Anesthesiology Critical Care Medicine
UNIVERSITY OF COLORADO **ANSCHUTZ MEDICAL CAMPUS**

ATLAS
Airway, Trauma, Lung injury, And Sepsis Research Team

Effect of Autonomous Oxygen Titration on Maintain Normoxemia for Acutely Ill Adults:

The SAVE-O2 AI Randomized Clinical Trial

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Disclosures

No conflicts of interest

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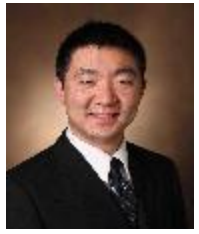
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Current Oxygen Titration in Hospital

Study Design

SAVE-O2 AI Study Design

- Multicenter randomized controlled trial
- 300 patients at four sites (April 2024-November 2025)
- Autonomous (intervention) vs. Manual oxygen titration (control)
- Goal SpO_2 range 90-96% for all patients
- 72-hour intervention period (or hospital discharge, if sooner)

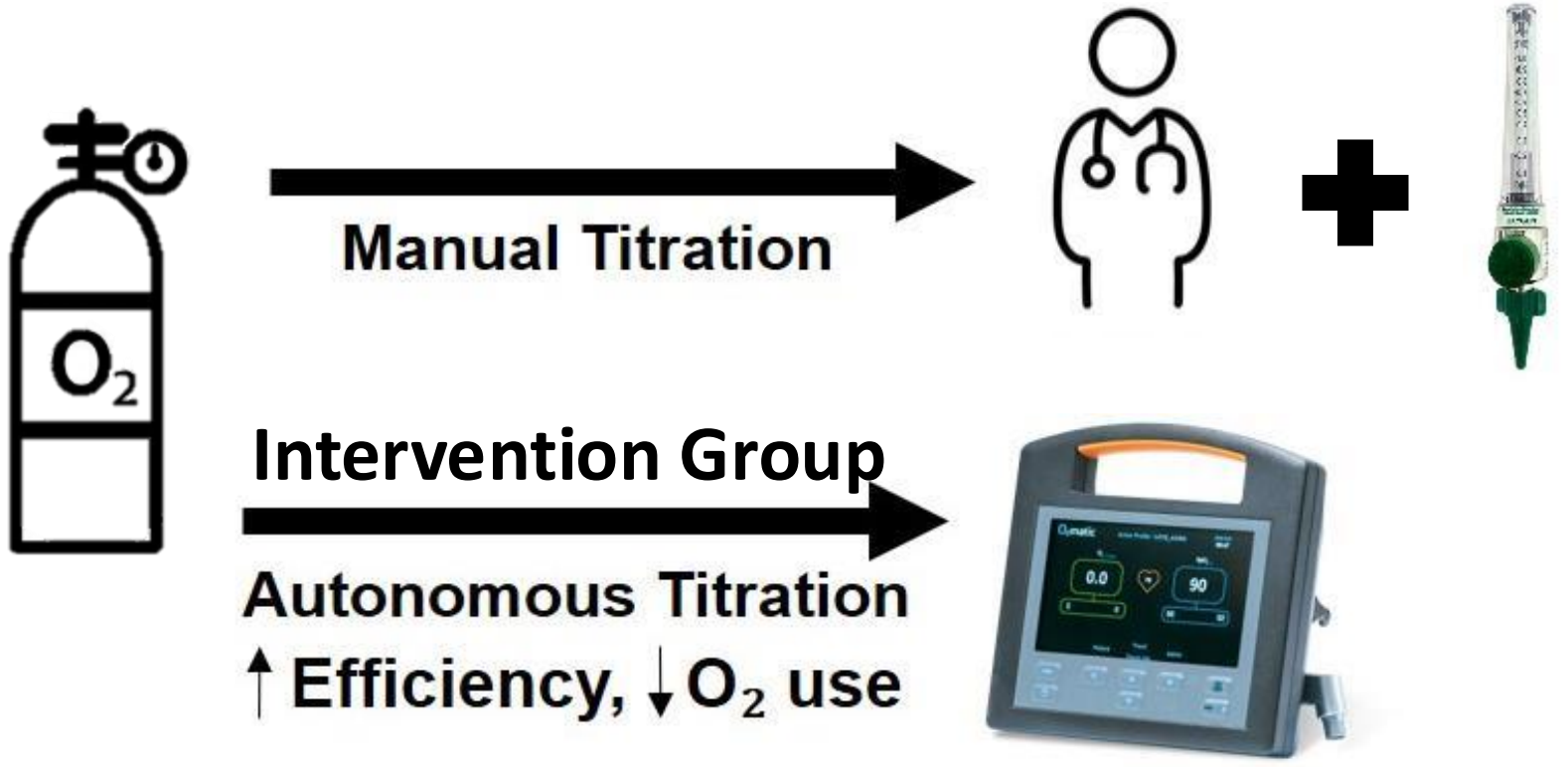
Population (Inclusion/Exclusion)

- Adults hospitalized with acute respiratory illness, trauma, burns, or acute care surgery
- Receiving 1-10 L/min supplemental oxygen
- Able to be randomized w/in 36 hours of hospitalization
- Excluded patients imminently transitioning to room air *or* higher oxygen support

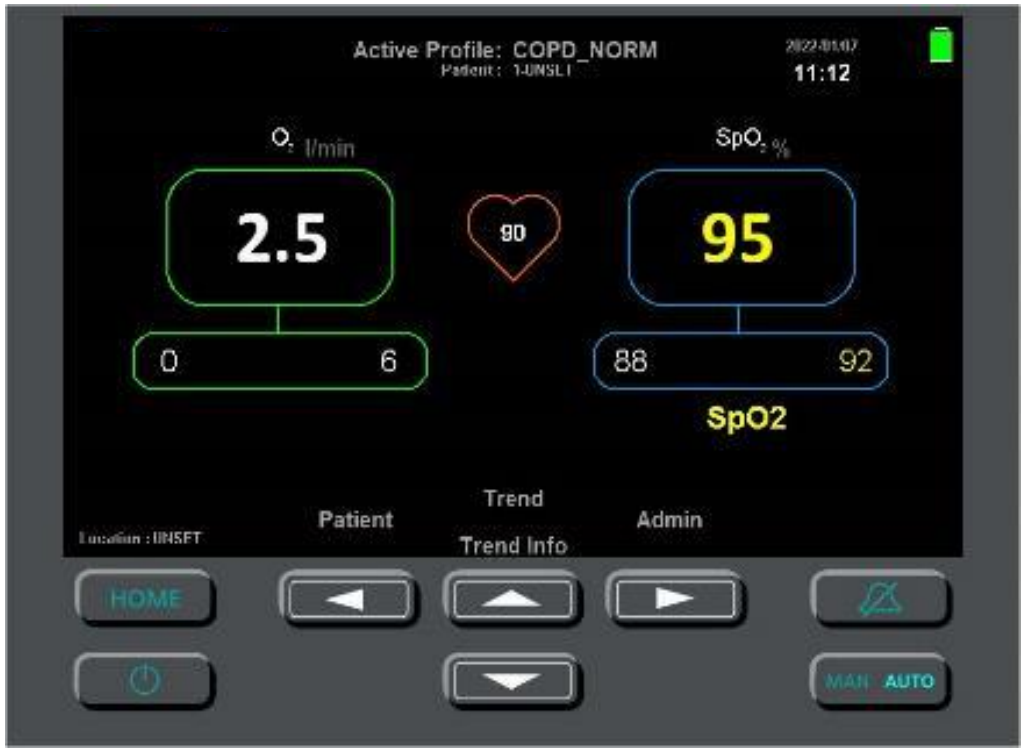
SAVE-O_2

STRATEGY TO AVOID EXCESSIVE OXYGEN

Strategy to Avoid Excessive Oxygenation Using Autonomous Oxygen Titration Intervention (**SAVE-O2 AI**)



O2matic PRO100 Device



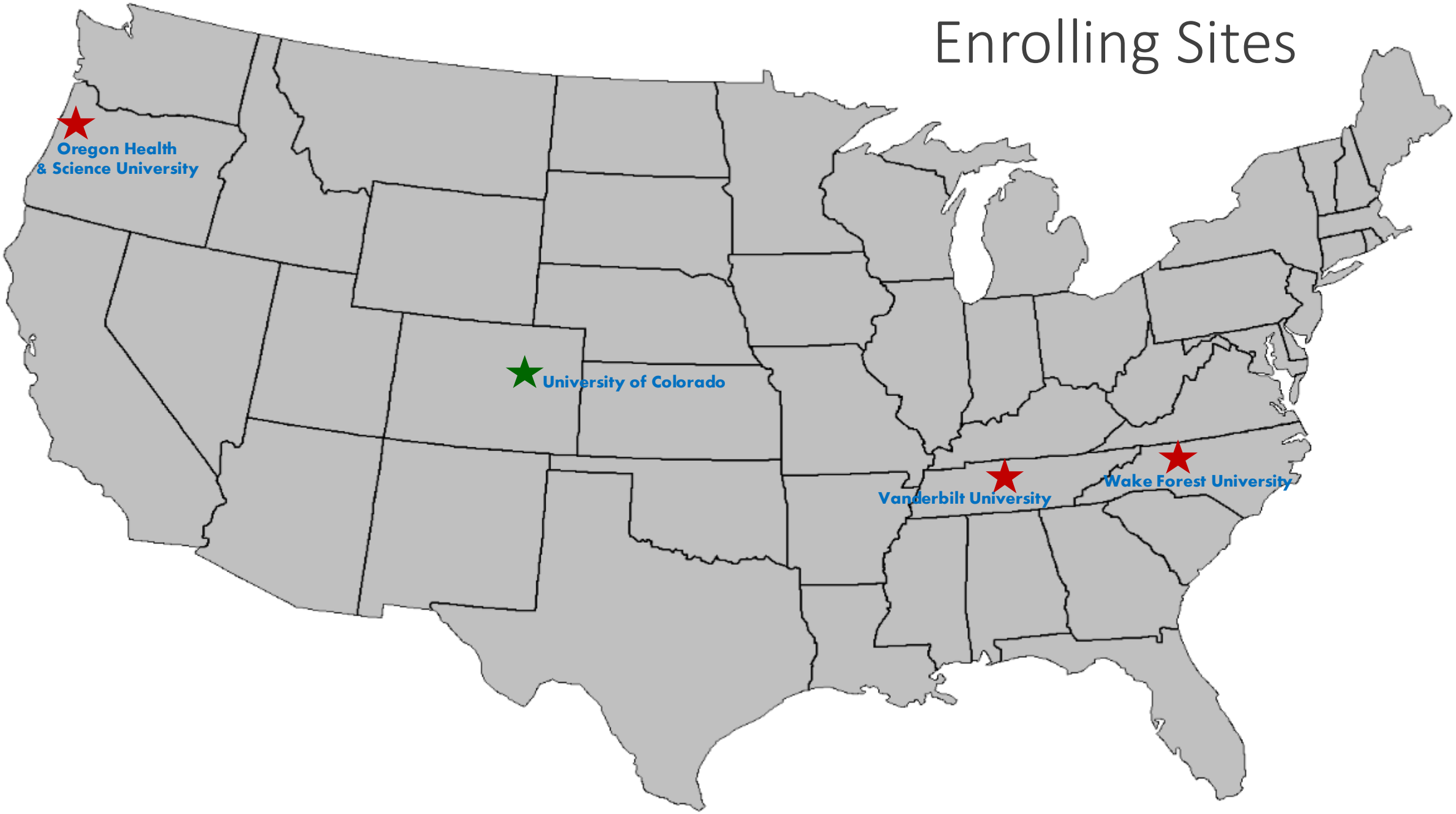
Primary Endpoint

Proportion of time spent within the targeted normoxemia (SpO_2 90-96%) during first 72 hours after randomization

Censored at:

- *at room air for 12+ hours*
- *hospital discharge*
- *escalation to high flow nasal oxygen/mechanical ventilation, or*
- *death if prior to 72 hours*

Enrolling Sites



Two Simultaneous Pulse Oximeters

Typically, one on each hand

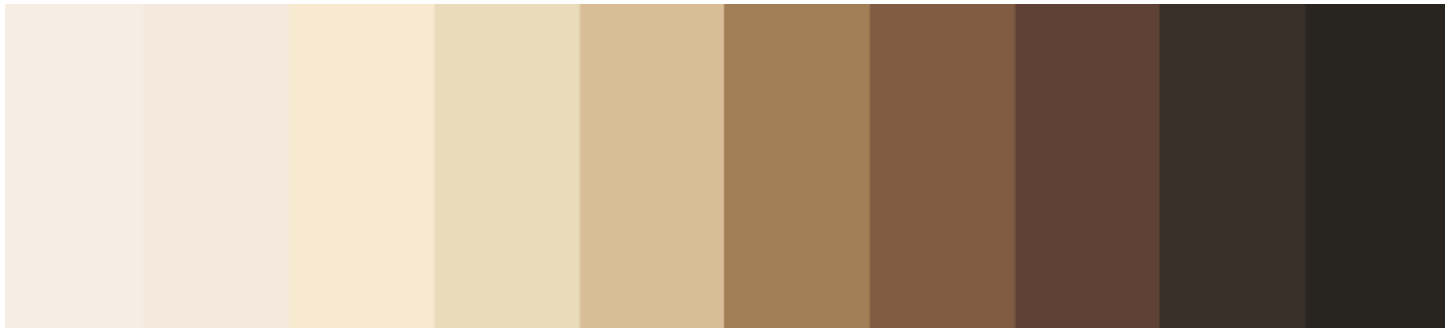
<u>Brands</u>

- Nonin
  (Autonomous Titration Device)
- Masimo or Medtronic
  (Hospital)

Skin Pigmentation in SAVE-O2 AI

Fitzpatrick Skin Type Scale

Monk Skin Tone Scale
(1-10)



Results

Table 1. Patient Demographics and Characteristics at Baseline

Characteristics	Autonomous Oxygen Titration n=152	Usual Care n=148
Age in years, median (IQR)	68 (59-77)	64 (53-72)
Female sex, n (%)	87 (57%)	75 (51%)
Race/Ethnicity, n (%)		
White, non-Hispanic	113 (74%)	105 (71%)
Black, non-Hispanic	26 (17%)	28 (19%)
Hispanic	9 (5.9%)	10 (6.8%)
Other	4 (2.6%)	5 (3.4%)
Monk Skin Tone Scale, n (%)*		
Light Skin	38 (25%)	29 (20%)
Medium Skin	83 (55%)	85 (57%)
Dark Skin	31 (20%)	34 (23%)
Primary Reason for Hospital Admission, n (%)		
Acute Respiratory Illness	106 (70%)	102 (69%)
Traumatic Injury / Burn / Acute Surgery	46 (30%)	46 (31%)
Oxygen Flow Rate at Randomization, n (%)		
1.0-2.9 L/min	77 (51%)	68 (46%)
3.0-4.9 L/min	57 (38%)	53 (36%)
5.0-10 L/min	18 (12%)	27 (18%)
Chronic Pulmonary Disease, n (%)	65 (43%)	63 (43%)
Current or Former Smoker, n (%)	64 (42%)	78 (53%)
Oxygen use at Baseline, n (%)	14 (9.2%)	17 (11%)
Body Mass Index, median (IQR)	28 (24-34)	29 (25-35)

Primary and Main Secondary Results

Outcome	Autonomous Oxygen Titration n=152 Mean (SE)	Usual Care n=148 Mean (SE)	Risk Difference (95% CI)
Primary: Proportion of time in Normoxemia (SpO2 90-96%)	**85% (1)**	**63% (2)**	21% (18, 25) p<0.001
Proportion of time in Hypoxemia (SpO2 <88%)	2.0% (0.2)	3.6% (0.4)	-1.3% (-2.0, -0.5) p=0.001
Proportion of time in Hyperoxemia (SpO2 >96%)	9% (1)	29% (2)	-18% (-22, -14) p<0.001

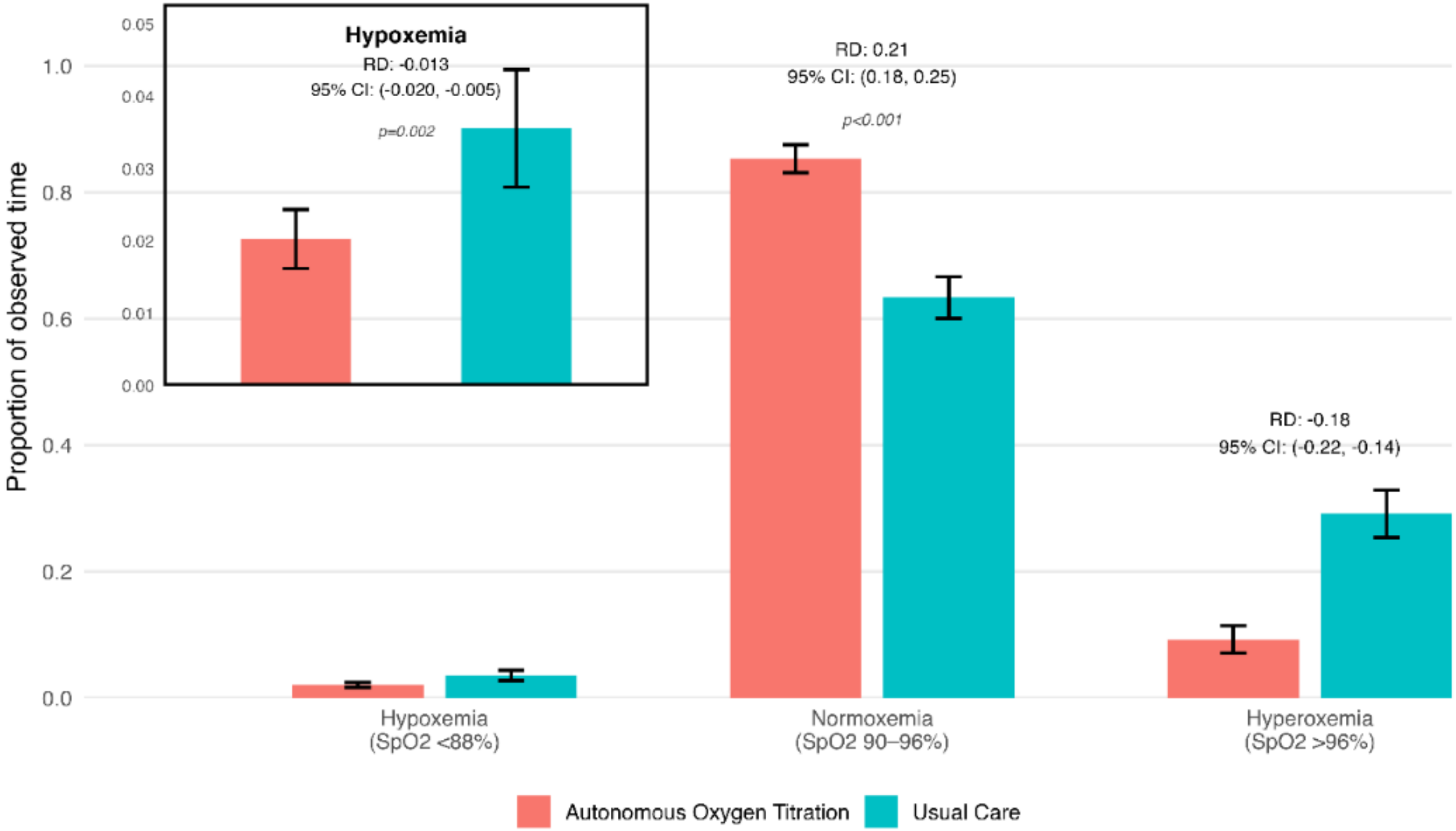

Hypoxemia
RD: -0.013
95% CI: (-0.020, -0.005)
p=0.002
RD: 0.21
95% CI: (0.18, 0.25)
p<0.001
RD: -0.18
95% CI: (-0.22, -0.14)
Proportion of observed time
0.0
0.2
0.4
0.6
0.8
1.0
0.00
0.01
0.02
0.03
0.04
0.05
Hypoxemia
(SpO2 <88%)
Normoxemia
(SpO2 90–96%)
Hyperoxemia
(SpO2 >96%)
Autonomous Oxygen Titration
Usual Care

Figure 2. Distribution of supplemental oxygen flow rates by study group.

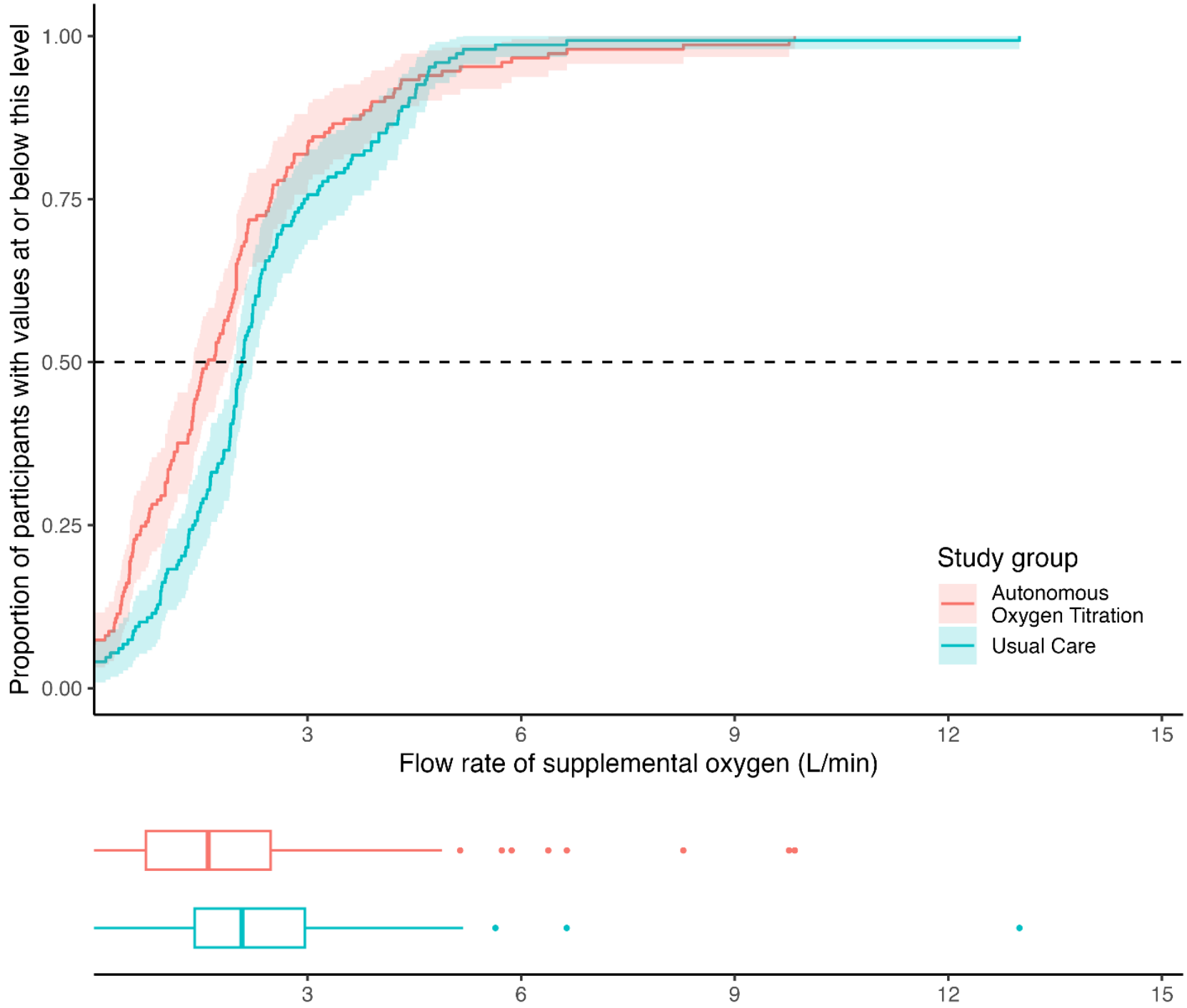
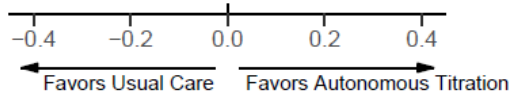


Figure 3.
Subgroup Analyses of the Primary Outcome

Subgroup	n	Autonomous Titration n	Usual Care n	RD (95% CI)
Overall	300	152	148	0.21 (0.18, 0.25)
Race/Ethnicity				
Non−Hispanic White	218	113	105	0.19 (0.15, 0.24)
Non−Hispanic Black	54	26	28	0.30 (0.21, 0.39)
Hispanic	19	9	10	0.18 (0.06, 0.31)
Other Race/Ethnicity	9	4	5	0.17 (0.09, 0.25)
Monk Skin Tone Scale				
Monk 1−3 Light	67	38	29	0.25 (0.18, 0.31)
Monk 4−6 Medium	168	83	85	0.18 (0.13, 0.23)
Monk 7−10 Dark	65	31	34	0.26 (0.17, 0.35)
Fitzpatrick Skin Type Scale				
Fitzpatrick I−II Light	144	75	69	0.22 (0.18, 0.27)
Fitzpatrick III−IV Medium	93	48	45	0.15 (0.09, 0.21)
Fitzpatrick V−VI Dark	63	29	34	0.28 (0.19, 0.37)
O2 Volume at Randomization				
1.0−2.9 L/Minute	145	77	68	0.22 (0.17, 0.28)
3.0−4.9 L/Minute	110	57	53	0.20 (0.14, 0.26)
5.0−10 L/Minute	45	18	27	0.21 (0.12, 0.30)
Dependent on Home O2 at Admission				
No Home O2	269	138	131	0.21 (0.17, 0.24)
Home O2 Present	31	14	17	0.25 (0.11, 0.38)
Primary Reason for Hospital Admission				
Acute Respiratory Illness	208	106	102	0.23 (0.18, 0.28)
Traumatic Injury/Burn/Acute Surgery	92	46	46	0.18 (0.12, 0.24)
Pulmonary Comorbidity				
Pulmonary Comorbidity	128	65	63	0.20 (0.14, 0.27)
No Pulmonary Comorbidity	172	87	85	0.22 (0.18, 0.27)

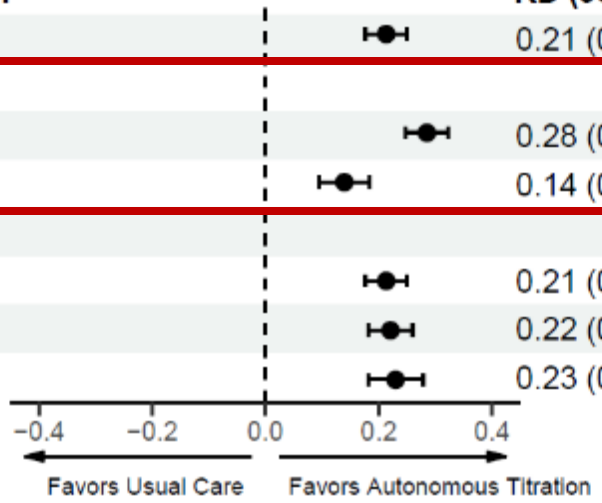


Selected Secondary Outcomes

Outcome	Autonomous Oxygen Titration n=152	Usual Care n=148	Difference (95% CI)
Total Volume of Supplemental Oxygen Administered per participant per day, median (IQR) to 72 hours	2,300 L [1.1-3.6]	2,990 L [2.3-4.3]	0.83 (0.67, 1.02)
Time to Room Air, median (IQR), d	1.05 [0.45-2.9]	1.15 [0.64-2.7]	1.03 (0.79, 1.34)
In-Hospital Mortality to day 28, n (%)	4 (2.6%)	5 (3.4%)	1.03 (0.22, 4.84)
Hospital Length of Stay, median (IQR), d	5.2 [3.1-7.9]	5.8 [3.5-9.0]	-

Sensitivity Analyses of Primary Outcome

Subgroup	n	Autonomous Titration n	Usual Care n	RD (95% CI)
Overall	300	152	148	0.21 (0.18, 0.25)
SpO2 Measurements				
Device Pulse Oximeter	298	151	147	0.28 (0.25, 0.32)
Hospital Pulse Oximeter	294	146	148	0.14 (0.09, 0.18)
Observed SpO2 Time				
>= 12h	287	145	142	0.21 (0.18, 0.25)
>= 24h	240	121	119	0.22 (0.18, 0.26)
>= 48h	150	74	76	0.23 (0.18, 0.28)



Adverse Events

Adverse Event, n (%)	Autonomous Oxygen Titration n=152	Usual Care n=148
Epistaxis	2 (1.3%)	0
Sinus Pain/Discomfort	2 (1.3%)	0
Skin Vesicle	0	1 (0.7%)

Conclusions

Among adults hospitalized with acute illness or injury and receiving 1-10 L/min of supplemental oxygen, autonomous oxygen titration:

1. Significantly **increased** the proportion of time spent in **normoxemia** (SpO_2 90-96%)

2. Significantly **decreased** the proportion of time spent in **hypoxemia** (SpO_2 <88%)

Compared with manual oxygen titration

JAMA Internal Medicine | Original Investigation

Autonomous Oxygen Titration for Maintaining Normoxemia in Acutely Ill Adults

The SAVE-O_2 AI Randomized Clinical Trial

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Thank you!

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