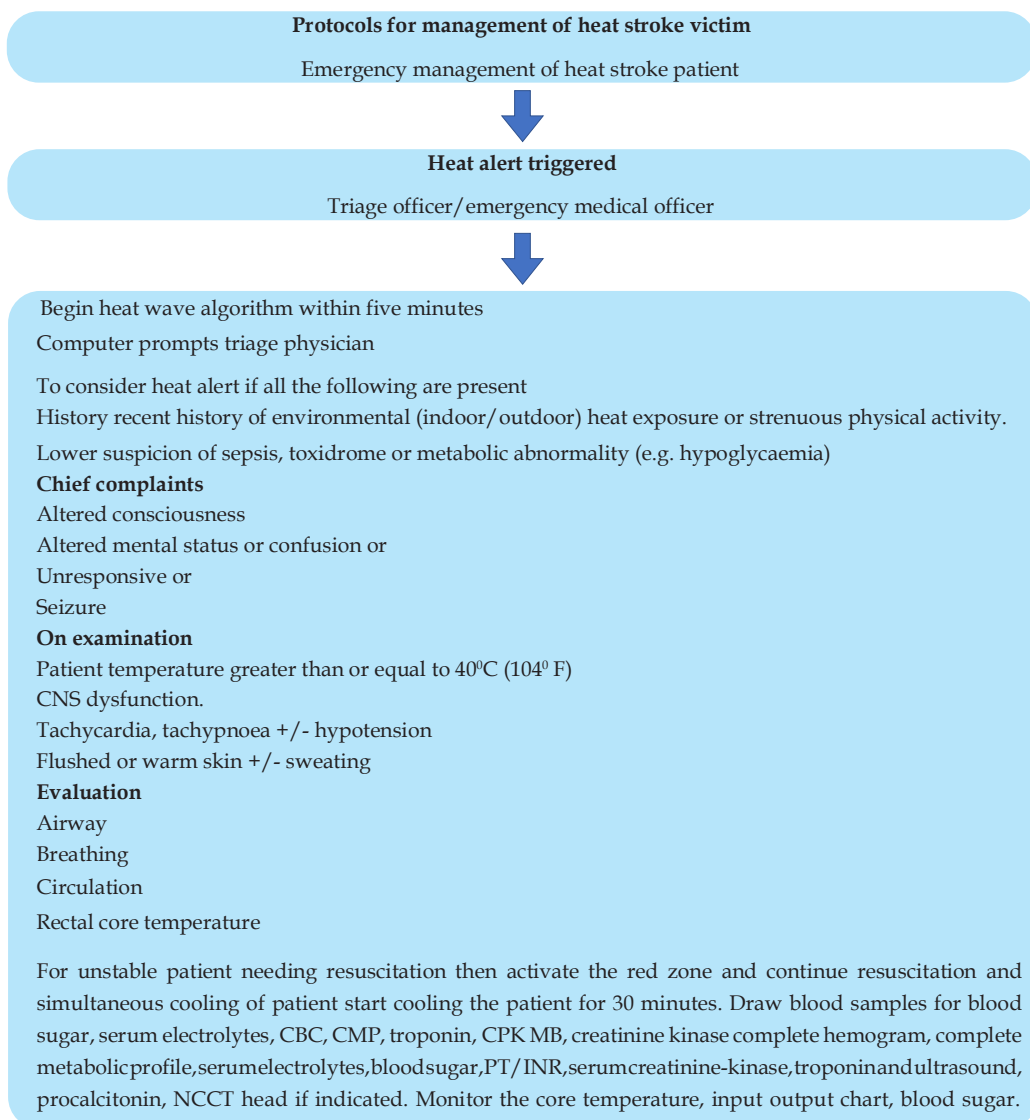


Chart Cont...

Multidisciplinary team work

Call to neurologist sos
Call to critical care medicine

Cooling of heat stroke patients

Immersion cooling in cold water is the treatment of choice.

Fill immersion tub with 250 liters water and add 50 kg of ice to achieve temperature of water up to 0–5°C.

Cold sponging with ice water in the chest, axilla and groin area.

Keep crash cart ready with all emergency drugs including adrenalin, nor adrenalin, midazolam, norcuron, vasopressors.

Internal cooling with cold fluid irrigation via foley catheter, Rylè tube and cold intravenous fluids.

Other evaporative cooling methods for extremes of age or critically ill patients.

Target of active cooling measures is reducing the temperature and cooling at 1°C every 10 minutes (till the core temperature reaches 38°C).

- Removal of all clothing while protecting patient's dignity.
- In cases of heat stroke emergency cooling measures to be initiated immediately and continued until the temperature falls below 39°C.
- A very effective method of evaporative external cooling is done in the field in which the skin is sprayed with cold water and then fanned to accelerate evaporation. In this heat from the skin (latent heat of vaporisation) is used and thus the body temperature falls down.

We use this facility of cold water spray in our ACLS ambulances

- Drape body with wet sheet wrapped loosely if water and ice is not available after removal of victim clothes. Spray the body continuously with a cool mist of water at about 15°C.
- If cold water or ice is not available then tap water of normal temperature can be used for spraying over the body or draping the body with wet linen.
- Desert cooler or table fan can be used if Air conditioner is not available to accelerate evaporation.
- External cooling by placing the ice packs in the groin and axilla and covering the upper thorax and neck with ice, then placing cool blankets/linen over the entire length of the body. This is the easiest and quickest way to reduce the body temperature.

Drawbacks of external cooling

- Shivering which can be controlled by rubbing the body, raising the feet of patient and avoid paracetamol or NSAIDs

Close monitoring of the following:

1. Temperature every 15-30 minutes (do not over correct to less than 38°C).

Even hypothermia can be fatal in children

2. Vital signs (BP/HR/SpO₂), watch for altered cardiac rhythms (ECG), altered mental status (GCS)
3. Look out for complications of treatment:
 - a. Acute pulmonary oedema
 - b. Hypothermia
4. Seizure - treat with benzodiazepines (Midazolam 0.1-0.2 mg/kg/dose slow over 5 minutes I/V or Lorazepam 0.05-0.1 mg/kg/dose over 2-5 minutes I/V)
5. Prevent shivering (Benzodiazepines (Midazolam / Lorazepam) can be used in conscious patients; by paralyzing patient if intubated)
6. Look for signs of coagulopathy
7. Arterial Blood Gases (ABG) regularly - look for metabolic acidosis
8. CT brain - to look for complications or rule out intracranial pathology
9. Continue management and referral to intensive care unit
10. Inform / communicate with next of kin regarding patient condition & prognosis
11. Emergency Cooling of Severe HRI case during ambulance transport

Guidelines for cooling

- » TARGET - Cool and Transport fast to nearest health care facility
- » To identify a suspected case of heat stroke by typical history and taking temperature (preferably by rectal thermometer).
- » Continue cooling in ambulance by evaporation. (mist and fan) Ice packs to be placed on groin, axilla, neck, and areas near other great vessels.

- » Check RBS by glucometer and start intravenous D50W/D25W if hypoglycemic.
- » Start oxygen supplementation
- » If trained, TACO* method of cooling may be employed in adult cases of exertional heatstroke.

*TACO: Tarp-assisted cooling with oscillation [TACO].

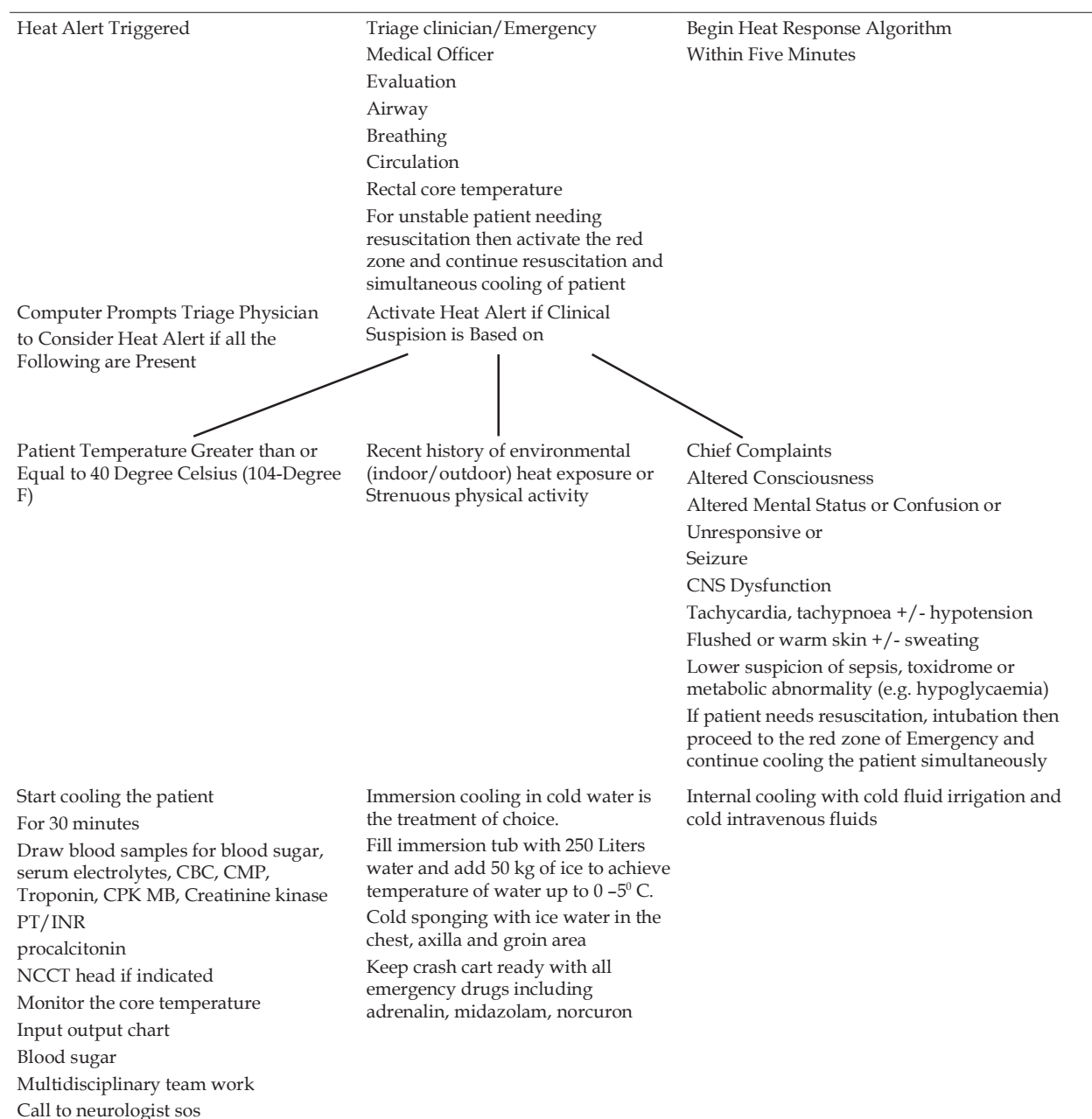
Recommended treatment for exertional heat stroke includes whole-body cold-water immersion (CWI).

However, remote locations or monetary or spatial restrictions can challenge the feasibility of CWI. Thus, the development of a modified, portable CWI method allows for optimal treatment of exertional heatstroke in the presence of these challenges. A plastic tarp held by staff members serves as the container for cold water while the patient sits or lies in the middle.

Flow chart 4

Protocols For Management of Heat Stroke Victim

Emergency Management of Heat Stroke Patient⁵



RESULT

Analysis for the procurement of emergency purchase of equipment was done and it was found that at least six months are required for the complete procurement cycle. Therefore to set up a heat stroke unit, purchase of equipment should be done six months in advance. In our study we could only procure 90 percent of the equipment

Also, mandatory training of all faculty, nurses, paramedics to be done in the form of CME to manage Heat Stroke victims both inside and outside the hospital in the pre hospital / ambulance zone.



Fig. 1: Ice Boy (Ice making machine) and Ceramic tub



Fig. 2: showing patient in Ceramic tub



Fig. 3: Showing Inflatable tub, Monitor with rectal / skin/ice cold water temperature monitor & Ventilator

Observation

The heat stroke unit procurement was done. On emergency basis.

Maximum equipment was purchased about 90 percent except for water resistant training half and full body manikin and point of care machine.

Training of all the faculty and staff (nurses and paramedic) and Multi Tasking Staff (MTS) and security guards was done by CME and formulating algorithm.

It was observed that the time needed for the faculty to be trained was on an average 2 hours in comparison to the nurses/ paramedics about 3 hours.

DISCUSSION

The heat stroke unit was set up on emergency basis. We had faced several challenges because of make in India, MSME and Government e Marketing (GeM) procurement policies which needs to be followed while purchase.

Certain equipment like Point of care machine and manikin required bidding process and so it was not procured within the time frame.

The faculty and staff were trained in managing Heat related illness.

Also, awareness regarding heat related illness was done by posters, Banners and expert talk on various channels.

It was found that the faculty was trained quickly in comparison to the nurses, paramedics and other staff members.

STATISTICAL ANALYSIS

Categorical variables were presented in numbers and percentages and the results were analysed accordingly.

CONCLUSION

In future all hospitals should have heat stroke preparedness at their facility in terms of training manpower and equipment.

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