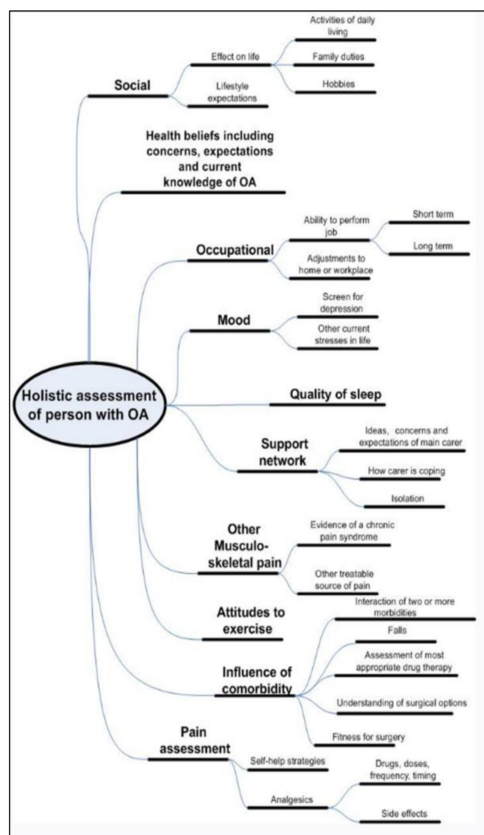


Additional File 2: Non-pharmacological intervention

The non-pharmacological component of the intervention consists of a holistic assessment of participant and the delivery of core treatments including patient information, exercise and weight loss (if required). The figure below will the nurses as to what issues could be included in the holistic assessment as recommended by NICE. Nurses will explore the impact of their knee pain on their day to day lives as well as their understanding of Osteoarthritis, health beliefs around the condition and attitudes to exercise and weight loss (where required). The nurse will also carry out a simple knee examination observing any deformities, palpating for swelling, testing available range of movement, muscle strength of the knee and hip extensors and observation of gait and simple functional activities (sit to stand and stepping up and down).

Figure: Holistic approach to osteoarthritis assessment and management <https://www.nice.org.uk/guidance/cg177>



Patient Advice and information

The information and guidance contained within the Arthritis Research UK booklet *Osteoarthritis of the Knee* will be used as starting point for talking to patients about what they can do themselves to help with their knee symptoms. Misconceptions about OA will be addressed and a positive message about the benefits of exercise and maintaining a healthy weight will be promoted.

Advice on pacing, use of hot and cold for pain relief, wearing supportive and cushioned footwear and the use of walking will also be explored and participants sign-posted to other sources of information.

Additional File 2: Non-pharmacological intervention

Exercise

Both aerobic exercise and strengthening exercises will be prescribed for participants.

Aerobic exercise

Advice on aerobic exercise will be in line with current UK guidelines for physical activity (PA) that adults should aim to be actively daily and over a week activity should add up to at least 150 minutes of moderate intensity exercise.

<https://www.nhs.uk/live-well/exercise/physical-activity-guidelines-older-adults/> Moderate intensity exercise will be described to participants as activity that will cause them to get warmer and breathe harder and their hearts to beat faster. Participants current PA will be estimated by asking two simple questions:

- On how many days of the week do you carry out moderate (like a brisk walk) or greater physical activity?
- On those days how many minutes do you engage in this activity at this level?

Participants will be encouraged to identify when and where they could increase their physical activity and a goal will be with the participants to increase this.

Strengthening exercise

Participants will be given an individualised from a range of simple strengthening exercises, functional exercise and stretches (see Table 1). Initial prescription of strengthening and functional exercises will be set at 2 sets of 12 repetitions and increased or decreased according to rate of perceived exertion (RPE) on a 0-10 scale. Participants will be told they should feel like they were working hard (RPE 5-6/10) to complete 12 repetitions of a strengthening exercise. If the exercise is too hard ie <12 repetitions the nurse will reduce the load or change the exercise. If the exercise is too easy then the load will be increased (using theraband where appropriate) or a more challenging exercise set. Stretches will be given and held for 30 seconds and repeated 3 times. Warm-up exercises, strengthening and functional exercises, and stretches for the main lower limb muscle groups may be included as below. Individual exercise booklets will be provided in using PhysioTools software.

Weight Loss

After calculating participants Body Mass Index Participants who were overweight or obese will be given provided with evidence-based advice and guidance on losing weight. Beliefs about eating, physical activity and weight and their knee pain will be explored and any previous experiences of losing weight discussed.

Key advice for participants will be to focus on a calorie restricted diet with a reduction of fat and increase in dietary fibre. The NHS BMI calculator will be used to determine how much weight someone would need to lose to have a healthy BMI and estimate how long it might take (based on a 500 calorie reduction per day). <https://www.nhs.uk/live-well/healthy-weight/bmi-calculator/>

Participants will be signposted to NHS weight loss plan which is a free 12 week diet plan with useful resources but will be free to use any method they prefer eg a commercial weight loss plan/group or other online weight loss apps.

<https://www.nhs.uk/Livewell/loseweight/Pages/Loseweighthome.aspx>

An initial weight loss of goal of 5% will be suggested for participants as an initial goal, then increased to 10% if that was achieved in the study duration or until a healthy BMI was achieved.

Additional advice on eating regularly, portion sizes, reading food labels, alcohol and sugary drink consumption and meal planning will be provided.

Additional File 2: Non-pharmacological intervention

Table 1 Exercise programme

Warm-up exercises/Dynamic stretches	Simple movements to warm the body up and prepare for the exercises to follow <ul style="list-style-type: none"> • Marching on the spot (increase knee height from low, middle, high) • Rocking from heels onto toes • Knee slides (long sitting/lying) 	
Strengthening exercises	Quadriceps	Static Quads contractions (sitting)
		Inner range quads
		Straight leg raises
		Leg press in long sitting with theraband
		Knee extension with theraband (sitting)
	Gluteals	Static glut contractions (prone lying)
		Hip extension in lying (knee bent)
		Hip abduction in side lying, knee bent (clam shell)
		Hip extension in lying (knee straight) +/- theraband
		Hip abduction in lying (knee straight) +/- theraband
	Hamstrings	Static Hamstrings contractions (sitting)
Knee curls (in standing)		
Functional exercises		Sit to Stand +/- theraband
		Mini Squats +/- theraband
		Partial wall squats
		Bridging
		Step-Ups (front/side)
		Step-Downs
Stretches		Quadriceps (lying or standing)
		Hamstrings (seated or standing)
		Calf muscle in standing at wall

Additional File 2: Non-pharmacological intervention

Motivation and behavioural change strategies

As well as providing participants with education about their condition and addressing negative illness perceptions, there are a number of strategies that will be used to motivate participants and support adherence to the intervention.

These include:

- 1. Establishing participants preferences for exercise and weight loss**

These will be established during discussions with nurse and integrated into goals and actions planes.

- 2. SMART goal setting**

SMART goals are Specific, Measurable, Achievable, Relevant and Timely. These will be set in collaboration with the participant and nurse and will include physical activity/ exercise goals and weight loss goals if appropriate. A goal sheet will be completed with the participants and a review date set.

- 3. Establishing self-efficacy (confidence) to achieve goals**

Participant's confidence to achieve their goals will be assessed on a 10 point scale, where 0 represents no confidence and 10 extremely confident. Where confidence is <7/10 the nurse will explore reasons for this and look at barriers and facilitators which might improve this.

- 4. Identifying barriers and facilitators to achieve goals**

Reasons for a lack of confidence will be explored by the nurse and potential solution discussed for example asking friends or family for support to engage in exercise or change eating habits

- 5. Action planning and use of exercise diaries**

Participant will have a written action plan of how, when and where they are going to undertake physical activity, carry out their exercise programme and make change to their diet. Adherence will be further supported by the use of exercise diaries so participants can self-monitor activities and bring to follow-up sessions to discuss with the nurse.

Follow-up sessions

Follow-up sessions with nurse focus on reviewing the participants exercise and weight loss goals and setting of new goals if appropriate. The performance of individual exercise will be checked and if necessary they will be corrected, progressed in terms of frequency and duration for aerobic exercise, load and repetitions for strengthening exercise or regressed if pain has increased as a result. Weight will be monitored at each session and the participant's efforts to lose weight discussed with nurse. Signposting to information and advice will be re-enforced as required.

The final session will include a review of goals with a focus on encouraging the participant to continue with long-term exercise adherence and continuing weight loss or healthy weight maintenance.