

Research carried out at the Research Institute for Primary Care Sciences, Keele University in osteoarthritis and low back pain have been successfully implemented by the Impact Accelerator Unit. Below you will find two case studies for each subject area which were case studies in the University's REF2014 submission.

1) Osteoarthritis

<https://impact.ref.ac.uk/casestudies/CaseStudy.aspx?Id=6283>

Improving health outcomes and primary care services for osteoarthritis in primary care

Submitting Institution

Keele University

Unit of Assessment

Allied Health Professions, Dentistry, Nursing and Pharmacy

Summary Impact Type

Political

Research Subject Area(s)

Medical and Health Sciences: Clinical Sciences, Public Health and Health Services

Summary of the impact

Osteoarthritis affects 8.5 million people in the United Kingdom, accounting for a third of all years lived with disability. Our research has provided commissioners and third-sector organisations with accurate estimates of the size of the problem, policy-makers with evidence on groups at particularly high-risk, and clinicians with original evidence on better approaches to assessing and managing osteoarthritis in patients presenting to primary care. These key insights have supported advances in public health and health care policy debate, changes in legislation, and improvements in the quality of patient care through training and new national, European, and global guidelines for health professionals.

Underpinning research

The key insights from our Centre's research have led a shift in the concept of osteoarthritis from a structural disease characterised by changes on an x-ray to a clinical syndrome of

persistent joint pain and disability, and provided rigorous evidence on the effective contributions of a range of active nonpharmacological treatments.

Specifically, our multidisciplinary team has combined quantitative and qualitative methods with public involvement in our studies to:

(i) Describe the nature and scale of the problem in the population and how it is currently managed in primary care. We have combined evidence synthesis, analysis of routine recording in a network of general practices (registered population=100,000) with new population surveys of 35,959 residents of North Staffordshire, to provide accurate, national estimates of the burden of painful osteoarthritis and associated disability [1]. [Programme Grants from the Medical Research Council (Dziedzic, Thomas, Lewis); 2000-2012 and Arthritis Research UK (Dziedzic, Roddy, Thomas); 2008-2013].

(ii) Identify possible contributing causes. Our studies have focused on lifestyle factors. Between 1993 and 2001, Croft (Professor of Primary Care Epidemiology, Keele University, 1995-) and collaborators in Southampton University discovered several high-risk occupations (farming, mining, carpet-fitting) and demonstrated that prolonged kneeling and squatting were specific, potentially modifiable exposures associated with developing knee osteoarthritis [2].

(iii) Develop and test new methods for improving patient assessment in primary care. Pain and its effects on individuals with osteoarthritis are often under-recognised in general practice. Our clinical studies, using intensive clinical and imaging assessments in over 2000 adults with joint pain, developed and validated new and practical tools to support assessment in primary care. We recently demonstrated that 3 simple questions asked by the GP during the consultation can improve their judgement of whose symptoms are unlikely to respond to routine care [3] [402 patients, 5 GP practices, ARUK Primary Care Fellowship, 2004-2008: Mallen].

(iv) Evaluate and implement new interventions aimed at more effective primary care management. Care was traditionally focussed on what the general practitioner and the orthopaedic surgeon could offer. Our TOPIK trial [325 patients, 15 GP practices, 2001-2004; ARUK project grant: Hill, Sim, Thomas] was undertaken in response to gaps in evidence identified by local clinicians. Short-term improvements in health outcomes, reduced use of anti-inflammatory drugs, and high patient satisfaction were achieved by giving patients with knee osteoarthritis greater access to community physiotherapy (individualised exercise programme; advice on activity and pacing), and pharmacists (face-to-face medication review and advice) [4]. In separate trials we have confirmed the benefits of advice and exercise for knee osteoarthritis, that acupuncture yields no additional benefit [5] [352 patients, 37 NHS physiotherapy centres, 2003-2005; ARUK project grant: Dziedzic, Hill], and that for hand osteoarthritis joint protection education offered by occupational therapists is beneficial [6] [257 patients, 5 general practices, 2008-2009; ARUK project grant: Dziedzic].

We are now combining qualitative interviews and observations with practitioners and patients with large-scale trials to evaluate approaches to enhance adherence to exercise [526 patients, 55 NHS physiotherapists, Holden], and implement NICE recommended

management into everyday routine primary care [525 patients, 8 GP practices] [2008-2013; NIHR Programme Grant for Applied Research: Dziedzic].

References to the research

1. Peat G, McCarney R, Croft P. Knee pain and osteoarthritis in older adults: a review of community burden and current use of primary health care. *Annals of the Rheumatic Diseases* 2001;60(2): 91-7. DOI: 10.1136/ard.60.2.91
2. Coggon D, Croft P, Kellingray S, Barrett D, McLaren M, Cooper C. Occupational physical activities and osteoarthritis of the knee. *Arthritis Rheum.* 2000;43(7):1443-9. DOI: 10.1002/1529-0131(200007)43:7<1443::AID-ANR5>3.0.CO;2-1
3. Mallen CD, Thomas E, Belcher J, Rathod T, Croft P, Peat G. Point-of-Care Prognosis for Common Musculoskeletal Pain in Older Adults. *JAMA Internal Medicine.* 2013;173(112):1119-25. DOI: 10.1001/jamainternmed.2013.962
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5. Foster NE, Thomas E, Barlas P, Hill JC, Young J, Mason E, et al. Acupuncture as an adjunct to exercise based physiotherapy for osteoarthritis of the knee: randomised controlled trial. *BMJ* 2007; 335(7617):436-48. DOI: 10.1136/bmj.39280.509803.BE
6. Dziedzic K, Nicholls E, Hill S, Hammond A, Handy J, Thomas E, Hay E. Self-management approaches for osteoarthritis in the hand: a 2x2 factorial randomized trial. *Annals of the Rheumatic Diseases* 2013; DOI: 10.1136/annrheumdis-2013-203938

Details of the impact

Key insight: Osteoarthritis as a clinical syndrome of persistent joint pain and disability

Our epidemiologic estimates of joint pain, osteoarthritis, and severity of disability have informed central government and directed the commissioning of clinical services for osteoarthritis across England by underpinning the costing reports and templates produced by NICE and rolled out nationally [1]. In specially commissioned work undertaken for the Policy & Public Affairs Unit of Arthritis Research UK in 2012-2013 presented in the report "Osteoarthritis in General Practice" to Parliament in June 2013, cited in national health

economic reports, and in national press releases in July 2013, we have provided information for policy-makers and third-sector organisations that has helped *advance the policy debate* on health priorities for the nation and the NHS, specifically towards greater recognition of the disability attributed to musculoskeletal disorders and osteoarthritis in particular [2].

Our research has also directly influenced *health professional guidelines and training on clinical assessment, diagnosis and prognosis*. Members of our research team sat on national (NICE - Dziedzic, 2008; NICE Update - Dziedzic, Porcheret 2013) and European (EULAR Hand - Dziedzic, 2009; EULAR Knee - Peat, 2010) guideline development groups where, in addition to our epidemiologic estimates, our research on clinical diagnosis and assessment underpinned recommendations for clinical (as opposed to x-ray) diagnosis of osteoarthritis in routine practice [3]. Dissemination of this core message for practitioners has been actively pursued by us through advising on the national Map of Medicine (Peat [4]) and NHS Patient Decision Aids (Wood, Myers) with these in turn forming the basis for national knowledge summaries used by clinicians at the point of care [5] as well as featuring in NHS Evidence and Osteoarthritis Research Society International's OA Primer - an online educational resource for practitioners and patients worldwide.

Key insight: High-risk occupations and causal exposures

The research on physical occupational exposures associated with knee osteoarthritis was frequently cited and highly influential in the Industrial Injuries Advisory Council's (IIAC) 2008 report on osteoarthritis of the knee in miners [6] and in helping *advance the national policy debate* to consider other similarly affected occupational groups, notably carpet fitters and carpet and floor layers — the subject of a later IIAC report in 2010. Both IIAC reports were presented to Parliament by the Secretary of State for Work and Pensions and resulted in a *change in legislation* with Parliament approving the addition of osteoarthritis of the knee in these occupational groups to the prescribed list of industrial injuries (PDA14) with effect from 13 July 2009 [7] and 30 March 2012 respectively, resulting in *benefits to health and welfare for over 16,000 coalminers* who were successfully awarded claims [8].

Key insight: central importance of self-management and active nonpharmacological management and the effective contribution of allied health professionals to delivering these in primary care

Our research on the effectiveness of high-quality advice and supervised exercise programmes for osteoarthritis and our commitment to seeing the implementation of these in routine primary care contributed to exercise becoming a core treatment recommended in successive NICE [3] and European guidelines for all persons with osteoarthritis and directly challenging both the belief that exercise is bad for joints with osteoarthritis by accelerating 'wear and tear' and the idea that 'nothing can be done'. Members of our research team sat on these guideline development groups (Dziedzic, Porcheret, Mallen).

Our impact has extended beyond influencing *health professional guidelines* to *training health professionals* to support the implementation of these evidence-based changes to care. Working with Arthritis Research UK and the Royal College of General Practitioners, Porcheret

(GP research fellow and RCGP Clinical Champion for Osteoarthritis 2008-2011) and co-workers at Keele developed

(i) a new e-learning module on osteoarthritis for primary care health professionals [9] that to date has been completed by 606 individuals since its launch in February 2013

(ii) a series of all-day workshops run across UK sites training 230 GPs to date, and

(iii) a series of health care professional leaflets and topical evidence digests [circulated to >44,000 GPs] [10].

Regionally, our clinical researchers have provided practical, face-to-face training for 44 GPs, 141 physiotherapists, 12 occupational therapists, and 17 practice nurses from across the West Midlands and Cheshire on the practical delivery of best evidence treatment for osteoarthritis as part of our osteoarthritis studies, organised and run 'Sharing Best Practice' days, hosted a series of clinical appraisal topic sessions with local health professionals, and shaping local clinical algorithms and patient pathways. Our Osteoarthritis Guidebook, developed and co-authored with members of the public together with health professionals and researchers at our Centre, has been made available through our institutional website and that of Arthritis Research UK. In a set of local general practices it has been provided to over 500 people consulting with osteoarthritis.

Sources to corroborate the impact

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Map of Medicine - Osteoarthritis suspected. Available at: <http://healthguides.mapofmedicine.com/choices/map/osteoarthritis1.html> Last accessed: 4 October 2013.
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Hansard Written Answers (17 January 2012, Column 648W). Available at: <http://www.publications.parliament.uk/pa/cm201212/cmhansrd/cm120117/text/120117w0001.htm> Last accessed: 4 October 2013.

Royal College of General Practitioners, Arthritis Research UK, and Arthritis Research UK Primary Care Centre. E-Learning course on Musculoskeletal Care, February 2013. Available at: <http://elearning.rcgp.org.uk/course/view.php?id=118>

Porcheret M, Healey E, Dziedzic K, Corp N, Howells N, Birrell F. Osteoarthritis: a modern approach to diagnosis and management. Hands On Series 6, Issue 10, Autumn 2011. Available at: <http://www.arthritisresearchuk.org/health-professionals-and-students/reports/hands-on/hands-on-autumn-2011.aspx>

2) Low back pain

<https://impact.ref.ac.uk/casestudies/CaseStudy.aspx?Id=6239>

Optimising clinical outcomes and cost-effectiveness of primary care for patients with back pain

Submitting Institution

Keele University

Unit of Assessment

Public Health, Health Services and Primary Care

Summary Impact Type

Health

Research Subject Area(s)

Medical and Health Sciences: Clinical Sciences, Public Health and Health Services

Summary of the impact

Our research has produced a paradigm shift in the primary care management for back pain, by expanding traditional diagnostic approaches to attending to physical and psychosocial

factors shown to influence future outcome ('prognosis'). We have developed screening tools (freely available, widely accessed, translated and adopted), to distinguish groups at low or high risk of long-term disability, and developed primary care interventions tailored to these groups. Through improved clinical outcomes and cost-effectiveness, we have changed back care at national and international levels, evidenced by inclusion in official guidelines, into training of health professionals, adoption by spine and pain services, and active engagement of health care commissioners, clinicians and educators.

Underpinning research

The Global Burden of Disease Project highlighted back pain as the leading cause of years lived with disability. This is strong justification for the focus of our research on the impact, long-term outcomes, and optimal management of back pain, strongly supported by patient and public involvement from our dedicated Research User Group. This research has generated over 190 peer-reviewed publications since 1994. Based on large primary care-based cohort studies funded by Arthritis Research UK, Wellcome Trust and National Institute of Health Research (NIHR), we have improved current understanding of the impact and prognosis of back pain. The research outputs overturned the commonly held belief that back pain patients have a good prognosis and highlighted the multidimensional consequences of pain. Croft (Keele University, Professor of Primary Care Epidemiology, 1995-present) conducted one of the first population-based studies of back pain using linked medical record data, and demonstrated that 75% of patients still experience pain and disability one year after consultation in primary care, with psychological and social factors predicting poor long-term outcome (references 1,2). Using novel statistical approaches to analysing longitudinal data, Dunn (Wellcome Trust Reader in Epidemiology, Keele University, 2008-2014) identified distinct back pain trajectories characterised by increasing psychosocial consequences and risk of poor long-term outcome (reference 3). These insights instigated a shift in the classification of back pain from a focus on current pain duration and diagnosis to a prognostic definition based on assessment of key physical and psychosocial factors to estimate risk of poor outcome, and initiated the development and validation of a brief screening tool for use in clinical practice (STarTBack Tool, reference 4). This research has been pivotal in the development of new approaches to the management of back pain.

In a National Lottery funded randomised trial Hay (Professor in Community Rheumatology, Keele University, 1994-present) demonstrated that appropriately trained physiotherapists can adopt and incorporate psychosocial approaches in the management of back pain, and that such a pain management approach can be delivered in fewer sessions and with equal effectiveness compared to a standard package of physiotherapy (reference 5). Key findings from this trial and our prognostic studies underpinned a new programme of research funded by Arthritis Research UK, the Health Foundation and the NIHR, developing and testing a model of stratified care based on patients' prognosis. In this model, patients at low risk of poor outcome are supported to self-manage, while those at medium and high risk access treatment that target their key physical and psychosocial obstacles to recovery. We provided robust evidence that stratified care is superior to best current care in a large randomised trial (STarTBack trial, reference 6) where subgrouping using the STarTBack screening tool and

matched treatments improved patients' clinical and work outcomes with clear cost-savings for the NHS and society. A subsequent impact study (Foster, NIHR Professor of Musculoskeletal Health in Primary Care, Keele University, 2012-17) confirmed that stratified care can be implemented in primary care, leading to improvements in patient outcomes including disability and days lost from work at similar healthcare costs.

References to the research

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[Reference 2]. Thomas E, Silman AJ, Croft PR, Papageorgiou AC, Jayson MI, Macfarlane G. Predicting who develops chronic low back pain in primary care: a prospective study. *BMJ* 1999;318(7199):1662-7. (428 citations Google Scholar)

[Reference 3]. Dunn KM, Jordan K, Croft PR. Characterising the course of low back pain: a latent class analysis. *Am J Epidemiol* 2006;163(8):754-61. (119 citations Google Scholar)

[Reference 4]. Hill JC, Dunn KM, Lewis M, Mullis R, Main CJ, Foster NE, Hay EM. A primary care back pain screening tool: identifying patient subgroups for initial treatment. *Arthritis Rheum* 2008;59(5):632-41. DOI:10.1002/art.23563 (117 citations Google Scholar)

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Details of the impact

Key impact: Incorporating prognostic information in clinical care for back pain

The prognostic information identified by our research, particularly information about the course of back pain and key predictors of poor outcome, has been incorporated into Evidence Based Medicine resources: BMJ Best Practice, e-Guidelines; UpToDate; and NICE Clinical Knowledge Summaries in the UK [1] and internationally.[e.g. 2] Our novel approach to bringing together key predictors of outcome in a brief prognostic screening tool (STarTBack Tool) has been adopted by at least 85 clinical services across the world to classify and inform patients regarding the likely course of their symptoms.[e.g. 3,4] We have developed a website (www.keele.ac.uk/sbst/) including free and open access to the tool, and information to encourage implementation into clinical practice. The website has been accessed by 30,000

unique visitors since inception in 2009. Research groups in Denmark, Sweden and the USA are collaborating with our team to test its generalizability to other patient populations and healthcare settings, and its use in children with back pain. Use of the tool to identify high-risk patients has been recommended by key professional groups; the Royal College of General Practitioners (RCGP Online MSK Module) [5]; Department of Health National Spinal Taskforce [6]; British Pain Society (2013); and other national guidelines.

Key impact: Implementing psychosocial approaches in primary care for back pain

We pioneered the application of psychosocial approaches to chronic pain management, on the basis of our findings that psychosocial factors are predictors and consequences of chronic pain. These approaches were developed by specialist teams of psychologists and physiotherapists, and applied more broadly to primary care. Our back pain trial (Hay et al. 2005) showed that our training and mentoring programme enable primary care physiotherapists to successfully deliver psychologically informed physiotherapy, encouraging patients to alter unhelpful attitudes and pain-related fears, increasing activity, and supporting self-management and return-to-work. By integrating these research findings into routine health services, we have ensured more immediate improvements in the care provided for back pain patients. Our staff have led and collaborated on the development of back pain and chronic pain management ('IMPACT') services, which continue to offer enhanced approaches to pain management. In 2013 the IMPACT service won the national Care Integration Award for pain management. Since 2007 we have trained over 230 healthcare professionals from the UK, Denmark, Australia, Germany, USA and Ireland to adopt and deliver psychologically informed physiotherapy, and have developed a cascade training model for wider dissemination. Healthcare services [e.g. 7] now incorporate such models of care. This pioneering work contributed substantially to the Centre's receipt of the Queen's Anniversary Prize (2009).

Key impact: Providing a novel cost-effective model of stratified care for back pain

In a randomised trial and impact study, we combined our expertise in prognostic stratification with matched interventions to produce a new model of stratified care for back pain. This demonstrated improved patient outcomes and reduced work loss compared to current best care, together with cost savings for the NHS. Public and professional awareness of the benefits of stratified care has been increased via radio and patient magazines (BBC Health News Sept 2011, Arthritis Today October 2011) and professional forums (Frontline CSP Sept 2011, RCGP Conference 2012, RCGP on line training). We held workshops with leading UK musculoskeletal clinicians in November 2009 and June 2012, plus a conference in April 2012 with >120 delegates, including representatives from the Department of Health, professional bodies and key charities, leading to adoption of the StarTBack approach in at least 23 healthcare organisations. Change in healthcare delivery and patient outcome has been achieved through our team working with expert groups to revise the Department of Health's Any Qualified Provider documentation (March 2012) and the Map of Medicine care pathway for back pain (April 2012)[8], which provide evidence-based guidance and clinical decision support at the point of care, and enable commissioners to develop efficient and effective development of new services. Through the Keele Primary Care Musculoskeletal

Research Consortium, considered a national exemplar model for academic- healthcare collaboration, we have facilitated implementation of the stratified care model within community physiotherapy services in Cheshire and Staffordshire. It has been incorporated into commissioning plans for Vale Royal, South Cheshire, North Staffordshire and Stoke Clinical Commissioning Groups, as part of General Practice QP plans, service providers QiPP initiatives and commissioning CQUIN targets [9], which allows for the new approach to become sustainable and serve as good practice model for the wider NHS. Multiple services in the UK have changed their clinical pathways to implement stratified care [e.g. 4,7]. Internationally, prognostic stratification in patients with back pain has been advocated on government websites, recommended in international guidelines [e.g. 10], and several healthcare organisations are adopting stratified care for back pain (e.g. Fairview Healthcare, Minnesota and Intermountain Healthcare, Utah).

Sources to corroborate the impact

[Source 1]: National Institute for Health and Clinical Excellence (NICE) Clinical Knowledge Summaries (CKS). Back Pain — low (without radiculopathy). November 2009. <http://cks.nice.org.uk/back-pain-low-without-radiculopathy> (Last accessed 17-Oct-13)

[Source 2]: Therapeutic Guidelines: Rheumatology (revised October 2010, Key References — non-specific low back pain). In: eTG complete [Internet]. Melbourne: Therapeutic Guidelines Limited (Last accessed 17-Oct-13) http://www.tg.org.au/etg_demo/desktop/tgc/rhg/rheumatology_version_2.htm

[Source 3]: STarTBack Tool implemented in Region of Southern Denmark (STarT skema in Danish): since June 2012. Available at <http://www.regionsyddanmark.dk/wm370018> (Last accessed 17-Oct-13)

[Source 4]: Sheffield back pain services: <http://www.sheffieldbackpain.com/professional-resources/resources/keele-start>. (Last accessed 17-Oct-13)

[Source 5]: Royal College of General Practitioners (RCGP) Musculoskeletal online module and 2012 Curriculum for Care of People with for Musculoskeletal Problems, page 8 (<http://www.rcgp.org.uk/gp-training-and-exams/gp-curriculum-overview.aspx>) (Last accessed 17-Oct-13)

[Source 6]: National Spinal Taskforce January 2013: Commissioning Spinal Services: Getting the service back on track: a guide for commissioners of spinal services (page 15, 16). Available at <http://www.nationalspinaltaskforce.co.uk/> (Last accessed 17-Oct-13)

[Source 7]: Back Rehabilitation Programme in Department of Physiotherapy, Ipswich Hospital. Available at http://www2.ipswichhospital.net/microsites/physiotherapy/gp_backrehab.asp (Last accessed 17-Oct-13)

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