

Medical Data Deluge: Will It Benefit Patients ?

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Background

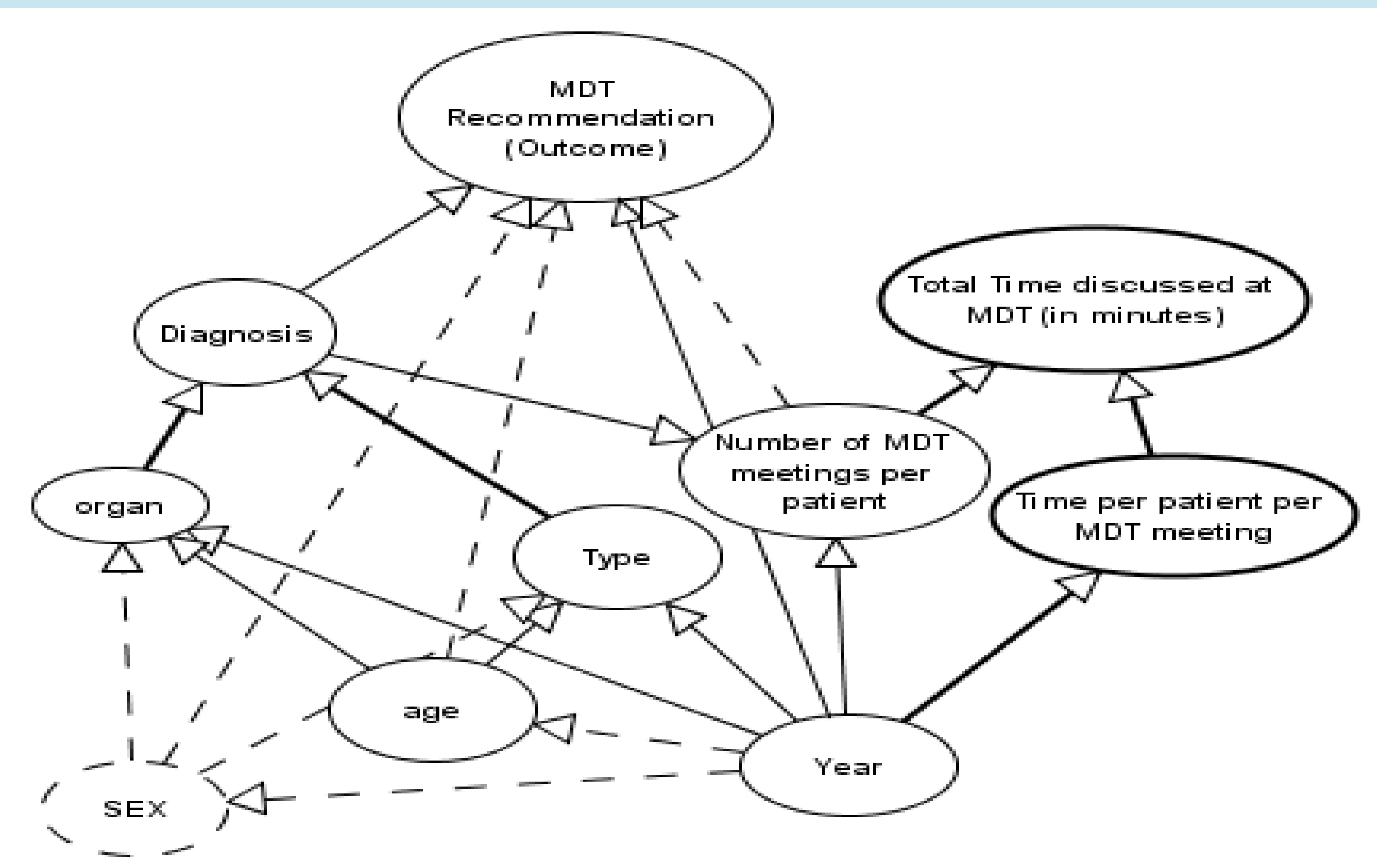
Large amounts of non-experimental data are gathered in normal medical practice. Can this data be used to improve decision making? However, using non-experimental data for effective decision support is challenging, since the historical data derives from past practices and includes out-of-date decisions and medical errors.

MDT meetings on treatment selection for patients with cancer

Multidisciplinary team (MDT) meetings are a standard medical decision making forum, bringing together doctors with different specialties to generate a coordinated care plan for patients with suspected cancers.

Purpose of the study

Use records of patients considered in MDT meeting to analyse whether improvements in the MDT process is benefiting patients.



Simplified version of causal Bayesian Network for analysing MDT processes.

Materials and Methods

- Records of 2074 patients discussed at MDT meetings between 2005 & 2009
- Dataset contains missing values and fields with multiple values
- Bayesian network structure derived by expert judgement
- Data fitted to the structure, to analyse strength of each relationship
- Subsidiary Bayesian network used to learn the parameters of multinomial distributions

Domain Knowledge and Data

In his discussion about medical validity and clinical evidence, Richard Horton [Statist. Med. 2000;19:3149-3164] states:

“The task now must be to find ways of drawing together the various lines of opinion and evidence we have into some valid but also generalizable synthesis.”

Research Goals

Our goal is to build predictive decision support models for complex clinical problems by integrating clinical domain knowledge and medical literature with historical data using causal Bayesian Networks.

Mangled Extremity Decision Support

After a traumatic injury, clinicians have to decide whether to amputate or repair the injured limb. Making such decisions is challenging since:

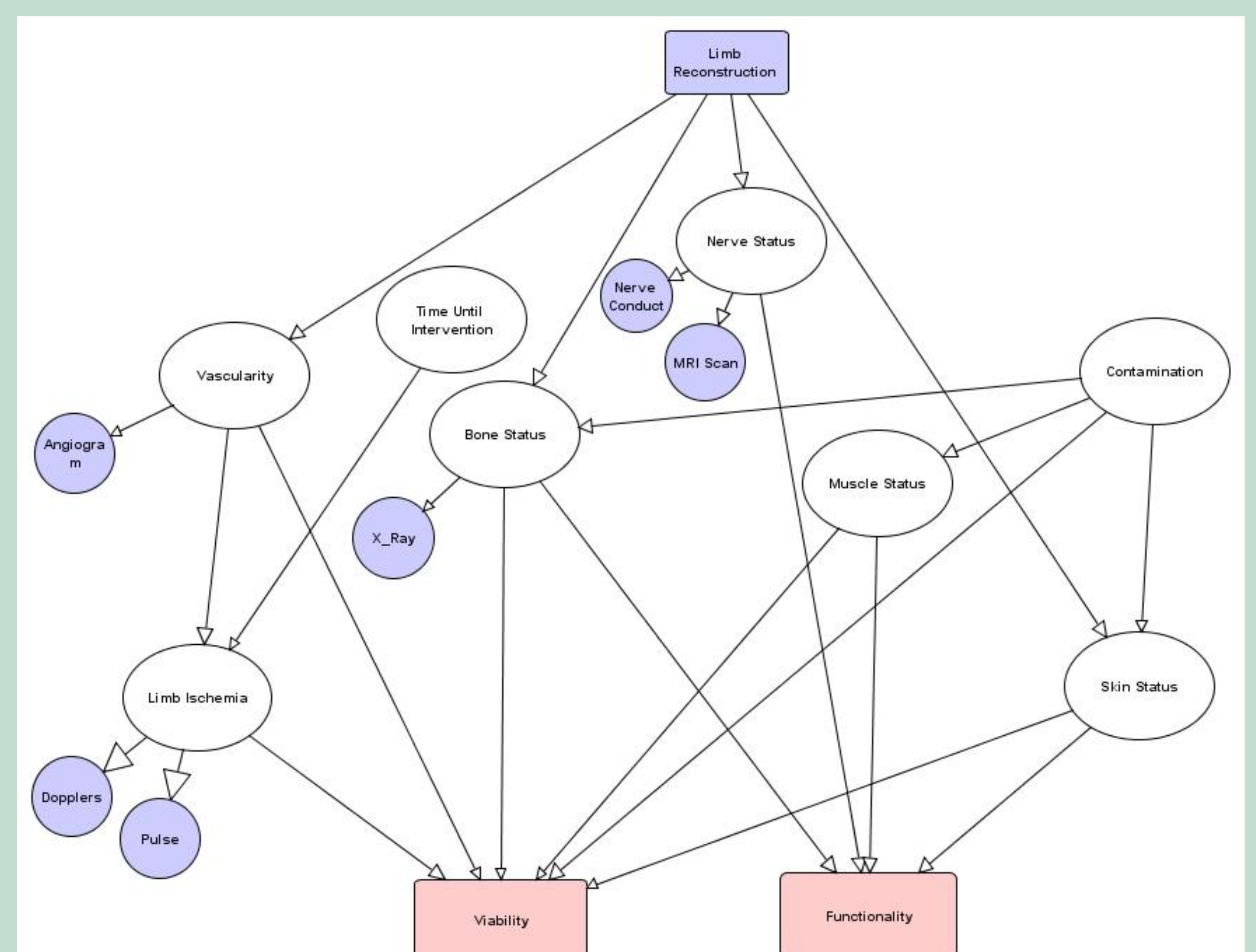
- Patient’s situation and available clinical information changes in time. Consequently, clinicians have to reevaluate their decisions at multiple time stages.
- In each decision making stage, clinicians have to evaluate risk of death, limb’s viability, and compare the possible long-term functioning of repaired limb to prosthesis.



Trauma Emergency

Purpose of the study

The purpose of this study is to build a causal Bayesian network model that can effectively predict the outcomes of amputation and salvaging decisions at multiple time-stages during mangled extremity treatment. The model will be built by refining the information in available data by integrating expert knowledge.



Simplified version of Bayesian Network for predicting outcomes of limb injuries