

Bayesian Networks for Managing Rheumatoid Arthritis

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Outline

1. Background

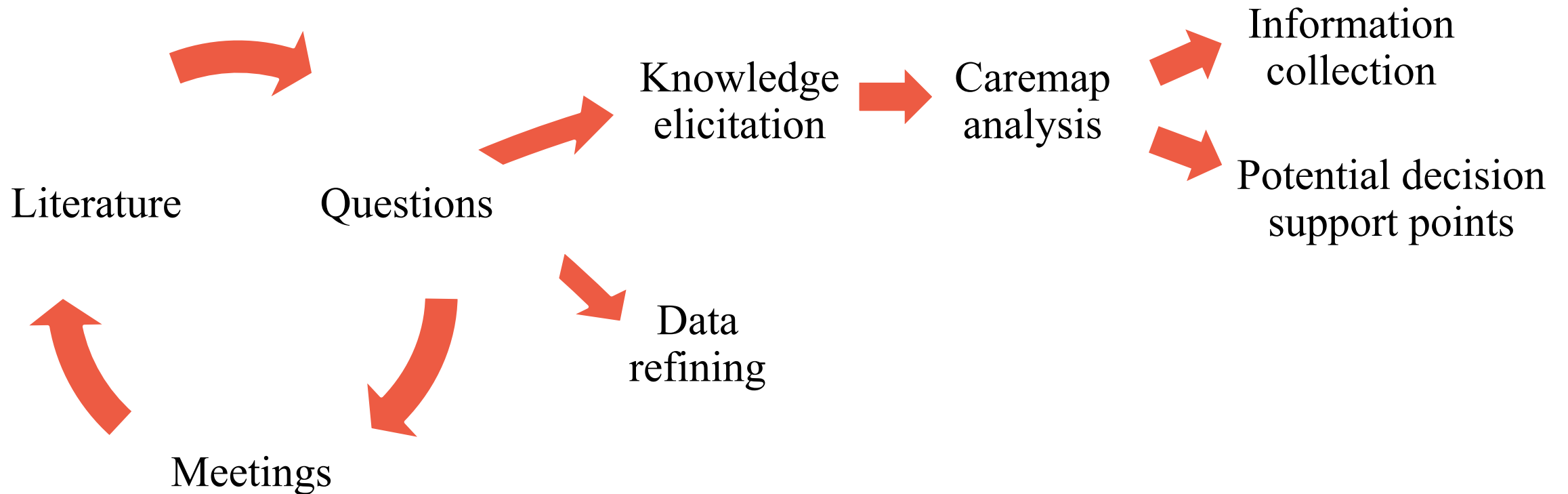
- Caremaps for Rheumatoid Arthritis (RA)
- Decision support points and predictions needed

2. Causal modelling approach

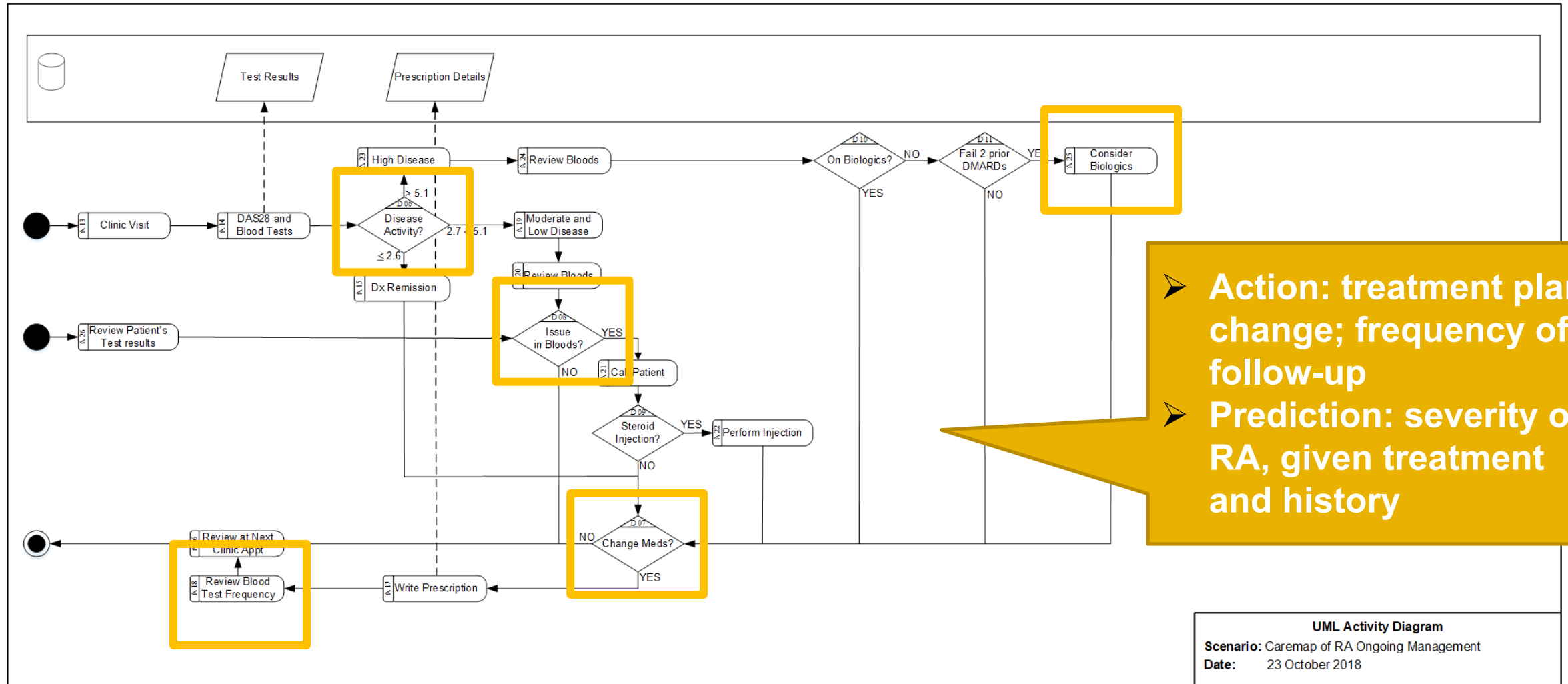
3. Progress on the diagnostic model

4. Summary and future works

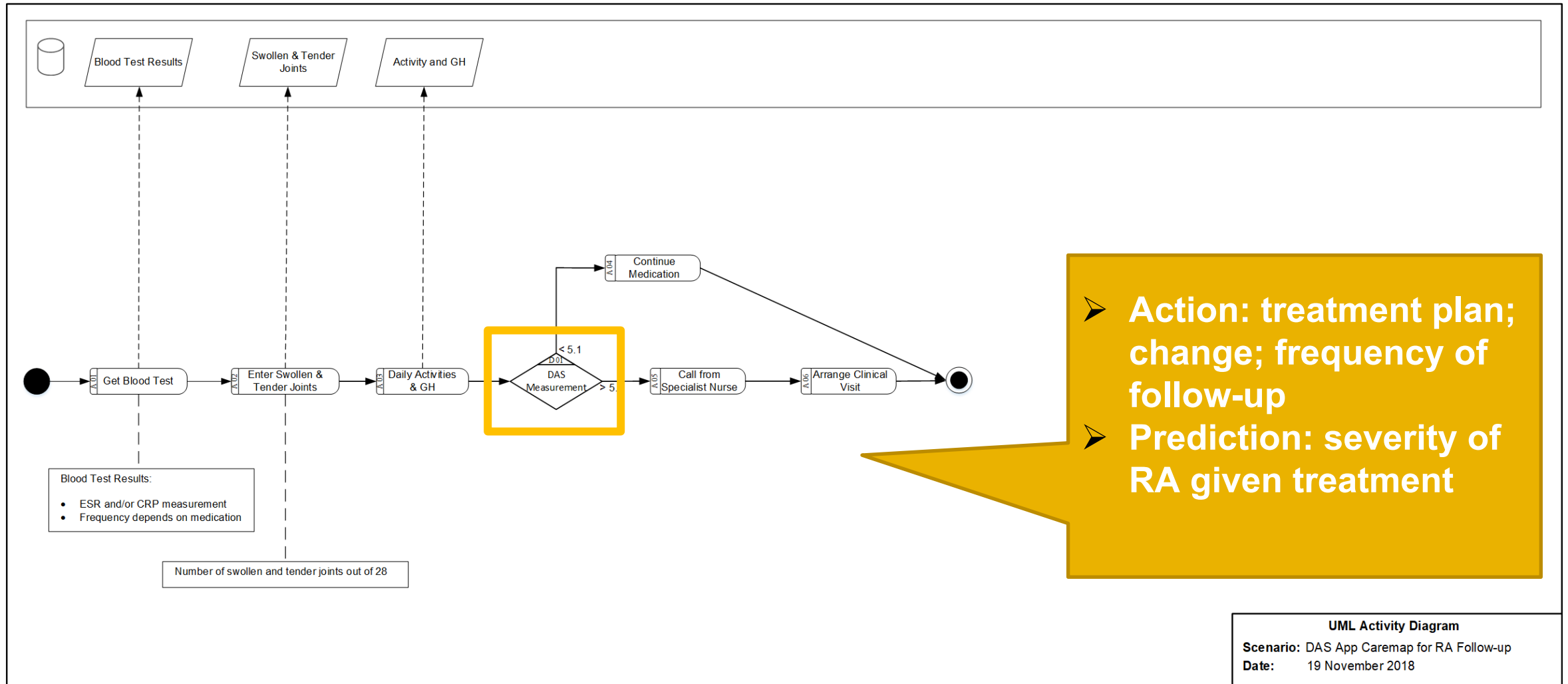
Background - Discussions with Clinicians



Background - Ongoing Management Caremap



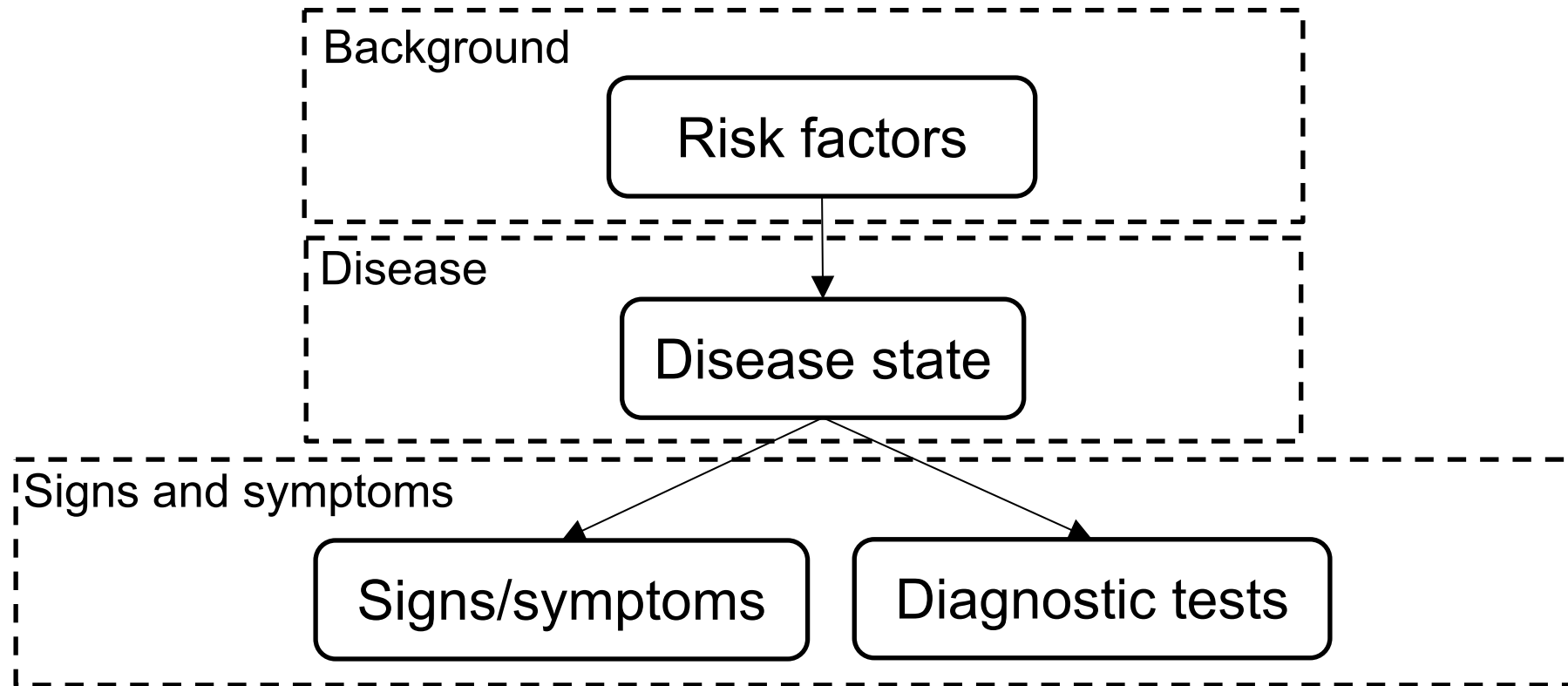
Background – self-management (DAS caremap)



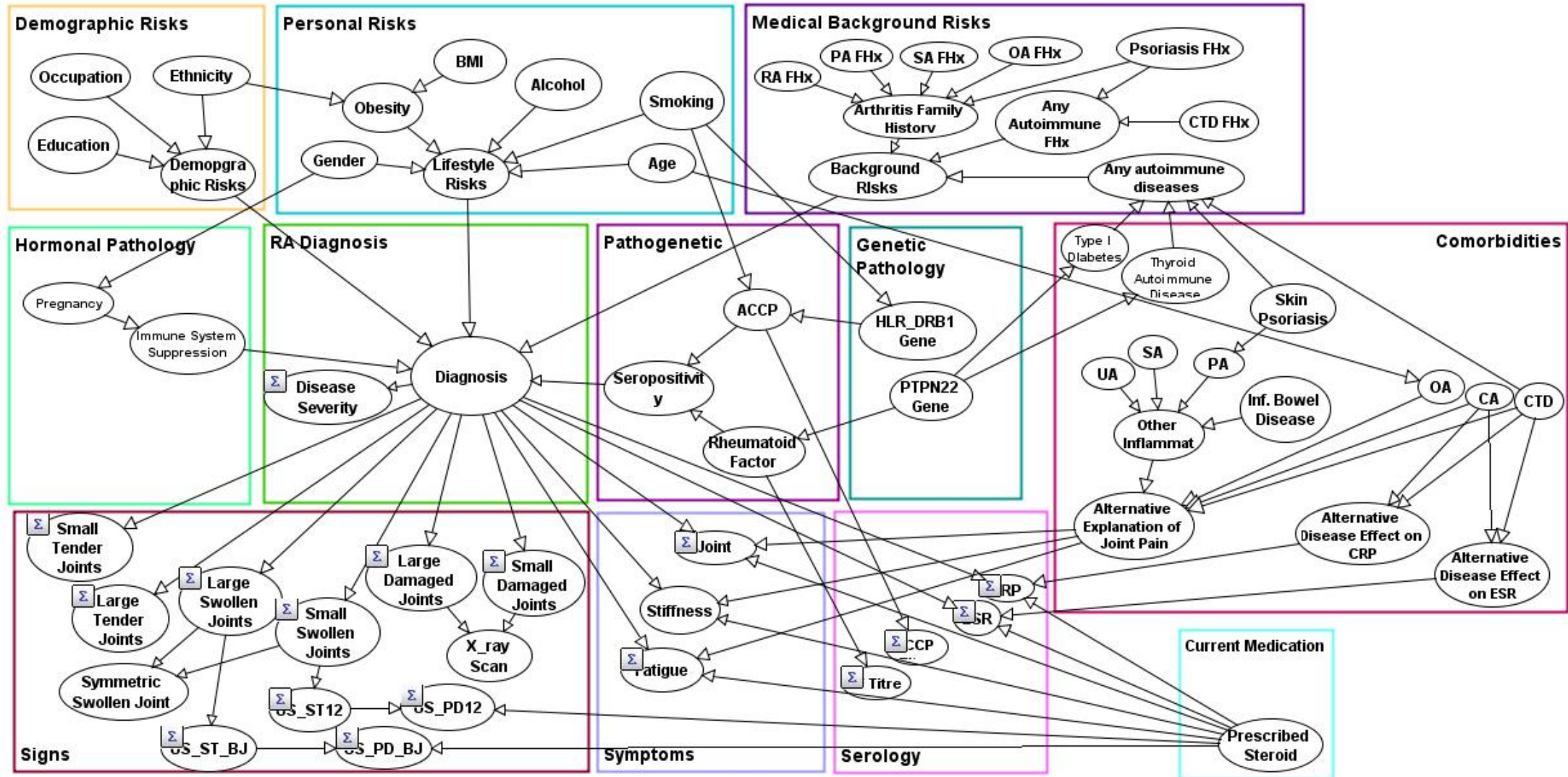
Prediction and Decision

Care process	Potential decision points
Diagnosis	RA Diagnosis
Initial management	DMARD Prescription
Initial management	Follow-up
Ongoing management	Disease Activity?
Ongoing management	Issue in Blood?
Ongoing management	Change Medications
Ongoing management	Biologics Prescription
Ongoing management	Follow-up
Self-management	Disease activity measurement

Causal Modelling



Progress on the diagnostic model



Diagnostic model and data

44 fields

Sample.ID	peac_id	Joint	Size	Baseline Diagnosis	Current Diagnosis	Age	onset.mo .	BL.esr	BL.crp	CCPtitre	ccpPos	Rftitre	Rfpos	BL.VAS	BL.tende r	BL.swolle n	baseline _das28
QMUL2010048	50	Wrist	Small	RA	RA	49	12	6	0	45.9	1	0	0	30	8	2	3.65
QMUL2011018	70	MCP	Small	RA	RA	49	5	49	0	383	1	66	1	78	26	12	7.64
QMUL2010041	46	MCP	Small	RA	RA	43	11	35	9	5	1	10	0	57	24	6	6.72
QMUL2010034	41	Wrist	Small	RA	RA	70	8	30									5.2
QMUL2010038	43	Wrist	Small	RA	RA	52	6	9									8.89
QMUL2012031	124	Wrist	Small	RA	RA	49	8	29									2.28

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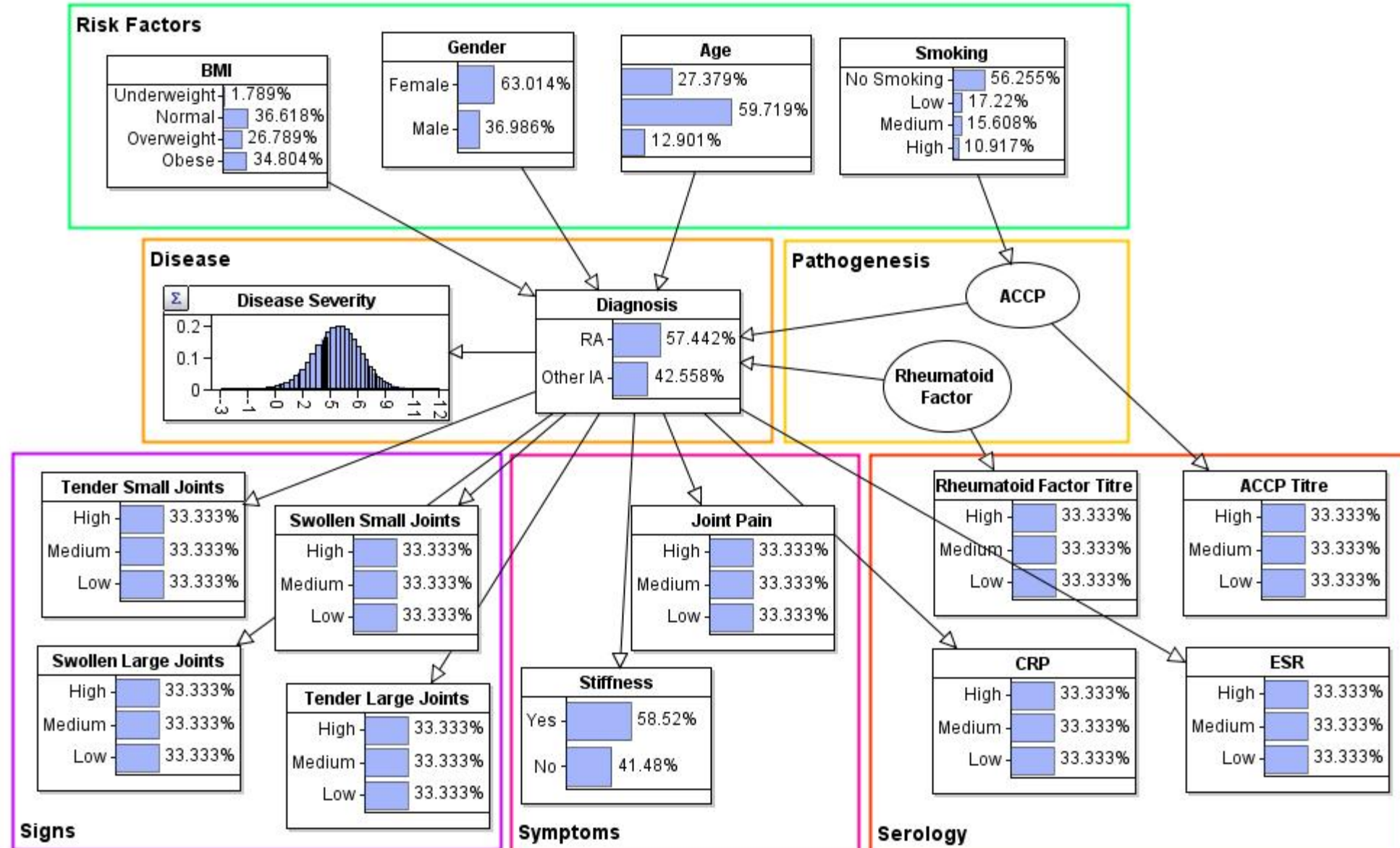
This number of patient is less than required number for this complex model!

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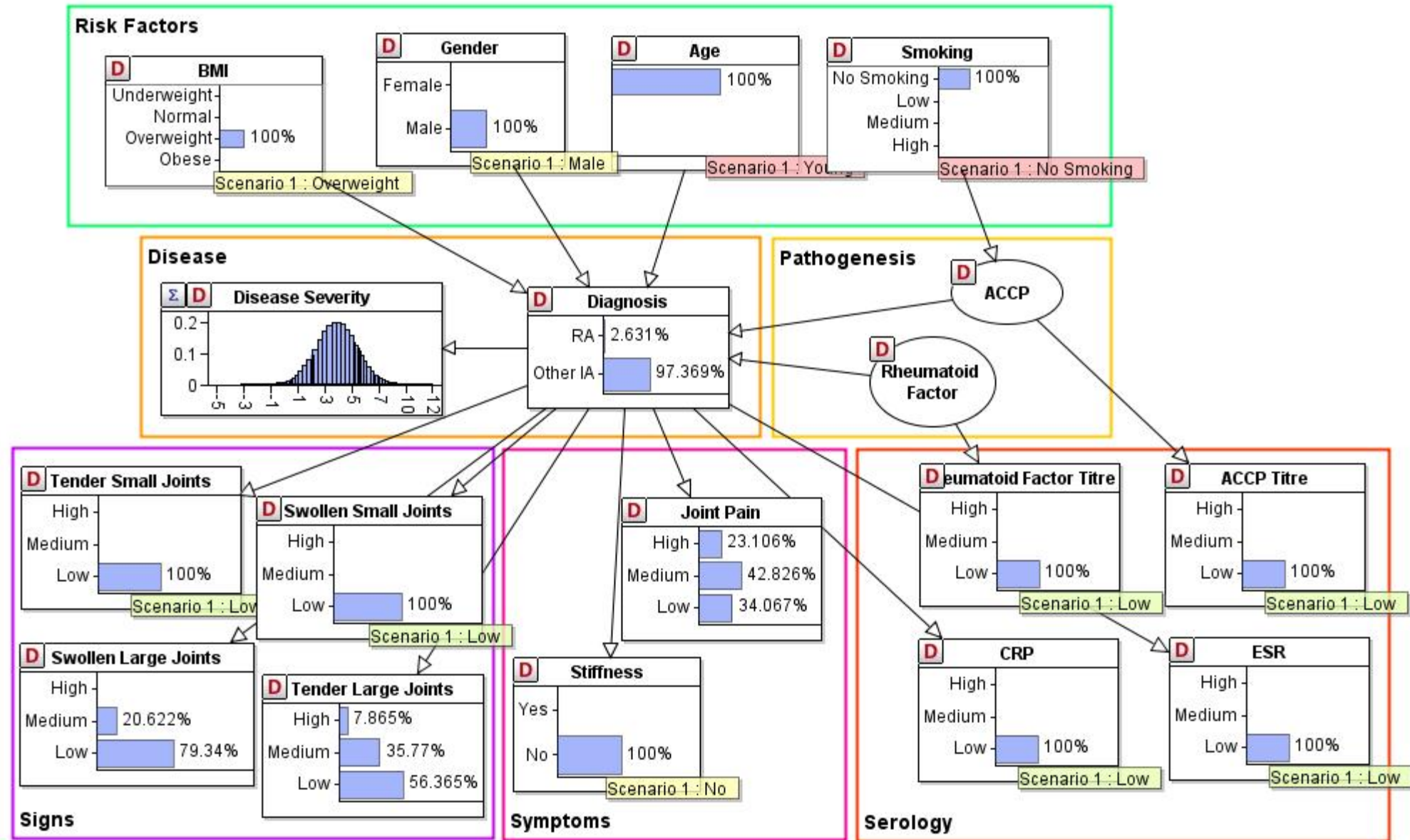
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219 patients

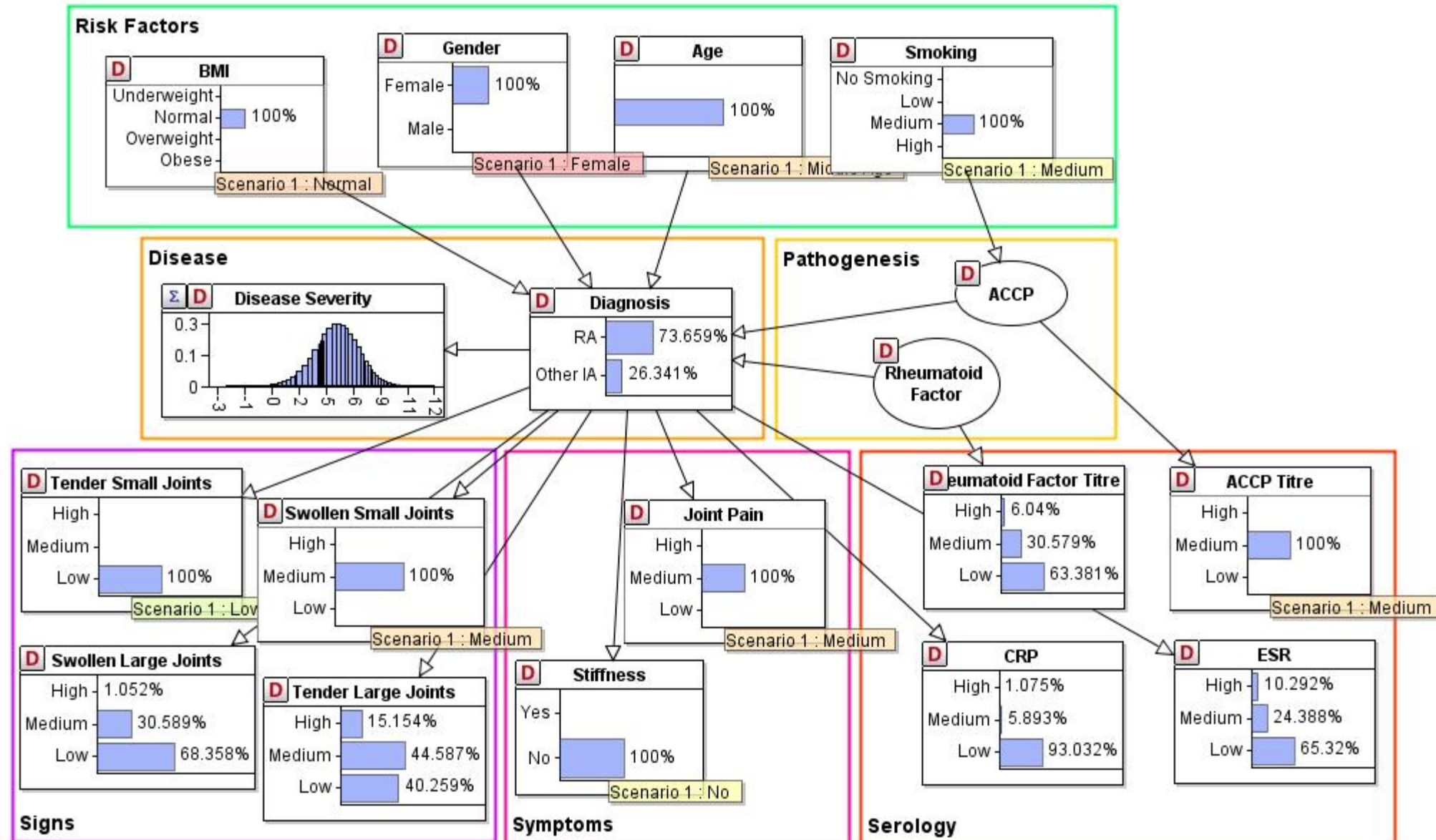
Simple diagnostic BN



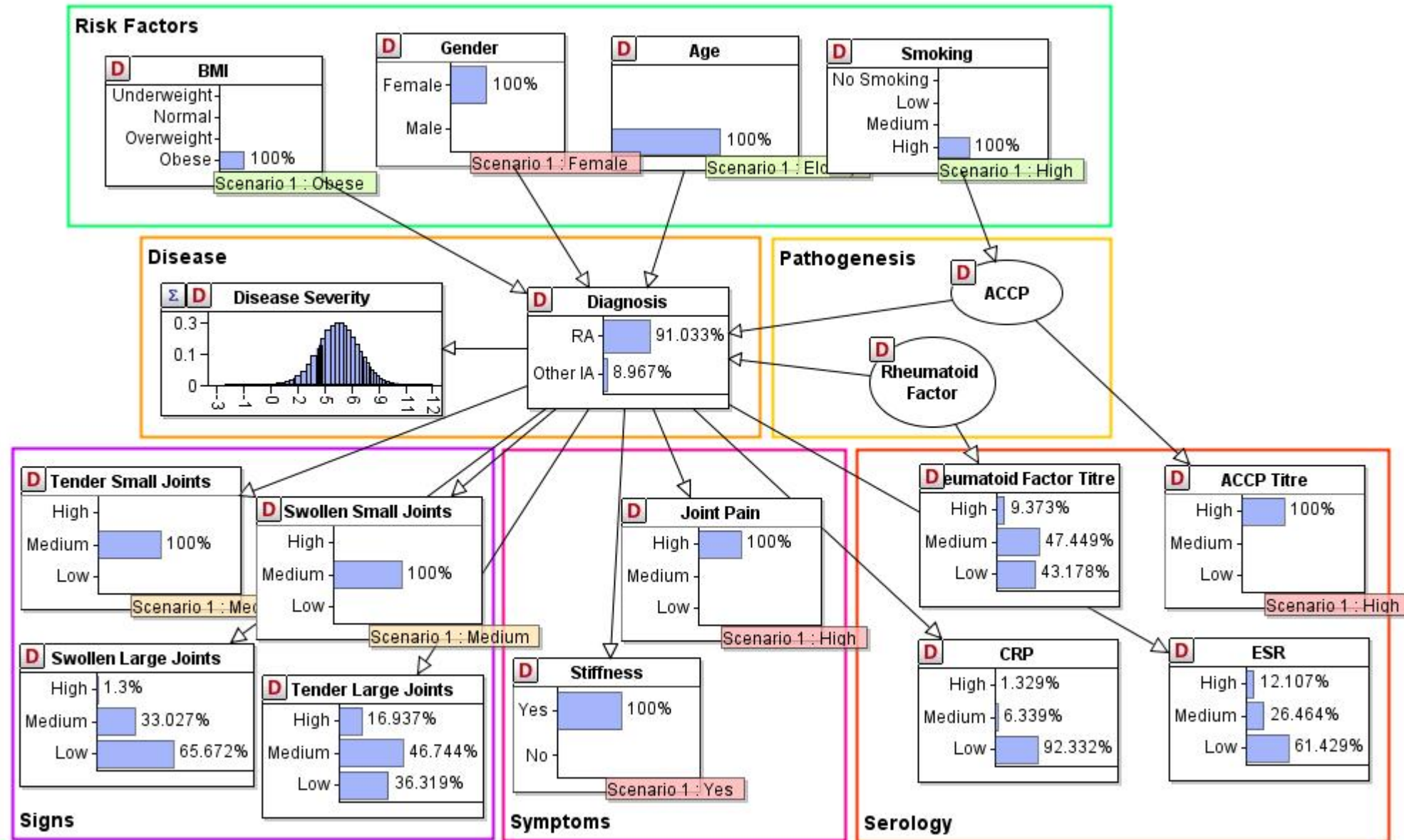
Simple diagnostic BN – low risk




Simple diagnostic BN – medium risk



Simple diagnostic BN – high risk



Summary and future works

- BN model for diagnosis
 - Structure ✓ ✓
 - Finish quantification ✓
 - Evaluation
- BN model for initial management
 - Finish structure ✓
 - Quantification
 - Evaluation
- BN model for ongoing management  self-management
 - Structure
 - Quantification
 - Evaluation