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# Trevor Silver Memorial Essay Submission

Musculoskeletal Medicine related to Primary Care

**RE: 84 year old female first seen on 30/10/2014 at Narrabeen Sports Medicine Centre, Sydney****Case Summary**

This patient presented with 4 months of progressive bilateral medial knee pain, described as an ache of gradual onset with sharp exacerbations up to a severity of 8/10 in the left knee during weight-bearing. There were no mechanical symptoms.

Her medical history included a partial medial meniscectomy of the right knee in 2001 and the left knee in 2005.

The patient stopped playing representative netball in her mid-20s and has done little exercise since. She was concerned that she required joint replacements but believed she was not fit for surgery.

Her medication included Mobic 15mg, Omeprazole 10mg, Simvastatin 40mg and Aspirin 75mg.

On examination, the following significant findings were noted:

- The patient was obese (BMI 39.4 kg/m<sup>2</sup>).
- There were bilateral knee effusions and a tender popliteal cyst in the left knee.
- Range of motion was 5° - 135° in the right knee and 12° - 116° in the left knee restricted by pain.
- There was significant crepitus in the medial compartment of both knees.
- There were no mechanical signs but there was pain on loading the medial compartments of both knees.

Medial knee pain and swelling can be caused by osteoarthritis, rheumatoid arthritis, gout, meniscal tears, Baker's cysts, medial plica syndrome and pes anserine bursitis.

Plain X-rays showed loss of medial joint space with some osteophytes more pronounced on the left knee.

The patient was diagnosed with progressive medial compartment osteoarthritis, with an inflammatory component causing a joint effusion and popliteal cyst.

## **Discussion**

### **Factors Contributing to the Diagnosis**

Osteoarthritis (OA) is the most common cause of disability in the older population. The prevalence in the United Kingdom of painful osteoarthritis of the knee in those over 55 years old is 10%, of which 25% would consider themselves severely disabled. With an ageing population, the prevalence of OA is expected to increase.<sup>1</sup>

OA has a multifactorial aetiology with systemic and local risk factors. Many of these are non-modifiable, including age, gender, and genetics, and many are modifiable.<sup>2</sup> Therefore, interventions exist which may prevent or delay the onset of the condition. As Obesity has long been recognised as the single most important modifiable risk factor for osteoarthritis of the knee<sup>2</sup>, and is a large topic in its own right, this will be the primary focus of this case discussion.

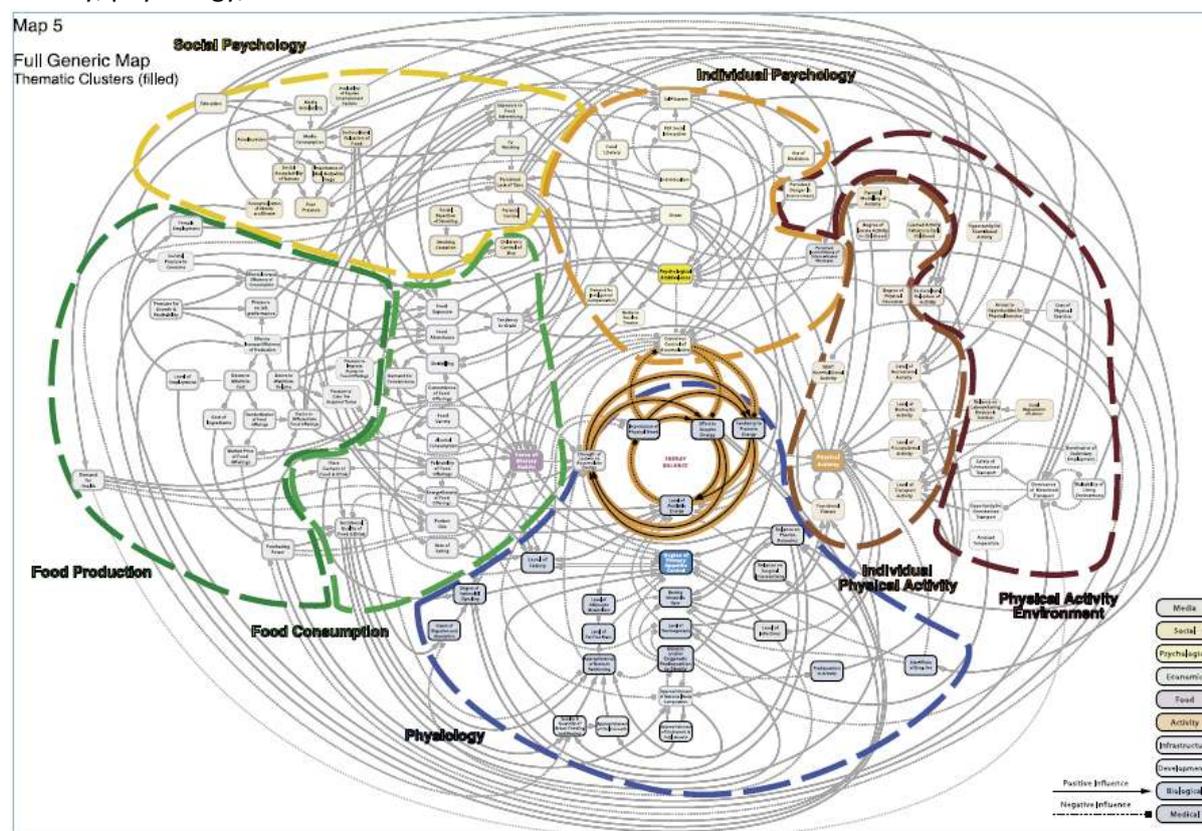
### *Obesity as a risk factor for Osteoarthritis*

Obesity has been the focus of many studies evaluating causes of osteoarthritis of the knee, with a recent meta-analysis reporting 36 papers analysing the effect of BMI on osteoarthritis. Although the effect sizes were variable, all of them found that being overweight or obese was a significant risk factor for the development of knee osteoarthritis (Pooled Odds Ratio 2.96; 95% Confidence Interval: 2.56, 3.43). Some studies reported gender-specific results which found greater effect sizes for obesity in women than those in men.<sup>2</sup>

The traditional explanation for obesity as a risk factor for OA has involved the increased mechanical load on the joint from adipose tissue. Over time, a more complex and multifactorial theory has evolved, linking excessive fat accumulation and relative loss of muscle mass with the release of a range of pro-inflammatory mediators including adipokines, interleukin-1 $\beta$ , cyclooxygenase-2, prostaglandin-E2 and matrix-metalloproteinase-2. Furthermore, interleukin-6 and C-reactive protein have both been shown to predict the incidence and progression of arthritis.<sup>3</sup>

Obesity results from the interplay between many variables, including biology, physical activity (PA) and eating behaviour within an environmental, cultural and social landscape. This is depicted in the obesity system map (Figure 1).<sup>4</sup> Although extremely complex, at the core is central energy balance driven by 4 key variables and intervention points: primary appetite control, dietary habits, level of PA, and psychological ambivalence. The degree of appetite control in the brain controls the biological appetite and energy expenditure relationship, and covers the physiology cluster of the map. Dietary habits often keep individuals from adopting healthier alternatives, and cover the food section of the map including calorific content and portion size. An individual's physical activity level is the most important modifiable method of energy expenditure in the activity section of the map, and finally the psychological aspect of the map covers many motivations and social drivers on individual, family and societal behaviours regarding lifestyle choices.<sup>4</sup>

**Figure 1: Obesity System Map** – The central energy balance engine is influenced by psychological, activity, physiology, and food factors.



Government Office for Science and Department of Health. Tackling Obesity: Future Choices.<sup>4</sup>

### Interventions

One high quality study involved 473 individuals and concluded that 5kg of weight loss reduced the risk of OA by over 50%, and a weight loss of 1 kg/m<sup>2</sup> reduced male symptomatic OA by 21.4% and female symptomatic OA by 33%.<sup>5</sup> These results clearly demonstrate the benefit of weight loss for preventing osteoarthritis, and as a treatment for osteoarthritis.

Opinion and evidence for the best method of weight loss is variable. While a calorie-restricted diet is important, maintenance of daily nutrients such as calcium is essential for the elderly, and for many obese patients compliance with long-term lifestyle changes is low.<sup>3</sup> However, exercise can help to reduce weight, strengthen the muscles around the knee, and reduce pain and disability. Some studies have highlighted combined exercise and diet therapy showing greater improvements in knee pain and physical function than exercise or diet alone.<sup>3</sup>

### *Physical Activity*

Brief primary care interventions vary from basic advice to focussed discussions around factors influencing levels of activity. The Physical Activity and Health Alliance have published a number of tools to facilitate such interventions, in particular the Scottish Physical Activity Screening Question (Scot-PASQ - Appendix 1) used to assess current activity level and readiness for behaviour change.<sup>6</sup> Physical Activity Brief Advice and Brief Intervention Scripts (Appendix 2) also provide a format for

these discussions<sup>7</sup>, and are included as part of the GP Quality Outcomes Framework (CVD-PP003) for the primary prevention of cardiovascular disease.<sup>8</sup>

Current recommendations for older adults (Appendix 3) are for daily PA, totalling 150 minutes/week of moderate intensity activity, including muscle strengthening activity at least twice per week.<sup>9</sup> Although walking, climbing stairs and running are recommended, these are load-bearing activities which may exacerbate osteoarthritis. Therefore, partial and non-weight bearing activities including water-based wading, deep-water running and freestyle kicking with flippers may be more appropriate. Resistance activities, such as drop-squats and calf raises, should also be included.<sup>10</sup> Physiotherapy supervision and swimming pool membership may help to maintain compliance.

Formal exercise referral schemes also exist which may maintain compliance and initiate behaviour change. In Scotland, sedentary patients with existing health problems, including osteoarthritis, can be referred by a GP to a programme of free or subsidised exercise.<sup>11</sup>

### *Diet*

Dietary interventions to aid weight loss require modifying the quantity, frequency and type of food to achieve a caloric deficit. This may be achieved by diet alone, or supplementation with PA. SIGN guidance describes a number of interventions including reducing energy intake, low calorie diets and commercial diets. SIGN have produced criteria to assist practitioners in advising patients on these programmes in adults (Table 1).<sup>11</sup>

**Table 1:** Best practice guidelines for weight management programmes<sup>11</sup>

- |  |
|--|
| <ul style="list-style-type: none"> <li>• Help people assess their weight and decide on a realistic healthy target weight (5 – 10% of their original weight)</li> <li>• Aim for a maximum weekly weight loss of 0.5 – 1.0kg</li> <li>• Focus on long-term lifestyle changes rather than a short-term, quick-fix approach</li> <li>• Be multi-componential addressing both diet and physical activity and offering a variety of approaches</li> <li>• Using a balanced, healthy eating approach</li> <li>• Recommending regular physical activity and offering practical, safe advice about being more active</li> <li>• Including some behaviour-change techniques, such as keeping a diary and advice on how to cope with lapses.</li> <li>• Recommending and/or providing appropriate support.</li> </ul> |
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### Application of Obesity Interventions

#### *Physical Activity*

Moderate evidence from 15 studies suggests an increase in PA levels in those who received brief advice. However, there is also evidence that practitioners consider a lack of materials, incentives, time, knowledge and confidence as a barrier to discussing or prescribing physical activity.<sup>12</sup> Therefore, an early brief intervention from this patient's GP may have enabled her to increase her activity levels and reduce her weight, delaying or preventing the onset of her knee OA. However, a

lack of support and materials for her GP may have influenced this, and an improvement in these resources could improve brief physical activity interventions.

There is variable evidence for the effectiveness of exercise referral schemes, with 2 RCTs reporting a positive effect on PA levels in 6 – 12 weeks, but 4 trials have shown that such schemes are ineffective over one year.<sup>12</sup> Therefore, a brief intervention may initially have been more appropriate to encourage the patient in this case to lose weight, but if this was ineffective then a trial of an exercise referral scheme could have been considered.

### *Diet*

Studies have shown that the recommended 0.5 kg of weight loss per week results from an energy deficit of 500 kcals per day. Reducing energy intake, up to a maximum of 600 kcal/day, were shown in an analysis of 12 studies to produce a median weight change of 4.6 kg. Low and very low calorie diet analysis included patients who consumed 800 - 1800 kcal/day and <800 kcal/day respectively, and were associated with 5 – 6% weight loss at 12 months. Very low calorie diets showed greater weight loss at 3 – 4 months but this was not maintained at 12 months.<sup>11</sup>

A number of commercial diets exist including Slim-Fast and WeightWatchers. One RCT found all such diets to be successful in losing weight (mean loss 5.9 kg) at 6 months. Participants who maintained the diet at 12 months sustained weight loss at 10% of their original weight.<sup>11</sup> Therefore, this patient may have experienced some benefit by losing weight via dietary means. In particular, a calorie restricted diet may have been the optimum long-term measure, but in the short term a commercially available diet may confer considerable benefit. Such weight loss would reduce the impact of obesity on the development of her osteoarthritis.

### Conclusion

This patient had a number of risk factors for the development of bilateral knee OA. However, her obesity is known to be the largest modifiable risk factor implicated in the pathogenesis of her disease<sup>2</sup>, which is due to the abnormal load placed upon the joints as well as the release of pro-inflammatory mediators.<sup>3</sup> A number of interventions exist within the UK to increase physical activity levels and improve the dietary intake of patients.<sup>11</sup> For this patient, appropriate exercise prescription involving partial and non-weight bearing exercise, as well as information regarding calorie-deficit and commercially available diets, may have prevented or delayed the onset of her OA.

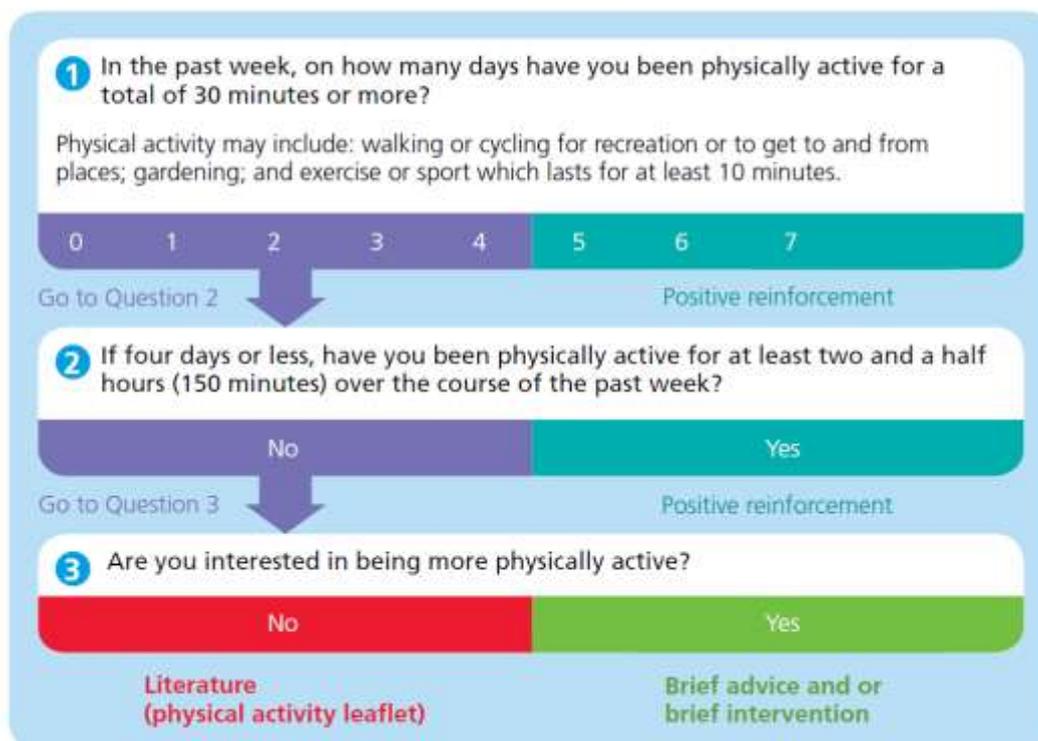
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12. National Institute for Health and Care Excellence (NICE). NICE Public Health Guidance 2: Four commonly used methods to increase physical activity. Issued: March 2006; Last Modified: May 2013. Cited 07/12/14. Available from: <http://www.nice.org.uk/guidance/ph2>

## Appendix 1: Scottish Physical Activity Screening Question (Scot-PASQ)

### Scottish Physical Activity Screening Question (Scot-PASQ)

Before completing Scot-PASQ, practitioners must first assess that it is appropriate to raise the issue of physical activity with the patient. Further guidance on raising the issue of physical activity can be found in the accompanying **Physical Activity Brief Advice** and **Brief Intervention Scripts** and by completing the e-learning module **Raising the Issue of Physical Activity**.



### Practitioner guidance

#### Question 1: 30 minutes moderate activity most days of the week

Question 1 aims to determine the number of days in the past week on which at least 30 minutes moderate physical activity has been achieved. If the past week was not typical, please refer to a previous week.

Physical activity may include: walking or cycling for recreation or to get to and from places; gardening; and exercise or sport which lasts for at least 10 minutes.

The intensity of physical activity must be high enough to increase the heart rate, make you feel warmer and make you breathe a little faster. The 'walkie talkie' test is a good way of measuring intensity. For example, if walking at a moderate intensity you would be able to carry on a conversation, taking a few extra breaths between sentences, but you would not be able to sing.

For those reporting activity four days or less continue to Question 2.

Those meeting the guidelines (five to seven days) should be praised for their efforts and encouraged to continue to be physically active.

**Question 2: 150 minutes of moderate physical activity over the course of the week**

The Chief Medical Officer (CMO) Physical Activity Guidelines state that adults should accumulate at least 150 minutes of moderate physical activity over the course of each week. This can be achieved in a number of ways, such as:

- 30 minutes moderate physical activity on most days of the week
- a two and a half hour walk or cycle at the weekend in the guise of the 'Weekend Warrior'
- a combination of activity options equalling a minimum of 150 minutes.

Question 2 only follows on from Question 1 if someone reports being active on four days or less. It should be used to clarify if the moderate physical activity guidelines are being met. If someone reports vigorous activity (such as running) for 75 minutes or more, then it is unlikely that they will require further support from the pathway.

Those meeting the guidelines should be praised for their efforts and encouraged to continue to be physically active.

**Question 3: Readiness to change**

If as a result of Questions 1 and 2 a person is deemed inactive, it is important to determine their readiness to change by simply asking them if they are interested in being more physically active.

**Ready to be more physically active**

If they are interested in being more active, the practitioner should progress by delivering brief advice and, where appropriate, a more in-depth brief intervention. Further guidance on the delivery of physical activity brief advice and brief interventions is detailed in the Physical Activity Brief Advice and Brief Intervention Scripts.

**Not ready to be more physically active**

If they are not interested, then they should be provided with a physical activity leaflet highlighting the benefits of being more active and details of how and where to go for more information should they change their mind in the future.

## References

1. Professor Nanette Mutrie and Dr Claire Fitzsimons, University of Edinburgh.

**2. Brief advice (BA)**

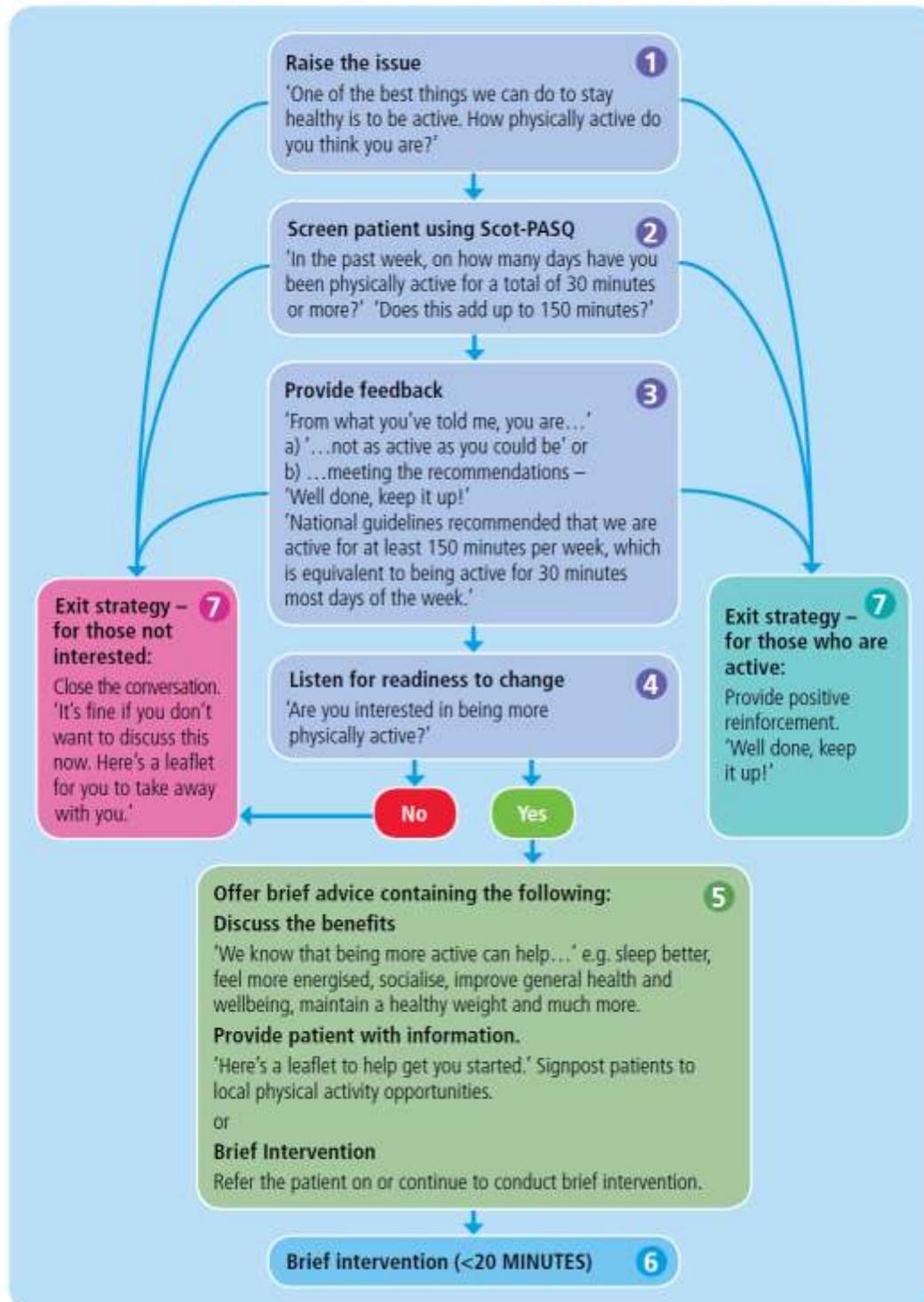
This describes a short intervention (usually around three minutes) delivered opportunistically in relation to a service user's reason for seeking help. It can be used to raise awareness of, and assess a person's willingness to engage in, further discussion about healthy lifestyle issues. Brief advice is less in-depth and more informal than a brief intervention and usually involves giving information about the importance of behaviour change and simple advice to support behaviour change.

**3. Brief interventions (BIs)**

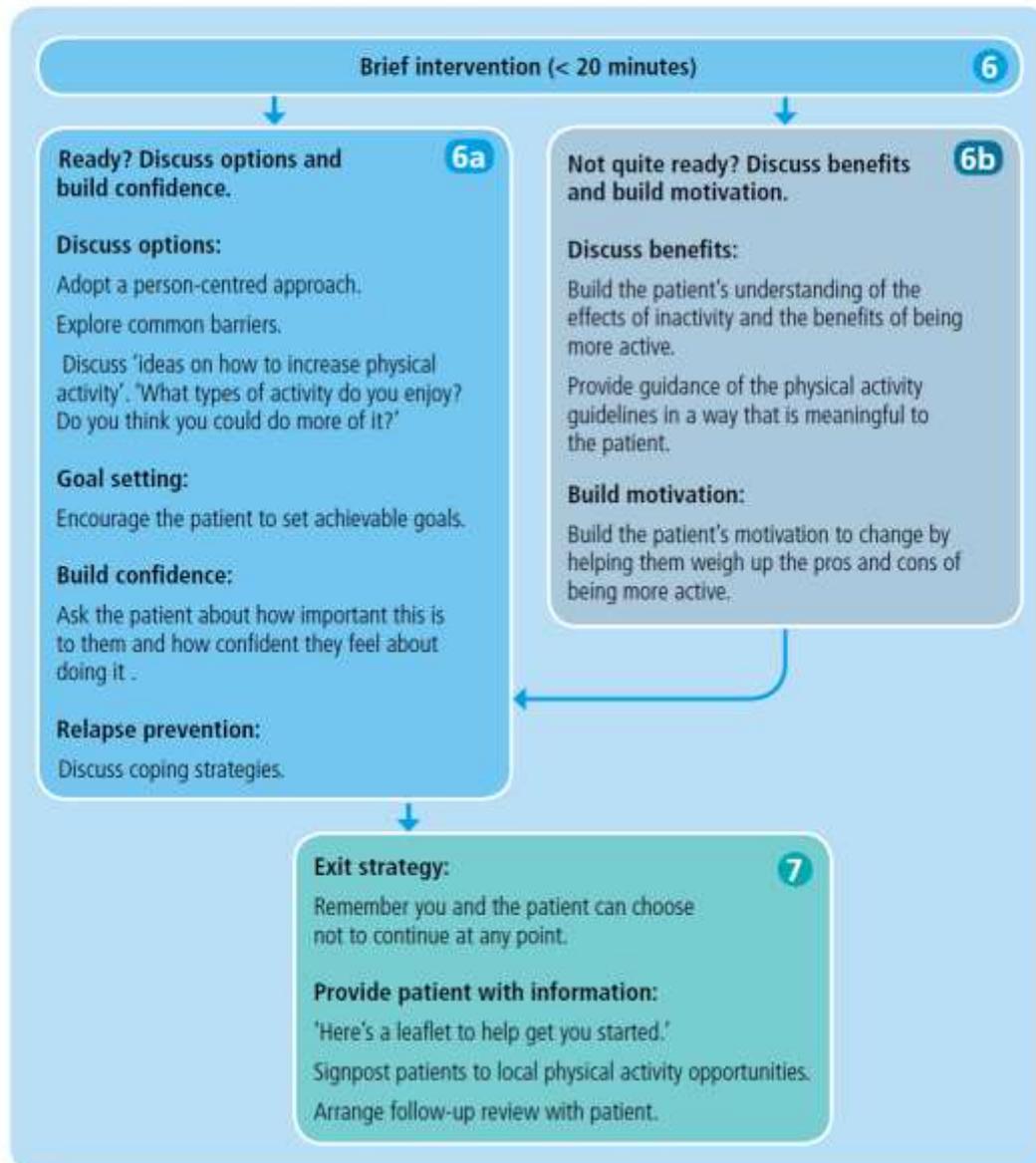
These provide a structured way to deliver advice and are a step beyond brief advice as they involve the provision of more formal help, such as arranging follow-up support. BIs aim to equip people with tools to change attitudes and handle underlying problems. As part of a range of methods, BIs may contain brief advice and may use a motivational interviewing approach in the delivery. BIs normally last between 3 and 20 minutes.

## Appendix 2 – Physical Activity Brief Advice and Brief Intervention Scripts

### Physical Activity Screening and Brief Advice (BA) Script (<3 minutes)



## Physical Activity Brief Intervention (BI) Script (<20 minutes)



**Appendix 3: Physical Activity Guidelines for Older Adults**

1. Older adults who participate in any amount of physical activity gain some health benefits, including maintenance of good physical and cognitive function. Some physical activity is better than none, and more physical activity provides greater health benefits.
2. Older adults should aim to be active daily. Over a week, activity should add up to at least 150 minutes (2½ hours) of moderate intensity activity in bouts of 10 minutes or more – one way to approach this is to do 30 minutes on at least 5 days a week.
3. For those who are already regularly active at moderate intensity, comparable benefits can be achieved through 75 minutes of vigorous intensity activity spread across the week or a combination of moderate and vigorous activity.
4. Older adults should also undertake physical activity to improve muscle strength on at least two days a week.
5. Older adults at risk of falls should incorporate physical activity to improve balance and co-ordination on at least two days a week.
6. All older adults should minimise the amount of time spent being sedentary (sitting) for extended periods.

*Individual physical and mental capabilities should be considered when interpreting the guidelines.*

#### Examples of physical activity that meet the guidelines

Moderate intensity physical activities will cause older adults to get warmer and breathe harder and their hearts to beat faster, but they should still be able to carry on a conversation. Examples include:

- Brisk walking
- Ballroom dancing

Vigorous intensity physical activities will cause older adults to get warmer and breathe much harder and their hearts to beat rapidly, making it more difficult to carry on a conversation. Examples include:

- Climbing stairs
- Running

Physical activities that strengthen muscles involve using body weight or working against a resistance. This should involve using all the major muscle groups. Examples include:

- Carrying or moving heavy loads such as groceries
- Activities that involve stepping and jumping such as dancing
- Chair aerobics

Activities to improve balance and co-ordination may include:

- Tai chi
- Yoga

Minimising sedentary behaviour may include:

- Reducing time spent watching TV
- Taking regular walk breaks around the garden or street
- Breaking up sedentary time such as swapping a long bus or car journey for walking part of the way

#### What are the benefits of being active daily?

- Helps maintain cognitive function
- Reduces cardiovascular risk
- Helps maintain ability to carry out daily living activities
- Improves mood and can improve self-esteem
- Reduces the risk of falls

For further information: *Start Active, Stay Active: A report on physical activity for health from the four home countries' Chief Medical Officers* (2011)