



High Ambient Temperature Does Not Predict a Surge in Emergency Department Presentations

Ms Fern McAllan¹, Dr Diana Egerton-Warburton^{2,3},
Dr Gerard O'Reilly^{1,4}, Margaret Loughnan¹, Dr George Jelinek⁵.

1 Monash University, Melbourne, Victoria, Australia

2 Southern Health, Melbourne, Victoria, Australia

3 Southern Clinical School, Melbourne, Victoria, Australia

4 Alfred Hospital, Melbourne, Australia

5 St Vincent's Emergency Practice Innovation Centre, Melbourne, Victoria, Australia



Background

- High ambient temperature is associated with considerable morbidity¹ and mortality.²
- The current Melbourne heat health alert system³ threshold is based on mortality in over sixty-four year olds.⁴ Its association with a surge in ED presentations was unknown.

Objectives

- To determine whether high ambient temperatures, including the current Melbourne heat health alert threshold, are associated with surges in ED presentations.

1. Ye, X et al. Environ Health Perspect. 2012;120(1):19-28.
2. Dhainaut J-F, et al. Crit Care. 2004;8(1):1-2.
3. Victorian Government Department of Health; 2011.
4. Nicholls N, et al. Int J Biometeorol. 2008;52(5):375-84.

Methods – Data

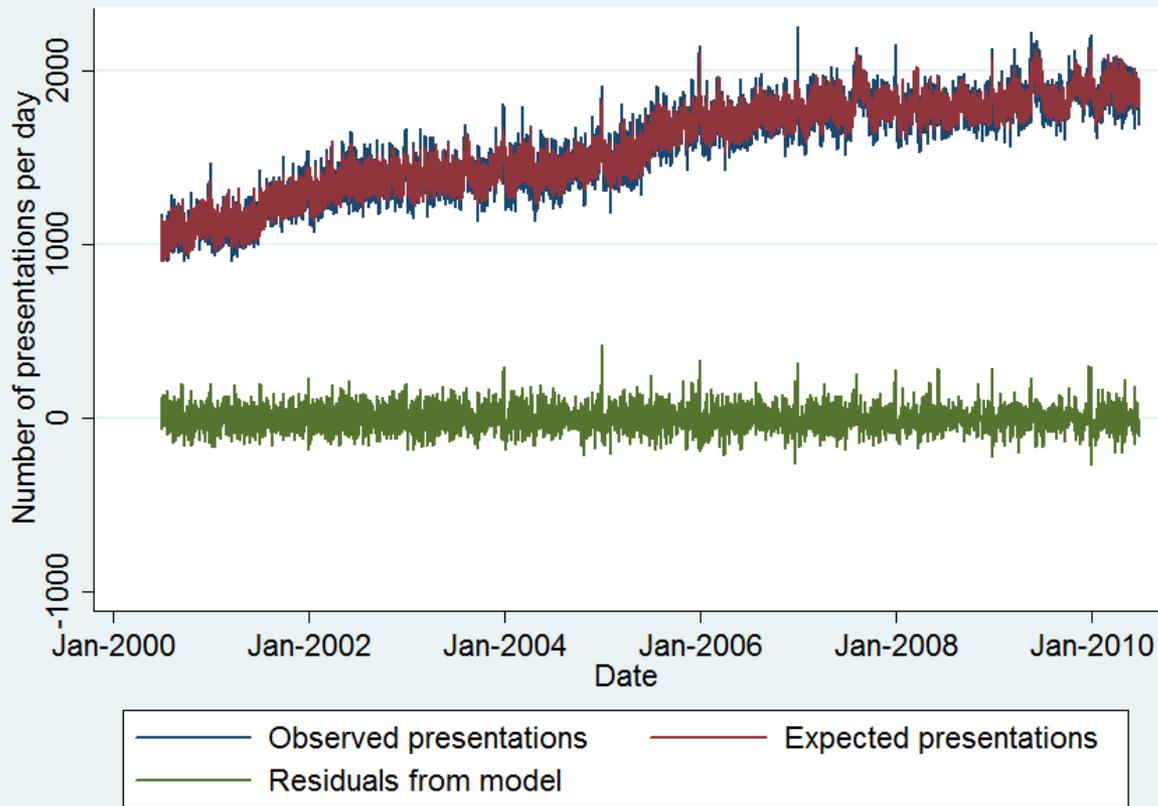
- Retrospective analysis of prospectively collected data sourced from the Victorian Emergency Minimum Dataset was performed and included 13 public hospitals in Melbourne.
- Temperature data from Bureau of Meteorology
- Ten years of data, July 2000 to June 2010.

Methods – Data Analysis

- Time series modelling determined the expected number of presentations of patients aged over 64 years and total presentations.
- Clinically significant surge was defined numerically by an expert panel of emergency physicians as a ten percent increase in observed presentations above expected.
- Logistic regression and area under the receiver-operating characteristic (AUROC) were used to assess predictive ability of temperature metrics on ED surge. The association between surge and days meeting the current heat health alert threshold was assessed.

Results – Patient Population

- A total of 5,609,367 patients presented to metropolitan EDs in the study period.
- Patients over 64 years of age constituted 38% of all presentations.



Clearly demonstrated annual increase in presentations (71% absolute increase over ten years).

Model included:

- Trend (gradual increase in presentations),
- Cycle (stochastic),
- Sunday-Monday (increased presentations, compared to other days),
- Public holidays (increased presentations).

Figure 1. Predicted total presentations using time series model

Wald χ^2 3906, $p < 0.0001$

Results – Temperature Analysis

Temperature		Presentations of over 64s AUROC [95% CI]	Total presentations AUROC [95% CI]
Maximum	Today	0.56 [0.54 to 0.61]	0.56 [0.51 to 0.61]
	Yesterday	0.51 [0.47 to 0.55]	0.51 [0.45 to 0.56]
	Day before yesterday	0.50 [0.47 to 0.54]	0.49 [0.44 to 0.58]
	Two-day MA	0.54 [0.50 to 0.57]	0.53 [0.48 to 0.59]
	Three-day MA	0.52 [0.49 to 0.56]	0.52 [0.46 to 0.57]
Minimum	Today	0.53 [0.49 to 0.56]	0.50 [0.44 to 0.55]
Overnight average	Today	0.52 [0.48 to 0.55]	0.50 [0.45 to 0.56]

Table 1. Area under the receiver operating characteristic (AUROC) curves for temperature variables. MA = moving average.

Results – Heat Health

- No statistically significant association between the current heat health alert threshold and a surge in presentations was found for the total population (Fisher's exact, $p = 0.075$) or the over 64s (Fisher's exact, $p = 0.434$).
- The temperature variable with the highest AUROC for a surge in total presentations and over 64 year olds was the current daily maximum temperature, 0.56 (95% confidence interval (CI) 0.51 – 0.61) and 0.57 (95% CI 0.54 – 0.61), respectively.

