



Collaborate to Extubate

Clinical Safety & Effectiveness Cohort 19: Team # 7



University Health System
University Hospital



UT MEDICINE
HEALTH SCIENCE CENTER SAN ANTONIO

The Team

- **Division**

- CS&E Participant: Marivel Garcia, BSRC, RRT- NPS
- CS&E Participant: Crisostomo Cabagay, BSN, RN, CCRN
- CS&E Participant: Veronica Armijo-Garcia, MD
- CS&E Participant: Dorinda Escamilla-Padilla, DNP, RN, PNP-AC/PC
- Team Member: Ronald Estrella, MSN, RN, CCRN
- Facilitator: Edna Cruz, M.Sc., RN, CPHQ, CPPS

- **Sponsor Department:**

- James Barker, M.D. V.P. Clinical Services, UHS

AIM Statement

- Decrease unplanned extubation (UPE) by 50% (1.1 UPEs/100 ventilator days to 0.5 UPEs/100 ventilator days) by December 31, 2016 in the Medical ICU at University Hospital.



The team used the PDSA model for Improvement

Definition

- UPE includes self-extubation and accidental extubation.
- Frequent during mechanical ventilation in critically ill patients
- Associated with increased morbidity and mortality

Background: Incidence

- Multiple Studies on UPE
 - Most recent articles in adult ICUs report: 1 – 22% of intubated patients have an UPE
 - 18-91% of UPE are self-extubations
 - Reintubation rates are also wide: 1.8 – 88%

Background: At What Cost?

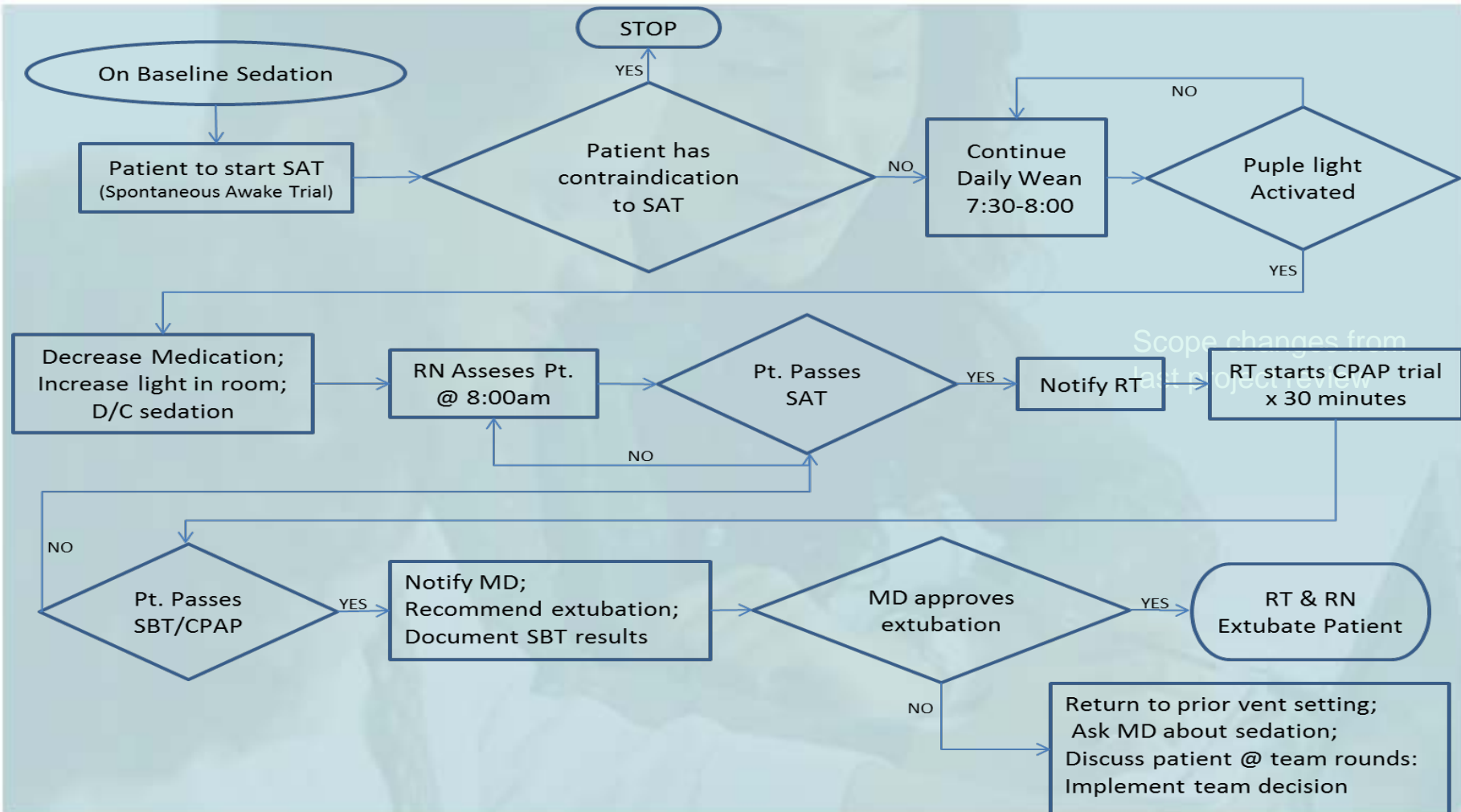
- Increased morbidity:
 - Increase ventilator days and associated risks
 - Pneumonia
 - DVT
- Increase LOS
- Increased mortality

Study: Baseline Data

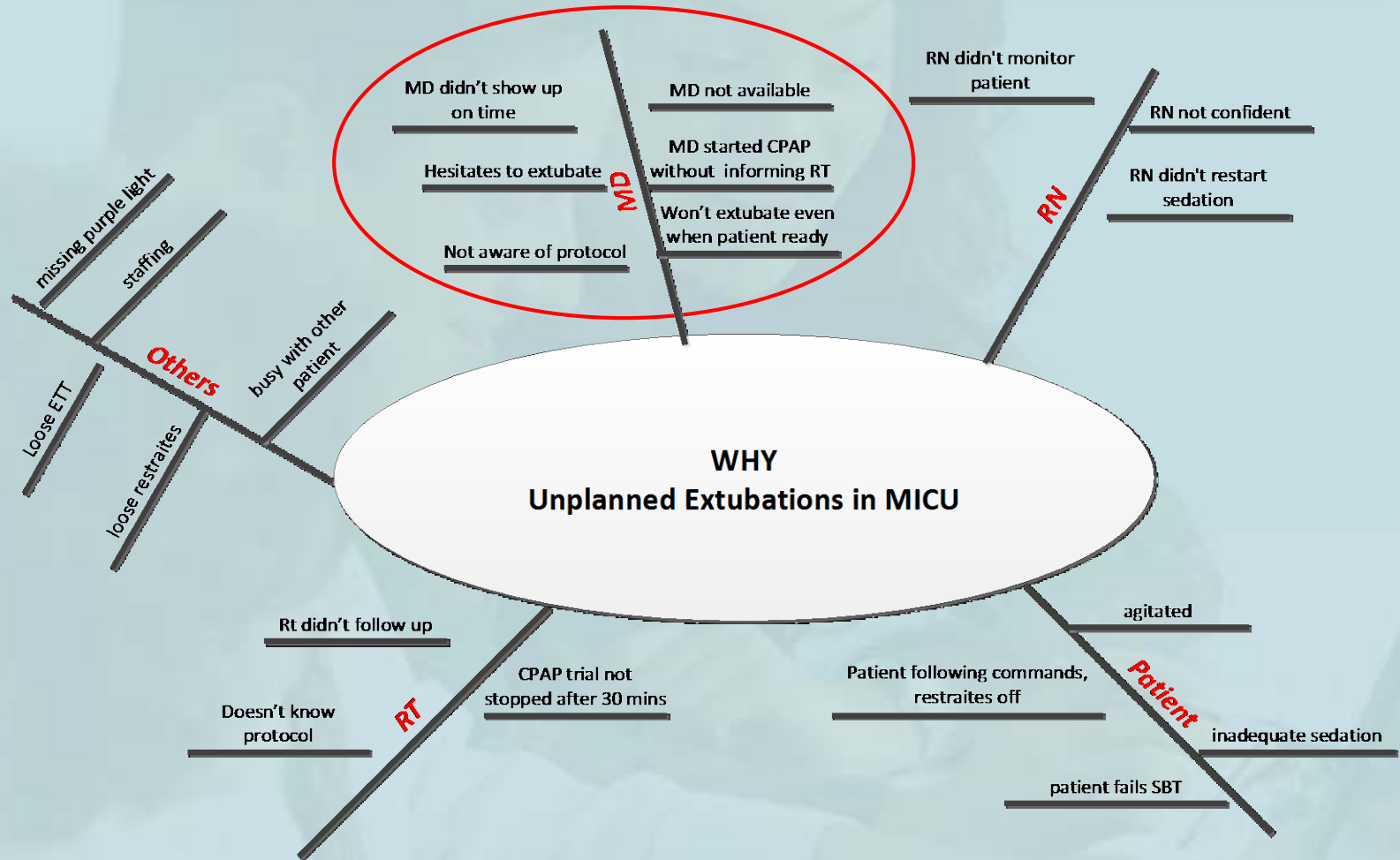
Medical Intensive Care Unit

- January thru July 2016
 - 148 intubated patients
 - 24 UPEs
 - 16% of all intubated patients
 - Data on 22 patients only
 - 1.1 UPEs/100 ventilator days
 - All were self-extubations
 - 17 (70%) occurred between Day 0-3

Extubation – Flow Diagram



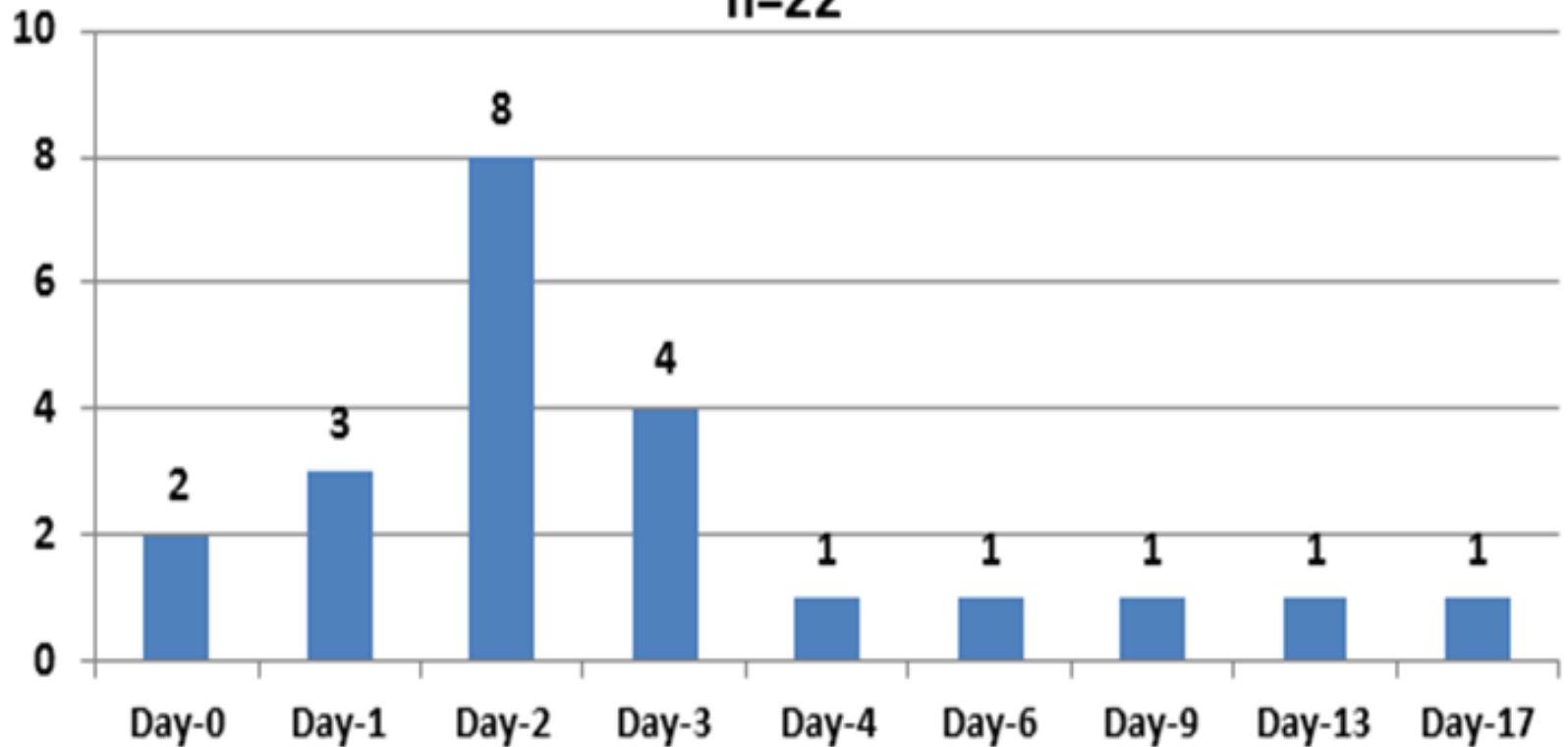
Cause and Effect Diagram



Unplanned Extubation

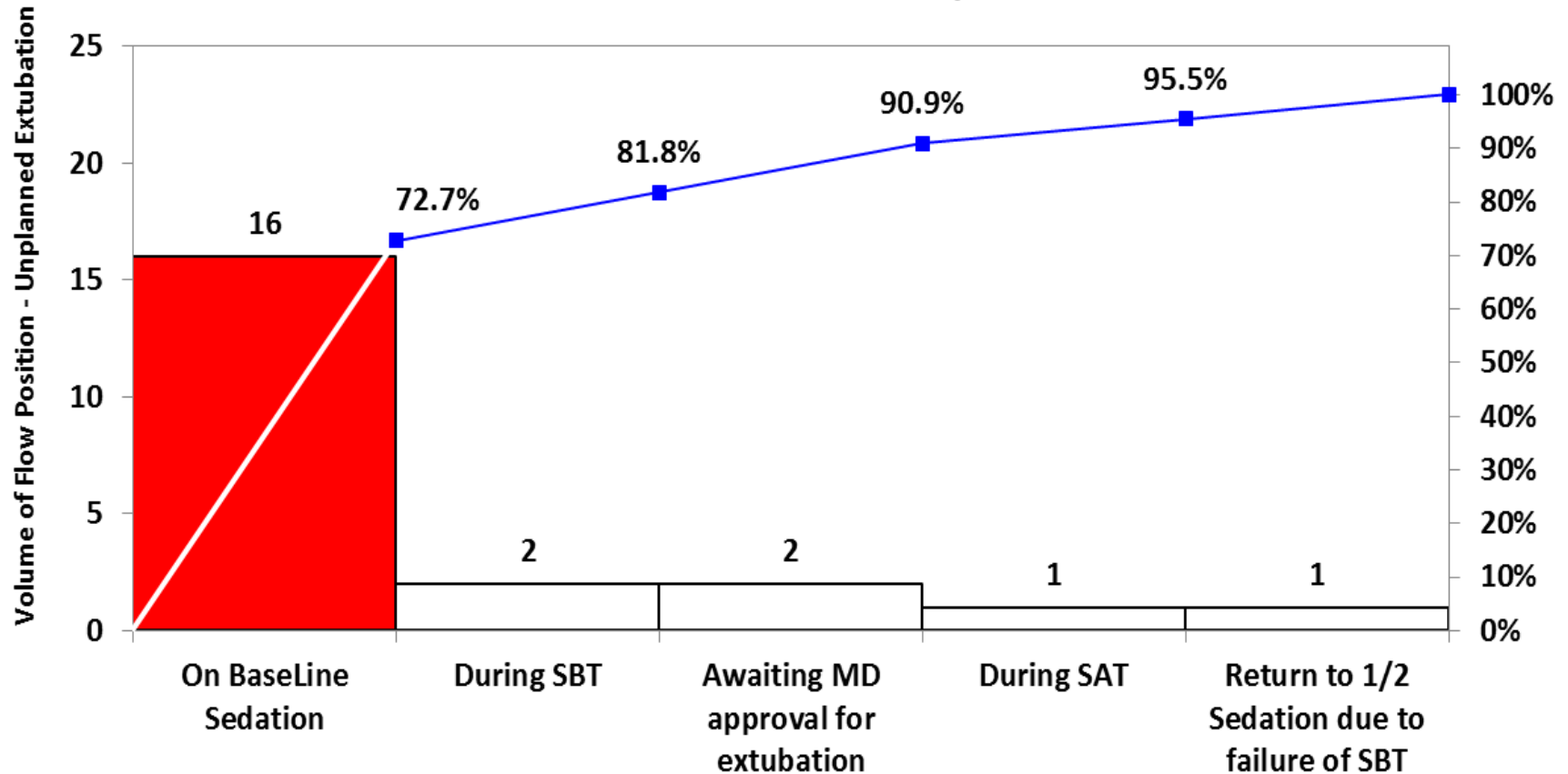
Volume of Cases by Day of Extubation

n=22



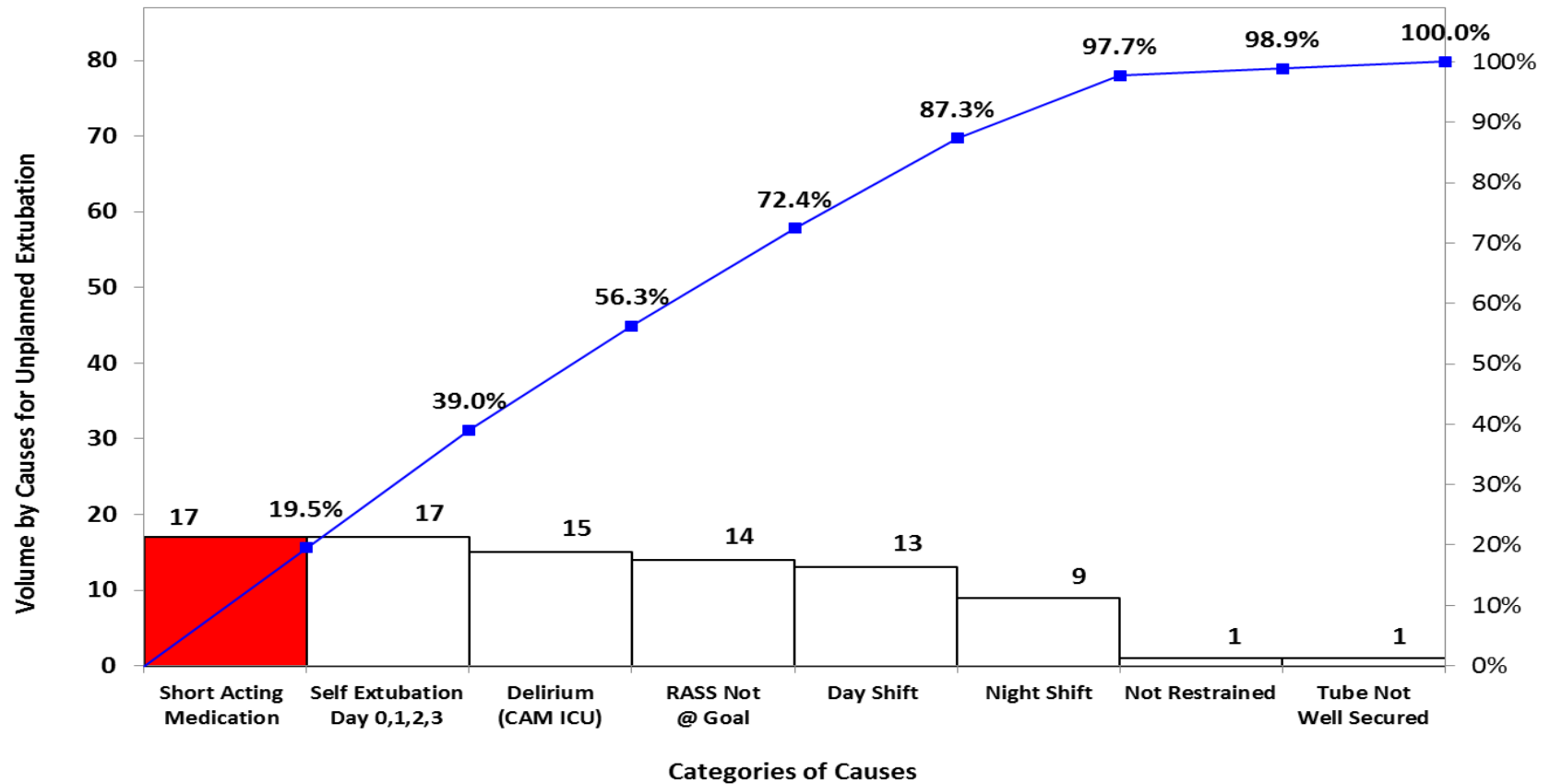
Real Issue: Flow Position at UPE

Pareto Chart of Flow Position at Unplanned Extubation



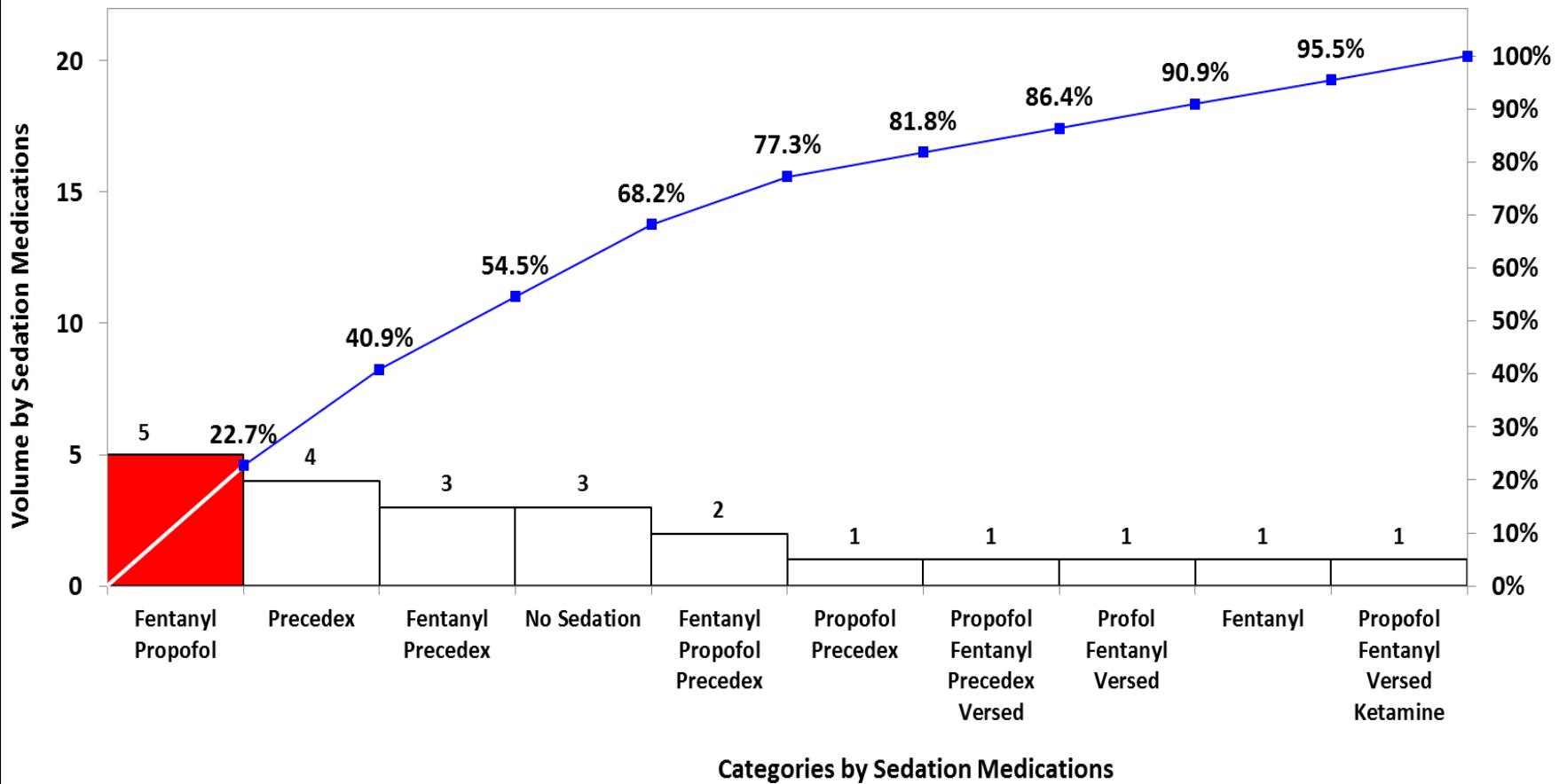
Causes for UPE

Pareto Chart of Causes for Unplanned Extubation
n = 87



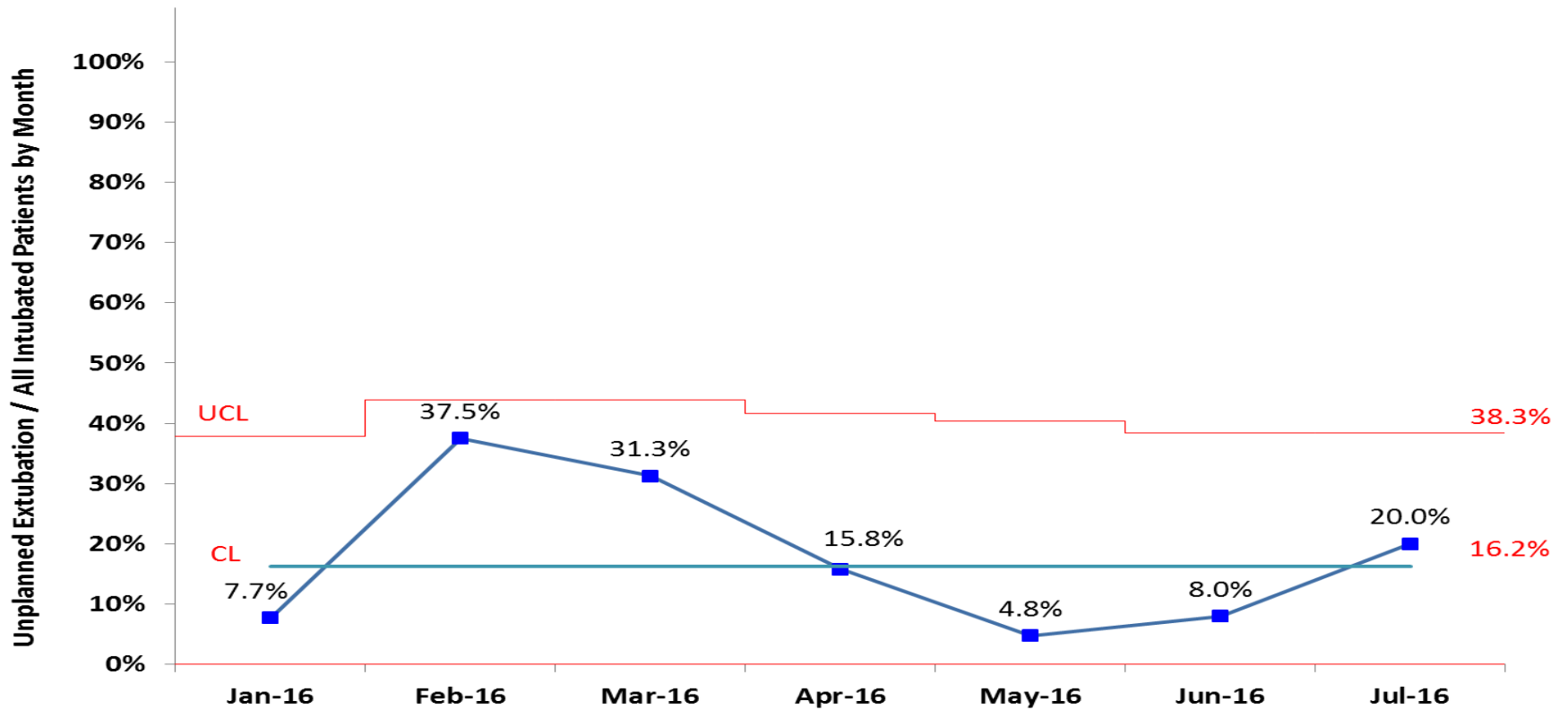
Sedation Utilized

Pareto Chart of Sedation Utilized



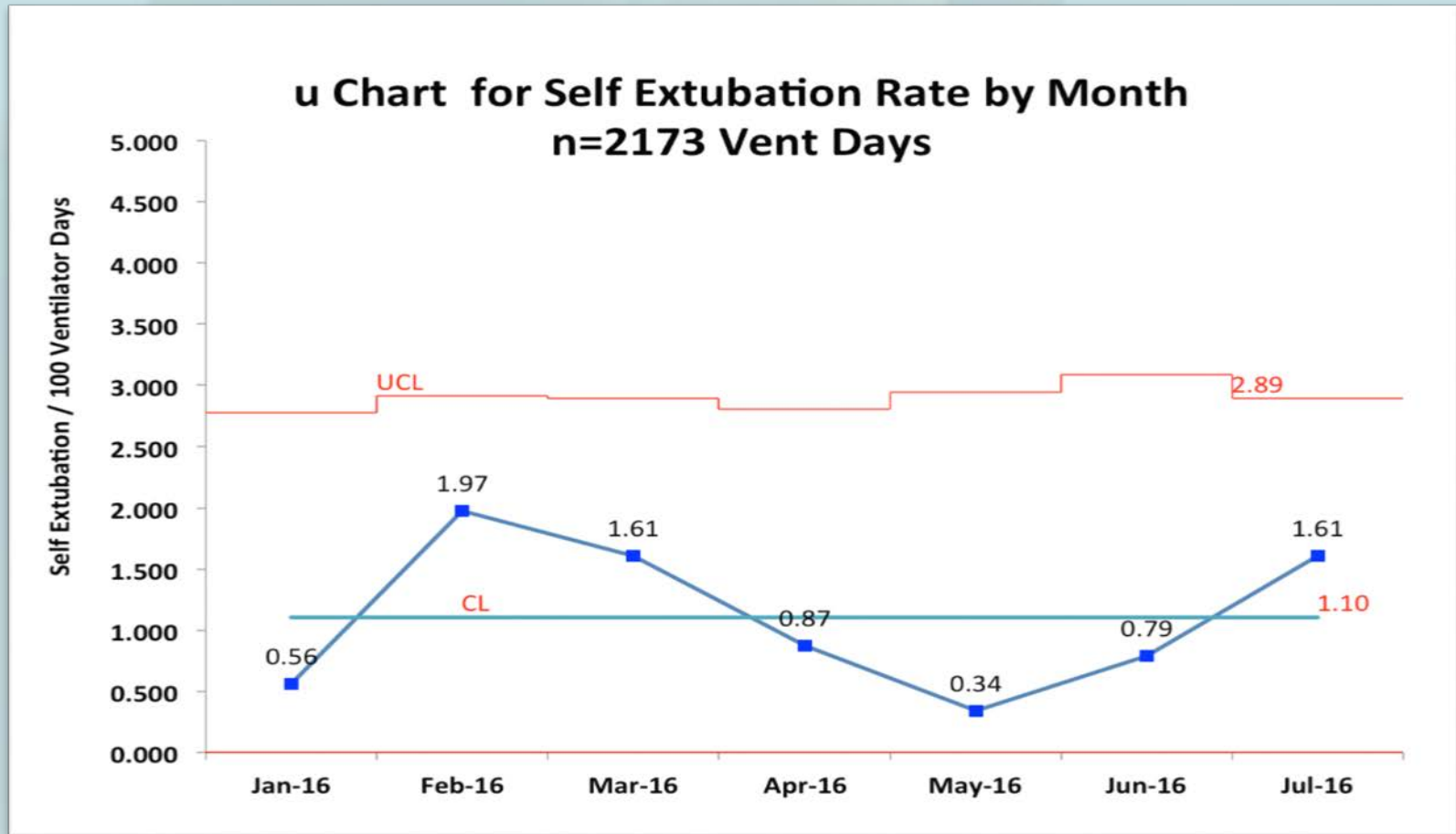
Baseline Process Control Chart Patients

**p-Chart for Unplanned Extubation by Month
n=148 Patients**



Baseline Process Control Chart

UPE per 100 Ventilator Days



Action Plan

Action Plan

Aim Statement: To reduce UPE in the Medical ICU by 12/31/2016

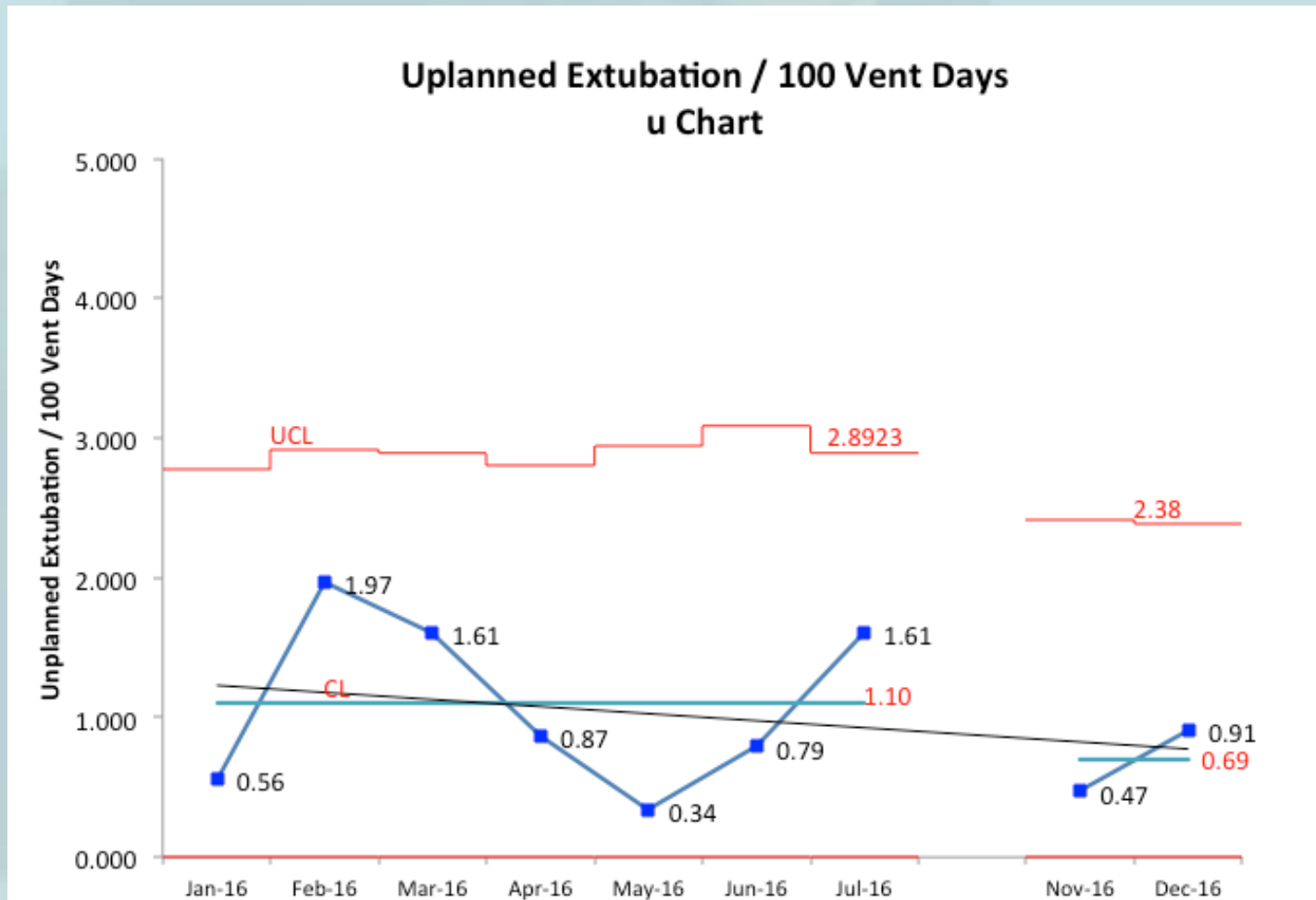
Action Strength	Action Driver	Action	Who?	Why?	Start Date
Strong	Inadequate sedation	Target RASS (-3) @ Day 0 - 3 of Mechanical Ventilation	Nursing Staff/MD	Standardize Simplify	11/1/16
Intermediate	Inadequate sedation	Patient Room Sign: Sedation Target:(-3) @ Day 0 - 3 of Mechanical Ventilation	Charge Nurse	Standardize Simplify	11/1/16
Intermediate	Subjective implementation of sedation protocol	Develop weekly process report to create awareness about compliance to new sedation target	Marivel/Cris	Standardize Simplify	11/1/16
Intermediate	Subjective implementation of sedation protocol	Use of Huddle & Process Report to hardwire the sedation protocol	Nursing Staff	Standardize Simplify	11/1/16

Compliance

Intervention:

- Target RASS of -3 on vent days 0-3
- Goal: 80% intervention adherence
- Compliance
 - November 56%
 - December 73%

Post-Intervention



* Excluding toxic ingestions, pre & post interventions UPE were 0.9 vs. 0.46

Financial Return on Investment

- Every UPE extends MV days and LOS by 6.8 days and 11 days, respectively and costs \$35,520 per UPE.
- Expected UPE over intervention time = $1.1/100$ vent days = 3.9 UPEs
- Actual UPE over intervention time = 2
- ROI = $(3.9-2) \times \$35,520 = \$67,488$ (amount saved over 2 month period)
 - Based on cost of UPE within literature
- Conservative ROI based on intensive care charges at UHS
 - Ventilator and room - \$53, 863 amount saved

Conclusions

- Sedation intervention has trended towards decreased UPE.
- Positive ROI
- Additional time needed to confirm success of intervention



Thank you for your time!

Questions?

References

- Bhattacharya, P., Chakraborty, A., Agarwal, P., (2007). Comparison of outcome of self-extubation and accidental extubation in ICU. *Indian Journal of Critical Care Medicine*, pg 105-108.
- McNett. M., & Kerber, K.(2015). Unplanned Exubations in the ICU: Risk Factors and Strategies for Reducing Adverse Events. *Journal of science communication*, p. 303-311.
- Epstein S, Nevins M, & Chung J. (2000). *American Journal of Respiratory and Critical Care Medicine*, 161:1912-1916.
- Krivopal M., Shlobin O., & Schwartzstein R. (2003). Utility of daily routine portable chest radiographs in mechanically ventilated patients in the medical ICU. *Chest*, 123:1607-1614
- De Lassence A., Alberti C., Azoulay E., et al. (2002). Impact of unplanned extubation and reintubation after weaning on nosocomial pneumonia risk in the intensive care unit. *Anesthesiology*, 97:148-156.