Did the patient present to the emergency department in pain? An application of machine and deep learning

J.A. Hughes¹,², N.J. Brown¹,³, Thanh Vu⁴, Anthony Nguyen⁴

¹. Emergency and Trauma Centre, RBWH; ². School of Nursing, QUT; ³. Faculty of Medicine, UQ; ⁴. Australian eHealth Research Centre, CSIRO.

Background / Aim

Pain is the most common presenting complaint to the emergency department. However, pain is difficult to identify retrospectively if clinicians do not document pain intensity. The aim of this study was to test if machine learning approaches could identify patients presenting in pain.

Method

• Triage assessments of a random sample of 2000 patients presenting to the Emergency and Trauma Centre, RBWH were reviewed by two emergency clinicians.
• Annotated as either “Pain” or “No Pain” on arrival.
• Dataset split into training, development and test datasets for machine learning and deep learning.
• Methods compared to a manually specified RULE based model.

Results

• Machine and deep learning models performed better than the RULE based algorithm.
• Deep learning approaches such as RNN performed better than machine learning approaches.

Conclusion

• Deep-learning models interrogating historical triage notes can accurately identify patients presenting in pain to the ED.
• Immediate applications include 1) determining the incidence of patients presenting in pain, 2) observing changes in incidence overtime, and 3) describing the characteristics of patients in pain and the care provided.
• Future applications include real-time help via a virtual assistant for nurses when triaging patients at risk of pain.