Surveillance and detection rates of beach lifeguards

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Background

Lifeguarding is critical to any water safety program, but it is nearly impossible for anyone to see everything that is happening in the sea; particularly when environmental, cognitive and physiological factors co-exist (1). In such conditions, a lifeguard's ability to process visual information, remain attentive and make sound judgments can be compromised (1).

Aims

This study determined the rates of detection of a 'drowning' individual by beach lifeguards, and whether differences exist in the scanning patterns of: i) Lifeguards in non-biased (no rip present) and biased (rip present) conditions, ii) Experienced and less experienced lifeguards, iii) Lifeguards from surf and non-surf beaches, iv) Male and female lifeguards, and, v) Those who did detect a person disappearing ('Detectors') versus those who did not ('Non-detectors'). It was hypothesized that i) Experienced lifeguards would perform better than inexperienced ii) A greater detection rate would be seen in the biased compared to non-biased condition iii) There would be no differences between the surf compared to non-surf lifeguards or male compared to female lifeguards with regard to scanning patterns or detection rates.

Methods

A mobile eye tracker (SMI, Germany) was worn by each lifeguard (N=69: 52 males, 17 females). They watched 12 minutes of animated beach footage projected onto a large screen in two conditions: i) Non-biased (uniform scene). ii) Biased (uniform scene with presumed rip on right side of screen). The lifeguards were informed that at any point in the 12 minutes a person may or may not disappear and to highlight if and where, a person disappeared. Unknown to the participants, a person always disappeared after 10 minutes at the same position within, but not between, conditions. Data were analysed using ANOVA and binary logistic regression. The time periods examined were 2–10 minutes and the time when the person was submerging (3.5s).

Results and Discussion

The detection rate of the different groups (i.e. male/females, experienced/inexperienced etc) of lifeguards was between 0% and 41.2%. Experienced lifeguards were five times ($P<0.05$) more likely to detect the drowning individual than inexperienced lifeguards. There were no significant differences between the visual search patterns of these groups between 2–10 minutes.

The specific detection rates for beach lifeguards averaged 16% in the non-biased condition and 29% in biased conditions ($P<0.1$); the drowning individual was twice as likely to be detected in the biased condition. The visual search patterns changed in the biased condition; experienced lifeguards searched more on the right of the water. Thus, the visual search pattern used by lifeguards can be altered by instruction and detection rates improve as a consequence. This suggests that a training programme for surveillance should increase detection rates.

Between 40% and 42% of the lifeguards did not detect the person disappearing, even though they fixated in the correct location in the final 3.5 seconds in both conditions. This suggests that that some lifeguards may have fixated on, but not processed, relevant visual data (looked but not seen). 25% of the lifeguards in the biased condition, and 36% of the lifeguards in the non-biased condition, did not fixate in the location of the person disappearing, but were able to identify their disappearance. This suggests that peripheral vision was being used effectively by some lifeguards.

Conclusion

All the hypotheses are accepted. Surveillance strategies are amenable to, and could be improved by, training.

References

1. Brener, J. & Oostman, M. (2002). Lifeguards watch but they don't always see. World Water Park Magazine. pp.14–16.

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