Session # 5

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Our Team

Our Team Captain

Our Team

- Susan Gerhardt, MSN, RN, Nursing Director, STICU/NSICU, UHS
- Jason Gourlas, BS, PA-C, Faculty Associate, UTHSCSA
- Charles Reed, MSN, RN, Patient Care Coordinator, STICU/NSICU
- Henri Stewart, BSN, RN, Staff Nurse, STICU
- Heather Carefoot, BSN, RN, Staff Nurse, STICU
- Randy Beadle, BSN, RN, Patient Care Coordinator, STICU/NSICU
- Nanette Larson, BSN, RN, Patient Care Coordinator, STICU/NSICU
- John Myers, MD, FACS, Associate Professor, UTHSCSA

And all of the nursing staff in the Surgical Trauma ICU at UHS without whom we could not accomplish our goal.

Aim Statement

Our original Aim Statement:

Reduce the incidence of self-extubation (SE) in the Surgical Trauma Intensive Care Unit (STICU) by 50% in 4 months.

Due to the complexity of human and system factors our Aim Statement was revised to:

Seek to understand the reasons for SE in the STICU and then reduce SE by 50% by the end of 2010.

Background

- Unplanned extubation (UE) includes SE and accidental extubation (AE).
- Unplanned extubations (UE) have been reported to occur in 1 to 16% of patients[1-3]
- Complications of UE include laryngospasm, laryngeal edema, aspiration pneumonia, bronchospasm, respiratory failure, and sometimes results in death.[2]
- Rates of adverse events following UE have been reported as ranging from 5% to 28%[3]
- SE results in prolonged mechanical ventilation (MV), longer ICU and hospital stay, and increased need for care[1-3]

1 Krinsley, J. & Barone, J. (2005). The Drive to Survive. *CHEST vol. 128 (2) 560-566*

2 Epstein, S., Nevins, M., & Chung, J. (2000). Effect of Unplanned Extubation on Outcome of Mechanical Ventilation *American Journal of Respiratory & Critical Care Medicine:* Vol 161(6), 1912-1916

3Atkins, P., Mion, L., Mendelson, W., Palmer, R., Slomka , J., & Franko, T. (1997). Characteristics and outcomes of patients who self-extubate from ventilatory support: a case control study, *Chest* 112(5) (pp. 1317–1323.

Selected Project Analysis Tools

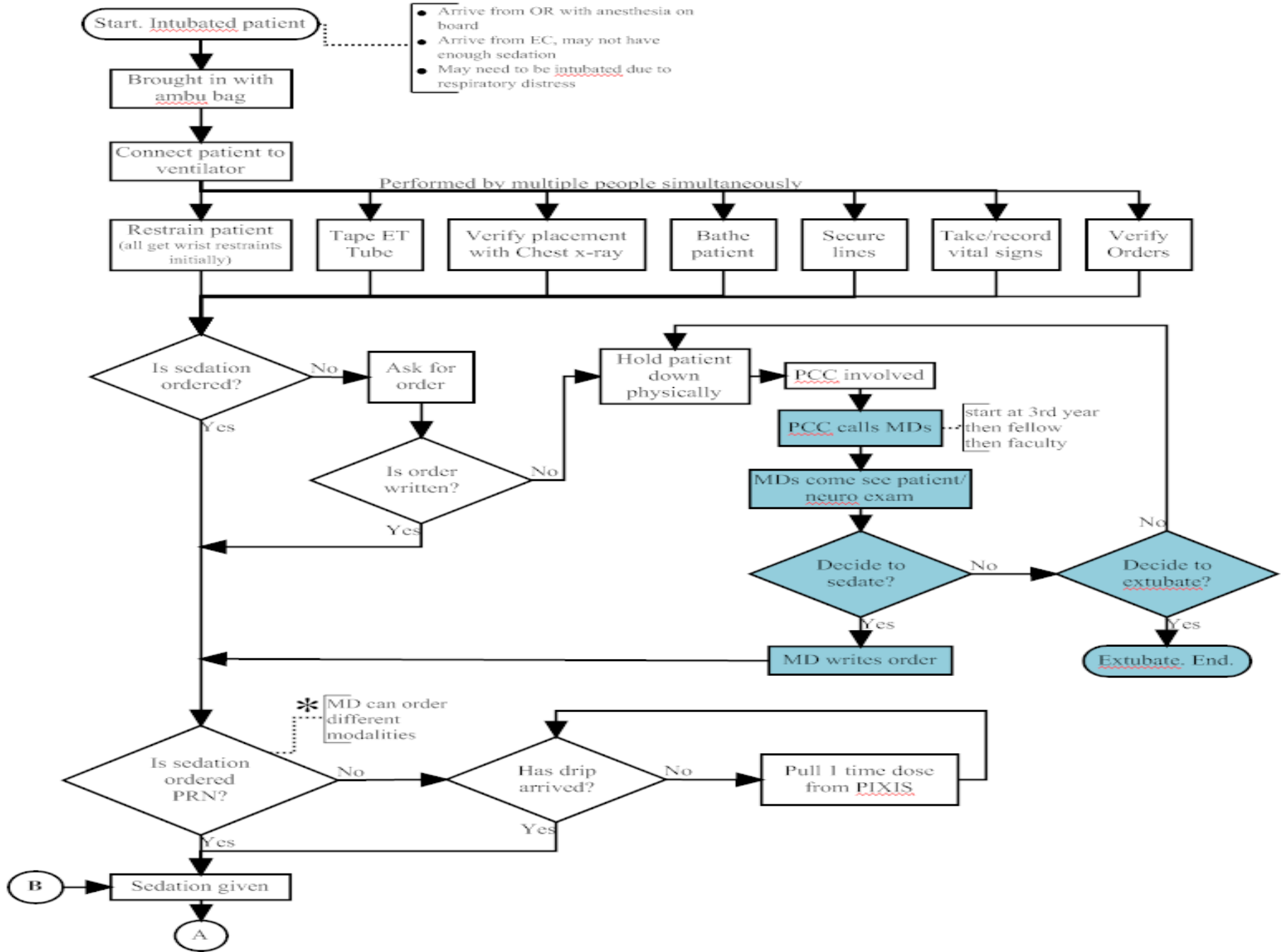
We realized that nurses and mid-levels/physicians might have two different but important perspectives so, both groups went through the process separately.

- Flowchart: We chose to use this tool because it allowed us to visualize the "*As Is Process"* for dealing with mechanically ventilated patients from arrival to the ICU to liberation from the ventilator.
- Fishbone: We looked at multiple factors that increase the risk for or set up patients to SE. Ours looked more like a whalebone diagram.
- Brainstorming : When both were completed, we got together and looked for similarities.
- We gathered data on our rates of SE and the circumstances surrounding them.

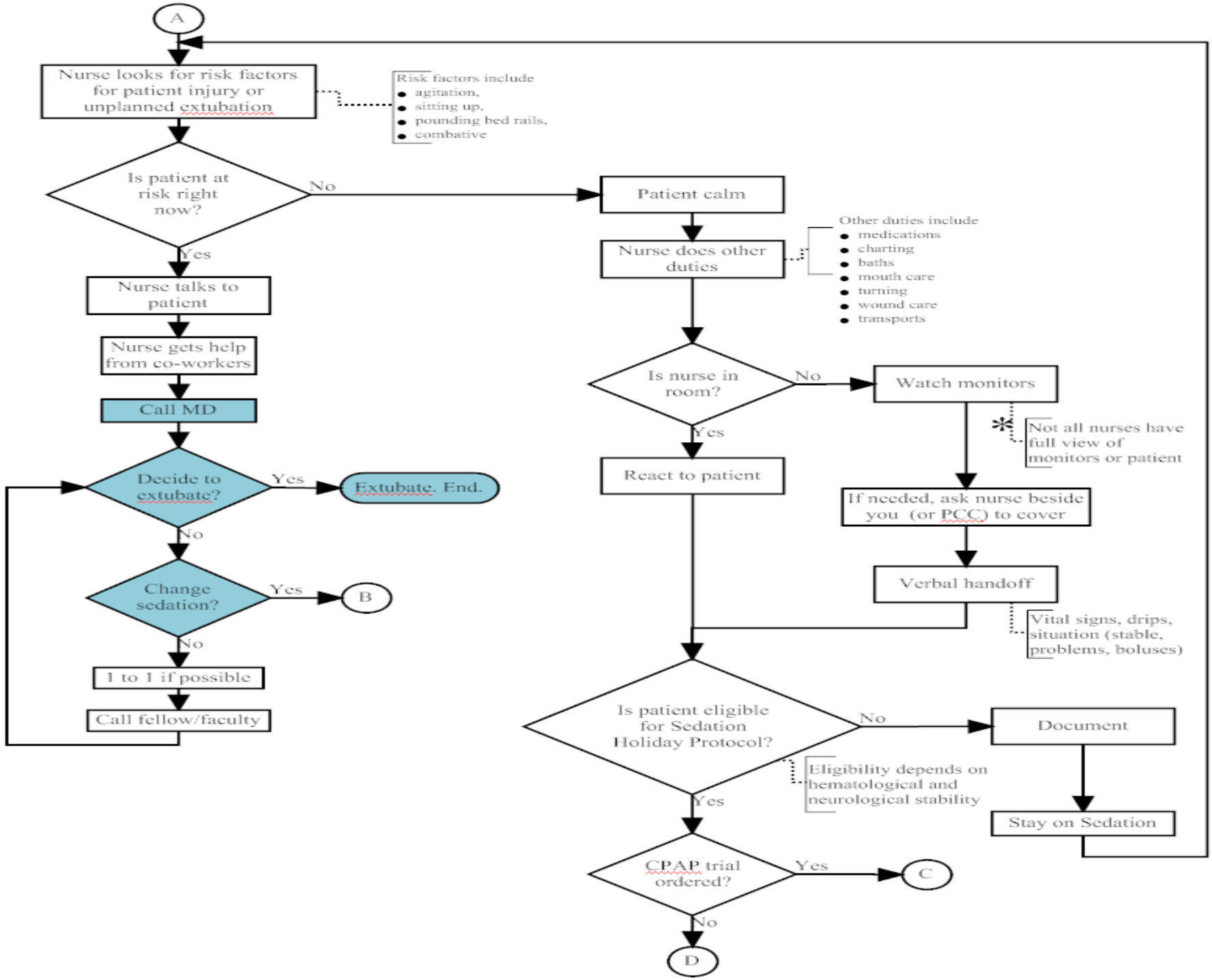
Nursing
As Is
Page 1

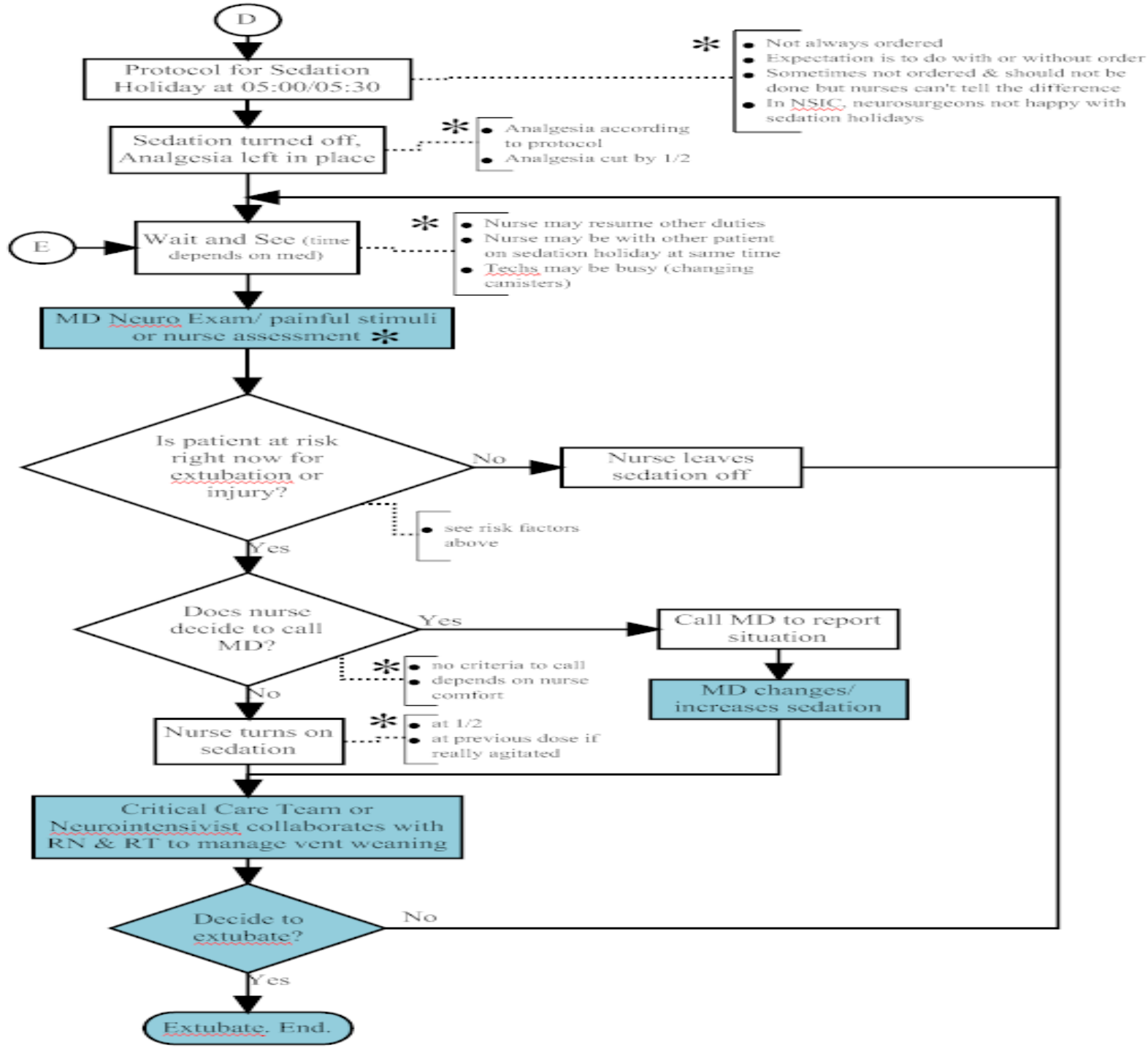
AS IS Process For Care of Intubated Patient on SICU

as of May 11, 2010

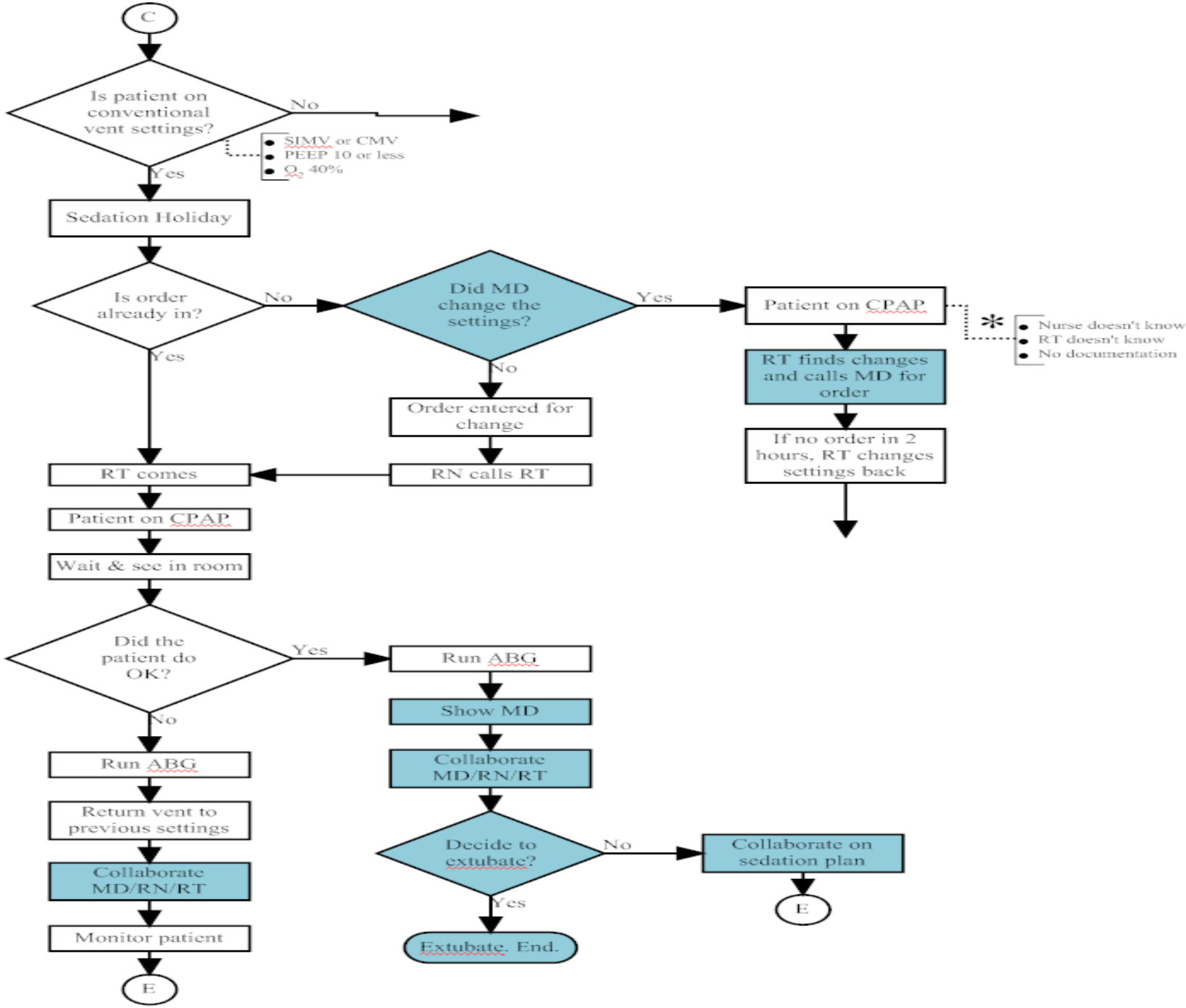


Nursing
As Is
Page 2



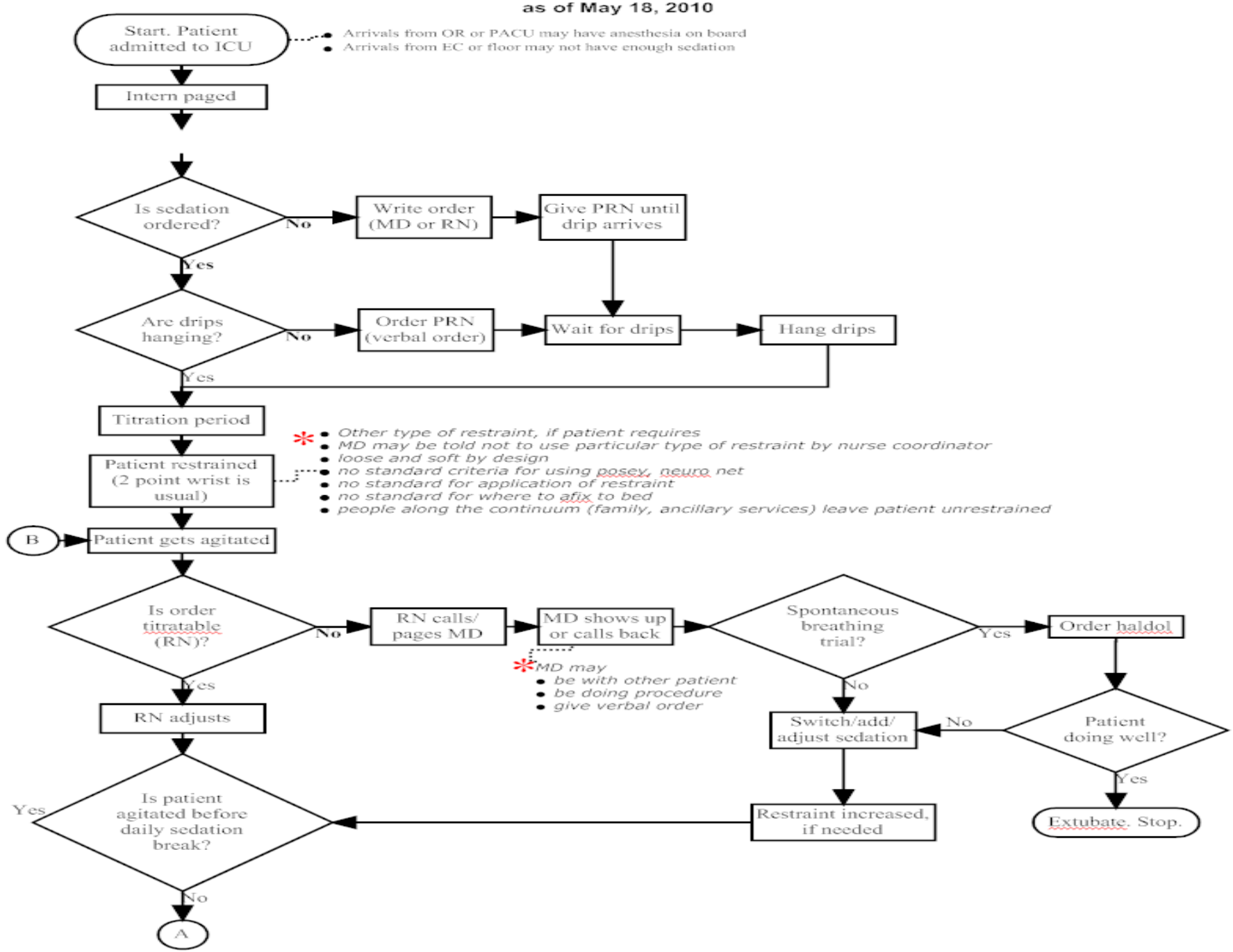

D
Protocol for Sedation Holiday at 05:00/05:30
Not always ordered
Expectation is to do with or without order
Sometimes not ordered & should not be done but nurses can't tell the difference
In NSIC, neurosurgeons not happy with sedation holidays
Sedation turned off, Analgesia left in place
Analgesia according to protocol
Analgesia cut by 1/2
E
Wait and See (time depends on med)
Nurse may resume other duties
Nurse may be with other patient on sedation holiday at same time
Techs may be busy (changing canisters)
MD Neuro Exam/ painful stimuli or nurse assessment
Is patient at risk right now for extubation or injury?
No
Nurse leaves sedation off
see risk factors above
Yes
Does nurse decide to call MD?
Yes
Call MD to report situation
no criteria to call
depends on nurse comfort
MD changes/ increases sedation
No
Nurse turns on sedation
at 1/2
at previous dose if really agitated
Critical Care Team or Neurointensivist collaborates with RN & RT to manage vent weaning
Decide to extubate?
No
Yes
Extubate. End.

Nursing As Is
Page 4

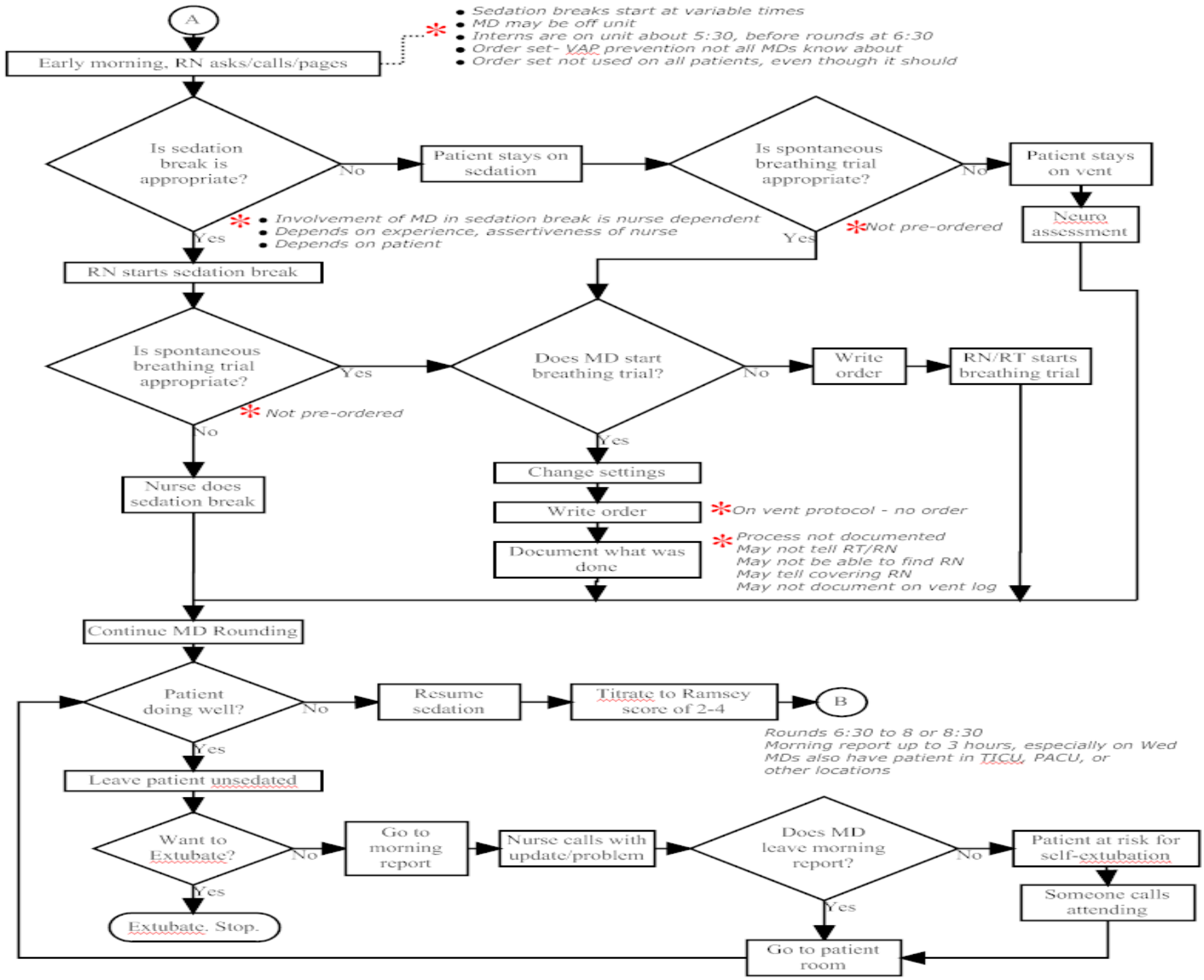


Physician
As Is
Page 1

AS IS Process For Care of Intubated Patient on SICU
Physician Version
as of May 18, 2010



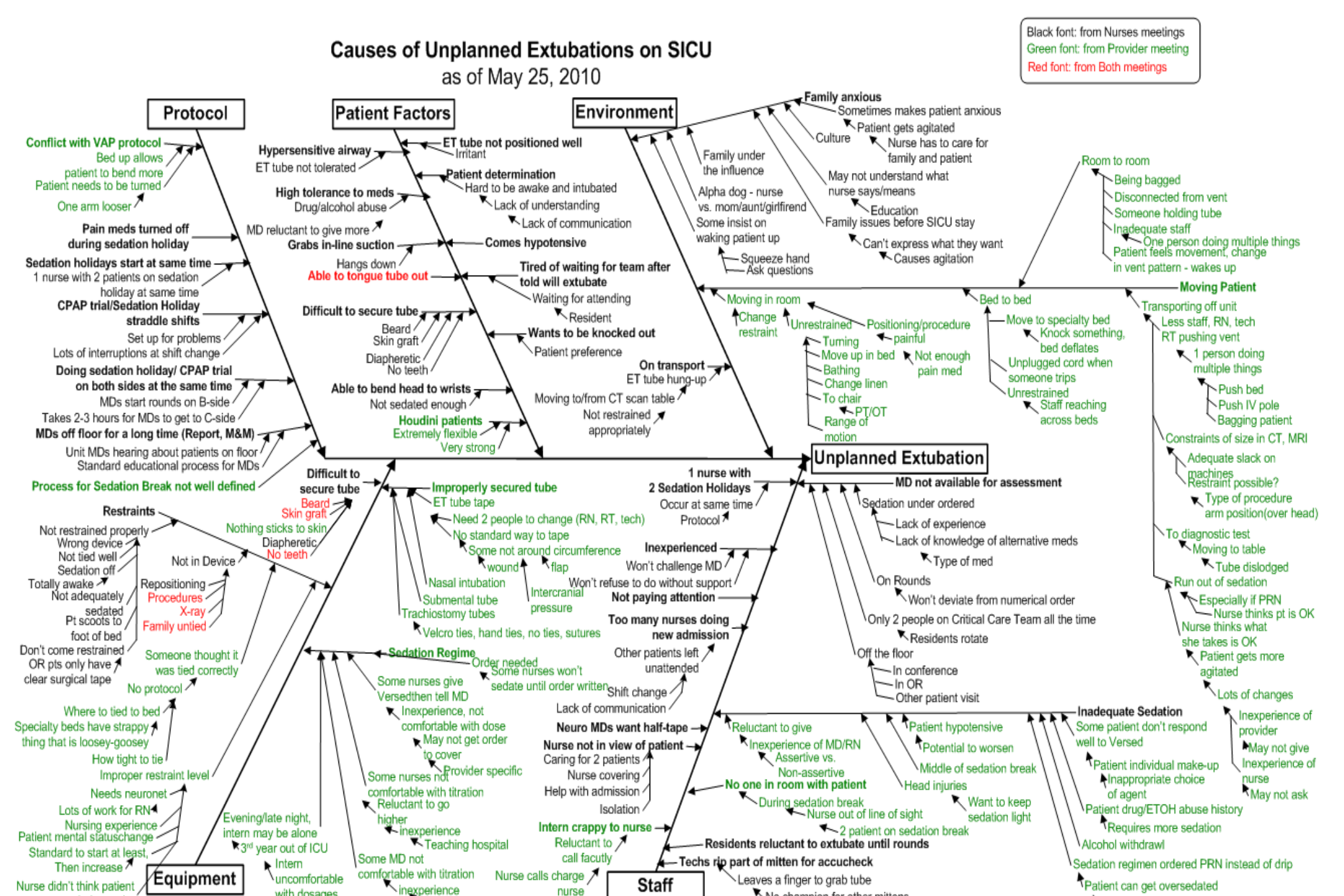
Physician
As Is
Page 2



Causes of Unplanned Extubations on SICU

as of May 25, 2010

Black font: from Nurses meetings
Green font: from Provider meeting
Red font: from Both meetings



The Results

- We gleaned from these tools and looking at the data of our patients involved in SE that, although our sedation protocol wasn't being used, it was also inadequate.
- There was no standardization in our spontaneous breathing trial (SBT) process resulting in patients possibly remaining intubated longer than necessary.
- The literature that we looked at corroborated that SE was associated with inadequate sedation. It also suggested that timely provider extubation would reduce SE. [4-5]

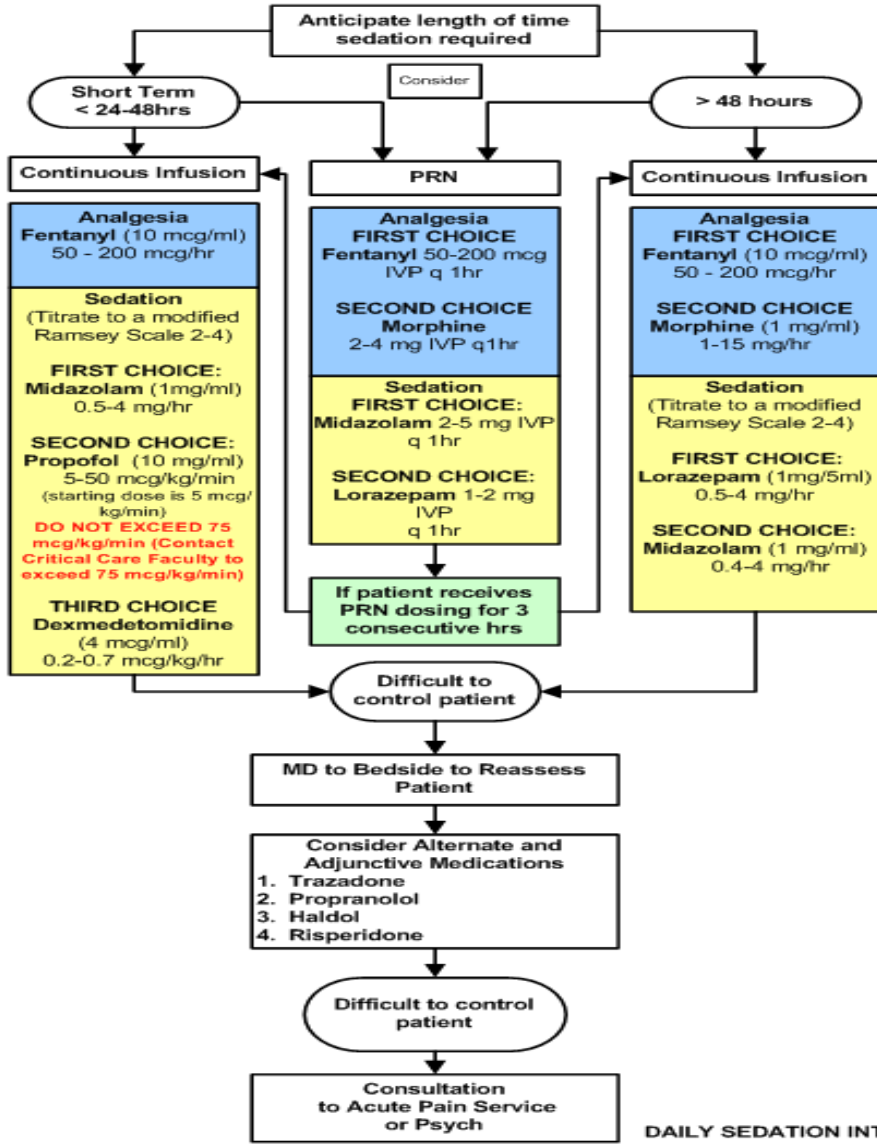
4. Moons P, Sels K, De Becker W, De Geest S, Ferdinand P: Development of a risk assessment tool for deliberate self-extubation in intensive care patients. *Intensive Care Med* 2004 Jul;30(7): 1348-55

5.Chevron M, Ménard JF, Richard JC, Girault C, Lerory J, Bonmarchand, G: Unplanned extubation: risk factors of development and predictive criteria for re-intubation. *Crit Care Med* 1998 Jun; 26(6): 1049-53

Interventions

- We revamped our sedation protocol and order sets for sedatives/analgesics. This provided the nursing staff more direction regarding titration to a patient's needs. It also serves as a reference should orders prove to be inappropriate/ inadequate.
- We instituted a plan involving the charge nurses and unit secretaries to better capture the incidence of SE.
- We formulated a SBT algorithm to coincide with our sedation protocol.

Sedation & Analgesia for the Mechanically Ventilated Patient



UHS MODIFIED RAMSEY SEDATION SCALE

Level 1A - Awake-Anxious/Agitated/Restless
Level 1B - Awake - Very Agitated/Does not calm/Bites ETT
Level 1C - Awake - Dangerous Agitation/Pulls tubes/Combative
Level 2 - Awake - Cooperative/Oriented
Level 3 - Awake - Responds to Commands
Level 4 - Asleep - Brisk response to tactile stimulation/loud noise
Level 5 - Asleep - Sluggish response to tactile stimulation/loud noise
Level 6 - Asleep - No response to tactile stimulation/loud noise

FENTANYL TITRATION

Increase infusion rate by 25 mcg/hr every 5-10 minutes.
BOLUS: May bolus 50 mcg every 5 minutes until desired level
Mixed: 2500 mcg/250 ml
Call HO for rate > 200 mcg/hr

MORPHINE TITRATION

Increase infusion rate by 0.5-1 mg/hr every 15 minutes.
BOLUS: May bolus 2 mg every 10 minutes until desired level
Mixed: 100 mg/100 ml
Call HO for rate > 15 mg/hr

Use Midazolam with caution in:
Asians
Liver Failure
Elderly > 65 yrs

MIDAZOLAM TITRATION

Increase infusion rate by 0.5 mg/hr every 5-10 minutes.
BOLUS: may bolus 0.5 mg every 5 minutes until desired level
Mixed: 100 mg/100 ml
Call HO for rate > 4 mg/hr

PROPOFOL TITRATION

Increase infusion rate by 5 mcg/kg/min every 10 minutes
BOLUS: may bolus 0.5 mg/kg until desired level
Call HO for rate > 50 mcg/kg/min

Obtain baseline triglyceride level, and a level every 3 days. if infusion rate is 40cc/hr or greater obtain a level daily. Call HO for level greater than 450.

LORAZEPAM TITRATION

Increase infusion rate by 0.5 mg/hr every 15-30 minutes.
BOLUS: may bolus 0.5 mg every 15 minutes until desired level
Mixed: 12 mg/60 ml
Call HO for rate > 4 mg/hr

DEXMEDETOMIDINE TITRATION

Increase infusion rate by 0.1 mcg/kg/hr every 1 hour
BOLUS: may bolus with caution 0.25-0.50 mcg/kg over 2-5 minutes every 30 minutes until desired level
Mixed: 200 mcg/ 50 ml
Call HO for rate > 0.7 mcg/kg/hr
FDA approved for < 24 hours

DAILY SEDATION INTERRUPTION

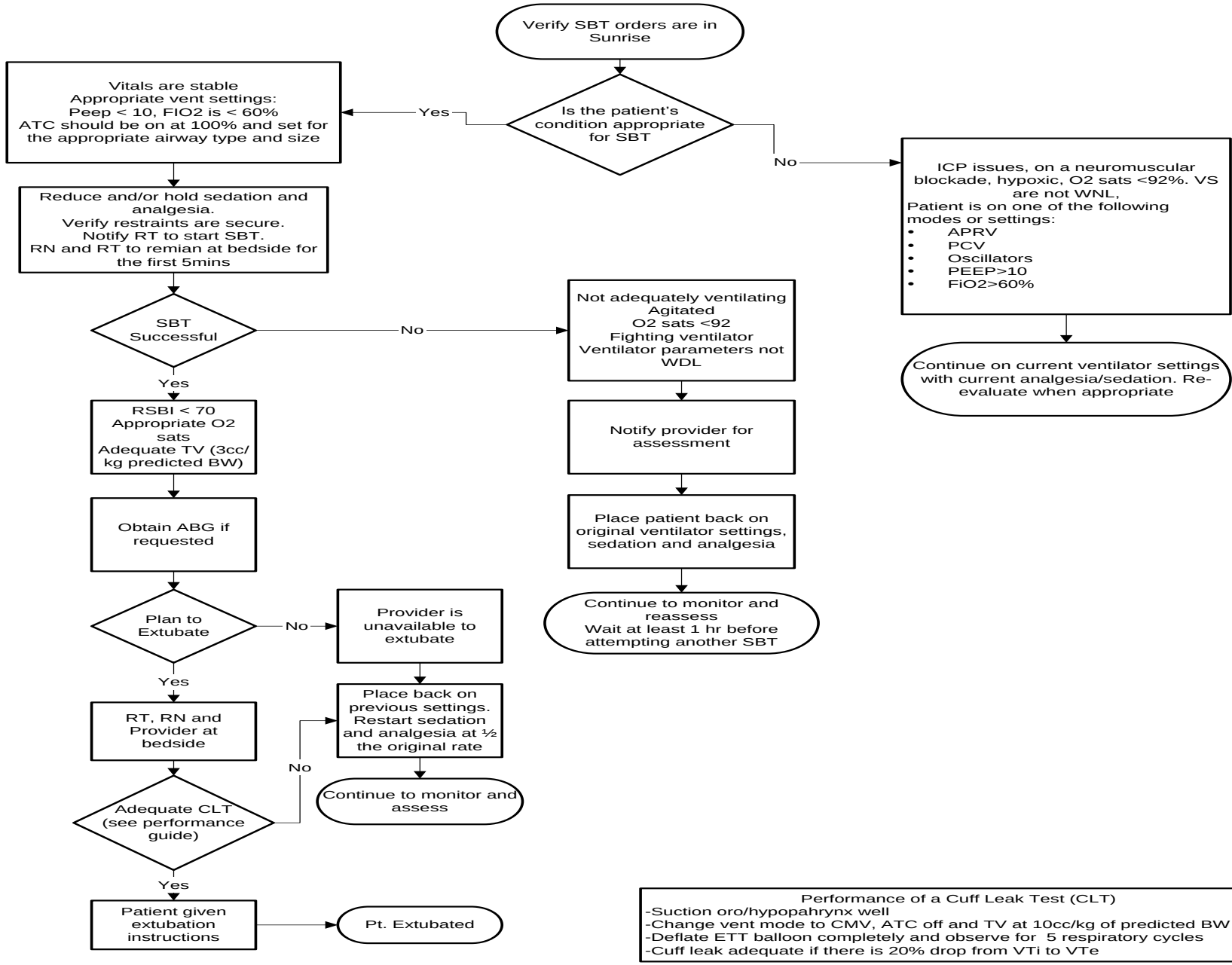
1. Hold both the sedative and analgesic infusions every morning to allow for an accurate neurological assessment.
   - Schedule odd numbered rooms @ 03:00, and even numbered rooms @ 05:00.
   - Do not interrupt the analgesic infusion in patients who currently follow commands, but reduce the dose by ½.
2. The SCC provider (PG3 or Midlevel) should be immediately called to the bedside to evaluate the patient once there is a change in clinical status including but not limited to agitation, fighting the ventilator, O2 desaturation, or awake and able to follow commands).
3. After the physician or the nurse has evaluated the patient, the infusion(s) THAT ARE NECESSARY for adequate patient sedation and or analgesia is (are) re-started at ⅓ the previous dose(s) and then titrated up as necessary to the minimal effective dose(s).
4. A spontaneous breathing trial should be done in conjunction with the daily sedation holiday.
   Please refer to Spontaneous Breathing Trial Protocol for exceptions

CONTRAINDICATIONS TO SEDATION INTERRUPTION:

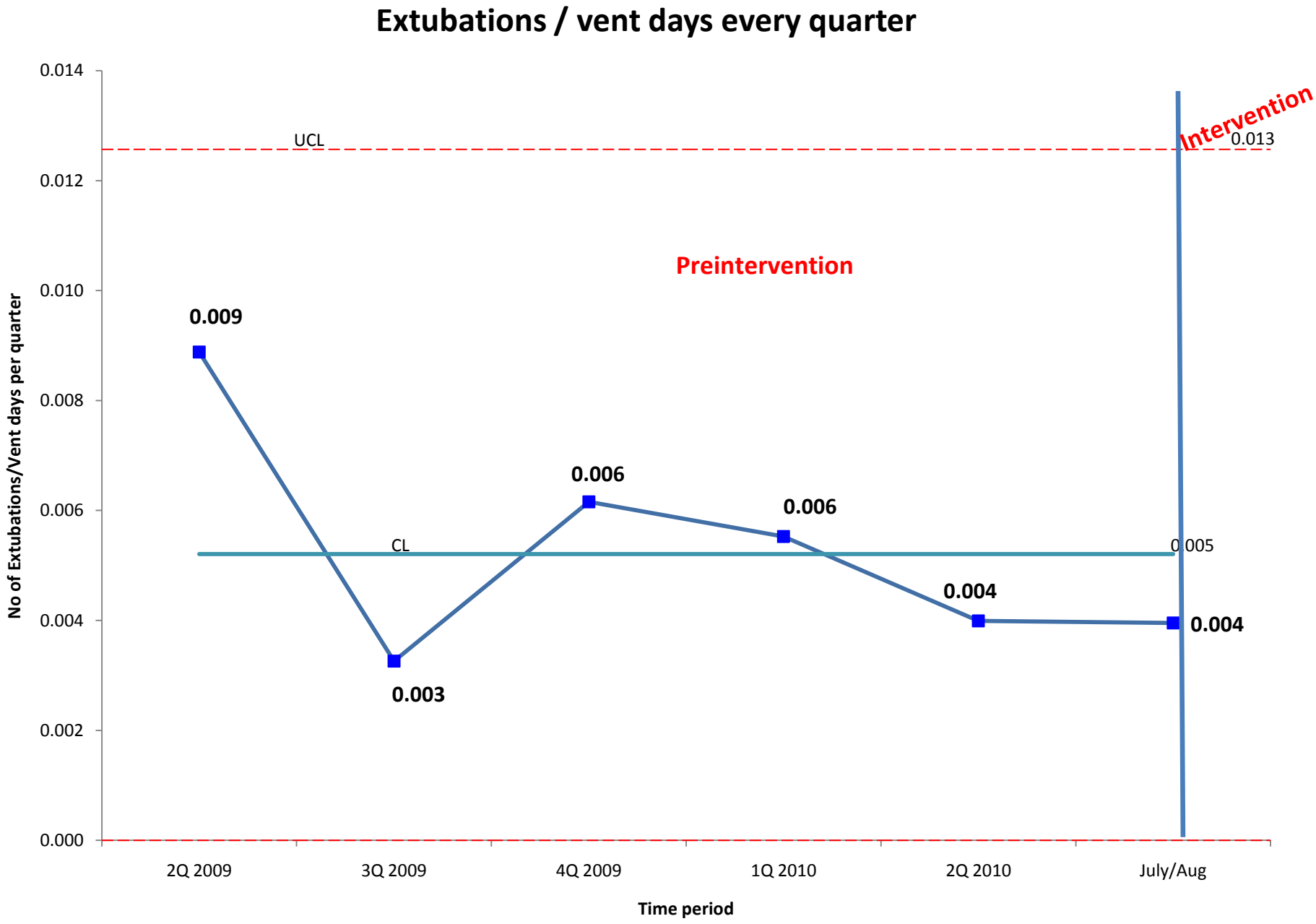
Undergoing active treatment for elevated ICP - Receiving neuromuscular blocking agents - Hypoxemia PEEP > 10 or FiO2 > 60% - ARDS
**** Patients identified at increased risk of self-extubation should not be turned during the sedation interruption.****

STICU Spontaneous Breathing Trial (SBT) Algorithm

Schedule odd numbered rooms at 03:00, and even numbered rooms at 05:00
Spontaneous breathing trial should be done in conjunction with the daily sedation interruption



Performance of a Cuff Leak Test (CLT)
-Suction oro/hypopahrynx well
-Change vent mode to CMV, ATC off and TV at 10cc/kg of predicted BW
-Deflate ETT balloon completely and observe for 5 respiratory cycles
-Cuff leak adequate if there is 20% drop from VTi to VTe


Extubations / vent days every quarter
No of Extubations/Vent days per quarter
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
UCL
0.013
Intervention
Preintervention
0.009
0.003
0.006
0.006
0.004
0.004
CL
0.005
2Q 2009
3Q 2009
4Q 2009
1Q 2010
2Q 2010
July/Aug
Time period

Beginning Steps

Teaching:

- Two staff nurses created a teaching tool and, with a group of experienced nurses, taught each nurse individually how to use the sedation/analgesia and SBT protocols.
- Residents were educated as well regarding the proper use of these protocols.
- Both protocols were put on the UHS Clinical Portal for easy reference by staff.

Teaching

Metrics for Potential ROI

- A ventilator day costs approximately $8,000.
- SE requiring re-intubation has been associated with longer total time of mechanical ventilation (17 vs. 6 days), increased ICU stay (22 vs. 9 days) and increased hospital stay (34 vs. 18 days).[6]
- If we can prevent even one SE requiring re-intubation the potential for ROI is significant.

6. De Lassence A, Alberti C, Le Miere E, Cheval C, Cohen, Y, Garrouste-orgeas M, Adrie C, Troche G, Timsit G: Impact of unplanned extubation and reintubation after weaning on a nosocomial pneumonia risk in the intensive care unit: a prospective multicenter trial. *Anesthesiology*. 2002 Jul; 97(1): 148-56.

Into the Future

In this process, other variables have been identified as impacting not only SE but also the unplanned removal of other medical devices:

- Inadequate or incorrectly applied restraint devices
- Need for protocol to assess and treat delirium
  - Non pharmacologic interventions
  - Validated delirium scale

In the future: Coed beds

Coed beds:
Provides 1:1 to prevent self extubation by providing companion support as well as increases patient satisfaction

In the future: Sharing oxygen

In the future: Nicotine impregnated ETT