Clinical Safety & Effectiveness
Session # 6

Decreasing Unplanned Extubations in a PICU

CENTER FOR PATIENT SAFETY & HEALTH POLICY

UT HEALTH SCIENCE CENTER™

SAN ANTONIO

Educating for Quality Improvement & Patient Safety

Our Team

- Division
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  - CS&E Participant Curt Froehlich, MD, UTHSCSA
  - Team Member Casey Howard, RRT, CSRCH
  - Team Member Donna Doerr, RN, CSRCH
  - Team Member Morris Sauter, Pharm D, CSRCH
  - Team Member Kendra LaBrosse, RN, CSRCH
  - Team Member Rick Taylor, MD, UTHSCSA
  - Facilitator Amruta Parekh, MD, UTHSCSA
- Sponsor Department
  - Thomas Mayes, MD CSRCH/UT Pediatrics
  - Trisha Montague, RN, CNO of CSRCH

Project Milestones

• Team Created	Aug 2010
• AIM Statement Created	Aug 2010
• Weekly Team Meetings	Sept 2010
• Background Data, Brainstorm Sessions, Workflow and Fishbone Analyses	Sept 2 – Sept 12
• Interventions Implemented	Oct 1-Jan 2011
• Data Analysis	Jan 2011
• CS&E Presentation	Jan 20, 2011

OUR AIM STATEMENT

To decrease the number of unplanned extubations at CHRISTUS Santa Rosa Children's PICU by 50% (1.6/100 to 0.8/100) by Jan 2011

Background

- Endotracheal tubes (ETT) and maintenance of ETT is key to the treatment of respiratory failure
- Respiratory failure accounts for 12-24% of admits to the PICU.
- Untimely removal of the ETT can add morbidity (increased LOS, increased vent days) and can lead to increased mortality (inability to replace ETT)
- Recent studies show an ability to decrease extubations to 0.2 to 0.8/100 vent days
- Target benchmark: <1 UE per 100 vent days

Am J Respir Crit Care Med 2003 May 15;167(10):1334-40.
Pediatric Crit Care Med 2010 Vol 11, No. 2, p287-294

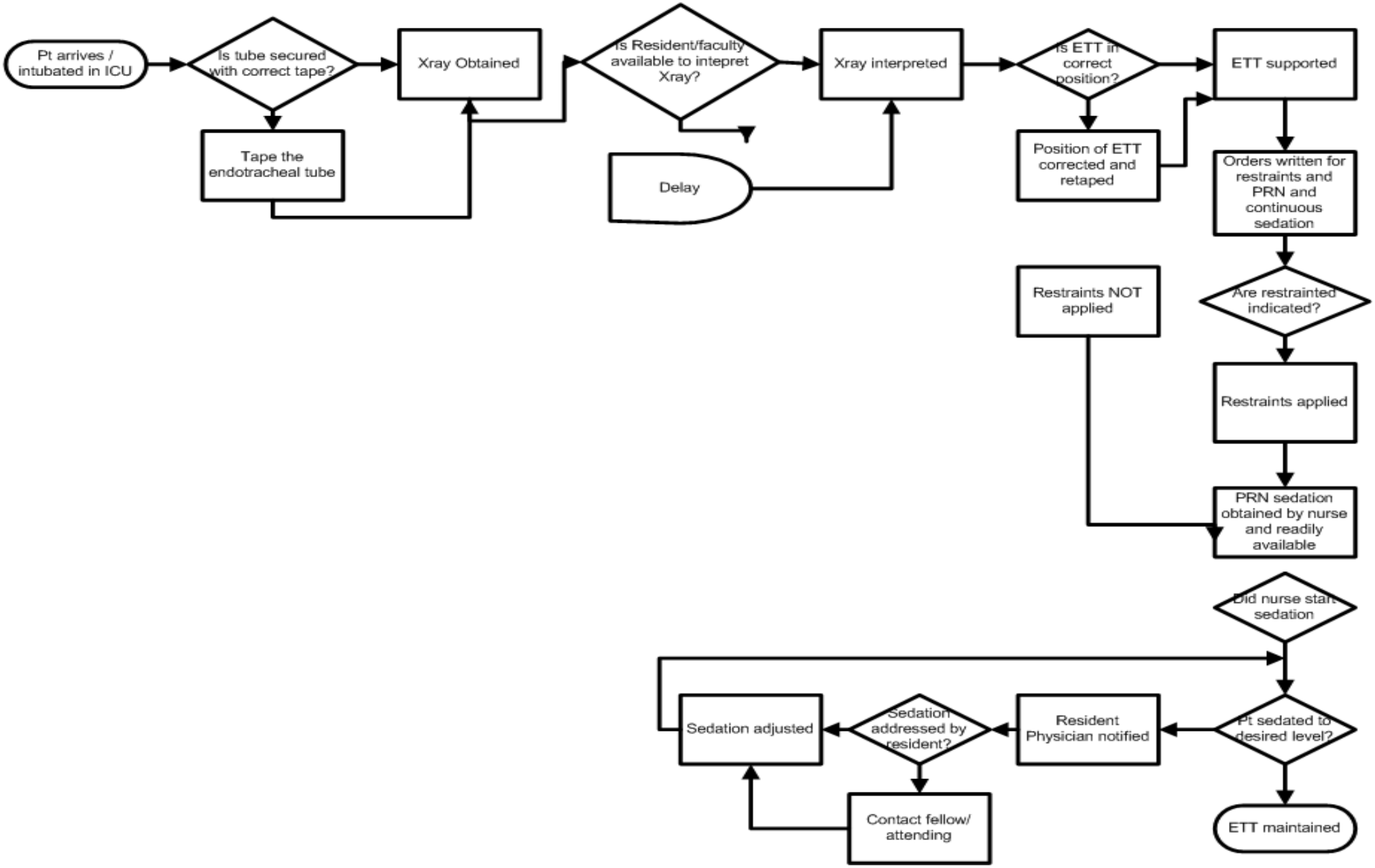
Background

- Our goal was to decrease unplanned extubations in the CHRISTUS Santa Rosa PICU
- Project was selected based upon timeframe/objects within our direct control due to timeline of the class
- Utilized existing data collection process at CHRISTUS SRCH
- What starts out simple….

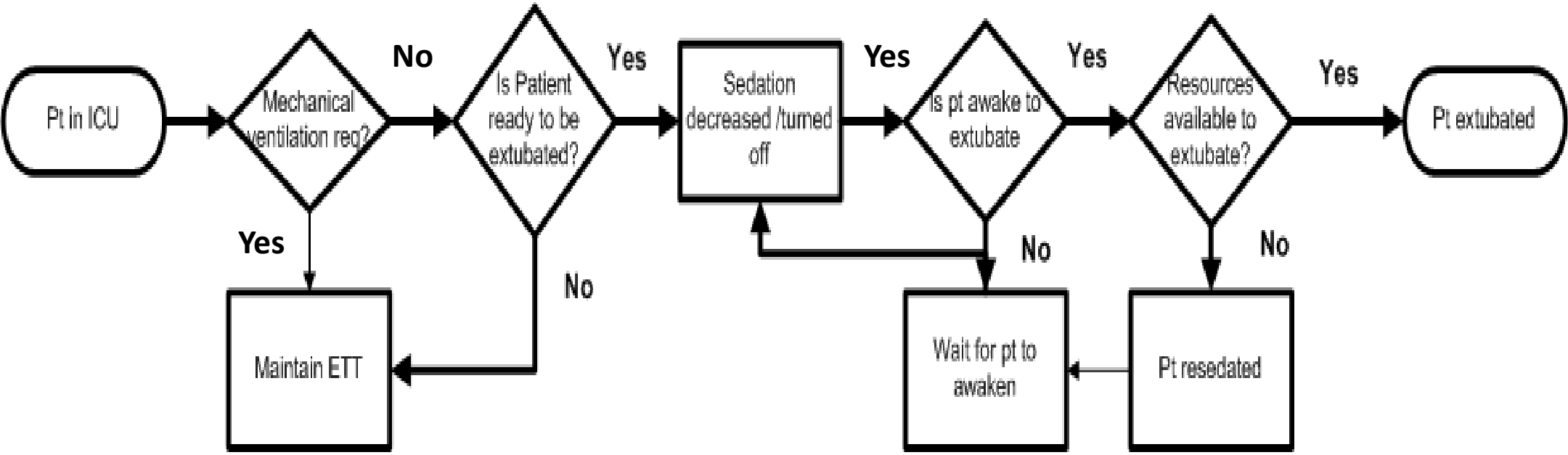
Measurement of Change

- All unplanned extubations are treated as sentinel events and reported to nursing leadership
- Charts of all patients in the CHRISTUS Santa Rosa PICU are reviewed for any missed events
- Chart review is used to calculate total number of patients with respiratory failure and ventilator days
- Rate of unplanned extubations will be evaluated over time and indexed per 100 vent days

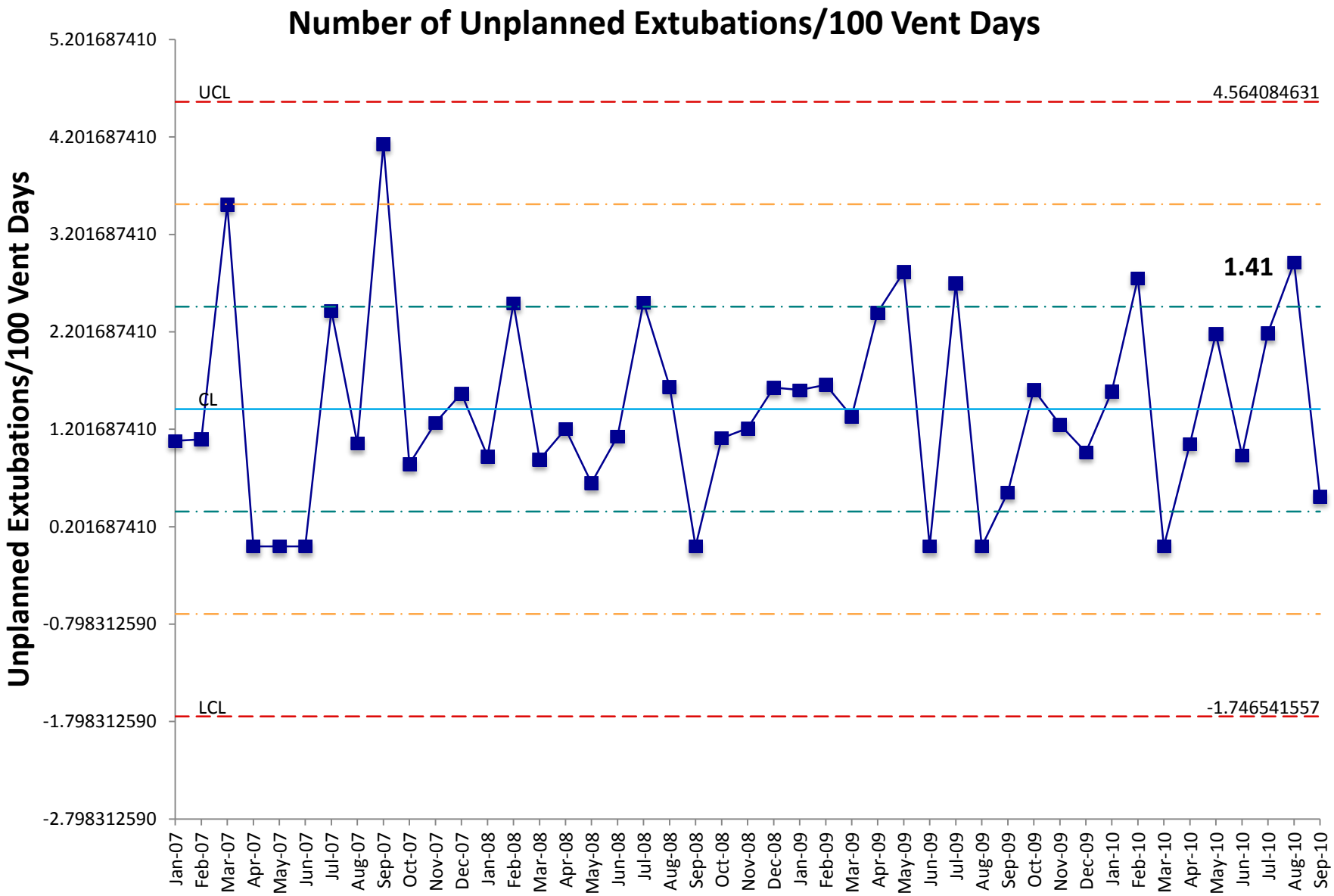
ETT Maintenance Flowchart



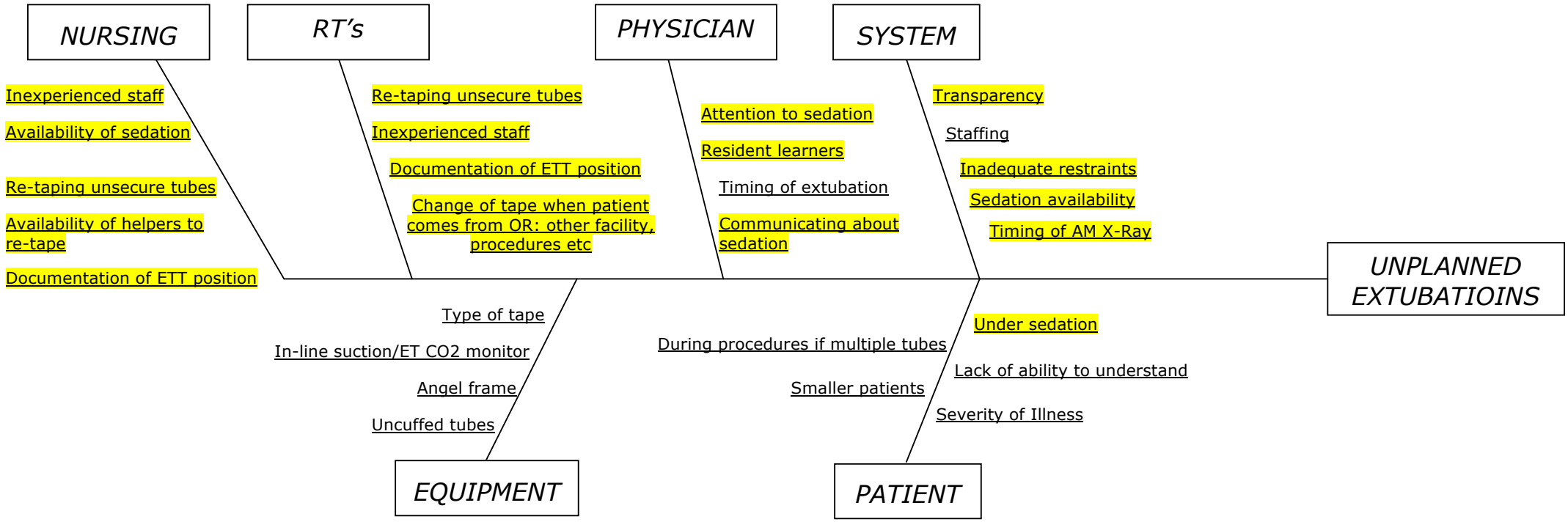
Flowchart for Planned Extubation



Background Data



Aim Statement: To Decrease Unplanned Extubations In The Santa Rosa PICU By 50% (1.6/100 vent days to 0.8/100 vent days) By January 15, 2011.



Background Data

	Before Interventions N=44
Patient < 5kg =	15 (34%)
Night time UE =	31 (70%)
RN < 1yr exp =	19 (43%)
Traveler =	3 (7%)
Tape moist a factor =	5 (11%)
Less than optimal sedation a factor =	32 (73%)
No restraints a factor =	7 (16%)
Related to procedure = (prone =)	12 (27%) 2 (5%)

“Save” the ETT Campaign

- Each child with an ETT will have a card posted at the head of the bed with size and location/last re-taped
- Each shift (Q12 hours) charge nurse will assess all ETT’s to verify the tape is dry/secure and taped at the correct depth
- Each day the charge nurse will assess each intubated patient to determine if restraints should be considered and if in place, ensure appropriate restraint orders are in effect

Decision Tools

CHRISTUS
SANTA ROSA
Children's Hospital

Pediatric Endotracheal Tube Card

Patient Label:

ETT Size: _____ ☐ cuffed ☐ uncuffed

Taped at _____ cm at lip

Last re-taped on _____ by _____

Decision Tools

PATIENT SAFETY REVIEW FOR ETT'S

Name of Day UBL: _____

Date: _____ Name of Night UBL: _____

Room #	ETT Day Assessment	ETT Night Assessment
	Green ETT card posted? Yes ! No ! If yes, tape dry/secure? Yes ! No ! @ correct depth? Yes ! No ! Sedation Flowsheet in use? Yes ! No ! Does child need restraints? Yes ! No ! If yes, please complete the restraint audit tool	Green ETT card posted? Yes ! No ! If yes, tape dry/secure? Yes ! No ! @ correct depth? Yes ! No !
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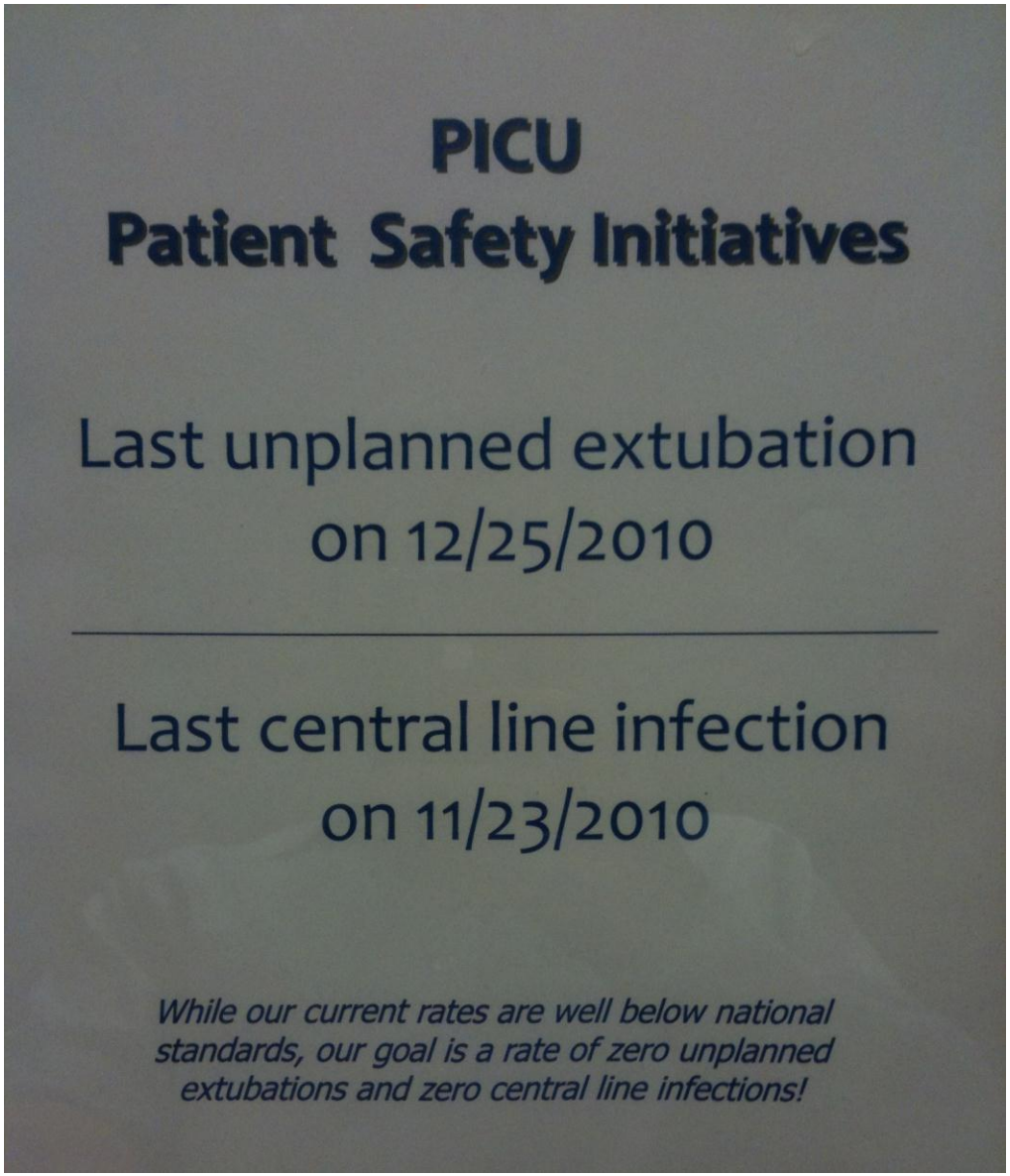
“Save” the ETT Campaign

- The date of our last unplanned extubation will be posted at the front of the unit
- Each child with an ETT will have a physician order stating a sedation goal
- Nursing will document patient sedation level Q2 and notify physician when sedation is “out of range”
- Addressed timing and interpretation of AM X-rays for ETT verification

Decision Tools



Decision Tools

PICU Sedation Level Scale

Desired Sedation Level	Description	Definition
0	Unresponsive	Does not move with noxious stimuli OR if on neuromuscular blockade (NMB), HR and MAP below baseline
1	Responsive to noxious stimuli	Opens eyes OR raises eyebrows OR turns head toward stimulus OR moves limbs when noxious stimulus is applied OR HR and MAP consistently at baseline if on NMB
2	Responsive to touch or name	Opens eyes OR raises eyebrows OR turns head toward stimulus OR moves limbs when touched or name is loudly spoken OR HR and MAP consistently at baseline if on NMB
3	Calm and cooperative	No external stimulus is required to elicit movement AND patient is adjusting sheets or clothes purposefully and follows commands OR HR and MAP at infrequent elevations of 20% or more above baseline if on NMB
4	Restless and cooperative	No external stimulus is required to elicit movement AND patient is picking at sheets or tubes OR uncovering self AND follows commands OR HR and MAP at infrequent elevations of 20% or more above baseline if on NMB
5	Agitated	No external stimulus is required to elicit movement AND attempting to sit up AND does not consistently follow commands OR HR and MAP at frequent elevations of 20% or more above baseline if on NMB
6	Dangerously agitated and uncooperative	No external stimulus is required to elicit movement AND patient is pulling at tubes OR lines OR thrashing OR trying to climb out of bed AND doesn't calm down when asked OR HR and MAP at sustained elevations >20% in on NMB

- Use "IV Sedation/Analgesia Flowsheet for Intubated Patients in PICU" for all intubated patients.
- Document sedation level at least q 2 hours.
- Obtain physician order for sedation level goal.

Decision Tools

Baseline HR: _____ Baseline MAP: _____ Weight: _____ kg

Date	Time	Medication/ Concentration	Dosage	Rate of Infusion	Desired Sedation Level	Current Sedation Level	Interventions/Comments	Nurses Initials

Sedation Level Scale
0 = Unresponsive
1 = Responsive to noxious stimuli
2 = Responsive to touch or name
3 = Calm and cooperative
4 = Restless and cooperative
5 = Agitated
6 = Dangerously agitated and uncooperative

Medication/Concentration
A.
B.
C.
D.

Initials	Signature	Initials	Signature

CHRISTUS SANTA ROSA
Children's Hospital

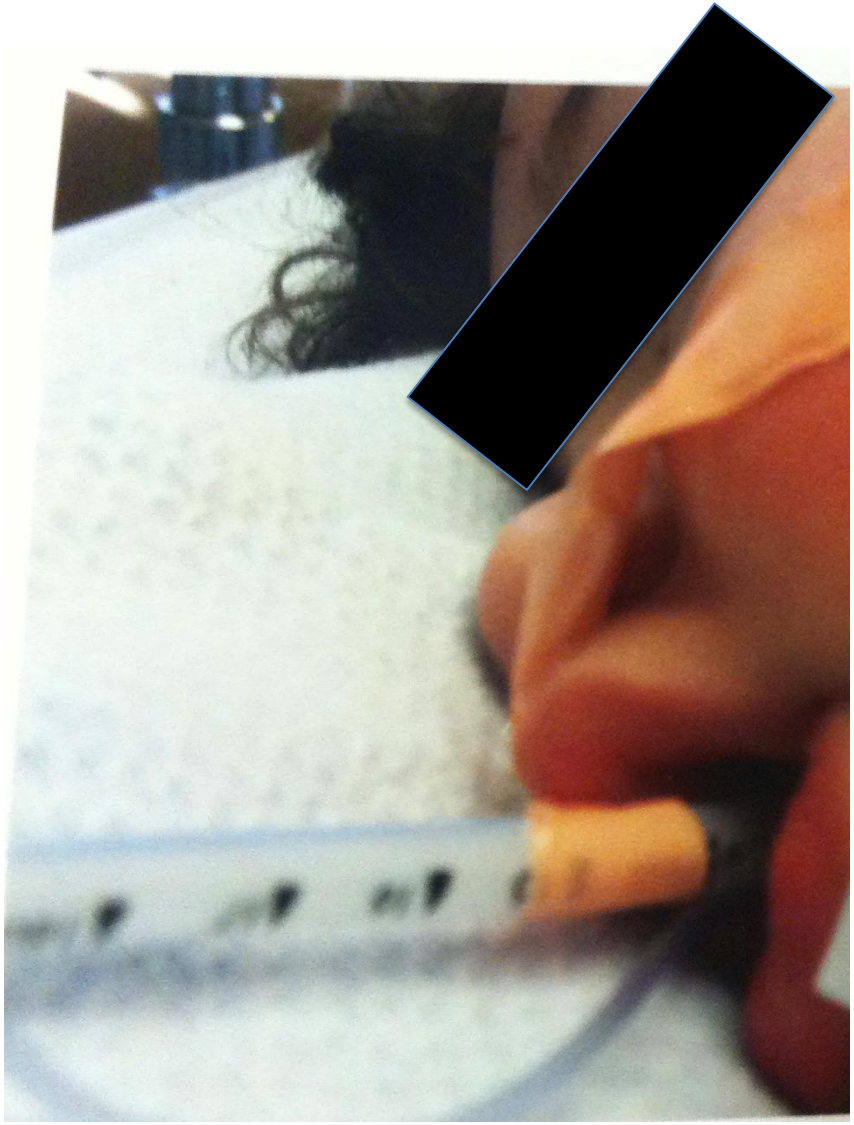
IV Sedation/Analgesia Flowsheet for Intubated Patients in PICU

Specific Episode #1 (PDSA)

- 1 yr old patient with seizure disorder underwent LP while intubated
  - Patient restrained and sedated prior to procedure
  - After procedure patient being repositioned
  - Restraints in place
  - Patient extubated with multiple resident physicians in the room
  - Reviewed by team
  - Opportunity for improvement

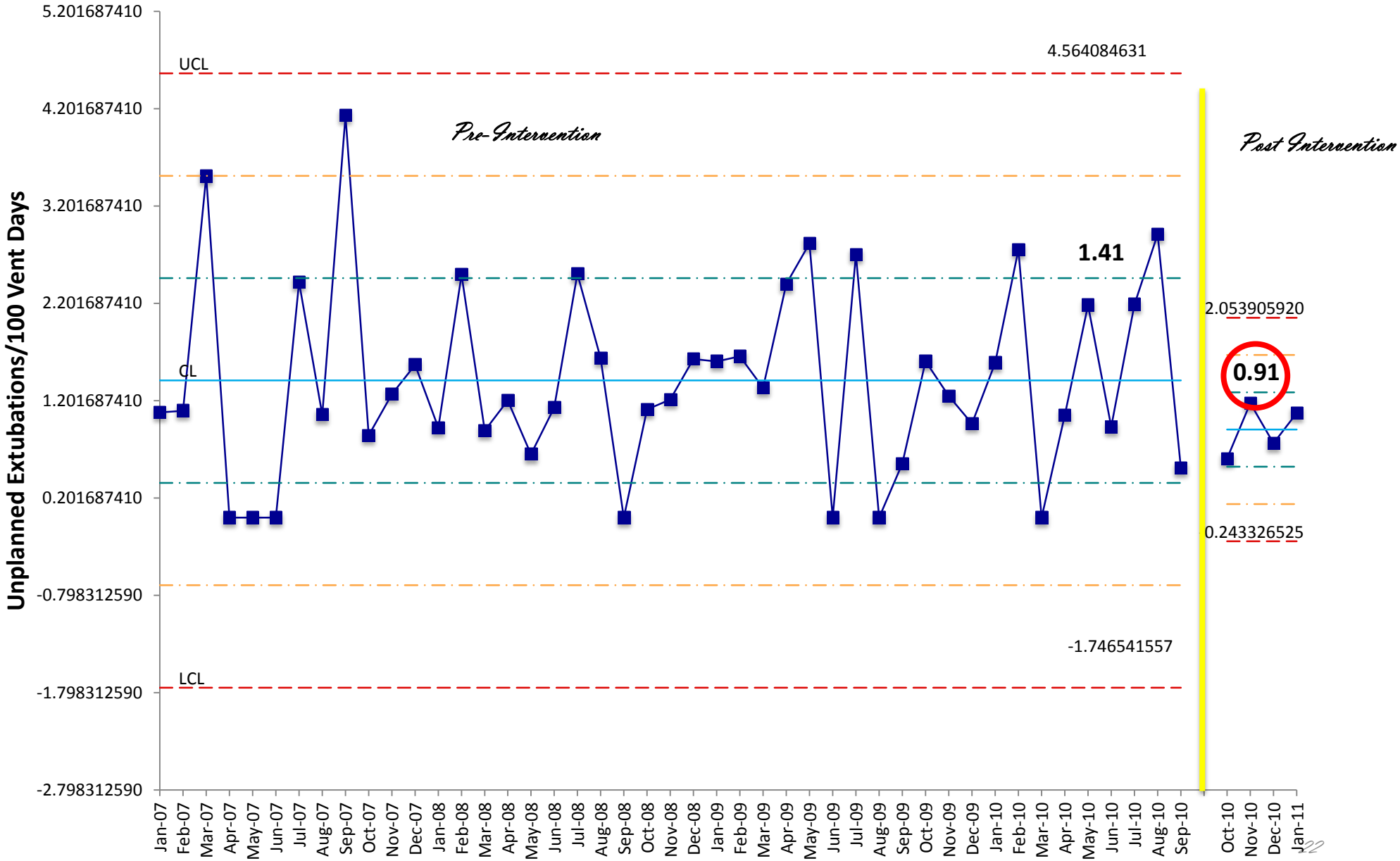
Specific Episode #2 (PDSA)

- Small 2.6 kg infant received from anesthesia S/P congenital cardiac repair
  - CXR obtained upon arrival to PICU (as per protocol)
  - ETT critically high (at the thoracic inlet)
  - When ETT attempted to be repositioned patient extubated
  - Reviewed by team
  - Opportunity for improvement



Results

Number of Unplanned Extubations/100 Vent Days



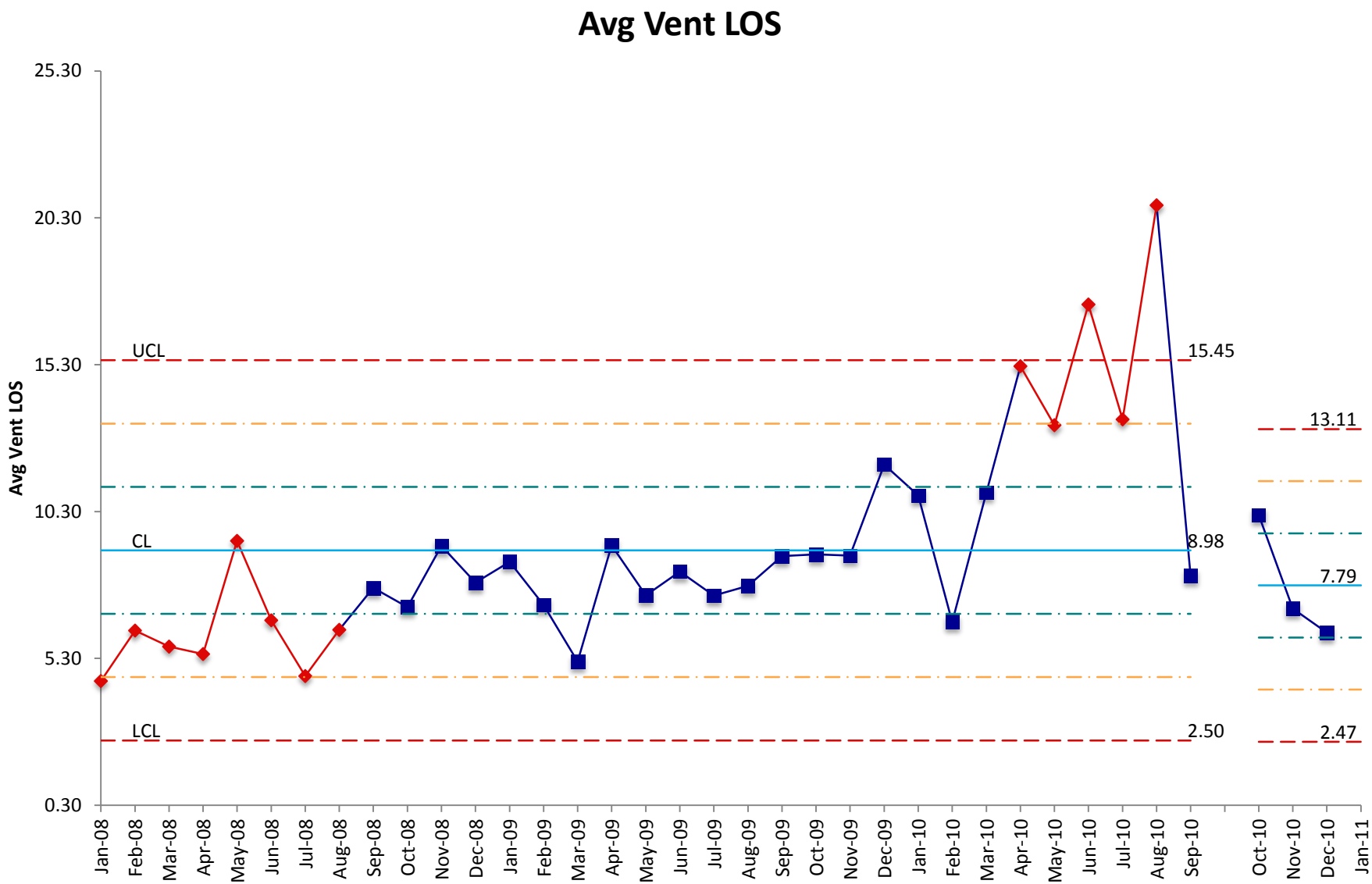
Results

	Before Interventions N=44	After Interventions N=5
Patient < 5kg =	15 (34%)	1 (20%)
Night time UE =	31 (70%)	1 (20%)
RN < 1yr exp =	19 (43%)	3 (60%)
Traveler =	3 (7%)	0
Tape moist a factor =	5 (11%)	0
Less than optimal sedation a factor =	32 (73%)	2 (40%)
No restraints a factor =	7 (16%)	1 (20%)
Related to procedure = (prone =)	12 (27%) 2 (5%)	3 (60%) 1 (20%)

Results

- Charge Nurse assess each ETT every shift
  - During our 90 day period 32 ETT's were identified which required re-taping or re-positioning
  - We believe this had a significant impact upon our unplanned extubations
  - We appreciate all of the extra work performed by the charge nurses

Return on Investment



Return on Investment

- Since Oct we have had 559 vent days
- At previous rate (1.41/100) we would have predicted 8 extubations for Oct-Jan
- During study period we had 5 unplanned extubations (0.91/100)
- We prevented 3 unplanned extubations during the study period
- Assuming unintentional extubation adds 4 ICU days and 3 vent days (each ICU day $3993 +2014 vent day)
- Savings: $66,042 ($22,014 per patient)

PEDIATRICS Vol. 114 No. 3 September 2004, pp. 628-632

Conclusions

- While we did not meet our goal our project had a positive impact:
  - Current Unplanned Extubation rate below benchmark of 1/100
  - Prevented 3 unplanned extubations thus far
  - If continues at current rate will prevent 9 unplanned extubations this year
  - Project saves $198,126/year
  - Increased vigilance by patient care team created 32 “saves”

Future Directions

- Based on historical data and information gained during the project:
  - Explore whether other institutions use an “extubation protocol” and consider its development at CSRCH
  - Develop a standard for ETT maintenance during procedures
  - Improved education about ETT maintenance during medical student/resident/fellow education
  - Refine education for new RN’s
  - Work with anesthesia/ER to standardize ETT maintenance practices

Questions?