# "Is Haloperidol effective in Delirium treatment?": Answering Treatment and Policy Controversies in Healthcare through Prior Knowledge-driven Structural Causal Model Generation

# Data doesn't lie. People do.

- Lee Baker, Truth, Lies & Statistics: How to Lie with Statistics

### Data doesn't lie... but it doesn't tell the whole truth.

- Bob Fisch, ForbesBooks

## Highlights of Research Idea

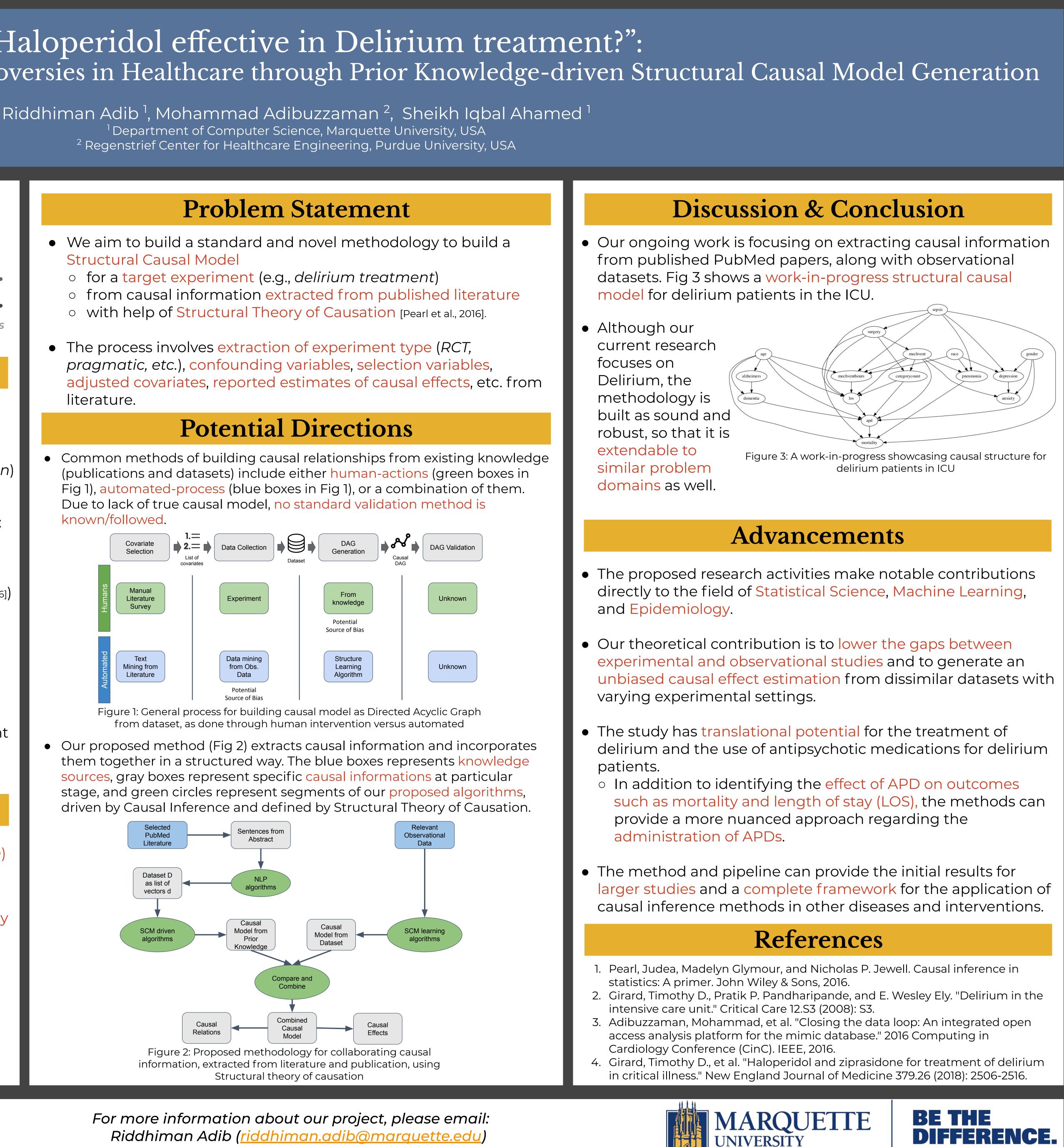
- Structural Causal Model is a standard representation of underlying causal mechanism of an experimental scenario.
  - Represents causal relationships through graph structure.
  - Highly sought after in healthcare, since it expands knowledge and enables virtual intervention (do-intervention)
- Causal Inference is the ideal framework to collaborate information from multiple data (information) sources, such as:
  - Published literature (i.e., *PubMed publications*)
  - Experts' experience (i.e., *experience of ICU physicians*)
  - Experimental data (i.e., Randomized Controlled Trial data)
  - Observational data (i.e., *MIMIC III database* [Adibuzzaman et. al. 2016])
- Easier said than done, since no state-of-the-art causal knowledge collaboration method exists
  - due to large variability in knowledge representation and value from different sources
- Data-driven analysis is highly dependent on the questions asked and methodology involved, and highly prone to different types of biases (i.e., selection bias, confounding bias, etc.)
  - Causal Inference holds structural definition to eliminate these biases

## Significance & Innovation

- Delirium occurs in about 80% cases in the Intensive Care Unit (ICU) and is commonly treated with antipsychotic drugs (APD) [Girard et. al. 2008]
- Controversy over usage of APDs in treating Delirium, since RCTs do not agree in clear evidence of similar efficacy or safety
- Observational data has potential to resolve this issue through generating underlying causal model using Causal Inference
  - MIMIC III database, an extensive EHR dataset with 53,423 distinct hospital admissions [Adibuzzaman et. al. 2016]
- The strength of the proposed methodology is not limited to only Delirium, rather any other policy or treatment controversies in healthcare

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