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Early Goal Directed Care of the Acute Ischaemic Stroke Patient: A Nursing Perspective

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As neuroscience nurses we encounter a multitude of challenges in caring of the acute stroke patients. Early goal directed treatment is the key to improving patient's longterm outcomes. Our goal as the bed-side practitioner, in conjunction with the medical staff, is to minimise cerebral injury and preserve penumbral tissue.

Acute Ischaemic Stroke (AIS) is the third leading cause of death in the United States and literature cites the percentage of AIS to be upwards of 85%. In an ischaemic stroke, injury occurs when a region of brain tissue has a reduced blood flow for a period of time sufficient enough to cause ischaemic and infraction. The infractioned tissue which is unsalvageable, is known as umbra (infract core) and the ischaemic tissue, which is hypoperfused, but not irreversibly damaged, is known as penumbra. The timely restoration of blood flow to the penumbral tissue is the ultimate goal of all the medical and nursing management.

In the care of the stroke patient, the beside practitioner should allow the ABCs of assessment to guide their treatment and monitor their medical exam.

Airway/Breathing

In close frequent patient assessment , airway management must always remain a priority. Intubation may be increase for a Glasgow Coma Scale (GCS) of 8 or less. Frequent ABG's are necessary to follow PaO2 levels and CO2 levels, since these two values play a critical role in the ischaemic brain. The more alert stroke patient may only require supplemental oxygen to

Augment O2 delivery to the penumbral tissue.

Circulation

Careful monitoring of patient's vital signs is crucial . These valuable data may be one of the first signs of clinical neurological deterioration. AIS patients present with acute hypertension that often improves over the first 24-48 hours of symptom onset.

Management of this hypertension can be labour intensive for the beside nurse. In a patient who has received IV-Tpa, the literature guides us to keep their BP<185/100 to prevent a haemorrhagic transformation, but one must be sensitive to a patient's baseline BP parameters to prevent decreasing penumbral perfusion, especially since this hypoperfused tissue loses its autoregulation abilities and perfusion is directly linked to the patient's Mean Arterial Pressure (MAP).IV Labetolol , Hydralazine, or Cardene are often used to manage this hypertension, secondary to their short-acting nature. When an ischaemic stroke patient does not qualify for Tpa administration, the acute, often transient, hypertension is often only treated when the BP is over 220/110. Literature recommends lowering BP by 15%while closely monitoring patients for symptoms of clinical deterioration. The guidelines suggest restarting patients home antihypertensive regimen on the day 2 if they are neurologically stable. Positioning the head of the bed flat to 15degrees can augment circulation to the ischaemic penumbra.

This improves blood flow through often stenotic vessels and helps to improve collateral flow.

Temperature Management

Maintaining euthermia is important for the AIS patient. Fever is cited to dramatically worsen cerebral ischaemia and worsen long term patient outcomes. Antipyretics, such as acetaminophen are often standard practice, but frequently proved ineffective in controlling fever in the brain injured patient. The bedside practitioner, in conjunction with medical staff, must rule out possible sources of infection, while actively working to maintain euthermia or even mild hypothermia. Goal temperatures of 35-37 degrees Celsius have been shown to be neuroprotective in nature and can often be achieved through either surface cooling or intravascular temperature management modalities. In our experience, intravascular cooling has been the method of choice due to its speed, accuracy, and ease of use, with noted reductions in patient shivering. Hyperthermia has been shown to increase the release of neurotransmitters, increase oxygen free radical production, increase the blood brain barrier breakdown, and increase damage to penumbral tissue secondary to ischaemic depolarisation and cellular calcium influx. Temperature management is a vital part of caring for the AIS patient.

Nutrition

In patients with AIS, it is prudent to assess swallowing function prior to initiating any PO intake. Early nutrition is important secondary to increased energy demands, and maintenance or replacement of albumin levels, which directly affect osmotic pressure, helping to keep fluid in the intravascular space. Placement of a nasogastric or feeding tube should be initiated within the first 24 hours of admission, followed by appropriate caloric assessment by a hospital dietician. Tight blood glucose control is imperative to prevent anaerobic metabolism and local cellular lactic acid production, which directly affects penumbral tissue.

Mobility /DVT Prophylaxis

Patients suffering from AIS are often immobile for the first several days of hospital admission and are at an increased risk for DVT/PE formation. Patients often receive SQ administration of Heparin or Lovenox, and also the application of sequential compression devices.

Fluid Volume Status

Maintaining euvoemia is essential to maintaining effective penumbral circulation with the AIS patient. In our facility, we often account for insensible fluid loss by calculating a patient's hourly output and replacing that output the next hour plus an extra 20ml of crystalloid solution. This diligent replacement of insensible fluid loss prevents the collapse of the thin walled arterioles of the ischaemic penumbra. Patients with extensive strokes with significant cerebral oedema may also require intermittent Mannitol administration or hypertonic saline (3% NS) administration to aid in the management of increased intracranial pressure. Acute ischaemic strokes in the posterior fossa region often require placement of an external ventricular device to help manage the symptoms of hydrocephalus from fourth ventricle outflow obstruction.

Acute Anticoagulation

There is conflicting information in the literature regarding the practice of anticoagulation therapy. In the past, it was standard practice to place patients with a history of atrial fibrillation or other highrisk conditions for secondary clot formation on IV Heparin therapy. Studies have shown that these older anti-coagulation practices put patient at a high risk for haemorrhagic transformation of the original injury and that heparin therapy does not aid in revascularisation of the initial injury site; it only decreases incidence of new clot formation. Early administration of antiplatelet drugs, such as aspirin and Plavix, has become the favoured approach in treating ischaemic strokes. If heparin therapy is initiated, careful patient and lab monitoring are essential. Hourly neurological assessments are essential to monitor for any clinical decline. The bedside nurse must be wary of the possibility of a haemorrhagic transformation. In the event this devastating event does occur, the Heparin must be shut off immediately, the MD notified, a head CT should be performed and the coagulopathy should be corrected to baseline.

Revascularisation Therapies

Revascularisation is the key to long term functional outcomes. There are several options available to AIS patients to reperfuse the occluded vessel, assuming they present to the hospital in the predetermined time frame, from the onset of stroke symptoms. If a patient presents within three hours of symptom onset and they meet all the inclusion criteria, they may receive IV-tPA in attempt to restore blood flow to the blocked artery. Literature states this drug may be administered outside of the standard three-hour window, but its efficacy is decreased dramatically. ER staff must be proactive and place several large-bore IV's, a Foley catheter, and a feeding tube before administering this medication, because once the IV-tPA is administered, all invasive procedures should be avoided for 24 hours secondary to the increased risk of bleeding. If a patient presents within six hours of symptom onset, intra-arterial TPA administration is an option coupled with other various cutting-edge interventional revascularisation therapies.

Conclusion

Ultimately the fate of the patient lies in the diligence of the bedside nurse and medical staff. Aggressive treatment, including oxygenation status, airway protection, blood pressure control, temperature management, frequent neurologic assessments, intracranial pressure management, anticoagulation therapy and good supportive nursing care make all the difference when it comes to salvation of the penumbral tissue. Decreasing stroke size is key to limiting a patient's lifelong disabilities, improving outcome, and ultimately, improving overall quality of life.

