PREScribed fluid consumption and its effects on the physiology and work behaviour of Australian Bushfire Fighters.

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DEHYDRATION IN FIREFIGHTING

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
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·h⁻¹ vs. ~ 300 mL·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**

- NO difference b/w groups
- Both: HYDRATED at end of shift
- Urine markers misleading
RESULTS

CORE (INTERNAL) TEMPERATURE

Potential* for more fluid to decrease heat storage
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·h$^{-1}$

• Firefighters’ **can** regulate their hydration levels
  • Agency education, frequent breaks

• Additional fluid (up to 530 mL·h$^{-1}$) **does not** alter:
  • Blood sodium levels
  • Heart Rate
  • Physical activity or distance walked

• Additional fluid **may slow** rising internal temperatures