Institution: Birmingham City University

Unit of Assessment: 3 Allied Health Professions, Dentistry, Nursing and Pharmacy

Title of case study: New approaches to the treatment of chronic pain

1. Summary of the impact (indicative maximum 100 words)

The Pain Research Group (PRG) is a research team within the Centre for Health and Social Care Research (CHSCR). The PRG's research programme in chronic pain management encompasses a range of robust methodological approaches to achieve better patient outcomes with local, national and international impact. The PRG has adopted a dual approach to investigating the treatment of chronic pain, incorporating psychological factors with the application of neuromodulation techniques. This has led to significant improvements in patient outcomes and patient satisfaction surveys demonstrate excellent, positive results. The research has had significant influence on clinical practice at national level, underpinning recommendations for best practice issued by the British Pain Society in relation to spinal cord stimulation and intrathecal drug therapy. It has also contributed to NICE's clinical guidelines on the implementation of spinal cord stimulation and influenced clinical decision making through the NHS evidence database. At an international level, our research has contributed to three sets of guidelines issued by the Polyanalgesic Consensus Conference: inflammatory mass, intrathecal drug therapy for chronic pain and recommendations for reducing mortality and morbidity of intrathecal drug therapy. The reduction of morbidity and mortality in intrathecal drug therapy is of particular significance as the reduction of harm and unnecessary complications in healthcare is of high concern to healthcare organisations worldwide.

2. Underpinning research (indicative maximum 500 words)

The PRG was established in 2007. It is collaboration between academics from the Faculty of Health at Birmingham City University and health professionals practising in the Pain Department at Russells Hall Hospital led by Professor Raphael and Professor Ashford. It also includes early career researchers (Dr Duarte, Dr Raheem, and Dr Sparkes) and a number of PhD students. The PRG's patient-focussed work is recognised nationally and internationally resulting in a number of awards. These include a BUPA Foundation Award for Professor Raphael in acknowledgement of his contribution to the field.

The PRG is supported by external research grants and internal development funds totalling over £650k to date. The research programme focuses on two issues associated with chronic pain: the use of psychological assessment and neuromodulation. The experience of chronic pain can have profound psychological consequences which may, in turn, have implications for pain treatment, particularly those in which the active participation/cooperation of the patient is essential. Neuromodulation is a technique for treating otherwise intractable chronic pain. It therapeutically alters the response of the central nervous system to reduce pain either by electrical spinal cord stimulation (SCS) or by drug administration directly into the spinal cord (intrathecal therapy). A series of studies investigating psychological issues and the use of neuromodulation have produced significant findings about multiple aspects of pain management which demonstrate that:

- Depression, previously considered a contraindication in SCS, may in fact improve as a result of successful pain relief with SCS (REF2).
- Intrathecal opioid dose is a risk factor for intrathecal granulomas; clonidine is protective against this. Yearly increases in opioid dose is a risk factor for granulomas and could serve as an indicator for closer surveillance (REF3).
- SCS is cost-effective as an adjunct to conventional management. This finding helped to shape policy decisions and NICE guidelines which examine cost-benefit analyses prior to guideline development (REF4) illustrating economic as well as therapeutic impact.
- The effectiveness of percutaneous electrical nerve stimulation (PENS) (REF5).
- Intrathecal drug delivery systems (IDDS) have the potential to be a life-long pain management solution in appropriately selected patients with chronic non-malignant pain (R6).

Where applicable, randomised control trials (RCTs) and longitudinal studies have been conducted (REF1, REF5). Furthermore, the PRG's activities have been aligned with social and economic requirements to find cost effective treatments that deliver better outcomes to patients than

conventional treatments (R4). Examples include the first blinded RCT of Percutaneous Electrical Nerve Stimulation (PENS) therapy, which has now led to this technique being used more widely (R5); the use of intrathecal morphine in chronic non-malignant pain (R1) and longitudinal studies (R6) which have facilitated decision making about life-long therapies to improve patient outcomes in the long term. Thus the commitment of the PRG has led to improvements in the lives of many patients both within and beyond the immediate care centre.

3. References to the research (indicative maximum of six references)

REF1. Raphael JH, Duarte RV, Southall JL, Nightingale P, Kitas GD. Randomised double blind controlled trial by dose reduction of implanted intrathecal morphine delivery in chronic non-malignant pain. BMJ Open Anaesthesia 2013;3:e003061 doi:10.1136/bmjopen-2013-003061

REF2. Sparkes E, Raphael JH**,** Duarte RV, Lemarchand K, Jackson C, Ashford RL. A systematic literature review of psychological characteristics as determinants of outcome for spinal cord stimulation therapy. *Pain* 2010;150(2):284-289. PMID 20603026

REF3. Duarte R, Raphael JH, Southall JL, Baker C, Hanu-Cernat D. Intrathecal inflammatory masses: is the yearly opioid dose increase an early indicator? *Neuromodulation* 2010;13 (2):109-113. PMID 21992783

REF4. Kemler MA, Raphael JH, Bentley A, Taylor RS. The cost-effectiveness of spinal cord stimulation for complex regional pain syndrome. *Value in Health* 2010;13(6):735-742. PMID 20561326

REF5. Raphael JH, Raheem TA, Southall JL, Bennett A, Ashford RL, Williams S. Randomized double-blind sham-controlled crossover study of short-term effect of percutaneous electrical nerve stimulation in neuropathic pain. *Pain Medicine* 2011;12(10):1515-22. PMID:21883874

REF6. Duarte RV, Raphael JH, Sparkes L, Southall JL, LeMarchand K,Ashford RL. Long-term intrathecal opioid administration for chronic non-malignant pain. *Journal of Neurosurgical Anesthesiology* 2012;24(1):63-70. PMID:21904220

4. Details of the impact (indicative maximum 750 words)

The impact of the research conducted by the PRG has led to significant improvements in the lives of patients who have chronic and debilitating pain. The Group's influence on clinical decision making is evident in the NHS Evidence R4 database (S1), which is a source of journal publications for frontline clinicians.

Outcomes of the PRG's work were used in the development of NICE clinical guidelines on spinal cord stimulation (S2). This is significant because NICE guidance uses best evidence to promote good health and prevent ill health and is recognised internationally as a centre of excellence that is used by health professionals, employers, voluntary groups and anyone else involved in the promotion of health to inform clinical decision making and promote best practice. Evidence of the impact of the PRG's work can also be seen in two sets of recommendations for best practice co-edited by Professor Raphael and issued by the British Pain Society: spinal cord stimulation (S3) and intrathecal drug therapy (S4).

At international level, the Polyanalgesic Consensus Conference (PCC) is an international clinical workgroup that strives to improve care, specifically for those receiving implantable devices. Through exhaustive literature searches and clinical experience, the workgroup formulates recommendations to establish current best practices. Multiple topics are targeted at each conference. In 2012 findings from the PRG's work were included in the PCC's best practice guidelines for three subjects: diagnosis, detection and treatment of catheter-tip granulomas (S5, R3), recommendations for the management of pain by intrathecal (intraspinal) drug delivery (S6, S6 R7) and recommendations to reduce morbidity and mortality in intrathecal drug delivery in the treatment of chronic pain (S6, S7, R3).

The dual focus of PRG's research has demonstrated that pain relief improves after the introduction of psychological assessment for treatment with spinal cord stimulation (S7). The cost effectiveness of a health care treatment (in this case IDDS) should take into consideration the relative cost before treatment is initiated. (S8). It has also underpinned the development of information booklets that are now used nationally in the treatment of cancer pain and selected pain therapies (S9). The PRG's research programme has focused on demonstrating the efficacy of interventions. In doing so it has made a significant contribution to the management of chronic pain and improved patients' quality of life. The influence of the PRG's research is evident at both national and international levels and informs decision making across a range of clinical fields.

5. Sources to corroborate the impact (indicative maximum of 10 references)

S1. Kemler MA, Raphael JH, Bentley A, Taylor RS. (2010) The cost-effectiveness of spinal cord stimulation for complex regional pain syndrome. *Value Health* Sep-Oct;13(6):735-42. doi: 10.1111/j.1524-4733.2010.00744.x. Epub 2010 Jun 7,
(screenshot available of availability in the NHS Evidence database) http://www.evidence.nhs.uk/search?q=The+cost-effectiveness+of+spinal+cord+stimulation+for+complex+regional+pain+syndrome.+#
S2. See NICE (2008) Spinal cord stimulation for chronic pain of neuropathic or ischaemic origin, available at http://www.nice.org.uk/nicemedia/pdf/ta159guidance.pdf and see also http://guidance.nice.org.uk/TA159
S3. Simpson K, Stannard CL, Raphael JH eds. (2009) Spinal cord stimulation: recommendations for best clinical practice. ISBN 0-9546703-7-X. London, *British Pain Society*
included document – a screen shot of inclusion in the NHS evidence database
S4. Grady K, Raphael JH eds. (2008) Intrathecal drug delivery for the management of pain and spasticity in adults: recommendations for best clinical practice. ISBN 978-0-9551546-3-8. London, *The British Pain Society.*
S5. Polyanalgesic Consensus Conference-2012: Consensus on Diagnosis, Detection, and Treatment of Catheter-Tip Granulomas (Inflammatory Masses).
http://www.ncbi.nlm.nih.gov/pubmed/22494332 (reference 13 within document)
S6. Polyanalgesic Consensus Conference 2012: Recommendations for the Management of Pain by Intrathecal (Intraspinal) Drug Delivery: Report of an Interdisciplinary Expert Panel.
http://www.ncbi.nlm.nih.gov/pubmed/22748024 (reference 99 within document)
S7. Polyanalgesic Consensus Conference 2012: Recommendations to Reduce Morbidity and Mortality in Intrathecal Drug Delivery in the Treatment of Chronic Pain.
http://www.ncbi.nlm.nih.gov/pubmed/22849581
S8. SA Biggs, RV Duarte, JH Raphael, RL Ashford. Influence of a latent period in QALY analysis: Pilot study of intrathecal drug delivery systems for chronic non-malignant pain. *British Journal of Neurosurgery* 2011;25(3):401-406.
S9. Raphael J, Hester J, Ahmedzai S, Barrie J, Farqhuar-Smith P, Williams J, Urch C, Bennett M, Robb K, Simpson B, Pittler M, Wider B, Ewer-Smith C, DeCourcy J, Young A, Liossi C, McCullough R, Rajapakse D, Johnson M, Duarte R, Sparkes E. Cancer pain: part 1: Pathophysiology; oncological, pharmacological, and psychological treatments: a perspective from the British Pain Society endorsed by the UK Association of Palliative Medicine and the Royal College of General Practitioners. *Pain Med* 2010;11(5):742-64.PMID:20546514