Pharmacy and Therapeutics Committee Approvals, August 2012

P&T Date: October 2, 2012

AGENDA ITEM	P&T COMMITTEE DECISION	COMMENTS
• **Acetaminophen for injection (Ofirmev®)**	Not added to formulary	***Indication:*** FDA approved for the management of fever, mild to moderate pain, and moderate to severe pain in conjunction with opioids ***Mechanism of Action:*** Not fully elucidated. Analgesia likely due to inhibition of prostaglandin production, the nitric oxide pathway, and modulation of various receptors and pathways. Antipyresis likely due to inhibition of production and release of prostaglandin ***Adverse effects:*** Most common adverse events reported in adults: nausea, vomiting, headache, and insomnia. Most common adverse events reported in pediatrics: constipation, pruritis, agitation, atelectasis, nausea, and vomiting. Hepatotoxicity has been associated with doses higher than recommended. ***Contraindications:*** known hypersensitivity to the drug, severe hepatic impairment or severe active liver disease ***Precautions:*** • Dose on mg/kg basis for patients weighing <50kg • Use judiciously in hepatic impairment (may require reduction of total daily dose), active liver disease, Clcr $\leq$ 30 ml/min (may require increasing dosing interval and decreasing total daily dose), severe hypovolemia, chronic malnutrition, or alcoholism • Pregnancy category: C; insufficient data to support use in nursing mothers, however compatible with breastfeeding according to the AAP • High doses (4000 mg/day) has been shown to affect the INR of stabilized warfarin patients
• **Guanfacine (Tenex®)**	Added to formulary	***Indication:*** FDA approved for the management of hypertension ***Mechanism of Action:*** Selective centrally-acting alpha-2a adrenergic agonist, resulting in reduced sympathetic outflow and decrease in vasomotor tone and heart rate ***Adverse effects:*** The most common adverse events reported include dry mouth, sedation, weakness, dizziness, constipation, impotence, and headache ***Precautions:*** • Use with caution in patients with severe coronary insufficiency, recent myocardial infarction, cerebrovascular disease, or chronic renal or hepatic failure • Dose-related sedation or drowsiness, especially during initiation period. Patients should be advised to exercise caution when opating machinery or motor vehicles • Abrupt cessation of therapy may precipitate withdrawal symptoms (nervousness, anxiety, increases in blood pressure) • Pregnancy category B • Potential for increased sedation when given with other CNS-depressing medications; may enhance hypotensive effects of other antihypertensives; concurrent therapy with CYP3A4 inhibitors/inducers may affect serum concentration of guanfacine
DROPERIDOL INJ (INAPSINE)	• Added to formulary; MD to document acknowledgment of potential for QT interval prolongation Automatic substitution as follows: **Medication ordered**: Droperidol dose >0.625 mg IVP Q6H **Automatic substitution**: Non-monitored bed: 0.625 mg IVP Q6H PRN nausea/vomiting; max 2.5 mg/day Monitored bed:	

	0.625 mg IVP Q6H PRN nausea/vomiting; MR x 1 dose; max 5 mg/day
AUTOMATIC SUBSTITUTIONS/ INTERCHANGEABILITY	**Medication ordered** / **Automatic substitution** Dexlansoprazole 30-60 mg, Lansoprazole 30mg, Rabeprazole 20 mg Omeprazole 10, 20, or 40 mg → Pantoprazole 40 mg, same route & frequency Pantoprazole 40 mg, same route & frequency • Generic betamethasone injection is interchangeable with Celestone®
OTHER APPROVALS	• **Guidelines for Management of Brain Hemorrhage – Revision**  ICH reversal guideline.pdf • **Dietary supplements, herbal therapies, and alternative medications** Medical Center policy states that dietary supplements and alternative medications, including nutriceuticals, complimentary medications, and herbal therapies, are not to be used during the acute hospitalization period due to concerns about safety and product integrity o Pharmacist will automatically discontinue nutriceuticals, complimentary medications, and herbal therapies except for those medications that have been approved based on evidence – e.g. fish oil, lactobacillus probiotics o Pharmacist will add the following comment to the prior to admission medication list: "Due to the risk of adverse events during hospitalizations, use of nutriceuticals, complimentary medications, and herbal therapies are not approved for administration during the admission"
ANTICOAGULATION DOSING PROTOCOL UPDATES	• **Pharmacist to determine alternative dosing/therapy/monitoring in conjunction with the prescriber and document as such in the Progress Note for the following special circumstances:** o Baseline aPTT >40 sec (monitoring challenge, recommend LMWH); PT/INR >15/1.5 at baseline, platelets < 30,000 µL) o Suspected DIC o History of HIT/HITTS within the previous 100 days; >100 days, request physician to order PF4 and if negative, heparin can be used. If physician wants to use heparin or LMWH within 100 days of diagnosed HIT (SRA+) without doing a PF4 assay • **LMWH dosing protocol** Therapeutic LMWH levels updated and added to lab reference range in CS-LINK: once daily dosing: 1-2 units/ml; twice daily dosing 0.6-1 units/ml
ANTIBIOTIC USE REVIEW & STEWARDSHIP COMMITTEE	• **Decavac® (Tetanus and diphtheria toxoid adsorbed (Td) - no longer available); replaced by to Tenivac® (Td)** • **High dose Fluzone®** In its recommendations for the 2012-2013 influenza season, the ACIP does not recommend any trivalent influenza vaccine formulation over another; there is no data conclusively demonstrating greater protection against influenza disease following High Dose Fluzone® vaccination • **Antibiotic selection for surgical prophylaxis in adult patients – SCIP procedures chart approved for posting in ORs**  Surgical prophylaxis_SCIP pro • **Liposomal amphotericin (AmBisome®) will replace Amphotericin lipid complex (Abelcet®) as the preferred lipid amphotericin product**
CS-LINK	• **Duplicate medication alerts** Will only appear if ALL the following criteria are met: same chemical component, same route, same frequency type (PRN vs. scheduled), same effective period (start and end time), and same admission/encounter
DRUG SHORTAGES	• **Current shortages**  Drug shortages update 0912.pdf

Requests for full monographs or questions regarding this listing may be addressed to the Drug Information Center at **(310) 423-3784**

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Guidelines for Management of Brain Hemorrhage

The Following Guidelines Apply to Intracerebral Hemorrhage (ICH) and Intraventricular Hemorrhage (IVH)

(Updated 2 23 12)

These guidelines should be used only as medical and educational reference tools. They are not intended to be used as a diagnostic decision-making system and must not be used to replace or overrule a physician's judgment or diagnosis. Application of this information in a particular situation remains the professional responsibility of the practitioner

For the purpose of these guidelines spontaneous hemorrhage includes primary intracerebral (ICH) and intraventricular (IVH), as well as thrombolytic, anti-platelet or anti-coagulant induced hemorrhage.

For patients with ICH, the differential diagnosis includes but is not limited to: coagulopathy, trauma, vascular lesions, venous thrombosis, aneurysmal rupture, underlying malignancy, and vasculitis.

The following steps should be considered in parallel rather than in sequence, especially in the stabilization of vital functions and correction of coagulopathy.

A. Identification of patients with suspected intracranial hemorrhage requires urgent brain imaging. Unenhanced CT is the study of choice given its availability, ease of use and sensitivity to acute intracranial hemorrhage, but MR and CT angiogram imaging may contribute to the evaluation and management of suspected brain hemorrhage.
B. ABCs: Determine if intubation is required for patient safety during imaging evaluation. If so, consider use of an ultra-short acting neuromuscular blockade or sedative-hypnotics agent to allow for rapid return of motor control and assessment of neurologic deficits. Establish if co-morbid acute myocardial injury is a risk in patients with severely elevated BP.
C. Emergent Labs: STAT PT/INR, PTT, CBC, D-dimer, fibrinogen, electrolytes, BUN/Cr, glucose, liver function tests, blood type and screen to blood bank (Phone: 310-423-5411).
    1. Obtain consent from patient or family member if possible for all blood products (including factors)
D. Neurosurgery consult: Cerebellar ICH is a neurosurgical emergency. Hematoma evacuation can be considered for patients with lobar ICH who demonstrate progressive deterioration. Patients may also be considered candidates for intracranial pressure monitoring or emergent Ventricular drain placement.
E. Trauma consult if patient has ICH secondary to trauma
F. Further imaging: additional imaging may be needed if a diagnosis other than spontaneous ICH is suspected (see above)
G. Measure ICH volume using ABC/2 method, where A is the greatest hemorrhage diameter by CT, B is the diameter 90 degrees to A and C is the approximate number of CT slices with hemorrhage multiplied by slice thickness in cm.

Agent	Reversal agent	Reversal guideline
Warfarin (Coumadin®) or elevated PT in the absence of warfarin	Factor IX Complex (Profilnine®)[1-6]	• Factor XI should be considered as a first line agent for ICH • Obtain baseline coagulation profile and blood type & screen • Consent is required as Factor IX is considered a blood product • Thombotic risk should be discussed with the patient's family • Administer 2000 units (2 vials) of Factor IX Complex (Profilnine®) immediately (1 vial = 1000 units) o Administer 3000 units (3 vials) of Factor IX Complex if patient weight > 90 kg o **NOTE: SOME VIALS VARY IN THE NUMBER OF UNITS PER VIAL SO USE AS MANY VIALS AS WILL APPROXIMATE THE TOTAL DOSE ORDERED** o Do not exceed administration rate of 10 ml/minute. • Alert Blood Bank that Factor IX Complex is being utilized (Phone: 310-423-5411) • Recheck PT 10 minutes after infusion of Factor IX Complex to verify effect. o This must be a new blood draw o Repeat Factor IX Complex at 2000 units (2 vials) if repeat INR ≥ 3 o Repeat Factor IX Complex at 1000 units (1 vial) if repeat INR <3 for a desired INR goal of 1.3-1.4 • **Warning:** Be aware that rapid reversal of anticoagulation could lead to thrombosis or DIC, confounding the initial reason that the patient was on Coumadin. This concern is increased in patients with liver failure.
	Vitamin K and FFP[1-6]	Order 2 to 4 units FFP (and begin thawing) • 10-20 mL/kg over 90 minutes (Each unit of FFP contains ~ 200 mL) o Administration of FFP @ 10 mL/kg is rarely associated with a risk of volume overload and congestive heart failure, but higher doses may lead to volume overload. Administer Vitamin K (10mg IV) and give with FFP, for prolonged correction of anticoagulation • When administered intravenously, the rate should not exceed 1mg/minute. o http://web/clinical/clinical-departments/pharmacy/clinical-library/documents/iv-guidelines/phytonadione_aqua-mephyton_vitamin-k$p-220.pdf o Intravenous vitamin K is associated with a small risk of severe allergic reaction.
	Platelet transfusion and DDAVP	• Consider platelet transfusion or DDAVP or platelet function assay (PFA-100) for those patients on concomitant antiplatelet therapy (see below)
	Follow up therapy	• STAT PT/INR q 4 hrs x 24; then q 6 hrs x 36; then as needed. • If the INR is > 1.3 at 4 hours after FFP administration, administer second dose of Vitamin K 10 mg IV and infuse a second dose of FFP (10 ml/kg over 90 minutes) • If the INR is > 1.3 at 8 hours, evaluate the patient for disseminated intravascular coagulation (repeat D-dimer, fibrinogen) or liver failure. • Vitamin K 10mg SQ daily for 3 days

Oral Anti-platelet agents	Reversal agent	Reversal Guideline
• Aspirin • Aspirin/dipyridamole (Aggrenox®)	Platelet transfusions[7]	• There is no specific antidote for these agents, thus efficacy of the agents below remains uncertain • Platelet transfusion is the optimal approach for reversal, however the optimal # of platelets to be transfused in uncertain • Consider ordering platelet function assay (PFA-100)
• Clopidogrel (Plavix®) • Ticlopidine (Ticlid®)	Platelet transfusions and DDAVP[7-10]	• There is no specific antidote for this agent, thus efficacy of the agents below remains uncertain • Platelet transfusion is the optimal approach for reversal, however the optimal # of platelets to be transfused in uncertain o In a study of 11 healthy subjects, patients loaded (300-600 mg) with clopidogrel, followed by ASA 325 mg and clopidogrel 75 mg daily X 2 days 10-12.5 platelet concentrate units were needed for complete reversal of platelet function[8] • Consider ordering platelet function assay (PFA-100) • Consider administering DDAVP (0.3 microgram per kg[9-10]) over 30 minutes and 1 platelet pheresis concentrate (equivalent to 6-10 individual platelet packs) o An additional dose of DDAVP or an additional platelet transfusion may be required o Caution: Serial doses are associated with tachyphylaxis, hyponatremia and seizures[24] o IV guideline: http://web/clinical/clinical-departments/pharmacy/clinical-library/documents/iv-guidelines/desmopressin_ddavp$d-110.pdf • Clopidogrel is ***not*** removed by dialysis[7]
IIb/IIIa inhibitors		
• Abciximab (Reopro®)	Platelet transfusions[7,11-13]	• There is no specific antidote for this agent, thus efficacy of the agents below remains uncertain • Abciximab (Reopro®) o Platelet transfusion is the optimal approach for reversal, however the optimal # of platelets to be transfused in uncertain[7,11-13] ▪ In 1 clinical trial of 12 patients undergoing emergency CABG, average transfusion requirements were as follows: RBC (3.6 units), apheresis platelets (1.4 units), FFP (1.5 units) [12] o Without treatment platelet function generally returns to ~50% of baseline w/in 48 hours of discontinuation o Abciximab is ***not*** removed by dialysis
• Eptifibatide (Integrellin®) • Tirofiban (Aggrastat®)	Platelet and FFP/ cryoprecipitate transfusions[7, 14-15]	• There is no specific antidote for this agent, thus efficacy of the agents below remains uncertain • Eptifibatide (Integrellin®) and Tirofiban (Aggrastat®) o Platelet transfusions alone may not be adequate, FFP/cryoprecipitate may be needed[15] o ***The studies below suggests that up to 8 units FFP and 2 units of single-donor platelets may be required:*** ▪ In 24 healthy volunteers: platelet aggregation was inhibited by 40-50%, but reversal was achieved with fibrinogen in a concentration-dependent manner. ▪ In vitro experiments: recovery of platelet aggregation to ≥ 50% was achieved after the addition of fibrinogen (0.76-0.80 g/L), platelets (2.4×10^{11}/L), or their combination. Inverse relationship bet. baseline fibrinogen and amount of supplemental fibrinogen to restore platelet aggregability ($r = -0.60$; $P < .01$). o Without treatment platelet function generally returns to normal within 4-8 hours o Eptifibatide/tirofiban are removed by dialysis

Heparin, Low molecular weight heparin, Direct Xa inhibitor	Reversal agent	Reversal guideline

• Unfractionated Heparin (UFH)	Protamine[16,20]	• 1mg protamine neutralizes 100 units UFH (based on the dose given over last 4 hours) [16,20]
		  o Undiluted solution given IV push slowly
		  ▪ Not exceed (NTE) 5 mg / minute (bradycardia and hypotensive risk)
		  o IV guideline: http://web/clinical/clinical-departments/pharmacy/clinical-library/documents/iv-guidelines/protamine$p-300.pdf
		• Follow up PTT monitoring:
		  o STAT PTT q1 hour for the next 4 hours
		  o Then Q4H X 12 hours
		  o Then Q24H X 3 days

• Dalteparin (Fragmin®)
• Tinzaparin (Innohep®)
	Protamine[16-17]	• 1 mg protamine to neutralize 100 anti-Xa units dalteparin
		  o Undiluted solution given IV push slowly over 1-3 minutes NTE 5 mg / minute
		• May repeat in 2-4 hours after checking aPTT
		  o 0.5 mg/100 anti-Xa units if aPTT continues to be prolonged
		• **Caution:** Even with higher doses of protamine the aPTT may remain more prolonged vs heparin. In all cases, the anti-Factor Xa activity is never completely neutralized (maximum 60%)
		• Dalteparin/tinzaparin are ***not*** removed by dialysis[7]

• Enoxaparin (Lovenox®)	Protamine[16, 18]	• If given < 8 hours after last dose: 1 mg protamine to neutralize 1 mg enoxaparin • If given > 8 hours after last dose or if readministration is necessary: 0.5 mg protamine to neutralize 1 mg enoxaparin o Undiluted solution given IV push slowly over 1-3 minutes NTE 5 mg / minute • **Caution:** Even with higher doses of protamine the aPTT may remain more prolonged vs heparin. In all cases, the anti-Factor Xa activity is never completely neutralized (maximum 60%) • Enoxaparin is ***not*** removed by dialysis[7]
• Fondaparinux (Arixtra®)	Factor VIIa[19-21]	• There is no specific antidote for this agent, thus efficacy of the agents below remains uncertain • Factor VIIa has only been studied in healthy patients[20-21] and case reports o 90 mcg/kg has been utilized • Fondaparinux is removed by dialysis and may increase clearance by ~20%[19]

Direct Thrombin Inhibitors		

• Argatroban®
• Lepirudin (Refludan®)
• Bivalirudin (Angiomax®)
	DDAVP
	Cryoprecipitate
	FFP
	Aminocaproic acid (Amicar®) or Tranexamic acid (Cykolkapron®)[23-27]
		• There is <u>no specific antidote</u> for these agents, thus efficacy of the agents below remains uncertain
		• DDAVP: 0.3 mcg/kg IV, may repeat if necessary in 8-12 hours[23-26]
		  o Caution: Serial doses are associated with tachyphylaxis, hyponatremia and seizures
		• The optimal amounts of cryo and FFP to be transfused remains uncertain
		  o Cryoprecipitate: ≥ 10 units[23]
		  o FFP: 2 units (limited efficacy)[23]
		• Antifibinolytic therapy (Caution in patients being treated for HIT: increased risk for thrombosis):
		  o Aminocaproic acid (Amicar®)[23]:
		  ▪ Bolus: 0.1-0.15 gm/kg IV over 30 minutes
		  ▪ Continuous infusion: 0.5-1 gm/h until bleeding ceases
		  o Tranexamic acid (Cyklokapron®)[23]:
		  ▪ 10 mg/kg Q6H-Q8H until bleeding subsides
		• Dialysis, hemofiltration, plasmapheresis
		  o Lepirudin is optimally removed by the use of high-flux dialyzers with polysulfone membranes [26-30]
		  ▪ Hemofiltration and plasmapheresis also appear to be effective[27]
		  o Bivalirudin is removed by hemofiltration (in vitro[32], 1 case report[31]) (~65% removed) or plasmapheresis filter (~69% removed)
		  ▪ Hemofilteration may be preferred b/c it does not remove coagulation factors
		  o Argatroban® is ***not*** removed by dialysis[34-35]

Thrombolytics		

• tPA (Alteplase/Activase®)
• Reteplase (Retavase®)
• Streptokinase (Streptase®)
• Tenecteplase (TNKase®)
• Urokinase (Kinlytic®)
	Platelet transfusion
	Cryoprecipitate
	FFP
		• There is <u>no specific antidote</u> for these agents, thus efficacy of the agents below remains uncertain
		• STAT head CT, if ICH suspected and consult Neurosurgery for ICH
		• Check CBC, PT, PTT, platelets, fibrinogen and D-dimer. Repeat q 2 h until bleeding is controlled
		• Institute frequent neurochecks and therapy of acutely elevated ICP, as needed
		• If patient received concomitant heparin (see protamine reversal above)
		• The optimal amounts of platelets, cryo and FFP to be transfused remains uncertain[7,23]:
		  o Cryoprecipitate 10-20 units
		  ▪ If fibrinogen level < 200 mg/dL at 1 hr, repeat cryoprecipitate dose.
		  o Platelet transfusion: 10 Units
		  ▪ Especially useful if patient is thrombocytopenic[23]
		  ▪ Repletes factor V, which may be depleted[23]
		  o FFP: 2 units, every 6 hours for 24 hours after dose
		  ▪ Repletes factor V, which may be depleted[23]
		• Thrombolytic removal by dialysis has not been studied[7]

Platelet disorders		
Thrombocytopenia (platelet count < 100,000/uL)	Platelet transfusion	• Transfuse with platelets until platelet count exceeds 100,000/uL.

Von Willebrand syndrome	Von Willebrand Factor DDAVP	▪ Recommendations from the NHBLI/NIH Management of Von Willebrand disease management of major bleeding episodes[37] (1) Order a loading dosing: 40-60 VWF:RCo international units/dL /kg X 1 (2) Phone consult with a staff member of hematology or transfusion medicine for further doses of VWF factor concentrate • Usual maintenance dose: 20-40 units/kg Q8H to Q24H • Monitoring: VWF:RCo and Factor VIII trough and peak at least daily o Therapeutic goal: ▪ Initial goal: VWF:RCo and factor VIII > 100 international units/dL ▪ Trough VWF:RCo and factor VIII > 50 international units/dL for 7-10 days o Safety: Do not exceed VWF:RCo 200 international units/dL or factor VIII > 250-300 international units/dL ▪ May alternate with DDAVP for the later part of treatment • DDAVP 0.3 mcg/kg DDAVP given IV over 30 minutes
Uremic platelet dysfunction Congenital platelet function disorders	DDAVP	▪ DDAVP 0.3 mcg/kg DDAVP given IV over 30 minutes

H. Patients with anticoagulant-related ICH are at high risk for prolonged bleeding and hematoma expansion. Non-contrast cranial CT scan should therefore be repeated every 12 ± 2 hours from time of initial CT scan until ICH volume is stable on ≥ 2 consecutive CT scans. In addition, CT scanning should be repeated when neurologic deterioration occurs.

I. Blood pressure

A. Blood pressure should be managed according to AHA 2010 ICH Guidelines[36]. All patients who require treatment with continuous intravenous antihypertensive therapy in the emergency department should undergo urgent placement of an intra-arterial catheter for blood pressure monitoring and central venous catheter for central venous pressure monitoring as well as administration of IV antihypertensive medications. Once a physician determines that a patient requires treatment with IV antihypertensive therapy, he/she must designate an individual who will remain at the bedside and monitor effectiveness of therapy until blood pressure is controlled.

1. Hypertension[36]

Agent	IV bolus dose	Continuous infusion rate
Labetalol	5 to 20 mg every 15 min	2 mg/min (maximum 300 mg/d)
Esmolol	250 mcg/kg IVP loading dose	25 to 300 mcg/kg/min
Enalapril	1.25 to 5 mg IVP every 6 h (first test dose should be 0.625 mg)	N/A
Hydralazine	5 to 10 mg IVP every 30 min	1.5 to 5 mcg/kg/min
Nipride	N/A	0.1 to 10 mcg/kg/min
Nitroglycerin	N/A	20 to 400 mcg/min
Nicardipine*	N/A	5 to 15 mg/h

***Nicardipine is restricted at CSMC for ICH hypertensive management and stroke patients being considered for tPA**

1. The following suggested algorithm is adapted from the AHA 2010 Guidelines for ICH[36]:
   - If SBP is >200 mm Hg or MAP is >150 mm Hg, then consider aggressive reduction of blood pressure with continuous intravenous infusion, with frequent blood pressure monitoring every 5 minutes.
   - If SBP is >180 mm Hg or MAP is >130 mm Hg and there is evidence of or suspicion of elevated ICP, then consider monitoring ICP and reducing blood pressure using intermittent or continuous intravenous medications to keep cerebral perfusion pressure >60 to 80 mm Hg.
   - If SBP is >180 mm Hg or MAP is >130 mm Hg and there is not evidence of or suspicion of elevated ICP, then consider a modest reduction of blood pressure (eg, MAP of 110 mm Hg or target blood pressure of 160/90 mm Hg) using intermittent or continuous intravenous medications to control blood pressure, and clinically reexamine the patient every 15 minutes.
   - Exceptions to the criteria above include the presence of end-organ damage, in which more stringent management is required (ex aortic dissection, renal failure, or AMI)
   - Any clinical deterioration in association with reduction of BP should prompt reconsideration of ongoing BP management strategy.
2. Hypotension
   - The etiology of hypotension must be established. Consider CVP monitoring.
     - Fluid resuscitation
     - Phenylephrine: 2-10 mcg/kg/min
     - Dopamine: 2-20 mcg/kg/min
     - Norepinephrine: 0.05-0.2 mcg/kg/min

B. Monitoring and management of patients for the first 24hrs should take place in a critical care setting due to the acuity of the condition, frequent needs for Blood pressure and ICP management, airway protection and frequent medical and Neurological deterioration
1. ICP treatment
   - 3% Hypertonic Saline:
     - http://web/clinical/clinical-departments/pharmacy/clinical-library/documents/iv-guidelines/sodium_chloride_3pct_hypertonic_for_icp$s-190.pdf

- Mannitol:
  - http://web/clinical/clinical-departments/pharmacy/clinical-library/documents/iv-guidelines/mannitol_injection_mannitol$m-120.pdf

C. Prophylactic Anti-epileptics are at the discretion of the treatment physician, but should be given to all patients with clinical seizures[36]

D. Early mobilization and rehabilitation is important once clinically stable patients

E. All patients with extensive IVH, Hydrocephalus and GCS < 8 should be considered for ICP monitoring and EVD placement, contingent on prognosis and family wishes. A gradual escalating approach to ICP management is recommended starting with HOB elevation and sedation progressing to Osmotic therapy (3% hypertonic saline or Mannitol), EVD drainage and hypothermia, sedation, induced coma and neuromuscular blockade. Goal CPP 50-70mm Hg.

F. Surgical Evacuation
   1. Collective decision regarding surgical evacuation of the hematoma and craniectomy should be mad by the treating Neurosurgeon, Neurologist, Neuro intensivist and intensive care physicians.
   2. Cerebrellar hemorrhage > 3cm with neurological deterioration or with brain stem compression and/or obstructive hydrocephalus should have surgical removal of the clot as soon as possible
   3. Patients with large ICH < 1cm below the cortical surface with deterioration in their neurological status may benefit from clot evacuation

G. Glycemic Control[36]:
   1. For glucose > 140 mg/dl institute insulin therapy either in the form of a sliding scale dose regimen or continuous IV drip.

H. Temperature[36]:
   1. Maintain temperature ≤ 38 degrees using PO/PR acetaminophen 650 mg q6h.
   2. In the setting of poor airway control or if temperature remains elevated despite acetaminophen, consider external cooling.

I. Repeat neuro-imaging: Non-contrast cranial CT scan should be repeated 12 ± 2 hours from time of initial CT scan, except in cases of anticoagulant-related ICH (see above). Further scans maybe needed as clinically indicated

J. All patients should receive DVT prophylaxis[36]:
   1. Initially with SCDs
   2. After documentation of cessation of bleeding, patients with hemiplegia can be started on heparin or dalteparin SQ 3-4 days after onset.

K. Long term risk factor modification:
   1. All patients should be counseled on risk factor modification regarding smoking, heavy alcohol use, cocaine and hypertension control.
   2. Long term treatment of hypertension should be a goal in all patients.

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CEDARS-SINAI MEDICAL CENTER

ANTIBIOTIC SELECTION FOR SURGICAL PROPHYLAXIS IN ADULT PATIENTS

(ABSENCE OF DOCUMENTED OR SUSPECTED INFECTION)

SCIP procedures

Procedure	Antibiotic(s) Pre-Operative (whenever possible, antibiotic infusion to be completed prior to incision)				Antibiotic(s) Post-Operative[1,2]			
	No β-Lactam Allergy Concern		*History of Severe β-Lactam Allergy*		*No β-Lactam Allergy Concern*		*History of Severe β-Lactam Allergy*	
	Patient Weight < 80 kg	*Patient Weight ≥ 80 kg*	*Patient Weight < 80 kg*	*Patient Weight ≥ 80 kg*	*Patient Weight < 80 kg*	*Patient Weight ≥ 80 kg* (1 or 2 gm IVP acceptable)	*Patient Weight < 80 kg*	*Patient Weight ≥ 80 kg*
CABG or Other Cardiac	Cefazolin 1gm IVP x 1	Cefazolin 2gm IVP x 1	Vancomycin 15 mg/kg IVPB x 1, rounded to nearest 250 mg[3]		Cefazolin 1gm IVP Q8H x 5	Cefazolin Q8H x 5	Vancomycin per pharmacy protocol	
Vascular	Cefazolin 1gm IVP x 1	Cefazolin 2gm IVP x 1	Vancomycin 15 mg/kg IVPB x 1, rounded to nearest 250 mg[3]		Cefazolin 1gm IVP Q8H x 2	Cefazolin Q8H x 2	Vancomycin per pharmacy protocol	
Hip and Knee Arthroplasty	Cefazolin 1gm IVP x 1	Cefazolin 2gm IVP x 1	Vancomycin 15 mg/kg IVPB x 1, rounded to nearest 250 mg[3]		Cefazolin 1gm IVP Q8H x 2	Cefazolin Q8H x 2	Vancomycin per pharmacy protocol	
Hysterectomy or Colon	Cefotetan 1gm IVP x 1	Cefotetan 2gm IVP x 1	Gentamicin[4] 1.5mg/kg IVPB x 1, pharmacy may adjust per protocol **PLUS** *either* Clindamycin 600mg IVPB x1 **OR** Metronidazole 500 mg IVPB x1	Gentamicin[4] 1.5mg/kg IVPB x1, pharmacy may adjust per protocol **PLUS** *either* Clindamycin 900mg IVPB x1 **OR** Metronidazole 500mg IVPB x1	Cefotetan 1gm IVP Q12H x 1	Cefotetan Q12H x1	Gentamicin[4] 1.5mg/kg IVPB Q8H x 2; pharmacy may adjust per protocol **PLUS** *either* Clindamycin 600mg IVPB Q8H x 2 **OR** Metronidazole 500 mg IVPB Q8H x2	Gentamicin[4] 1.5mg/kg IVPB Q8H x 2; pharmacy may adjust per protocol **PLUS** *either* Clindamycin 600 or 900mg IVPB Q8H x 2 **OR** Metronidazole 500 mg IVPB Q8H x 2

1. Timing of first post-operative dose should be based on the timing of the last antibiotic dose given (pre-operative/pre-incisional or intra-operative dose)
2. Dosing interval based on normal renal function
3. Dose based on total body weight
4. Infusion times: Vancomycin: 500 or 750 mg: over 60 minutes; 1000 or 1250 mg: over 90 minutes; 1500 mg: over 120 minutes; 2000 mg: over 180 minutes
   Clindamycin: 30 minutes Metronidazole: 60 minutes
5. Gentamicin dosing recommendations by patient weight (infuse dose over 30 minutes)
   - ☐ ≤ 40 kg (~ 90 lbs) = 60 mg
   - ☐ 41 - 50 kg (~ 91 - 110 lbs) = 80 mg
   - ☐ 51 - 60 kg (~ 111 - 130 lbs) = 90 mg
   - ☐ 61 - 70 kg (~ 131 - 150 lbs) = 110 mg
   - ☐ 71 - 80 kg (~ 151 - 176 lbs) = 120 mg
   - ☐ 81 - 90 kg (~ 177 - 198 lbs) = 140 mg
   - ☐ 91 - 100 kg (~ 199 - 220 lbs) = 150 mg
   - ☐ > 100 kg (> 220 lbs) - contact pharmacy; use adjusted body weight [AdjBW = IBW + 0.4(TBW-IBW)]

Cephalosporins			
Generations	Drug name	Half-life (normal renal fxn)	Redosing interval
1st Gen	Cefazolin (Ancef®)	90-120 min	3-4 hours
2nd Gen	Cefuroxime (Zinacef®, Kefurox®)	80 min	3-4 hours
	Cefotetan (Cefotan®)	180-276 min	6 hours
3rd Gen	Cefotaxime (Claforan®)	60 min	3-4 hours

References: 1. TJC; 2. Medical Letter; 3. Johns Hopkins; 4.Bratzler et al.; 5. Garey et al.

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Changes in Drug Supply (Updated September 2012)

Current Drug Shortages

- Acetylcysteine 10% inhal
- Sodium Bicarbonate 4.2% & 8.4% syr and vial
- Metoclopramide inj
- Torsemide inj
- Intermittent concentrations of morphine and HYDROmorphone inj
- Amikacin inj
- TPN components (macro- and micro-nutrients)

Change in Dosage Forms

- Naloxone vials available as syringes and MDV vials

Slowly Resolving Drug Shortage

- Etomidate inj
- Midazolam infusions

Resolved Drug Shortages

- Vitamin K injection