

# OHSU Health Care

## System Practice Standard

**ACUTE STROKE PRACTICE GUIDELINES FOR INPATIENT MANAGEMENT OF INTRACEREBRAL HEMORRHAGE, PS 01.16 LAST REVIEWED DATE: 1/29/10**

### POLICY

OHSU Hospitals and Clinics has adopted this practice guideline in order to delineate a consistent, evidenced-based approach to treating the patient who presents with signs and symptoms consistent with acute stroke due to intracerebral hemorrhage. Although this standard assists in guiding care, responsibility to determine appropriate care for each individual remains with the provider themselves.

### Outcomes/goals

- Create a multi-disciplinary, evidence-based, approach to the management of acute stroke patients with intracerebral hemorrhage (ICH).
- Patient plan of care to take into consideration the entire continuum of care from emergency department through rehabilitation.

### Physician

1. Determine the appropriate unit for admission.  
Recommended Admission Criteria for patient with ICH to Neurosciences ICU:
  - a. Acute symptom onset of < 24 hours.
  - b. Patients in whom impending mental status decline and loss of protective airway reflexes is of concern.
  - c. Patients requiring IV blood pressure or heart rate control.
  - d. Patients requiring continuous cardiac monitoring.
  - e. Patients requiring q 1-2 hour neurological evaluation due to ongoing or anticipated neurological deterioration.
  - f. Patients post interventional neuroradiology procedure for minimum of 6 hours.
  - g. Patients requiring external ventricular drainage (EVD) and/or intracranial pressure (ICP) monitoring.
 Recommended Criteria for Admission to 10K:
  - a. S/p NSICU monitoring for at least 24 hours and not meeting above criteria.

### Physician

2. Complete appropriate physician order set:
  - a. NSG: NSICU Admission Orders.
  - b. Neurointerventional Radiology: Post Procedure Orders.
  - c. NSICU: Daily Care Orders on Rounds.

Admission orders must include CBC, CMP (complete metabolic set), PT/INR/PTT, lipid profile, urine toxicology, EKG, and CXR. Cardiac enzymes & transthoracic echocardiogram (TTE) are optional. Activity and diet orders, code status, GI and DVT prophylaxis must also be addressed.

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## Pharmacy and RN

3. Process physician orders according to OHSU policy.

## RN

4. Complete admission database and initiate nursing plan of care according to the appropriate OHSU Adult Inpatient Standards of Care:  
Adult Critical Care Standard of Care  
Adult Acute Care Inpatient Standard of Care

## Physician

5. Evaluate for loss of airway protection and need for intubation.

## Physician, RN, and RT

6. Maintain adequate oxygenation and ventilation. Avoid prophylactic or prolonged hyperventilation.

## Neurosurgeon

7. Consider ICP monitoring and/or EVD for patients based on poor neurological status: Glasgow Coma Scale (GCS) score <8 or neurological deterioration with hydrocephalus or any concern for ICP elevation. If EVD placed, ICP goal < 20 with cerebrospinal fluid (CSF) surveillance sampling q 72h by Neurosurgery (more frequent if clinically indicated).

Primary surgical intervention (at Attending Neurosurgeon's discretion) in:

- A) Cerebellar hemorrhage > 3 cm with 4th ventricle effacement and/or hydrocephalus with neurological deterioration.
- B) Lobar ICH (< 1 cm from surface) in younger patients (< 45) with GCS 9-12 or expanding lobar ICH associated with progressively worsening GCS.
- C) Select patient with Medically Refractory Intracranial Hypertension.
- D) Select patient for Early Hemispherectomy.

## Physician and RN

8. Keep Cerebral Perfusion Pressure (CPP) > 70 or Mean Arterial Pressure (MAP) > 70 in patients with no concern for elevated ICP. If concern for elevated ICP, prior to ICP monitor placement and estimation of CPP, consider MAP goal > 80. Consider continuous arterial pressure monitoring for continuous titration of blood pressure.
9. Measures to prevent increased ICP include: head of bed elevation > 30 degrees, avoiding excessive hip flexion, keeping head in midline position as much as possible, avoiding pressure on neck from endotracheal tube tape and suctioning only as needed and using short acting sedative or lidocaine prior to suctioning.
10. Measures to treat elevated ICP include controlled hyperventilation (Goal PaCO<sub>2</sub> 28-32; short term use only), osmotherapy with mannitol and/or hypertonic saline (central line for latter, 3% saline may be started using large bore PIV), analgesia and sedation, controlled external ventricular drainage, pharmacological coma, mild

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hypothermia (34-36 degrees centigrade) and, in refractory cases, hemicraniectomy and/or clot evacuation as indicated by patient condition. Routine prophylactic hyperosmolar therapy NOT recommended.

11. Isotonic fluids recommended for volume resuscitation with goals of maintaining euvolemic state.
12. Initiate vasopressors, if necessary, to achieve MAP and CPP goals. Continuous arterial pressure monitoring is recommended in patients requiring close titration of vasoactive medications including vasopressors and continuous IV infusions for BP titration. Central line or peripherally inserted central venous catheter (PICC) recommended if patient receiving a vasoactive medication and/or hypertonic saline.
13. Aggressively reverse coagulopathy with INR goal < 1.3 using Fresh Frozen Plasma (FFP). Vitamin K 10 mg q 12-24h times three doses (q 12 in large and expanding ICH), may be given as slow infusion as well. Administered IV upon admission, may be continued IV or transitioned to po.
14. Factor VIIa (20 mcg/kg) restricted only to exceptional cases with warfarin-associated ICH with either a) failure to respond to FFP with neurological deterioration with associated hematoma expansion; or b) ongoing neurological deterioration with delayed FFP availability; or c) elective use of factor VIIa with evidence of spot sign on CTA or evidence of hematoma expansion on two serial CT.
15. Platelet transfusions (2-6 units, higher end of range if surgery planned) in patients on anti-platelet therapy.
16. Platelet transfusions (6 units) and cryoprecipitate in patients with ICH related to prior use of tPA.
17. Protamine sulfate (dosing based on dose and time since administration of heparin) in heparin-induced ICH.
18. Consider seizure prophylaxis ONLY in high risk patients (Lobar hemorrhages). Consider continuous EEG x 24h in comatose patients (GCS < 8) including patients with deep supratentorial hemorrhages. Keppra IV >> IV Fosphenytoin for prophylaxis. All patients presenting post seizure should be treated with anti-epileptic medications.
19. Diagnostic Testing: If patient is a) > 45 years of age, b) h/o HTN with c) SBP > 160 on admission and d) ICH in basal ganglia or thalamus, CT and CT angiogram of head upon admission (latter if no history of or evidence of renal failure). If any of aforementioned criteria not met, consider conventional angiogram. MRI recommended if suspicion of underlying mass based on history (age, history of primary cancer), radiological appearance (multiple bleeds: r/o amyloid angiopathy, mets), or if etiology unclear.

### Physician and RN

20. Recommended Guidelines for Treating Elevated BP
  - a. SBP goal < 160 in patients with no clinical suspicion of elevated ICP.
  - b. If clinical suspicion of elevated ICP exists, SBP goal < 180, with titration to SBP goal < 160 once ICP monitor placed and ICP better controlled.
  - c. If evidence of hematoma expansion on serial CT or positive spot sign on CTA or if underlying coagulopathy, suspected or known lesion (aneurysm, AVM) consider aggressive titration of SBP goal to < 140 if no concern for significant elevation in ICP.

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### Physician and RN

21. IV medications that may be considered for control of elevated BP
  - a. Labetalol, 5-20 mg IV bolus every 15 minutes or start at 2 mg/min continuous infusion (maximum 300 mg/day).
  - b. Nicardipine, 5-15 mg/hour IV continuous infusion.
  - c. Enalapril, 1.25 to 5 mg IV push every 6 hours.
  - d. Hydralazine, 5-20 mg IV push every 30 minutes

### Physician and RN

22. Monitor laboratory values as needed to monitor electrolytes, blood counts, coagulation status, and drug levels.
23. Maintain glucose levels with sliding scale insulin titrated to blood glucose 120-160 mg/dL. Use Insulin infusion if blood glucose > 180 mg/dL for two consecutive checks.
24. Goal of normonatremia unless otherwise indicated. (If elevated ICP, or cerebral edema with worsening mass effect causing neurological deterioration: Administer hypertonic saline as needed.)
25. Maintain normothermia. Treat fever by trying to identify source; tailor interventions to possible source(s); provide antibiotics, if indicated; and use of antipyretics. Attempt to achieve goals with acetaminophen, cooling blankets, ice packs etc; if failure to achieve goal of 36-37 degrees centigrade in 4h, transition to Arctic Sun and institute 'shivering protocol'. As part of 'normothermia protocol measures', pan culture q 48h.

### RN

26. Perform focused neurological assessments based on patient condition and physician orders, every 1-2 hour while in the ICU and every 2-4 hours in acute care.
27. Changes in patient condition to be reported to the physician in a timely manner.
28. Maintain VAP (Ventilator associated Pneumonia) precautions per protocol.
- RN and Rehabilitation Services      29. Keep head of bed > 30 degrees, if not contraindicated.
30. Bedrest for 24 hours from admission, then increase activity as tolerated, as ordered by the physician, to promote active exercise, strength training, and gait training.
31. Initiate interventions as needed to reduce risk of formation of contractures and minimize edema formation, using bracing/orthotic devices as needed.
32. Provide aphasia treatment, cognitive rehabilitation, communication devices, movement therapy, spasticity treatment, and functional adaptation for visual/perceptual deficits and neglect.

### RN, Rehabilitation Services, and Nutrition Services

33. Dysphagia screening to be completed and documented prior to anything by mouth using the Bedside Nurse Swallow Screen. Initiate Speech Language Therapist consult for formal swallow evaluation, as needed, and when patient able to participate. Place dobbhoff tube (DHT) within 24h of admission if patient unable to swallow to optimize nutrition needs.
34. Nutrition consult as needed to maximize nutritional support.
35. Initiate dietary interventions to lower LDL's, if greater than 100mg/dL.

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### Physician and RN

36. Initiate DVT prophylaxis upon admission with intermittent pneumatic compression (IPC) in all ICH patients. Initiate pharmacological prophylaxis with Lovenox 40 qd if at least 24 h of hematoma stability documented on serial CT scans in high risk (comatose or non-ambulatory) patients if ICH deemed to be of hypertensive etiology (Alternative: Heparin 5000 SQ q 8-12h). Hold pharmacological prophylaxis in all patients with EVD and for 24h after either removal of EVD or shunt placement and for at least 1 week post surgery for clot evacuation or hemicraniectomy in spontaneous hypertensive ICH. Surveillance venous duplex of affected limb/ limbs q 3 days in high risk patients (comatose or non-ambulatory and D-dimer elevated); q 7 days in all other ICH patients.
37. Initiate peptic ulcer prophylaxis (PUD) as appropriate.
38. Review FAST HUG in daily rounds.

### RN, Social Worker (MSW), Case Manager, and Physician

39. Provide social and psychological support for the patient and their significant others as needed.
40. Case management services to begin upon admission. providing ongoing utilization review. Works with multiple disciplines to determine patient's condition and needs/barriers for discharge. Coordinates discharge planning with patient and family (e.g., inpatient rehab, skilled nursing facility, home health, durable medical equipment).

### Multi-disciplinary team

41. Identify patient and family education needs and provide appropriate information and resources found in the stroke education packet. This should include: personal risk factors, warning signs for stroke, activation of EMS, need for follow-up after discharge, medications prescribed, tobacco cessation counseling if smoked anytime in past 12 months, nutrition, exercise, and blood pressure regulation.
42. Document education provided in the Patient Education section of the electronic medical record.

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### Related Forms and Procedures:

- Nursing Standard of Care: Adult Inpatient Critically Ill  
<http://ozone.ohsu.edu/healthsystem/nursing/policy/soc/details/104soc.pdf>  
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 NSICU Faculty Group (12/15/2009)  
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 Neurosciences Best Practices Committee,(01/22/2010)

