Stony Brook Medicine

Pharmacist Continuing Education

IV Anticoagulation Infusions

2012

Stony Brook University

Part 1

Adult Intravenous Heparin Protocol

Stony Brook University

Objectives

- Identify the 2 University Hospital Adult Weight-Based IV Heparin protocols in CPOE
- Discuss practitioner responsibilities in using the University Hospital Adult Weight-Based IV Heparin protocols
- Name the 3 heparin drug orders involved with each protocol
- Describe the heparin rate adjustment nomograms
- Identify patients that may be exhibiting signs of HIT

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Neuro/Cardio Order Form and Flow Sheet

STONY BROOK UNIVERSITY MEDICAL CENTER

IV HEPARIN ORDER SHEET FOR NEUROLOGY/CARDIOLOGY

SECTION 1: Initiation of Heparin Protocol **(Neuro/Cardio)**

To initiate the following orders:

1. Specify patient's weight
2. Calculate bolus
3. Calculate initial maintenance rate
4. Time, date and sign at bottom

☑ **BEGIN PROTOCOL**

PATIENT WEIGHT= kg

SECTION 2: Protocol Steps

☑ Draw baseline aPTT
☑ Draw baseline CBC
- Start a flowsheet

☑ **Calculate bolus of 60 units/kg using 1000 units/mL heparin** for heparin initiation and/or as indicated based on aPTT results (Must be calculated even if initial bolus is to be omitted)

Bolus dose* calculation:

60 units X _____kg = _____units
Maximum 5,000 units
(round to nearest 100 units)

☐ **Administer bolus**
☐ **Patient bolused previously;** do not rebolus unless indicated based on aPTT result
☐ **Omit initial bolus,** but bolus as necessary thereafter as indicated based on aPTT result

Maintenance Rate (choose one box below):

☑ Platelets Every 48 hours
☑ Draw aPTT 6 hours after start of infusion and then as indicated by adjustment nomogram below
☐ **Patient presently on heparin infustion. Draw STAT aPTT and continue heparin infusion 25,000 units/250 mL D5W at_____ units/hr. Proceed to adjustments/monitoring below**

☐ **Heparin 25,000 units in 250 mL D5W at** 12 units/kg/hr
Calculate: **12 units/kg X_____ kg =**

Infusion Rate
_____ units/hr
Do not exceed the maximum of 1000 units/hr as an initial rate
(round to the nearest 50 units)

aPTT (seconds)	Special Instructions	Infusion	Next aPTT
< 43	*** Rebolus as per Heparin Protocol Orders** (max 5000 units)	Increase rate by 100 units/hr	6 hrs
43-59	Rebolus with **half** the bolus calculated above (max 2500 units)	Increase rate by 50 units/hr	6 hrs
60-85		**No change**	Next AM
86-100		Decrease rate by 50 units/hr	6 hrs
101-130		Decrease rate by 100 units/hr	6 hrs
131-160	Hold infusion 1 hour and inform MD	Decrease rate by 150 units/hr	6 hrs
161-190	Hold infusion 1 hour and inform MD	Decrease rate by 200 units/hr	6 hrs
> 190	Hold infusion 1 1/2 hour and inform MD	Decrease rate by 200 units/hr	6 hrs

Physician/LIP/PA Signature: **ID#:** **Date:** **Time:**

Nurse Signature: **ID#:** **Date:** **Time:**

SCAN TO PHARMACY AND PLACE IN PATIENT CHART

CI2C084

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HEPARIN FOR NEURO-CARDIO INFUSION FLOWSHEET

Pt. Weight: kg	*Baseline aPTT: Date: _____ Time:_____*	*Baseline Platelets: Date: _____ Time:_____*

Adjustment Nomogram: *FOR USE WITH HEPARIN* **NEURO/CARDIO** *PROTOCOL ONLY*

aPTT (seconds)	Special Instructions	Infusion	Next aPTT
< 43	Rebolus as per Heparin Protocol Orders	Increase by 100 units/hr	6 hrs
43-59	Give 1/2 bolus as per Heparin Protocol Orders	Increase by 50 units/hr	6 hrs
60-85		**No change**	Next AM
86-100		Decrease by 50 units/hr	6 hrs
101-130		Decrease by 100 units/hr	6 hrs
131-160	Hold infusion 1 hr & inform MD	Decrease by 150 units/hr	6 hrs
161-190	Hold infusion 1 hr & inform MD	Decrease by 200 units/hr	6 hrs
>190	Hold infusion 1 1/2 hr & inform MD	Decrease by 200 units/hr	6 hrs

Please utilize a separate line for every entry

Date	Time	Bolus: **Units** *Do Not use "U"*	Rate: **(Units/hr)** *Do Not use "U"*	aPTT (sec)	Time next aPTT due	Platelets (thousands)	Initials

Initials	Signature/ID#	Initials	Signature/ID#	Initials	Signature/ID#

SIDE 1 OF 2

PH2C048 (05/10)

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The DVT/PE Order Form and Flow Sheet

PH2C044

STONY BROOK UNIVERSITY MEDICAL CENTER

IV HEPARIN ORDER SHEET FOR DVT/PE

SECTION 1: Initiation of Heparin Protocol (DVT/PE)

To initiate the following orders:
1. Specify patient's weight
2. Calculate bolus
3. Calculate initial maintenance rate
4. Time, date and sign at bottom

PATIENT WEIGHT= kg

☑ **BEGIN PROTOCOL** NOTE: DO NOT use protocol if aPTT is abnormal, patient is 24 hrs or less post-op, on concomitant administration on thrombolytic agents (specifically: streptokinase, urokinase, GPIIb/IIIa inhibitors)

SECTION 2: Protocol Steps

☑ Draw baseline aPTT
☑ Draw baseline CBC
- Start a flowsheet

☑ **Calculate bolus of 80 units/kg using 1000 units/mL heparin** for heparin initiation and/or as indicated based on aPTT results (Must be calculated even if initial bolus is to be omitted)

Bolus dose* calculation:
80 units X _____kg = _____units
Maximum 10,000 units
(round to nearest 100 units)

☐ **Administer bolus**
☐ **Patient bolused previously;** do not rebolus unless indicated based on aPTT result
☐ **Omit initial bolus,** but bolus as necessary thereafter as indicated based on aPTT result

Maintenance Rate (choose one box below):
☑ Draw aPTT 6 hours after start of infusion and then as indicated by adjustment nomogram below
☑ Platelets Every 48 hours

☐ **Patient presently on heparin infustion. Draw STAT aPTT and continue heparin infusion 25,000 units/250 mL D5W at_____ units/hr. Proceed to adjustments/monitoring below**

☐ **Heparin 25,000 units in 250 mL D5W at** 18 units/kg/hr ***(Standard dose)***
Calculate initial rate (max: 1800 units/hr): **18 units/kg X_____ kg =**

Infusion Rate
_____ units/hr
Do not exceed the maximum initial rate (round to the nearest 50 units)

☐ **Heparin 25,000 units in 250 mL D5W at** 15 units/kg/hr ***(High risk dose)***
Calculate initial rate (max: 1450 units/hr): **15 units/kg X_____ kg =**
High Risk reason: *____ over age 70, _____ known bleeding disorder, _____ abnormal aPTT, _____kidney disorder/dysfunction,_____ Other:_____*

aPTT (seconds)	Special Instructions	Infusion	Next aPTT
< 38	* Rebolus with full bolus as calculated above (max 10,000 units)	Increase rate by 100 units/hr	6 hrs
38-55	Rebolus with half the bolus calculated above (max 5,000 units)	Increase rate by 100 units/hr	6 hrs
56-64	No bolus	Increase rate by 50 units/hr	6 hrs
65-90	No bolus	No change	Next AM
91-100	No bolus	Decrease rate by 50 units/hr	6 hrs
101-120	No bolus	Decrease rate by 100 units/hr	6 hrs
121-180	Hold infusion 1 hour and inform MD	Decrease rate by 150 units/hr	4 hrs
181-240	Hold infusion 1 hour and inform MD	Decrease rate by 200 units/hr	4 hrs
>240	Hold infusion 1 1/2 hour and inform MD	Decrease rate by 200 units/hr	4 hrs

Physician/LIP/PA Signature: **ID#:** **Date:** **Time:**

Nurse Signature: **ID#:** **Date:** **Time:**

SCAN TO PHARMACY AND PLACE IN PATIENT CHART PH2C044

PH2C046

STONY BROOK UNIVERSITY MEDICAL CENTER

HEPARIN DVT/PE INFUSION FLOW SHEET

Pt. Weight: kg	*Baseline aPTT:* *Date:* _____ *Time:*_____	*Baseline Platelets:* *Date:* _____ *Time:*_____

Adjustment Nomogram: *FOR USE WITH HEPARIN* DVT/PE *PROTOCOL ONLY*

aPTT (seconds)	Special Instructions	Infusion	Next aPTT
< 38	Rebolus as per Heparin Protocol Orders	Increase by 100 units/hr	6 hrs
38-55	Give 1/2 bolus per Heparin Protocol Orders	Increase by 100 units/hr	6 hrs
56-64	0	Increase by 50 units/hr	6 hrs
65-90	0	**No change**	Next AM
91-100	0	Decrease by 50 units/hr	6 hrs
101-120	0	Decrease by 100 units/hr	6 hrs
121-180	Hold infusion 1 hr & inform MD	Decrease by 150 units/hr	4 hrs
181-240	Hold infusion 1 hr & inform MD	Decrease by 200 units/hr	4 hrs
> 240	Hold infusion 1 1/2 hr & inform MD	Decrease by 200 units/hr	4 hrs

Please utilize a separate line for every entry

Date	Time	Bolus: **Units** *Do Not use "U"*	Rate: **(Units/hr)** *Do Not use "U"*	aPTT (sec)	Time next aPTT due	Platelets (thousands)	Initials

Initials	Signature/ID#	Initials	Signature/ID#	Initials	Signature/ID#

SIDE 1 OF 2 PH2C046 (05/10)

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Our Institution Specific Nomogram for DVT/PE

aPTT (seconds)	Special Instructions	Infusion	Next aPTT
< 38	* **Rebolus with full bolus as calculated above** (max 10,000 units)	Increase rate by 100 units/hr	6 hrs
38-55	Rebolus with **half** the bolus calculated above (max 5,000 units)	Increase rate by 100 units/hr	6 hrs
56-64	No bolus	Increase rate by 50 units/hr	6 hrs
65-90	No bolus	**No change**	Next AM
91-100	No bolus	Decrease rate by 50 units/hr	6 hrs
101-120	No bolus	Decrease rate by 100 units/hr	6 hrs
121-180	Hold infusion 1 hour and inform MD	Decrease rate by 150 units/hr	4 hrs
181-240	Hold infusion 1 hour and inform MD	Decrease rate by 200 units/hr	4 hrs
>240	Hold infusion 1 1/2 hour and inform MD	Decrease rate by 200 units/hr	4 hrs

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Prescriber Responsibilities

- Choose proper protocol (arterial vs. venous)
- Screen for exclusions
- Assess patient for appropriateness of protocol use
- Assess patient as to normal or high risk status
- Identify the accurate patient weight in kilograms (actual body weight)

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Prescriber Responsibilities

- Choose proper protocol (arterial vs. venous)
- Screen for exclusions
- Assess patient for appropriateness of protocol use
- Assess patient as to normal or high risk status
- Identify the accurate patient weight in kilograms (actual body weight)

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Nurse Responsibilities

- Verify that proper protocol was chosen (arterial vs. venous)
- Obtain a baseline aPTT and CBC as ordered
- Verify calculations of bolus and maintenance rate
- Maintain flow sheet

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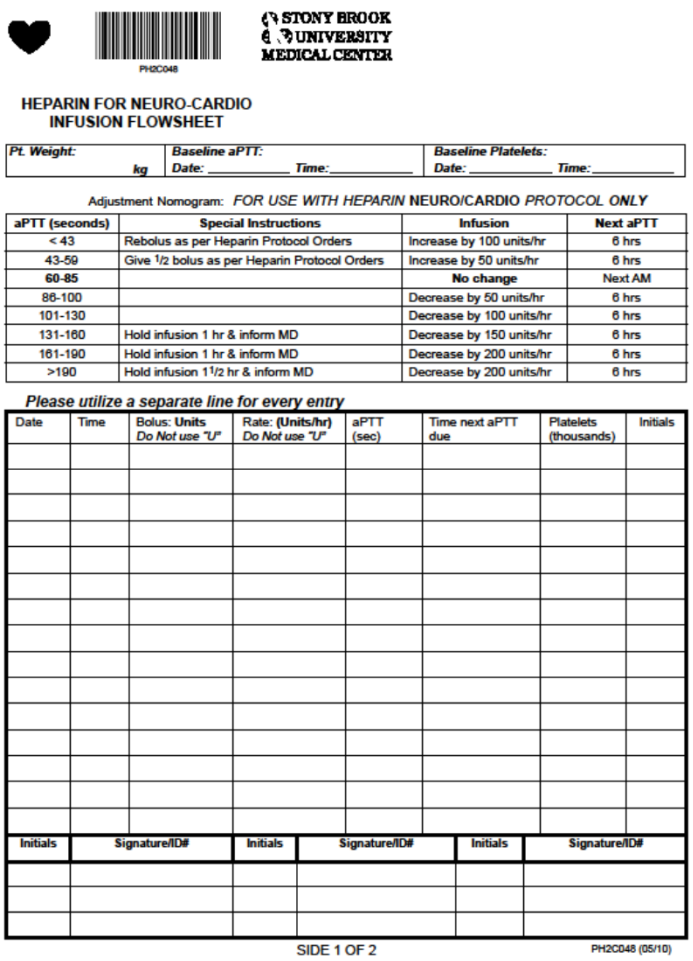
Using the FlowSheet



PH2C048

STONY BROOK UNIVERSITY MEDICAL CENTER

HEPARIN FOR NEURO-CARDIO INFUSION FLOWSHEET

Pt. Weight: kg	*Baseline aPTT:* *Date:* _____ *Time:* _____	*Baseline Platelets:* *Date:* _____ *Time:* _____

Adjustment Nomogram: *FOR USE WITH HEPARIN* **NEURO/CARDIO** *PROTOCOL ONLY*

aPTT (seconds)	Special Instructions	Infusion	Next aPTT
< 43	Rebolus as per Heparin Protocol Orders	Increase by 100 units/hr	6 hrs
43-59	Give 1/2 bolus as per Heparin Protocol Orders	Increase by 50 units/hr	6 hrs
60-85		**No change**	Next AM
86-100		Decrease by 50 units/hr	6 hrs
101-130		Decrease by 100 units/hr	6 hrs
131-160	Hold infusion 1 hr & inform MD	Decrease by 150 units/hr	6 hrs
161-190	Hold infusion 1 hr & inform MD	Decrease by 200 units/hr	6 hrs
>190	Hold infusion 1 1/2 hr & inform MD	Decrease by 200 units/hr	6 hrs

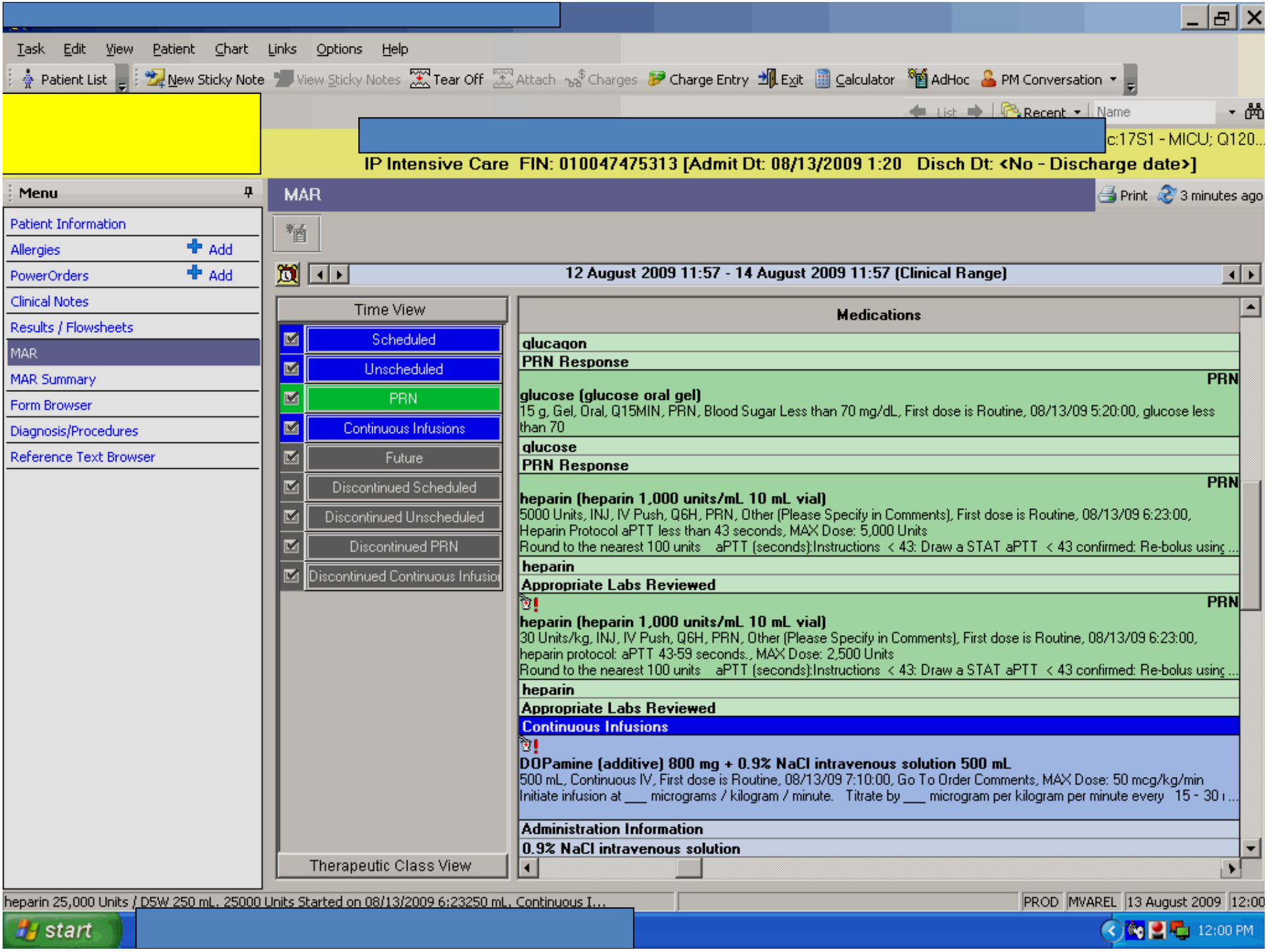
Please utilize a separate line for every entry

Date	Time	Bolus: **Units** *Do Not use "U"*	Rate: **(Units/hr)** *Do Not use "U"*	aPTT (sec)	Time next aPTT due	Platelets (thousands)	Initials

Initials	Signature/ID#	Initials	Signature/ID#	Initials	Signature/ID#

SIDE 1 OF 2

PH2C048 (05/10)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Patient List
New Sticky Note
View Sticky Notes
Tear Off
Attach
Charges
Charge Entry
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Calculator
AdHoc
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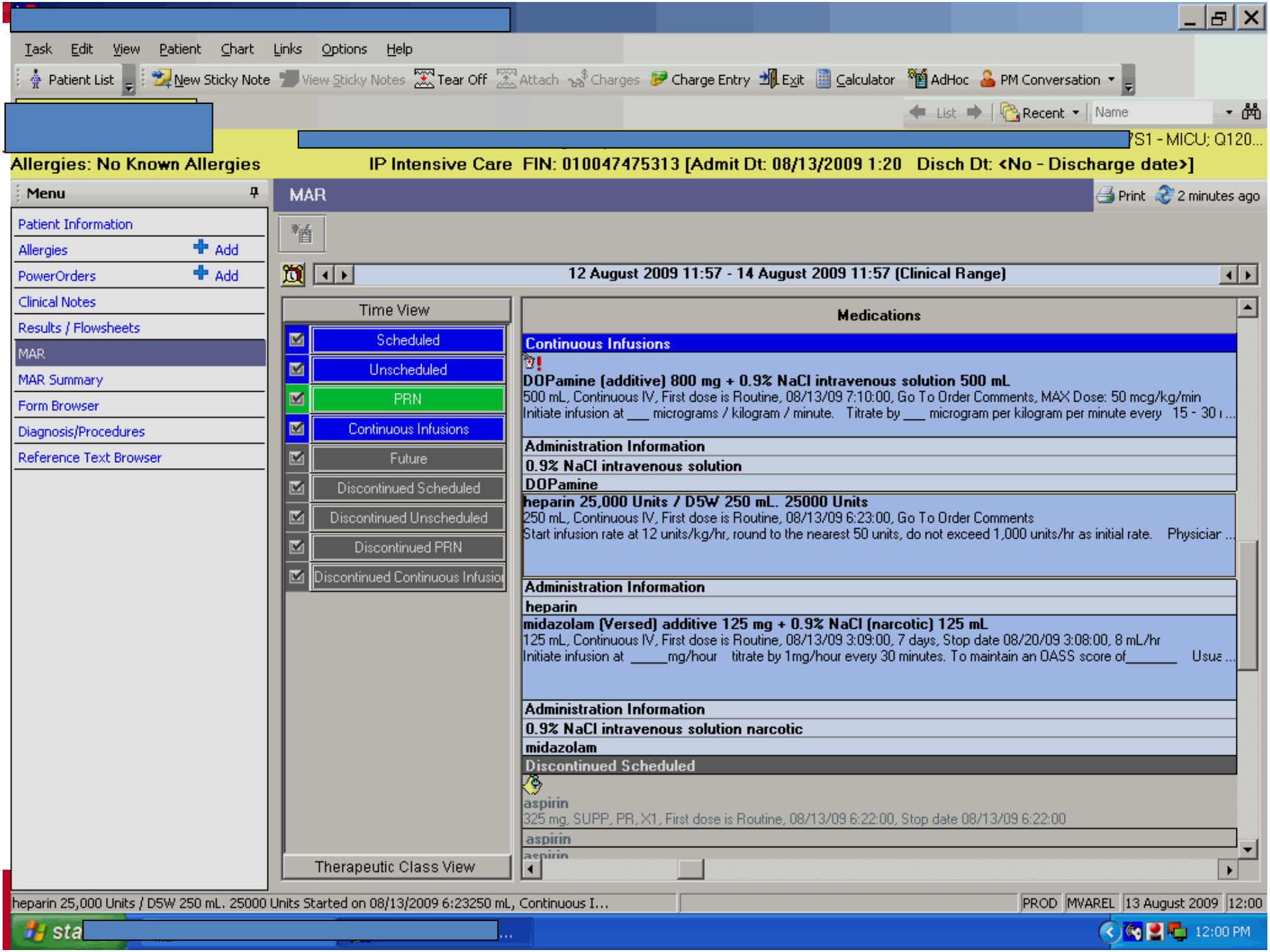
Recent
Name
c:17S1 - MICU; Q120...
IP Intensive Care FIN: 010047475313 [Admit Dt: 08/13/2009 1:20 Disch Dt: <No - Discharge date>]
Menu
Patient Information
Allergies
Add
PowerOrders
Add
Clinical Notes
Results / Flowsheets
MAR
MAR Summary
Form Browser
Diagnosis/Procedures
Reference Text Browser
MAR
Print
3 minutes ago
12 August 2009 11:57 - 14 August 2009 11:57 (Clinical Range)
Time View
Scheduled
Unscheduled
PRN
Continuous Infusions
Future
Discontinued Scheduled
Discontinued Unscheduled
Discontinued PRN
Discontinued Continuous Infusio
Therapeutic Class View
Medications
glucagon
PRN Response
PRN
glucose (glucose oral gel)
15 g, Gel, Oral, Q15MIN, PRN, Blood Sugar Less than 70 mg/dL, First dose is Routine, 08/13/09 5:20:00, glucose less than 70
glucose
PRN Response
PRN
heparin (heparin 1,000 units/mL 10 mL vial)
5000 Units, INJ, IV Push, Q6H, PRN, Other (Please Specify in Comments), First dose is Routine, 08/13/09 6:23:00,
Heparin Protocol aPTT less than 43 seconds, MAX Dose: 5,000 Units
Round to the nearest 100 units aPTT (seconds):Instructions < 43: Draw a STAT aPTT < 43 confirmed: Re-bolus using ...
heparin
Appropriate Labs Reviewed
PRN
heparin (heparin 1,000 units/mL 10 mL vial)
30 Units/kg, INJ, IV Push, Q6H, PRN, Other (Please Specify in Comments), First dose is Routine, 08/13/09 6:23:00,
heparin protocol: aPTT 43-59 seconds., MAX Dose: 2,500 Units
Round to the nearest 100 units aPTT (seconds):Instructions < 43: Draw a STAT aPTT < 43 confirmed: Re-bolus using ...
heparin
Appropriate Labs Reviewed
Continuous Infusions
DOPamine (additive) 800 mg + 0.9% NaCl intravenous solution 500 mL
500 mL, Continuous IV, First dose is Routine, 08/13/09 7:10:00, Go To Order Comments, MAX Dose: 50 mcg/kg/min
Initiate infusion at ___ micrograms / kilogram / minute. Titrate by ___ microgram per kilogram per minute every 15 - 30 ...
Administration Information
0.9% NaCl intravenous solution
heparin 25,000 Units / D5W 250 mL. 25000 Units Started on 08/13/2009 6:23250 mL, Continuous I...
PROD
MVAREL
13 August 2009
12:00
start
12:00 PM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Patient List New Sticky Note View Sticky Notes Tear Off Attach Charges Charge Entry Exit Calculator AdHoc PM Conversation
List Recent Name
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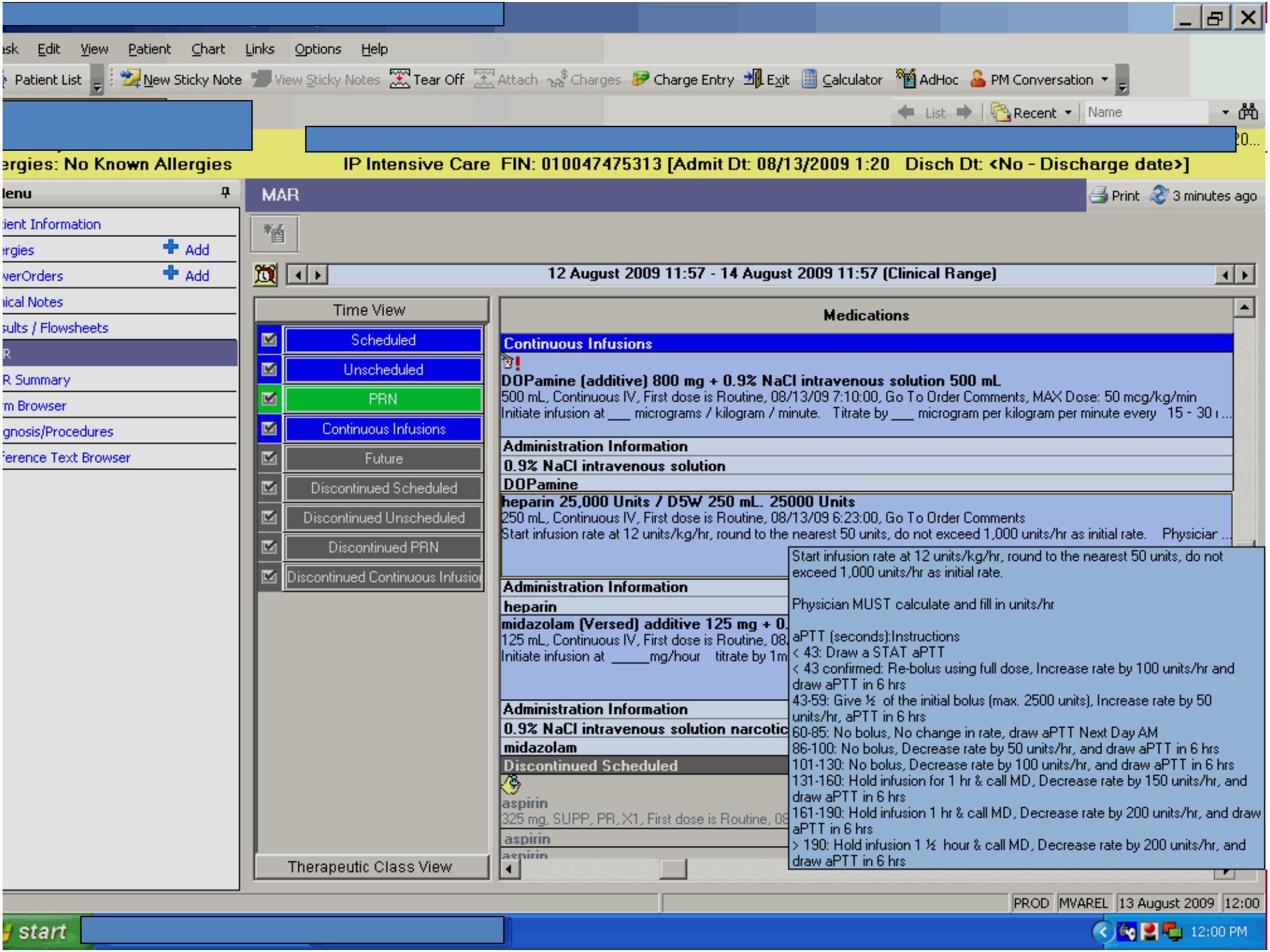
Allergies: No Known Allergies
IP Intensive Care FIN: 010047475313 [Admit Dt: 08/13/2009 1:20 Disch Dt: <No - Discharge date>]
Menu
Patient Information
Allergies Add
PowerOrders Add
Clinical Notes
Results / Flowsheets
MAR
MAR Summary
Form Browser
Diagnosis/Procedures
Reference Text Browser
MAR
Print 2 minutes ago
12 August 2009 11:57 - 14 August 2009 11:57 (Clinical Range)
Time View
Scheduled
Unscheduled
PRN
Continuous Infusions
Future
Discontinued Scheduled
Discontinued Unscheduled
Discontinued PRN
Discontinued Continuous Infusio
Therapeutic Class View
Medications
Continuous Infusions
DOPamine (additive) 800 mg + 0.9% NaCl intravenous solution 500 mL
500 mL, Continuous IV, First dose is Routine, 08/13/09 7:10:00, Go To Order Comments, MAX Dose: 50 mcg/kg/min
Initiate infusion at ___ micrograms / kilogram / minute. Titrate by ___ microgram per kilogram per minute every 15 - 30 ...
Administration Information
0.9% NaCl intravenous solution
DOPamine
heparin 25,000 Units / D5W 250 mL. 25000 Units
250 mL, Continuous IV, First dose is Routine, 08/13/09 6:23:00, Go To Order Comments
Start infusion rate at 12 units/kg/hr, round to the nearest 50 units, do not exceed 1,000 units/hr as initial rate. Physiciar ...
Administration Information
heparin
midazolam (Versed) additive 125 mg + 0.9% NaCl (narcotic) 125 mL
125 mL, Continuous IV, First dose is Routine, 08/13/09 3:09:00, 7 days, Stop date 08/20/09 3:08:00, 8 mL/hr
Initiate infusion at _____mg/hour titrate by 1mg/hour every 30 minutes. To maintain an OASS score of_____ Usua ...
Administration Information
0.9% NaCl intravenous solution narcotic
midazolam
Discontinued Scheduled
aspirin
325 mg, SUPP, PR, X1, First dose is Routine, 08/13/09 6:22:00, Stop date 08/13/09 6:22:00
aspirin
heparin 25,000 Units / D5W 250 mL. 25000 Units Started on 08/13/2009 6:23250 mL, Continuous I...
PROD MVAREL 13 August 2009 12:00
12:00 PM


Edit View Patient Chart Links Options Help
Patient List New Sticky Note View Sticky Notes Tear Off Attach Charges Charge Entry Exit Calculator AdHoc PM Conversation
List Recent Name
ergies: No Known Allergies
IP Intensive Care FIN: 010047475313 [Admit Dt: 08/13/2009 1:20 Disch Dt: <No - Discharge date>]
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Time View
Scheduled
Unscheduled
PRN
Continuous Infusions
Future
Discontinued Scheduled
Discontinued Unscheduled
Discontinued PRN
Discontinued Continuous Infusio
Therapeutic Class View
Medications
Continuous Infusions
DOPamine (additive) 800 mg + 0.9% NaCl intravenous solution 500 mL
500 mL, Continuous IV, First dose is Routine, 08/13/09 7:10:00, Go To Order Comments, MAX Dose: 50 mcg/kg/min
Initiate infusion at ___ micrograms / kilogram / minute. Titrate by ___ microgram per kilogram per minute every 15 - 30 ...
Administration Information
0.9% NaCl intravenous solution
DOPamine
heparin 25,000 Units / D5W 250 mL. 25000 Units
250 mL, Continuous IV, First dose is Routine, 08/13/09 6:23:00, Go To Order Comments
Start infusion rate at 12 units/kg/hr, round to the nearest 50 units, do not exceed 1,000 units/hr as initial rate. Physiciar ...
Start infusion rate at 12 units/kg/hr, round to the nearest 50 units, do not exceed 1,000 units/hr as initial rate.
Physician MUST calculate and fill in units/hr
aPTT (seconds):Instructions
< 43: Draw a STAT aPTT
< 43 confirmed: Re-bolus using full dose, Increase rate by 100 units/hr and draw aPTT in 6 hrs
43-59: Give ½ of the initial bolus (max. 2500 units), Increase rate by 50 units/hr, aPTT in 6 hrs
60-85: No bolus, No change in rate, draw aPTT Next Day AM
86-100: No bolus, Decrease rate by 50 units/hr, and draw aPTT in 6 hrs
101-130: No bolus, Decrease rate by 100 units/hr, and draw aPTT in 6 hrs
131-160: Hold infusion for 1 hr & call MD, Decrease rate by 150 units/hr, and draw aPTT in 6 hrs
161-190: Hold infusion 1 hr & call MD, Decrease rate by 200 units/hr, and draw aPTT in 6 hrs
> 190: Hold infusion 1 ½ hour & call MD, Decrease rate by 200 units/hr, and draw aPTT in 6 hrs
Administration Information
heparin
midazolam (Versed) additive 125 mg + 0.
125 mL, Continuous IV, First dose is Routine, 08
Initiate infusion at _____mg/hour titrate by 1m
Administration Information
0.9% NaCl intravenous solution narcotic
midazolam
Discontinued Scheduled
aspirin
325 mg, SUPP, PR, X1, First dose is Routine, 08
aspirin
PROD MWAREL 13 August 2009 12:00
start
12:00 PM

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FAQ: Regarding Maximum Dosages

- Can the minimum rate of the infusion be exceeded once the protocol is in progress?

  Yes. The maximum rates only apply to initialization. The infusion rate can be increased as necessary as per the aPTT result.

The bolus maximums, however, should not be exceeded however.

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HIT

- Results from an allergy to heparin
- Antibodies are formed and attack heparin which has a receptor site on platelets
- First sign is decrease in platelets to 50% of baseline
- Usually occurs after 1 or 2 weeks of heparin therapy
- Can result in thrombosis
- Potential loss of limbs
- Potentially fatal

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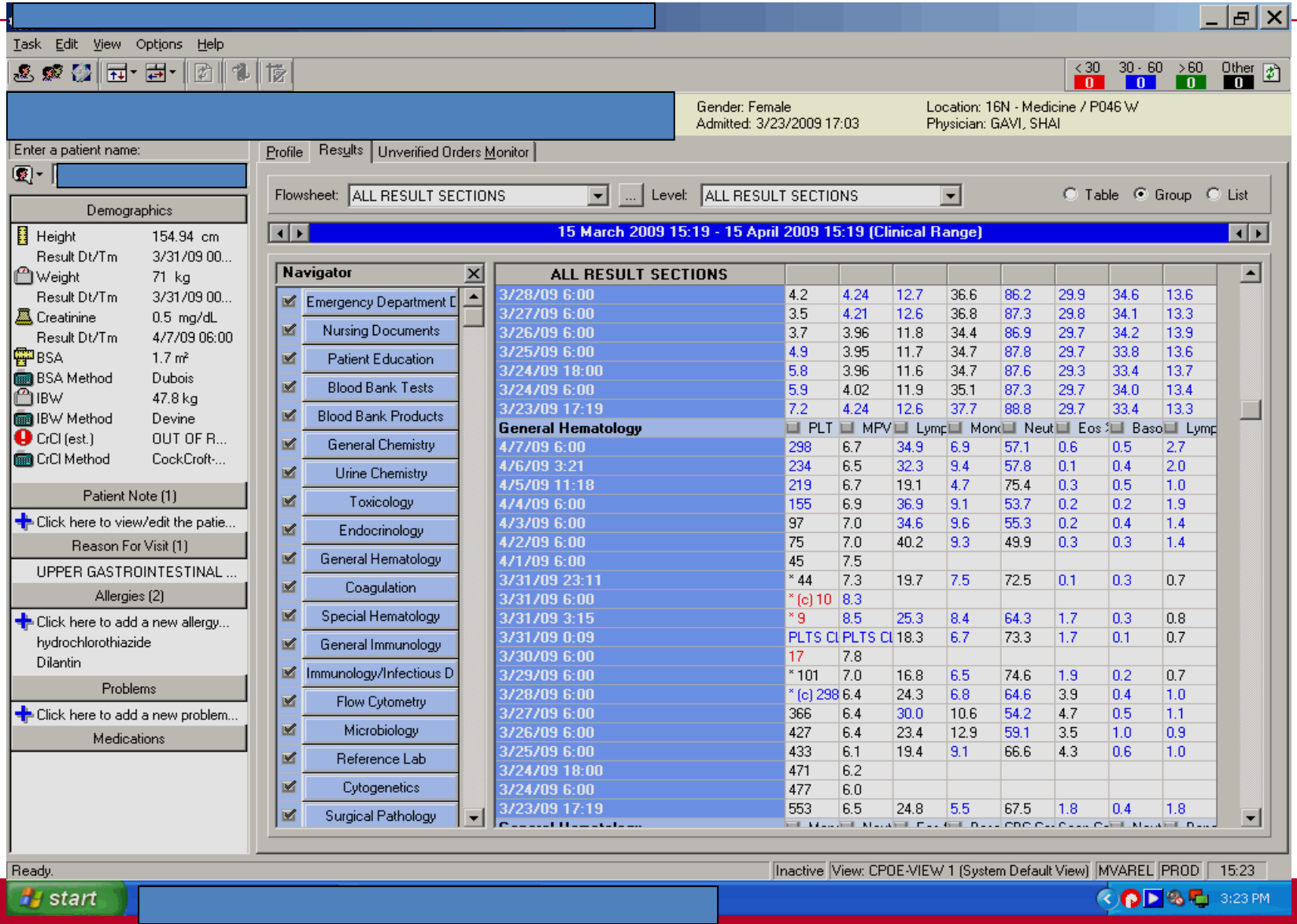
Platelet Drop



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Management of HIT

- Discontinue all heparin therapy (including flushes)
- For patients at risk of thrombosis, prescriber must begin therapy with a direct thrombin inhibitor
  - Argatroban
  - Lepirudin (REFLUDAN)
- Prescriber to order heparin antibody test
- Assessment of heparin allergy (physician/LIP)
- Dopplers
- Documentation of heparin allergy in records
- Discuss with patient

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Part 2

Intravenous Argatroban Protocol

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Objectives

- Discuss the use of argatroban as an anticoagulant in the treatment of patients with HIT
- Indentify the Argatroban PowerPlan in CPOE
- Discuss the responsibilities of different healthcare practitioners in the treatment of a patient on the argatroban protocol
- Identify the 3 paper (back-up) order forms and 3 corresponding flow sheets

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The 4 T's: A Clinical Probability Scoring Model

4 T's	2 Points	1 Point	0 Points
Thrombocytopenia	Platelet count fall ➢50% and platelet ➢Nadir $\geq 20 \times 10^9$ /L	Platelet count fall 30-50% or platelet nadir 10-19 x $10^{9/L}$	Platelet count fall < 30% or platelet nadir <10 x 10^9L /L
Timing of platelet Count fall	Clear onset between days 5-14 or platelet falls $\leq$ 1 day prior heparin exposure within 30 days	Consistent with days 5-14 fall, but not clear (e.g. missing platelet counts) or onset after day 14 or fall $\leq$ 1 day (prior heparin exposure 30-100 days ago)	Platelet count falls $\leq$ 4 days without recent exposure
Thrombosis or other sequelae	New thrombosis (confirmed): skin necrosis at heparin injection site, anaphylactoid reaction after bolus	Progressive or recurrent thrombosis; Non-necrotizing (erythematous) skin lesions; Suspected thrombosis (not confirmed)	None
oTher causes of Thrombocytopenia	None apparent	Possible	Definite

High probability: 6-8 points; intermediate probability: 4-5 points; low probability: $\leq$ 3 points

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Argatroban

- Class
  - Direct thrombin inhibitor
  - Anticoagulant
- Indications
  - Anticoagulation therapy with history of HIT
  - Treatment of HIT
- Standard Concentration
  - 250 mg in 250 mL D5W (1:1)
- Protect from Light

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Argatroban

- Dosing (initial rate)
  - Standard: 2 mcg/kg/min
  - Greater than 140 kg 1 mcg/kg/min
  - Critically ill /hepatic 0.5 mcg/kg/min
- ADRs
  - Bleeding
  - Hypotention
  - Dyspnea
  - N/V
- Monitoring
  - aPTT
  - Target 45-90 seconds
  - Stroke patient target: 45-65 seconds

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The Argatroban PowerPlan

- Choice of 3 different dosing strategies
- Similar to heparin protocol
- No bolusing necessary with Argatroban PowerPlan
- This PowerPlan is NOT for PCI dosing of argatroban

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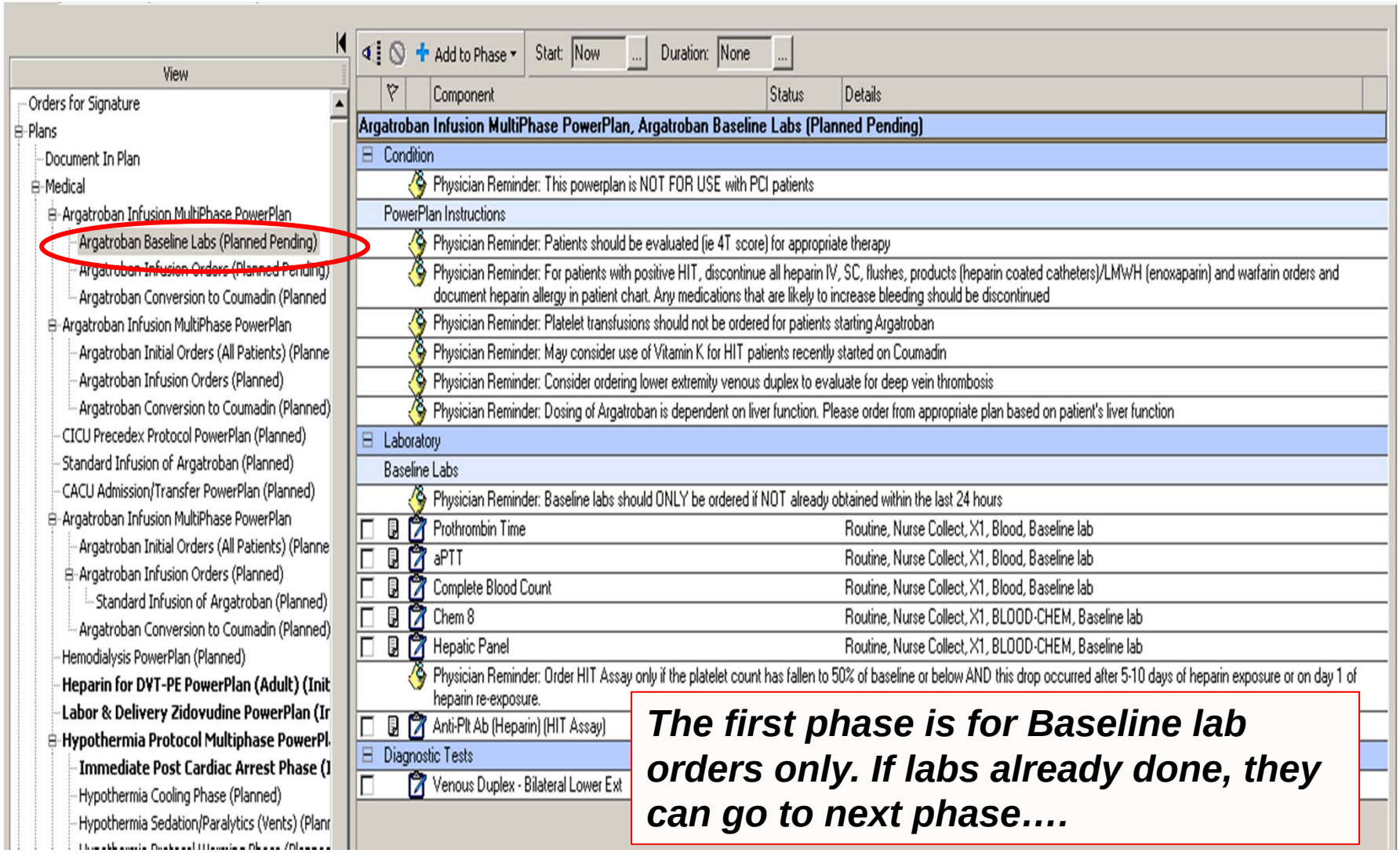
MD to use Argatroban Infusion Multiphase Powerplan



The first phase is for Baseline lab orders only. If labs already done, they can go to next phase….

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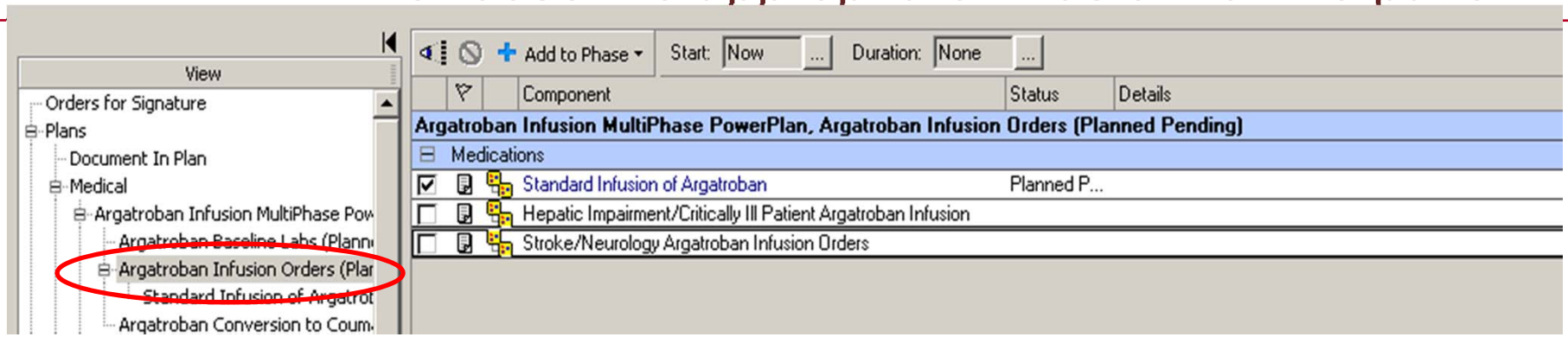
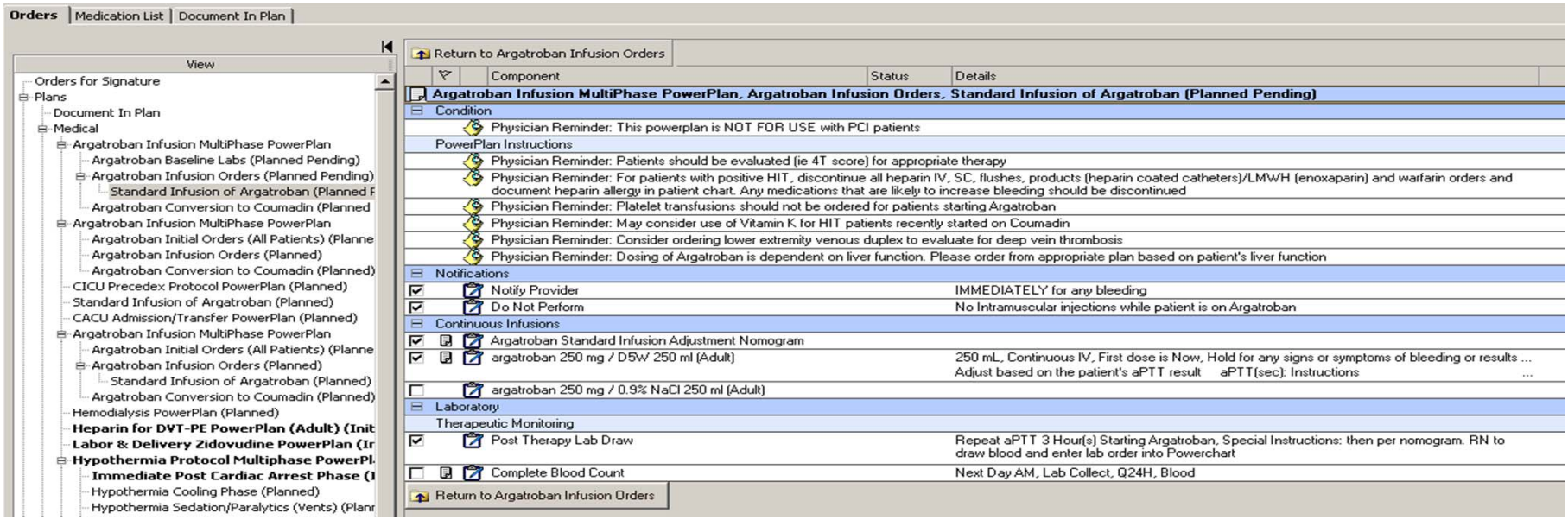
Choose the appropriate Infusion for the patient



Once the correct infusion plan is chosen, the MD needs to sign and initiate the plan



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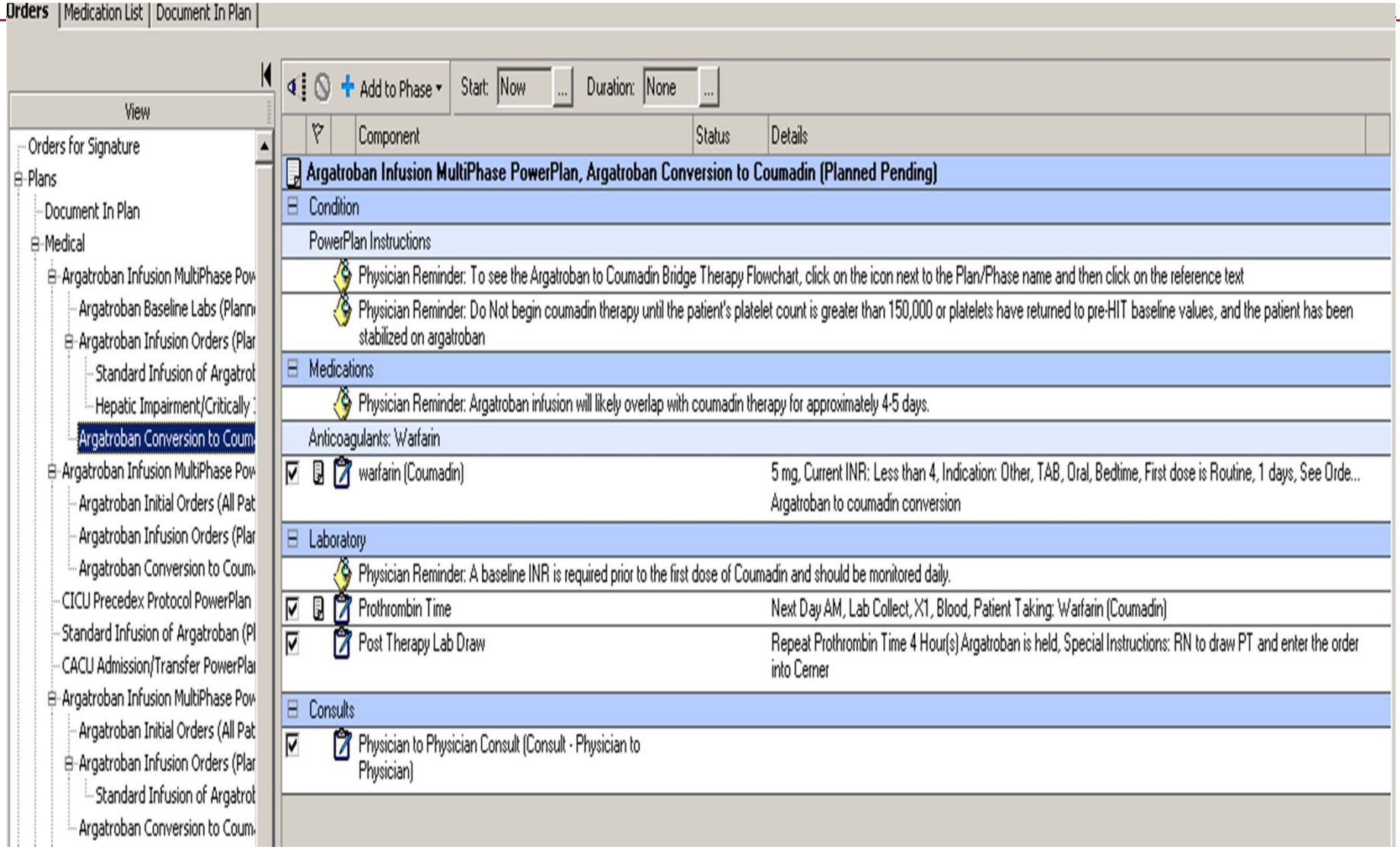
Conversion to Coumadin Phase



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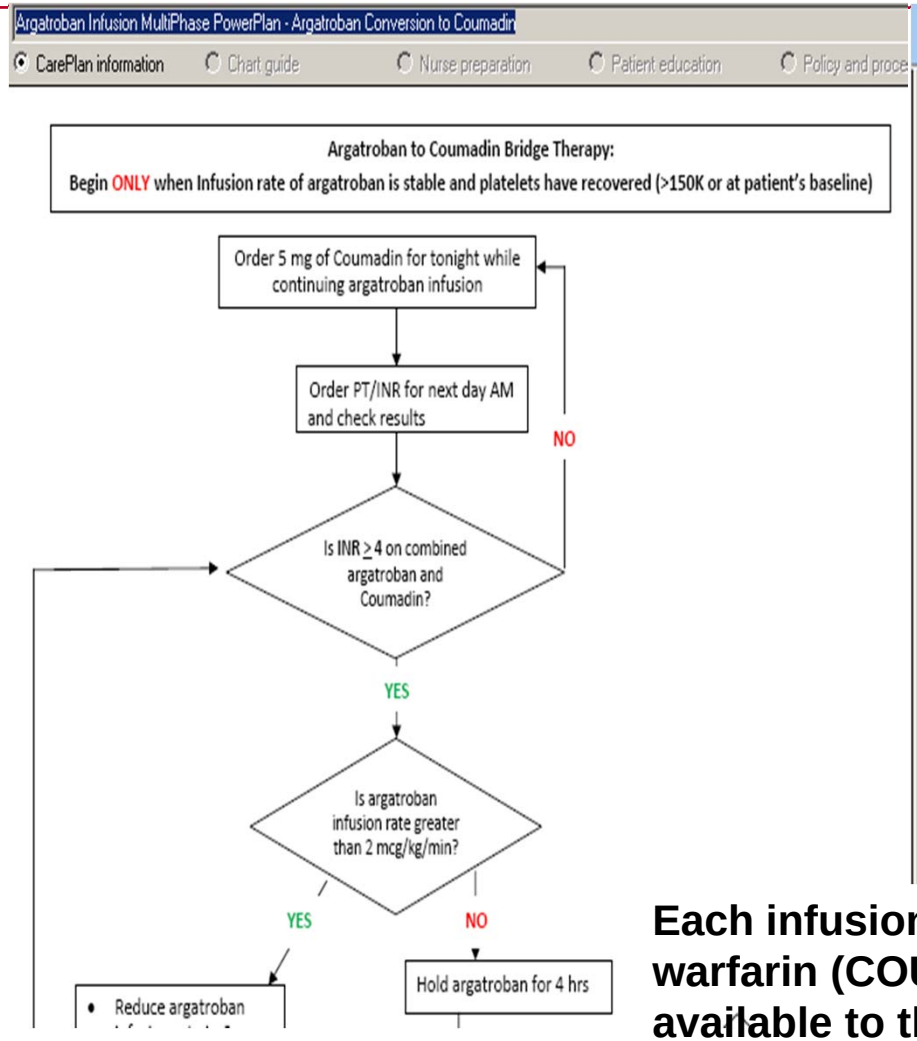
Reference Text available in the Plan



Argatroban Infusion MultiPhase PowerPlan - Standard Infusion of Argatroban

Reference

Argatroban Infusion MultiPhase PowerPlan - Standard Infusion of Argatroban

CarePlan information | Chart guide | Nurse preparation | Patient education | Policy a

Argatroban Infusion: Standard Nomogram Max: 10 mcg/kg/min		
Initial infusion rate: See above: Check aPTT 3 hrs after start of infusion. Adjust rate of infusion as follows		
aPTT (sec)	**Infusion rate change**	**Next aPTT**
Less than or equal to 44	Increase by 0.5 mcg/kg/min	3 hrs after rate change
45-90 (target)	**NONE**	3 hours from last aPTT; once there are two consecutive aPTTs within target range, check aPTT every 12 hours.
91-120	Decrease by 0.5 mcg/kg/min	3 hours after rate change
121-149	Hold infusion for 1 hour, then resume at half the previous rate	3 hours after rate change
Greater than or equal to 150	Hold infusion and check aPTT in 1 hour and every hour thereafter until the aPTT is less than 90 sec, then resume at half the previous rate	Repeat every hour until the aPTT is less than 90 sec. (Once infusion restarted, check aPTT in 3 hours)

Each infusion plan has the nomogram available and the warfarin (COUMADIN) phase has a conversion flow chart available to the ordering prescriber. It can be printed and placed in the chart

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Conversion to Warfarin (Bridge Therapy)

- Warfarin initiation requires
  - Platelet recovery
  - Stabilization of aPTT in the target range on argatroban
  - Continuation of argatroban until warfarin is therapeutic
- Argatroban affects INR
- Monitoring requires checking INR while argatroban is infusing until total INR is above 4 when on warfarin
- Subsequent monitoring (when INR is above 4) requires holding of argatroban before and until blood is drawn for INR while warfarin
- See bridge therapy flow chart (next slide)
- Hematology consult during bridge therapy is recommended

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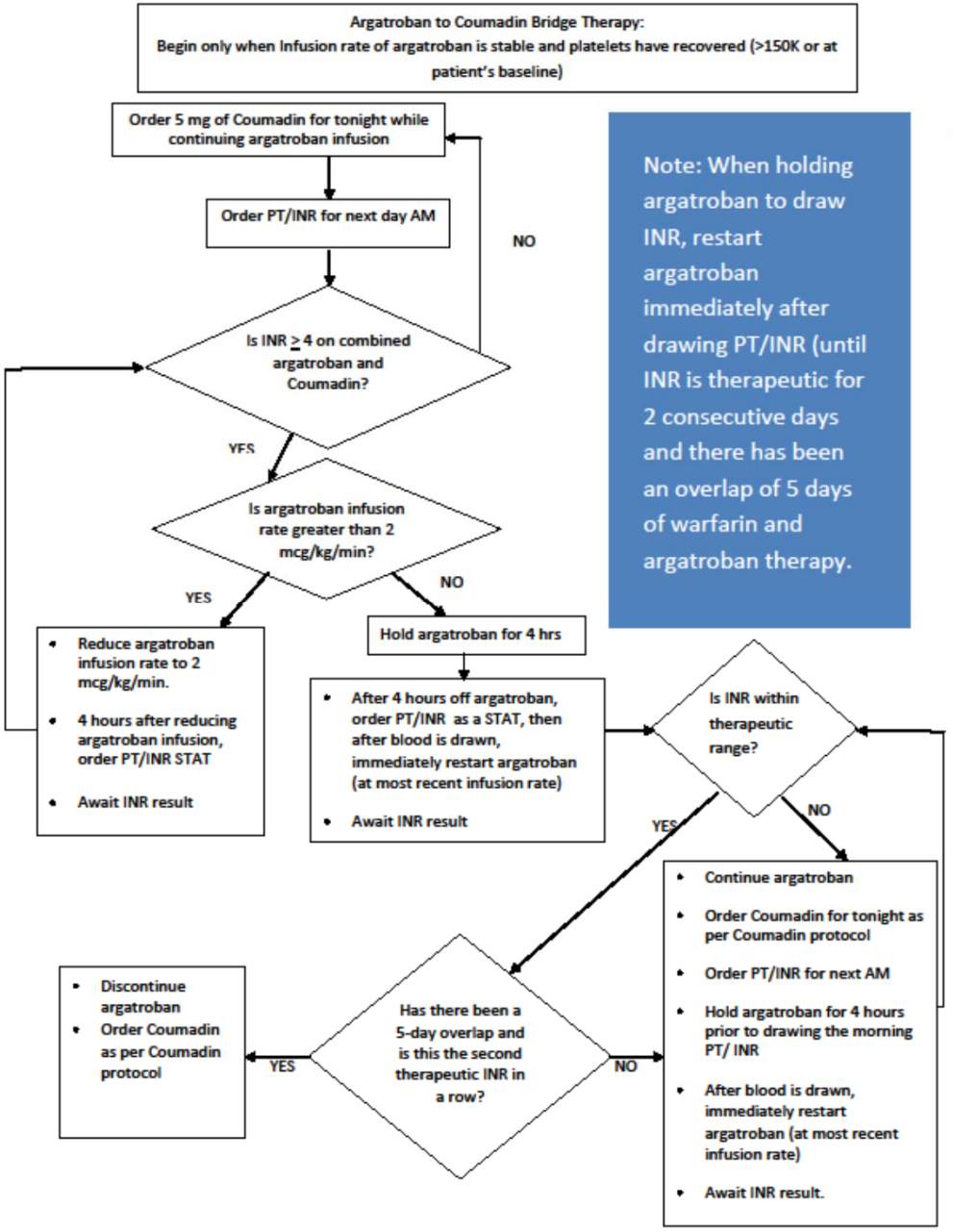
Bridge Therapy Flow Chart

for initiating warfarin while on argatroban



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Prescriber Responsibilities

- Assess patient for appropriateness of protocol use
- Discontinue the following:
  - Heparin products IV, SC
  - Heparin flushes
  - heparin coated catheters
  - LMWH (enoxaparin)
  - Warfarin (COUMADIN)
- Assess heparin allergy
- Document positive heparin allergy in medical record
- Discuss heparin allergy with patient

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Prescriber Responsibilities (continued)

- Choose proper protocol (standard, critical care, or neuro)
- Order correct PowerPlan based on patient co-morbidities
- Identify the accurate patient weight in kilograms (actual body weight)
- Accurately calculate the Argatroban dose

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Prescriber Responsibilities (continued)

- Avoid IM injections while on Argatroban
- Platelet transfusions should not be ordered for patients starting Argatroban
- Assess patient daily
- Bridge to warfarin therapy if and when appropriate (hematology consult recommended)

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Nurse Responsibilities

- Verify that proper protocol was chosen
- Verify that the dosage calculations are correct
- Obtain blood draws for laboratory test as ordered

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Nurse Responsibilities (continued)

- Argatroban settings and guardrails are programmed into the pump
- Properly set pump (see screen shots)
- Double check pump settings with another nurse
- Maintain documentation of infusion administration

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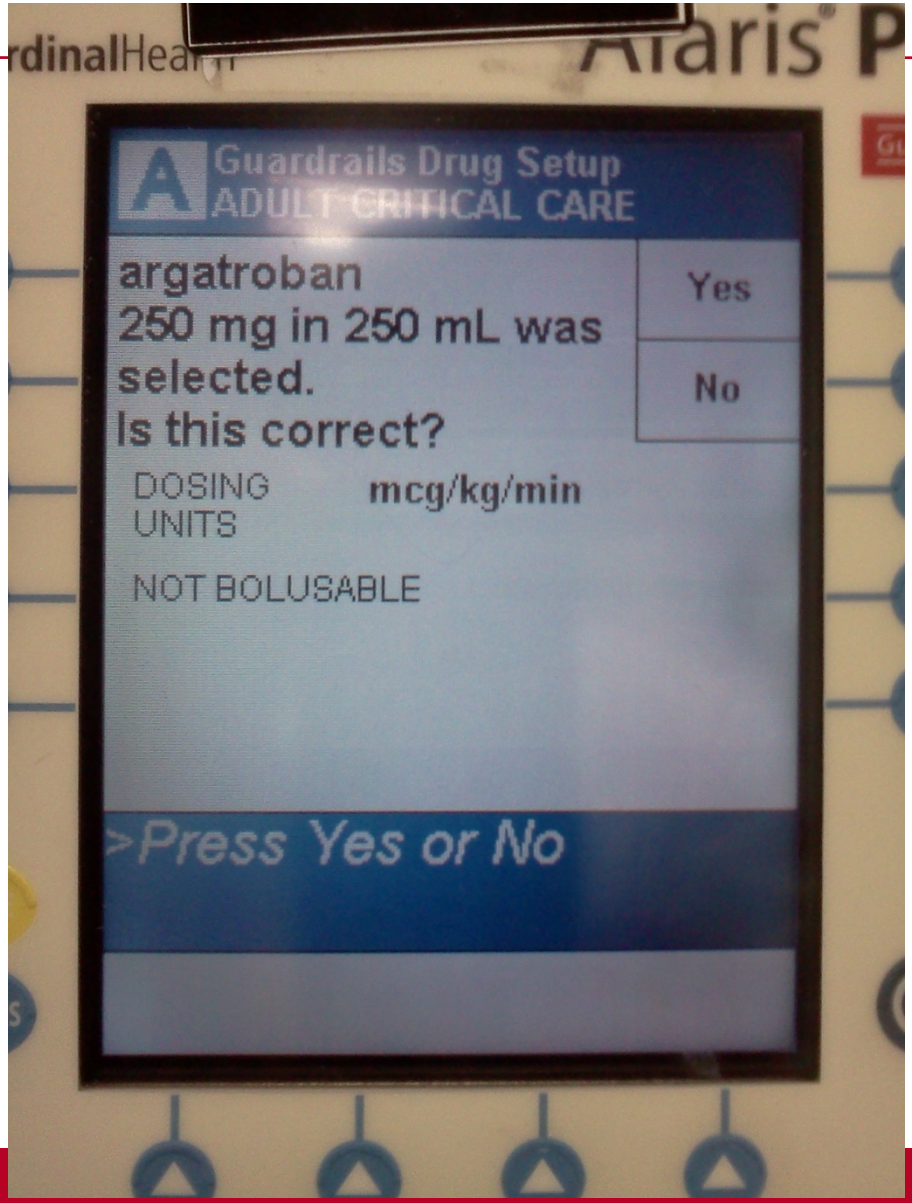
Screen 1



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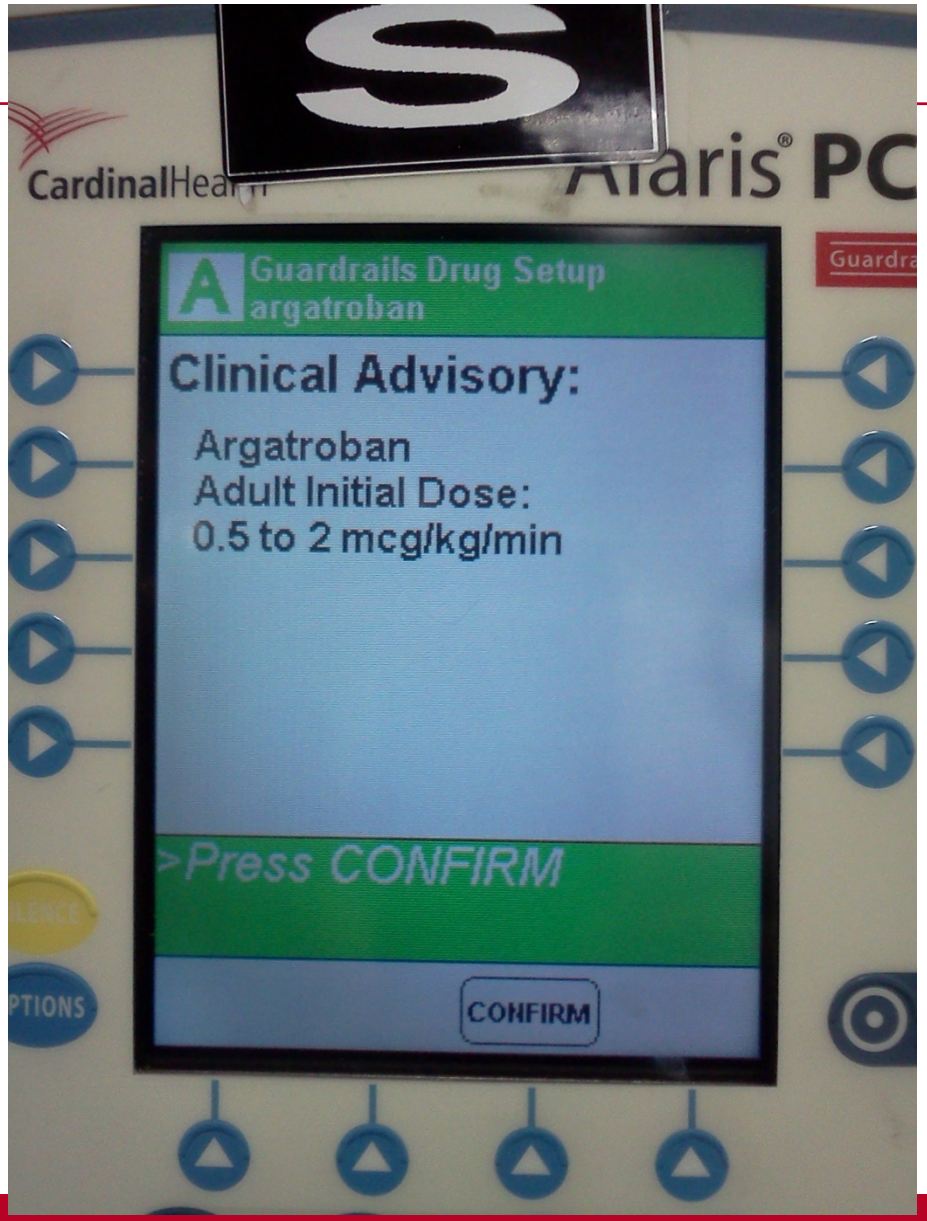
Screen 2



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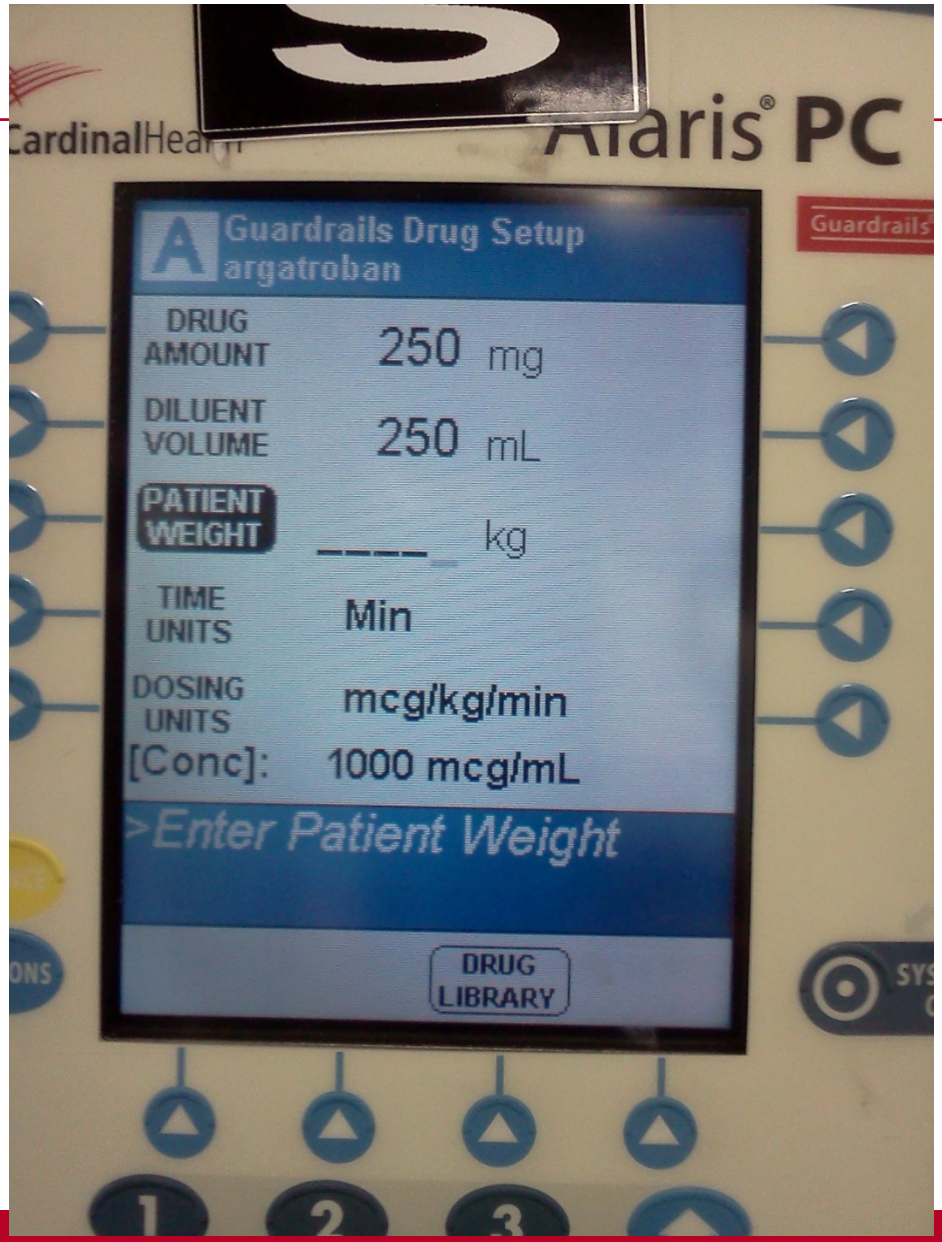
Screen 3



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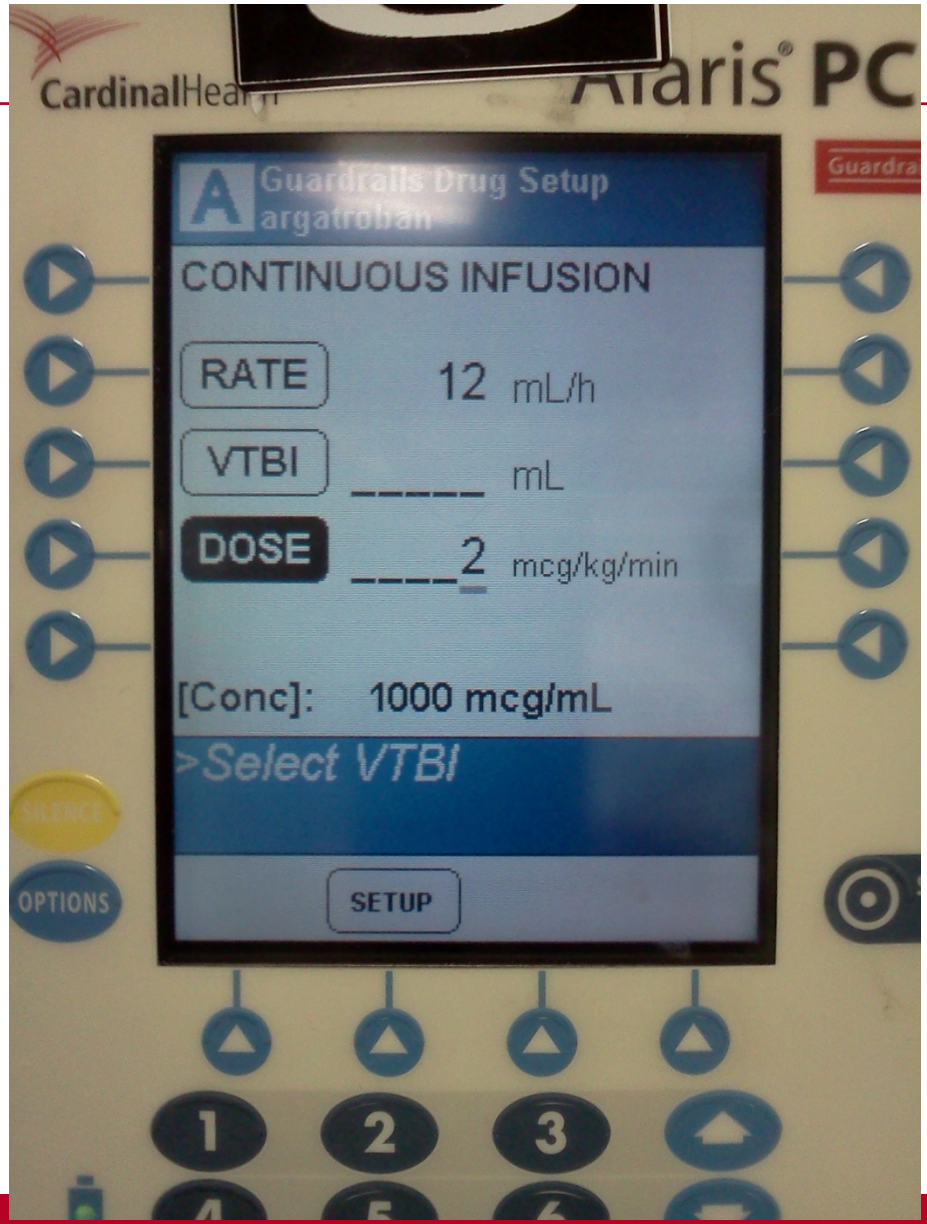
Screen 4



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Nurse Responsibilities (continued)

- Notify prescriber if any bleeding occurs
- Notify prescriber if aPTT therapeutic range is not reached within 48 hours of argatroban initiation
- Avoid IM injections while patient is on argatroban
- Provide and document patient education regarding medication and bleeding precautions

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Pharmacist Responsibilities

- Assess that proper dosing strategy was chosen
- Screen patient EPR for any active heparin or enoxaparin orders that need to be discontinued
- Contact prescriber to discontinue any active heparin or enoxaparin orders
- Verify the PowerPlan order (if appropriate)
- Dispense in light protected covering

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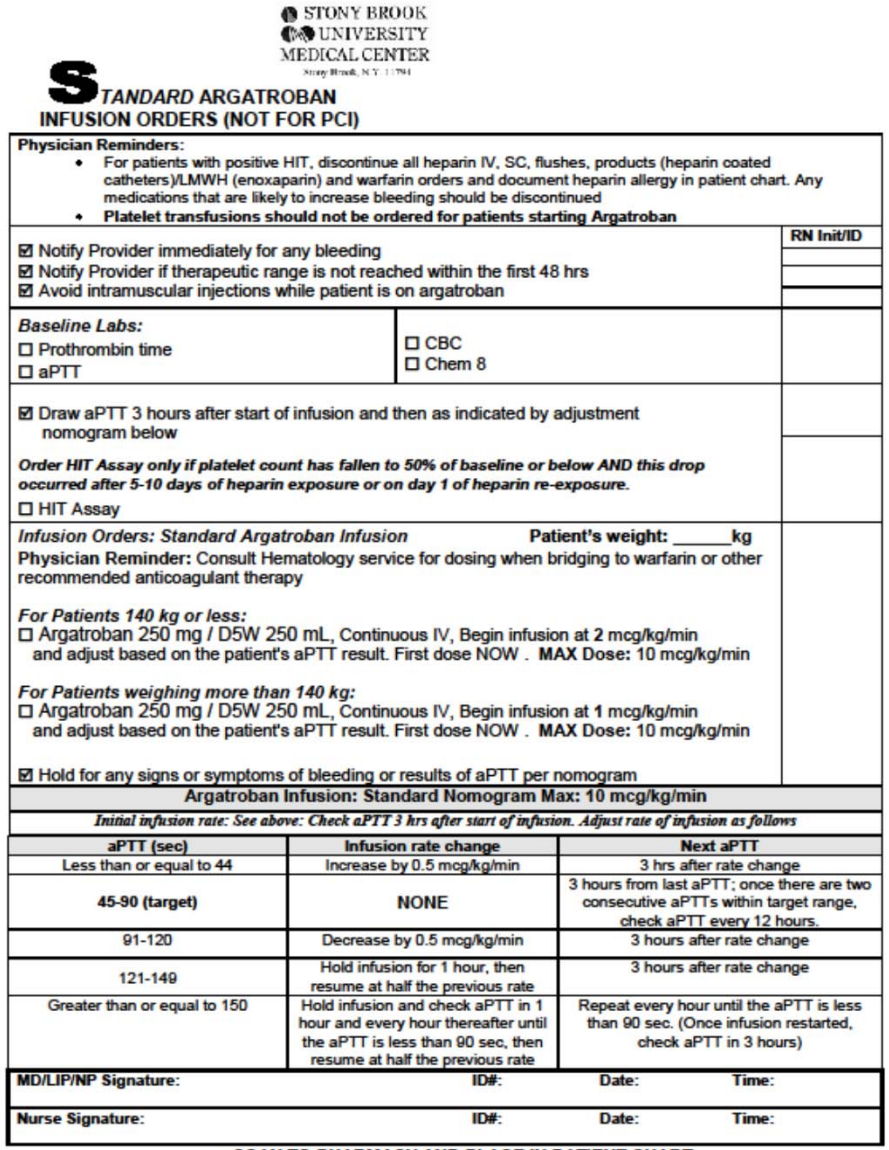
Paper Version of Argatroban Standard Order Form



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STANDARD ARGATROBAN INFUSION ORDERS (NOT FOR PCI)

Physician Reminders:

- For patients with positive HIT, discontinue all heparin IV, SC, flushes, products (heparin coated catheters)/LMWH (enoxaparin) and warfarin orders and document heparin allergy in patient chart. Any medications that are likely to increase bleeding should be discontinued
- **Platelet transfusions should not be ordered for patients starting Argatroban**

	RN Init/ID
☑ Notify Provider immediately for any bleeding	
☑ Notify Provider if therapeutic range is not reached within the first 48 hrs	
☑ Avoid intramuscular injections while patient is on argatroban	

Baseline Labs:

☐ Prothrombin time ☐ aPTT ☐ CBC ☐ Chem 8

☑ Draw aPTT 3 hours after start of infusion and then as indicated by adjustment nomogram below

Order HIT Assay only if platelet count has fallen to 50% of baseline or below AND this drop occurred after 5-10 days of heparin exposure or on day 1 of heparin re-exposure.

☐ HIT Assay

Infusion Orders: Standard Argatroban Infusion **Patient's weight: _____kg**

Physician Reminder: Consult Hematology service for dosing when bridging to warfarin or other recommended anticoagulant therapy

For Patients 140 kg or less:

☐ Argatroban 250 mg / D5W 250 mL, Continuous IV, Begin infusion at **2** mcg/kg/min and adjust based on the patient's aPTT result. First dose NOW . **MAX Dose:** 10 mcg/kg/min

For Patients weighing more than 140 kg:

☐ Argatroban 250 mg / D5W 250 mL, Continuous IV, Begin infusion at **1** mcg/kg/min and adjust based on the patient's aPTT result. First dose NOW . **MAX Dose:** 10 mcg/kg/min

☑ Hold for any signs or symptoms of bleeding or results of aPTT per nomogram

Argatroban Infusion: Standard Nomogram Max: 10 mcg/kg/min

Initial infusion rate: See above: Check aPTT 3 hrs after start of infusion. Adjust rate of infusion as follows

aPTT (sec)	Infusion rate change	Next aPTT
Less than or equal to 44	Increase by 0.5 mcg/kg/min	3 hrs after rate change
45-90 (target)	**NONE**	3 hours from last aPTT; once there are two consecutive aPTTs within target range, check aPTT every 12 hours.
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Greater than or equal to 150	Hold infusion and check aPTT in 1 hour and every hour thereafter until the aPTT is less than 90 sec, then resume at half the previous rate	Repeat every hour until the aPTT is less than 90 sec. (Once infusion restarted, check aPTT in 3 hours)

MD/LIP/NP Signature: **ID#:** **Date:** **Time:**

Nurse Signature: **ID#:** **Date:** **Time:**

SCAN TO PHARMACY AND PLACE IN PATIENT CHART

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Paper Version of Argatroban Standard FlowSheet

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PH2C424

STANDARD ARGATROBAN INFUSION FLOWSHEET

Pt. Weight: kg	Baseline aPTT: Date/Time: ____/____	Baseline Platelets: Date/Time: ____/____

Adjustment Nomogram: FOR USE WITH ARGATROBAN INFUSION PROTOCOL ONLY

Argatroban Infusion: Standard Nomogram Max: 10mcg/kg/min

Initial infusion rate: 2 mcg/kg/min for patients 140 kg or less
Initial infusion rate: 1 mcg/kg/min for patients greater than 140 kg
Check aPTT 3 hrs after start of infusion. Adjust rate of infusion as follows:

aPTT (sec)	Infusion rate change	Next aPTT
Less than or equal to 44	Increase by 0.5 mcg/kg/min	3 hours after rate change
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DO NOT ADJUST ARGATROBAN BY NOMOGRAM ONCE WARFARIN THERAPY HAS BEGUN. PRESCRIBER WILL MAKE ADJUSTMENTS BASED ON BRIDGE THERAPY GUIDELINES.

Please use a separate line for every entry

Date	Time	Rate: **(mcg/kg/min)**	aPTT: (sec)	Time next aPTT due	Platelets: (thousands)	Initials

Initials	Initials

Signature _____ ID# _____ Date _____ Time _____

Signature _____ ID# _____ Date _____ Time _____

SIDE 1 OF 2
PLACE IN PATIENT CHART

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Argatroban Infusion Flowsheets/ Order Forms

CATEGORY:NURSING

- PH2C425 ARGAT HEP IMPAR FLOWSHEET
- PH2C426 ARGAT NEURO/STK FLOWSHEET
- PH2C424 ARGAT STAND INF FLOWSHEET

CATEGORY: PHYSICIAN ORDERS ADULTS

- PH2C433 ARGAT HEP IMPAR ORDER
- PH2C432 ARGAT NEURO/STK ORDER
- PH2C434 ARGAT STAND INF ORDER

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Summary

- PowerPlans for IV anticoagulation infusions are available to improve anticoagulation safety
- Paper forms are available (in DAS) as backup to CPOE
- The right protocol must be ordered based on the indication and patient comorbidities
- Therapy is guided with the aPTT
- Baseline (off anticoagulation) aPTT is necessary
- Monitor for ADRs (esp. a precipitous drop in platelets and signs of bleeding)

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