

Table S1 All risk factors from the OAI database and measure result that may influence KOA progression

Number	Classification	OAI variable name	Description	Type
1	Basic information	SIDE	Left and right knee indicator (1: right knee, 2: left knee)	Binary
2		P02SEX	Patient's sex (1: male, 2: female)	Binary
3		P01FAMKR	Blood relative ever had knee replacement surgery for arthritis (0: no, 1: yes)	Binary
4		P02ACTRISK	Engage in at least one frequent knee bending activity (0: no, 1: yes)	Binary
5		P02PA3	Squat or deep knee bend for 30 minutes or more on most days (0: no, 1: yes)	Binary
6		P02PA2	Kneel for 30 minutes or more on most days (0: no, 1: yes)	Binary
7		P02RACE	Racial background (1: White, 2: non-White)	Binary
8		V00PASE	Physical Activity Scale for the Elderly (PASE) score	Continuous
9		P01KSURGL/P01KSURGR	Left knee/right knee ever have surgery or arthroscopy (0: no, 1: yes)	Binary
10		P01INJL/P01INJR	Left knee/right knee ever injured badly enough to limit ability to walk for at least two days (0: no, 1: yes)	Binary
11	V00PSMOKER	Smoking status for pipe, cigars or cigarillos (0: never, 1: current, 2: former, 3: current, but never regular)	Ordered categorical	
12	Annual condition 0 month	P02PA4	Lift or move objects weighing 25 lbs. or more by hand on most days (0: no, 1: yes)	Binary
13		V00AGE	Patient's age +0 month	Continuous
14		V00SF1	In general, how is health +0 month (1: excellent, 2: very good, 3: good, 4: fair, 5: poor)	Ordered categorical
15		P01LKX/P01RKXSX	Left knee/right knee symptom status +0 month (0: no pain in past 12 months, 1: pain in past 12 months, not most days of month, 2: pain most days of a month in past 12 months)	Ordered categorical
16		P01BMI	Body mass index +0 month	Continuous
17		V00WOMTSL	WOMAC total score +0 month	Continuous
18		V00KOOSKPL	KOOS pain score +0 month	Continuous
19		V00KOOSYML	KOOS symptoms score +0 month	Continuous
20		V00CHNFQCV	Chondroitin sulfate frequency of use +0 month (0: not used, 1: a few days per month or less, 2: 1–3 days per week, 3: 4–5 days per week, 4: nearly every day or every day)	Ordered categorical
21		V00GLCFQCV	Glucosamine frequency of use +0 month (0: not used, 1: a few days per month or less, 2: 1–3 days per week, 3: 4–5 days per week, 4: nearly every day or every day)	Ordered categorical
22	V00NSAIDS	Used nonprescription NSAIDS for joint pain or arthritis more than half the days of the month (0: no, 1: yes) +0 month	Binary	
23	V00PASE6	Leisure activities: muscle strength/endurance +0 month [0: never, 1: seldom (1–2 days), 2: sometimes (3–4 days), 3: often (5–7 days)]	Ordered categorical	
24	Annual condition 12 month	V01AGE	Patient's age +12-month	Continuous
25		V01SF1	In general, how is health +12-month	Ordered categorical
26		V01LKXSX	Left knee/right knee symptom status +12-month	Ordered categorical
27		V01BMI	Body mass index +12-month	Continuous
28		V01WOMTSR	WOMAC total score +12-month	Continuous
29		V01KOOSKPR	KOOS pain score +12-month	Continuous
30		V01KOOSYMR	KOOS symptoms score +12-month	Continuous
31		V01CHNFQCV	Chondroitin sulfate frequency of use +12-month	Ordered categorical
32		V01GLCFQCV	Glucosamine frequency of use +12-month	Ordered categorical
33		V01NSAIDS	Used nonprescription NSAIDS for joint pain or arthritis more than half the days of the-month +12-month	Binary
34	V01PASE6	Leisure activities: muscle strength/endurance +12-month	Ordered categorical	
35	Annual condition 24 month	V03AGE	Patient's age +24-month	Continuous
36		V03SF1	In general, how is health +24-month	Ordered categorical
37		V03LKXSX	Left knee/right knee symptom status +24-month	Ordered categorical
38		V03BMI	Body mass index +24-month	Continuous
39		V03WOMTSR	WOMAC total score +24-month	Continuous
40		V03KOOSKPR	KOOS pain score +24-month	Continuous
41		V03KOOSYMR	KOOS symptoms score +24-month	Continuous
42		V03CHNFQCV	Chondroitin sulfate frequency of use +24-month	Ordered categorical
43		V03GLCFQCV	Glucosamine frequency of use +12-month	Ordered categorical
44		V03NSAIDS	Used nonprescription NSAIDS for joint pain or arthritis more than half the days of the-month +12-month	Binary
45	V03PASE6	Leisure activities: muscle strength/endurance +12-month	Ordered categorical	
46	Annual condition 36 month	V05AGE	Patient's age +36-month	Continuous
47		V05SF1	In general, how is health +36-month	Ordered categorical
48		V05LKXSX	Left knee/right knee symptom status +36-month	Ordered categorical
49		V05BMI	Body mass index +36-month	Continuous
50		V05WOMTSR	WOMAC total Score +36-month	Continuous
51		V05KOOSKPR	KOOS pain score +36-month	Continuous
52		V05KOOSYMR	KOOS symptoms score +36-month	Continuous
53		V05CHNFQCV	Chondroitin sulfate frequency of use +36-month	Ordered categorical
54		V05GLCFQCV	Glucosamine frequency of use +36-month	Ordered categorical
55		V05NSAIDS	Used nonprescription NSAIDS for joint pain or arthritis more than half the days of the-month +36-month	Binary
56	V05PASE6	Leisure activities: muscle strength/endurance +36-month	Ordered categorical	
57	Annual condition 48 month	V06AGE	Patient's age +48-month	Continuous
58		V06SF1	In general, how is health +48-month	Ordered categorical
59		V06LKXSX	Left knee/right knee symptom status +48-month	Ordered categorical
60		V06BMI	Body mass index +48-month	Continuous
61		V06WOMTSR	WOMAC total score +48-month	Continuous
62		V06KOOSKPR	KOOS pain score +48-month	Continuous
63		V06KOOSYMR	KOOS symptoms score +48-month	Continuous
64		V06CHNFQCV	Chondroitin sulfate frequency of use +48-month	Ordered categorical
65		V06GLCFQCV	Glucosamine frequency of use +48-month	Ordered categorical
66		V06NSAIDS	Used nonprescription NSAIDS for joint pain or arthritis more than half the days of the month +48-month	Binary
67	V06PASE6	Leisure activities: muscle strength/endurance +48-month	Ordered categorical	
68	0-month fJSW	Medial fJSW 1	Measure through joint space segmentation model and automatic measurement model	Continuous
69		Medial fJSW 2		Continuous
70		Medial fJSW 3		Continuous
71		Medial fJSW 4		Continuous
72		Medial fJSW 5		Continuous
73		Medial fJSW 6		Continuous
74		Medial fJSW 7		Continuous
75		Lateral fJSW 1		Continuous
76		Lateral fJSW 2		Continuous
77		Lateral fJSW 3		Continuous
78		Lateral fJSW 4		Continuous
79		Lateral fJSW 5		Continuous
80		Lateral fJSW 6		Continuous
81		Lateral fJSW 7		Continuous
82	12-month fJSW	Medial fJSW 1	Measure through joint space segmentation model and automatic measurement model	Continuous
83		Medial fJSW 2		Continuous
84		Medial fJSW 3		Continuous
85		Medial fJSW 4		Continuous
86		Medial fJSW 5		Continuous
87		Medial fJSW 6		Continuous
88		Medial fJSW 7		Continuous
89		Lateral fJSW 1		Continuous
90		Lateral fJSW 2		Continuous
91		Lateral fJSW 3		Continuous
92		Lateral fJSW 4		Continuous
93		Lateral fJSW 5		Continuous
94		Lateral fJSW 6		Continuous
95		Lateral fJSW 7		Continuous
96	24-month fJSW	Medial fJSW 1	Measure through joint space segmentation model and automatic measurement model	Continuous
97		Medial fJSW 2		Continuous
98		Medial fJSW 3		Continuous
99		Medial fJSW 4		Continuous
100		Medial fJSW 5		Continuous
101		Medial fJSW 6		Continuous
102		Medial fJSW 7		Continuous
103		Lateral fJSW 1		Continuous
104		Lateral fJSW 2		Continuous
105		Lateral fJSW 3		Continuous
106		Lateral fJSW 4		Continuous
107		Lateral fJSW 5		Continuous
108		Lateral fJSW 6		Continuous
109		Lateral fJSW 7		Continuous
110	36-month fJSW	Medial fJSW 1	Measure through joint space segmentation model and automatic measurement model	Continuous
111		Medial fJSW 2		Continuous
112		Medial fJSW 3		Continuous
113		Medial fJSW 4		Continuous
114		Medial fJSW 5		Continuous
115		Medial fJSW 6		Continuous
116		Medial fJSW 7		Continuous
117		Lateral fJSW 1		Continuous
118		Lateral fJSW 2		Continuous
119		Lateral fJSW 3		Continuous
120		Lateral fJSW 4		Continuous
121		Lateral fJSW 5		Continuous
122		Lateral fJSW 6		Continuous
123		Lateral fJSW 7		Continuous
124	48-month fJSW	Medial fJSW 1	Measure through joint space segmentation model and automatic measurement model	Continuous
125		Medial fJSW 2		Continuous
126		Medial fJSW 3		Continuous
127		Medial fJSW 4		Continuous
128		Medial fJSW 5		Continuous
129		Medial fJSW 6		Continuous
130		Medial fJSW 7		Continuous
131		Lateral fJSW 1		Continuous
132		Lateral fJSW 2		Continuous
133		Lateral fJSW 3		Continuous
134		Lateral fJSW 4		Continuous
135		Lateral fJSW 5		Continuous
136		Lateral fJSW 6		Continuous
137	Lateral fJSW 7		Continuous	

WOMAC, Western Ontario and McMaster Universities Arthritis Index; KOOS, Knee Injury and Osteoarthritis Outcome Score; NSAIDS, non-steroidal anti-inflammatory drugs; fJSW, fixed joint space width.

Table S2 Clinical features required for prediction model

Feature code	OAI variable name	Description	Type
2	P02SEX	Patient's sex (1: male, 2: female)	Binary
3	P01FAMKR	Blood relative ever had knee replacement surgery for arthritis (0: no, 1: yes)	Binary
13	V00AGE	Patient's age +0 month	Continuous
16	P01BMI	Body mass index +0 month	Continuous
28	V01WOMTSR	WOMAC total score +12-month	Continuous
31	V01CHNFQCV	Chondroitin sulfate frequency of use +12-month	Ordered categorical
50	V05WOMTSR	WOMAC total score +36-month	Continuous
51	V05KOOSKPR	KOOS pain score +36-month	Continuous
52	V05KOOSYMR	KOOS symptoms score +36-month	Continuous
58	V06SF1	In general, how is health +48-month	Ordered categorical
59	V06LKSX	Left knee/right knee symptom status +48-month	Ordered categorical
61	V06WOMTSR	WOMAC total score +48-month	Continuous
62	V06KOOSKPR	KOOS pain score +48-month	Continuous

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