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Kate Bennett provides a useful explanation of both conditions, their potential risk factors and treatment options.

Helping people with knee, hip and back pain understand how to manage their problems by being physically active

Professor Mike Hurley discusses his rehabilitation programme called “ESCAPE-pain”.

contributors:

Dr Carolyn Greig
Reader in Musculoskeletal Ageing and Health
The University of Birmingham

Peder Remman
CEO & Co-Founder
Boneprox

Dr James Bluett
Senior Clinical Lecturer and Honorary Consultant Rheumatologist
The University of Manchester
Welcome to issue 26 of Innov-age, focusing on the topic of Arthritis and Osteoporosis!

Osteoporosis affects over 3 million people in the UK. It is a progressive medical condition that weakens bones, making them fragile and more likely to break. Arthritis is a condition that causes chronic joint pain and inflammation. The most common type is osteoarthritis, affecting nearly 9 million people in the UK. Both conditions tend to occur more frequently in older people and can have a major impact on quality of life.

In this issue, Professor Mike Hurley introduces a rehabilitation programme he has developed called “ESCAPE-pain”. The programme aims to educate and enable people living with chronic joint pain to self-manage and cope with arthritic pain using individualised exercise regimens.

Kate Bennett also emphasises that people suffering from these conditions shouldn’t fear physical activity, and how a tailored exercise regime can be a great help in reducing pain and leading a fulfilling life. Her article provides a useful explanation of both conditions, their potential risk factors and treatment options.

Shawn Luechens introduces a new technology called Optasia Medical, which helps to identify Vertebral Fragility Fractures (VFF), a common indicator of osteoporosis and predictor of subsequent hip fractures. Using existing CT scan data and artificial intelligence technology, it will allow osteoporotic patients to be identified and treated earlier and reduce their risk of subsequent hip fractures.

Dr Fiona Watt discusses the potential link between hand arthritis and oestrogen loss in menopausal women and the HOPE-e study currently underway to investigate the feasibility of using an oestrogen-containing therapy (HRT) in post-menopausal women as a treatment for painful small joint hand osteoarthritis.

Also, in this issue, Dr James Bluett highlights his study of a newly developed blood test that is hoped will help increase patient adherence to methotrexate—a treatment for rheumatoid arthritis.

Peder Remman introduces another novel technology called Bonexpro, which brings together dental care and healthcare, with the two fields collaborating to help spot osteoporosis before a hip fracture occurs! The software uses dental X-rays to measure the trabecular density of the lower jaw, linked to the risk of having osteoporosis.

Justin Aunger and Dr Carolyn Greig discuss their research into new approaches for surgery prehabilitation to promote longer-lasting behavioural changes and increased physical activity following hip and knee surgery.

Finally, our resident contributor, Tracey Hove, presents Cochrane Corner, highlighting Cochrane research findings in relation to chronic joint pain.

I think the crucial message to take from this issue is that although it’s easy to think that exercise may exacerbate osteoporosis and arthritis, counter-intuitively it can actually improve joint pain. Osteoporosis is often referred to as the ‘silent disease’ as many people are only diagnosed after a fracture occurs. It’s therefore exciting to see new technologies that will help to diagnose earlier, as well as new research and services that will allow better treatment and self-management following diagnosis. These conditions are associated with ageing but shouldn’t be something to just put up with!

Enjoy reading.

Jackie Oldham
Honorary Director, Edward Centre for Healthcare Management Research
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Helping people with knee, hip and back pain understand how to manage their problems by being physically active

Professor Mike Hurley qualified as a physiotherapist. He was a Lecturer, Reader and Professor of Physiotherapy at Kings College London before joining St George’s University of London and Kingston University as Professor of Rehabilitation Sciences. Since September 2013 he has been seconded as Clinical Director to the Musculoskeletal Programme at the Health Innovation Network. In 2017 he became an Innovation Fellow on the NHS Innovation Accelerator.

Impact of osteoarthritis.
In the UK, chronic joint pain in older people, usually labelled osteoarthritis (OA), affects over 8 million people. The disease can impair mobility, physical function, mental and emotional wellbeing, independence and quality of life, and increases the risk of comorbidity (Arthritis Research UK, 2018). OA accounts for two million GP consultations, approximately 150,000 arthroplasties (the surgical reconstruction or replacement of a joint), the third largest NHS expenditure, 36 million lost working days, and out-of-pocket expenses of £480 per person per year. These problems are increasing rapidly as people are living longer and levels of inactivity and obesity, important risk factors for OA, are increasing. It is predicted that by 2030 OA will affect over 17 million people (Arthritis Research UK, 2018).

Management of OA.
Most people with OA (90%) are managed in primary care by GPs, who should follow the National Institute of Care and Clinical Excellence (NICE) core recommendations for OA management. The recommendations advise the use of patient-centred, holistic approaches to inform people about their condition and how to self-manage, emphasising the importance of physical activity and maintaining a healthy body weight (NICE, 2014). However, GPs feel overwhelmed by the numbers of people with OA, and don’t have the time or skills required to deliver the NICE advice during a 10-minute consultation. Consequently, most people are maintained on analgesia (painkillers), even though it is often ineffective, unpopular, expensive and risks serious side-effects.

Moreover, people believe OA is an inevitable consequence of ageing that will deteriorate relentlessly. They also associate activity with increased pain and assume this signals that the activity may be causing more harm than good and accelerating joint “wear and tear”. To minimise pain and prolong the life of their joints, people start to avoid movement and physical activity, known as “fear-avoidance behaviours”. In fact, joints were made to move and, counterintuitively, activity is one of the most effective ways of ameliorating pain and the impact of OA. If people stop moving, their joints get stiffer and their muscles get weaker, so that over time they end up being able to do less and less. Unfortunately, it’s very difficult to alter entrenched beliefs and behaviours, and persuade people to adopt healthier behaviours such as being more active and losing excess body weight.

ESCAPE-pain – “it does what it says on the tin”!
To help address these problems, a rehabilitation programme called ESCAPE-pain was developed. This stands for “Enabling Self-management and Coping with Arthritic Pain using Exercise”. In line with NICE guidelines, the programme integrates information, advice, support and exercise to help people understand their problem, dispel erroneous health beliefs and advise them what (not) to do. The aim is that participants experience the benefits of exercise and start to regain control of their symptoms and alter the course of their condition. The programme consists of 12 sessions, twice a week for 6 weeks, which are led by a trained facilitator (a clinician or exercise professional). Groups of 8-12 people, aged 45 years and over, that suffer with chronic knee and/or hip pain attend the sessions. Each session comprises of the following:

- a 20-minute education component – themed discussions of the causes of joint pain, prognosis, advice, and self-management/coping strategies,
such as heat/ice, rest-activity cycling and relaxation (Figure 1);

• a 40-minute supervised exercise component where participants undertake a personalised, progressive exercise regimen to increase strength, endurance and function (Figure 2).

Behavioural change techniques (goal-setting, action/coping planning, positive feedback, etc.) are threaded into the programme to challenge erroneous beliefs that physical activity causes and/or exacerbates joint pain. The blend of information-giving, support, shared-learning and experiential learning starts to alter people’s beliefs about joint pain and its impact. It encourages them to adopt healthier lifestyles, in particular by taking regular activity and losing weight if appropriate. In the largest clinical trial of its kind, ESCAPE-pain has been shown to reduce pain and improve physical function, health beliefs and general well-being. The research found that it was more cost-effective than usual care and had substantial savings for health care with the benefits sustained for up to two and a half years after completing the programme (Hurley et al., 2007a; Hurley et al., 2012; Jessep et al., 2009).

Interviews with participants described how their positive experiences of the programme helped them to understand what (not) to do and how to exercise effectively. Completion of the exercise regimen engendered a sense of achievement (Hurley et al, 2010). Participants came to appreciate that exercise is a safe, effective self-management strategy that they can use to help themselves. It increased their self-reliance, empowering them to use activity as an alternative to medication and surgery. Moreover, working in a group of people with similar problems had powerful effects and benefits on participants’ mental and emotional wellbeing and breaks down socialisation isolation. Participants described improvements in their health and wellbeing, their ability to walk, climb stairs, and interact with family and friends. They slept better and felt more confident, positive, optimistic and in control of their lives. The socialisation involved in group-work improved their emotional wellbeing.

**Case study.** Sandra is an 84-year-old retired nurse, who had suffered knee pain for many years. This made her normal daily activities - walking, climbing stairs, taking a bath - extremely difficult and interfered with her sleep. She went to her GP, who referred her to an orthopaedic surgeon for a knee replacement, but she was reluctant to have surgery and returned to her GP who referred her to her local leisure centre and offered her a place on their ESCAPE-pain programme.

After completing ESCAPE-pain Sandra noticed big improvements in her walking, ability to climb stairs, felt more confident and “…much better in myself because I can do things again…” Sandra described how the programme taught her how to manage her problems “…I don’t think I need knee surgery. The pain is much less, and it doesn’t bother me. I know how to cope now…” She was determined to continue to do the exercises she had learnt to maintain her improvement.

**Expanding the programme reach.**

Since 2013, the Musculoskeletal Team at the Health Innovation Network (HIN), South London’s Academic Health Science Network, has been working with NHS England, Public Health England, Sport England, Versus Arthritis and others to improve OA management by spreading effective evidence-based interventions, such as ESCAPE-pain. Until recently, ESCAPE-pain was only delivered in NHS outpatient departments via physiotherapists. However, logistical and financial constraints within the NHS were seriously limiting the number of people who could access the programme. Since 2018, access to ESCAPE-pain has therefore been expanded by delivering the programme in leisure and community centres across the UK. The programme has been found to be as effective in those settings as when delivered in clinical centres and the feedback continues to be overwhelmingly positive.

Adoption of ESCAPE-pain is also being supported as a national adoption programme by the 15 regional Academic Health Science Networks in England and is **continued on next page**
demonstrating significant impact for patients with an increase from 50 - 154 sites adopting it associated with a 428% increase in participants. There are 900 trained facilitators and over 11,500 people have benefitted from the programme, saving about £14 million in health and social care (Figure 3). For further information see https://www.ahsnnetwork.com/wp-content/uploads/2019/07/AHSN-Network-Impact-Report-2018-19-Single-Pages-WEB.pdf

The programme is also currently being piloted for back pain. The early results are highly encouraging and so the plan is to roll it out to other clinical, leisure and community centres from autumn 2019.

The ESCAPE-pain team work closely with people to help them set-up and deliver the programme. They have developed an accredited training programme, implementation support tools, a smartphone app and online programme. The website has a lot of information about the programme’s ethos, content, format, results, endorsements and where it is being delivered.

For further information, please contact hello@escape-pain.org.
To view other videos of participants and facilitators’ stories and testimonies, visit https://escape-pain.org/living-with-joint-pain/personal-stories), or the twitter feeds @escape_pain and #LiveBetterDoMore.

Increasing the reach of NICE advice

Although ESCAPE-pain is a very effective programme, attending twelve sessions requires time and effort that many people find hard due to work, family and social commitments. To reach the large number of people who weren’t receiving the NICE advice but would benefit from it, a “Joint Pain Advice” (JPA) service was developed.

JPA is delivered to individuals with knee, hip and/or back pain in up to four 30-minute, face-to-face consultations, over a period of 6 months (Figure 4). Participants have an initial assessment consultation with a trained “Advisor”, who make brief assessments and then use motivational interviewing and behavioural change techniques to help people understand why and how they can become more active and achieve a healthy body weight. At each subsequent session, the Advisor reviews, progresses and revises if necessary, the agreed goals, advice and plans. They signpost people to local services (specific activity/exercise, cookery, weight-watcher classes) to help participants implement the advice received.

Initially, JPA was delivered in one GP practice in South London, but it was soon adopted by five neighbouring practices who heard about its benefits. Participants reported that it helped them to reduce pain, lose weight and increase physical activity. It improved mental and emotional wellbeing and quality of life and reduced GP consultations and investigations (Walker et al., 2018). This gives a “return of investment” where every £1 spent results in £2.43 to £4 in return (Walker et al., 2017). Participants find the JPA service accessible, convenient and acceptable.

JPA is not a specific intervention that can only be delivered by a specific profession, but rather it is a generic service that a range of professionals (clinicians, health trainers, social prescribers, outreach workers, community pharmacists, occupational health) can be taught to incorporate and deliver as part of their existing roles. It can be
delivered in clinical, community settings and elderly care homes (Figure 5). The team recently trained health trainers to deliver JPA in local community centres, such as libraries and civic centres where the outcomes were replicated (Hurley et al., 2019). Other work is currently underway using social prescribers in a rural setting, and community pharmacists.

Employers have also seen the potential of JPA to address the enormous problem with lost work productivity, presenteeism and absenteeism caused by musculoskeletal conditions. With the Department of Work and Pensions, the team are delivering JPA in several workplace settings through Occupational Health departments.

A film has been produced documenting the value of JPA for participants (https://vimeo.com/191170670), a “NICE Shared Learning Case Study” (https://www.nice.org.uk/sharedlearning/the-joint-pain-advisor-approach-for-knee-and-hip-pain) and the website (www.healthinnovationnetwork.com) has a lot more information and resources explaining the JPA service.

ESCAPE-pain and JPA provide opportunities to revolutionise the management of OA providing more accessible, effective, efficient care, to address the rapidly increasing burden of knee, hip and back pain.

Learning Points

1. Joint pain/osteoarthritis is very common and adversely impacts millions of older people’s lives
2. Relatively simple interventions (information, advice, supported self-management, exercise) reduce the impact of OA, but few people receive these interventions
3. Effective programmes can be delivered to a range of settings, by a range of people, to reach and benefit the millions of people needing help

References:


Figure 5. Structure of the JPA service

Figure 6. Flexibility of the JPA service means it can be delivered by a variety of professionals across a range of settings
The bare bones of the matter: Osteoarthritis and Osteoporosis

Kate Bennett is a specialist physiotherapist with extensive experience in working with the older population in a variety of settings. She is currently based in the NHS in Southampton, providing services to people in the community. Kate is Chair of AGILE, the association of physiotherapists working with older adults.

Introduction
Osteoarthritis and osteoporosis are conditions encountered in older age which affect the bones and joints and can cause pain and discomfort. The symptoms can make people with these conditions frightened to exercise, which in turn can lead to other health problems. This article explains more about each condition and the role of exercise in reducing the pain. It also provides links where readers can get more information and advice to allay these fears and enable people with these diagnoses to be active safely.

Arthritis
Arthritis is a term commonly used to describe pain, swelling and stiffness of the joints. Arthritis can affect a single joint or several joints and can affect both adults and younger people. There are several different types of arthritis, the most common one being osteoarthritis, which affects people from the age of 45 onwards. Osteoarthritis is a leading cause of pain and disability in the adult population with an estimated 8.75 million people in the UK having reported seeing a doctor regarding this condition (Versus Arthritis, 2019). Information regarding other types of arthritis can be found on the Versus Arthritis (formerly Arthritis UK) website (details below).

Osteoarthritis
Osteoarthritis commonly affects more women than men. In the 75 and over age group, it is estimated that 1.45 million women have osteoarthritis compared to 0.82 million men (Carenity, 2019). The most commonly affected joints are the knees, hands, hips and spine (Versus Arthritis, 2019).

A joint is the area where two or more bones meet in the body. They are supported by muscles and ligaments and are surrounded by a capsule that is filled with a thick fluid that acts as a lubricant. The ends of the bones have a smooth lining over the top of them called cartilage which acts as a shock absorber to the weight bearing surface of the bone and allows the bones to glide over each other during movement.

In osteoarthritis, this lining is roughened or torn causing pain during certain movements. The body tries to repair this damage which can lead to the growth of more bone at the end of the bone within the joint (known as osteophytes), an increase in the amount of lubricating fluid within the joint capsule, or the joint capsule stretching which causes the joint to become misshapen.

Risk Factors
The risk factors for osteoarthritis are varied and include genetic factors, including a family history of the condition, biological factors, such as gender and increasing age, and biomechanical factors, including previous joint injury/damage, joint laxity, joint misalignment and excess joint loading and micro trauma (NICE, 2018). A high body mass index is also a known risk factor for osteoarthritis in the knee joint (Villareal et al., 2005). Being overweight or obese increases the load placed on joints, in particular the knee and hip joint; which can result in pain and a decreased ability to carry out daily activities.

Treatment
Osteoarthritis cannot be cured and the damage to the joint is irreversible. However, there are several treatment options available to reduce the pain and improve the ability to complete daily activities.

The main treatment options are lifestyle measures, such as exercise and weight loss, medication and supportive measures (NHS, 2016).

The main goal of managing arthritis is to try and maintain the range of movement and function of the joint and surrounding structures, including tendons, muscles and ligaments. Exercise is the key to achieving this, but it is tricky to advocate exercise when many people believe that it will cause a flare up of symptoms and contribute to their pain. However, regular exercise can help build up muscles and strengthen the joint which leads to a reduction in pain.
and an increase in function. Regular activity can also assist with weight loss which can also be beneficial in reducing symptoms. A chartered physiotherapist will be able to provide a tailored programme based on symptoms and review it on a regular basis to ensure it is still effective. However, before commencing any exercise, people should consult with their GP, especially if they have other issues with their health.

**Osteoporosis**

Osteoporosis (also sometimes called “brittle bone disease”) is a condition where the bones become weakened making them more likely to break. Osteoporosis occurs due to the cells that produce new bone tissue being less able to produce the new tissue quickly enough to replace old bone tissue.

Osteoporosis is thought to affect almost three million people in the UK (Age UK, 2019). It develops slowly over several years and is commonly diagnosed after someone has undergone an unexpected break or fracture following a sudden impact such as a fall. The most common fractures people with osteoporosis suffer from are hip, wrist or spinal/ vertebral fractures (NHS, 2019). There are more than 300,000 osteoporosis related fractures per year in the UK (Age UK, 2019).

**Causes and Risk Factors**

The causes of osteoporosis are not well understood but there are several factors which cause bones to lose strength (Royal Osteoporosis Society, 2019). These include low body weight, smoking, increased alcohol consumption and poor balance. These are all factors that could be modified.

There are also a number of factors that cannot be modified including genetic predisposition, increasing age, and gender: approximately one in two women over 50 are likely to break a bone due to osteoporosis compared to one in five men (Age UK, 2019).

There are also other risk factors relating to health conditions, demographics and medication; information on these can be found on the Royal Osteoporosis Society website (details below). For those people unlucky enough to have a fall, practitioners will often use a tool called the FRAX to calculate risk and begin treatment if indicated (FRAX, 2019).

**Treatment**

There are treatments available for osteoporosis. These include medicines designed to strengthen the bone which can be taken in tablet form or as a regular infusion. Calcium and vitamin D supplements may also help. Other treatments include modifying lifestyle factors, such as decreasing alcohol intake and stopping smoking, and appropriate exercise.

Many people with osteoporosis are wary to exercise due to the risk of fractures. But exercise can be really beneficial. It is important to do a combination of weight-bearing exercise with impact and muscle strengthening exercises to keep bones strong throughout life.

If someone has been diagnosed with osteoporosis, exercise and safe movement will help with promoting bone and muscle strength, improving balance, reducing risk of falls, and caring for their spine (Royal Osteoporosis Society, 2019). In 2018, a series of exercise guidelines and expert consensus statement was produced by the Royal Osteoporosis Society in conjunction with several other organisations, including AGILE and the Chartered Society of Physiotherapy (Strong, Straight, Steady, 2018). This provides information for both healthcare professionals and members of the public around safe exercise recommendations for those living with osteoporosis.

**Learning points**

1. Osteoarthritis and osteoporosis are both conditions affecting people in older age.
2. It is possible to lead active and fulfilling lives with these conditions with appropriate treatment and an exercise/activity regime tailored to individual circumstances.
3. It is always recommended to consult with a GP prior to starting any new exercise programme.

**For Further Information**

Age UK: https://www.ageuk.org.uk/

Versus Arthritis: https://www.versusarthritis.org/

The Chartered Society of Physiotherapy: www.csp.org.uk

NHS information site: https://www.nhs.uk/

NICE guidelines: https://www.nice.org.uk/

Royal Osteoporosis Society: https://theros.org.uk/

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The algorithm that can stop your future hip fracture
Artificial Intelligence is helping osteoporotic patients to benefit from earlier treatment and avoid hip fracture in later life

Shawn Luetchens is Chief Executive of Optasia Medical, based in Cheadle Hulme, Manchester. Shawn studied at the University of Nebraska and later at the renowned Kellogg School of Management at Northwestern University. A founding partner in Saffron Hill Ventures, which provides financial support to companies in the technology, media and cleantech sectors, he was a member of the Johnson & Johnson corporate innovation team.

Osteoporosis is a debilitating medical condition which not only adversely affects the health and wellbeing of millions of people in the UK but also creates a significant drag on the economy as a result of ever-increasing health and social care costs. People living with osteoporosis are at risk of fracturing their hip or spine; they also experience difficulties with everyday activities and reduced mobility - potentially leading to isolation and loneliness. Women over the age of 50 are most at risk of developing the disease but it is found in both men and women.

Hip fractures in elderly people are not only catastrophic, and often fatal for the patient, but also generate significant surgical, aftercare, rehabilitation and social care costs. Vertebral Fragility Fractures (VFFs) are a good indicator that the patient may be osteoporotic and, if found early enough, can lead to protective drug treatments and lifestyle advice to improve bone health and avoid fractures.

The incentives for early detection of osteoporotic patients by identifying VFFs can be gauged by the extent of the problem. More than 500,000 Vertebral Fragility Fractures occur in the UK each year. According to the International Osteoporosis Foundation, more than 55% of patients with hip fracture have evidence of prior vertebral fracture. In a 2015 study, the average cost of a hip fracture to an NHS hospital was found to be £16,302 in the first two years (Leal et al., 2015).

The annual cost of fragility fractures to the UK is estimated at £4.4 billion - yet some 70% of vertebral fractures currently go undiagnosed. At any one time there are 4,000 beds occupied in England by hip fracture patients. Social care costs are harder to pin down but a study in Denmark revealed €1.5 billion as the estimated national social care cost following hip fracture (Hansen et al., 2013).

The importance of finding a way to detect VFFs as early as possible was highlighted by Richard Evans, Chief Executive Officer, Society of Radiographers when he said: “Vertebral fractures are the most common osteoporotic fracture and are the most predictive of subsequent hip fractures. The cost to both the patient and the NHS of further fractures can be avoided if we design systems that are alert to a patient’s first vertebral fracture”.

It is good news, then, that an artificial intelligence algorithm which can identify future hip fracture patients has been developed in Manchester and is already being used by hospitals to provide better care and reduce NHS costs.

Funded by the National Institute for Health Research Invention for Innovation programme, a process to
identify VFFs has been developed by the University of Manchester and Manchester University NHS Foundation Trust, in collaboration with Optasia Medical Ltd with input from the Royal Osteoporosis Society.

The program looks through thousands of existing CT scans already held by NHS Trusts, quickly identifies VFFs and returns the scan to the hospital with the fractures clearly ‘flagged up’ for further investigation. In doing so, it also frees up valuable time for specialist doctors to use their expertise and skills where they are needed most.

“The Optasia reporting service identifies Vertebral Fragility Fractures within seconds, freeing up time and resources at the nation’s hospitals.” says Lisa Provan, Head of Clinical Services and Business Development at Optasia Medical.

“Most importantly, patients receive early medical intervention allowing them to live healthier, happier, safer lives. This technology is ‘patient protective’ because osteoporotic patients will be identified and treated earlier, their risk of hip fracture will be significantly reduced, and they will enjoy better health and better quality of life for longer”.

Lisa, a Registered General Nurse who previously worked in a busy NHS A&E department, points out that the service also supports the recently announced NHS Patient Safety Strategy which seeks to reduce preventable harm of patients.

Using the new technology, Optasia Medical has already carried out two successful pilots in collaboration with Nottingham University Hospitals NHS Trust and Bradford Teaching Hospitals NHS Trust, referring a total of 1,432 previously undiagnosed patients for further assessment and treatment.

Although there are many Artificial Intelligence solutions being developed for radiology, this is one of the few delivering real-world benefits to both patients and healthcare budgets in an NHS setting.

Because the fractures are found in existing CT scans which have been commissioned for another investigation but happen to image the spine, there are no new imaging costs (which helps hospitals make the most of NHS resources). Once the algorithm has “done the hard work” by finding the fractures and identifying them, the results are verified by a consultant radiologist. This is a very efficient use of a consultant radiologist’s expertise at a time when the UK has a shortage of them.

Patients have the opportunity to lead a healthier, more protected and active life. Over the course of a few years, hospitals will start to see a big reduction in the number of elderly patients coming back into hospital with costly hip fractures.

As fractures due to osteoporosis affect half of all women and one in five men aged over 50, this is an important advancement for the wellbeing of older patients.

From a financial perspective, with the treatment of fractures estimated to rise in the UK to more than £5.5 billion each year by 2025, the beneficial effect on the nation’s bank balance will also be noticeable (Svedbom et al., 2013).

Learning points

- Vertebral Fragility Fractures are often a significant early indicator of osteoporosis and, by using Optasia’s AI service, can now be reliably identified in seconds from previously existing CT scans that have imaged the spine.
- Early detection is an essential first step in supporting patients with timely medical and lifestyle interventions that can provide improved quality of life and wellbeing into older age.
- With rising costs for replacement hip surgery, patient aftercare and social care provision, early detection and treatment of osteoporotic patients can lead to significant savings across the NHS and social services.

References:


Is there HOPE for hand osteoarthritis?

Fiona Watt is based at the Kennedy Institute of Rheumatology, Nuffield Department of Orthopaedics, Rheumatology, and Musculoskeletal Sciences (NDO RMS), University of Oxford and has been an honorary consultant rheumatologist at the Nuffield Orthopedic Centre (NOC), Oxford since 2013 as well as a visiting consultant at Imperial College Healthcare NHS Trust (ICHNT).

“It’s a sign of ageing.” “There’s nothing you can do about it.” “It’s inevitable”. Osteoarthritis is certainly a disease associated with ageing, but research over the last twenty years reveals that it is not simply ‘wear and tear’ and should be a process in which humans can intervene. Painful osteoarthritis is more common in women compared with men and there is a significant heritable component. However, not everyone will be affected: for example, the lifetime risk of painful hand osteoarthritis is approximately 30% (Arthritis Research UK, 2013).

Certainly, osteoarthritis can be treated – joint replacement for advanced large joint osteoarthritis is one of the most successful operations in terms of improving quality of life. However, an ageing and increasingly obese population means that joint replacement rates are set to overwhelm healthcare systems, if an alternative for at least some cases is not found (Losina et al., 2015). For many the increasing rate of joint replacement is the ultimate sign that there is a lack of good non-surgical treatments which slow down the progression of this disease in large numbers of people. There are, however, other treatments available, including lifestyle advice, exercise and weight loss (Conaghan et al., 2008).

A preponderance for osteoarthritis in females appears to manifest itself as people get older, particularly over the age of 50 (Prieto-Alhambra et al., 2014, Oliveria et al., 1995). In the specialist hand osteoarthritis clinic at ICHNT, 90% of patients are women, and of those approximately 80% are peri- or post-menopausal (Watt, 2015). The menopause is associated with progressive oestrogen deficiency and typically occurs around the age of 50. Around 50% of women have musculoskeletal pain around the time of the menopause. There also appears to be a spike in the incidence of hand osteoarthritis at this age, potentially supporting a link between oestrogen loss and either osteoarthritis pathogenesis or its symptom manifestation (Prieto-Alhambra et al., 2014).

The hand is one of the most commonly affected sites in osteoarthritis. Approximately 2 million people have hand osteoarthritis in the UK, which can affect the base of thumb and/or the small (interphalangeal) joints of the hand (Arthritis Research UK, 2013). Whilst for some, this is a transient or self-limiting problem, for others many joints can be affected leading to daily pain, reduced hand function and impaired quality of life. Sometimes resolving after 2-5 years or persisting for longer, irreversible joint damage and deformity usually remains even when pain remits. Education, lifestyle and hand specific advice and exercises remain the core treatment (Conaghan et al., 2008). Whilst some controversy exists over treatments for base of thumb osteoarthritis (splinting, steroid injection, sometimes surgery), those with painful multiple interphalangeal joint osteoarthritis have few treatment options on offer. Compared to those with rheumatoid arthritis, where the advent of biologic treatments has transformed management, there are no proven drugs which can slow down osteoarthritis in the same way.

Knee and hip osteoarthritis often have better pathways of care in the NHS (perhaps because of the associated cost of joint replacement, their non-surgical treatment is maximised). Several ‘re-purposing’ clinical trials of drugs which are routinely used in rheumatoid arthritis have recently failed to show efficacy in hand osteoarthritis (Kingsbury et al., 2018, Kloppenburg et al., 2016).

The ICHNT team became interested in whether they could exploit these clinical observations around gender, menopause and hand OA onset to treat hand pain in those not responding to standard treatments. If oestrogen deficiency is associated in some way with hand osteoarthritis onset in perimenopausal women, simply put, can it be put back as a therapeutic and reduce hand pain? Laboratory experiments suggest that both oestrogens and SERMS (selective oestrogen receptor modulators) may counteract cartilage loss and bone changes seen in osteoarthritis, and oestrogens are well known to modulate pain sensing at various levels (Sniekers et al., 2008, Wluka et al., 2000). Oestrogen-containing therapies in the form of hormonal replacement therapy (HRT) are licensed for severe symptoms of menopause such as flushing or urogynaecological reasons. However, when present, musculoskeletal symptoms appear to improve significantly with HRT (Chlebowski et al., 2013). The Women’s Health Initiative (WHI) study also reported a significant reduction in joint replacements for both hip and knee in the active oestrogen arms (Cirillo et al., 2006, de Klerk et al., 2009). However, research which looks at its effects on different subgroups of musculoskeletal pain, or tests HRT in those with high levels of musculoskeletal symptoms are lacking. Currently osteoarthritic pain would be an off-license use for HRT and it must be investigated fully to justify its use. Could giving an oestrogen-containing HRT improve hand pain in post-menopausal women with hand osteoarthritis?
There are some challenges in this area. There are no animal models of hand osteoarthritis and usual clinical data includes some inherent biases (that is women with more menopausal symptoms including musculoskeletal ones are probably more likely to seek HRT) (Watt, 2016). The ICHTN team wanted to test this question in a randomised controlled trial (RCT) setting. However, there were some uncertainties: what agent should be used, what to do with those with and without a uterus (regarding uterine protection), would there be enough women identifiable who are eligible (as per European guidance for HRT prescription, 40-65 years old and more than 1 but less than 10 years after their last menstrual period) (Stuenkel et al., 2015)? Individuals must have definite clinical hand osteoarthritis and moderate hand pain, not responding adequately to other therapies. They cannot already be on current systemic HRT and must have no medical contraindication to its use, for example having a BMI of over 30. In addition, women would need to want to take part in a research study. Because of these uncertainties and some other design questions (for example, the best strategy for measuring average hand pain, our primary outcome), a feasibility study was designed and has been funded by NIHR Research for Patient Benefit (with no commercial funding or support). The HOPE-e (Hand Osteoarthritis: investigating Pain Effects in a randomised placebo-controlled feasibility study of Oestrogen-containing therapy) involves randomisation to Placebo or Duavive (Pfizer) for 24 weeks (a combination of conjugated equine oestrogens and bazexofenex, that is an oestrogen and a SERM). The SERM acts as an endometrial protection for those with a womb (Lobo et al., 2009), but is used in all individuals in the active arm in the study, to test the effect of this component on hand pain too.

With recruitment to the study now live in two large secondary care centres (Oxford NOC and ICHNT Charing Cross Hospitals), a site in primary care has also been opened, given that so much hand osteoarthritis never reaches secondary care. There is also a diverse scheme of identification including advertising and self-referral at GP surgeries across Oxford and London.

Through this study the researchers want to know if patients with painful hand osteoarthritis will consider taking this type of therapy (the patient involvement activities suggest they would), and whether enough eligible individuals can be identified to make a full trial viable. WHI was carried out in older women, not those near to menopause and without appropriate modern-day considerations, exclusions and formulations which maximise safety. WHI inaccurately identified some risks with HRT such as thromboembolism and cancer which were evident in this older, less selected group. The world has moved on from WHI, with 17 years of further data and prescribing guidance. But controversy and confusion around use of HRT continues. It needs to be tested whether those with hand osteoarthritis, and importantly the medical community advising them, have moved on too.

What is clear to people living with osteoarthritis and the healthcare professionals caring for them is that this disease should not be tolerated and that better treatments are needed.

References:
Arthritis Research UK 2013. Osteoarthritis In General Practice: Data And Perspectives. University Of Keele.

HOPE-e web: https://www.ndoms.ox.ac.uk/clinical-trials/current-trials-and-studies/hope-e
Email: ouh-trhope-e@nhs.net
Phone: 01865 612661

8.5 million people in the UK live with osteoarthritis, the commonest form of arthritis. 50% of women will have musculoskeletal symptoms around the time of menopause, with an increased risk of hand osteoarthritis around the time of the menopause.

Learning points
• Osteoarthritis is the commonest form of arthritis and is associated with ageing and menopause: the socioeconomic burden of osteoarthritis is large, because of GP consultations and joint replacements which are rising unsustainably
• New treatments for osteoarthritis need to be harnessed by interfering with basic disease mechanisms: underlying mechanisms are poorly understood but do not appear to be the same as rheumatoid arthritis
• There is a high unmet need in hand osteoarthritis. Further research is needed to shed light on underlying processes and identify new treatment strategies in this disease.
Development and validation of a methotrexate adherence assay

Dr James Bluett is a senior clinical lecturer and honorary consultant in rheumatology at the University of Manchester with an interest in strategies to improve treatment response in rheumatoid arthritis. In 2015, he completed his PhD investigating methotrexate adherence in rheumatoid arthritis and methotrexate-pneumonitis. His research has been presented at international conferences and he has collaborated internationally.

Rheumatoid Arthritis (RA) affects nearly 1% of people in Britain (Symmons et al., 2002). Most patients with RA experience joint pain, stiffness and swelling. This is due to inflammation of the joints that can lead to joint damage. RA can have a severe impact on the lives of sufferers.

RA treatment follows a standard pathway. Anti-rheumatic drugs, such as methotrexate are used first (Smolen et al., 2014). If patients have persistent disease despite this, they may be prescribed “biologic” anti-rheumatics. These are more expensive but are usually more effective in those whose joint inflammation doesn’t improve on methotrexate alone.

Not all of the treatments work for everyone. Time on ineffective medication, where the disease remains active, contributes to joint damage and disability. One of the major influences on whether or not a drug works is “adherence”. This is whether or not a patient is taking their medications as prescribed. Non-adherence to treatments costs the NHS in excess of £500 million per year (Trueman et al., 2010). As RA is estimated to cost the NHS over £4 billion per year, improving adherence could result in huge health and economic benefits (Society, 2010).

Research has shown that up to 40% of patients are non-adherent to methotrexate treatment. This non-adherence is associated with reduced drug response (Hope et al., 2016). Prescribers in the NHS are currently unable to test if a patient is adherent, preventing targeted patient support that would help to improve adherence.

A study (Bluett et al., 2019) was therefore carried out to develop and test the ability of a new blood test to accurately measure methotrexate adherence. First, the new blood test was used to measure the amount of methotrexate in the blood of 20 patients with RA over a 6-day period. Using these results, the blood test was optimised to make the results as sensitive as possible.

Next, samples from patients taking part in the Rheumatoid Arthritis Medications Study were tested for methotrexate adherence. This is a UK-based study of patients with RA. It is designed to identify factors indicating that a positive response to methotrexate treatment is more likely. Patients recorded when they last took their methotrexate and a blood sample was taken which was tested for adherence to methotrexate.

Seven out of the 138 samples tested showed non-adherence. This was where the patient recorded in the diary that they had taken their methotrexate correctly, but the test showed lower levels of methotrexate in the blood than expected. This suggests that the test has a 95% sensitivity to detect non-adherence.

In conclusion, this research project showed that methotrexate adherence can be measured using a newly developed blood test. The next step in the development of the blood test is to explore whether measuring methotrexate adherence and providing patient support to improve adherence where required, can improve treatment response.

Learning Points:

- ~40% patients are non-adherent to methotrexate
- Methotrexate adherence can be measured using a blood test
- In the future, the blood test could be used to identify those patients who may benefit from supportive adherence interventions

References:


“Nanokicking” to reverse osteoporosis?

Researchers at the University of Strathclyde are testing the use of a ground-breaking technique called “nanokicking” to fight against osteoporosis.

When a bone breaks, a signal is sent out to stem cells, part of the body’s repair mechanism, which then start to create new healthy bone. The signal consists of vibrations at tiny and highly precise distances and frequencies which scientists have managed to recreate, using a new “nanokicking” technique.

It is hoped that this new approach could pave the way to slowing down, and even reversing, osteoporosis. The first human clinical trial launched in January of this year. Fifteen volunteers from the National Spinal Injuries Unit at the Queen Elizabeth University Hospital in Glasgow will be invited to take part in the study over a two-year period.

‘Disuse osteoporosis’ affects patients who have been paralysed as the lack of everyday stresses and strains weakens the bones and makes them more susceptible to fractures. Loss of bone density can be extremely fast for people who have suffered severe sudden paralysis, so developing treatments to minimise fractures is vitally important.

If positive results are achieved, the project would immediately be scaled up and could have great benefits for the wider population. It could also have a significant impact on space travel, helping protect astronauts whose bones deteriorate due to microgravity.

To find out more please visit...
https://www.bbc.co.uk/news/uk-scotland-glasgow-west-46953192
https://www.telegraph.co.uk/science/2019/01/22/trial-launched-cure-osteoporosis-playing-quiet-musical-note/

Chronic inflammation and bone healing

A study published in March 2018 reported its findings that “increases in chronic inflammation – rather than the passage of time – is the main reason that injured bones do not heal as well with age”.

It is known that the protein machines and large molecules necessary for the life of human cells break down over time due to wear and tear, and their remnants trigger the immune system, leading to inflammation.

The study found that the age-driven increases in such immune system signals diminish the ability of stem cells to multiply. This reduces the amount of stem cells available, compromising their ability to restore healthy bone cells following a fracture.

When exposing stem cells from young mice to the blood serum of older mice, researchers found this made their stem cells four times less likely to divide and multiply – a state known as senescence. Previous studies have found evidence that senescent stem cells send signals that encourage inflammation. Thus, it is a vicious circle of chronic inflammation.

Researchers, however, found that anti-inflammatory treatment suppressed the signals and related inflammation, increasing the number and bone-healing contribution of stem cells. They were also able to restore the stem cells to a genetic profile found in younger mice skeletons by using the anti-inflammatory treatment.

However, if this was translated into human medicine, increasing the pool of stem cells available with anti-inflammatory treatment following a bone fracture, would also block the acute inflammation that is necessary for successful healing.

It was instead suggested that the anti-inflammatory medicine could be used to build up the numbers of stem cells, not after bone breaks, but ahead of elective orthopaedic surgeries such as knee replacements. That way the anti-inflammatory drugs could be stopped just before surgery to allow the acute inflammation, necessary for normal healing, to take place.

To find out more please visit...
https://www.sciencedaily.com/releases/2019/03/190318151746.htm
Parasitic worms and rheumatoid arthritis

The trillions of bacteria which live in our gut, mouth and elsewhere on our bodies are collectively known as the ‘microbiome’.

The microbiome is known to help regulate disease and it has long been suggested that damage or disturbances to it could affect the immune system and lead to diseases, including rheumatoid arthritis.

Versus Arthritis are therefore funding further research into this area in the hope of building expertise and progressing the understanding of the role of the microbiome in arthritis.

The research suggests that environmental factors (smoking, infections, diet) thought to be involved in the development of rheumatoid arthritis appear to act, at least in part, by disrupting the gut microbiome to drive progressive inflammation and bone destruction.

Professors Margaret and William Harrett and their teams at the Universities of Glasgow and Strathclyde respectively have found that an anti-inflammatory molecule ‘ES-62’, which is a product secreted by a parasitic worm, can prevent arthritis in mice by acting on both the immune system and joint cells.

The protection against arthritis afforded by ES-62 happens because it is able to convert the altered gut microbiome in rheumatoid arthritis back to normal, resetting the resolution of inflammation and bone repair.

Current rheumatoid arthritis treatments can suppress the immune system, increasing the risk of infection for those patients. The parasitic worms are thought to release the anti-inflammatory molecules without any suppression to the immune system.

The team will continue to investigate ES-62 to understand how it works and whether it can be mimicked by synthetic ES-62-based drug-like compounds. If so, the work may lead to the future development of a new class of drugs to treat rheumatoid arthritis.

To find out more please visit... https://www.versusarthritis.org/news/news/the-potential-for-future-arthritis-treatments-provided-by-a-parasitic-worm/

Could a less sedentary lifestyle help to beat osteoporosis?

An international research team, led by Dr Alexandra Mavroeidi from the University of Strathclyde, Glasgow, UK, is investigating, in a controlled laboratory setting, whether extended periods of sitting lead to increased bone loss, and whether breaking up sedentary behaviour has the opposite effect.

Current data suggest that people are sedentary for as much as six to eight hours per day and this increases to eight to ten hours in older adults. This study aims to identify if this type of lifestyle behaviour is detrimental for bones and whether promoting frequent breaks from sitting could be a possible, and simple, preventative intervention for osteoporosis in later life.

The research is being funded by the Royal Osteoporosis Society, previously the National Osteoporosis Society.

To find out more please visit... https://www.strath.ac.uk/whystrathclyde/news/couldlesssedentarylifestylehelptobeatosteoporosis/
Upcoming Events…

Quality Improvement in Healthcare of Older People
3rd – 4th October 2019
This course taking place in Leeds is an introduction to Quality Improvement, specifically utilising geriatric medicine case studies and example data. It is intended for clinicians and healthcare professionals working with older people with the aim of improving skills in planning and completing a Quality Improvement Project and sharing focused best practice.
To find out more, please visit https://www.bgs.org.uk/events/quality-improvement-in-healthcare-of-older-people-2019

Care Show 2019
9th – 10th October 2019
The Care Show, taking place at the NEC Birmingham, is the UK’s largest completely care focused event, attracting 4,800+ professionals from across the UK. The Care Show provides expert-led CPD accredited conference sessions, hands-on training, latest solutions and networking opportunities to support those connected to and responsible for providing excellent care for others. To find out more, please visit https://www.careshow.co.uk/

UK Dementia Congress 2019
5th – 7th November 2019
The UK Dementia Congress, taking place at Doncaster Racecourse, offers a mix of presentations, interactive workshops and symposia, covering all areas of care and support for people with dementia and their carers in care homes, acute hospitals, day care, sheltered and extra-care housing and the community. Over the last 14 years, the UK Dementia Congress, organised by the Journal of Dementia Care, has built a reputation as the single event which those working in dementia care do not want to miss.
To find out more, please visit https://careinfo.org/event/uk-dementia-congress/

British Geriatrics Society Autumn Meeting 2019
6th – 8th November 2019
The BGS Autumn meeting in Leicester will cover the latest scientific research and the best clinical practice in care of older people. Our ageing population is stimulating extensive NHS service redesign to deal with the challenge of caring for larger numbers of older people both in and out of hospitals. This conference will cover core areas of interest to all specialists responsible for the health care of older people.
To find out more, please visit https://www.bgs.org.uk/events/autumn-meeting-2019

Future of Ageing 2019
5th December 2019
The Future of Ageing 2019 event at the Wellcome Collection in London, will seek to reshape the debate about how business, the voluntary sector and Government can work together to deliver the economic potential of an ageing world. This conference is focused on the future role for business and how can they work with Government and society as a whole to help ensure that we all benefit from maximising the longevity dividend.
To find out more, please visit http://futureofageing.org.uk/
Connecting dental care to healthcare

Boneprox connects oral health to general health, to address one of society’s largest epidemics – osteoporosis. Through artificial intelligence, the company enables analysis and diagnosis of diseases, such as osteoporosis, using a standard dental x-ray.

Peder Remman (CEO & Co-founder) started the company in 2013 together with Anton Kärrbrink, and has built the company organically during his studies at Jönköping International Business School. Boneprox won the DNB Healthcare Prize in 2017, has been appointed the Seal of Excellence by the EU Commission, was a finalist in the eHealth Award 2019 at Vitalis and is considered as one of top 50 innovative companies in Norway. Peder currently leads the business development and has established customers in Sweden, Norway and the UK.

With ongoing advancements in technology, healthcare and lifestyles, average life expectancy has greatly increased. It is estimated that there will be a 61% increase in the number of over 65-year-olds in the UK by 2032, making the UK one of the ‘oldest’ countries in the future. With an ageing population, there is increasing stress and demand on the healthcare system. This must be responded to by improving the efficiency of healthcare, through modifications and collaborations with other sectors.

The silent epidemic:
It is predicted that approximately 50% of women and 25% of men over the age of 50 will suffer from a fracture caused by osteoporosis in their future, making it one of the biggest cost burdens in healthcare throughout Europe. Osteoporosis is often referred to as a silent epidemic; it lacks symptoms with people often being diagnosed only after suffering a fracture. This has resulted in severe pain and disability to sufferers, and an annual cost of £4.4 billion to the NHS. It is also responsible for more days spent in hospital than any other disease for women over 45 years of age, including diabetes and breast cancer (Kanis et al., 1997).

Osteoporosis affects more than 3 million people in the UK a year, with 500,000 fragility fractures (low energy) being treated annually. One of the most severe fractures is that of the hip, resulting in lifelong disability for 50% of sufferers, and fatality for 20%.

Projections show that hip fracture incidence will increase from 91,500 in 2015 to 101,000 in 2020 (NHS Digital, 2019). It is clear that osteoporosis decreases quality of life significantly, causing substantial pain and disability to sufferers.

Thankfully, osteoporosis fractures can be prevented with good medication and lifestyle improvements such as exercise and dietary advice. The biggest challenge today is the delay in diagnosis of osteoporosis. Risk assessment tools exist currently such as FRAX and Q-Fracture, however, their algorithms have limited use and reliability. It calculates a qualitative risk of having osteoporosis based solely on lifestyle habits. DEXA scans are also available but used sparingly due to their high expense. Therefore, the introduction of a safe, cost effective screening tool which can assess risk of osteoporosis quantitatively, is a monumental advancement.

Screening for osteoporosis at the dentist?
In the field of dentistry, many have studied the bone quality of the jaw bones for years. Generally, dentists have high skills and good habits in assessing bone structure on X-rays, both on intraoral and panoramic images.

In a major European study from 2007, “The Osteodent Study”, funded by the EU, a link between the bone structure of the jaws and the bone mineral density (BMD) in hip and vertebrae was clearly shown (Lindh et al., 2008). Several studies and dissertations support that there is unequivocal evidence of the relationship between the trabeculae structure of the lower jaw and the prevalence of future fractures.

Based on data from the Osteodent study and in cooperation with the Faculty of Odontology at Malmö University, a program and method has been developed, where dentists on a digital x-ray image of the premolar area of the lower jaw can automatically evaluate the trabecular structure in a ‘Region Of Interest’ (ROI) (see Figure 2). Together with questions from the record of early fragility fractures, heredity and medication, the patient may be notified if he/she is in the...
risk zone of having osteoporosis and thus having an increased risk of fracture.

Dentists have the most regular and frequent interaction with patients, making the dental practice the perfect place to screen patients. The information already exists in the images they are taking, so why not exploit that information? A recent study stated: "that screening in the community to reduce fractures in older women represents an efficient use of healthcare resources.” (Turner et al., 2018).

The Method:
Boneprox makes a computerised digital image analysis which provides a standardised and operator-independent bone quality analysis. The software uses intraoral X-rays from a defined region of the lower jaws (mandible) premolar region to measure trabecular density and indicate the risk of having osteoporosis.

The software uses digital image algorithms in combination with artificial intelligence to automatically place the region of interest in the optimal area and analyse the trabecular structure of the selected region.

Boneprox’s vision is to detect the risk of osteoporosis before the first fracture occurs. Therefore, the cut-off points for risk are based on T-score < -1 (osteopenia).

The dentist does not provide a diagnosis or treatment proposal; however, they can make a statement based on an x-ray image and a few anamnestic questions. They can report these results and advise the patient to contact their GP if need be. Several dental clinics in Scandinavia have already started using this, taking a holistic approach to dental care.

Other areas where dentists can help:
The mouth serves as a “window” to the rest of the body, providing early signs of general health disorders. According to a recent study published in the Diabetes Care Journal by researchers at Karolinska Institutet, it showed that undetected diabetes is linked to heart attack and gum disease. The findings suggest that patients’ dental health should be taken into consideration when managing a patient for diabetes, and that there is a need for closer collaboration with dentists.

A few disorders that may be detected at the dentist amongst many other, are aphthous ulcers (that are occasionally a manifestation of Crohn’s disease) and blood disorders (which can present orally through a blanched mucosa, ulceration or petechiae).

With today’s technology and artificial intelligence, Boneprox can provide the dental sector with simple methods in order to improve the efficiency of risk assessment and diagnosis through dental x-rays as well as dental clinical photos.

The findings in the above-mentioned studies demonstrate that there is a need for a closer collaboration between dentistry and healthcare (Norhammar et al., 2019).

References & Scientific Background:
Aron, (2019). [online] Available at: https://www.iofbonehealth.org/factsstatistics
Rehabilitation is important after events such as injury, illness or surgery, which cause a physical setback. Rehabilitation often entails some form of physical activity or exercise with the aim of regaining function. Prehabilitation is a different approach that tackles the decline in physical capabilities before the event, for example, prior to elective surgery. The impact of a surgery is always relative to one’s initial condition. For example, the average 70-year old weightlifter is less likely to be put out of action than the average, inactive, 70-year old undergoing a similar procedure. Improving an inactive person’s fitness prior to surgery may lead to a shorter hospital stay and more rapid overall recovery, thus reducing the impact on daily living.

Until now, most approaches to prehabilitation have used a physiotherapy perspective, i.e. providing exercises to do at home or in a gym, without incorporating behaviour change theory (Santa Mina et al., 2015; Thomas et al., 2019). Reviews suggest that this physiotherapy-only approach may have limited positive impact on surgical recovery (Cabilan et al., 2015). At the University of Birmingham, a study was conducted that took a new approach to prehabilitation. It aimed to promote longer-lasting changes to physical activity after surgery in older adults, in a way that they would be able to achieve on their own.

To identify who might benefit most from the new approach, it was noted that older people waiting for hip and knee surgery were often highly sedentary, spending over 10 hours per day sitting, not meeting physical activity recommendations, and suffering from low physical function (Manns et al., 2015; Webber et al., 2017). Surprisingly, despite reductions in pain after surgery, these patients did not become more active (Webber et al., 2017).

To help these people be more active and reduce their sitting, the team worked with older people in a person-centred manner (Aunger et al., 2018; Aunger et al., 2019). This meant that different behaviour change techniques were used, such as motivational interviewing, individualised feedback from accelerometers regarding their sitting and physical activity patterns, formulating personalised action plans that incorporated social support, modifying the home environment (such as putting up poster reminders), and self-monitoring using a pedometer. The objective was to see whether reducing sitting time would result in more time standing, walking, or doing other forms of physical activity, and if these new habits might persist after surgery.

To test this novel intervention, 35 people aged 60 years or older with severe osteoarthritis were

Can we reduce sitting time to improve physical function in older adults undergoing hip or knee replacement surgery?

Justin Aunger is an Early Stage Researcher on an EU-commission funded Innovative Training Network known as the PANINI project (https://www.birmingham.ac.uk/generic/panini/about/index.aspx) at the University of Birmingham, and is currently completing his PhD. He previously attained a Bachelor of Arts with Honours at University College Maastricht in the Netherlands.

Dr Carolyn Greig PhD FPhysiol is a Reader in Musculoskeletal Ageing and Health at the University of Birmingham, based in the School of Sport, Exercise and Rehabilitation Sciences. She is a translational scientist with a long-standing research interest in the design and conduct of interventions to improve muscle mass and muscle function, and thus maintain physical independence, in older age.
Dr Carolyn Greig  
Reader in Musculoskeletal Ageing  
and Health  
The University of Birmingham

recruited approximately 8-weeks prior to their hip or knee replacement surgeries in Dudley, UK. They were randomly assigned into intervention and usual care groups. As this was a novel intervention in terms of the patient population, feasibility was the primary outcome. This was assessed using questionnaires, study-related statistics, and interviews. The team also measured physical function and objectively assessed physical activity and sedentary behaviour using activity monitors and cardiometabolic biomarkers (blood tests), with assessments at baseline, 1-week pre-surgery, and 6-weeks post-surgery. Throughout the intervention, the team followed up with patients every other week to see whether their action plans required adjustment. The results suggest the study was feasible, may reduce sedentary behaviour by over 60 minutes per day in the intervention group, and has the potential to improve physical function to a clinically meaningful degree. This study paves the way for future clinical trials of prehabilitation, delivered in more personalised ways whilst considering longer-term habits and activity patterns in their design.

Learning points

- Older people with osteoarthritis spend over 10 hours per day sitting.
- New approaches to prehabilitation are needed which produce lasting behaviour change.
- Reducing sitting time prior to surgery using a personalised approach is feasible and may improve physical function.

References:


Applying medication to the skin
A topical medication is one that is applied to the skin using creams, foams, gels, lotions, and ointments. Topical products can include a large range of medicines.

There is evidence from 61 research studies to demonstrate that topical non-steroidal anti-inflammatory drugs (NSAIDs) provided good levels of pain relief in acute conditions such as sprains, strains and overuse injuries, probably similar to that provided by oral NSAIDs (tablets and liquid). Gel formulations of diclofenac (as Emugel®), ibuprofen, and ketoprofen, and some diclofenac patches, provided the best effects. Harmful side effects were usually minimal.

Chronic musculoskeletal pain is long-term pain in the bones and joints of the body, for example in the hip, knees, shoulders or back. It may be the result of a musculoskeletal disease or previous injury or the cause may not be known. Topical diclofenac and topical ketoprofen can provide good levels of pain relief in chronic osteoarthritis, but only for about 10% of people. There is no evidence for other chronic painful conditions.

Rubefacients are drugs that cause irritation and reddening of the skin due to increased blood flow. They are believed to relieve pain in various musculoskeletal conditions and are available on prescription and in over-the-counter remedies. Salicylate is a commonly used rubefacient. The evidence does not support the use of topical rubefacients containing salicylates for acute injuries or chronic conditions. They seem to be relatively well tolerated in the short-term, based on limited data.

Exercise
Exercise can be any activity that enhances or maintains muscle strength, physical fitness and overall health. People exercise for many different reasons including weight loss and strengthening muscles, and improving their energy. Evidence from 42 studies with over 8000 participants, mainly with osteoarthritis and spinal pain, demonstrated that supervised or individualised exercise therapy and self-management techniques may enhance exercise adherence.

Exercise for osteoporosis
We know from a review of 43 studies with over 4000 people about the effect of exercise on bone mass in postmenopausal women that exercise will improve bone mineral density slightly and will reduce the chances of having a fracture slightly. Exercise interventions are typically those that stress or mechanically load bones (when bones support the weight of the body or when movement is resisted for example when using weights) and include aerobics, strength training, walking and tai chi.

References:
What is your current position and what was the career path that took you there?
Currently I’m Professor of Rehabilitation Sciences at St George’s University of London and Kingston University, and I’m seconded to the Health Innovation Network (HIN) as Clinical Director of the Musculoskeletal Programme.

What challenges do you face in your current position and which has been the greatest one?
The most difficult challenge that the musculoskeletal (MSK) team and I face is to convince clinicians, managers and commissioners to change their practice and adopt new interventions. Many health interventions aim to get people to change their beliefs and behaviours, try new things, adopt better ways of doing things – it’s just as difficult to get us to do that in our work as it is for us to get other people to do them!

In your opinion, what are the top three issues affecting the care of older people?
i. Low prioritisation of care for older people
ii. Under-resourcing of older people’s care
iii. Under-appreciation of the positive role that older people can play in all areas of society. They have so much experience, time and understanding – we should be harnessing their experiences and the help they could give us.

What changes in elderly care do you anticipate in the next few years?
I think there will be a greater appreciation of the fact that the problems an ageing society brings must be addressed urgently. Hopefully this won’t be in a negative way and for negative reasons with older people seen as a burden that needs to be suffered, but much more positively, appreciating the positive role they can play.

Like all areas, there will also be an increasing role for digital resources in elderly care.

If you hadn’t become a physiotherapist, what might you have done?
I planned on becoming a brilliant footballer (Georgie Best, Ronaldo, Messi) but it didn’t quite work out.

What experience has influenced your career the most?
When I was twenty-one I had a serious motor bike accident that landed me in hospital for a long time. While I was undergoing rehabilitation, I decided to become a physiotherapist. That was the most important and best thing I’ve ever done. It not only gave me a great career, but the insight that being a patient gave has guided my work and research.

What advice would you give to someone contemplating following in your footsteps?
Go for it. It’s hard work but tremendously gratifying and the kick from getting people better and improving their lives is just a great feeling.

Where do you go for advice and information?
These days I’d probably do exactly what I used to tell my students not to do – I’d start with some form of simple internet search. There’s so much good information out there now and the search engines are so much better and more powerful. You just have to make sure you that you filter out the rubbish. But it’s a good place to start.

Who would you most like to work with?
The MSK team here at the HIN. They’re brilliant. Hardworking, committed, clever, resourceful and so supportive of each other.

What do you enjoy doing when you are not working?
Doing a bit of gardening then sitting back and looking at it with a beer or wine. Being with my family – always great fun.

What do you do in a typical working day?
Oh dear, there really is no typical day. I usually wake up about 6am, surface slowly with a cup of tea while listening to the news and then face into the day.

If you were stranded on a desert island what would be your one luxury?
Scuba gear – I might as well make the most of it. Or maybe a football to reignite my stalled football career.
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