# Queen Mary
## University of London

Barts & the London School of Medicine & Dentistry / Sport & Exercise Medicine

# Developing BENDi

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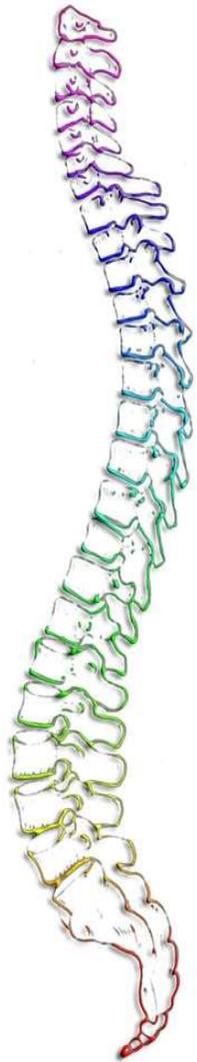
## BACKGROUND

Back pain is a recalcitrant problem which has showed no signs of abating despite decades of research. Pathways are complex, treatment decisions are flawed and outcomes are partial. We believe that decision support using a Bayesian Network (BN) can assist with streamlining the process. We are proposing BENDi: BayEsian Network DecIsion Support for low back pain. Recent research[2] has highlighted that BNs may offer a solution in their ability to manage more complex interactions between clinical prognostic factors.

Our method focuses on expert opinion and the causal structure of clinical reasoning. BNs are probabilistic graphical models which calculate the posterior probability of the unobserved variables given the variables that are observed.

We will use a modified Delphi and Rand procedure and will recruit subject matter experts from physiotherapy, general practice, rheumatology and orthopaedics to elicit the BN.

540 million people worldwide

£10Bn healthcare spend

1,000 years lived with disability (per 100k)[1]

## METHODS



Stage 1: Variables
Variable elicitation — Workshop 1

Stage 2: Structure
Structure elicitation — Workshop 2

Stage 3: Probability
Probability elicitation (online only)

Validation
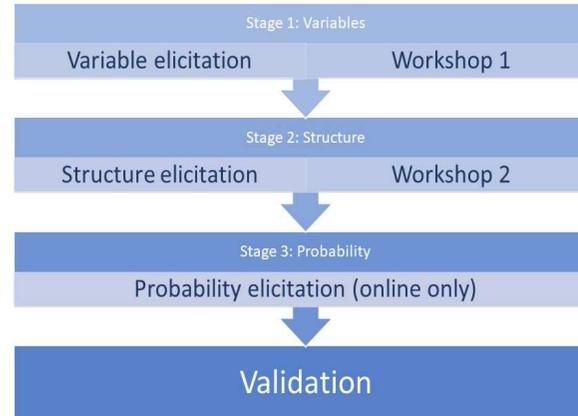
Participants will take part in online elicitations and structured workshops, aiming to achieve consensus around the key factors which influence clinical reasoning for low back pain. The factors identified by the experts are translated into variables in the BN. The experts are asked to categorise the variables and establish the structure of the BN by evaluating the relationships between variables.

These key factors are split into three categories; Risk factors, Judgement factors and Signs and Symptoms. Relationships between the factors are valued between 0 (no relationship) and 3 (strong relationship). The scores are then appropriately averaged and a threshold value is set, meaning weak relationships are removed from the BN structure. The higher the threshold the simpler the BN.

## ANALYSIS

We are half way through this process at the time of presentation. The team has captured lessons learned and some technical considerations. Once the probability elicitation has taken place, the BN will be tested with clinical case studies.

We plan a further iteration of the entire process to develop clinical presentations, before a feasibility and pilot study for clinical use.

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