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# The Effects of Bundle Adherence on Ventilator-Associated Pneumonia: A Quality Improvement Project

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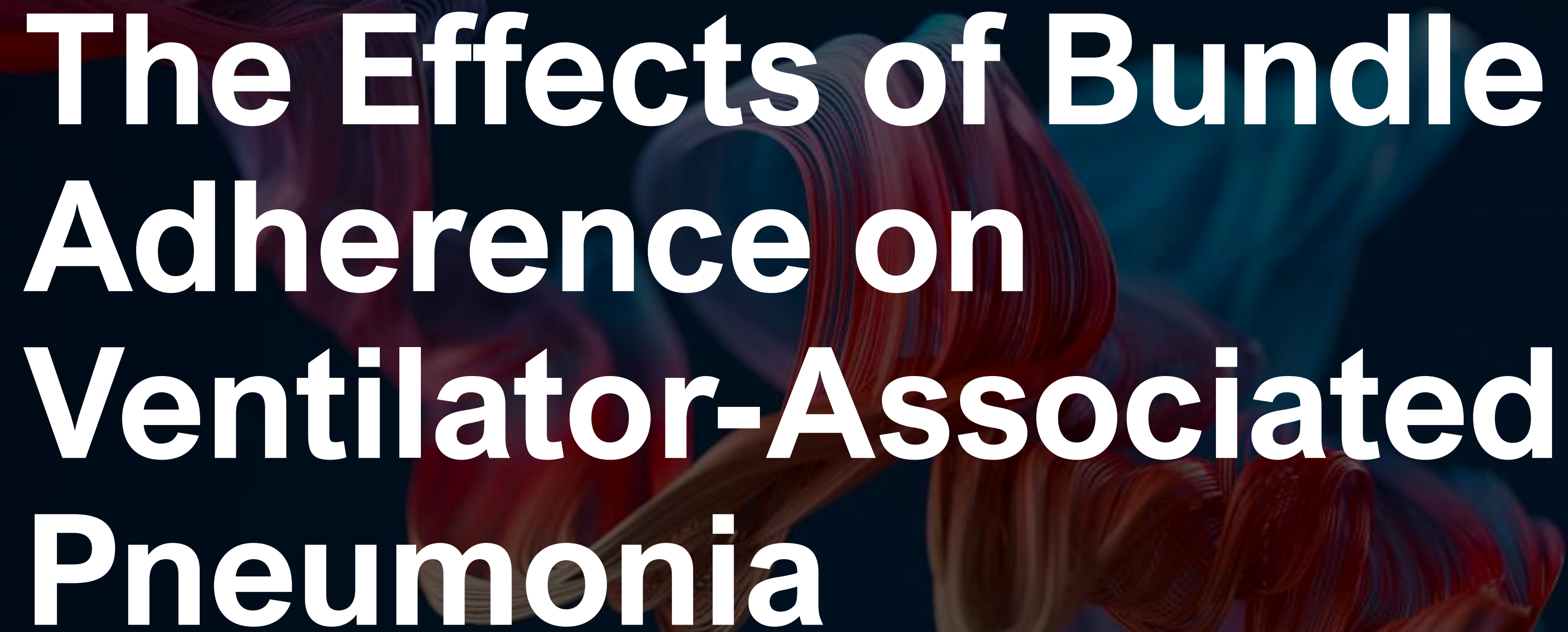


# The Effects of Bundle Adherence on Ventilator-Associated Pneumonia

SARA BORGES, MA RN

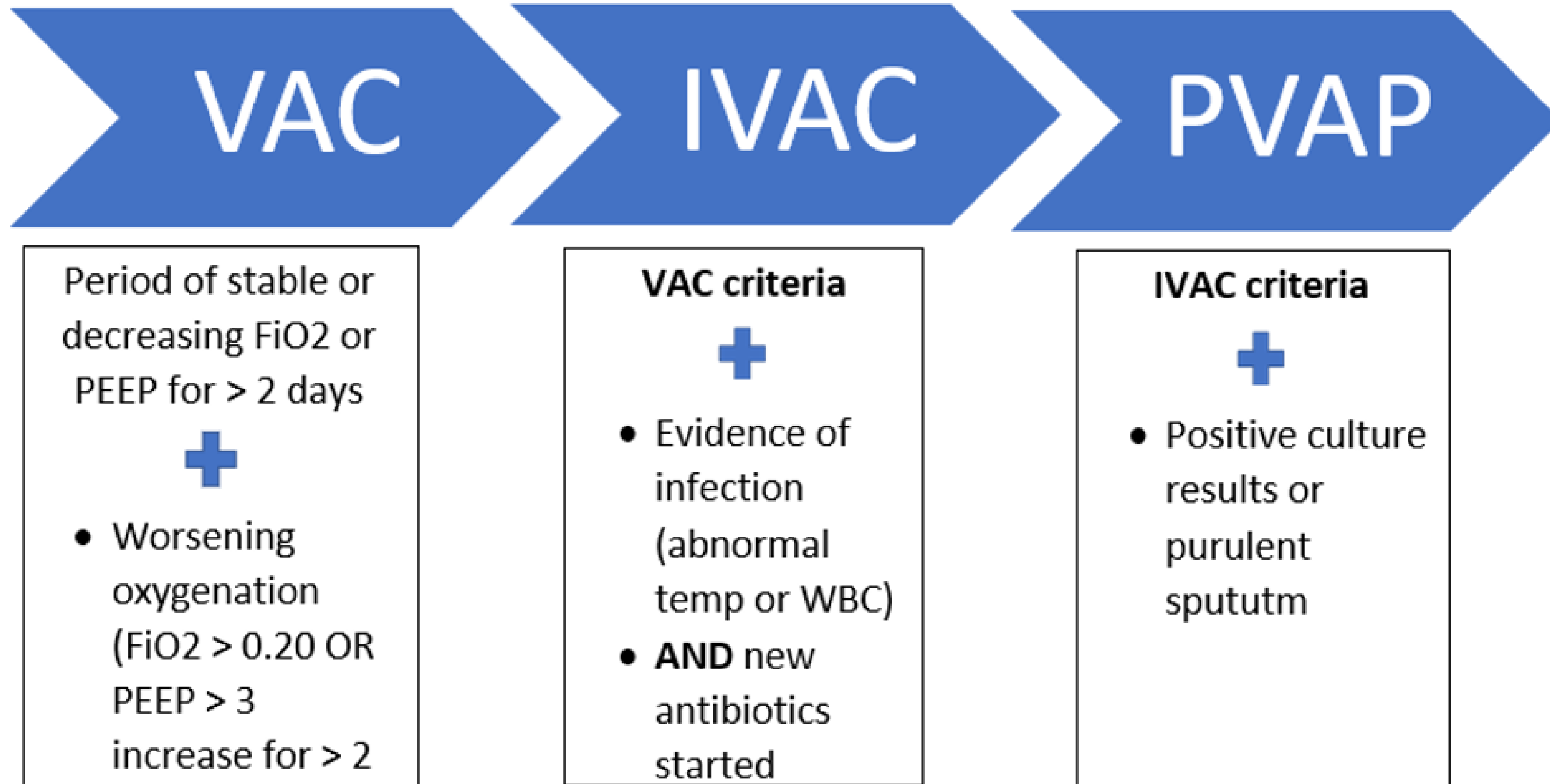
# Problem Identification

5-40% of ventilated patients develop pneumonia (VAP)

Increases time spent on a ventilator, days in Critical Care, and costs

Increases mortality risk by 10-40%

(Collard et al., 2003)




(AHRQ, 2017)

# VAP Prevention Bundle

- Every 2 hours: Oral care, HOB elevated 30-45 degrees
- Every 12 hours: Brush teeth, CHG mouth, deep suction, sedation vacation
- Every 24 hours: Spontaneous breathing trial and DVT and PUD prophylaxis (medications)
- Hi-Lo Evac tubes connected to continuous suction

# PICOT Question

**"In mechanically ventilated adults (P), how does adherence to a ventilator-associated pneumonia (VAP) bundle (I) compared to no bundle adherence (C) affect VAP rates (O) during hospitalization (T)?**

# Project Purpose

- Provide training to increase awareness of VAP bundle components

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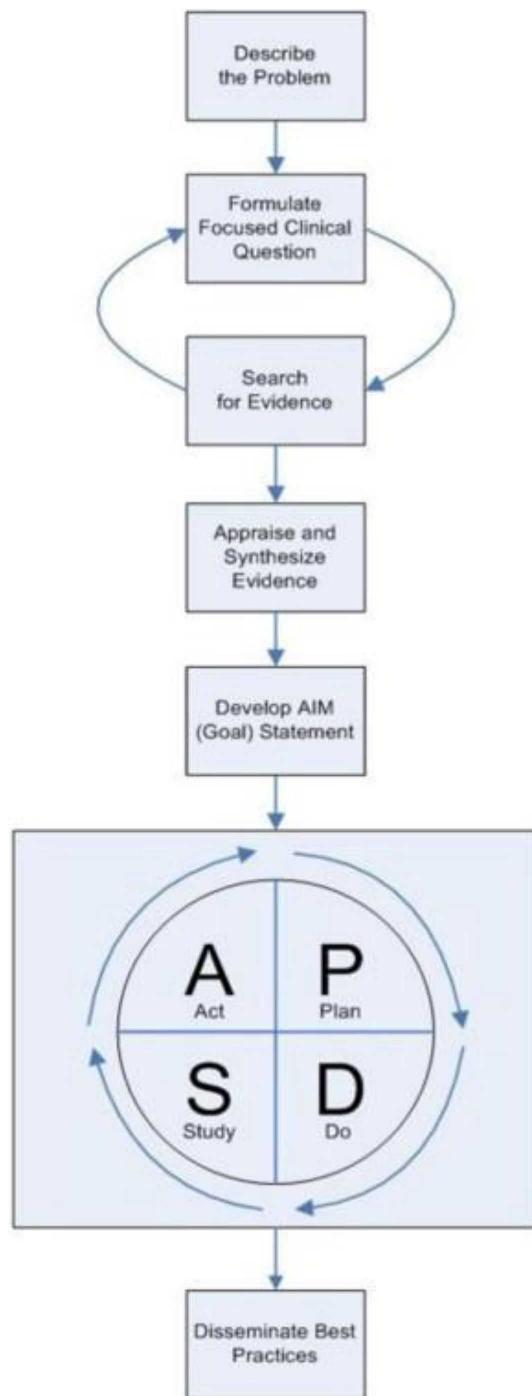
# AIMS OF PROJECT

Increase bundle adherence to 100%

Decrease VAP rates by 10%

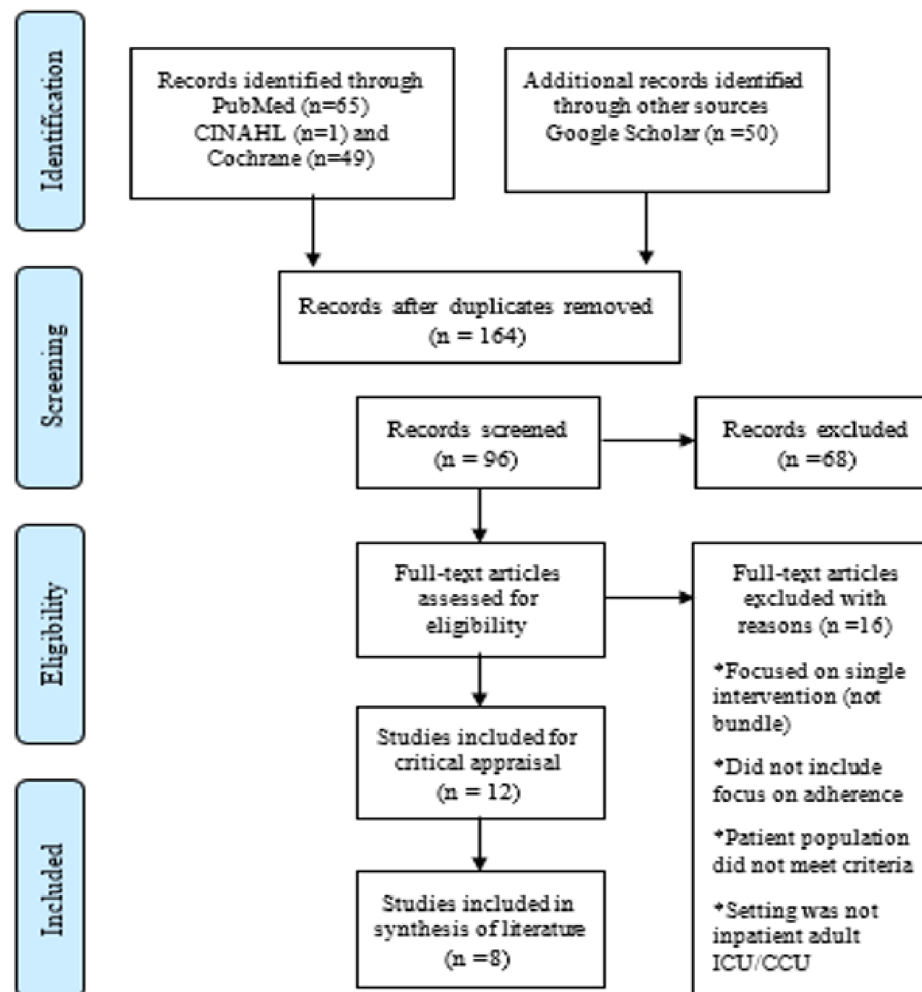



# Levin's EBPI Model Framework

- Describe the problem
- Formulate focused clinical question
- Search the evidence
- Appraise & synthesize evidence
- Develop aim/goal statement
- PDSA cycles
- Disseminate best practices

(Levin et al, 2010)

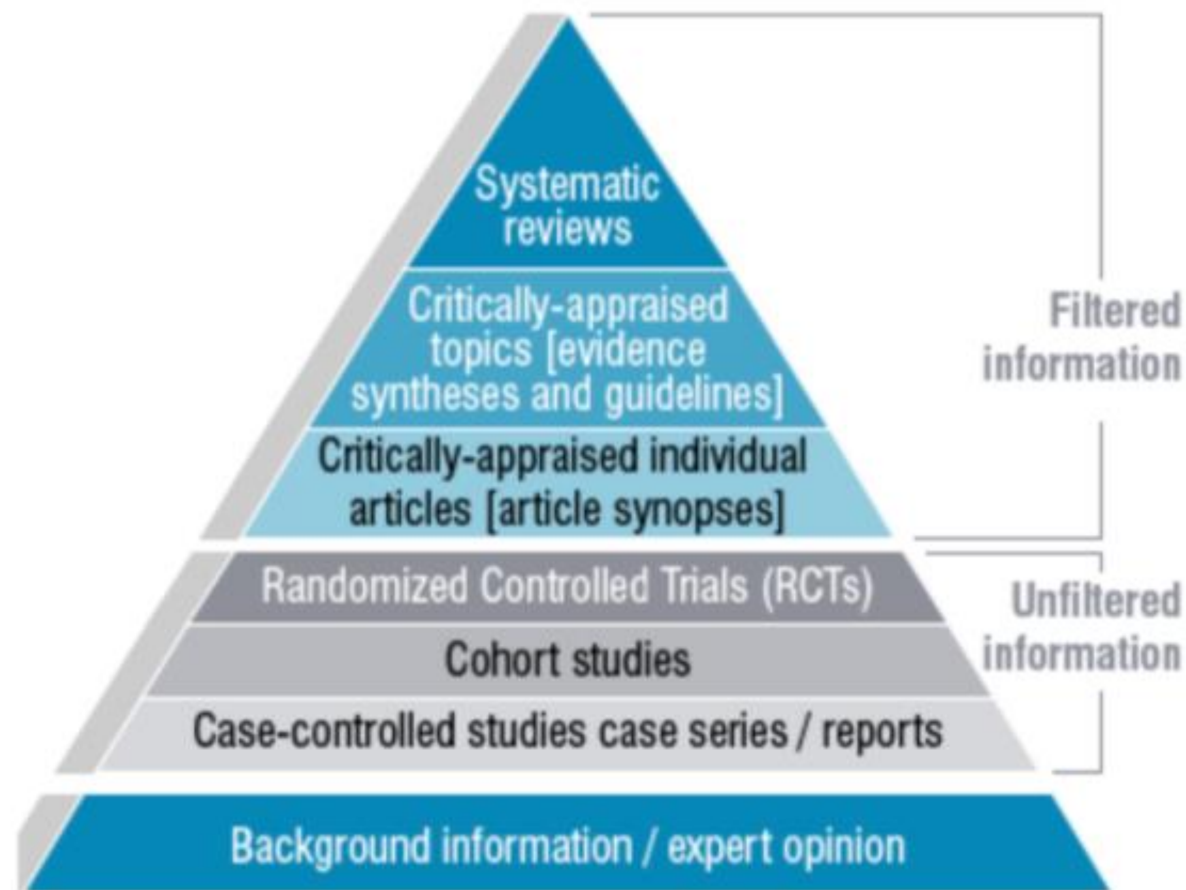
# Literature Search




(Moher et al., 2009)

# Critical Appraisal

- John Hopkins Nursing Evidence-Based Practice (JHNEBP) research evidence appraisal tool
- JHNEBP Evidence Level and Quality Guide



*Evidence Synthesis Table*

| Outcome | Bird et al., (2010) | Borgert et al., (2015) | Evans et al., (2012) | Harris et al., (2018) | Rello et al., (2013) | Sachetti et al., (2014) | Talbot et al., (2015) | Wolfensberger et al., (2018) |
|---|---|---|---|---|---|---|---|---|
| Bundle Adherence | ⇧ | ⇧ | ⇧ | ⇧ | ⇧ | ⇧ | ⇧ | ▭ |
| VAP rates | * ⇩ | NE | * ⇩ | ▭ | + ⇩ | ▭ | * ⇩ | NE |
| Sample | VAP cases/1000 ventilator days | 47 Studies | 52,946 ventilator days | 273 patients with VAE diagnosis | 3845 ventilator days | 433 ventilated patients | 87,537 ventilator days | 46 interviews and 1576 bundle component observations |
| Level of Evidence | Level III | Level III | Level III | Level III | Level III | Level III | Level II | Level III |
| Quality of Evidence | B (Good) | B (Good) | B (Good) | B (Good) | B (Good) | B (Good) | A (High) | B (Good) |
| Information related to PICOT | There is correlation between VAP bundle compliance and reduction in VAP incidence | The most frequently used strategies for bundle compliance were education, reminders and audit and feedback | Implementing an electronic dashboard provided reminders for bundle elements not in compliance | No association between increased bundle compliance and reduced risk of VAE | Efforts should be concentrated in continuous education of multidisciplinary providers to maintain high levels of compliance | An educational intervention increased adherence to the bundle, but incidence of VAP did not decrease | A real-time bundle adherence dashboard was associated with significant decreases in VAP rates and an increase in bundle compliance | Technical, rather than education-based, solutions should be promoted to improve VAP prevention |

*Note.* ▭ No Association; ⇧ Increased; ⇩ Decreased; NE = Not Evaluated; * Statistical Significance; + Clinical Significance

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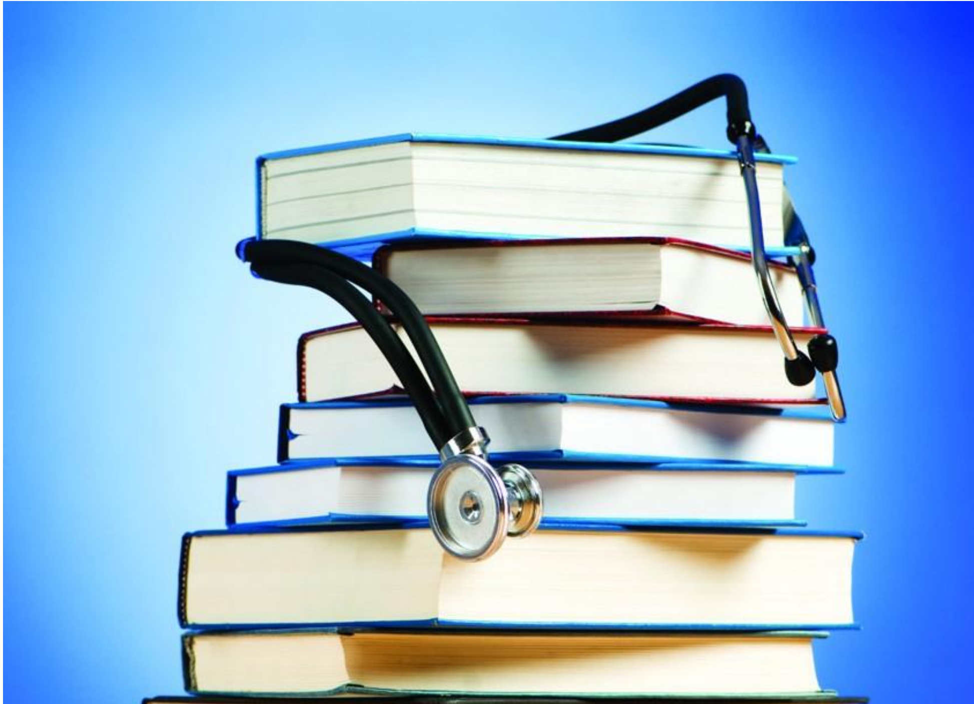
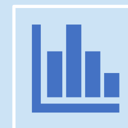
(AACN, 2017; IHI, 2021)

# Recommendations for Practice



Good and Consistent Evidence

Educate multi-disciplinary providers



Implement adherence dashboard

Parkwest Medical Center
Covenant
HEALTH

# Project Team

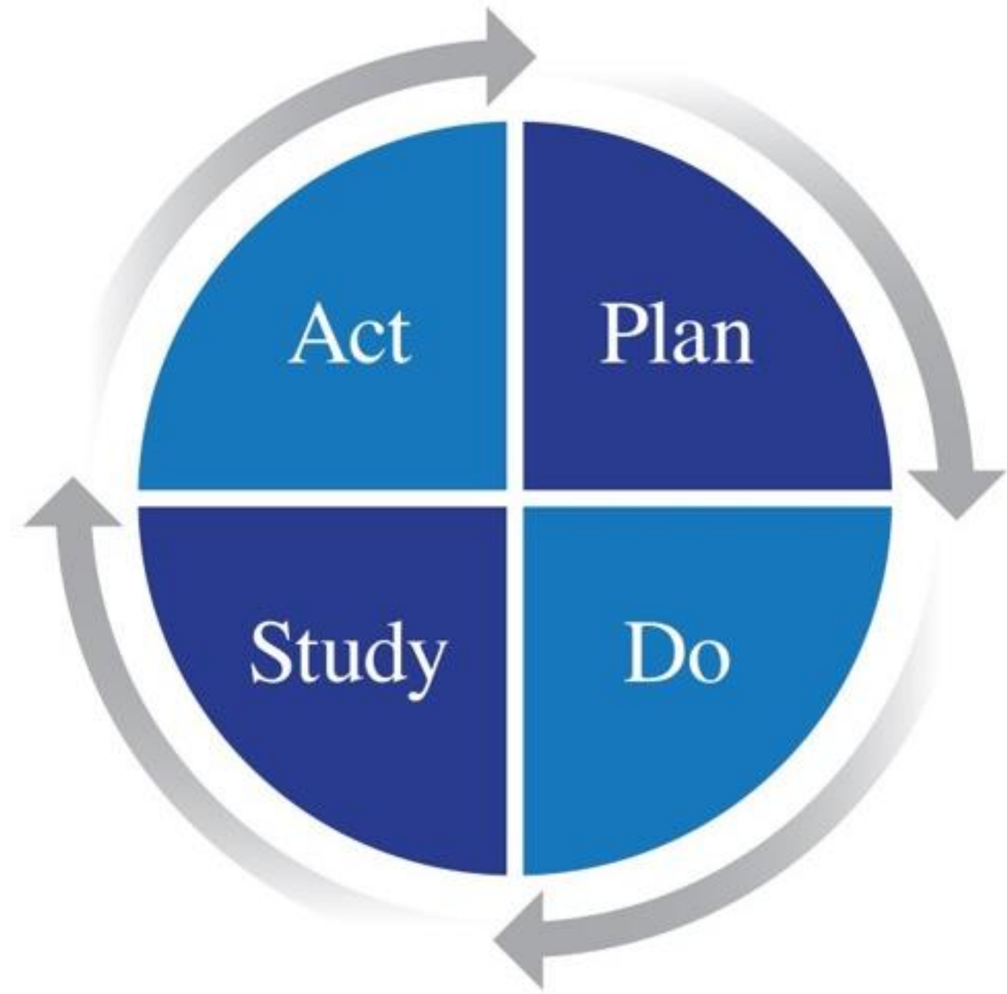
- DNP Student
- Project Chair
- CCU Manager
- UTK Statistician

Institutional
Review
Board (IRB)

# Ethical Considerations

# Implementation

# PDSA Cycles

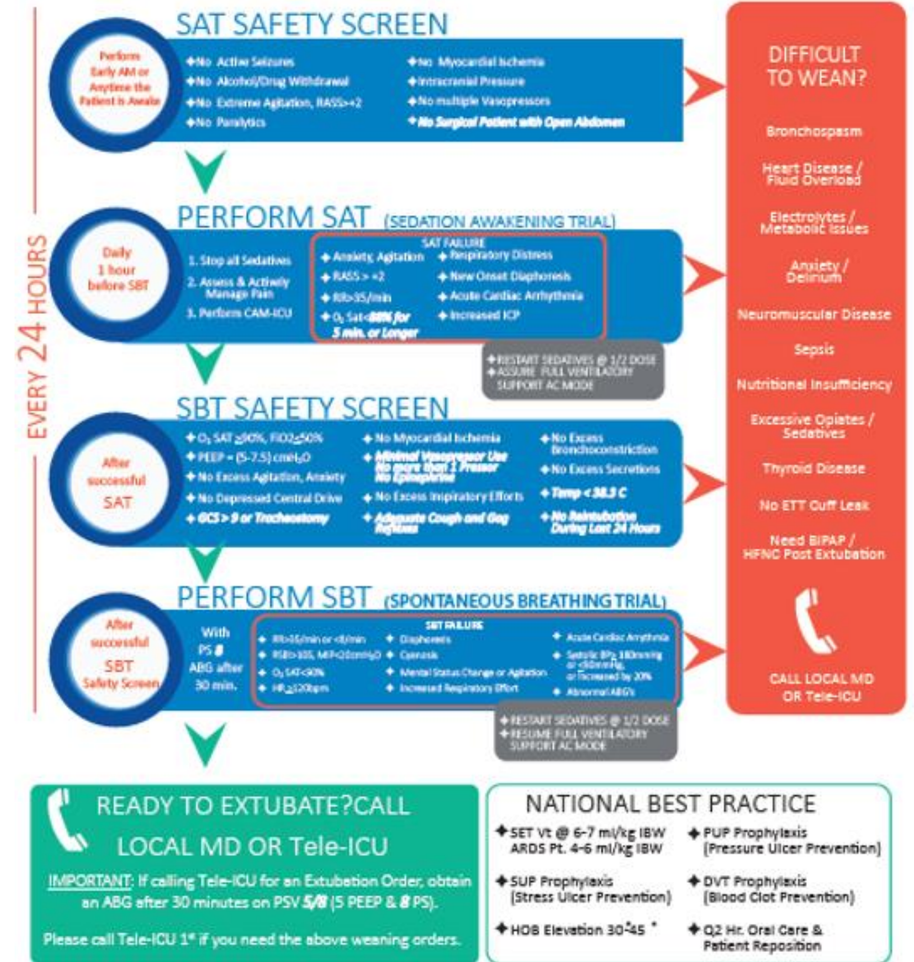


Skills Day

Staff Meetings

GroupMe/Reminders

Physician Meetings



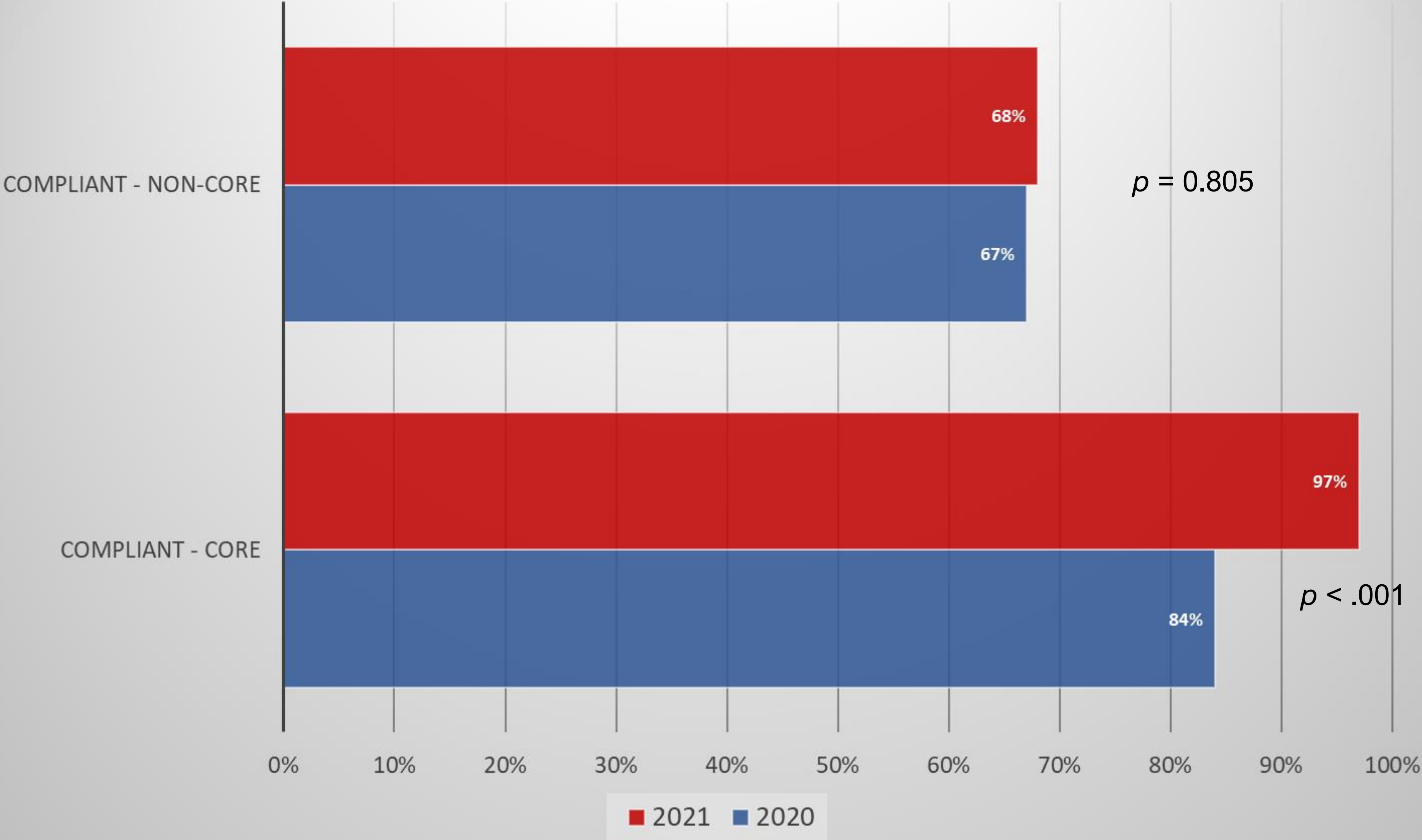

# Tele-ICU

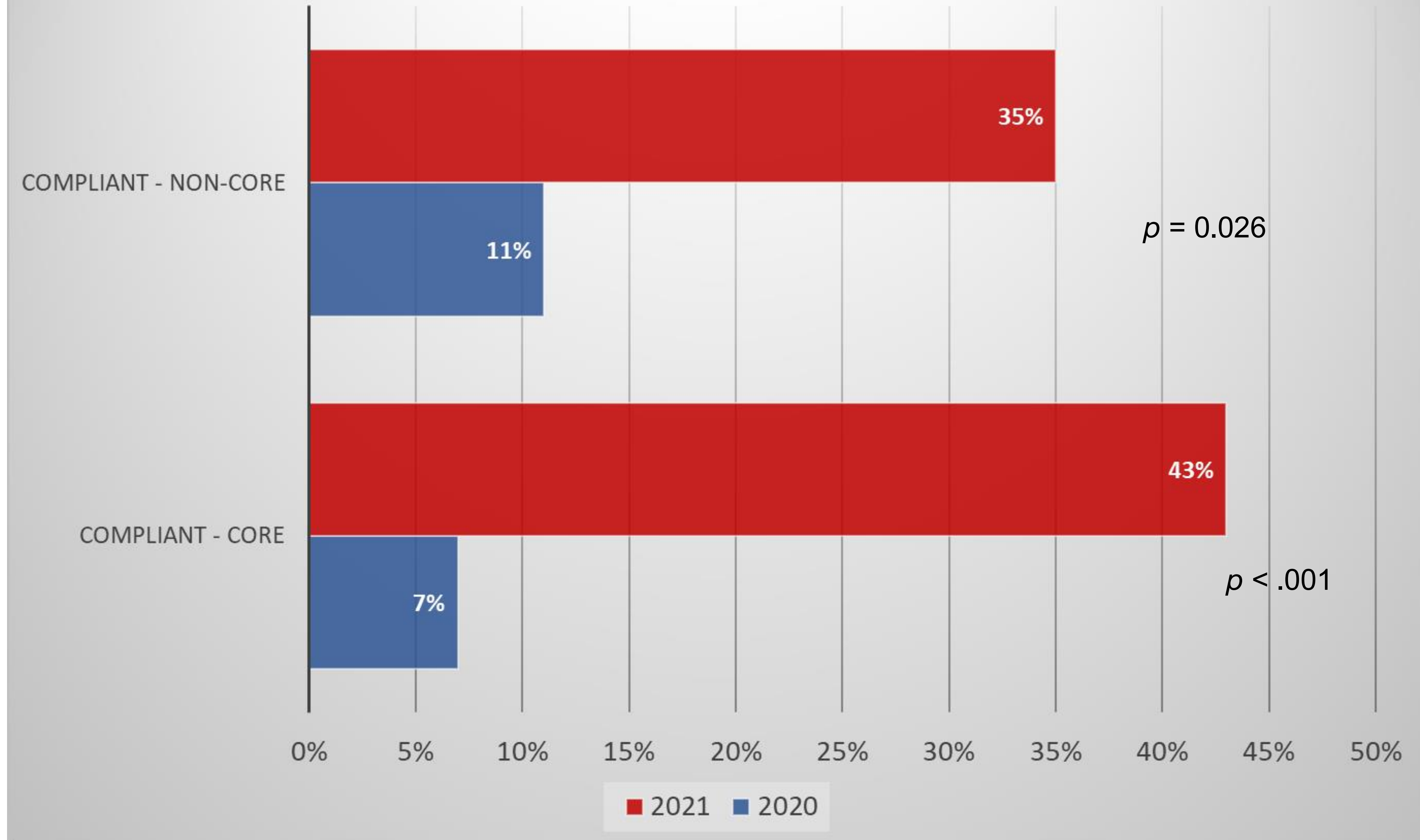
# Findings

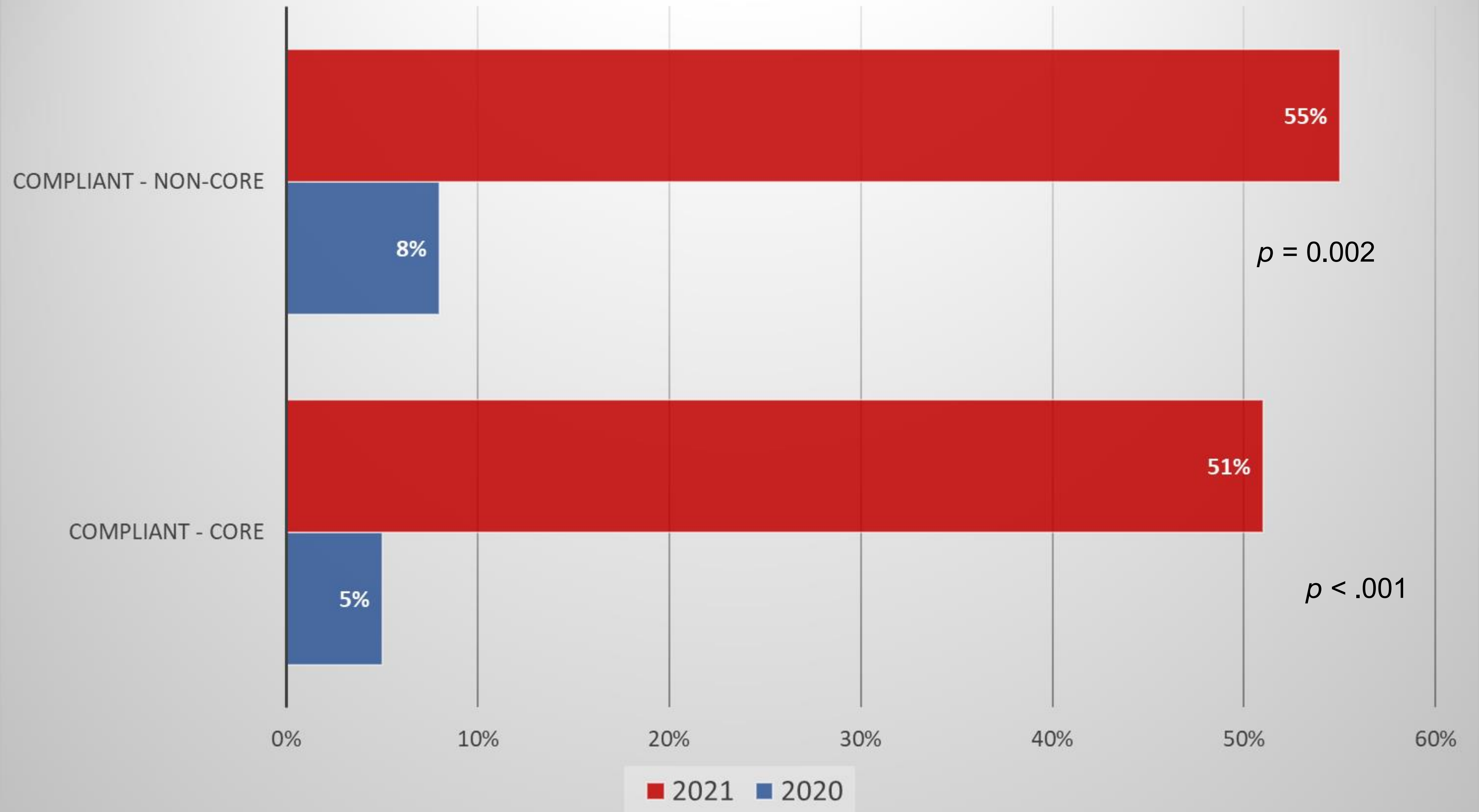
# Data Security

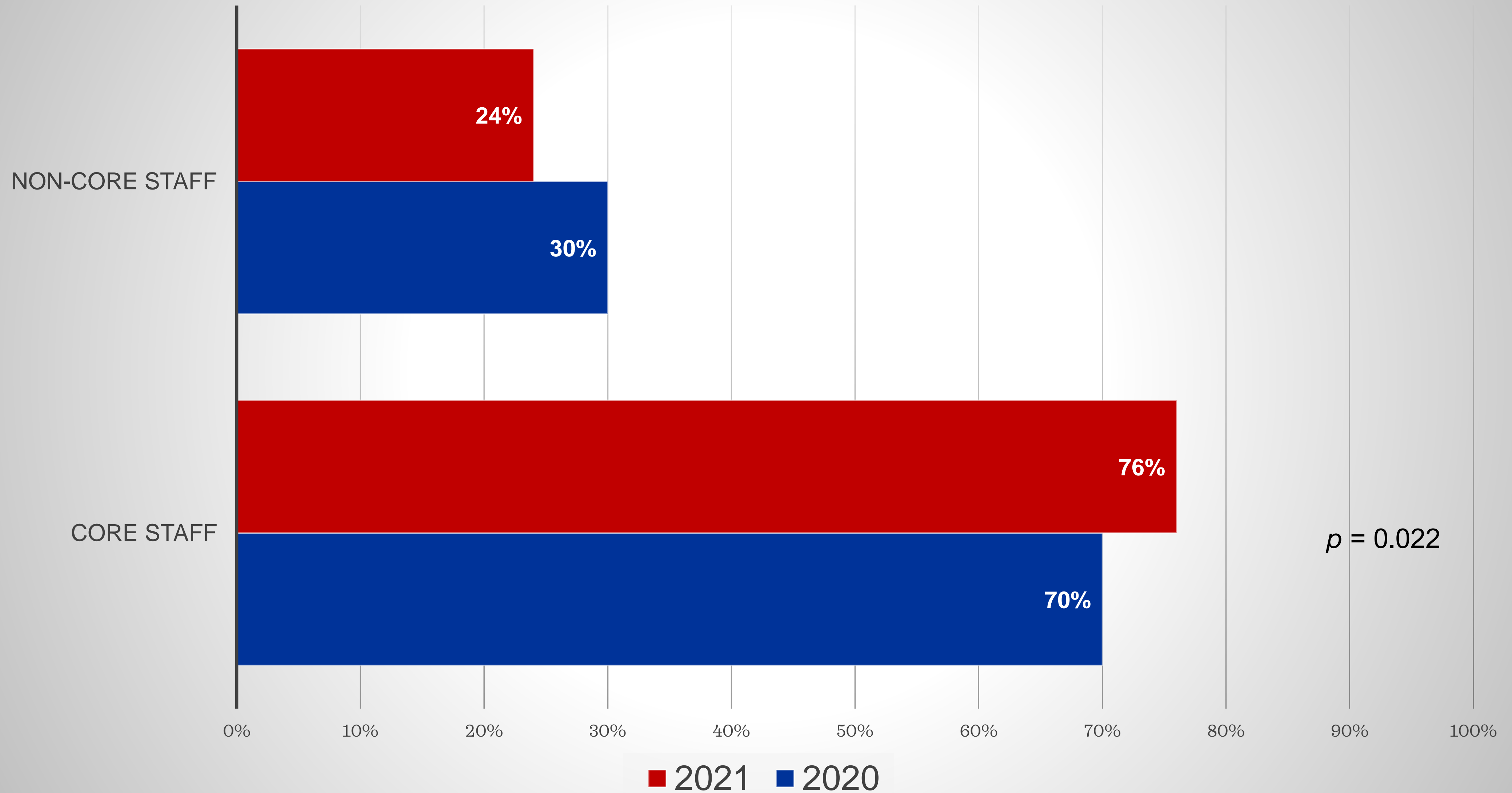
- Unique Patient ID
- Password Protected Excel
- OneDrive Account
- UTK's Vault

| Characteristic | Pre-Implementation (n=20) | Post-Implementation (n=20) |
|---|---|---|
| **Age** (*M* ± *SD*) in years | 66.5 ± 8.10 | 70.3 ± 13.62 |
| **Sex** (%) | | |
| Female | 53% | 47% |
| Male | 47% | 53% |
| **Admit Diagnosis** | | |
| Resp Failure | 49.40% | 73% |
| Pneumonia | 41.50% | 15.80% |
| Hypoxia | 7.10% | 1.70% |
| Other | 1.90% | 9.50% |
| **Covid +** (on admission) | | |
| Yes | 63.2 | 17.2 |
| No | 32.8 | 82.8 |

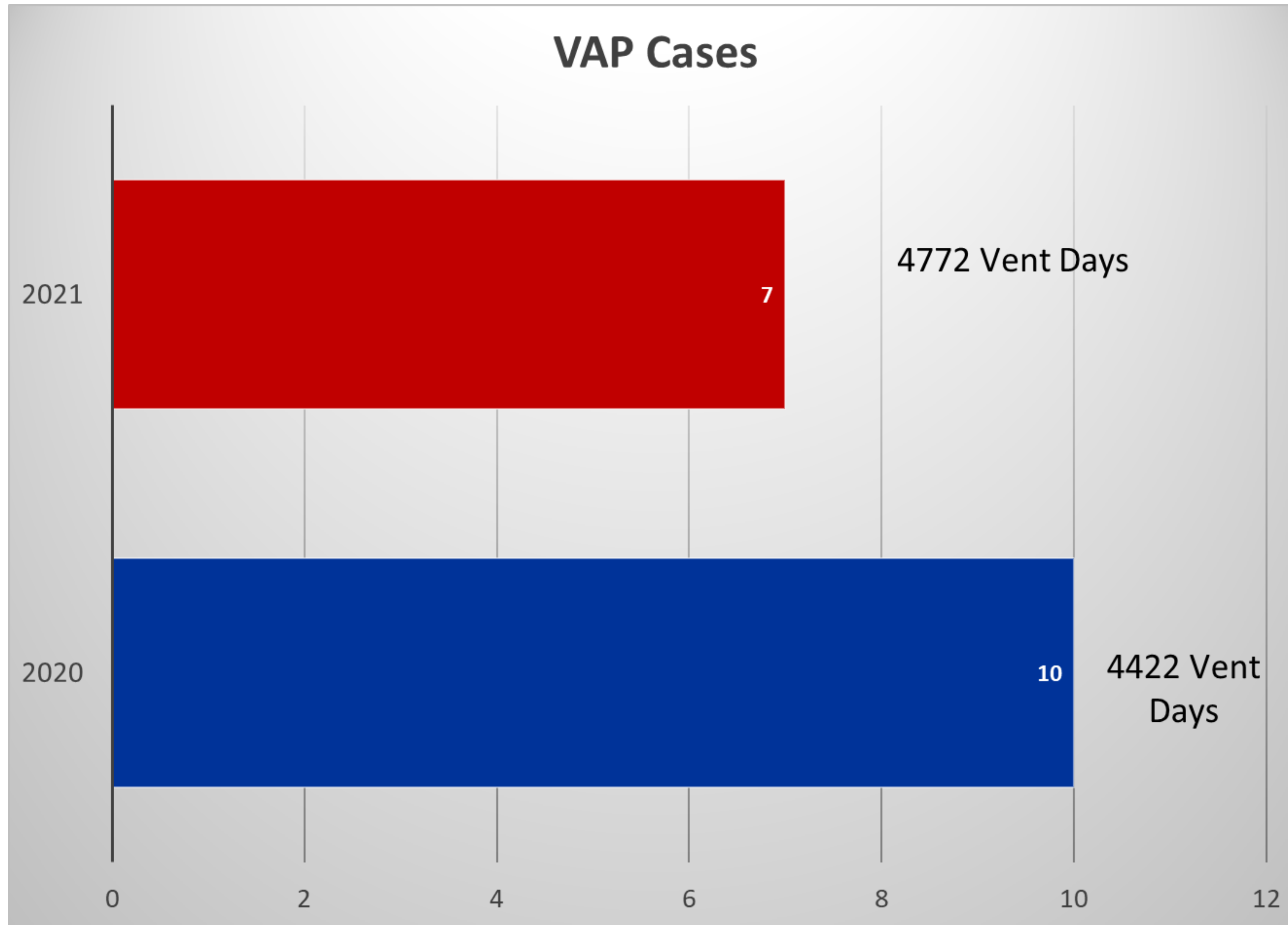

Head of Bed Compliance by Year
COMPLIANT - NON-CORE
COMPLIANT - CORE
68%
67%
97%
84%
p = 0.805
p < .001
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
2021
2020


Sedation Vacation Compliance by Year
COMPLIANT - NON-CORE
35%
11%
p = 0.026
COMPLIANT - CORE
43%
7%
p < .001
0%
5%
10%
15%
20%
25%
30%
35%
40%
45%
50%
2021
2020


Spontaneous Breathing Trial Compliance by Year
COMPLIANT - NON-CORE
COMPLIANT - CORE
55%
8%
51%
5%
p = 0.002
p < .001
0%
10%
20%
30%
40%
50%
60%
2021
2020



Total Bundle Compliance by Year
NON-CORE STAFF
CORE STAFF
24%
30%
76%
70%
p = 0.022
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
2021
2020



VAP Cases
2021
7
4772 Vent Days
2020
10
4422 Vent Days
0
2
4
6
8
10
12

# Implications

- Core vs. Non-Core
- Dashboard
- Continued education
- Continued auditing

# Limitations

- Timeframe
- Generalize
- Manual extraction

# Dissemination Plan

- Stakeholder Presentation
- Manuscript (Journal of Nursing Care Quality)
- Research Day Poster

# Questions?

# References

Available upon request