

Inhaled Corticosteroid Utilization in Mechanically Ventilated Adults: Patterns of Use, Safety, and Cost

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Background

Burden of Asthma and COPD

- Asthma and COPD are prevalent diseases associated with significant burden to patients and the health care system
- 10% of ICU admissions are associated with asthma or COPD

Role of Inhaled Corticosteroids (ICS) for Asthma and COPD

- ICS are mainstay of therapy for patients with asthma
- ICS have key role for patients with severe COPD

Benefits of ICS Use in Mechanically Ventilated Patients

- ICS efficacy has not been evaluated in mechanically ventilated patients with asthma or severe COPD
- ICS may improve expiratory airflow in mechanically ventilated patients with asthma or severe COPD

Risks of ICS Use in Mechanically Ventilated Patients

- ICS safety has not been evaluated in mechanically ventilated patients with asthma or severe COPD
- ICS use in mechanically ventilated patients may increase the risk of ventilator-associated conditions (VAC) such as pneumonia
- ICS are associated with significant direct costs

Potentially Unnecessary ICS Use in Asthma and COPD

- 18-25% of ICS for obstructive lung disease in the community are considered unnecessary
- Unnecessary ICS increase medication burden and costs
- Unnecessary ICS may increase the risk of lower respiratory tract infections and other adverse drug events
- Frequency and impact of unnecessary ICS use in mechanically ventilated patients not known

Methods

Design

- Retrospective health records review (paper-based)

Setting & Sampling

- 11-bed ICU at 375-bed tertiary care hospital at Interior Health
- Consecutive sampling between November 9, 2012 – September 30, 2014

Inclusion Criteria

- Adults ≥ 18 years old & mechanical ventilation in ICU
- Received ICS or ICS/long acting beta agonist during ICU stay

Exclusion Criteria

- No medication reconciliation form on record

Data Abstraction

- One investigator (MB) abstracted all data; missing data managed by case deletion

Primary Endpoint

- Proportion of potentially unnecessary ICS use
- "Potentially unnecessary ICS"**: patients with no prior exposure to ICS until ICU admission & no documented asthma or COPD

Secondary Endpoints

- Proportion of patients receiving potentially unnecessary ICS:
 - Who have ICS continued through hospital stay
 - Who have ICS continued at hospital discharge
 - Who develop VAC
- Incremental drug costs associated with potentially unnecessary ICS

Statistical Analysis

- Endpoints analyzed and reported using descriptive statistics

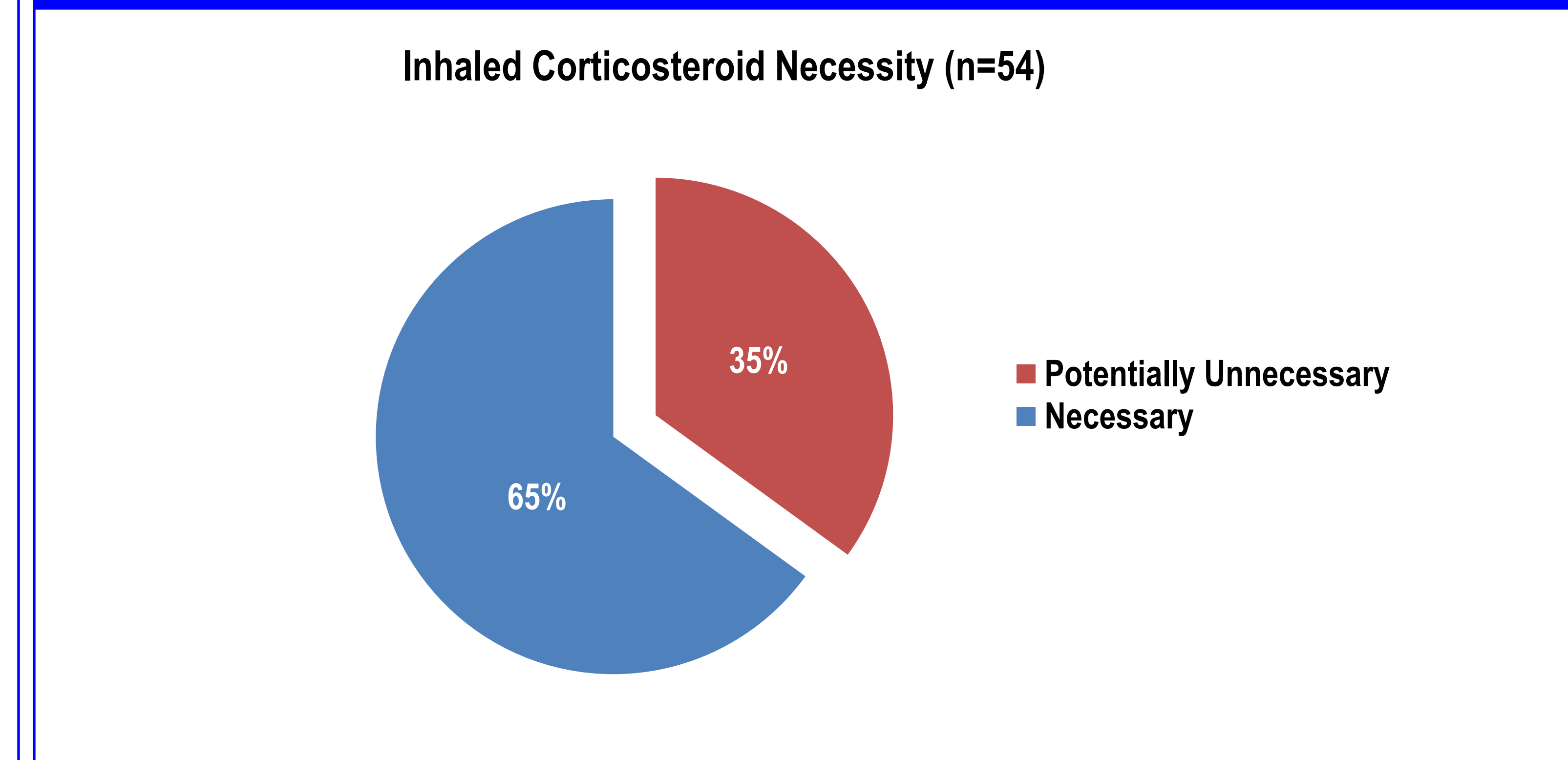
Table 1. Patient Characteristics

| Characteristic | |
|--------------------------------|-------------|
| Age, yr (mean \pm SD) | 69 \pm 13 |
| Male (%) | 31 (57%) |
| Past Medical History | |
| Asthma | 8 (15%) |
| COPD | 25 (46%) |
| Mixed Asthma & COPD | 5 (9%) |
| Medication History | |
| ICS prior to ICU admission | 21 (39%) |
| Systemic corticosteroid in ICU | 25 (46%) |

Table 2. Patient Disposition

| Characteristic | |
|-----------------------------------|-----------------|
| Reason for ICU Admission | |
| Respiratory Failure | 16 (30%) |
| Shock | 13 (24%) |
| Mixed Resp Failure/Shock | 19 (35%) |
| Other | 6 (11%) |
| Mechanical Ventilation > 24 hr | 42 (78%) |
| Length of Stay, d (mean \pm SD) | |
| ICU | 8.4 \pm 9.1 |
| Hospital | 12.8 \pm 24.8 |
| ICU Mortality | 36 (67%) |

Figure 1. Potentially Unnecessary ICS or ICS/LABA



Objectives

- To describe prescribing frequency of potentially unnecessary ICS in mechanically ventilated patients
- To describe frequency of potentially unnecessary ICS continuation after leaving the ICU
- To describe frequency of VAC in patients receiving potentially unnecessary ICS
- To describe costs associated with potentially unnecessary ICS prescribing in the ICU

Study Flow Diagram

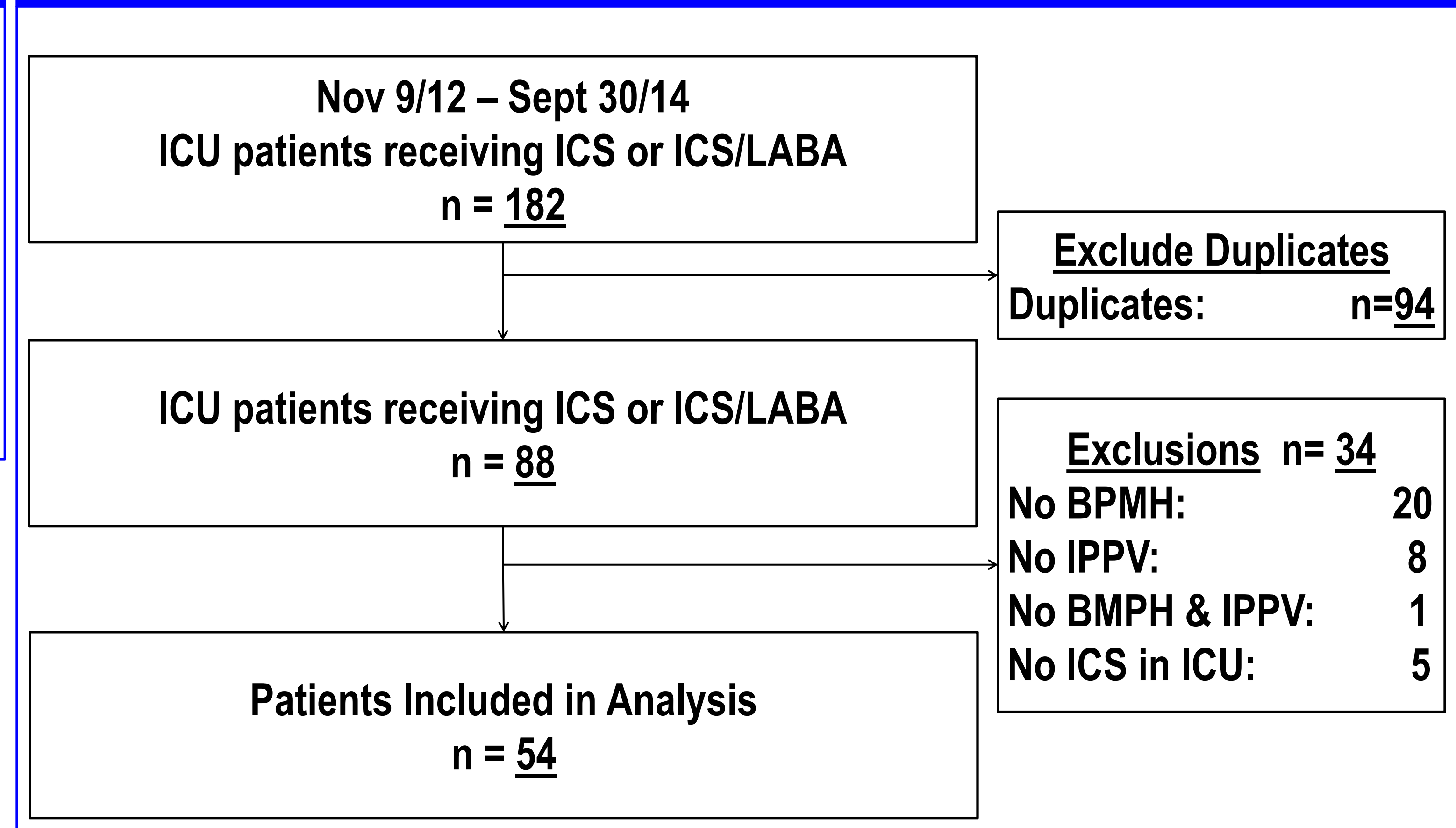


Table 3. Secondary Endpoints

| | | |
|--|-------------|---------------------|
| ICS or ICS/LABA continued in hospital after ICU transfer | 2/5 (40%) | |
| ICS or ICS/LABA continued at discharge | 2/4 (50%) | |
| VAC | 1/19 (5.3%) | |
| Incremental Drug Costs | Total | \$1220.54 |
| | ICU | \$1014.14 |
| | Per Patient | \$62.06 \pm 43.12 |

Conclusions

- Potentially unnecessary ICS are frequently prescribed to mechanically ventilated patients
- Signal suggests large proportion of these patients have ICS continued beyond ICU
- Unknown whether potentially unnecessary ICS are associated with VAC
- Potentially unnecessary ICS are associated with additional, though minimal drug costs



Interior Health