PRESCRIBED FLUID CONSUMPTION AND ITS EFFECTS ON THE PHYSIOLOGY AND WORK BEHAVIOUR OF AUSTRALIAN BUSHFIRE FIGHTERS.

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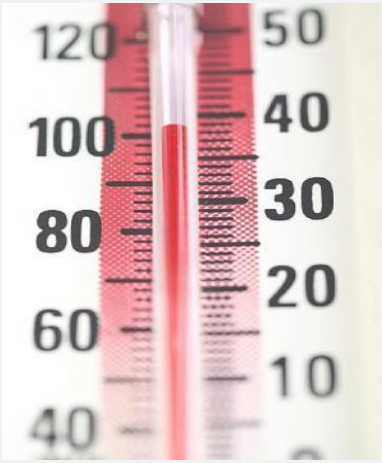
DEHYDRATION IN FIREFIGHTING

bushfire CRC



Dehydration

12 hr+

DEHYDRATION IN FIREFIGHTING

Firefighters arrive moderately dehydrated but leave…

- Moderately dehydrated
- Further dehydrated
- Hydrated

Dehydration has been shown to;

↑ heart rate

↓ physical work capacity

↑ core temperature (↑ risk of collapse)

↓ decision making

FLUID PRESCRIPTIONS

To limit risks of dehydration, Australian fire agencies prescribe **various** fluid volumes to their personnel

Too much fluid – critically low blood sodium = death

1200 $mL \cdot h^{-1}$ vs. ~ 300 $mL \cdot h^{-1}$:

↓ Heart rate
↓ core temperature
↑ productivity

AIMS

1. *Examine firefighters' actual fluid consumption*
2. *Evaluate firefighters **hydration**, **sodium** levels, **heart rate**, **core temperature**, **physical activity** with different drinking conditions*

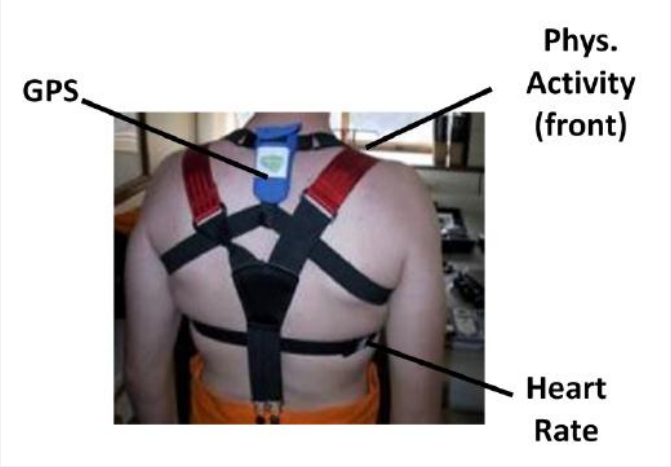
METHODS

34 firefighters

Ad libitum – drink as often as you choose (n = 17)

Prescribed – 600 mL of water **and** 600 mL of sports drink per hour (n = 17)

- ‘paired’ on vehicles to minimise between group differences



RESULTS

No difference b/w groups:

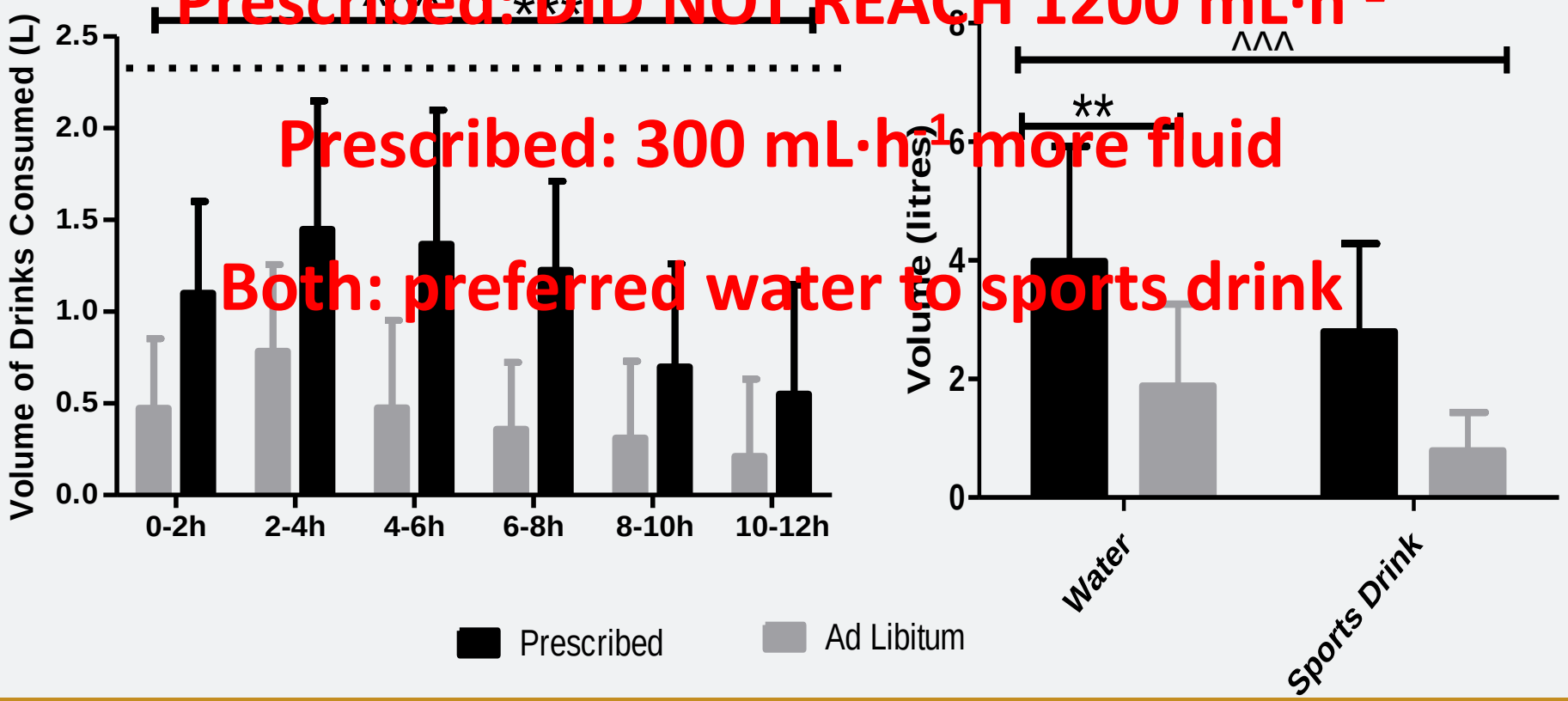
Age, mass, BMI, shift length, temperature on shift (**Avg: 21.0°C, Peak: 25.4°C)**

FLUID INTAKE

Prescribed: DID NOT REACH 1200 mL·h^{-1}

Prescribed: 300 mL·h^{-1} more fluid

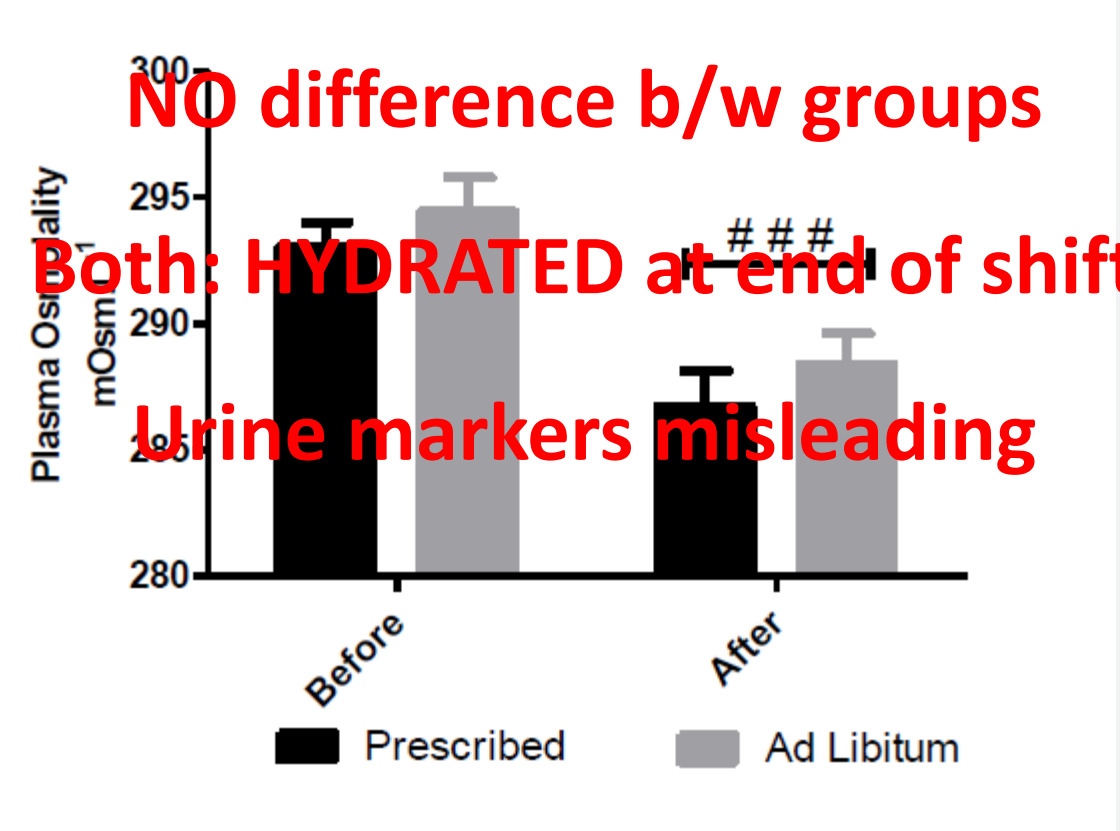
Both: preferred water to sports drink



RESULTS

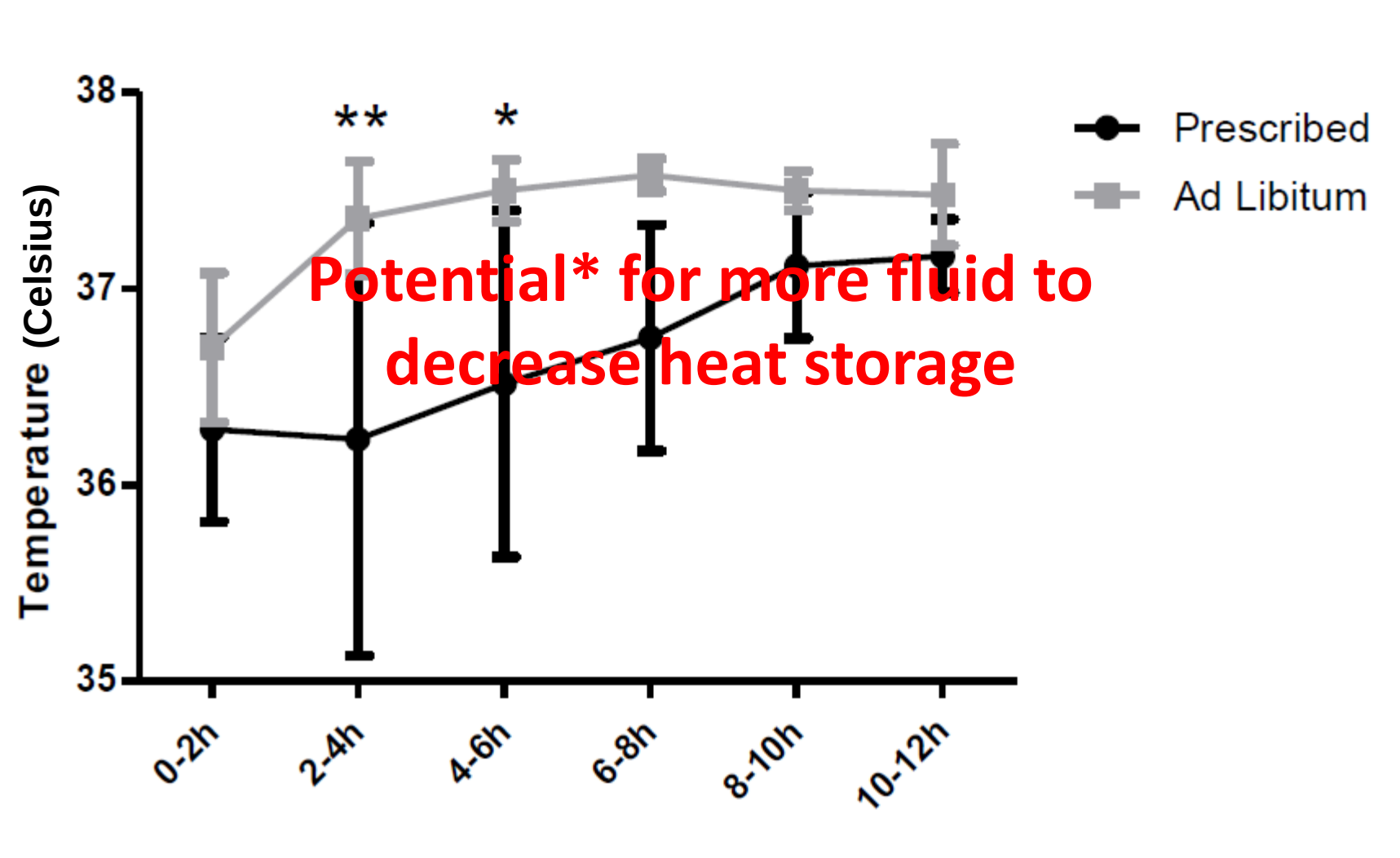
Plasma Sodium: NO difference b/w groups (both in 'normal' range)

HYDRATION STATUS



RESULTS

CORE (INTERNAL) TEMPERATURE



RESULTS

NO difference in **HEART RATE**

NO difference in **PHYSICAL ACTIVITY**

NO difference in **DISTANCE WALKED**

CONCLUSIONS & APPLICATIONS

In mild-warm conditions:

- Firefighters **cannot** drink 1200 $mL \cdot h^{-1}$
- Firefighters' **can** regulate their hydration levels
  - Agency education, frequent breaks
- Additional fluid (up to 530 $mL \cdot h^{-1}$) **does not** alter:
  - Blood sodium levels
  - Heart Rate
  - Physical activity or distance walked
- Additional fluid **may slow** rising internal temperatures