

2015 – A Year of Critical Care

Rob Mac Sweeney
NEICS Spring Meeting 2016



2015 – A Year of Critical Care

@critcarereviews | rob@criticalcarereviews.com [kmi](https://www.kmi.ac.uk)



<http://bit.do/CCR-NEICS16>



Conflict of
Interest

A photograph of a tug-of-war competition. In the foreground, a man with a determined expression is pulling on a thick rope. He is wearing a green long-sleeved jersey with a white shamrock emblem on the chest, white shorts, and green socks with yellow and white stripes at the top. Behind him, several other men in similar green jerseys are also pulling on the rope, their faces showing effort. The background is blurred, suggesting an outdoor setting with spectators.

Health Research Board of Ireland

A photograph of a tug-of-war competition. In the foreground, a man with a determined expression is pulling on a thick rope. He is wearing a green long-sleeved jersey with a white shamrock emblem on the chest, white shorts, and green socks with yellow and white stripes at the top. Behind him, several other men in similar green jerseys are also pulling on the rope, their faces showing effort. The background is blurred, suggesting an outdoor setting with spectators.

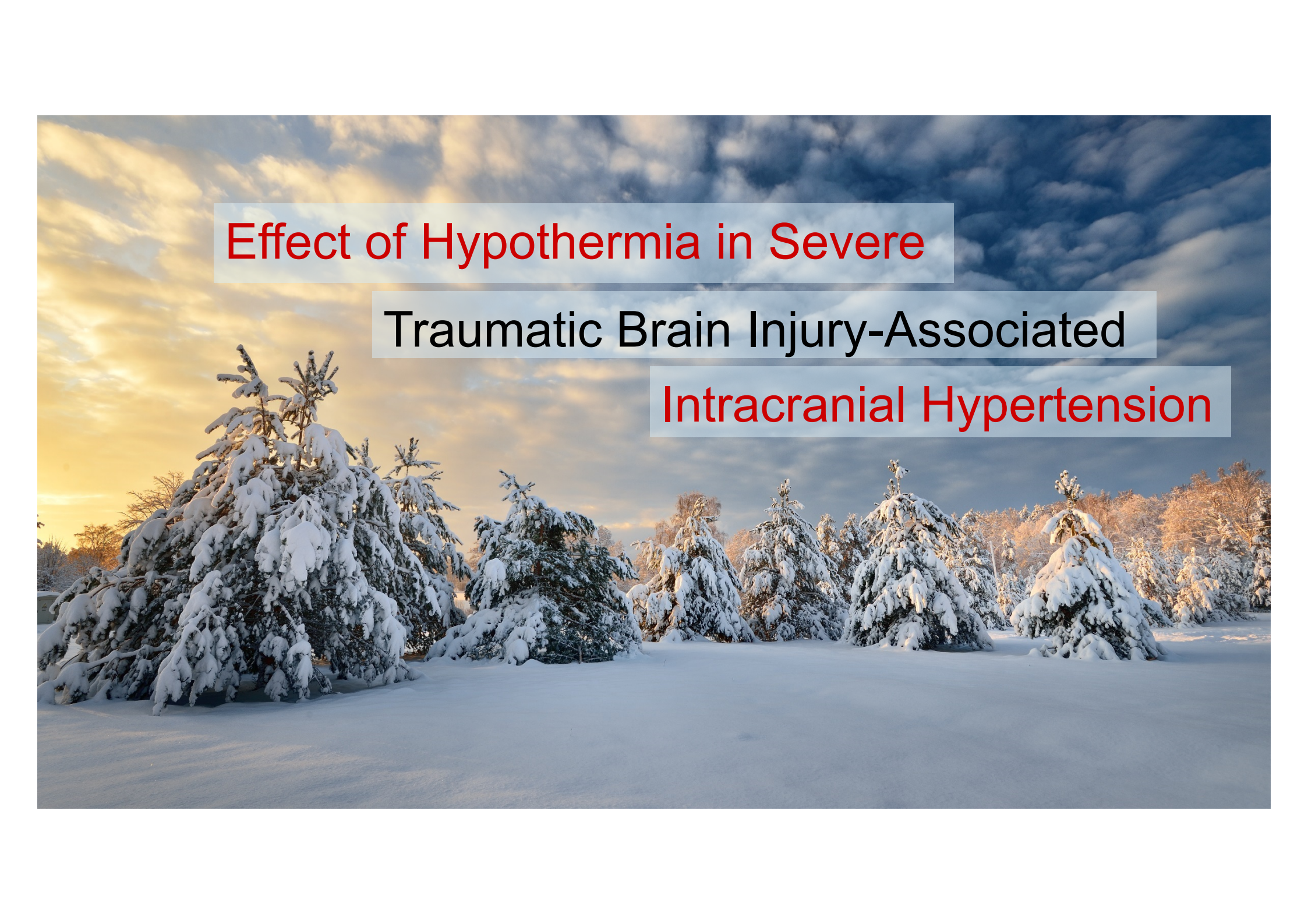
Health Research Board of Ireland

Irish Critical Care Trials Group





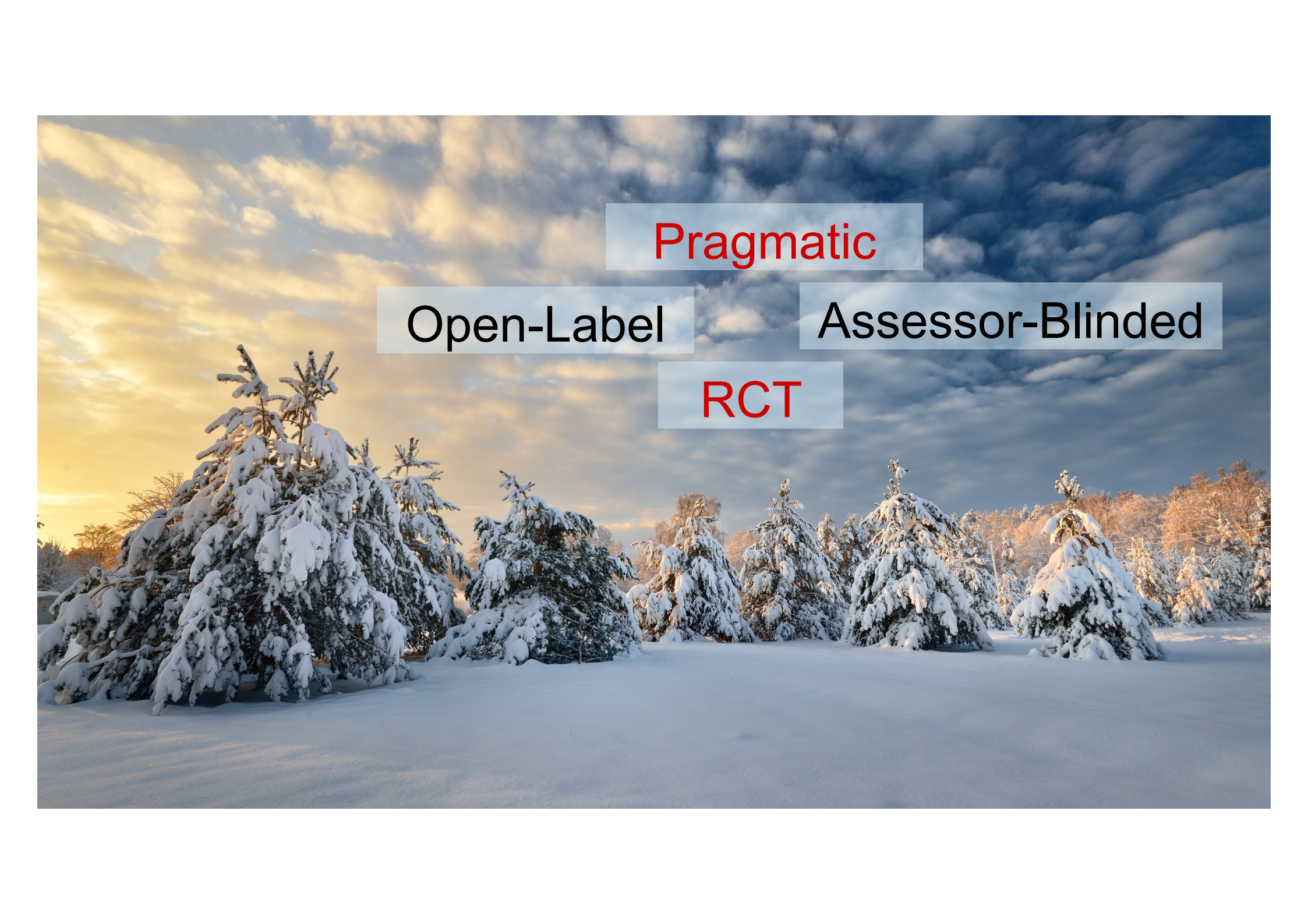
Eurotherm



Effect of Hypothermia in Severe

Traumatic Brain Injury-Associated

Intracranial Hypertension



Pragmatic

Open-Label

Assessor-Blinded

RCT



ICP > 20 mmHg > 5 min


```
graph TD; S1[Stage 1] --> S2[Stage 2]; S2 --> S[Standard]; S2 --> C[Cooling]; S --> S3[Stage 3]; C --> S3;
```

Stage 1

Stage 2

Standard

Cooling

Stage 3

Stage 1



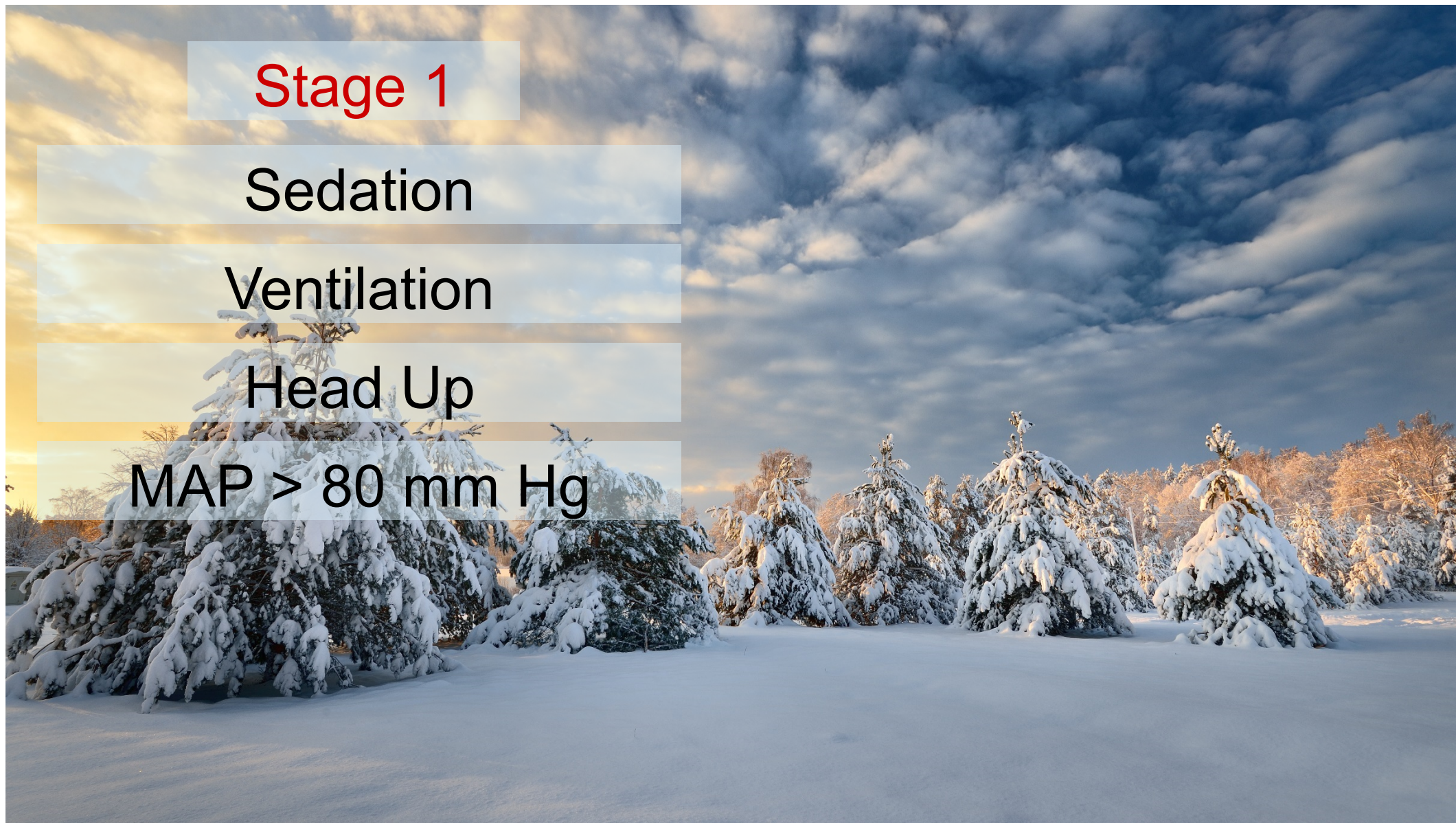
Stage 1

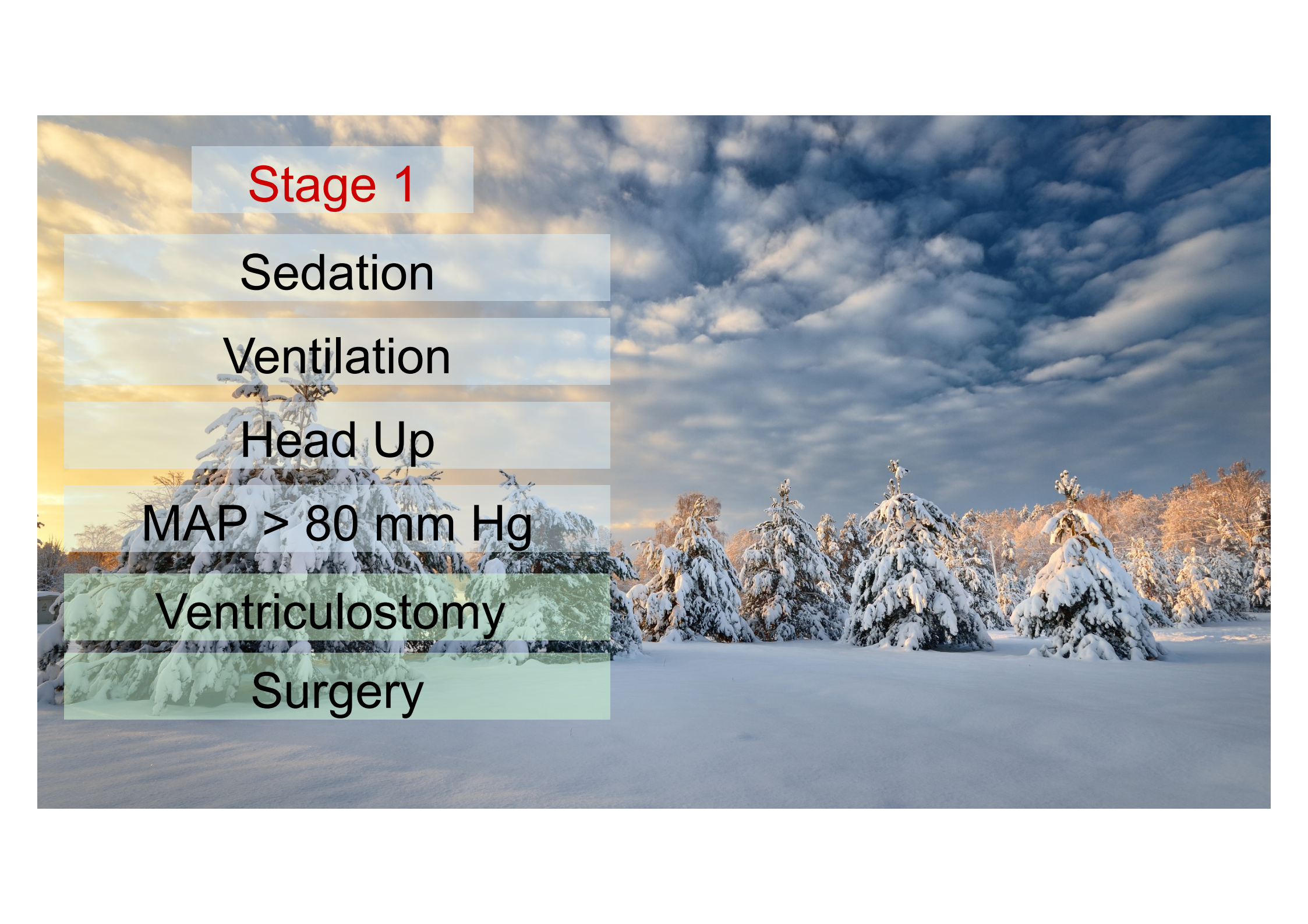
Sedation

Ventilation

Head Up

MAP > 80 mm Hg





Stage 1

Sedation

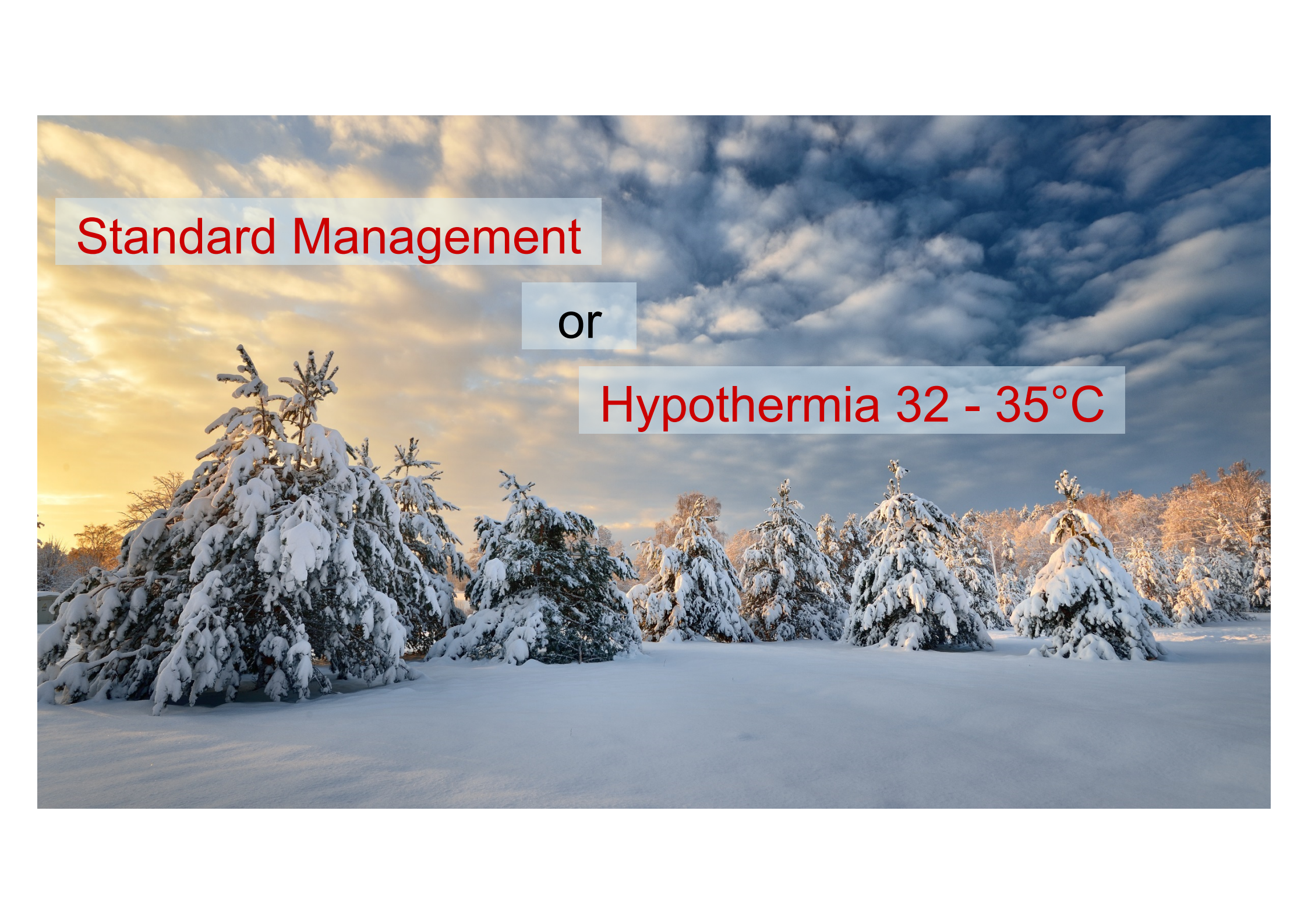
Ventilation

Head Up

MAP > 80 mm Hg

Ventriculostomy

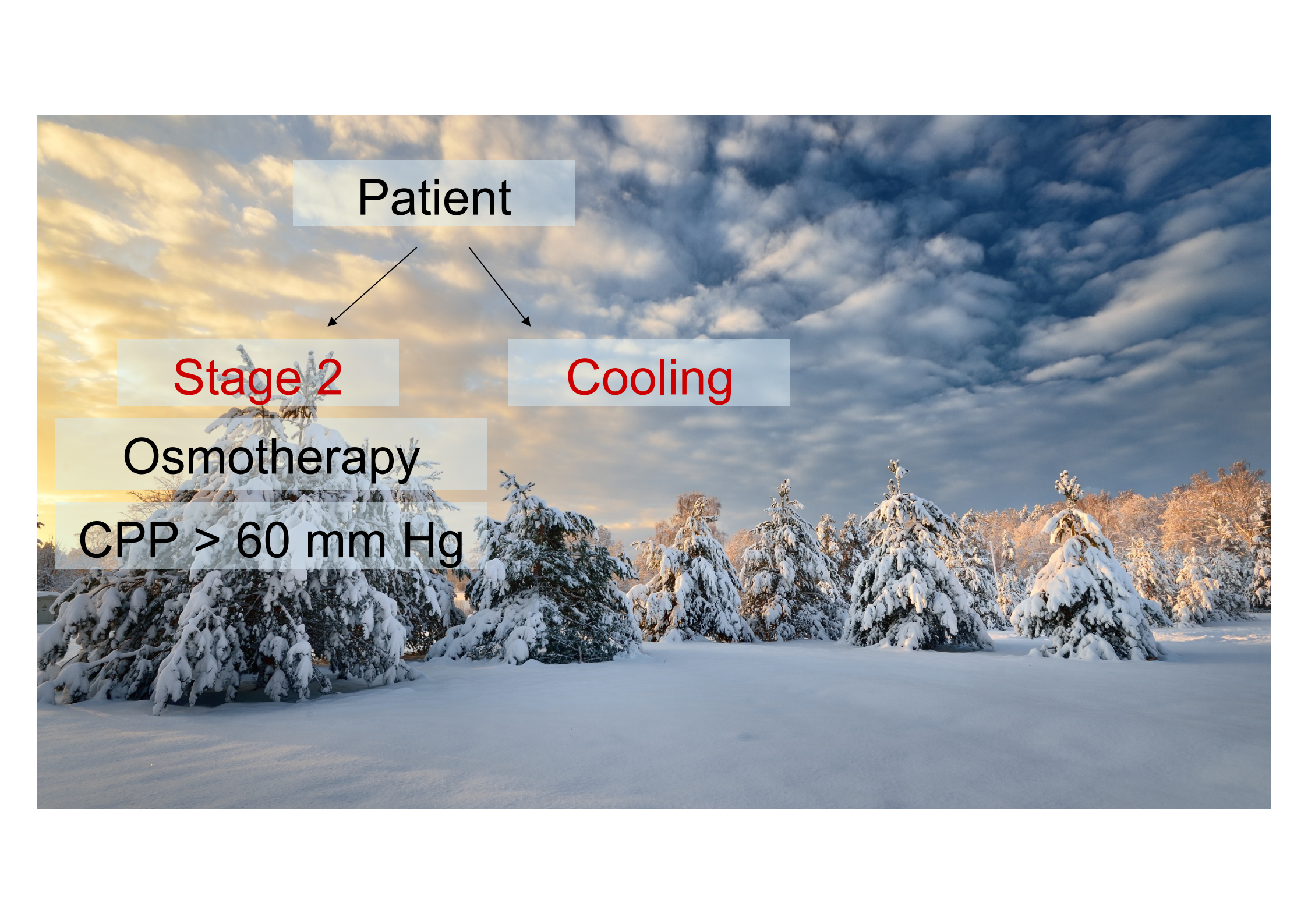
Surgery



Standard Management

or

Hypothermia 32 - 35°C



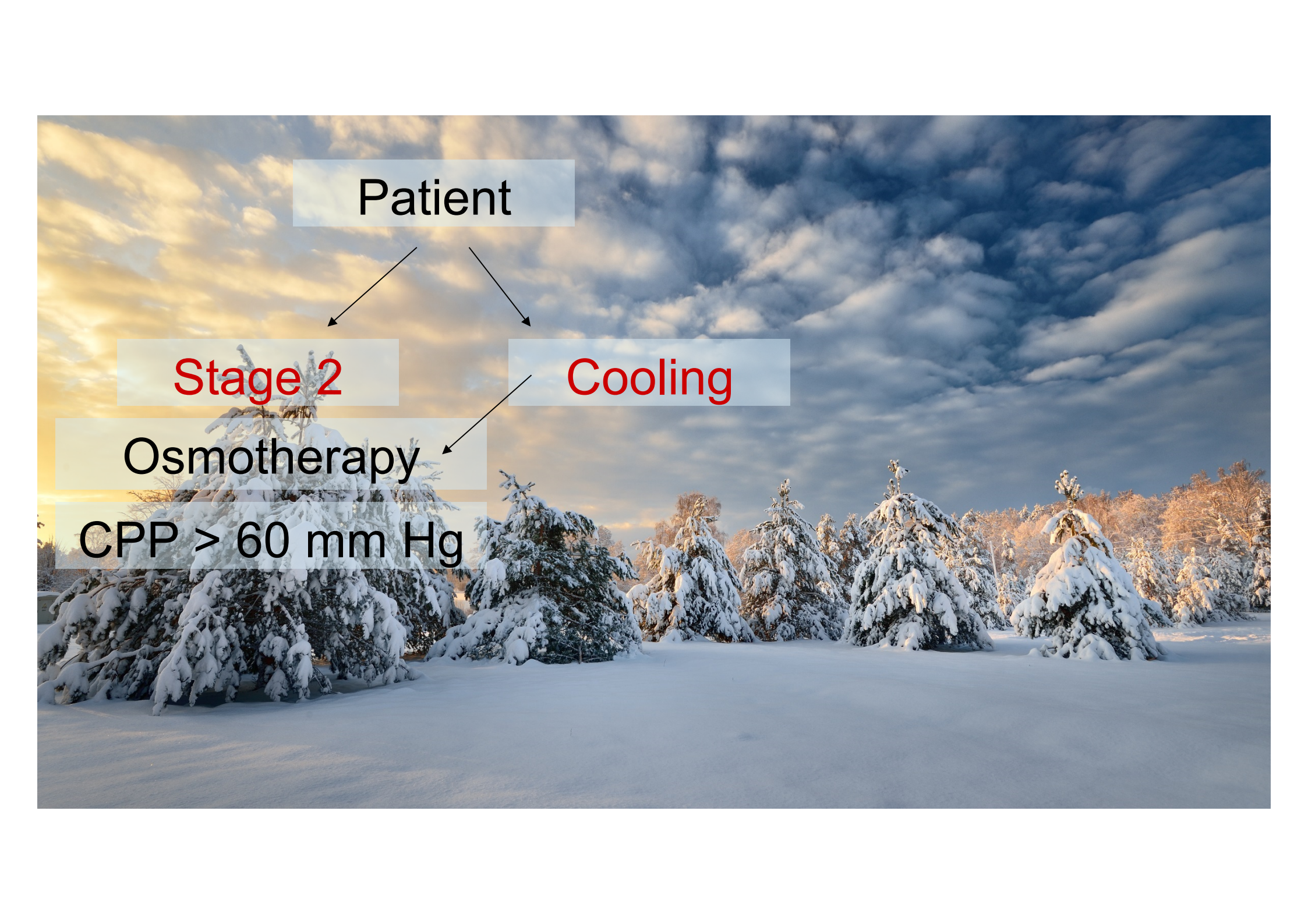
Patient

Stage 2

Cooling

Osmotherapy

CPP > 60 mm Hg



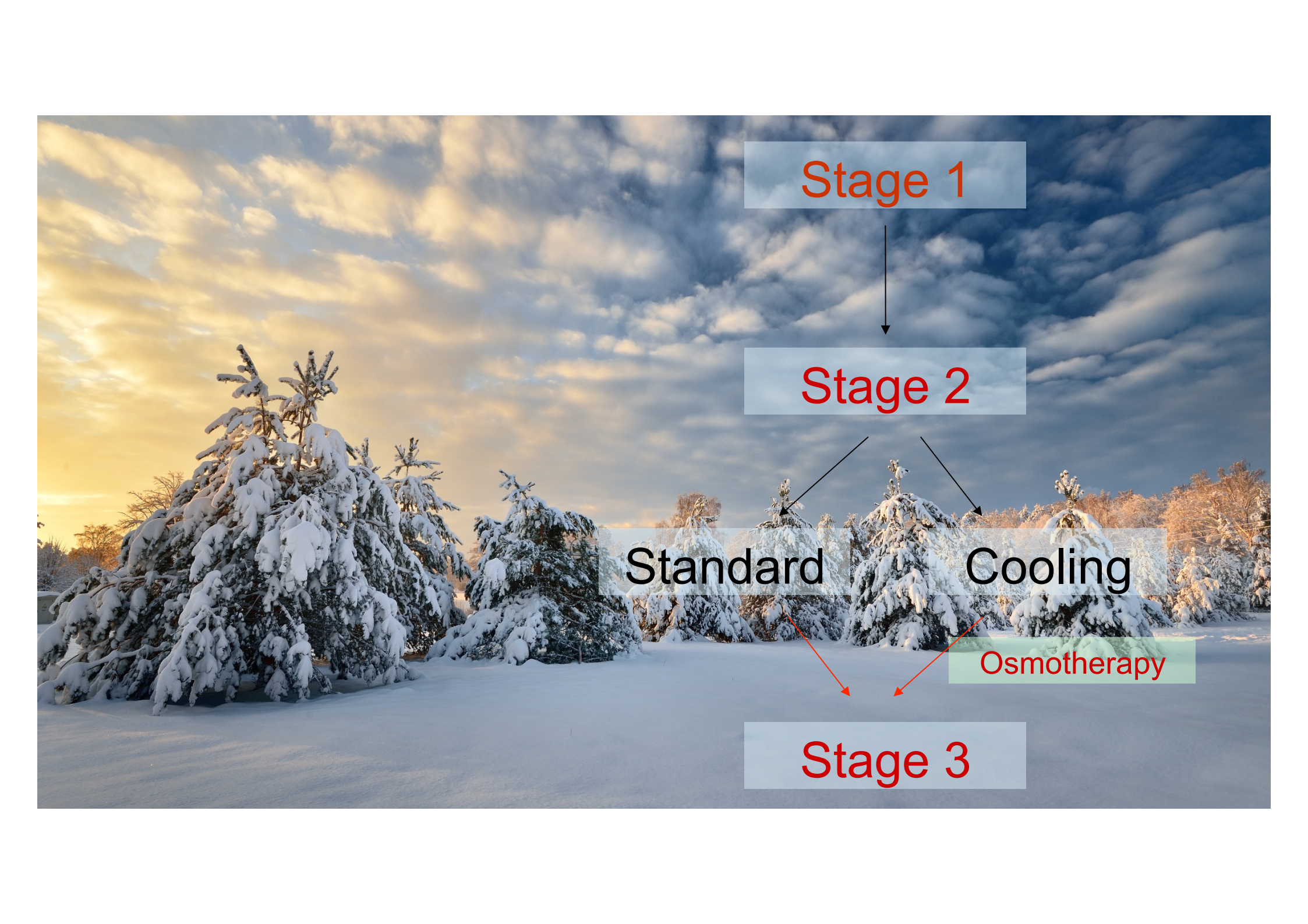
Patient

Stage 2

Cooling

Osmotherapy

CPP > 60 mm Hg



Stage 1

Stage 2

Standard

Cooling

Osmotherapy

Stage 3



Stage 3

Barbiturates

Decompressive
Craniectomy

Further Surgery

Proportion with GOS-E 1-4



Proportion with GOS-E 1-4

1800 Patients

80%

5%

Δ 9%

60% to 51%



Proportion with GOS-E 1-4

1800 Patients

80%

5%

Δ 9%

60% to 51%

600 Patients



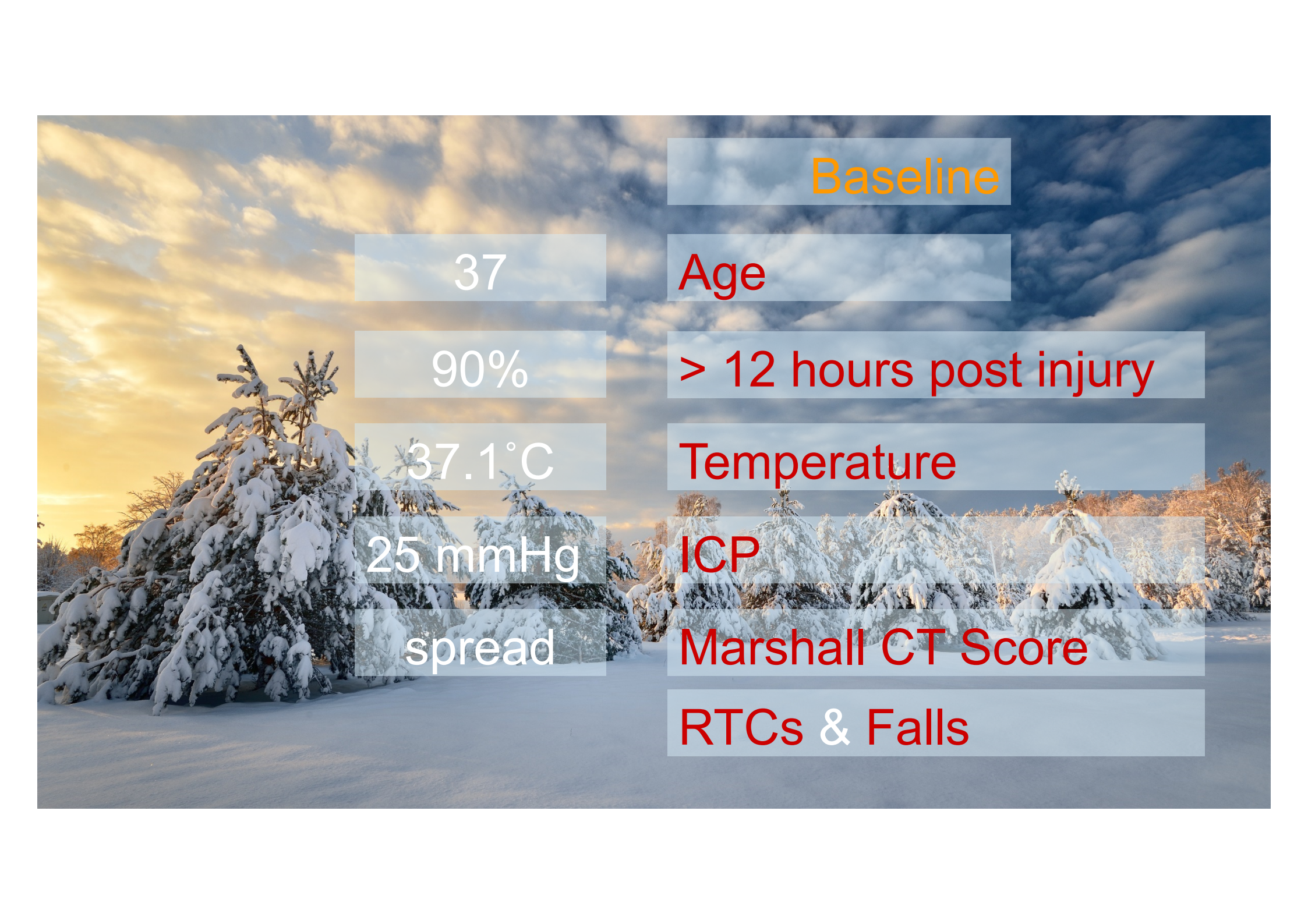




387 patients

47 centres

18 countries



Baseline

37

Age

90%

> 12 hours post injury

37.1°C

Temperature

25 mmHg

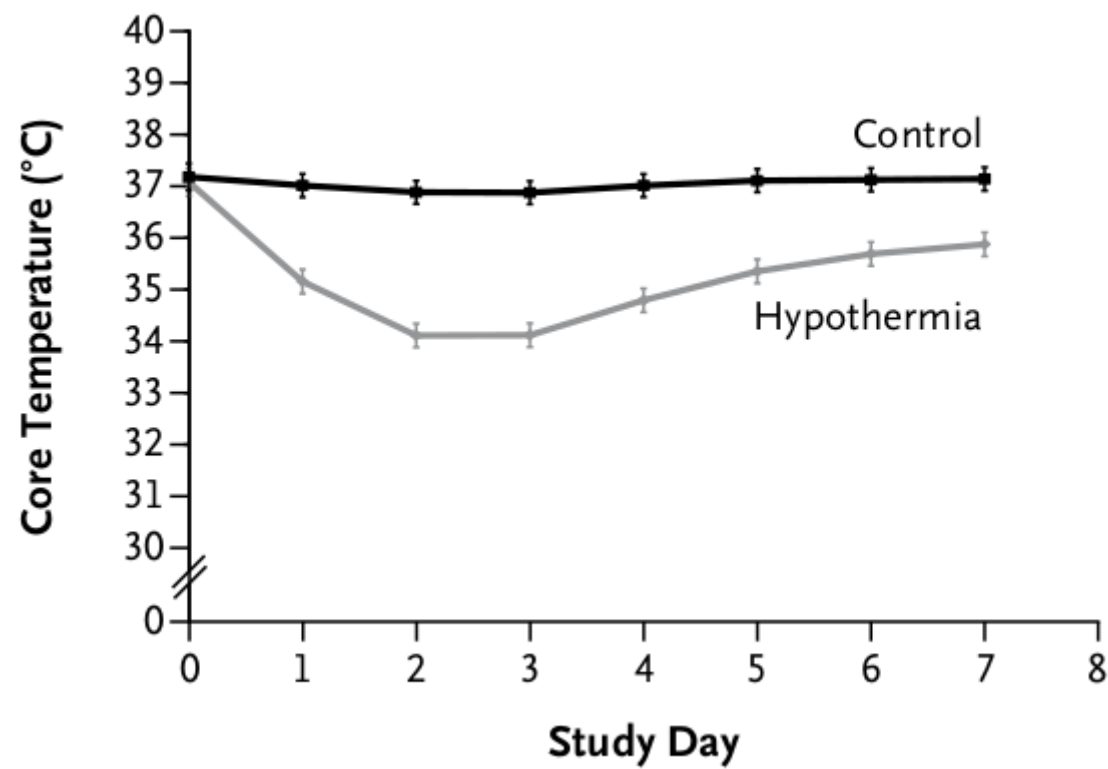
ICP

spread

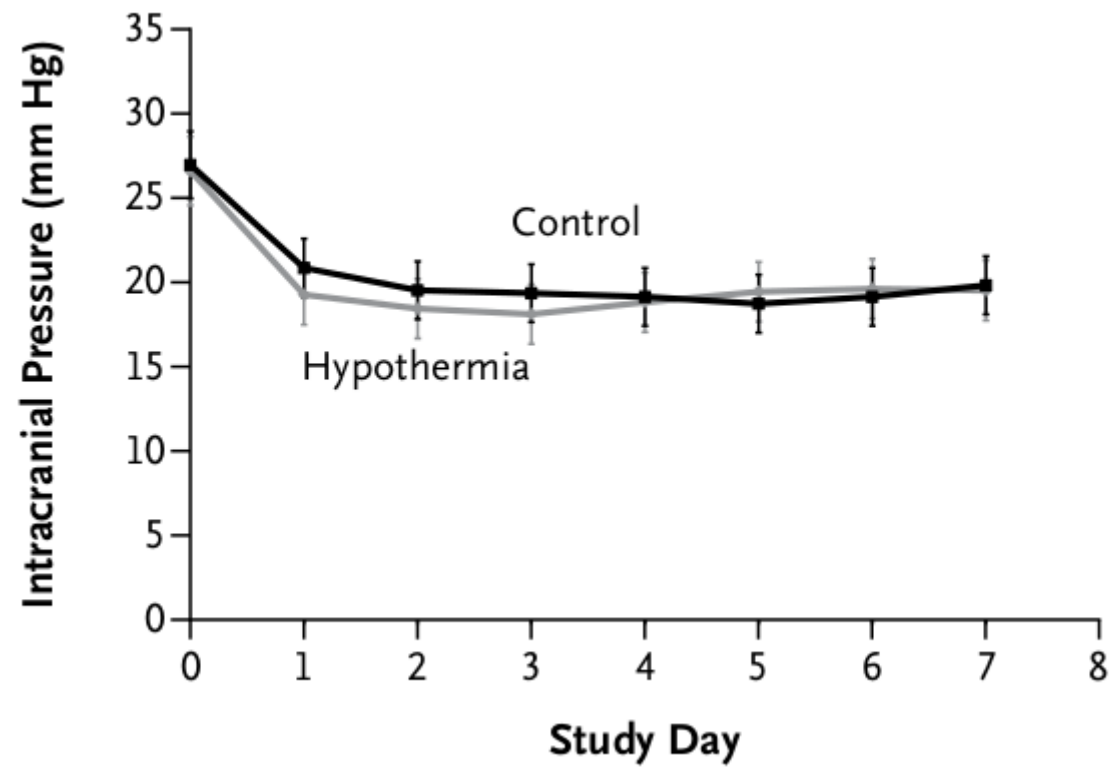
Marshall CT Score

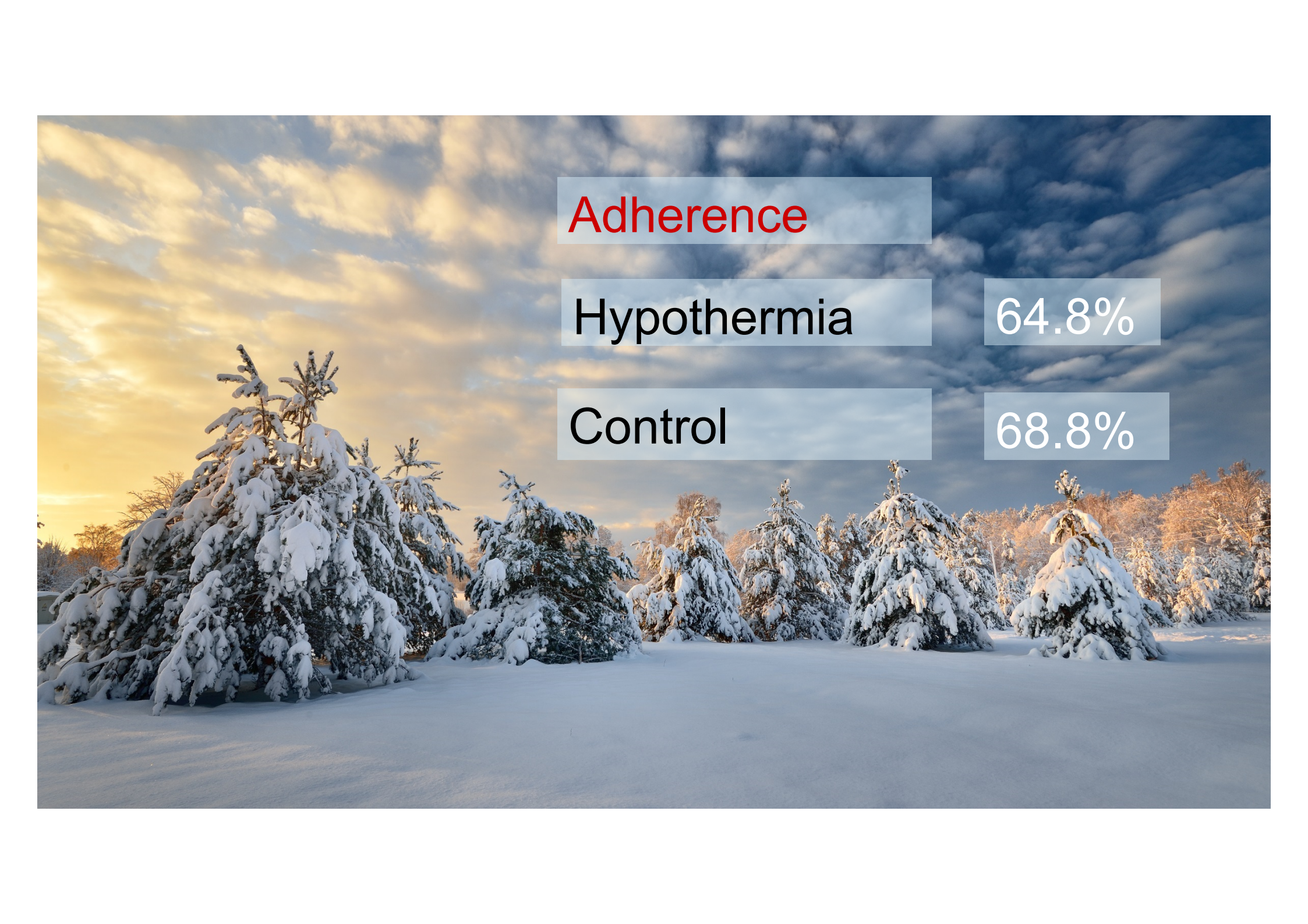
RTCs & Falls

B Core Temperature



A Intracranial Pressure





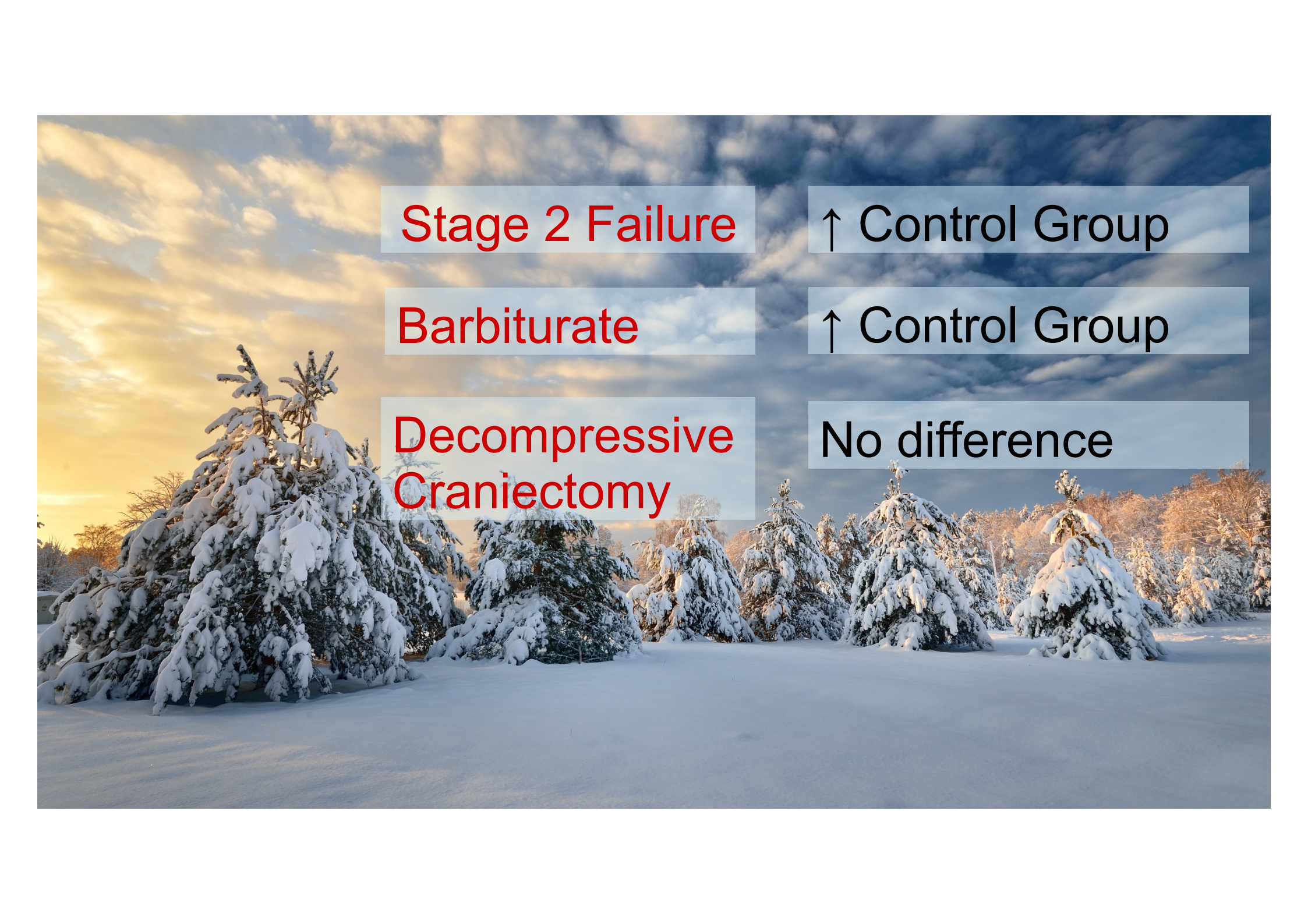
Adherence

Hypothermia

64.8%

Control

68.8%



Stage 2 Failure

↑ Control Group

Barbiturate

↑ Control Group

Decompressive
Craniectomy

No difference

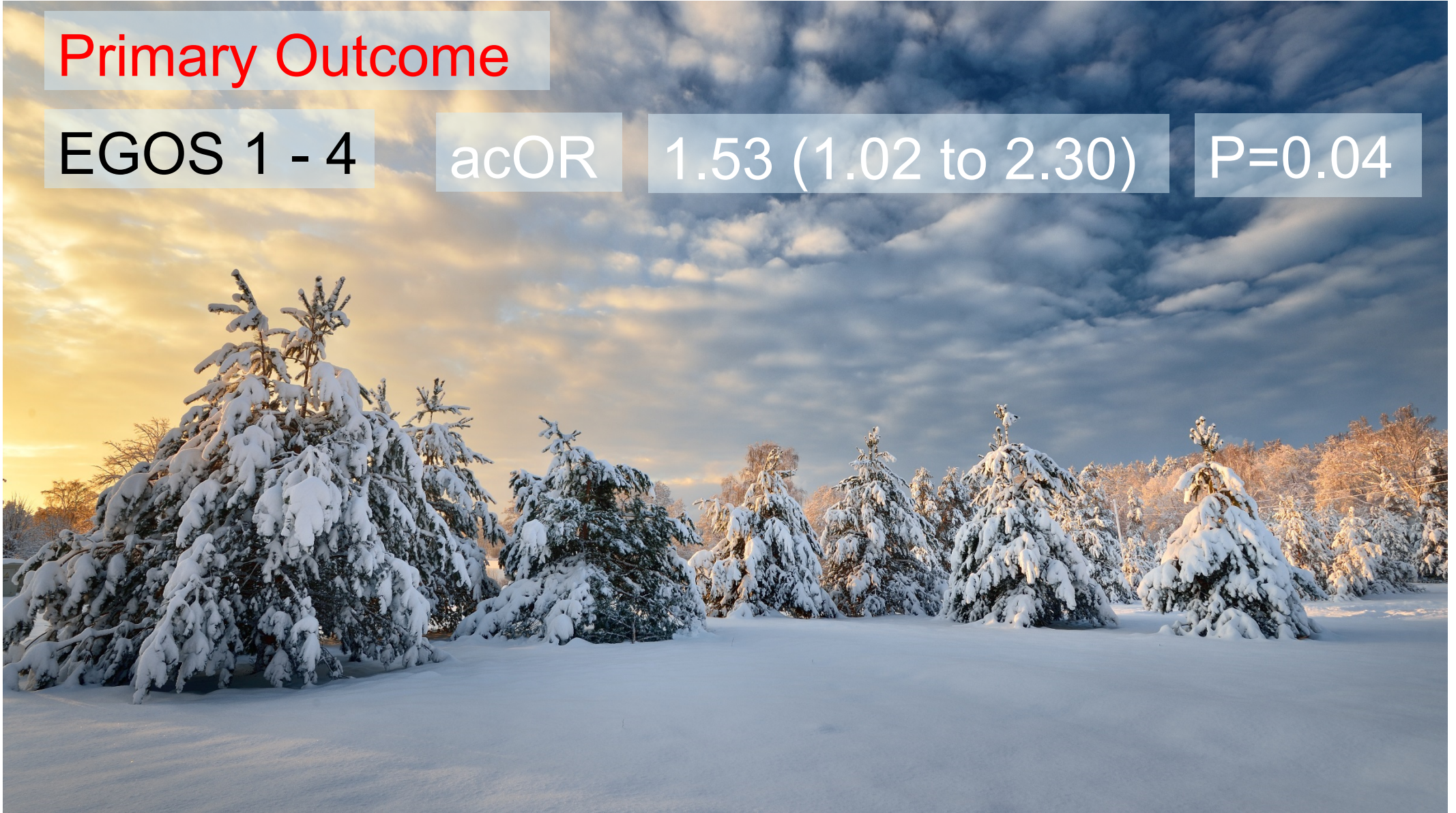
Primary Outcome

EGOS 1 - 4

acOR

1.53 (1.02 to 2.30)

P=0.04



Primary Outcome

EGOS 1 - 4

acOR

1.53 (1.02 to 2.30)

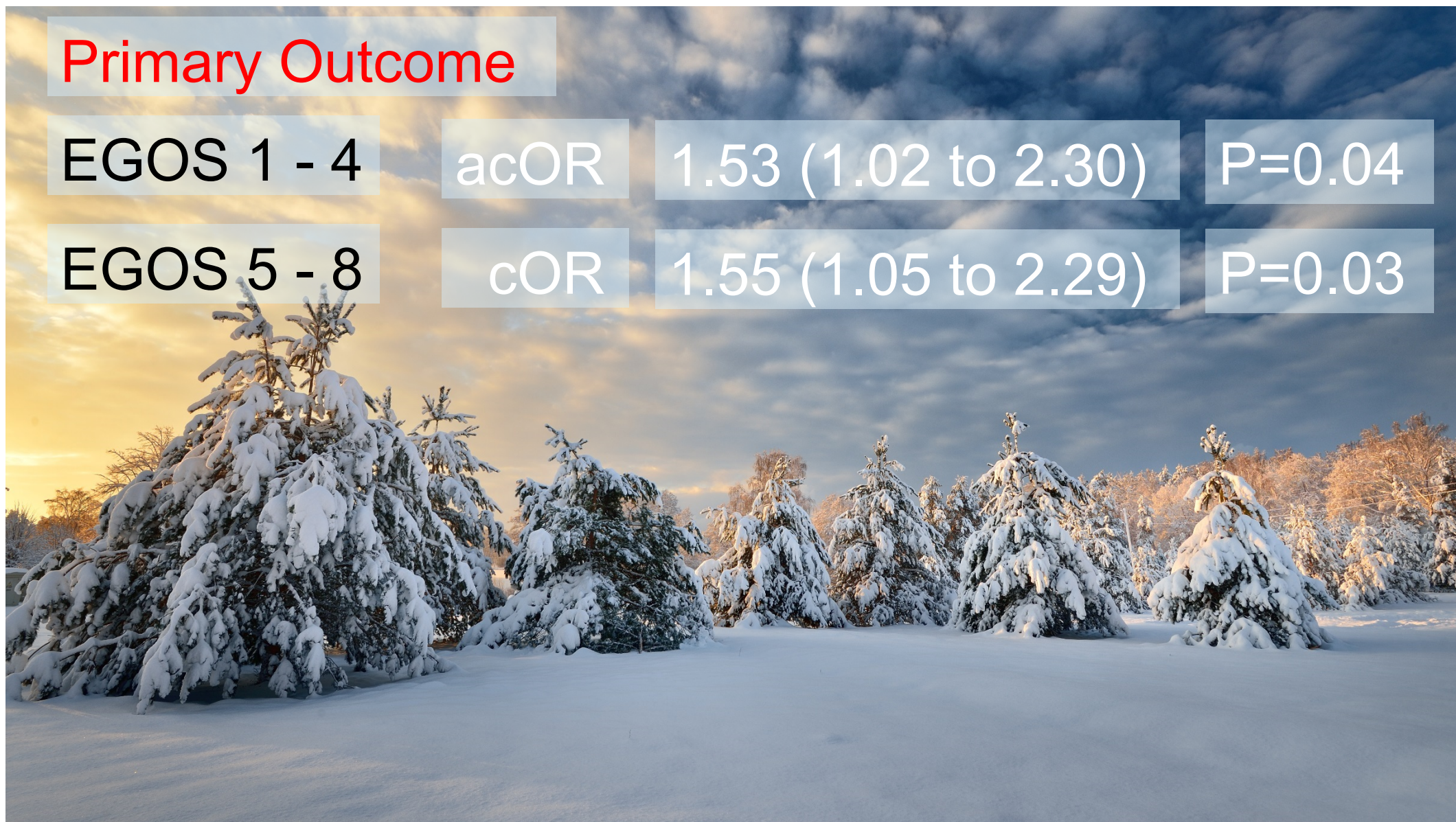
P=0.04

EGOS 5 - 8

cOR

1.55 (1.05 to 2.29)

P=0.03



Favourable Outcome

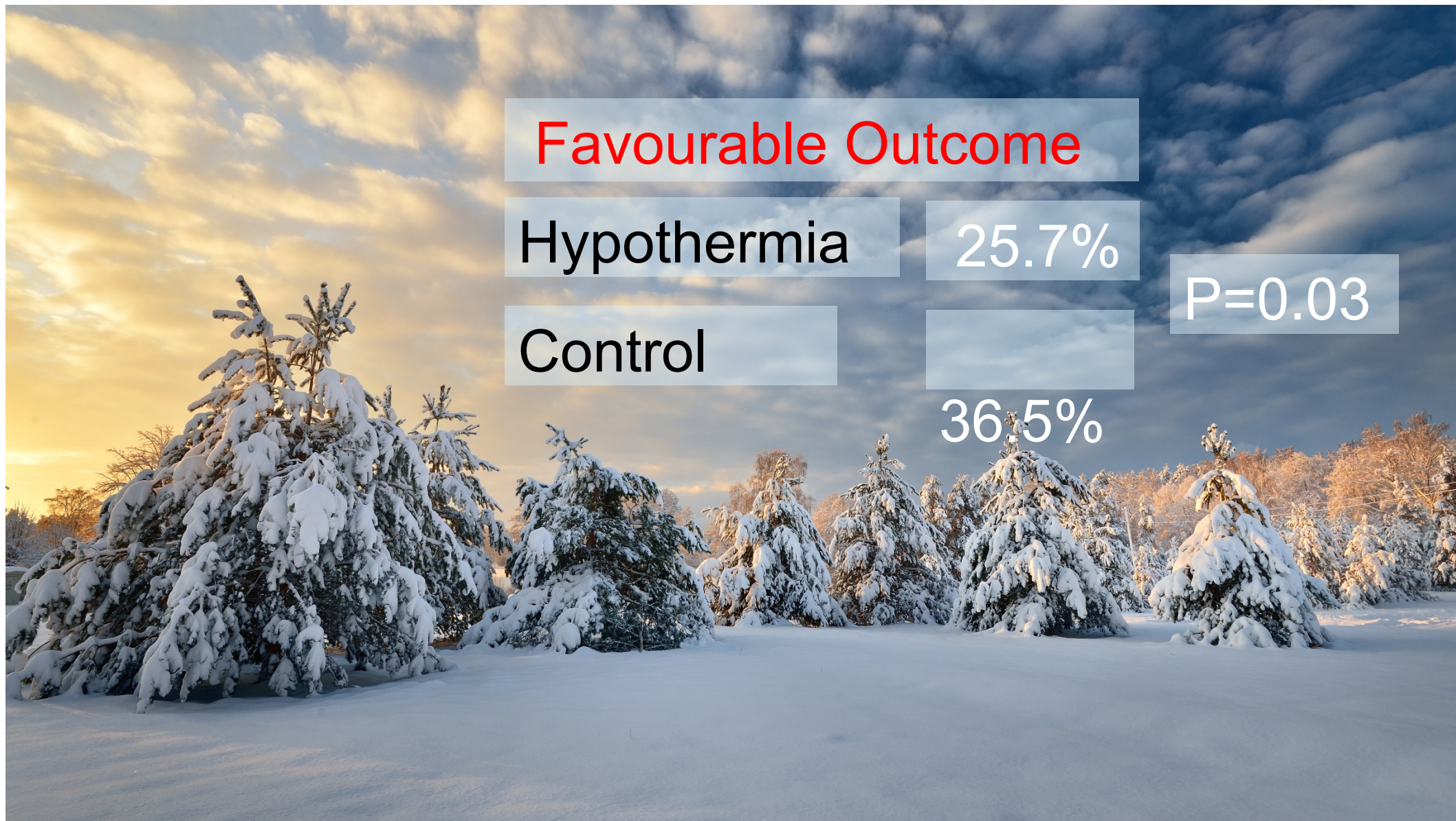
Hypothermia

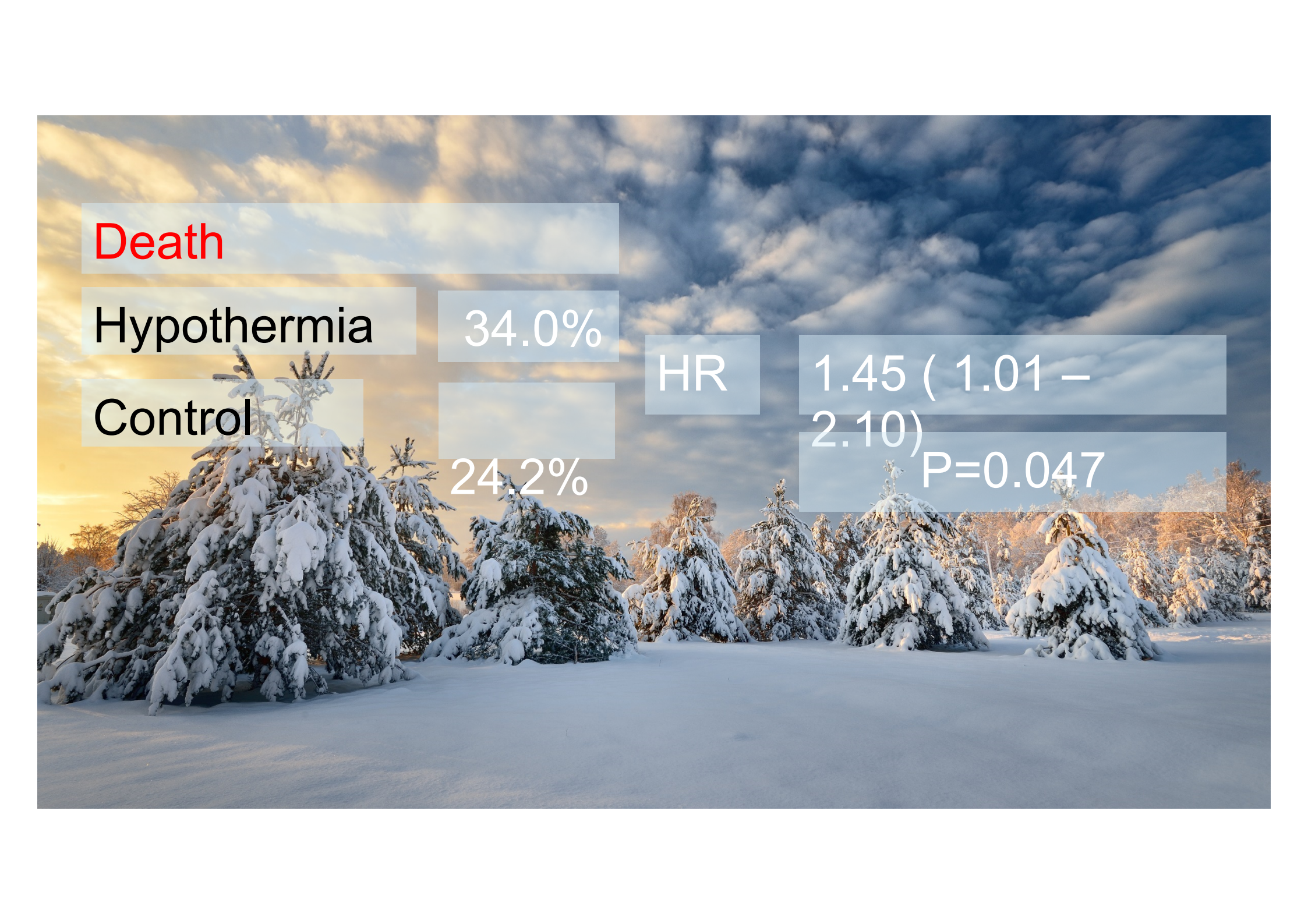
25.7%

Control

36.5%

P=0.03





Death

Hypothermia

34.0%

Control

24.2%

HR

1.45 (1.01 –
2.10)

P=0.047



Methodologically strong

Limitations some

Overall controversial

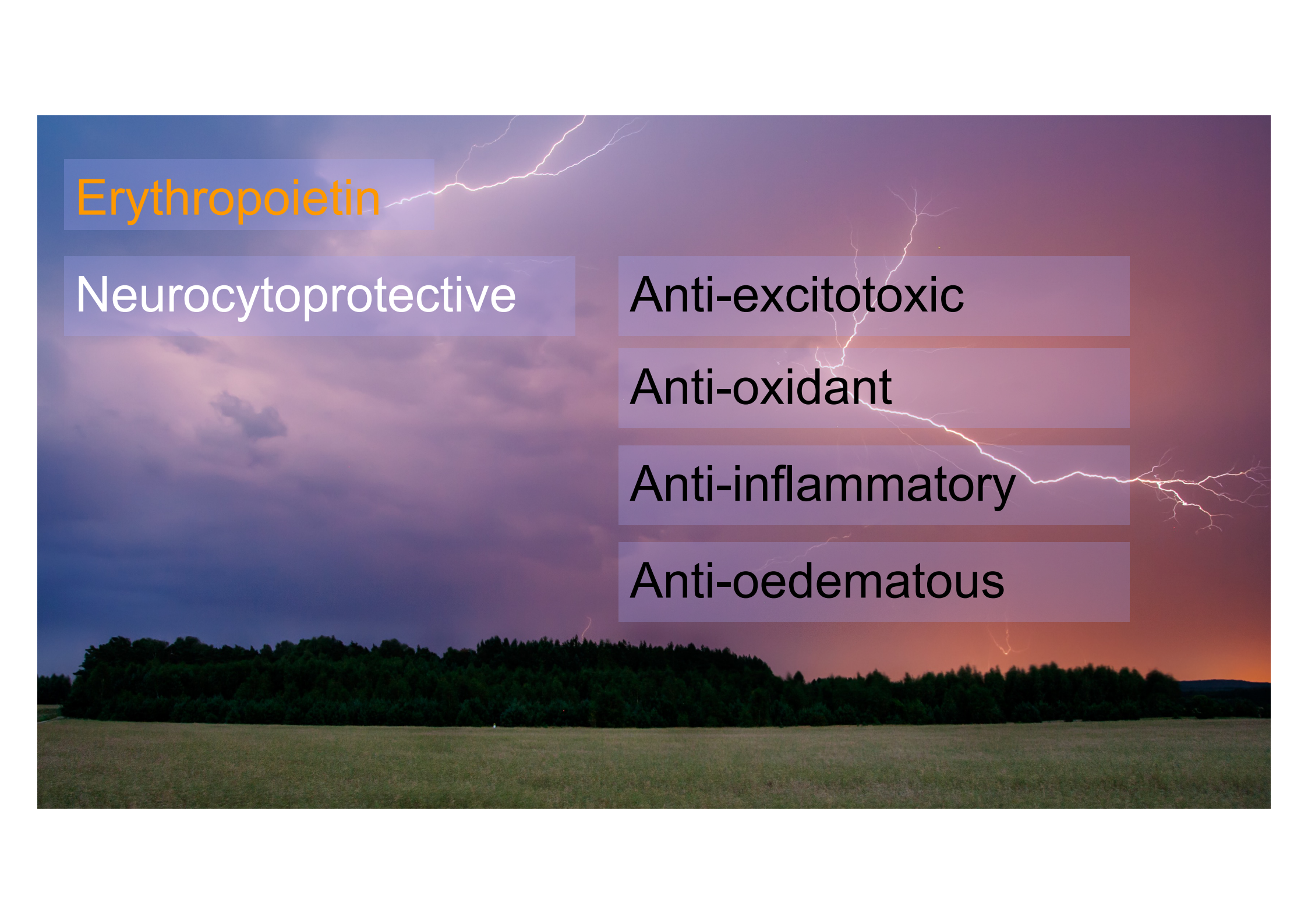




EPO-TBI



Erythropoietin in Traumatic Brain Injury

A dramatic landscape photograph of a stormy night. The sky is dark and filled with heavy, purple-tinged clouds. Several bright, jagged lightning bolts are visible, striking across the sky. In the foreground, there is a flat, grassy field. In the middle ground, a dense line of dark trees stretches across the horizon. The overall mood is intense and powerful.

Erythropoietin

Neurocytoprotective

Anti-excitotoxic

Anti-oxidant

Anti-inflammatory

Anti-oedematous

A dramatic night sky with dark, heavy clouds and several bright, jagged lightning bolts striking across the horizon. The foreground shows a dark, silhouetted treeline and a grassy field.

Erythropoietin

vs

Placebo

A dramatic night landscape featuring a dark, stormy sky with multiple bright, jagged lightning bolts striking across it. The horizon is silhouetted by a dense line of trees, and the foreground is a grassy field. The overall color palette is dominated by deep blues, purples, and oranges from the lightning and the twilight sky.

Design

International

Stratified

Double-Blind

Placebo controlled

Randomised trial

A dramatic night landscape featuring a dark, stormy sky with multiple bright lightning bolts striking down. The foreground consists of a grassy field and a dense line of trees in the distance. The overall color palette is dominated by deep blues, purples, and oranges from the lightning and the horizon.

Inclusion

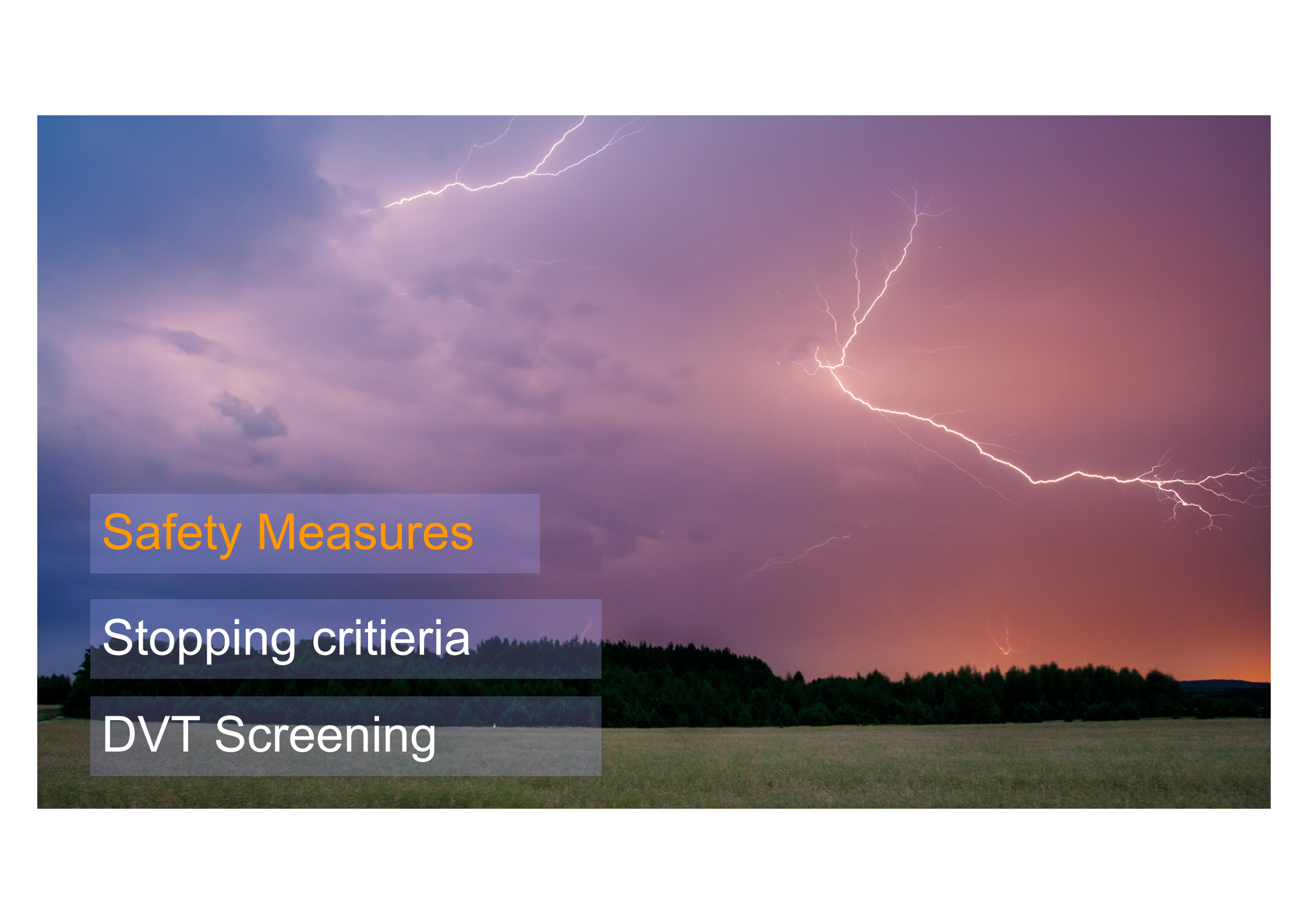
Aged 15 - 65

Non-Penetrating TBI

GCS < 13

Within 24 hours

Hb not raised

A dramatic photograph of a stormy night sky. Multiple bright, jagged lightning bolts are visible against a dark, cloudy sky. The horizon is silhouetted with a line of trees, and the foreground is a dark, grassy field. The overall mood is intense and powerful.

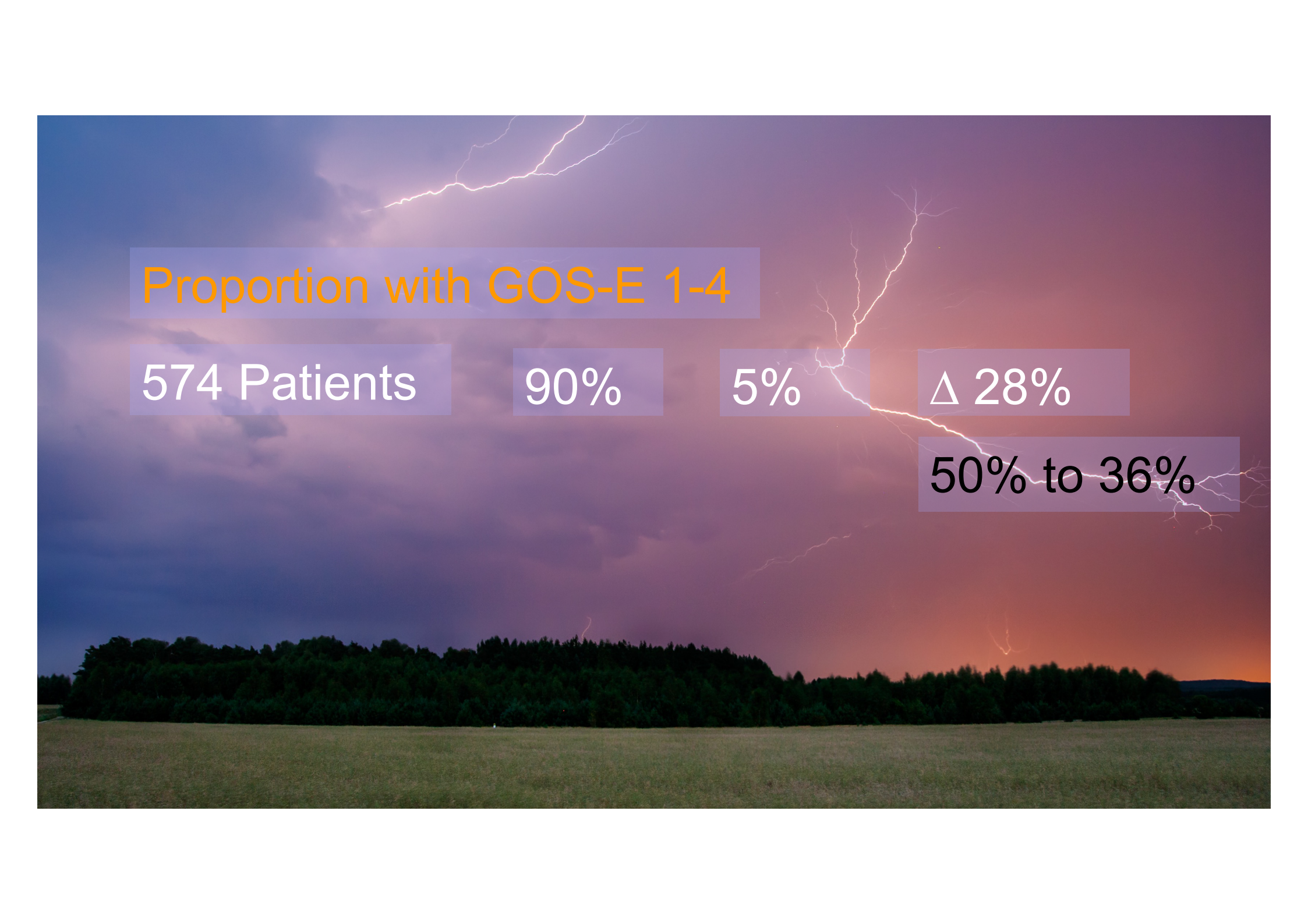
Safety Measures

Stopping criteria

DVT Screening

Proportion with GOS-E 1-4



A dramatic landscape photograph of a stormy sky at dusk or dawn. The sky is filled with dark, heavy clouds and several bright, jagged lightning bolts are visible, illuminating the scene. The horizon is a dark line of trees, and the foreground is a flat, grassy field.

Proportion with GOS-E 1-4

574 Patients

90%

5%

Δ 28%

50% to 36%

Proportion with GOS-E 1-4

574 Patients

90%

5%

Δ 28%

50% to 36%

80%

5%

Δ 24%

50% to 38%

Proportion with GOS-E 1-4

574 Patients

90%

5%

Δ 28%

50% to 36%

80%

5%

Δ 24%

50% to 38%

606 Patients

A dramatic landscape photograph of a stormy sky at dusk or dawn. The sky is filled with dark, heavy clouds, and several bright, jagged lightning bolts are visible, striking across the horizon. The foreground shows a dark, silhouetted line of trees and a grassy field.

606 Patients

29 Centres

7 Countries

A dramatic night sky with dark, heavy clouds and several bright, jagged lightning bolts striking across the horizon. The foreground shows a dark, silhouetted treeline and a grassy field under a deep purple and blue twilight sky.

606 Patients

29 Centres

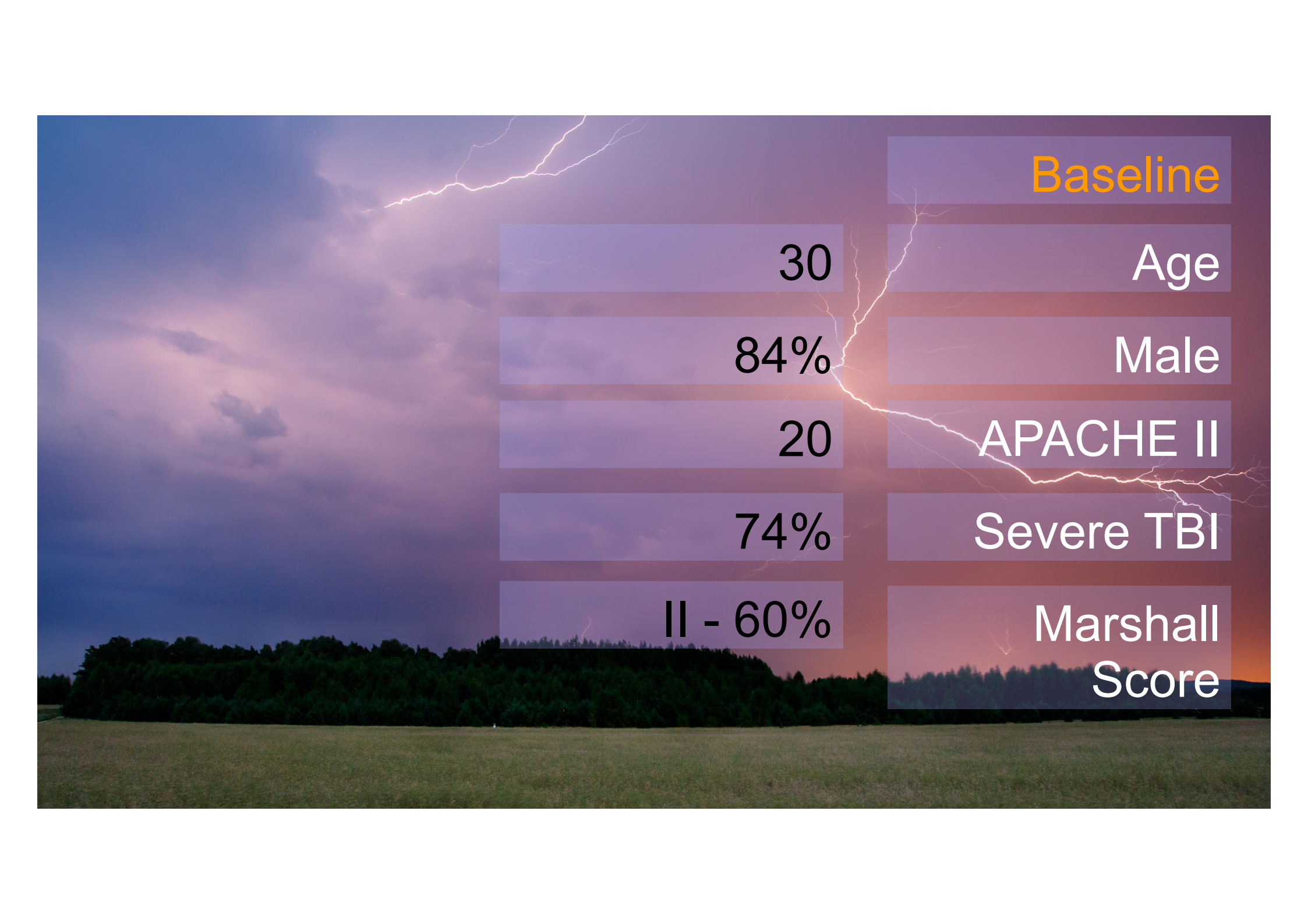
7 Countries

EPO

308

Placebo

298

A dramatic night sky with dark, heavy clouds and bright, jagged lightning bolts striking across the horizon. Below the sky is a dark silhouette of a forest, and in the foreground, a grassy field is visible under the low light of the storm.

Baseline

30

Age

84%

Male

20

APACHE II

74%

Severe TBI

II - 60%

Marshall
Score

Adherence

EPO

Placebo

1st Dose

99%

99.7%

2nd Dose

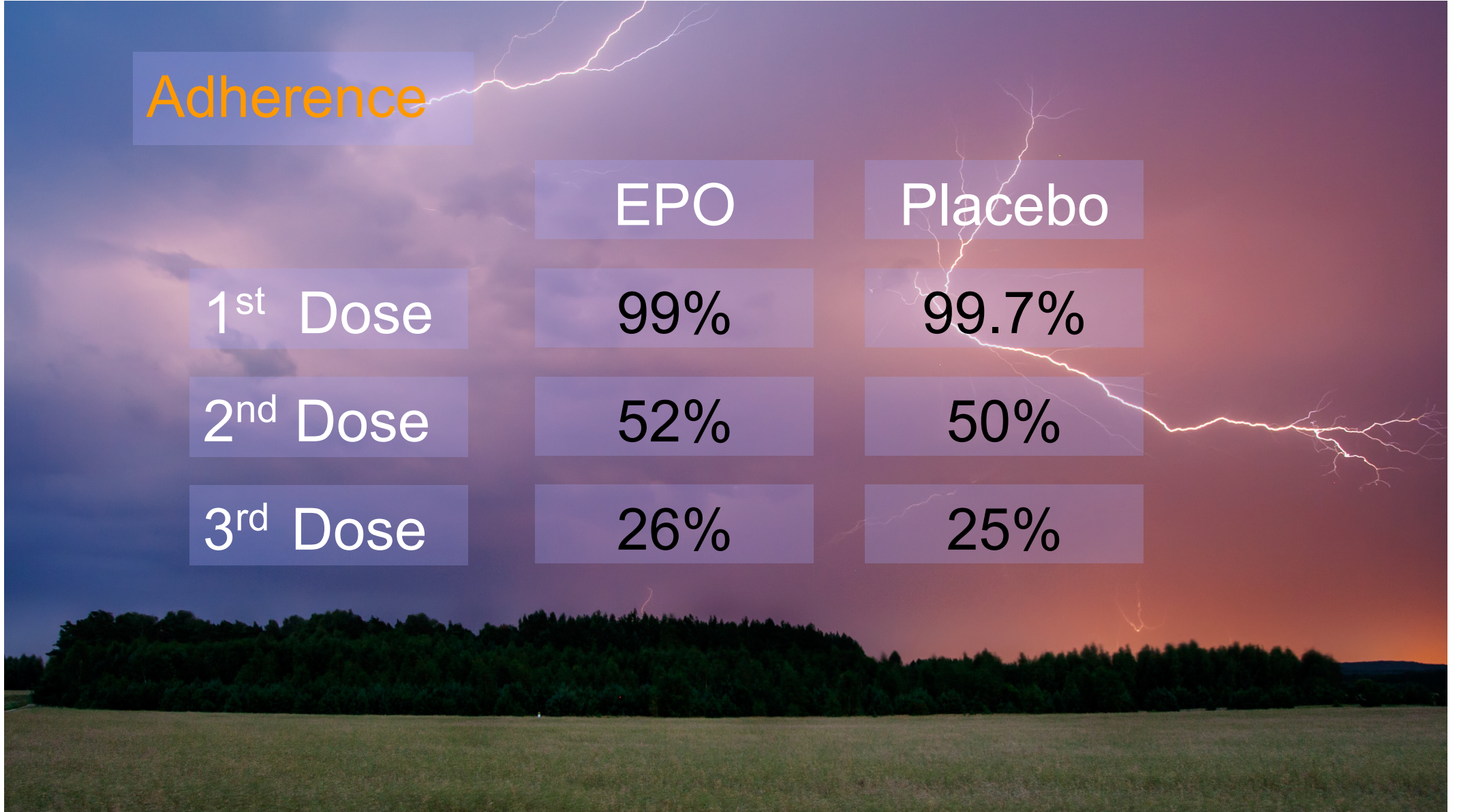
52%

50%

3rd Dose

26%

25%



Adherence

	EPO	Placebo
1 st Dose	99%	99.7%
2 nd Dose	52%	50%
3 rd Dose	26%	25%

No difference in surgical or medical interventions

GOS-E 1 -

4

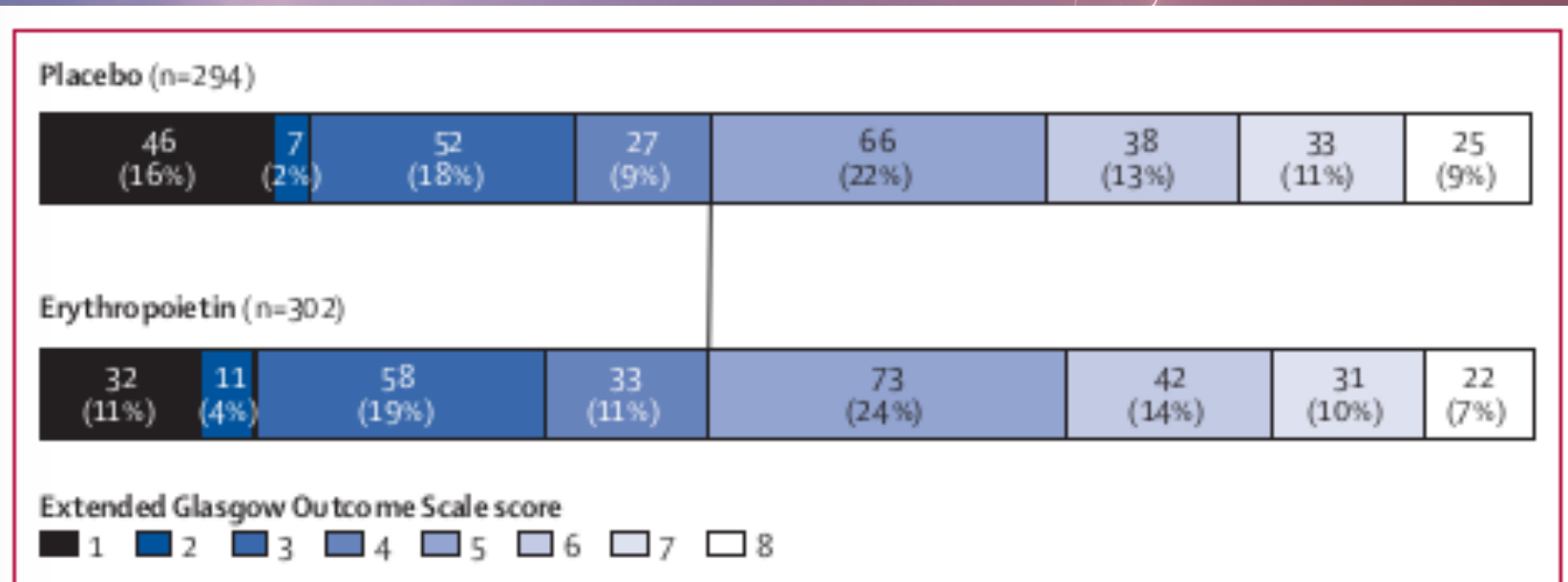


Figure 2: Distribution of Extended Glasgow Outcome Scale scores

RR 0.99, 95% CI 0.83 – 1.18; P=0.90

Day 180 Mortality

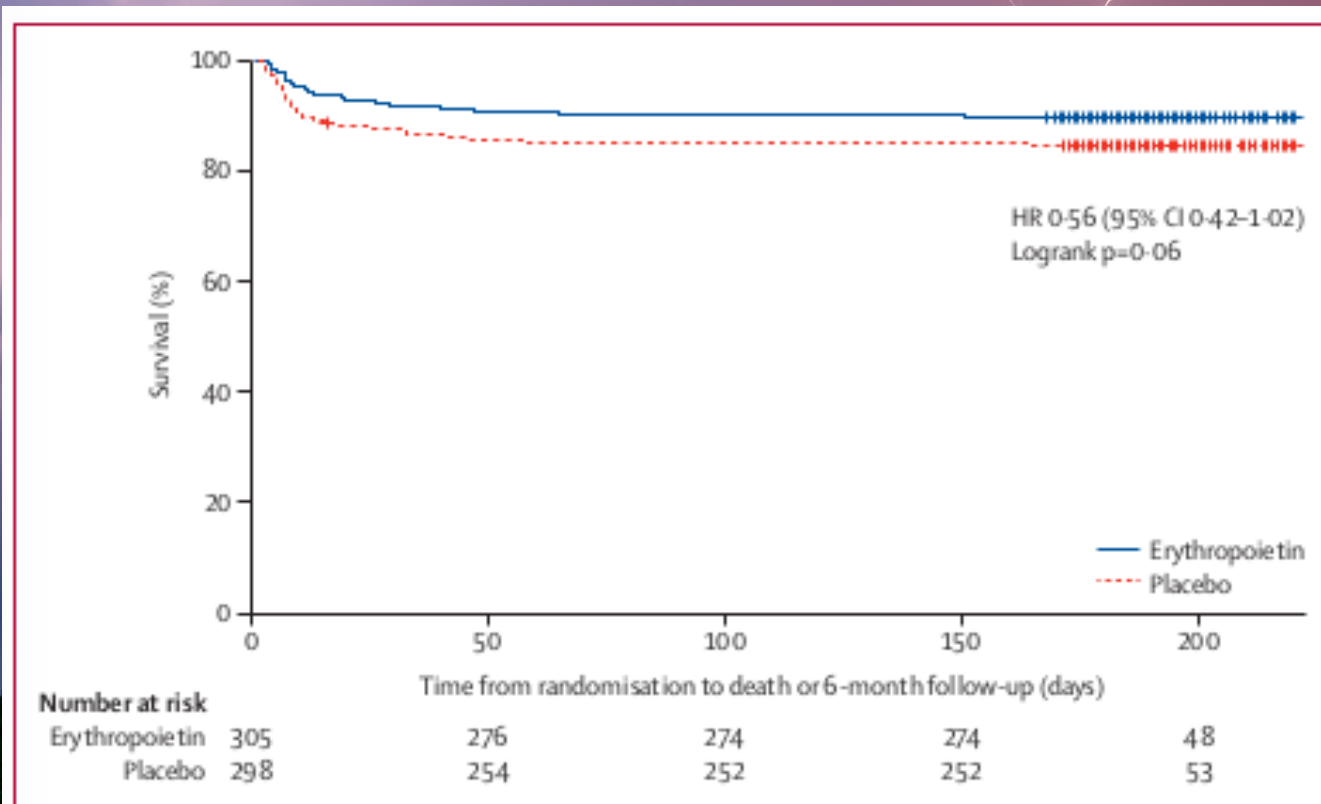


Figure 3: Kaplan-Meier estimates of the unadjusted probability of death at 6 months in patients receiving erythropoietin or placebo

Day 180 Mortality

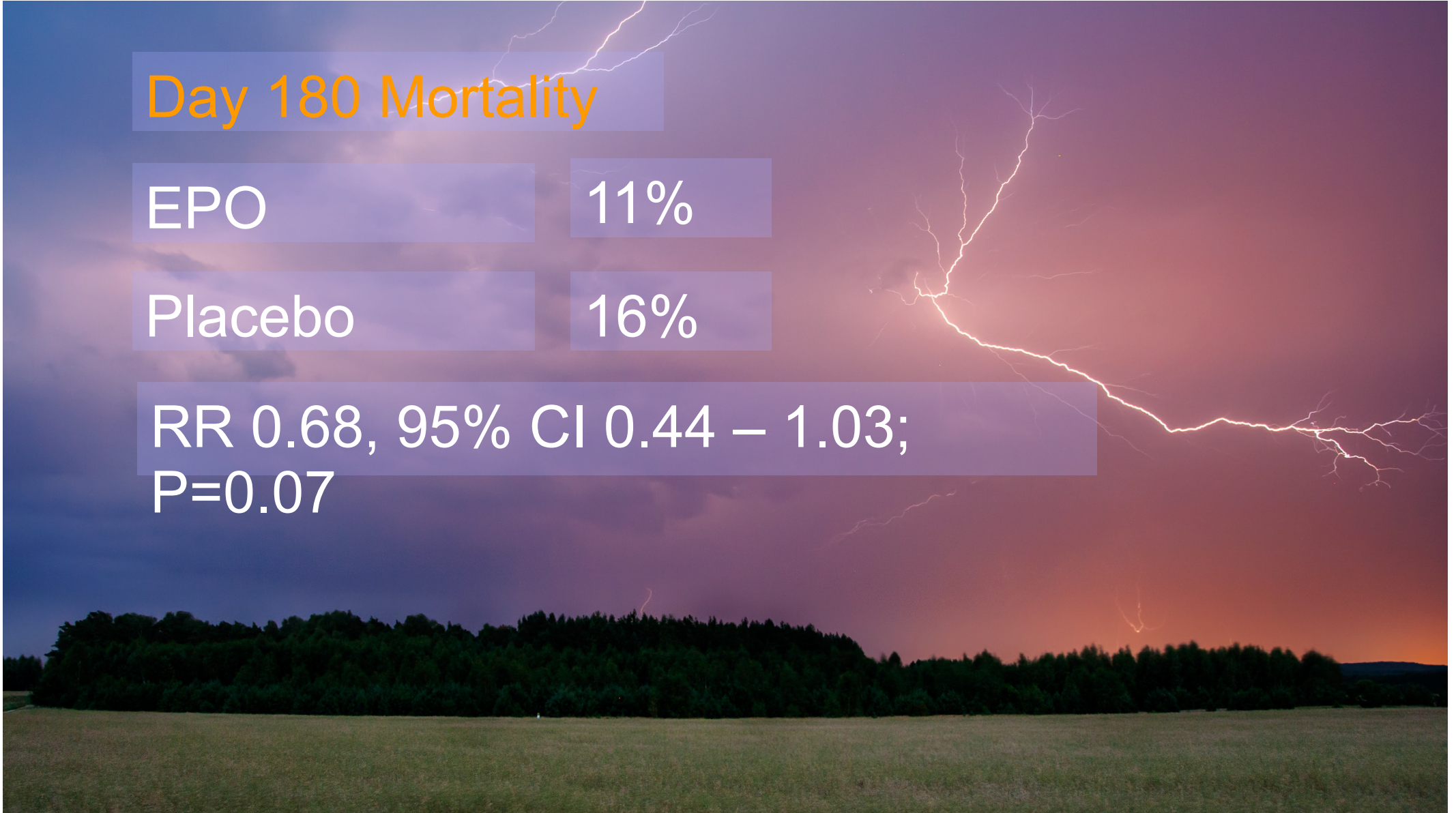
EPO

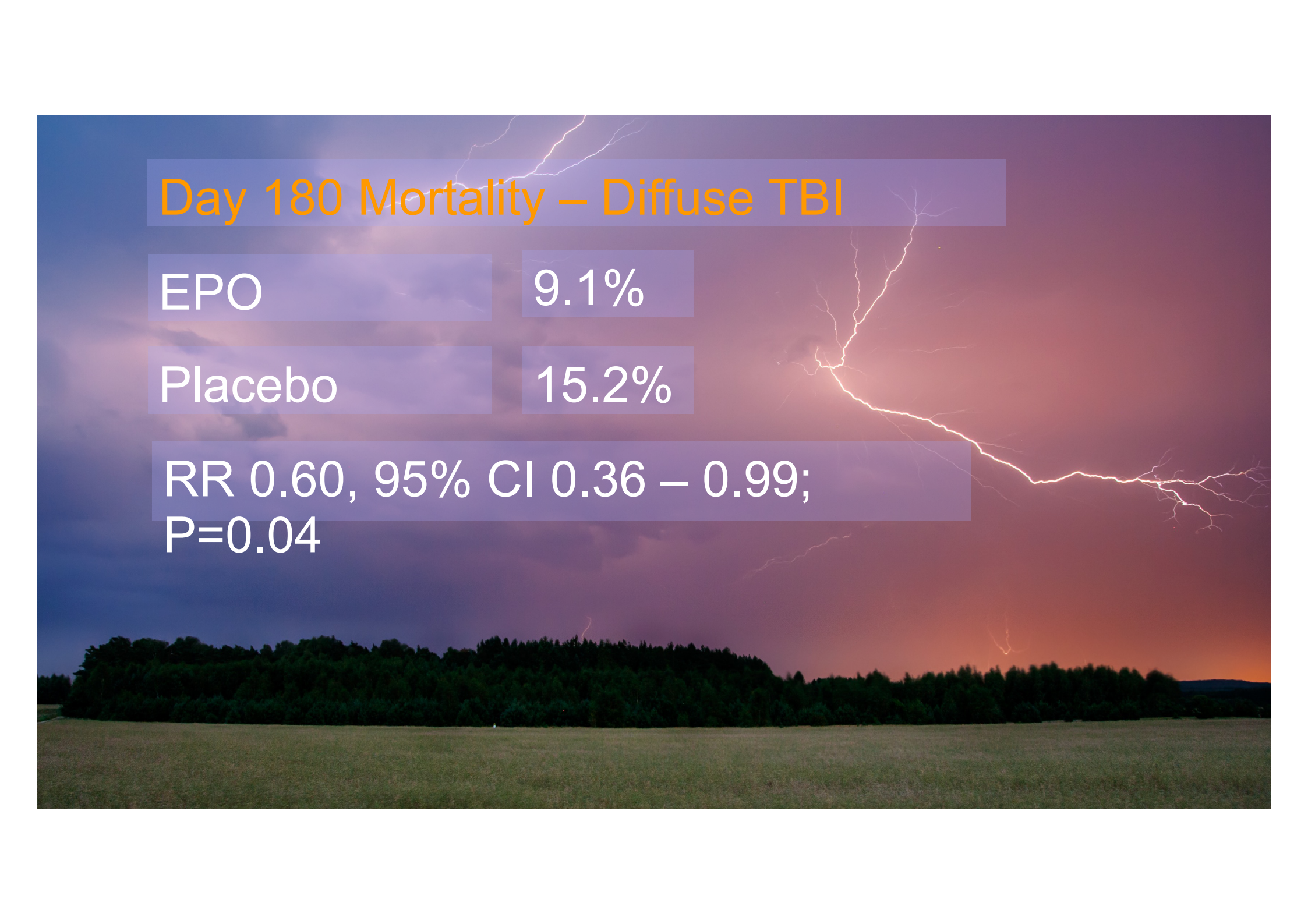
11%

Placebo

16%

RR 0.68, 95% CI 0.44 – 1.03;
P=0.07



A dramatic night sky with dark, heavy clouds and several bright, jagged lightning bolts striking across the horizon. Below the sky is a dark, silhouetted line of trees, and in the foreground, a flat, grassy field stretches across the bottom of the frame. The overall color palette is dominated by deep blues, purples, and oranges from the lightning and the setting or rising sun.

Day 180 Mortality – Diffuse TBI

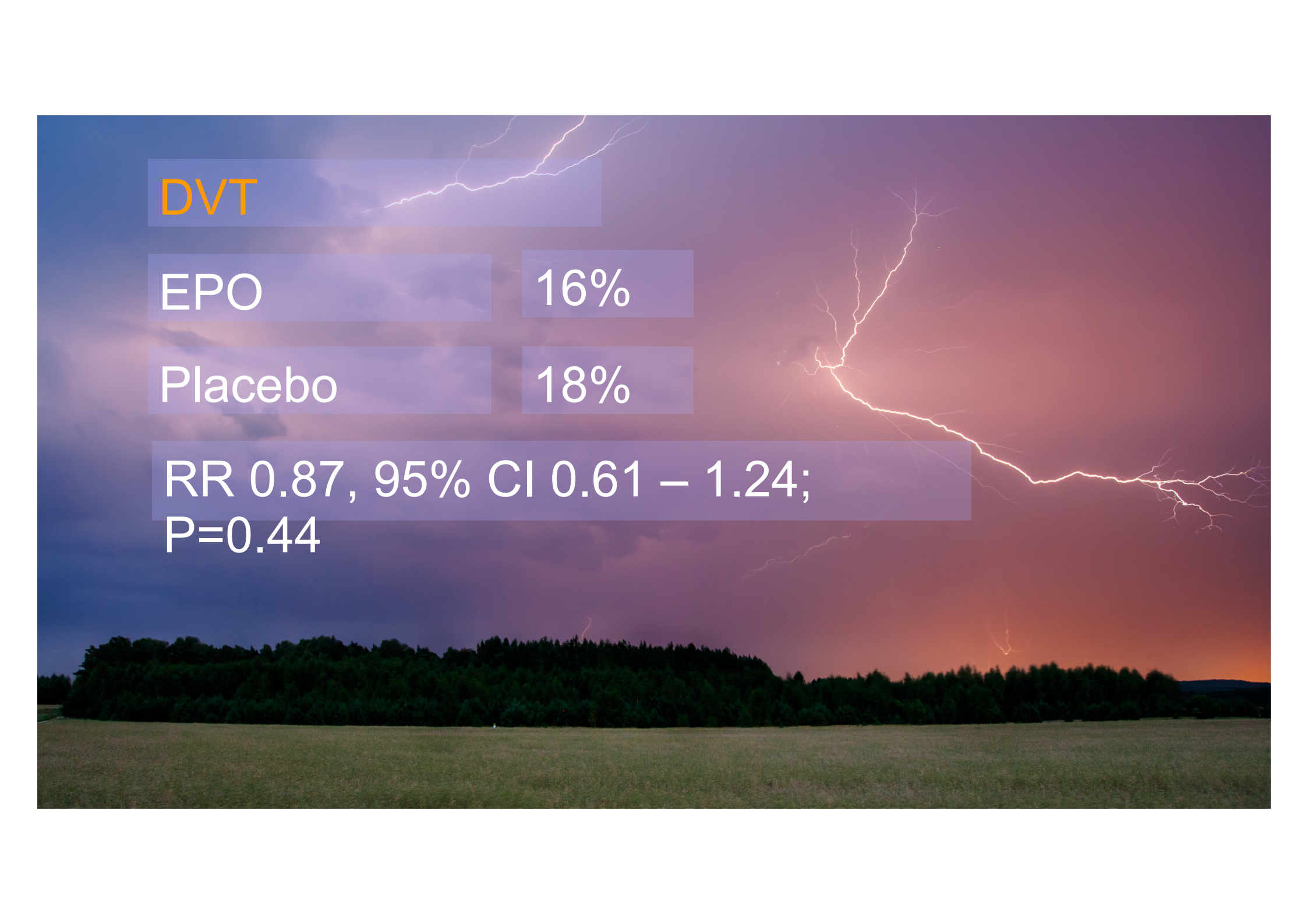
EPO

9.1%

Placebo

15.2%

RR 0.60, 95% CI 0.36 – 0.99;
P=0.04

A dramatic night sky with dark, heavy clouds and several bright, jagged lightning bolts striking across the horizon. The foreground shows a dark, silhouetted treeline and a grassy field under a deep purple and blue twilight sky.

DVT

EPO

16%

Placebo

18%

RR 0.87, 95% CI 0.61 – 1.24;
P=0.44

A dramatic landscape photograph featuring a dark, stormy sky with multiple bright, jagged lightning bolts striking across it. The sky transitions from deep blue on the left to a fiery orange and red on the right. In the foreground, there is a flat, grassy field. In the middle ground, a dense line of dark green trees stretches across the horizon. Three semi-transparent text boxes are overlaid on the right side of the image.

Methodologically Excellent

Limitations Few

Overall Impressive



PROPPR



Blood product ratios in
traumatic haemorrhage



Plasma : Platelets : RBCs

1:1:1

vs

1:1:2



Boxes



Boxes

1:1:1

1 platelets | 6 FFP | 6 RBCs



Boxes

1:1:1

1 platelets | 6 FFP | 6 RBCs

1:1:2

3 FFP | 6 RBCs



Boxes

1:1:1

1 platelets | 6 FFP | 6 RBCs

1:1:2

3 FFP | 6 RBCs

1 platelets | 3 FFP | 6 RBCs



Sequence



Sequence

1:1:1

1 platelets 6 x (1 RBCs | 1 FFP)



Sequence

1:1:1

1 platelets 6 x (1 RBCs | 1 FFP)

1:1:2

3 x (2 RBCs | 1 FFP) + 1
platelets



End Point

Cessation of requirement for blood

Surgeon

Radiologist



Mortality



Mortality

580 Patients

0.044

Δ 10%

21% to 11%



Mortality

580 Patients

0.044

Δ 10%

21% to 11%

0.044

Δ 12%

35% to 23%



Mortality

580 Patients



680 Patients

0.044

Δ 10%

21% to 11%

0.044

Δ 12%

35% to 23%



Mortality

580 Patients

95%

0.044

Δ 10%

21% to 11%



680 Patients

92%

0.044

Δ 12%

35% to 23%



1:1:1

338

1:1:2

342



1:1:1

1:1:2

Baseline

34.5

34

Age

78%

83%

Male

26.5

26

ISS

-8

-8.5

Base Excess

27.5

25.4

Time to
Recruitment



1:1:1

vs

1:1:2

Plasma :

RBCs

Platelets : RBCs



1:1:1

vs

1:1:2

Plasma :

1.0

0.5

RBCs

Platelets : RBCs



1:1:1

vs

1:1:2

Plasma :

1.0

0.5

RBCs

1.5

Platelets : RBCs

0.4



Blood Products during Intervention



Blood Products during Intervention

1:1:1

15

1:1:2

16



Blood Products after Intervention



Blood Products after Intervention

1:1:1

1

1:1:2

2



Blood Products at 24 hours



Blood Products at 24 hours

1:1:1

25

1:1:2

19



Blood Products at 24 hours

1:1:1

1:1:2



Blood Products at 24 hours

1:1:1

1:1:2

Plasma

7

5

$P < 0.001$



Blood Products at 24 hours

1:1:1

1:1:2

Plasma

7

5

P<0.001

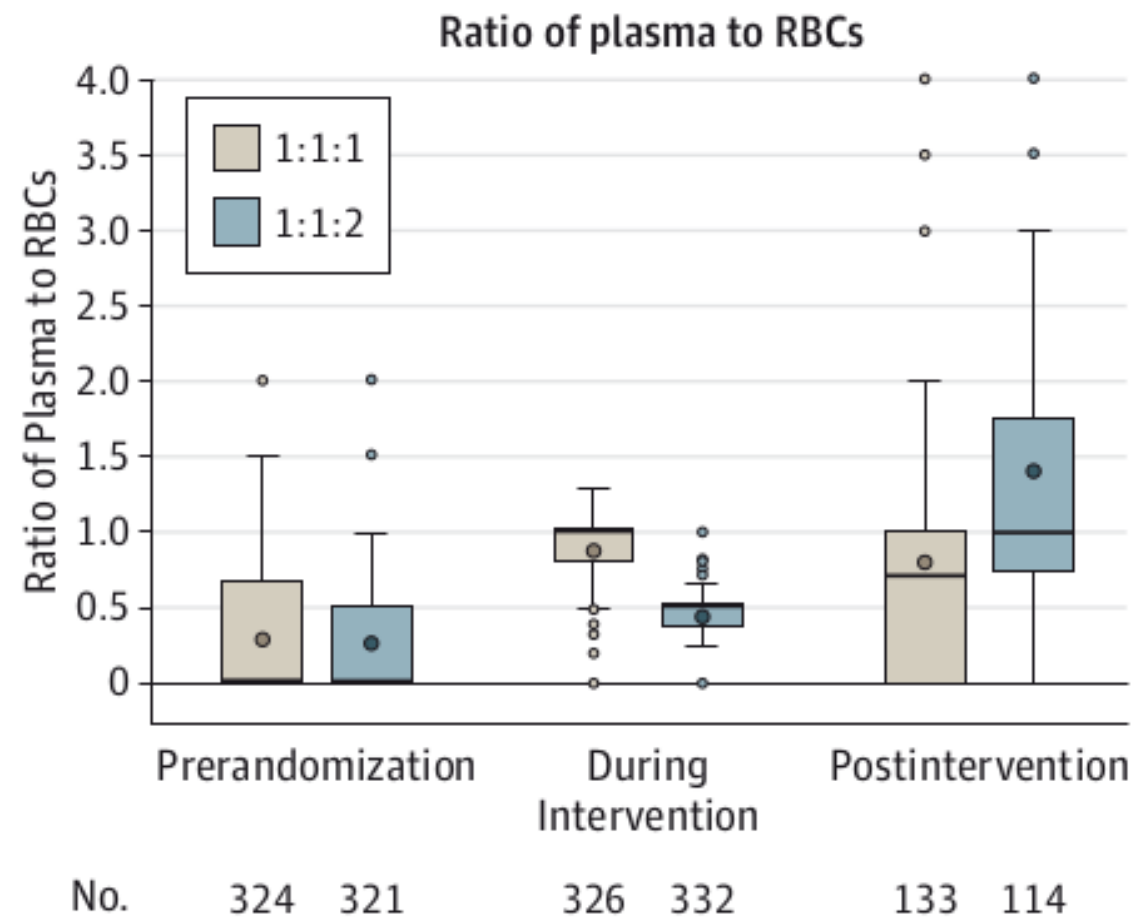
Platelets

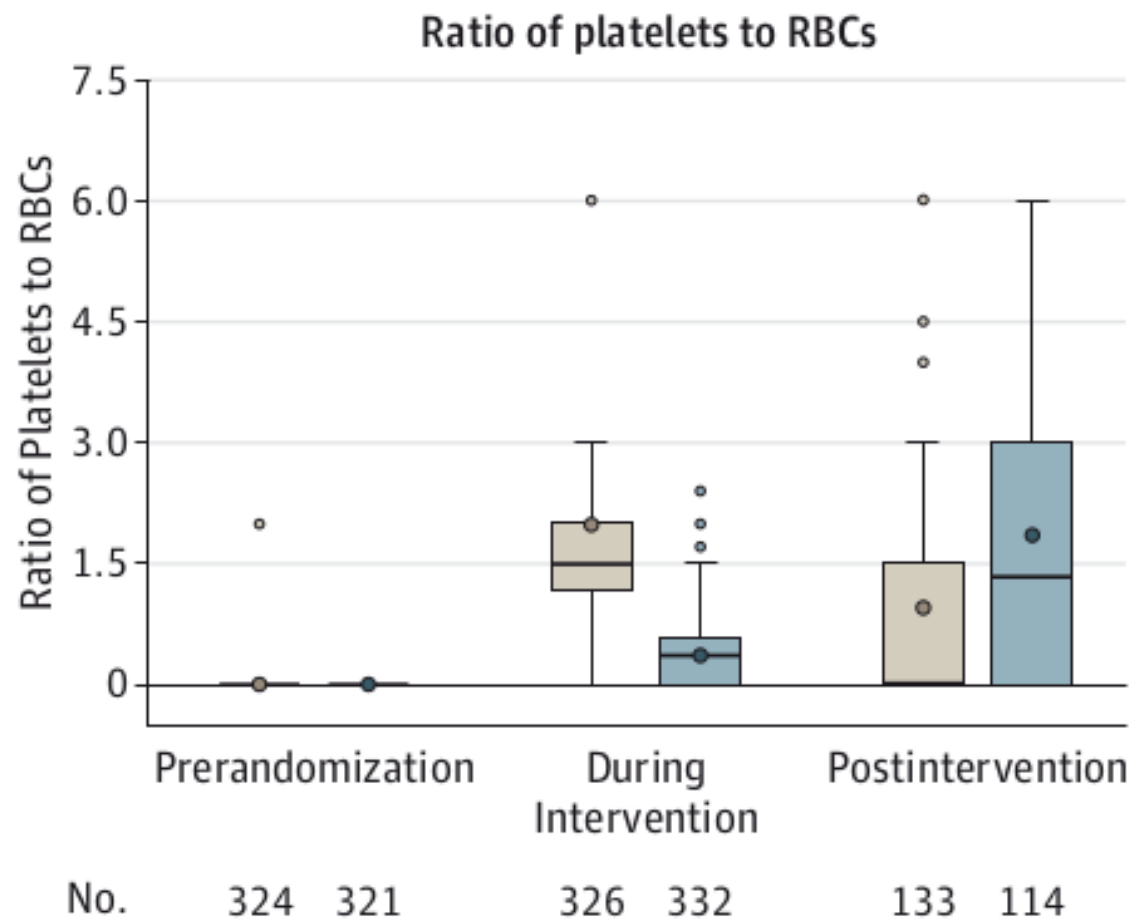
12

6

P<0.001







Mortality

1:1:1

1:1:2



Mortality

1:1:1

1:1:2

24 Hours

12.7%

17.0%



Mortality

1:1:1

1:1:2

24 Hours

12.7%

17.0%

30 Days

22.4%

26.1%



Deaths from Exsanguination at 24 hours



Deaths from Exsanguination at 24 hours

1:1:1

9.2%

1:1:2

14.6%



Deaths from Exsanguination at 24 hours

1:1:1

9.2%

1:1:2

14.6%

difference -5.4%

95% CI, -10.4% to -0.5%

P = 0.03



Haemostasis



Haemostasis

1:1:1

86.1%

1:1:2

78.1%

$p = 0.006$



Methodologically robust

Limitations few

Overall outstanding





HEAT



A full-page background image showing a sunset over a body of water. The sun is a bright white circle in the center of the upper half, with its light reflecting as a vertical column of shimmering orange and yellow on the water's surface. The sky is a deep orange with some wispy clouds. The water is dark with the reflection of the sun.

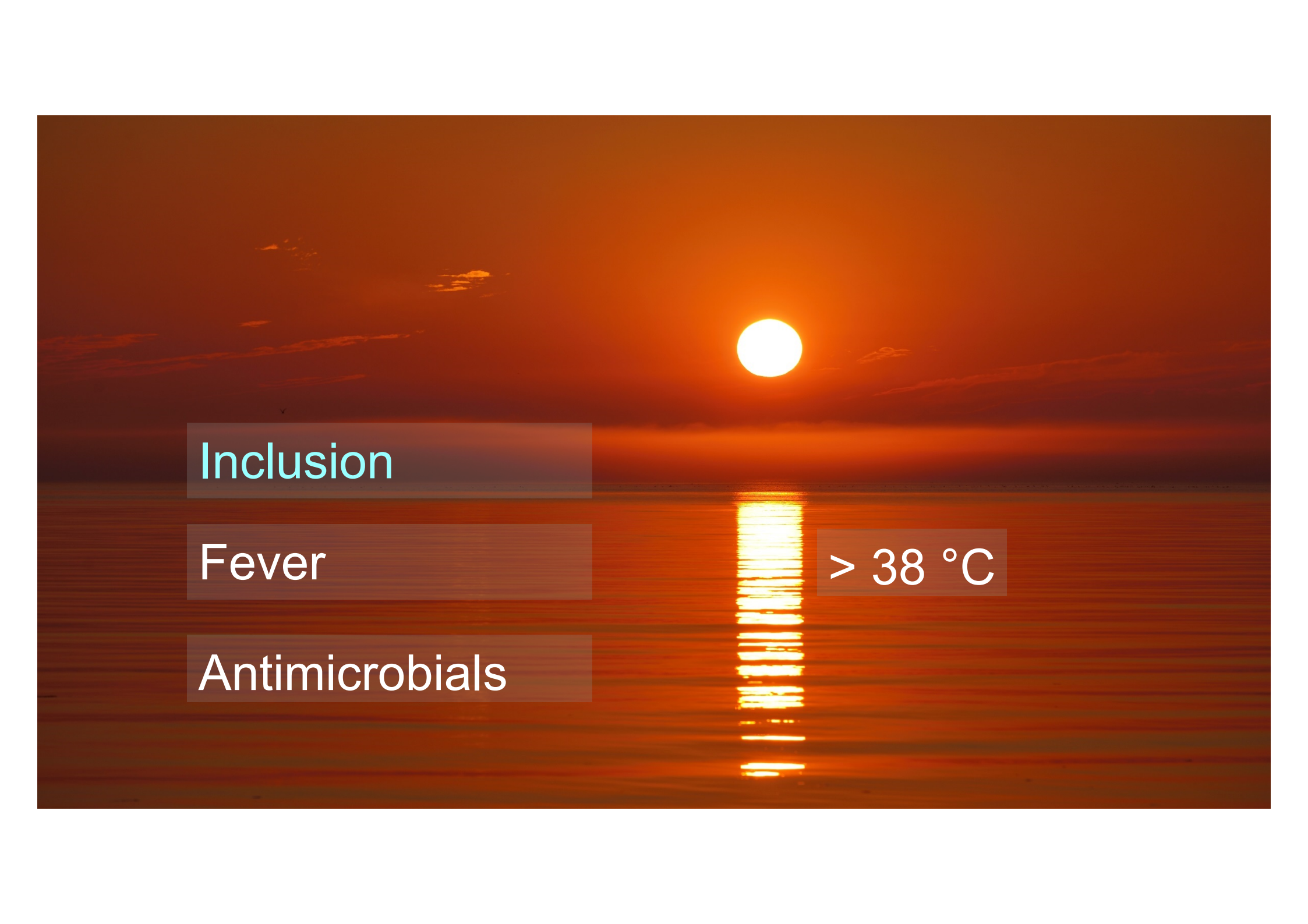
Paracetamol in fever from
suspected infection



Paracetamol

vs

Placebo

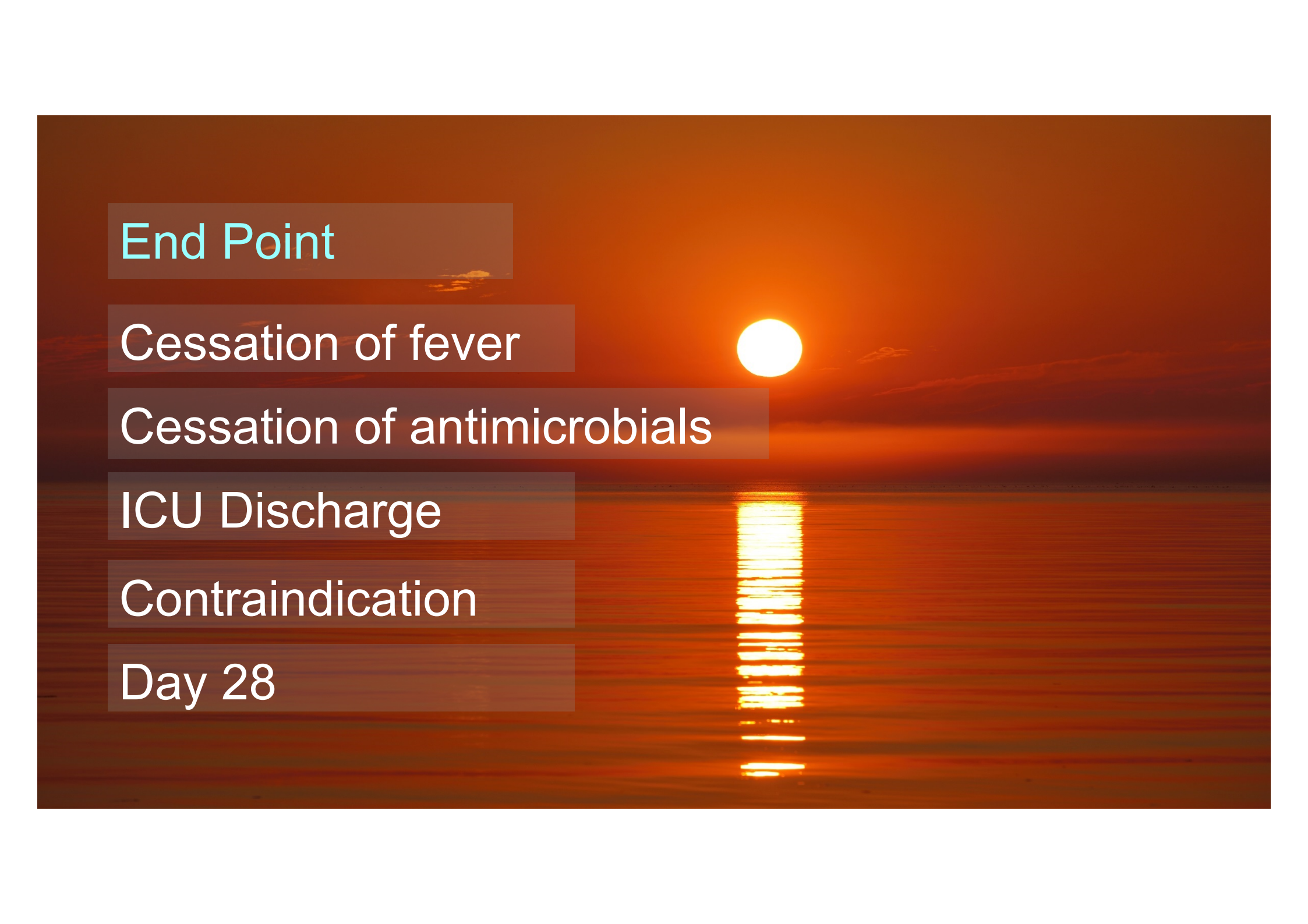
A sunset scene with a bright sun low on the horizon, casting a long, shimmering reflection on the water. The sky is a deep orange, and there are some wispy clouds. The overall mood is warm and serene.

Inclusion

Fever

> 38 °C

Antimicrobials

A background image of a sunset over a body of water. The sun is a bright white circle in the upper right, casting a long, shimmering reflection down the center of the water. The sky and water are in various shades of orange and red.

End Point

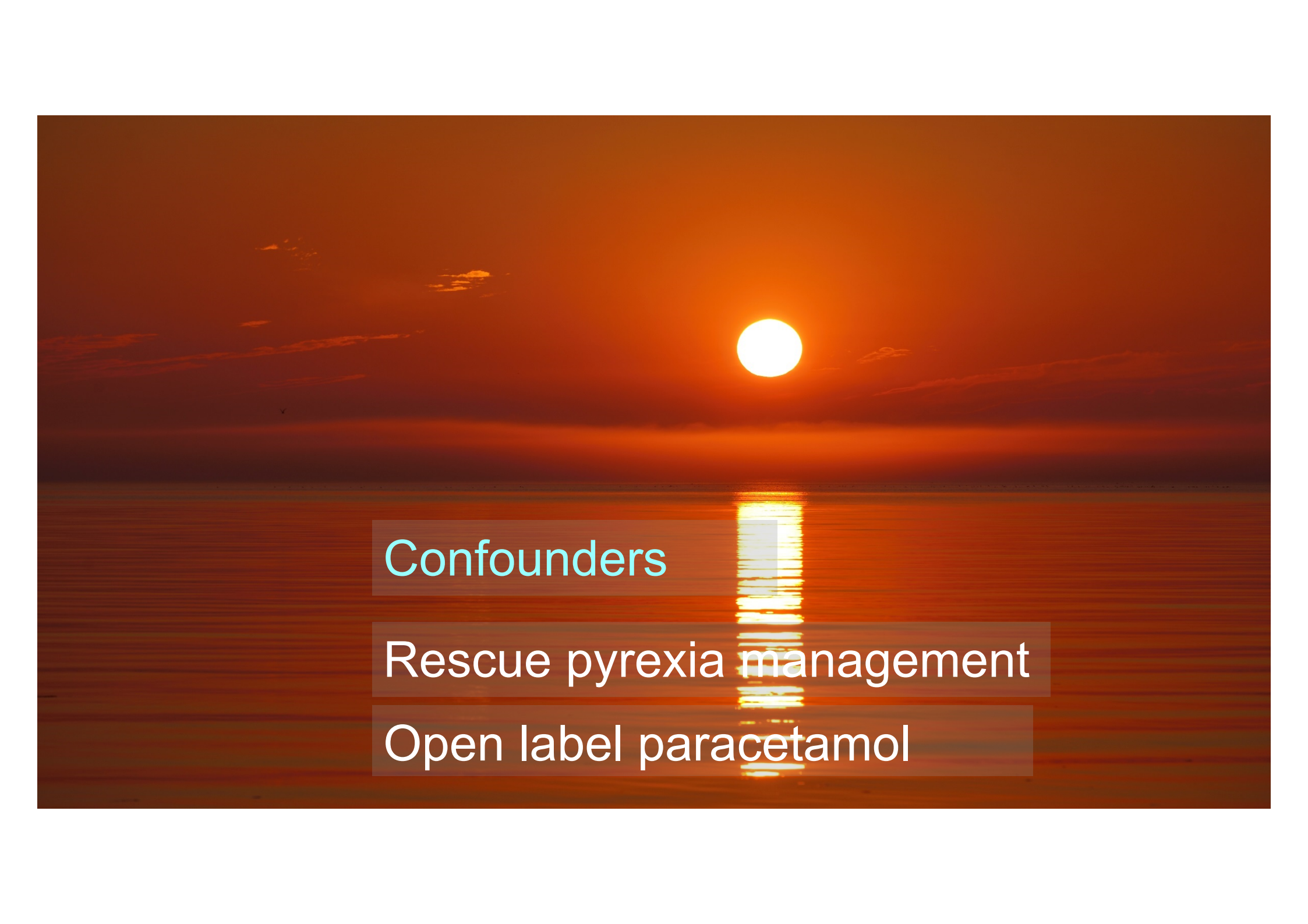
Cessation of fever

Cessation of antimicrobials

ICU Discharge

Contraindication

Day 28

A full-page background image of a sunset over a body of water. The sun is a bright white circle in the center of the upper half, with its light reflecting as a vertical column of shimmering orange and yellow on the water's surface. The sky is a deep orange with some wispy clouds. The water is dark with the reflection of the sun.

Confounders

Rescue pyrexia management

Open label paracetamol

ICU-Free Days



ICU-Free Days

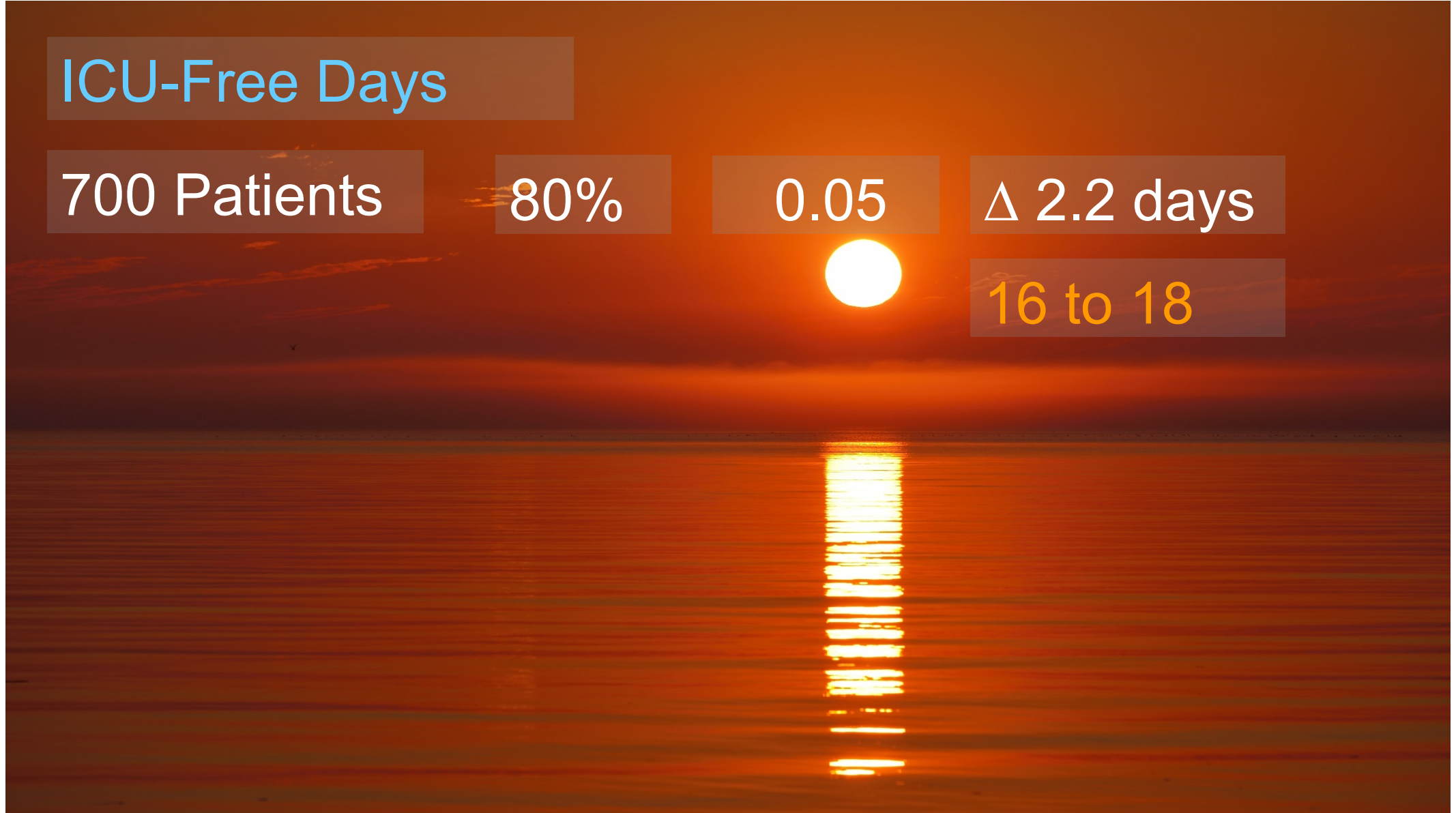
700 Patients

80%

0.05

Δ 2.2 days

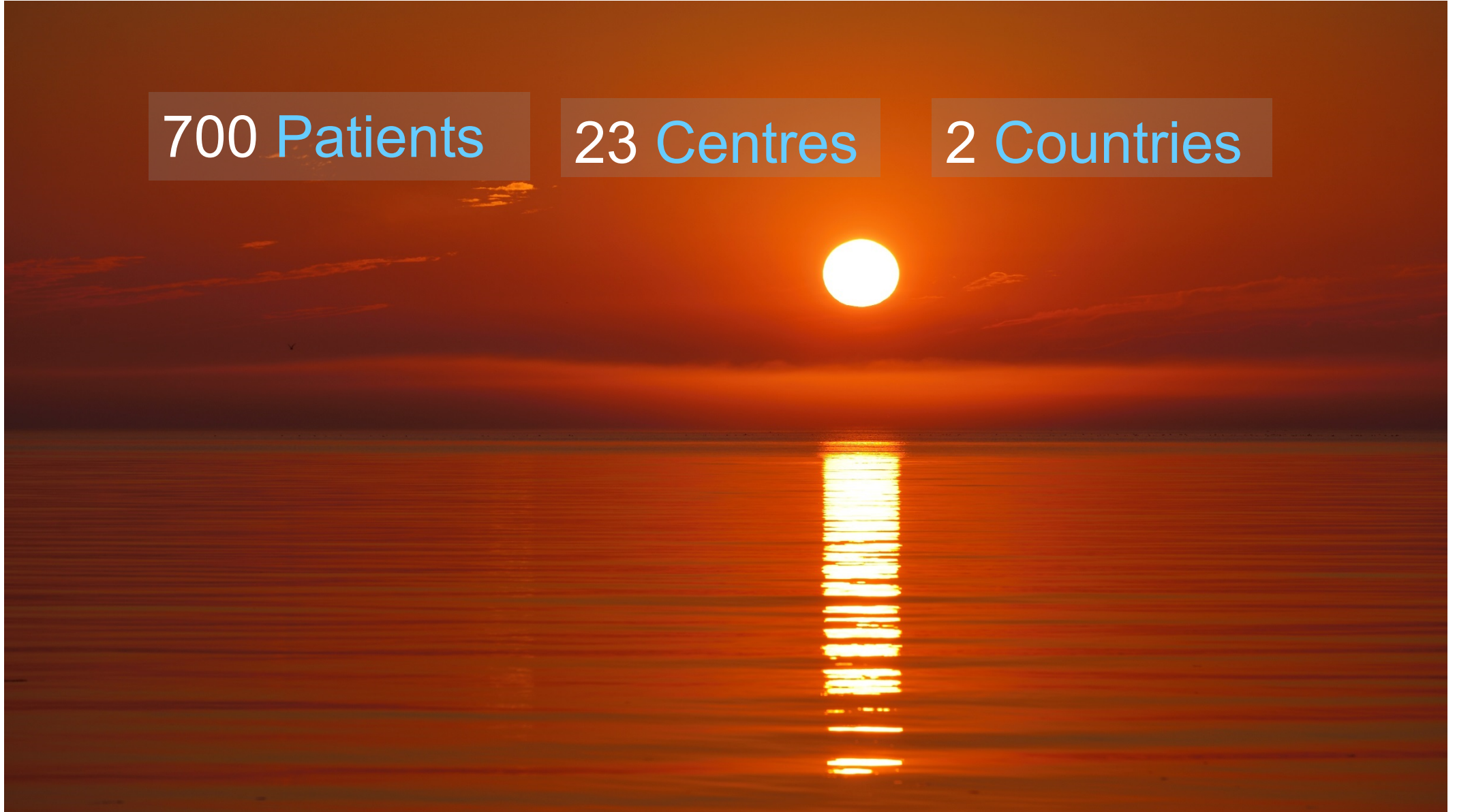
16 to 18



700 Patients

23 Centres

2 Countries



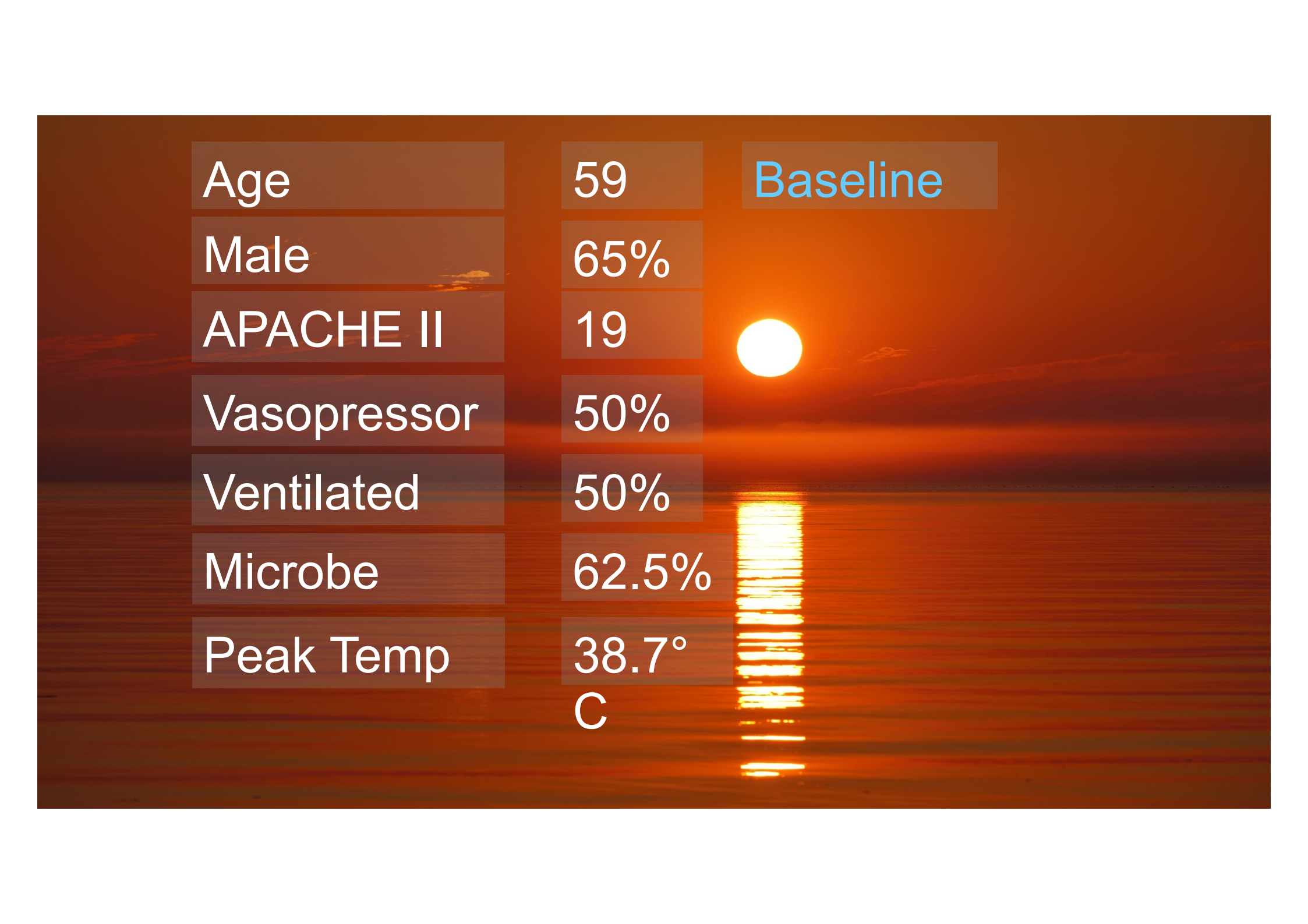
A sunset scene over a body of water. The sun is a bright white circle in the upper right, casting a long, shimmering golden reflection down the center of the water. The sky is a deep orange, and the water is a darker, rippling orange. In the lower left, there are two semi-transparent dark orange rectangular boxes containing white text.

Paracetamol

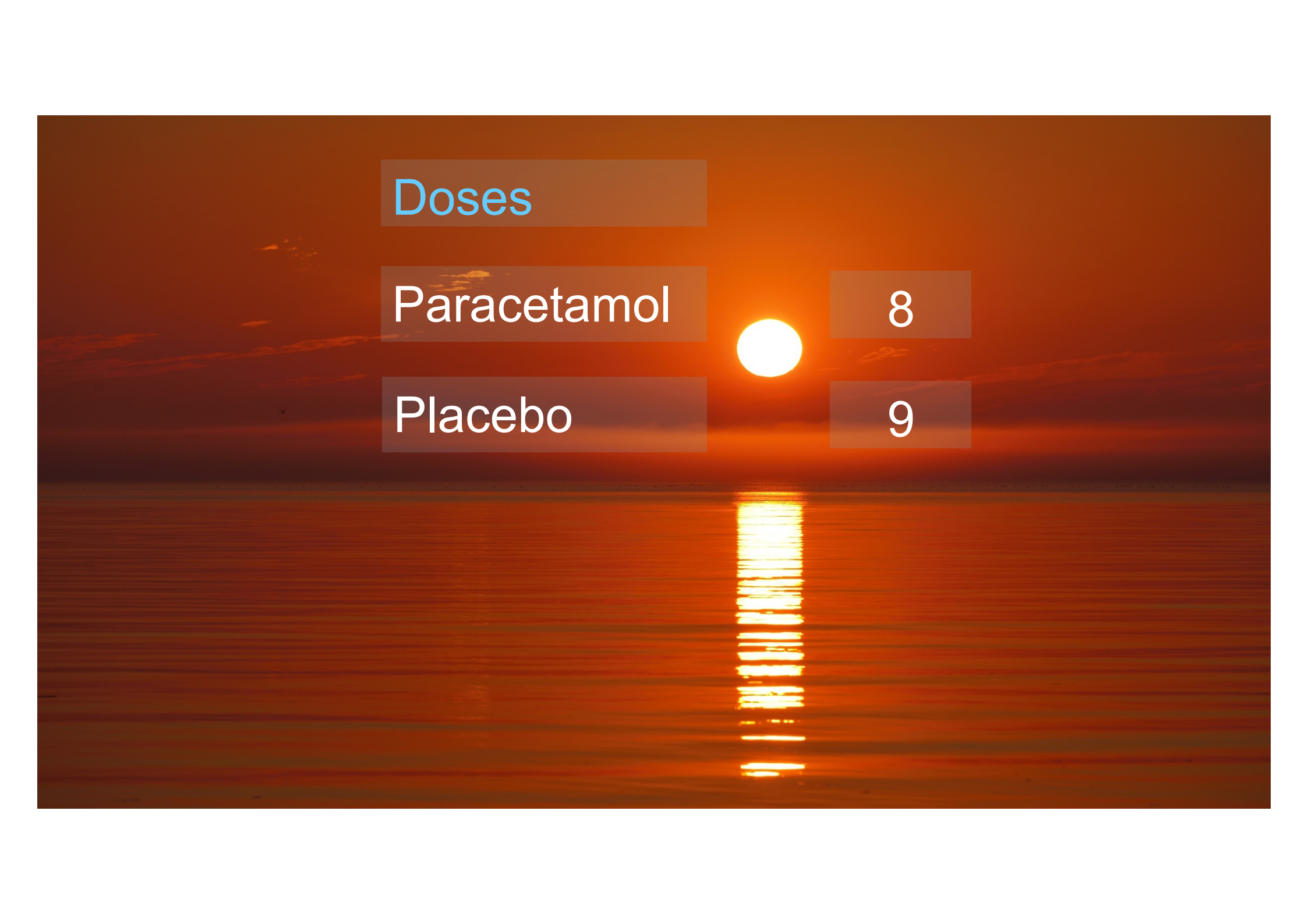
346

Placebo

344

The background of the slide is a photograph of a sunset over a body of water. The sun is a bright, glowing orb on the horizon, with its light reflecting in a shimmering path down the water. The sky is a deep orange, and there are some wispy clouds. Overlaid on the left side of the image is a table with a dark brown background and semi-transparent cells.

Age	59	Baseline
Male	65%	
APACHE II	19	
Vasopressor	50%	
Ventilated	50%	
Microbe	62.5%	
Peak Temp	38.7° C	

A sunset scene with a bright sun low on the horizon, reflecting on a body of water. The sky is a deep orange, and the water shows horizontal ripples. Overlaid on the upper half are three semi-transparent boxes containing text.

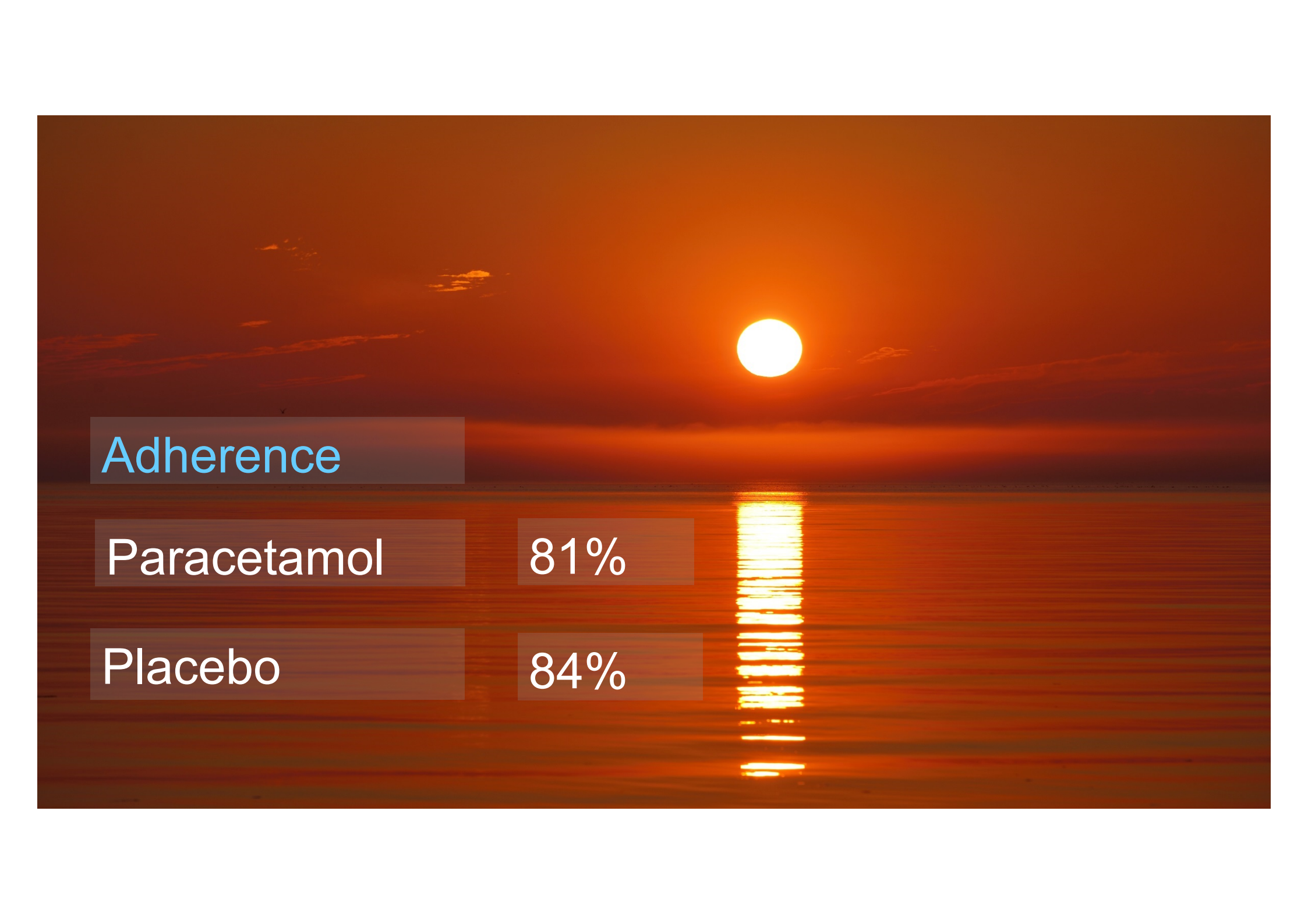
Doses

Paracetamol

8

Placebo

9

A background image of a sunset over a body of water. The sun is a bright white circle in the center of the upper half, casting a long, shimmering golden reflection down the center of the water. The sky is a deep orange-red, and the water is a darker, rippling orange. A few wispy clouds are visible near the horizon.

Adherence

Paracetamol

81%

Placebo

84%

Temperature Difference

Peak

$\Delta -0.25\text{ }^{\circ}\text{C}$

Mean

$\Delta -0.28\text{ }^{\circ}\text{C}$



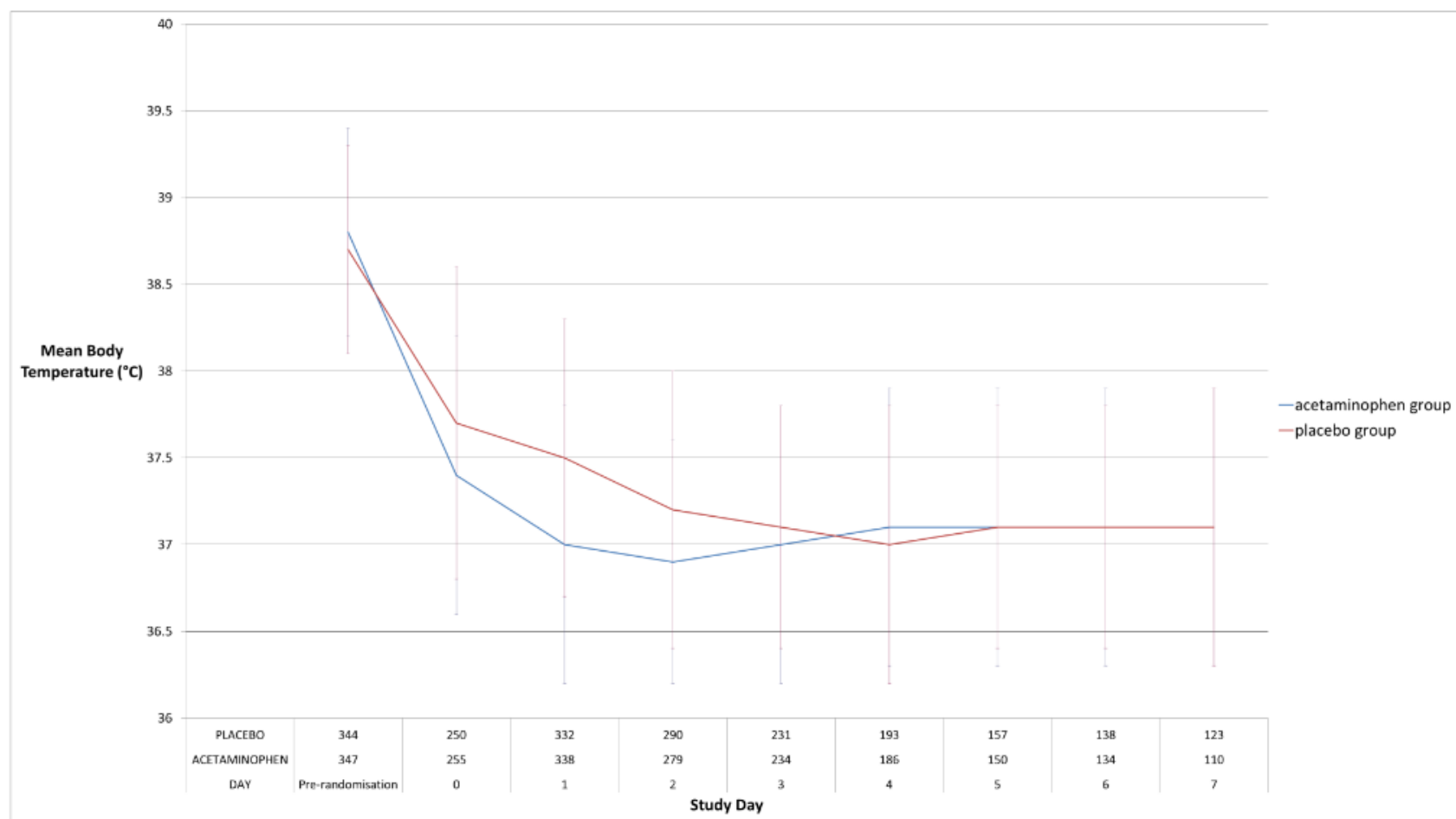
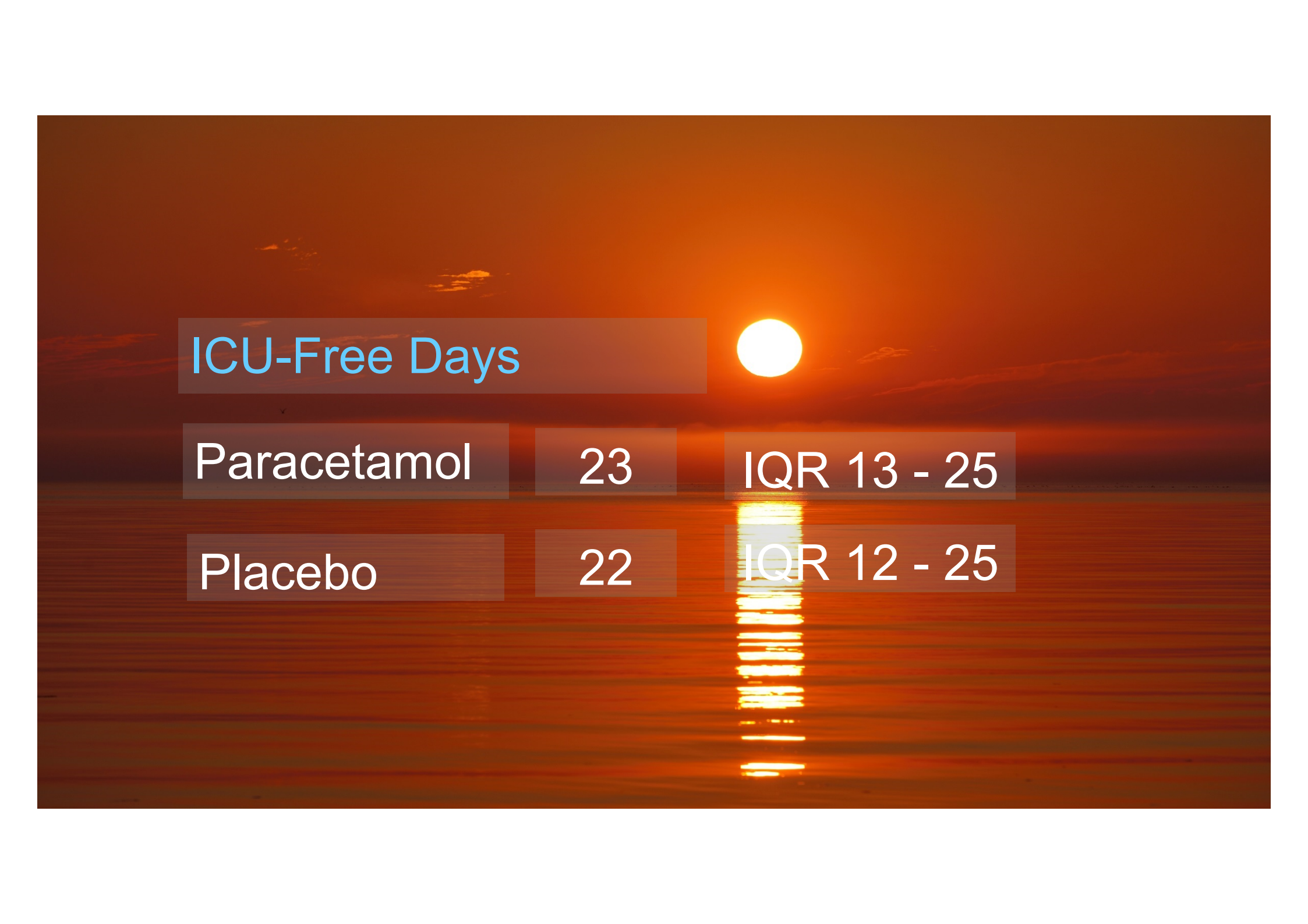


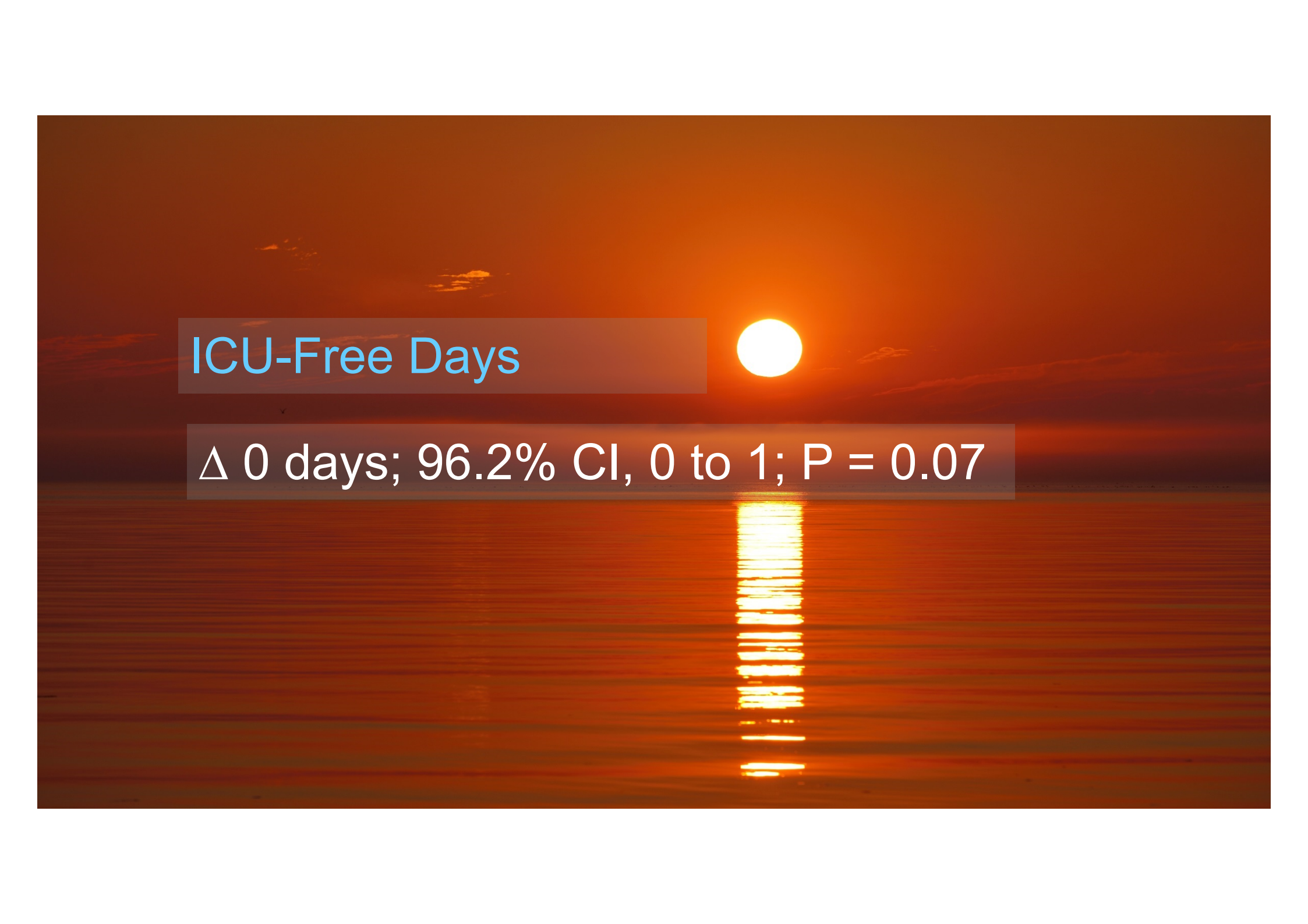
Figure S6. Average mean daily temperature by treatment group.*

*Error bars are plus or minus one standard deviation. The number of patients contributing data to each study point by treatment group is shown on the horizontal axis. Day zero is the day of randomization.

The background of the slide is a photograph of a sunset over a body of water. The sun is a bright, glowing orb in the center-right of the upper half, with its light reflecting as a shimmering path down the water's surface. The sky is a deep orange, and the water is a darker, rippling orange. A semi-transparent table is overlaid on the left and center of the image.

ICU-Free Days

Paracetamol	23	IQR 13 - 25
Placebo	22	IQR 12 - 25

A background image of a sunset over a body of water. The sun is a bright, glowing orb on the horizon, with its light reflecting as a shimmering path on the water's surface. The sky is a deep orange, and there are some wispy clouds. The overall mood is calm and serene.

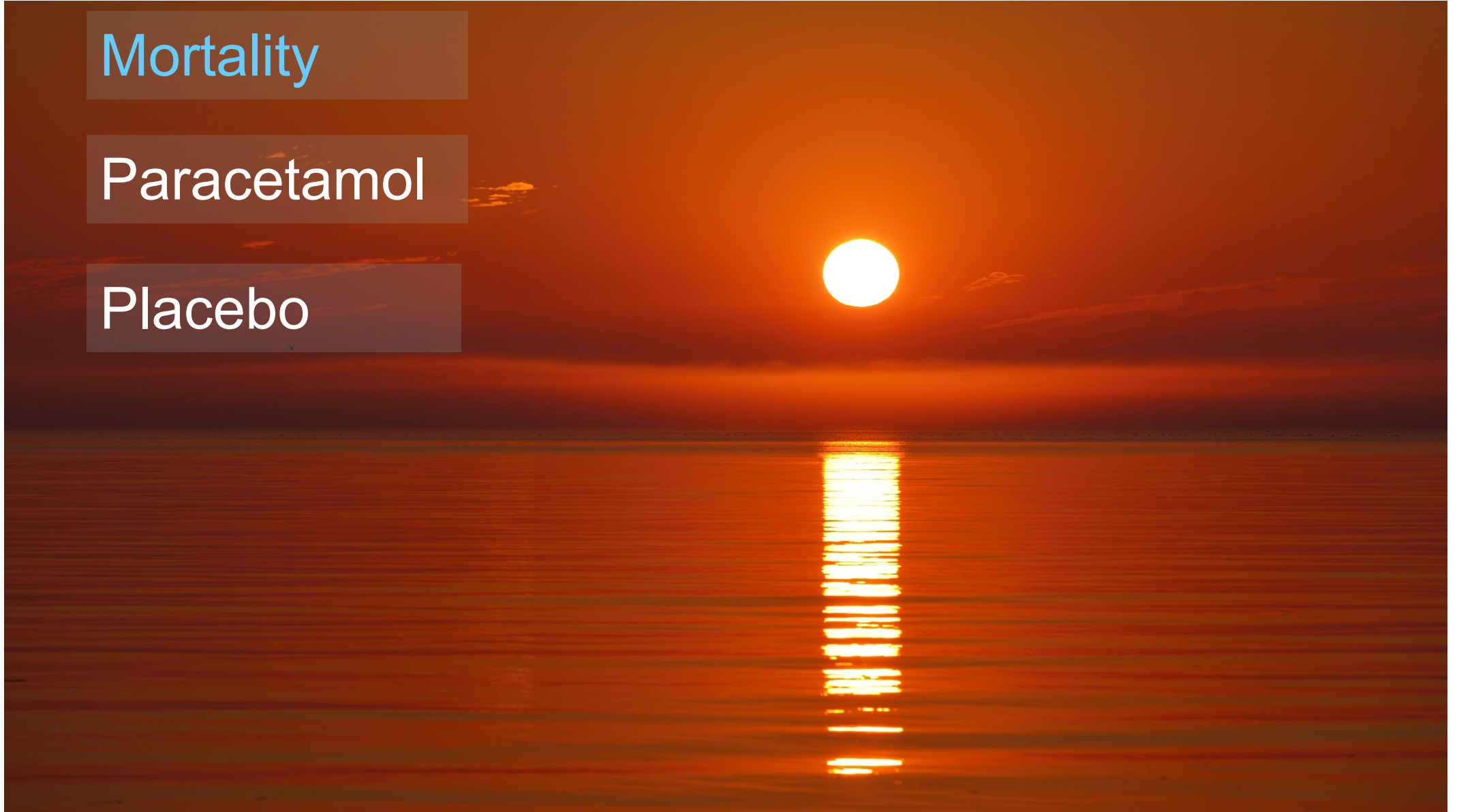
ICU-Free Days

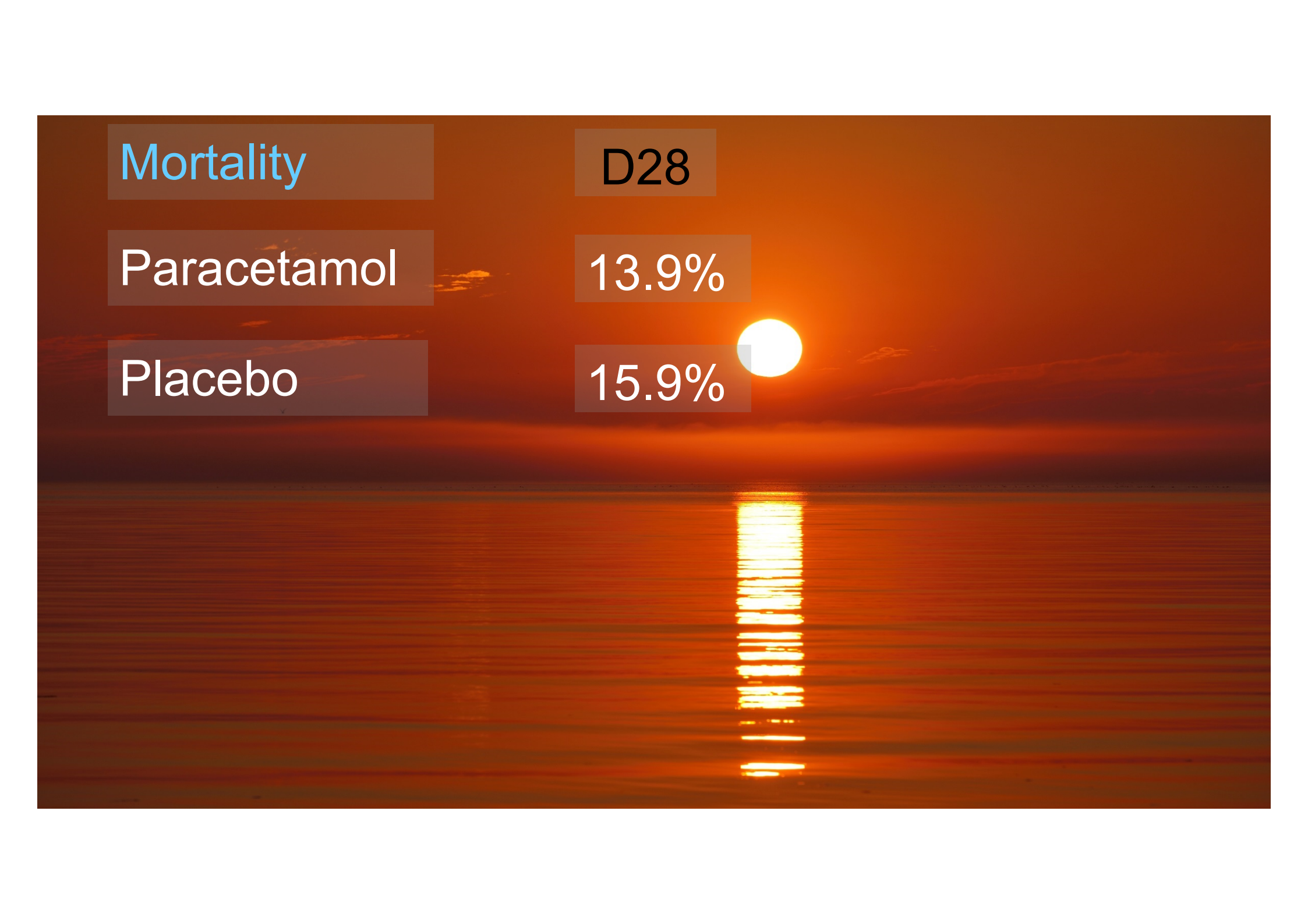
Δ 0 days; 96.2% CI, 0 to 1; P = 0.07

Mortality

Paracetamol

Placebo



A serene sunset scene with a bright orange sun low on the horizon, its light reflecting in a shimmering column on the calm water below. The sky is a deep, warm orange with some wispy clouds. The overall mood is peaceful and contemplative.

Mortality

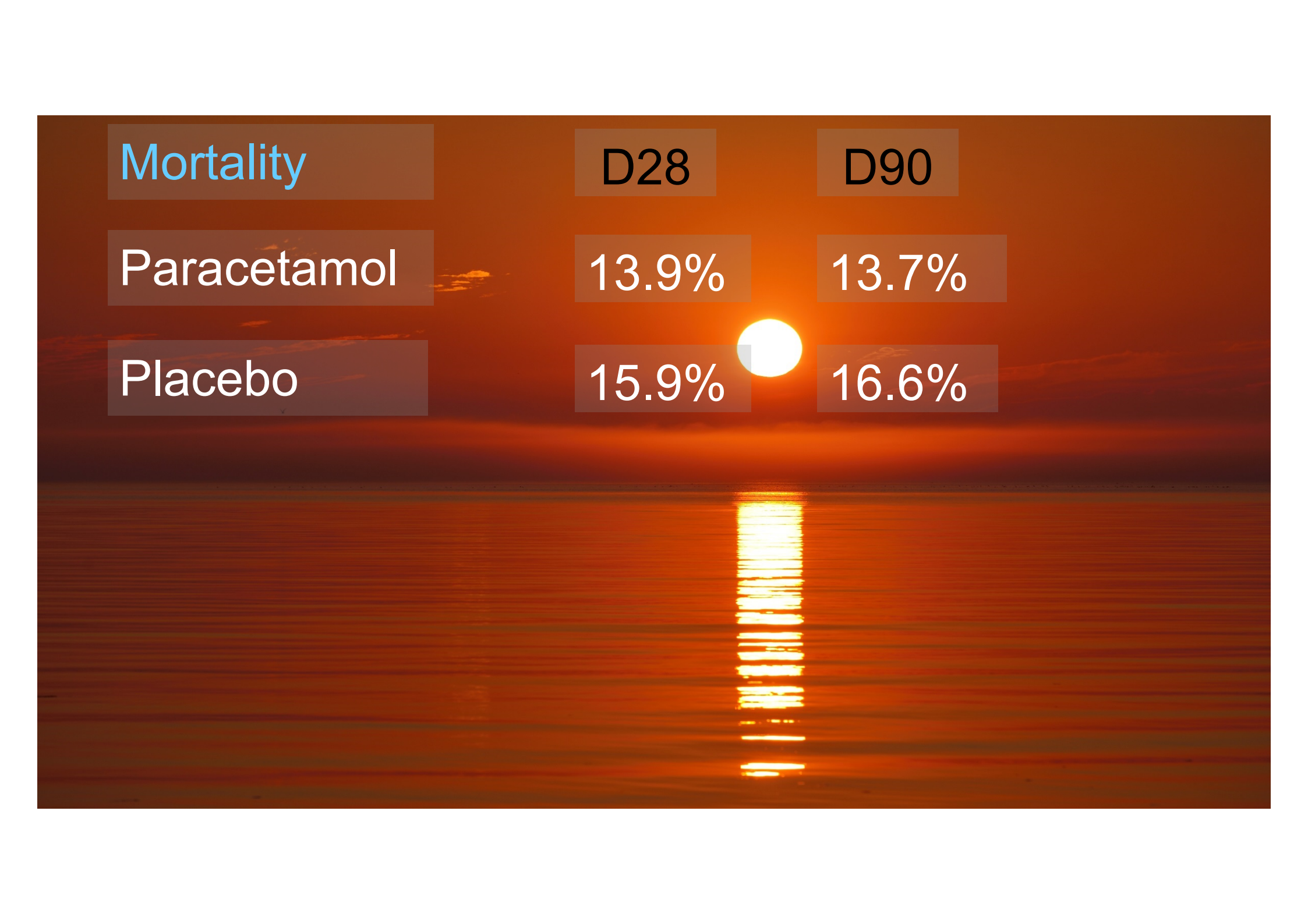
D28

Paracetamol

13.9%

Placebo

15.9%

The background of the slide is a photograph of a sunset over a body of water. The sun is a bright white circle on the horizon, with its light reflecting as a vertical column of shimmering orange and yellow on the water's surface. The sky is a deep orange, and the water is a darker, rippling orange. A semi-transparent table is overlaid on the upper half of the image.

Mortality	D28	D90
Paracetamol	13.9%	13.7%
Placebo	15.9%	16.6%

A photograph of a sunset over a body of water. The sun is a bright, glowing orb in the center of the frame, casting a long, shimmering reflection down the middle of the water. The sky is a deep orange, with some wispy clouds visible. The water is dark, with the reflection of the sun creating a bright, vertical path of light.

Contamination

30%

A full-page background image of a sunset over a body of water. The sun is a bright, glowing orb in the center of the upper half of the frame, casting a long, shimmering reflection down the center of the water. The sky is a deep orange-red, with some wispy clouds visible. The water is dark, reflecting the intense light of the sun.

Methodologically good

Limitations several

Overall good





SPLIT

Effect of plasma-lyte 148 vs 0.9% saline
on AKI in ICU patients



Saline harmful

Hyperchloraemia

Metabolic acidosis

A long-exposure photograph of a waterfall, creating a smooth, silky texture for the falling water. The water is a mix of white and blue, with some orange and yellow highlights from the setting or rising sun. The waterfall flows over dark, wet rocks. In the foreground, there's a small, dark rock formation with water cascading over it. The background shows more of the waterfall and some bare tree branches. The overall mood is serene and natural.

Inclusion

ICU Patient

Crystalloid
requirement

A long-exposure photograph of a waterfall, creating a smooth, silky texture for the falling water. The water is white and frothy as it cascades over dark, wet rocks. The background shows a river flowing away from the falls, with some reeds and trees visible in the distance. The lighting is soft, suggesting early morning or late afternoon.

Design

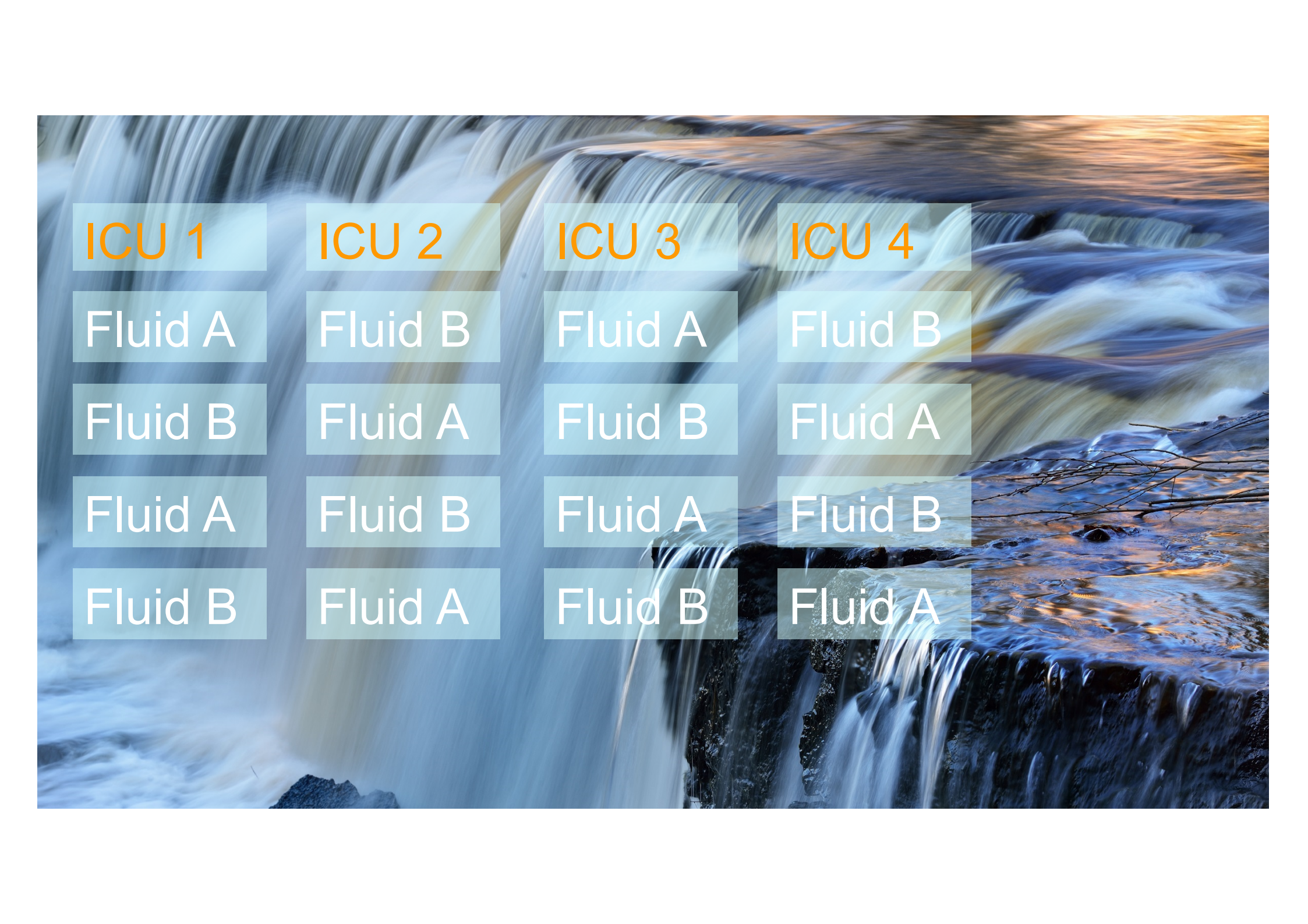
Investigator Initiated

Multicentre

Blinded

Cluster-Randomised

Double-Crossover

A long-exposure photograph of a waterfall, creating a soft, blurred effect of water cascading over rocks. The scene is illuminated with a warm, golden light, likely from a low sun, casting a glow on the water and rocks. The overall color palette is dominated by blues, greys, and warm oranges/yellows.

ICU 1

ICU 2

ICU 3

ICU 4

Fluid A

Fluid B

Fluid A

Fluid B

Fluid B

Fluid A

Fluid B

Fluid A

Fluid A

Fluid B

Fluid A

Fluid B

Fluid B

Fluid A

Fluid B

Fluid A

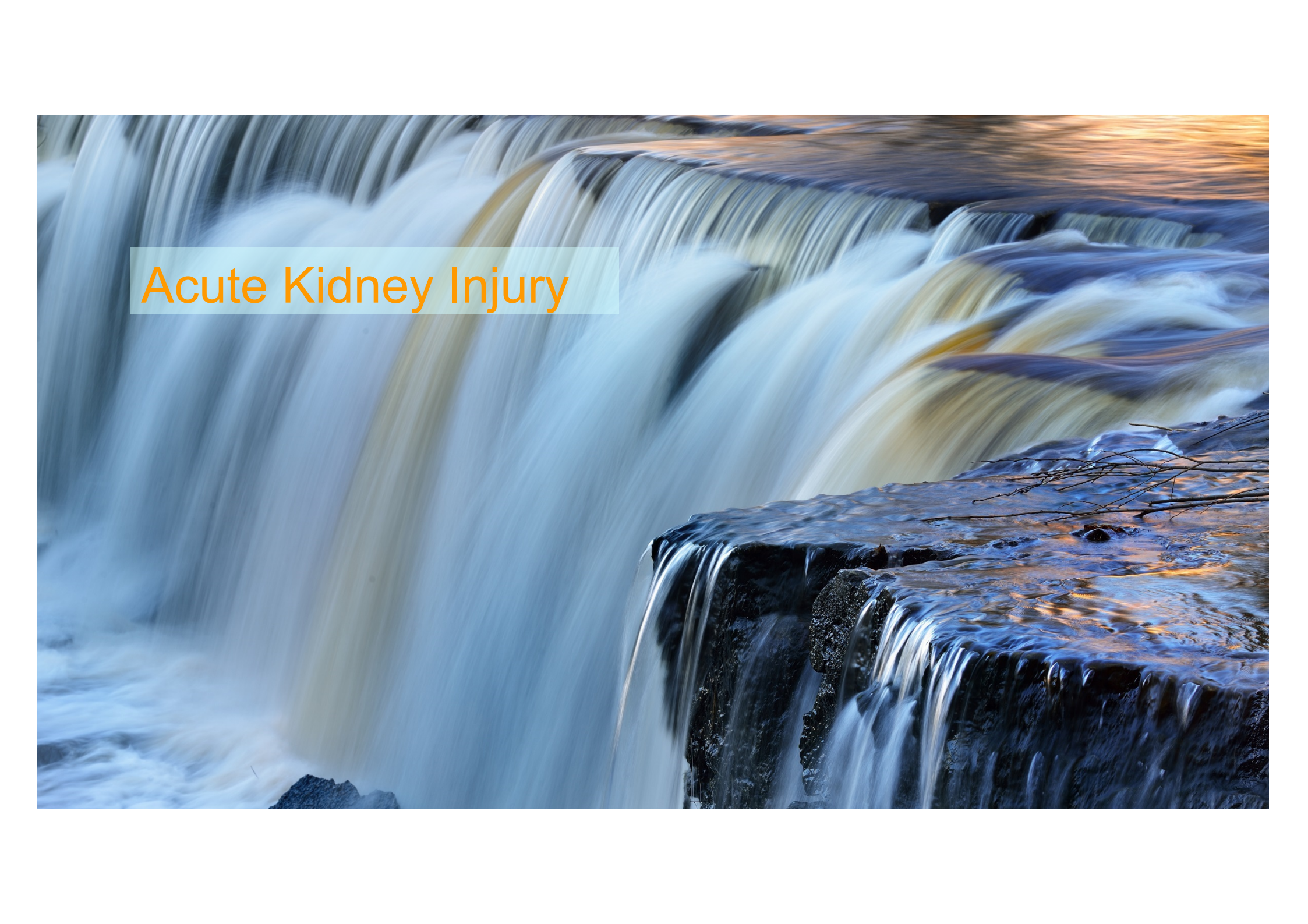


Fluid Therapy

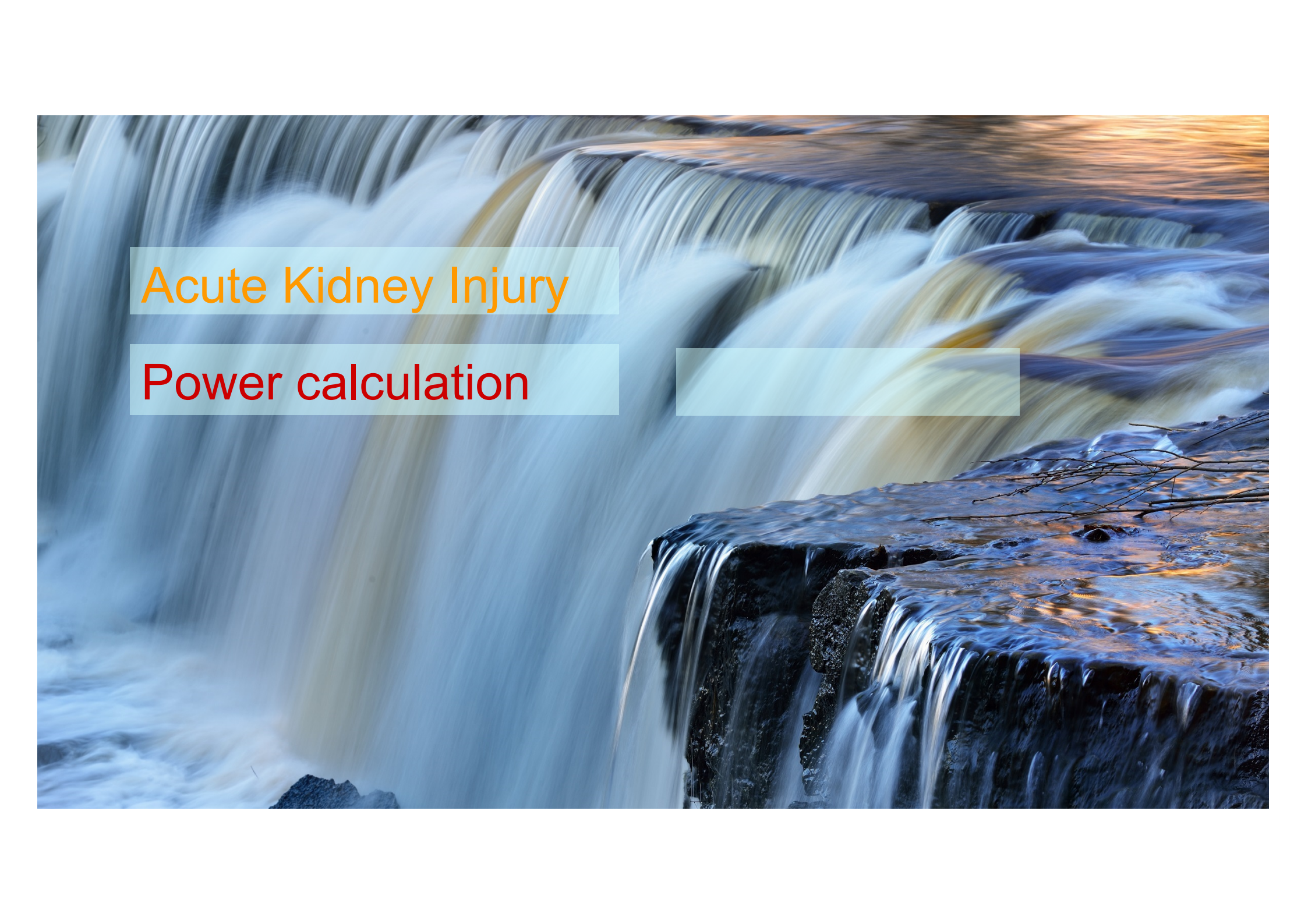
Study fluid encouraged

Open-label crystalloid

Clinician determined

A long-exposure photograph of a waterfall, creating a smooth, silky texture for the falling water. The water flows over dark, jagged rocks. In the foreground, a small section of the waterfall is visible, with water cascading over a dark rock ledge. The background shows the main body of the waterfall, with water flowing over a series of steps or ledges. The lighting is soft, with a warm, golden glow on the right side, suggesting a sunset or sunrise. The overall mood is serene and natural.

Acute Kidney Injury



Acute Kidney Injury

Power calculation



2278 Patients

4 Centres

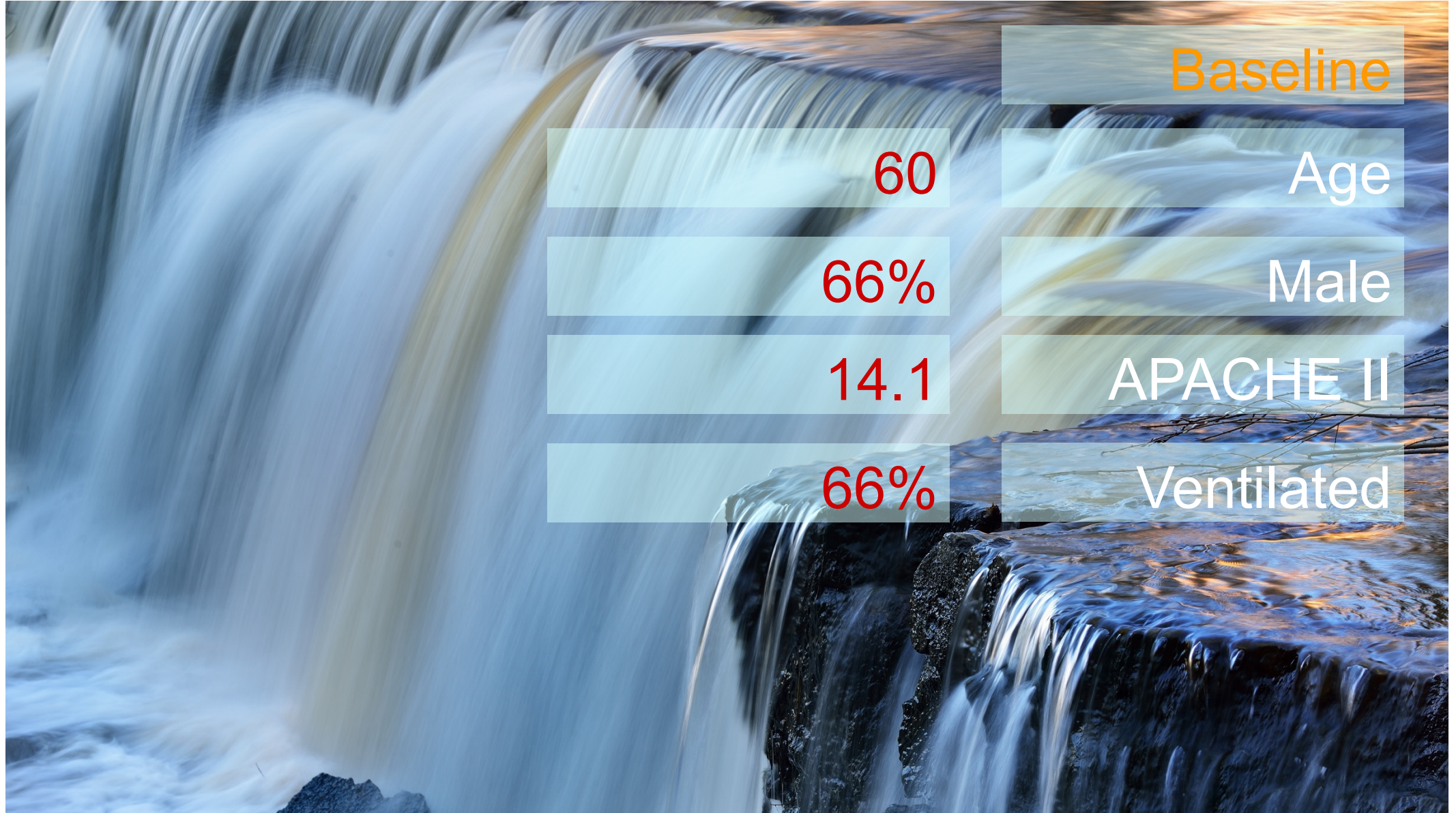
1 Country

A long-exposure photograph of a waterfall, showing the water as a series of smooth, flowing lines. The water is a mix of white and blue, with some yellowish-brown tones near the top. The waterfall is cascading over dark, wet rocks. In the foreground, a small section of the waterfall is visible, with water flowing over a dark, textured rock surface. The background is a soft, out-of-focus landscape with some trees and a warm, golden light, possibly from the setting or rising sun.

Plasmalyte	1162
Saline	1116

A long-exposure photograph of a waterfall, showing the water as a smooth, flowing ribbon of white and blue. The water cascades over dark, wet rocks. In the foreground, a small, dark rock formation is visible. The background shows more of the waterfall and some bare tree branches. The overall scene is serene and captures the continuous motion of the water.

Baseline



Baseline

60

Age

66%

Male

14.1

APACHE II

66%

Ventilated

A long-exposure photograph of a waterfall, creating a smooth, silky texture for the falling water. The water is a mix of white and light blue, with some areas reflecting a warm, golden light. The foreground shows dark, wet rocks with water cascading over them. The background is a soft, out-of-focus landscape with more water and rocks.

elective
surgical

few

Source

Comorbidities

Baseline

A long-exposure photograph of a waterfall, creating a smooth, silky texture for the falling water. The water is white and frothy as it cascades over dark, wet rocks. The background shows more of the waterfall and some distant trees under a soft, hazy sky.

Dose

Plasmalyte

2000 ml

Saline

2000 ml

A long-exposure photograph of a waterfall, showing the water as a smooth, flowing curtain. The water is white and frothy as it falls over dark, wet rocks. The background is a soft, out-of-focus landscape with some trees and a hint of a sunset or sunrise sky. Overlaid on the left side of the image are two light blue rectangular boxes containing text. The first box contains the word 'Plasmalyte' in red, and the second box contains the word 'Saline' in red. To the right of these boxes, in the same light blue background, are two more boxes containing the volumes '1200 ml' and '1000 ml' in white.

Plasmalyte

1200 ml

Saline

1000 ml

A long-exposure photograph of a waterfall, creating a smooth, silky texture for the falling water. The water is a mix of white and blue, with some golden light reflecting off the surface in the upper right. The foreground shows dark, wet rocks.

Plasmalyte

Plasmalyte

1200 ml

Saline

1000 ml

A long-exposure photograph of a waterfall, creating a smooth, silky texture for the falling water. The water flows over dark, jagged rocks. The scene is illuminated with a warm, golden light, likely from the setting or rising sun, which casts a glow on the water and the surrounding rocks. The overall mood is serene and powerful.

Acute Kidney Injury

A long-exposure photograph of a waterfall, creating a smooth, silky texture for the falling water. The water is a mix of white and blue, with some yellowish-brown tones near the top. The background is dark and rocky.

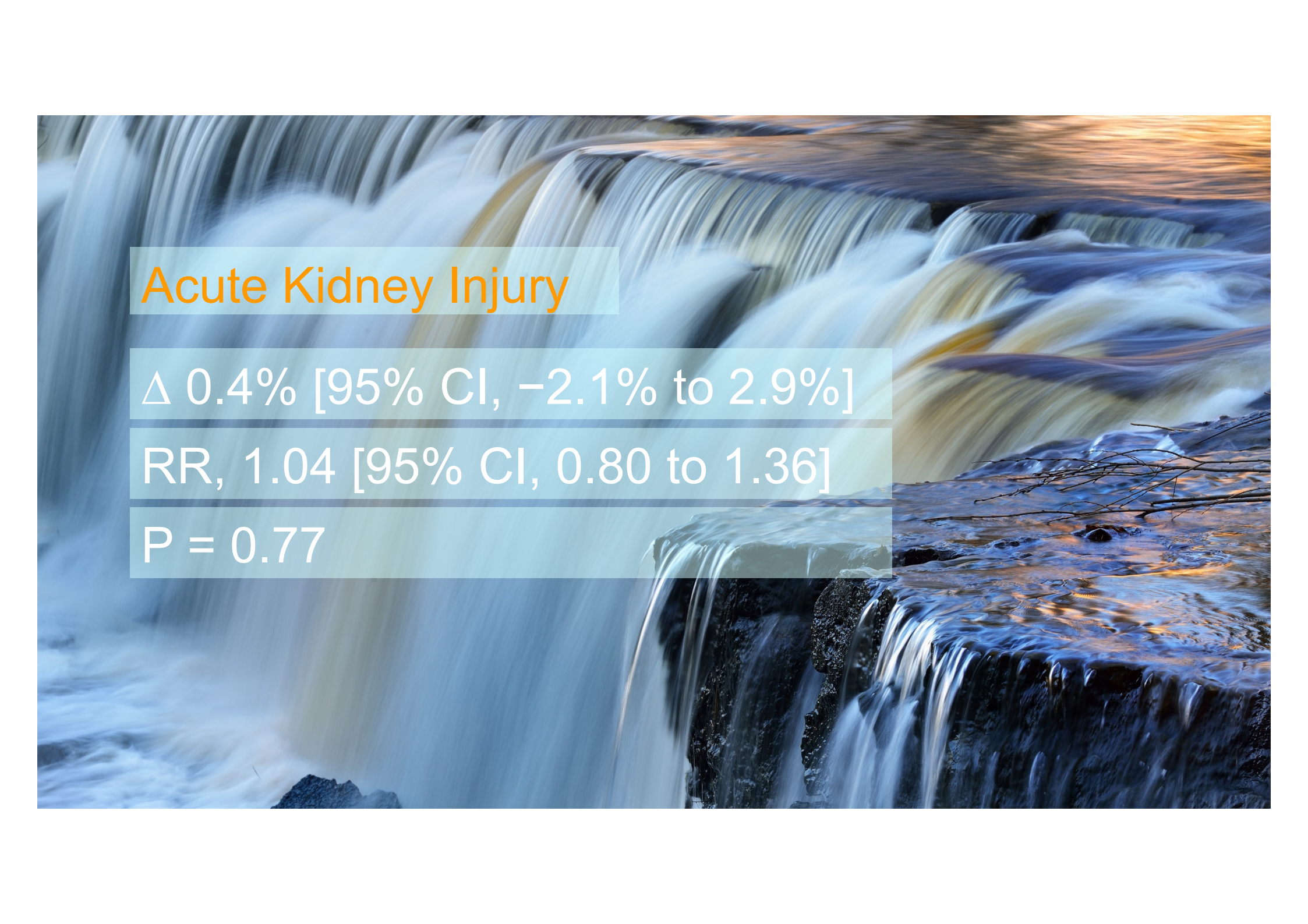
Acute Kidney Injury

Plasmalyte

9.6%

Saline

9.2%



Acute Kidney Injury

Δ 0.4% [95% CI, -2.1% to 2.9%]

RR, 1.04 [95% CI, 0.80 to 1.36]

P = 0.77

A long-exposure photograph of a waterfall, creating a smooth, silky texture for the falling water. The water is a mix of white and blue, with some areas reflecting a warm, golden light, possibly from the sun setting or rising. The rocks are dark and jagged, providing a stark contrast to the soft water.

Renal Replacement Therapy

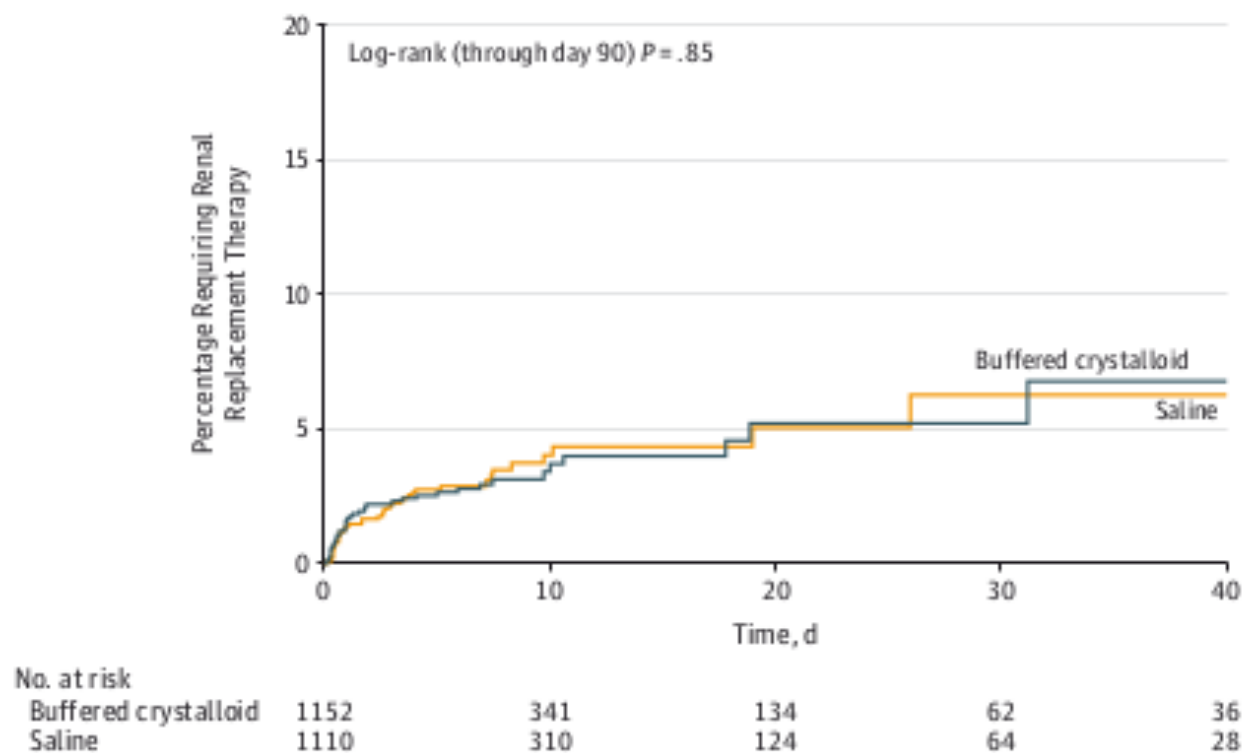
Plasmalyte

3.3%

Saline

3.2%

Figure 2. Cumulative Incidence of Patients Requiring Renal Replacement Therapy Until Day 90 After Enrollment in the SPLIT Trial





Methodologically excellent

Limitations few

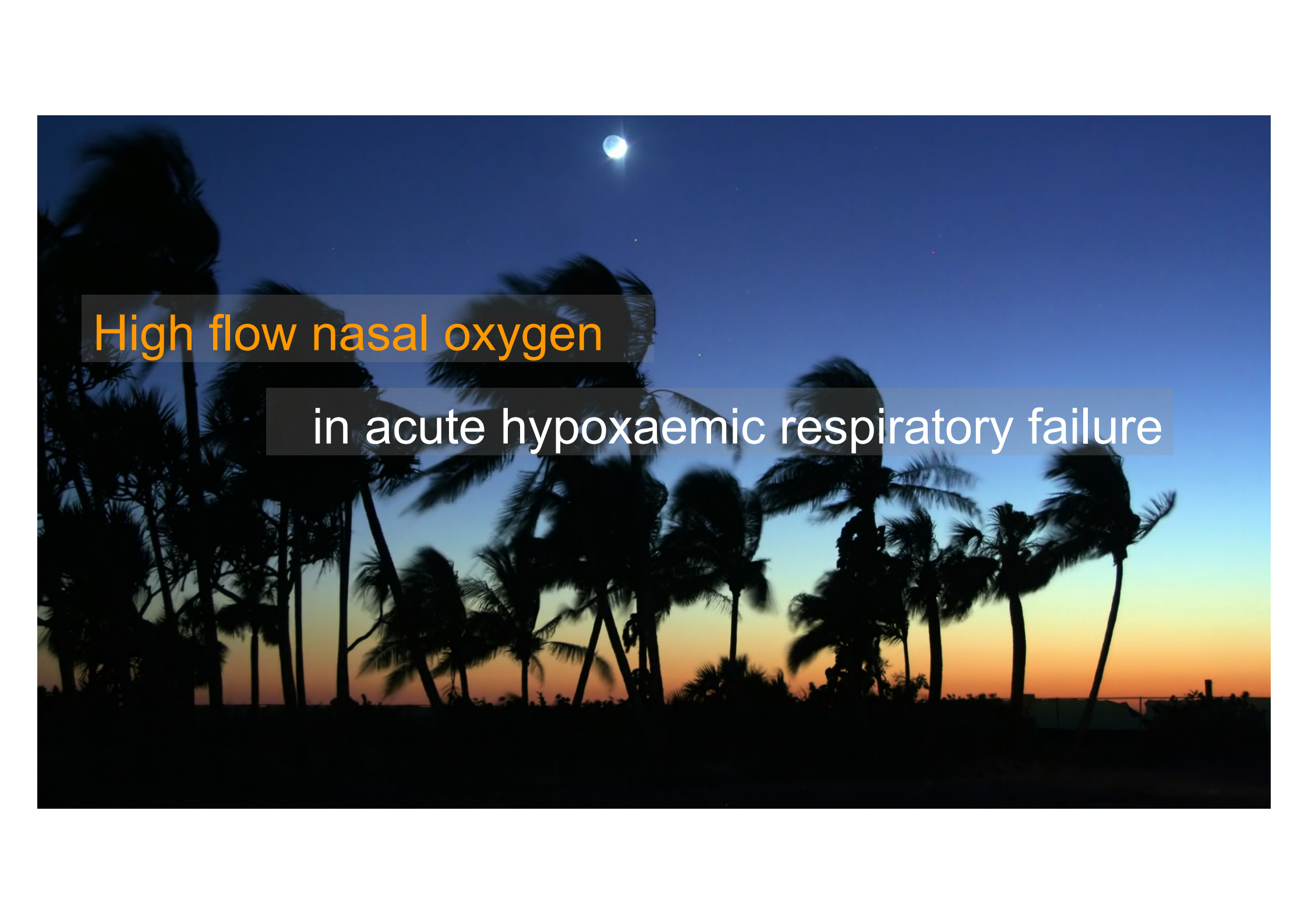
Overall strong



A photograph of palm trees silhouetted against a sunset sky. The sky transitions from a deep blue at the top to a bright orange and yellow near the horizon. A full moon is visible in the upper left portion of the sky. The palm trees are dark and their fronds are slightly blurred, suggesting a breeze. The overall mood is serene and tropical.

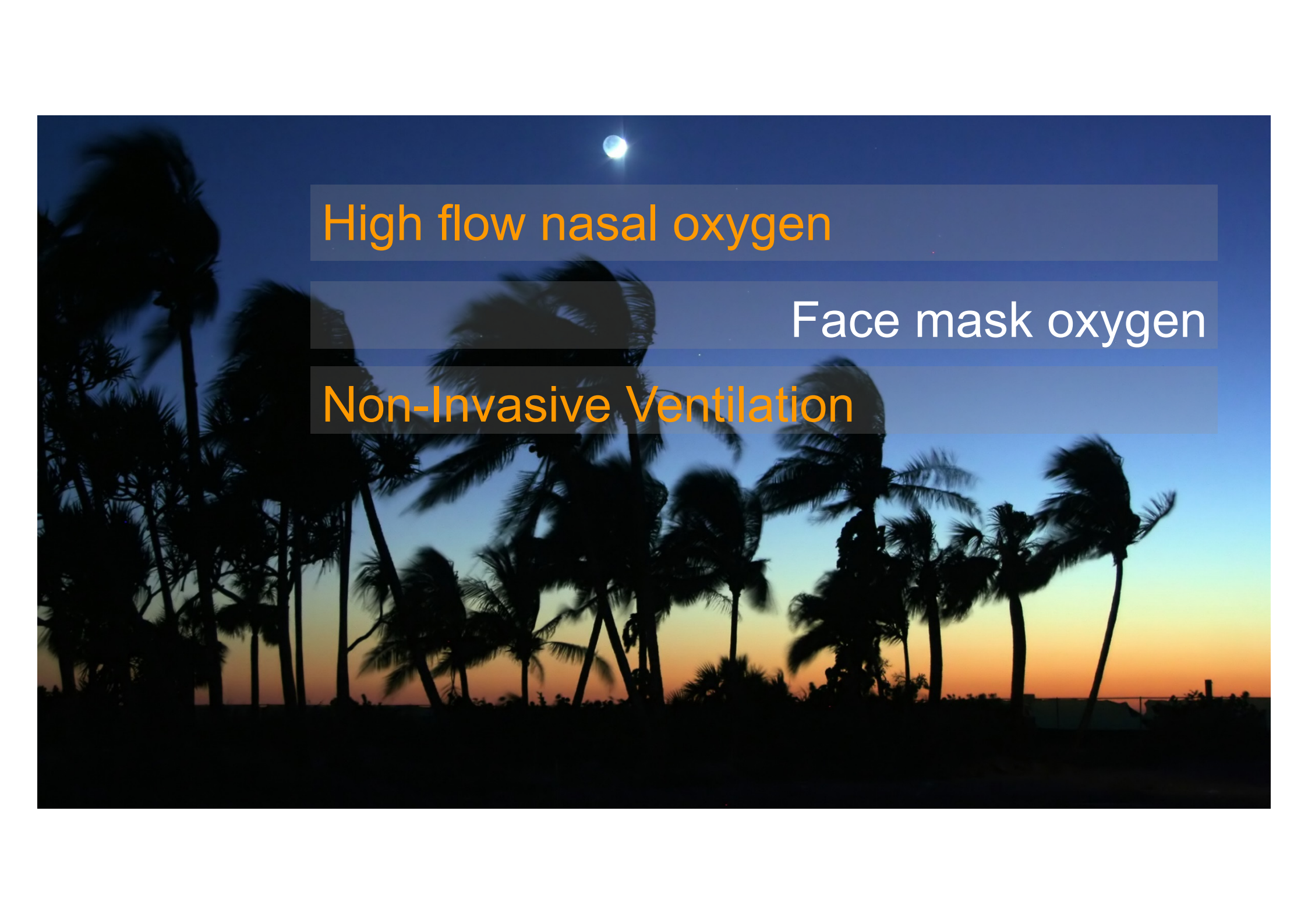
FLORAL

I

The background of the slide is a photograph of palm trees silhouetted against a sunset sky. The sky transitions from a deep blue at the top to a bright orange and yellow near the horizon. A full moon is visible in the upper left portion of the sky. The palm trees are dark and their fronds are clearly visible against the lighter sky.

High flow nasal oxygen

in acute hypoxaemic respiratory failure

The background of the slide is a photograph of palm trees silhouetted against a sunset sky. The sky transitions from a deep blue at the top to a bright orange and yellow near the horizon. A full moon is visible in the upper center of the frame. Three semi-transparent text boxes are overlaid on the image.

High flow nasal oxygen

Face mask oxygen

Non-Invasive Ventilation

Inclusion

ICU Patient

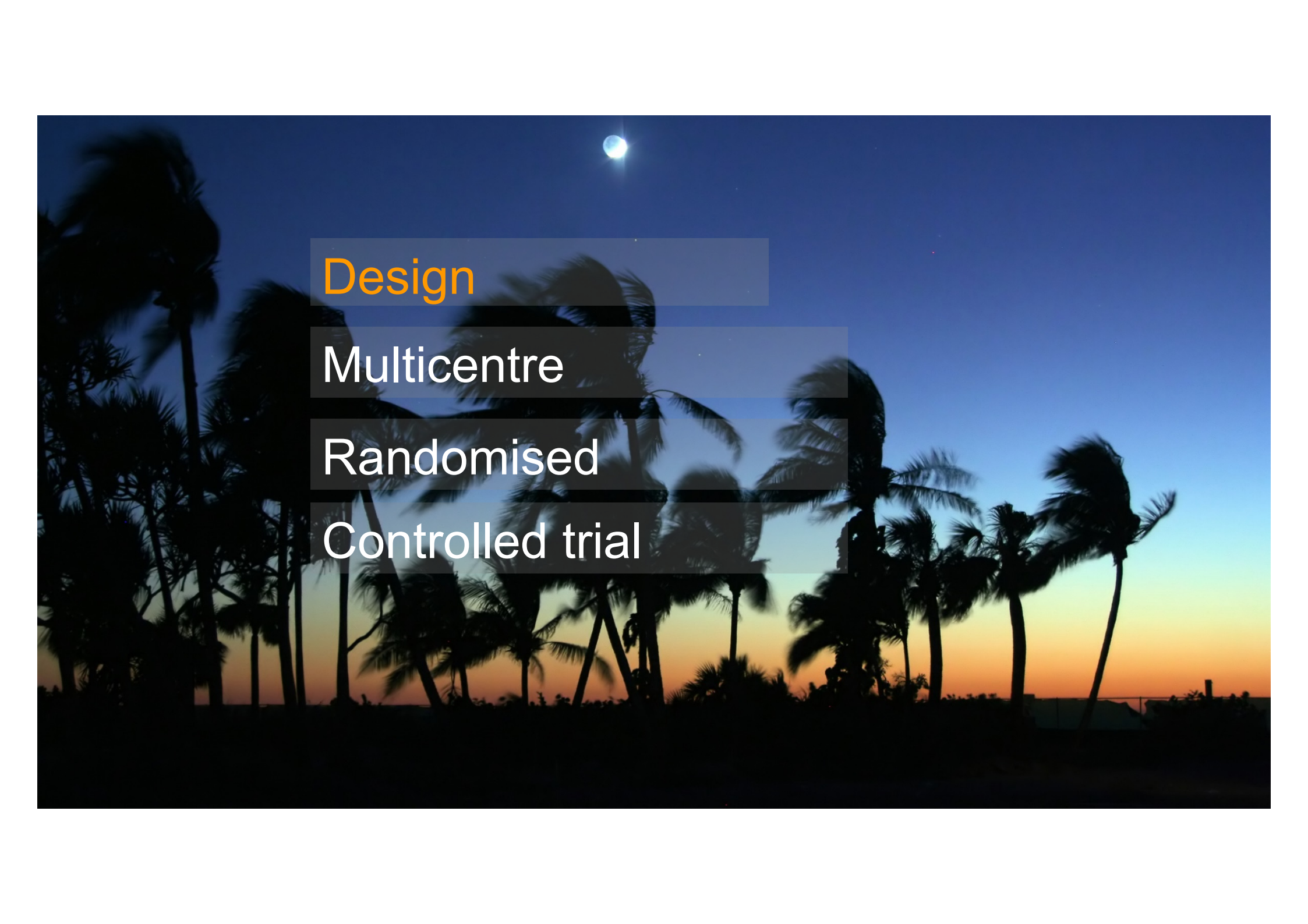
Acute hypoxaemic
respiratory failure



A photograph of palm trees silhouetted against a sunset sky. The sky transitions from a deep blue at the top to a bright orange and yellow near the horizon. A full moon is visible in the upper left portion of the sky. The palm trees are of various heights and are leaning slightly to the right, suggesting a breeze. The foreground is dark and indistinct.

Exclusion

Hypercapnoea



Design

Multicentre

Randomised

Controlled trial

Interventions



Interventions

Standard Oxygen



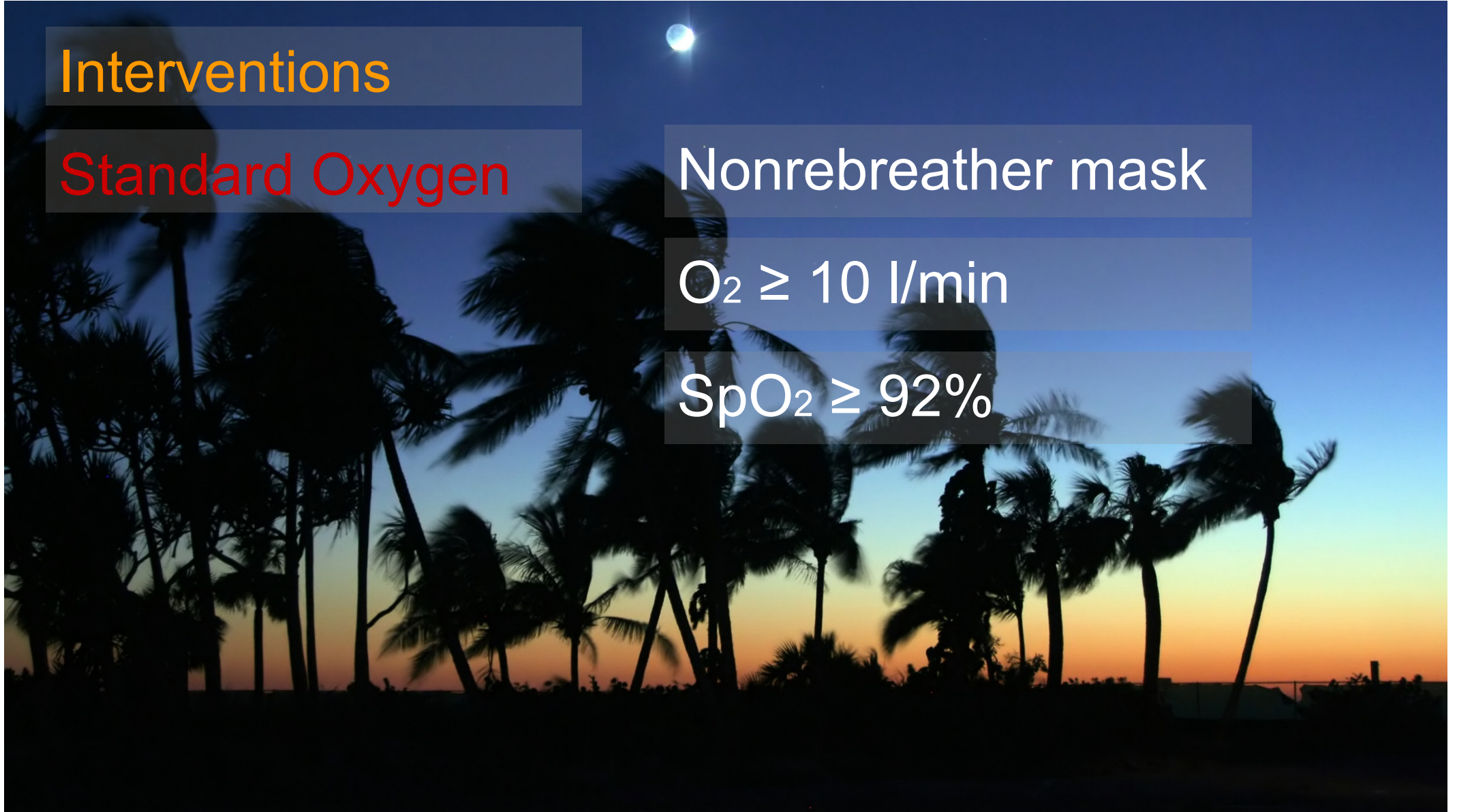
Interventions

Standard Oxygen

Nonrebreather mask

$O_2 \geq 10 \text{ l/min}$

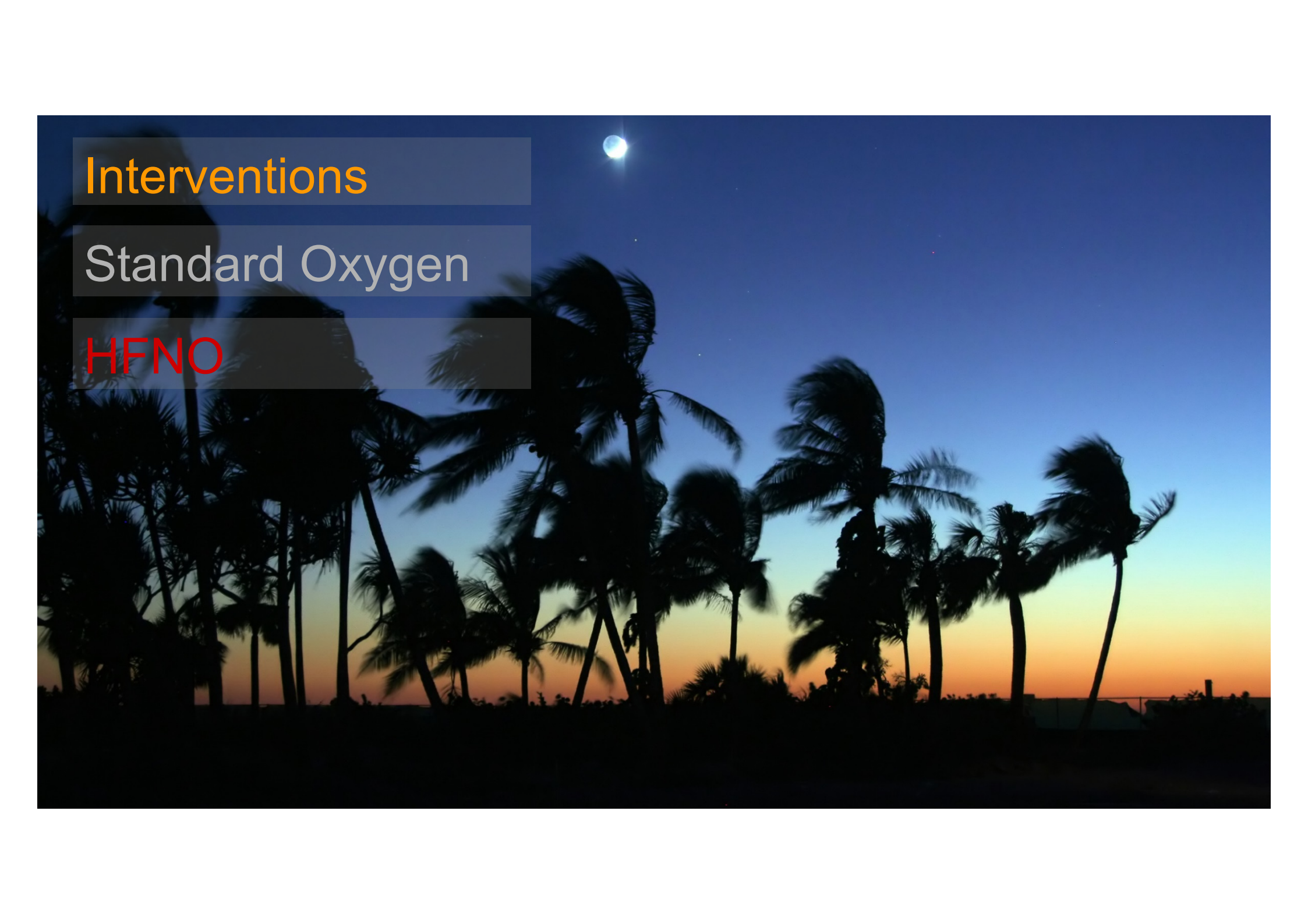
$SpO_2 \geq 92\%$



Interventions

Standard Oxygen

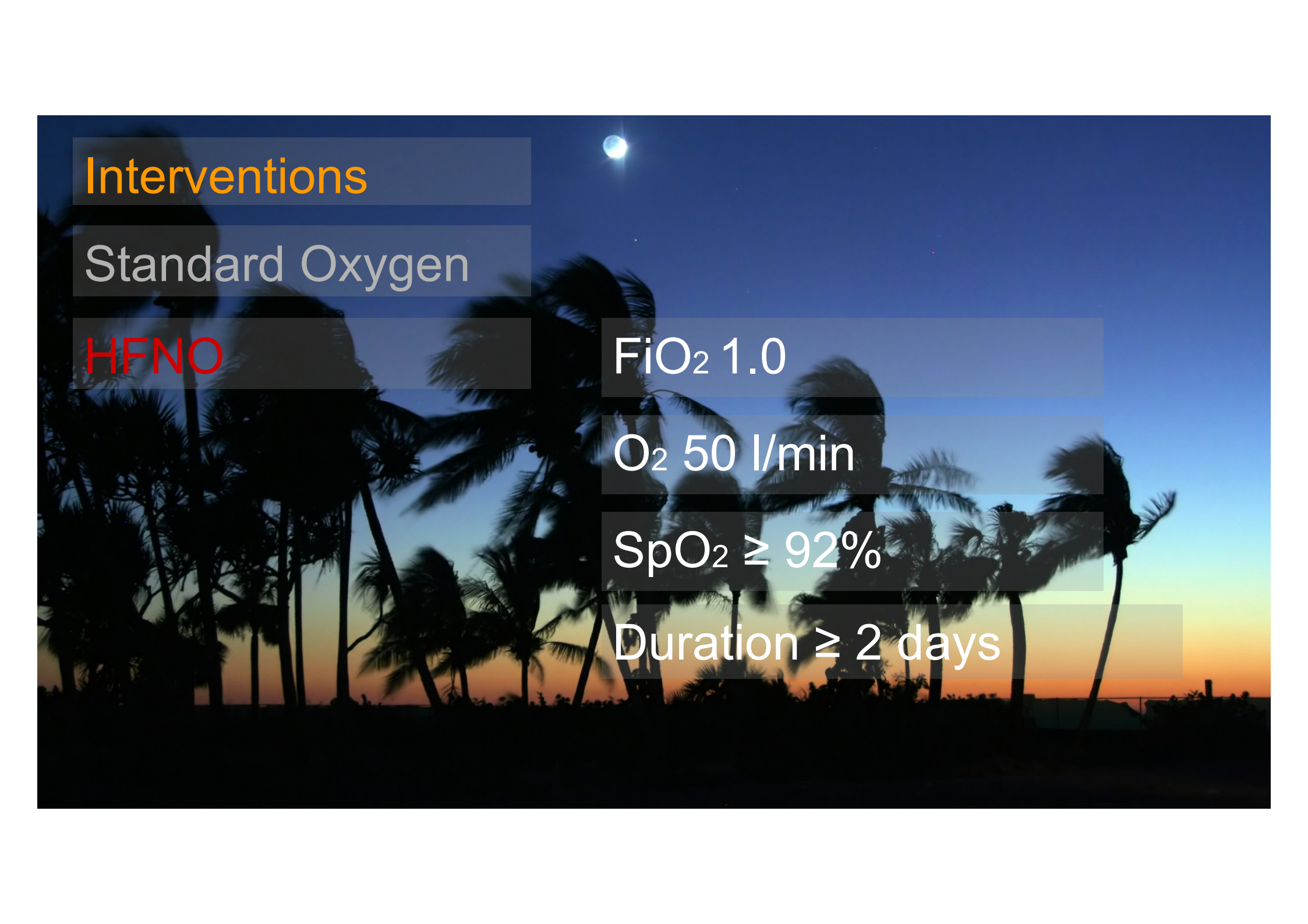


The background of the slide is a photograph of palm trees silhouetted against a sunset sky. The sky transitions from a deep blue at the top to a bright orange near the horizon. A full moon is visible in the upper left portion of the sky. The palm trees are dark and their fronds are clearly visible against the lighter sky.

Interventions

Standard Oxygen

HFNO



Interventions

Standard Oxygen

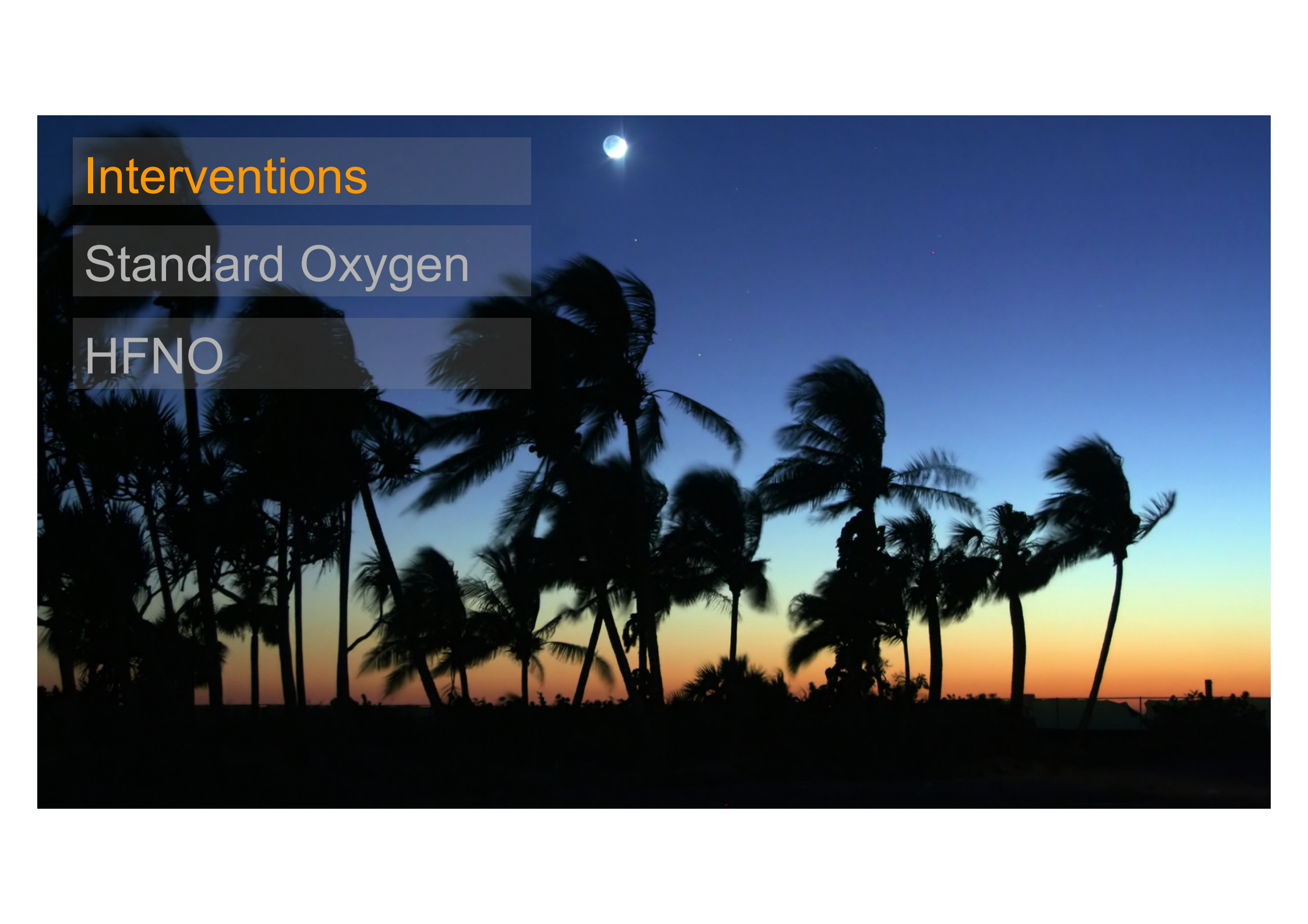
HFNO

FiO_2 1.0

O_2 50 l/min

$\text{SpO}_2 \geq 92\%$

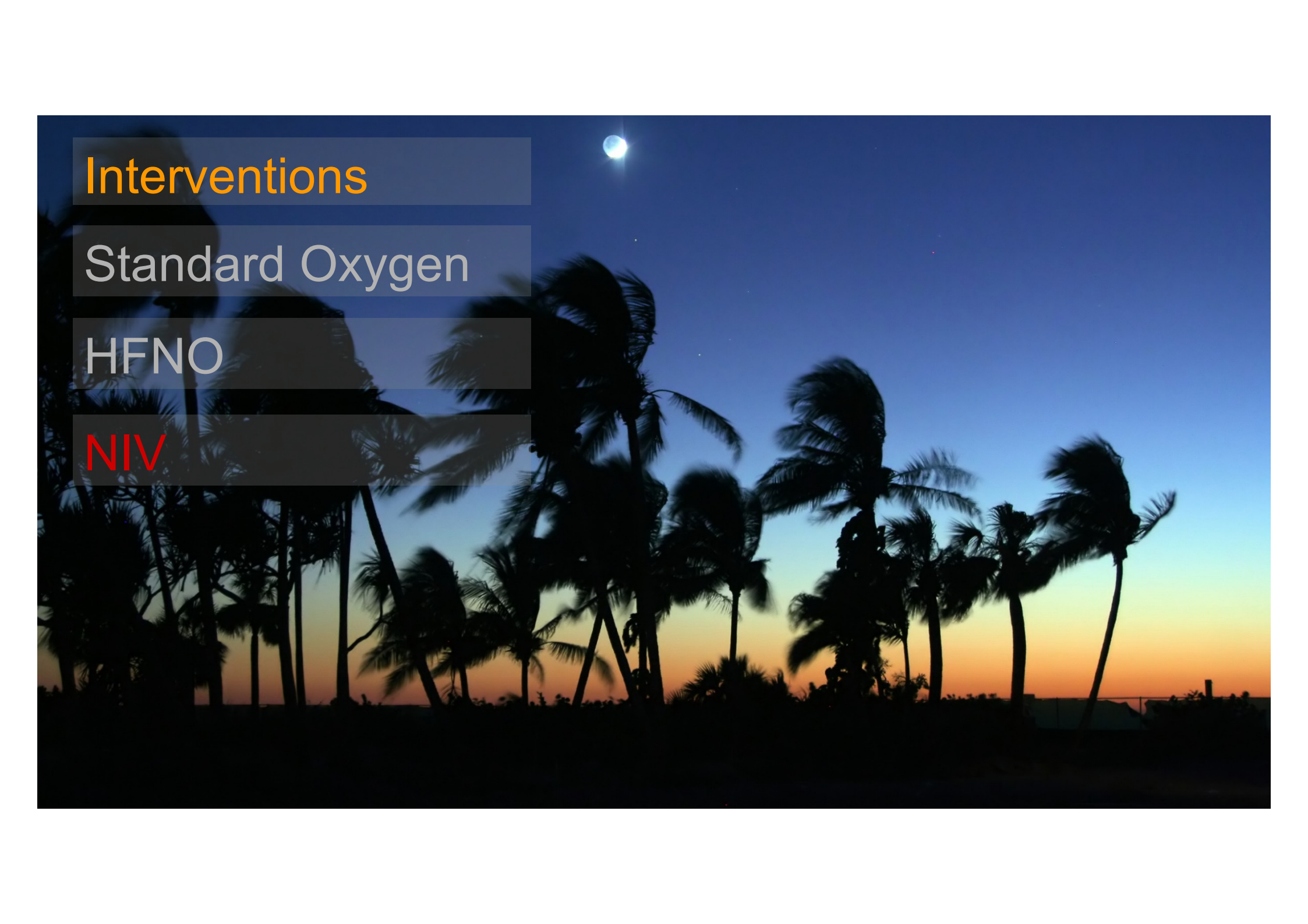
Duration ≥ 2 days

The background of the slide is a photograph of palm trees silhouetted against a sunset sky. The sky transitions from a deep blue at the top to a bright orange near the horizon. A full moon is visible in the upper left portion of the sky. The palm trees are dark and their fronds are clearly visible against the lighter sky.

Interventions

Standard Oxygen

HFNO

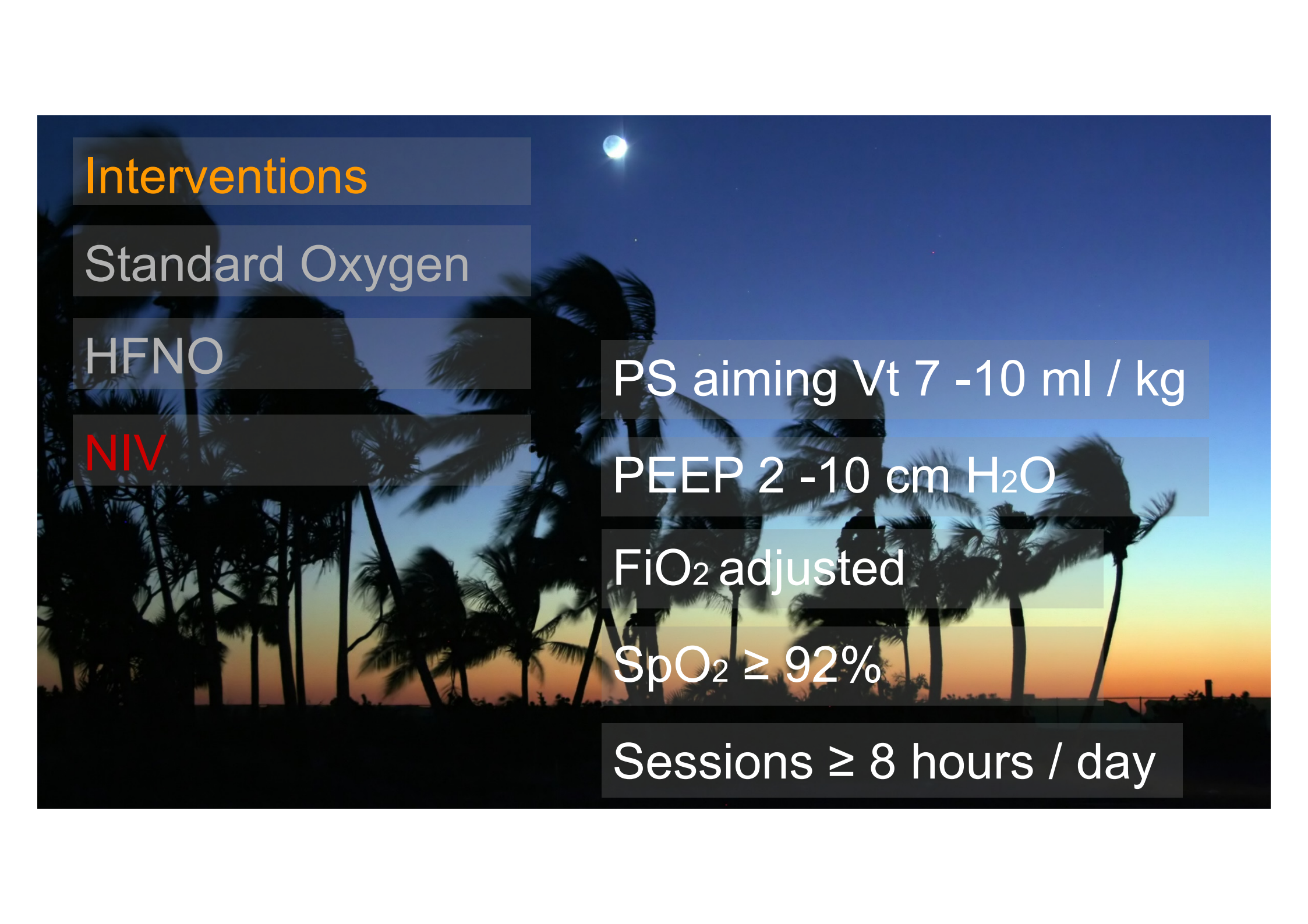
The background of the slide is a photograph of palm trees silhouetted against a sunset sky. The sky transitions from a deep blue at the top to a bright orange near the horizon. A full moon is visible in the upper left portion of the sky. The palm trees are dark and their fronds are clearly visible against the lighter sky.

Interventions

Standard Oxygen

HFNO

NIV



Interventions

Standard Oxygen

HFNO

NIV

PS aiming V_t 7 -10 ml / kg

PEEP 2 -10 cm H₂O

FiO₂ adjusted

SpO₂ $\geq$ 92%

Sessions $\geq$ 8 hours / day

Endpoints

Haemodynamic instability

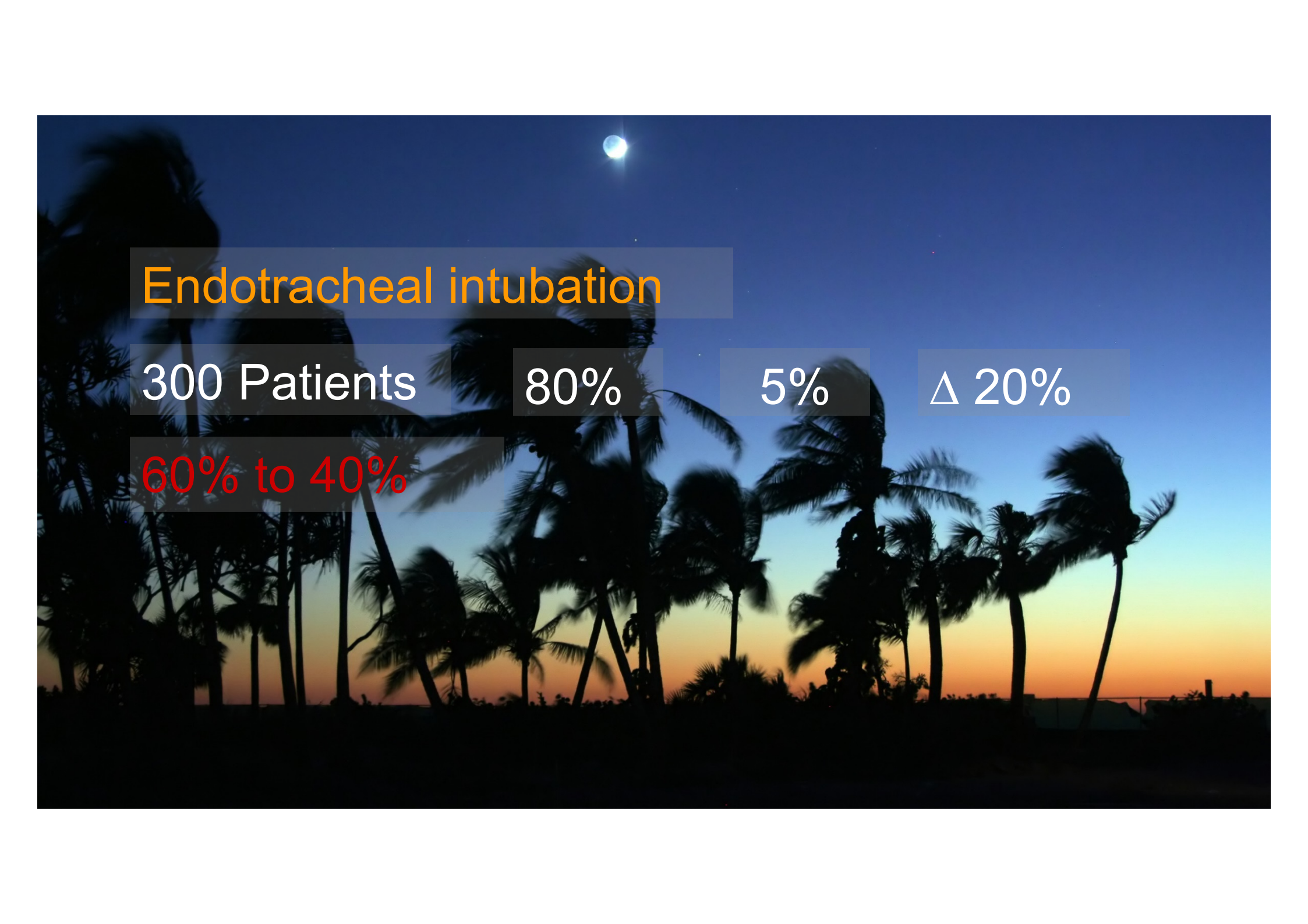
Neurological deterioration

Ongoing respiratory failure



Endotracheal intubation





Endotracheal intubation

300 Patients

80%

5%

Δ 20%

60% to 40%



313 Patients

23 Centres

2 Countries

The background of the slide is a photograph of palm trees silhouetted against a sunset sky. The sky transitions from a deep blue at the top to a bright orange near the horizon. A small, bright white circle, resembling a full moon, is positioned in the upper center of the frame. Overlaid on this image are three semi-transparent grey rectangular boxes, each containing a label on the left and a numerical value on the right.

Standard O₂

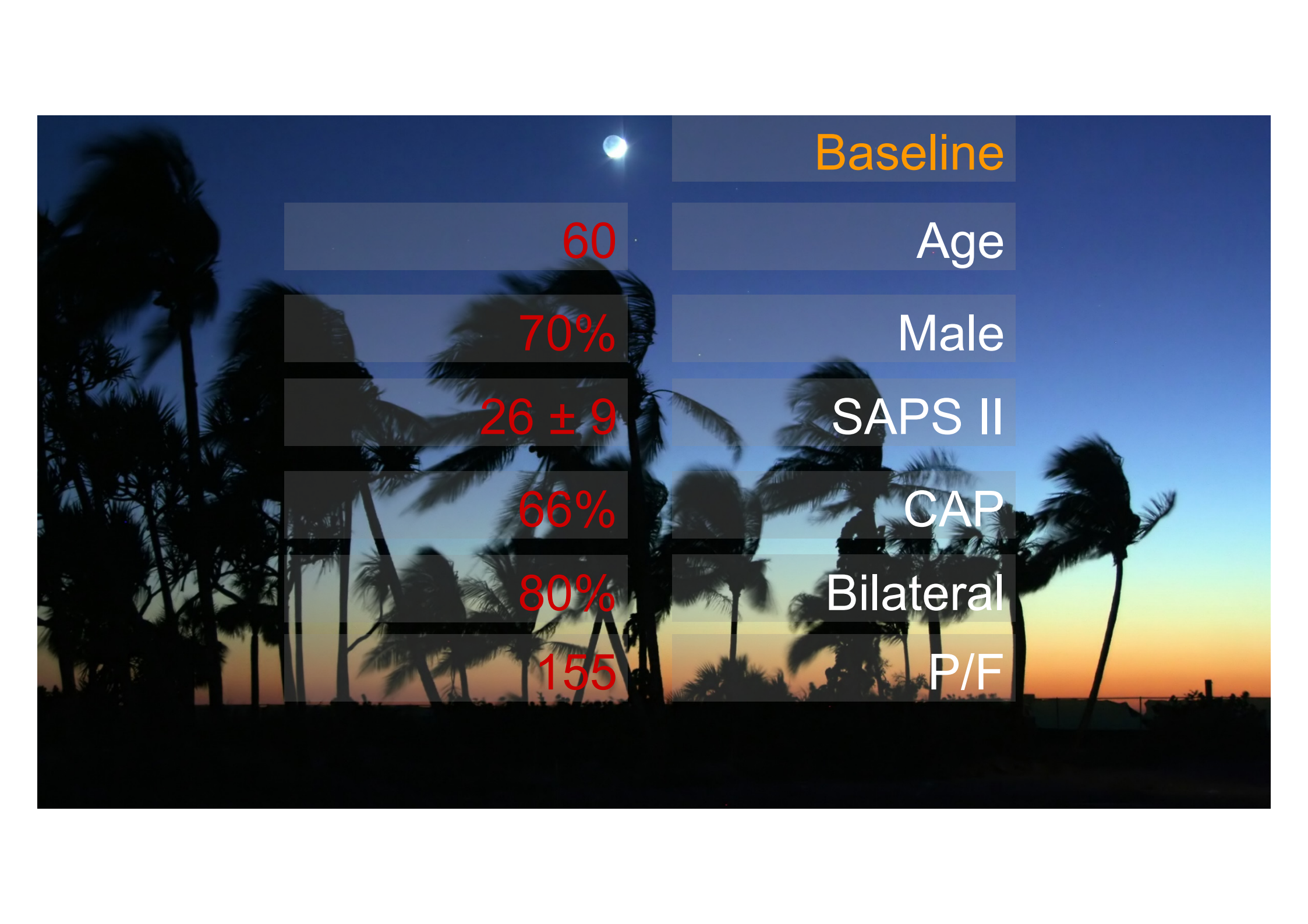
94

HFNO

106

NIV

110



Baseline

60

Age

70%

Male

26 ± 9

SAPS II

66%

CAP

80%

Bilateral

155

P/F

Interventions



The background of the slide is a photograph of palm trees silhouetted against a sunset sky. The sky transitions from a deep blue at the top to a bright orange and yellow near the horizon. A full moon is visible in the upper left portion of the sky.

Interventions

Standard Oxygen

13 ± 5 l/min



Interventions

Standard Oxygen

13 ± 5 l/min

HFNO

48 ± 11 l/min

$\text{FiO}_2 0.82 \pm 0.2$

Interventions

Standard Oxygen

13 ± 5 l/min

HFNO

48 ± 11 l/min

FiO_2 0.82 ± 0.2

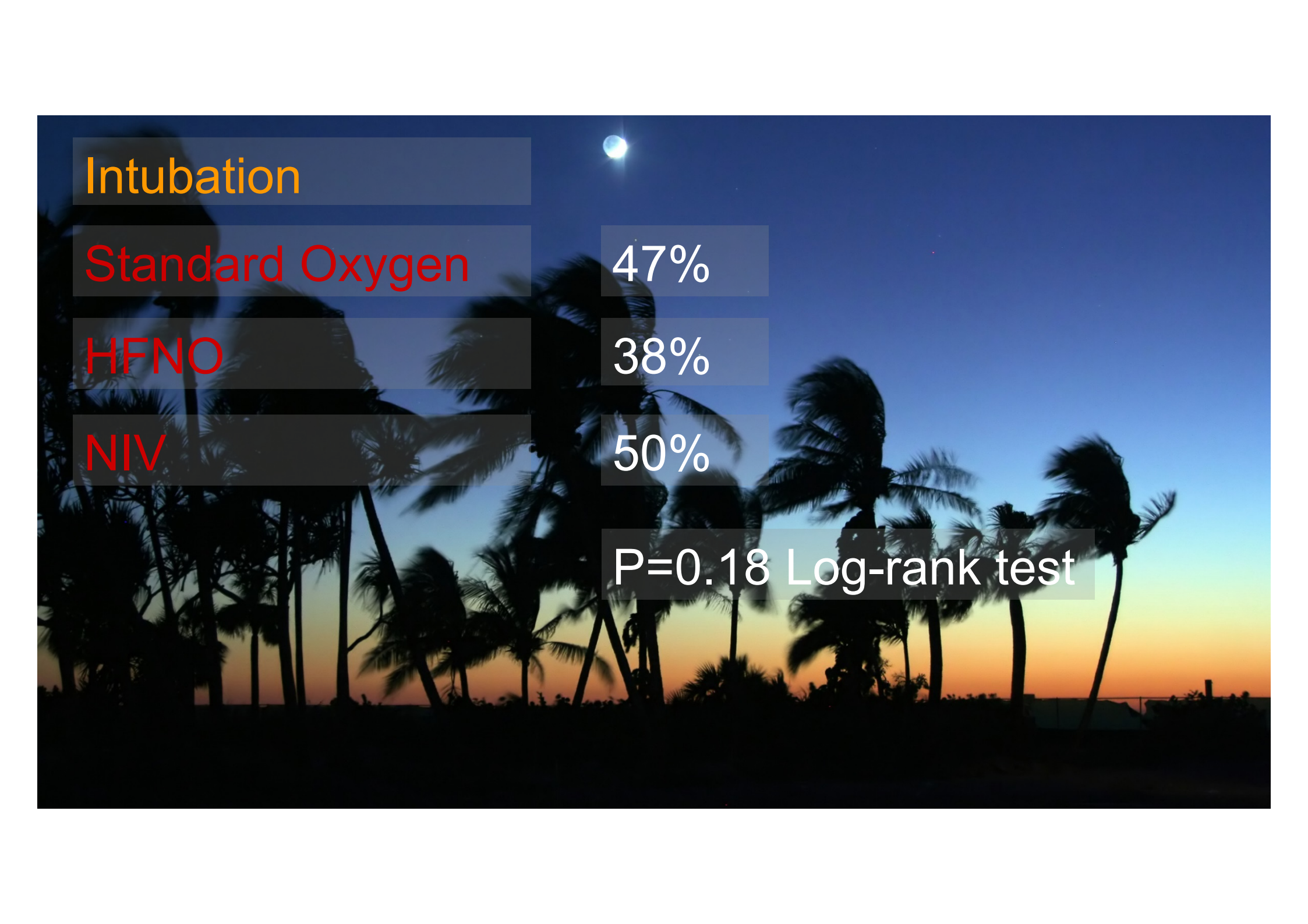
NIV

8 ± 3 / 5 ± 1

V_t 9.2 ± 3.0

FiO_2 0.67 ± 0.2

8 hours/day (IQR 4 ± 12)



Intubation

Standard Oxygen

47%

HFNO

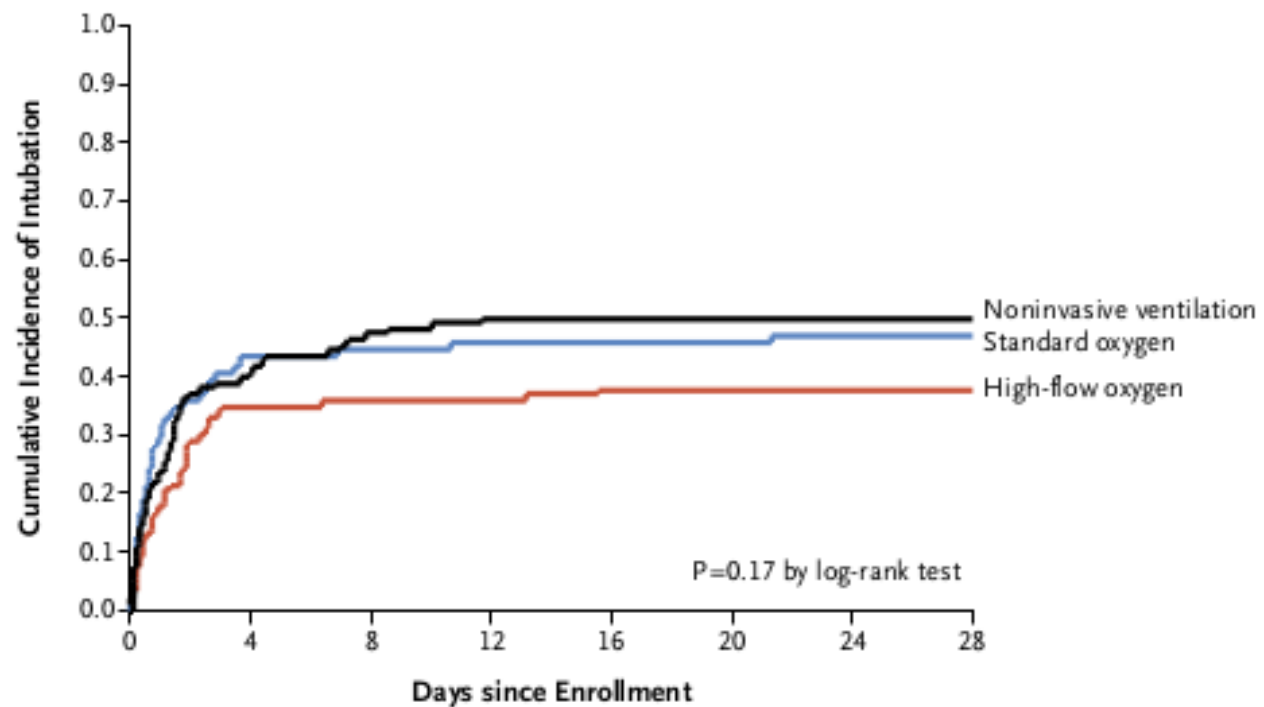
38%

NIV

50%

$P=0.18$ Log-rank test

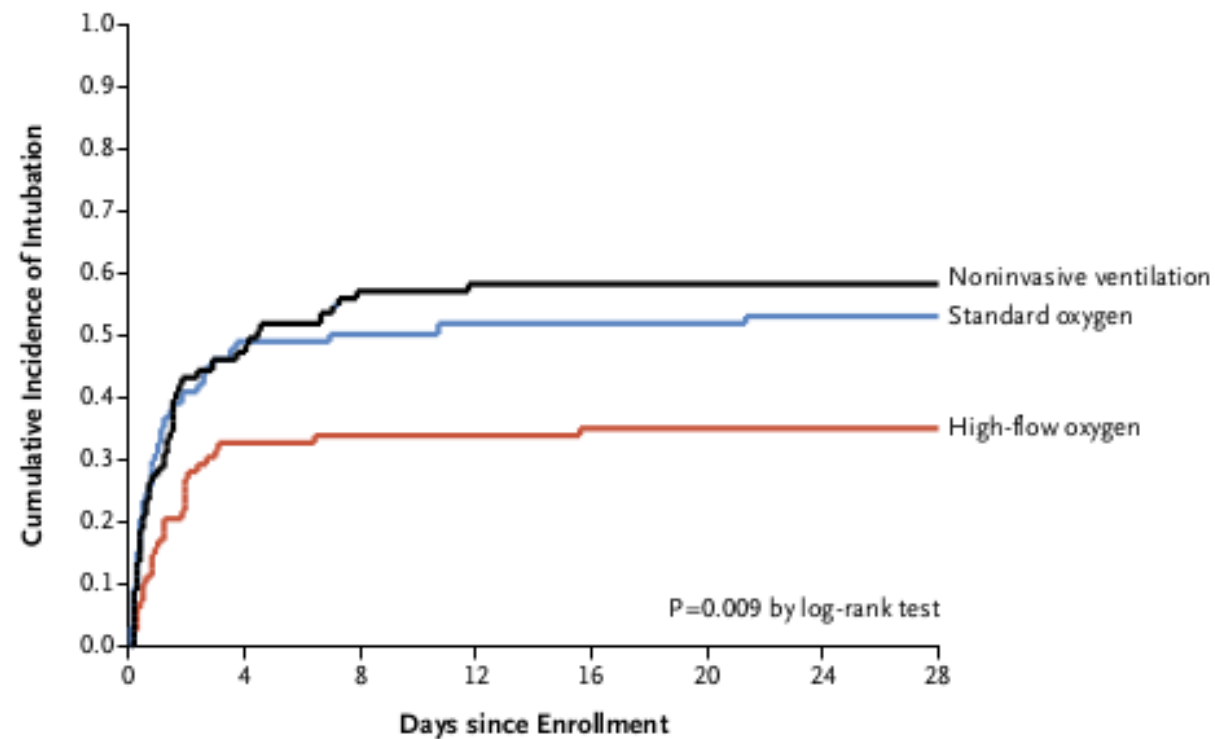
A Overall Population



No. at Risk

High-flow oxygen	106	68	67	67	65	65	65	65
Standard oxygen	94	52	50	49	49	49	48	48
Noninvasive ventilation	110	64	57	53	53	53	53	52

B Patients with a $\text{PaO}_2:\text{FiO}_2 \leq 200$ mm Hg



No. at Risk

High-flow oxygen	83	55	54	54	53	53	53	53
Standard oxygen	74	37	35	34	34	34	33	33
Noninvasive ventilation	81	41	34	32	32	32	32	32

ICU Mortality

Standard Oxygen

19%

HFNO

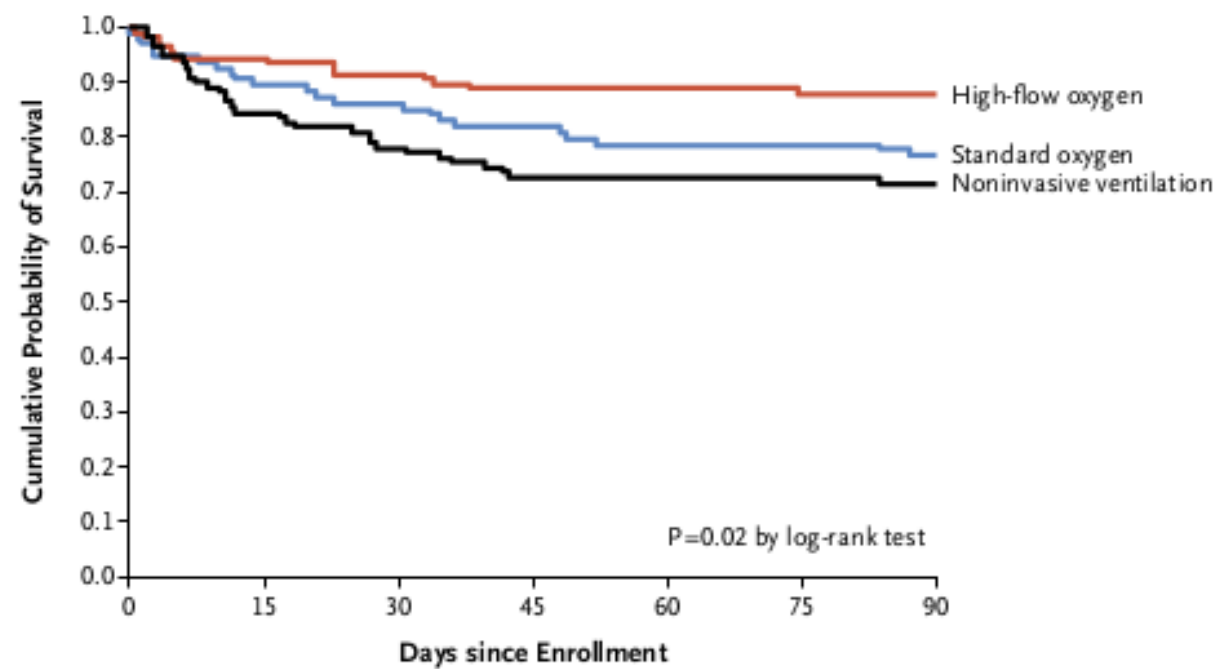
11%

NIV

25%

P=0.047 Log-rank test

OR 1.85 (0.84 – 4.09)



No. at Risk

High-flow oxygen	106	100	97	94	94	93	93
Standard oxygen	94	84	81	77	74	73	72
Noninvasive ventilation	110	93	86	80	79	78	77

Figure 3. Kaplan–Meier Plot of the Probability of Survival from Randomization to Day 90.

90 Day Mortality

Standard Oxygen

23%

HFNO

12%

NIV

28%

P=0.02 Log-rank test

OR 2.01 (1.01 – 3.99)

HFNO

More comfortable

Better in $P/F < 200$

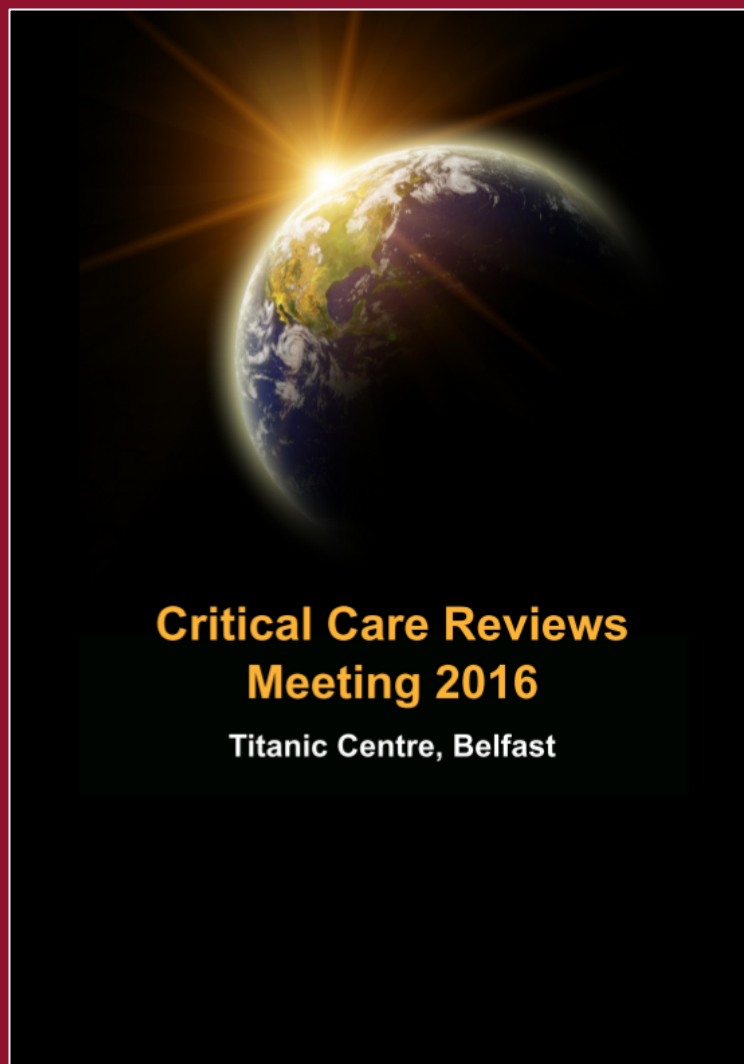


The background of the slide is a photograph of palm trees silhouetted against a sunset sky. The sky transitions from a deep blue at the top to a bright orange and yellow near the horizon. A full moon is visible in the upper left portion of the sky. Three semi-transparent grey rectangular boxes are overlaid on the right side of the image, each containing a line of text. The first box contains 'Methodologically' in orange and 'Good' in white. The second box contains 'Limitations' in orange and 'Some' in white. The third box contains 'Overall' in orange and 'Impressive' in white.

Methodologically Good

Limitations Some

Overall Impressive



Critical Care Reviews Meeting 2017

Titanic Centre, Belfast

Friday January 27th



John Myburgh Paul Marik Mervyn Singer
Anthony Gordon Danny McAuley