Pain Medicine
the AMERICAN ACADEMY of PAIN MEDICINE

Pain Medicine 2011; 12: 1738–1749
Wiley Periodicals, Inc.

PRIMARY CARE & HEALTH SERVICES SECTION

Original Research Article

A Whole-Person Model of Care for Persistent Pain: From Conceptual Framework to Practical Application

Chris Hayes, B Med Hons, FANZCA, FFPMANZCA, M Med,* and Fiona J. Hodson, RN DipHSc (Nurs), BHlthSc (Nurs)†

*Hunter Integrated Pain Service, Newcastle, New South Wales;

†Post Grad Pain Management Cert, Hunter Integrated Pain Service, Newcastle, New South Wales, Australia

Reprint requests to: Chris Hayes, B Med Hons, FANZCA, FFPMANZCA, M Med, Hunter Integrated Pain Service, PO Box 664J, Newcastle, NSW 2300, Australia. Tel: +61249223435; Fax: +61249223438; E-mail: Chris.Hayes@hnehealth.nsw.gov.au.

Abstract

Setting. The study was set in an Australian tertiary public hospital multidisciplinary pain center.

Objectives. The objectives of the study were to describe the conceptual shift undertaken by a multidisciplinary team in moving from a traditional approach to an emerging paradigm in pain medicine and to describe the practical application of a whole-person model of care and report outcomes over the period 2003–2010.

Design. The study design was descriptive, including a brief review of current evidence base, consideration of models of service delivery, and analysis of the impact of applying a new, whole-person model of care for persistent pain.

Intervention. Since 2004, a series of changes led to significant health system redesign. The process involved development of a broader, whole-person understanding of the individual with pain and a more integrated approach to service delivery across the spectrum from community to tertiary care.

Results. Broad trends in the period 2003–2010 included a modest reduction in referral rate, marked reduction in waiting times, more efficient staff utilization, inversion of the ratio of new assessments to review appointments, increased telephone contact with primary care, increased use of personalized pain management plans, reduced procedural interventions and increased attendance at and clinically significant gains from shorter and more flexible group programs.

Conclusions. Changes to conceptual framework inevitably influence the practicalities of service delivery. The application of a whole-person model for persistent pain brought improved engagement with the individual in pain and more efficient delivery of care at a systems level.

Key Words. Chronic Pain; Organizational Function; Strategic Planning; Primary Care; Quality of Health Care; Group Education; Self-Management

Introduction

Systems used for the management of persistent pain in Australia are beginning to change. The provision of early education to people in pain and subsequent use of their informed choices to influence service delivery have been defined as key principles underlying system reorganization at two Australian multidisciplinary pain centers (MPCs), one on the east coast and one on the west [1]. The west coast site has recently published results of the introduction of preclinic group education sessions showing reduced wait-times and costs with increased patient satisfaction and use of active pain management strategies [2].

This descriptive, longitudinal study reports on the process of change at Hunter Integrated Pain Service (HIPS), one of the earlier-mentioned MPCs, over the period 2003–2010. HIPS is based in Newcastle, on the Australian east coast and is part of the tertiary public hospital system. Referrals are taken from throughout the Hunter New England region, an area of over 130,000 km^2 (approximately the size of England) with a population of 840,000.

We discuss the conceptual shift the HIPS team has undertaken in transitioning from a traditional to an emerging paradigm in pain medicine and also the practical management strategies that have developed as a consequence. The change process has involved analysis of the prevailing paradigm and evidence base in pain management, synthesis of new evidence from related fields of research and a gradual evolution of clinical practice.

The Prevailing Paradigm in Pain Medicine

The foundations of pain medicine are based on the gate control theory of Melzack and Wall [3,4] and the biopsychosocial model proposed by Engel [5,6] with subsequent adaptations to the field of pain [7,8]. However, despite significant foundational strengths, contemporary pain theory is commonly interpreted with a residual dualism that favors a view of persistent pain as predominantly biological in origin [9,10]. This approach underestimates the influence of psychosocial and environmental factors as contributors to the causation of persistent pain and also the potential therapeutic benefit from targeting these factors with a view to pain reduction.

The existing evidence base suggests that unimodal biomedical approaches typically produce only limited benefit for a limited time. Problems of tolerance and opioid-induced hyperalgesia [11–13] have major implications for pharmacotherapy. Implanted devices such as intrathecal pumps and spinal cord stimulators have limited efficacy and high complication rates [14–16]. Other procedural interventions are also limited in degree and duration of benefit [17,18]. Furthermore, any unimodal use of biomedical strategies runs the risk of distracting the recipient from active management.

The benefits of cognitive-behavioral pain management programs have been consistently reported in the literature [19–21]. However a more recent systematic review reported only a weak effect on pain intensity, minimal effect on disability and modest improvement in mood [22]. The authors noted that while the quality of trial design has improved over the years, clinical outcomes have not.

At a systems level, pain medicine in Australia suffers from lack of integration across the community to tertiary spectrum. Neglect of collaborative interprofessional practice and a “siloed” approach [23] leave many therapeutic opportunities untapped.

In primary and community care, there continues to be an overemphasis on biomedicine with relative neglect of active self-management. This is despite evidence that active self-management reduces pain-related disability and use of health services [24]. Clear referral and triage processes are lacking. People with back pain for example, commonly undergo spinal imaging and are referred to surgical clinics in the absence of red flags [25].

At tertiary level, there are widespread access problems across Australia. Barriers include long waiting lists, complexity of referral process, limited resources, cost, and geographic location [2,26]. Referral rate exceeds service capacity for many MPCs indicative of system inefficiency. In addition, poorly defined patient flow and discharge policies within MPCs often mean a low ratio of new assessments to review appointments.

Those on long waiting lists can hold unrealistic expectations of curative biomedical intervention and may not have been made aware of potential gains from active self-management while they wait. A systematic review has documented significant deterioration of people on waiting lists for persistent pain services [27].

High intensity (≥80 hours) group pain management programs are commonly offered at Australian MPC’s. However the reality is that only a small percentage of those attending MPC’s actually go on to participate in such programs. Recent Australian figures showed that 5–6% of those initially assessed at a MPC attend group pain management programs despite a much higher percentage being recommended for the intervention [26,28]. In part, the low attendance rate is due to limited availability of places, but lack of participant motivation is also a contributor. Attendance rates are higher if workers compensation is involved. Interestingly, much of the Australian evidence for high-intensity pain management programs comes from the compensable sector, leaving unanswered questions about whether results can be extrapolated to non-compensable populations.

The need for system change in Australian health care has been highlighted recently by the National Health and Hospital Reform Commission [29] and by the National Pain Strategy [30]. Thus, the prevailing paradigm in Australian Pain Medicine is under pressure. The conceptual framework is in need of review and outcomes from traditional treatment approaches are limited. There are major design and funding problems at a systems level. In this high-pressured environment, the need for evolution is clear.

The Emerging Paradigm in Pain Medicine

Emerging pain theory derives from a diverse evidence base and also the harsh realities of clinical experience. Critical work is occurring in neuroscience and psychotherapy research. Other areas of interest include chronic disease management and lifestyle and integrative medicine.

A key challenge is the move beyond dualism toward a more holistic and integrated model. Person-centered care is fundamental. It relates to understanding the illness or condition from the person’s perspective, seeing the person as a whole rather than as fragmented parts and shared decision-making [31–34]. The “whole-person” approach [33,34] recognizes the importance of biopsychosocial influences in both causation and management. Personal story, mind–body connection [35,36] and the psycho-neuro-immunology of pain [37] are important integrating components. The emotional response to trauma is recognized as a critical determinant of physical healing as demonstrated by case series reporting abolition of persistent pain using a psychotherapeutic approach [35,36,38].

Patient-centered care can reduce use of diagnostic tests and referrals by 50% and also improve illness recovery in a primary care setting [39]. However, an approach that is centered on the individual does not imply their unrestricted freedom of choice; rather, decision-making is shared. This may be particularly relevant where issues of drug dependency or diversion arise and there is a need to apply therapeutic boundaries to motivate positive behavioral change.

Neuroscience and brain plasticity are also central to the emerging paradigm. The existence of nervous system plasticity [40–42] opens the door to a degree of therapeutic optimism lacking in a traditional interpretation of the biopsychosocial model. The so-called “paradox of plasticity” [43] recognizes that the inherent neural changeability that contributes to the causation of persistent pain will potentially allow its resolution. Hence, active management strategies, including such options as psychotherapy, effectively become brain plasticity tools.

Lifestyle is an important aspect of the emerging paradigm [44]. Economic growth contributes at a macro level to environmental damage and climate change, and at a micro level to low-grade systemic inflammation (metaflammation). Both aspects impact the health of individuals [45,46]. Western diet and lifestyle are major contributors to metaflammation, which in turn underlies many chronic diseases [47,48]. Mechanistically, metaflammation may contribute to the persistence of pain via nociceptive mechanisms as well as glial activation and neural sensitization [49–51]. Nutritional factors have been linked to many pain conditions including osteoarthritis [52,53], inflammatory arthritis [54], inflammatory bowel disorders [55], and fibromyalgia [56].

The emerging paradigm encompasses the potential for increased benefit from new biomedical interventions and also more effective use of existing treatments. Time-limited intervention is an important emerging strategy in this regard. For example, opioid maintenance therapy can be framed as time limited in the first instance [57]. In this context, the often modest pain reduction associated with opioid therapy can be seen as facilitating active management for which the evidence base is higher. After a contracted period (3–6 months), the opioid can be tapered, ceased, and reviewed [58]. There is also the potential for traditional high-intensity group pain management (cognitive-behavioral) programs to incorporate key messages from the emerging paradigm and hence achieve greater effectiveness.

At a systems level, partnership and integration [34] are critical. Various managed care approaches have been developed for chronic diseases [59,60], which promote partnership between primary and tertiary care and the targeting of more intensive input to those with more complex problems. In hospital practice, there is a need for improved integration between acute and persistent pain management services to prevent progression of posttrauma and postsurgical pain to the persistent phase.

Population health is another aspect of the emerging paradigm [34]. An Australian study of particular interest showed significant impact on beliefs about back pain and reduced work-related back pain presentations for 3 years after a television-based community education campaign [61].

Hunter Region Challenges

HIPS developed from an anesthesia-based tertiary hospital acute pain service and was established as a multidisciplinary team in 1997 recognizing that many of the pain problems within an “acute care” hospital system were chronic and complex, and that an outpatient system was required to provide appropriate follow-up. Clinical scope addressed acute, cancer, and persistent noncancer pain and service delivery covered three hospital campuses. Initial referrals came from within the hospital system and immediate surrounds, but the referral base rapidly expanded to the entire Hunter New England region. In the early years, assessment and management was based on a traditional paradigm. Biomedical interventions commonly included pharmacological and procedural approaches. Implanted intrathecal pumps and spinal cord stimulators were used in selected cases. A high-intensity (80 hours) cognitive-behavioral group pain management program (IMPACT) was set up. Outcome measurement was undertaken only on the cohort attending the group pain management program. Patients in the medical pathway were typically reviewed every 3 months. There were no clear referral or discharge criteria. A referral questionnaire was administered prior to clinic assessment but information contained did not significantly alter triage or clinical practice.

After almost 8 years of using a traditional approach the service hit crisis point in mid 2004. The referral rate was 1,000 cases per year. This compared with a service capacity of around 600 based on the existing model of care and a staffing level of 5.4 clinical full time equivalents for persistent pain, divided between medical, liaison psychiatry, clinical psychology, physiotherapy, and nursing positions. The waiting time in 2003 and the first half of 2004 was 18 months or more for nonurgent cases. There was a growing recognition among the team that results from biomedical interventions were generally limited and that the moderate gains from the group pain management program were highly resource intensive. Many people for whom the group pain management program was recommended remained uncommitted to attendance despite multiple planning appointments.

There was no opportunity for increased funding within the economic environment of a public hospital. Furthermore, in Australia at that time, there were no accepted standards to guide the model of care delivered or optimal staffing ratios for MPCs.

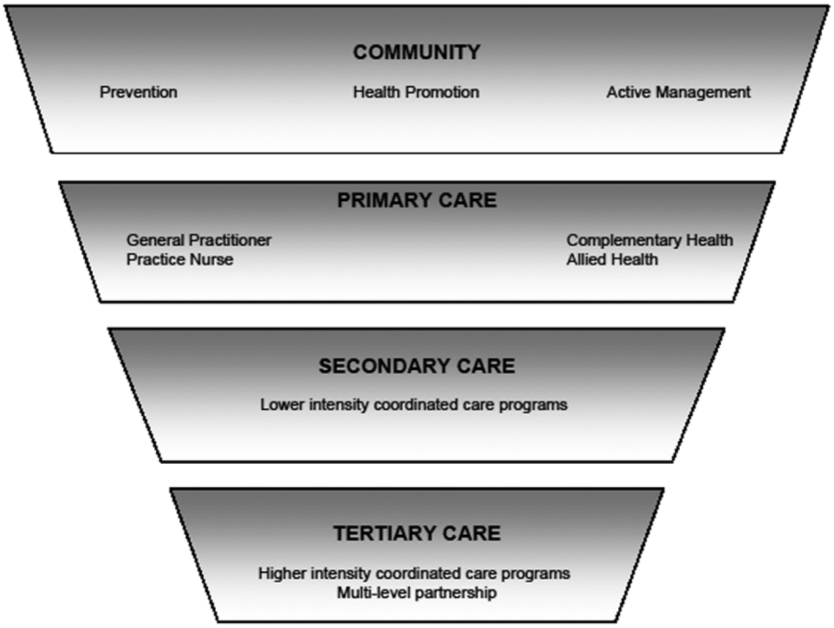

Figure 1 An integrated persistent pain model.

Intervention: Evolving Systems Change

A decision was taken to embark upon a process of redesign aiming to incorporate emerging pain theory at both conceptual and practical levels. A stratified model (Figure 1) was developed, which emphasized a tiered approach and inverted the Kaiser Permanente pyramid giving community and primary care preeminent positions. Interventions were targeted at community, primary and tertiary levels but resource limitations precluded any secondary care initiatives. The aim was to balance referral rate with service capacity. We aimed to achieve this by development of specific triage and discharge criteria and provision of general practitioner (GP) education.

The outworking of conceptual change at the individual level is illustrated in Figures 2A and B. The model shown in Figure 2A illustrates a non-dualistic view of personhood and the idea that pain can point to problems at any level of being. The whole-person approach to management shown in Figure 2B invites therapeutic balance and highlights the centrality of an informed person choosing relevant strategies. The fivefold management template shows nutrition and story (mind–body/psychodynamic) elements combined with the traditional components of biological (including medical), thoughts and actions (cognitive-behavioral). Both diagrams were routinely used in clinical interactions.

Multiple practical strategies were implemented from 2004 as part of an evolving model of care (Figure 3). Key steps included:

1. A website was developed (http://www.hnehealth.nsw.gov.au/pain) to provide information and educational material to people in pain, their families, carers,

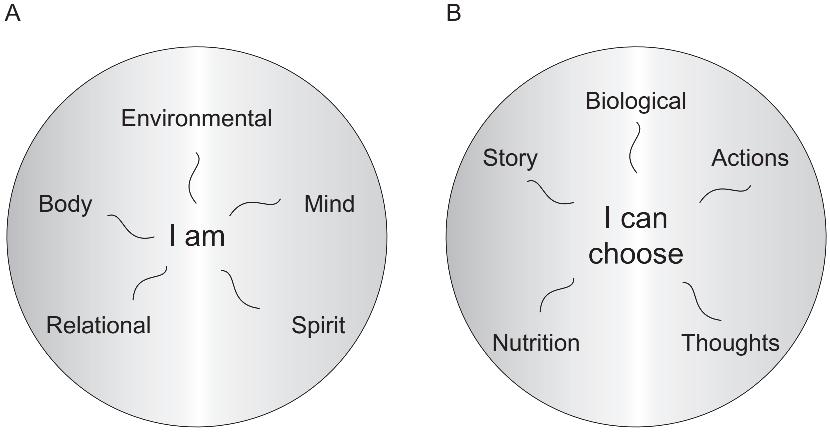

Figure 2 (A) A whole-person model; (B) whole-person management.

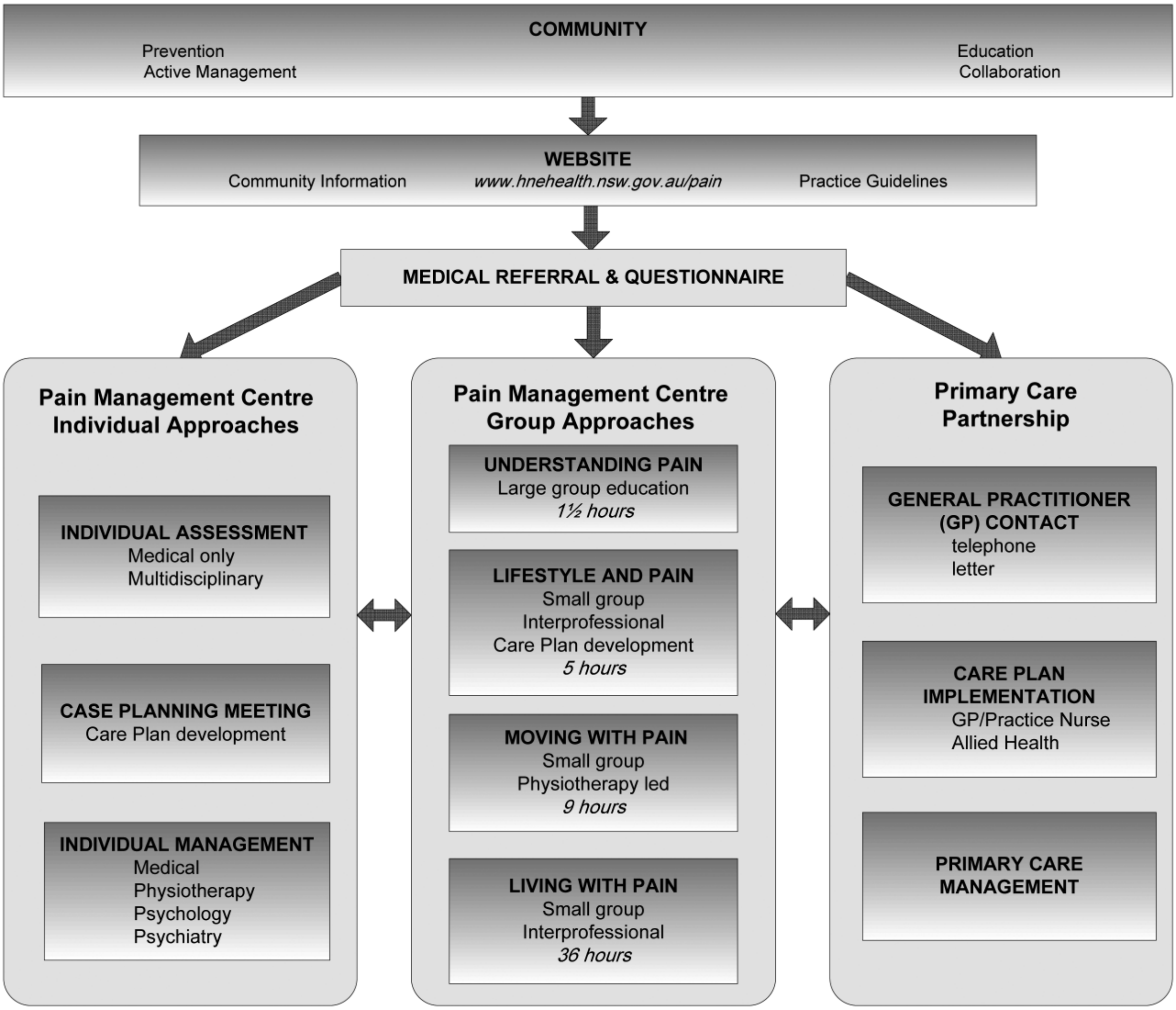

Figure 3 Hunter-integrated pain service model.

and health professionals. This was supported by regular education seminars for GPs and other health professionals.

2. A waiting list of approximately 800 referrals was dissolved in October 2004. An apology was given for system dysfunction and referrals returned to the initiating physician with the suggestion that people could be re-referred in the future if they met specific new criteria. Two hundred referrals were retained on the waiting list. These people either had booked appointments or were expected to be seen within the next 3 months.
3. Specific new triage criteria were developed in October 2004 along with waiting time targets (Figure 4). Referrals from outside the Hunter New England area were excluded.
4. HIPS Referral Questionnaire (http://www.hnehealth.nsw.gov.au/pain/clinical services/referral) was modified in 2004 (with further changes over subsequent years) to optimize efficiency of data capture from the person referred. Information was used to guide triage, provide baseline outcome data and give clinicians an overview of the person's history prior to assessment.
5. Discharge policy was developed with a growing emphasis on working with the person in pain to design a management plan that could be implemented in the community with assistance where necessary from their GP or practice nurse.
6. The use of personalized chronic condition care plans improved over the period of redesign. These Pain Management Action Plans (PMAPs) were initially used to provide feedback after multidisciplinary assessment. Early plans in retrospect were often clinician dominated and used excessively medical language. As PMAPs developed the input of the person in pain increased, language was simplified and usage became more widespread across the spectrum of people treated.

	URGENT	HIGH PRIORITY	MODERATE PRIORITY	GP CONTACT	REFERRAL NOT INDICATED
CRITERIA	1. Cancer pain 2. Neuropathic pain (including CRPS) < 3/12 duration 3. Vascular procedures	Pain < 1 year not responding to GP management OR Frequent Emergency Dept. presentations (≥ 1 per month) or hospital admissions (≥ 3 per year) **Focus areas:** 1. Neuropathic pain (including CRPS) 2. Frequent exacerbations of persistent pain 3. Marked psychological distress 4. Marked physical interference 5. Work related injuries	Pain > 1 year not responding to GP management **Focus areas:** 1. Medication optimisation 2. Opioid authority 3. Diagnostic advice 4. Psychological distress 5. Physical interference	Pain of any duration where GP/Pain Clinic contact may avoid HIPS face-to-face assessment **Focus areas:** 1. Medication 2. Opioid authority 3. Diagnosis 4. General advice	Patients who can be well managed by GP (using appropriate guidelines where necessary) Previous HIPS patients who have not followed management recommendations Previous HIPS patients who have completed group pain management programs and for whom no new management approaches are available
WAITING TIME TARGET	1 month Priority A	3 months Priority B	6 months Priority C	3 months Priority B	

Figure 4 Triage criteria and waiting time targets.

7. GP telephone contact was initiated as a new triage category (Figure 4). Thirty-minute appointments allowed a pain medicine specialist to contact the GP and make appropriate plans, compared with 60 minutes for a new medical clinic assessment. This activity category also included allied health and nursing telephone contacts.
8. An 80-hour group pain management program (IMPACT) was closed in the late 2006. The program had run five times per year aiming for 10 participants in each group. Despite significant participant gains across a range of outcome measures, the cost in terms of resources was deemed to be excessive. The program was replaced by multiple shorter programs. Moving with Pain commenced in late 2006, was physiotherapist delivered and comprised 9 hours of contact delivered in four sessions over a month. The emphasis was on increasing physical activity despite pain. Living with Pain commenced in early 2007 and was delivered by a clinical psychologist, a physiotherapist, and a nurse with a total of 36 hours in six sessions over a month. Participants could progress from Moving with Pain to Living with Pain depending on their level of need and commitment.
9. A preclinic education seminar called Understanding Pain (Figure 3) commenced in October 2008. This followed the pioneering implementation of a pre-assessment group intervention of 8 hours (STEPS: Self-Training Educative Pain Sessions) by Fremantle Hospital Pain Medicine Unit in October 2007 [2]. The Understanding Pain format was a single 90-minute session co-delivered each month by a pain medicine specialist and clinical psychologist. The opening 60-minute segment summarized causation and whole-person management of persistent pain with an emphasis on active strategies. Then followed 30 minutes for questions, answers, comments, and orientation to HIPS program. The educational format allowed for comparatively larger group numbers and participants were invited to bring a support person. Group size increased over time and ranged from 12 to 25 people in pain, with 68% accompanied by a family/support person. Initially, Understanding Pain was offered only to those triaged to multidisciplinary assessment. However, over time, it became a required first contact for an increasing proportion of people referred. A digital video disc version was developed for those living in rural and remote areas. Those with dementia or the elderly (>75 years) were not triaged to attend.
10. In early 2010, a further preclinic group intervention called Lifestyle and Pain (Figure 3) commenced. A small group structure was used for eight participants, each with the option to invite one support person. The program ran for 5 hours on a single day aiming to provide the information and support required for PMAP development. A randomized controlled trial is ongoing comparing outcomes from Understanding Pain plus multidisciplinary clinic assessment on one hand and Understanding Pain plus Lifestyle and Pain on the other. After the trial is completed the intention is that people will be able to choose to progress from referral to Understanding Pain to Lifestyle and Pain and then back to the community with a PMAP in

place, without the more resource intensive multidisciplinary clinic assessment. It is anticipated that this pathway may be suitable for those with an early interest in active management.

Plans for 2011 include commencement of a psychiatry led psychodynamic "Story Group" (8 hours) and a physiotherapy-led, neuroplasticity focused, "Neuropathic Pain Group" (8 hours). There will be the option of people flexibly participating in multiple groups of their choosing.

Results of System Change

In regards to demographic characteristics, a sample of 328 people referred concurrently to HIPS in 2007 showed that 55% were female and the mean age was 51 years (standard deviation [SD] 15 years). Eighty-four percent reported more than one site of pain and 28% reported pain of greater than a duration of 10 years. Seventeen percent were engaged in either full or part time work, with 41% stating they were unemployed because of pain. Twelve percent stated they were claiming workers compensation, motor vehicle accident or public liability compensation. Fifty-four percent of respondents reported very high levels of psychological distress as measured on the Kessler 10 [62], indicating the likelihood of a severe mental health disorder.

The transition to a whole-person model increased discussion of nutrition and story aspects of management and the emphasis on biomedicine gradually declined. There were a handful of cases where abolition of long-standing pain was achieved by addressing the underlying story. Yet many people remained guarded about the significance of their story and chose not to pursue treatment offered in that area. Commonly, people found that making simple nutritional change proved a safe first step on the journey of changing long-standing habits. The increased use of PMAPs over the study period was a key part of this more balanced, person-centered approach and facilitated discharge to primary care. In 2003, PMAPs were used only for people attending multidisciplinary clinic assessment (approximately 50% of all referrals). By 2010, 90% of those referred had a PMAP developed.

There was a modest reduction in referral rate over time (Figure 5) in the context of broader system changes including GP education and clarification of triage criteria. There was a reduction in HIPS staffing (Figure 5) from 2008.

The range of activity undertaken by HIPS is shown in Figure 6. There was a steady decline in procedural intervention and use of implanted devices for persistent noncancer pain ceased altogether. The increased emphasis on discharge planning meant many fewer review appointments. Medical redeployment away from review appointments and procedures facilitated a steady increase in new assessments (both multidisciplinary and solo medical categories) from 2004 to 2007. The reduction in staffing from 2008 contributed to a fall in assessment rate. Over the study period, a net effect of the change process was reversal of the ratio of new to review appointments (1:2.6 in 2003; 1:0.77 in 2010).

Booked telephone contacts facilitated a higher turnover of cases (Figure 6). The 2005 peak in telephone contact occurred in response to the dramatic waiting list measures and system reorganization undertaken in the previous year. Over the study period, approximately 50% of cases addressed by telephone contact were discharged without the need for further input from HIPS.

Waiting time fell dramatically at the beginning of the study period and those benefits were sustained. Waiting time in 2003 was over 18 months for nonurgent cases. In 2004, as reported earlier, the waiting list was largely dissolved and clear triage criteria and waiting time targets were put in place. Figure 7 shows that waiting times for clinic assessment initially increased after the gains achieved by the 2004 waiting list dissolution. From 2005, waiting times

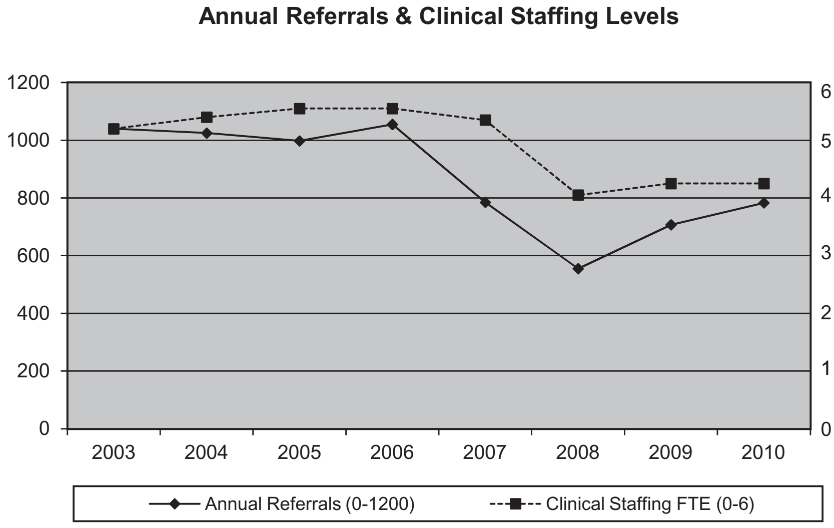

Figure 5 Referrals and staffing. Notes: (i) Referral criteria defined in October 2004; (ii) General practitioner education ongoing across study period; (iii) Reduced medical staff from 2008 because of recruitment/funding challenges.

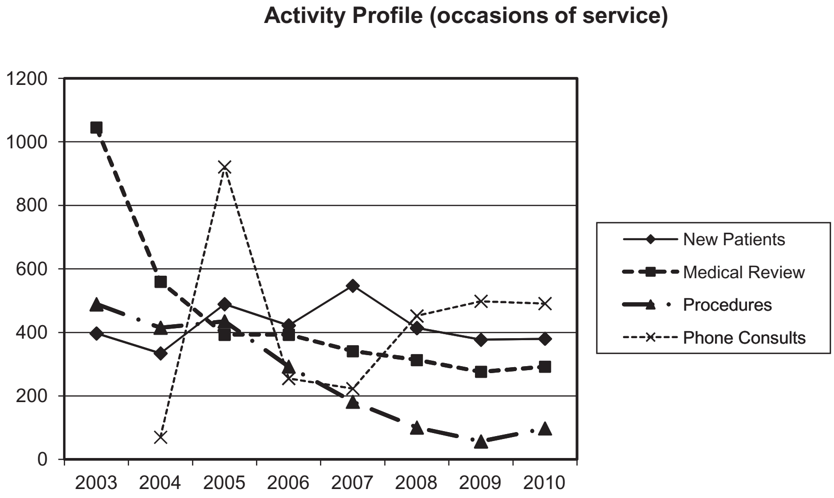

Figure 6 Hunter Integrated Pain Service activity. Notes: (i) October 2004 reorganization included waiting list dissolution, new triage categories including telephone consults, definition of referral criteria and discharge policy and emphasis on “whole-person” approach; (ii) 2005 peak in telephone consults as a response to major system reorganization of 2004; (iii) 2005 crossover point achieved where new patients seen exceeded medical reviews; (iv) 2008–2010 decline in new patients related to reduced medical staffing.

showed overall stability although the reduced staffing levels from 2008 had a measurable impact. Following the initiation of Understanding Pain in 2007, people were offered the benefit of an educational seminar within 1 month of referral and prior to clinic assessment. In 2010, Priority A cases (triaged for clinic assessment within 30 days) were seen on average in 45 days; Priority B cases (triaged for clinic assessment within 90 days) were seen on average in 83 days; Priority C cases (triaged for clinic assessment within 180 days) were seen on average in 111 days.

The use of a series of shorter and more flexibly time-tabled group interventions allowed a major increase in participation (Figure 8) from around 50 attendees per year with the old high-intensity program (IMPACT) to 367 per year in 2010 (with Understanding Pain, Lifestyle and Pain, Moving with Pain, and Living with Pain).

Of participants with pain attending the Understanding Pain seminar, 67% reported that either all or some of the information presented was new to them. The information was also rated as helpful and informative concerning treatment. On average, attendees reported intending to pursue two active self-management strategies following the seminar.

In regards to the Moving with Pain group, 156 participants completed outcome measures while attending one of 35 groups between 2007 and 2010. Over the 4 weeks of the program, participants showed significant reductions in time spent resting (23-minute reduction in lying, $Z(124) = -3.8$, $P < 0.001$ and 10-minute reduction in

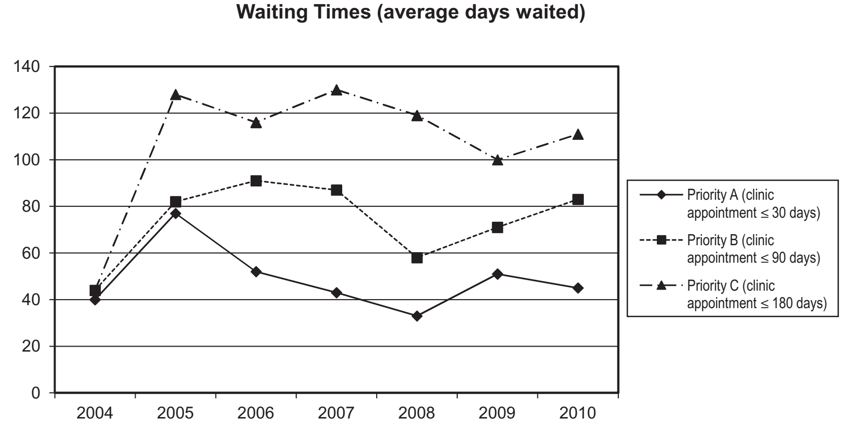

Figure 7 Waiting time for clinic assessment. Notes: (i) Prior to mid 2004 waiting time categories (Priority A, B, C) had not been defined. Nonurgent waiting time was over 18 months. The 40-day waiting time shown for 2004 followed dissolution of the major part of the waiting list late that year.

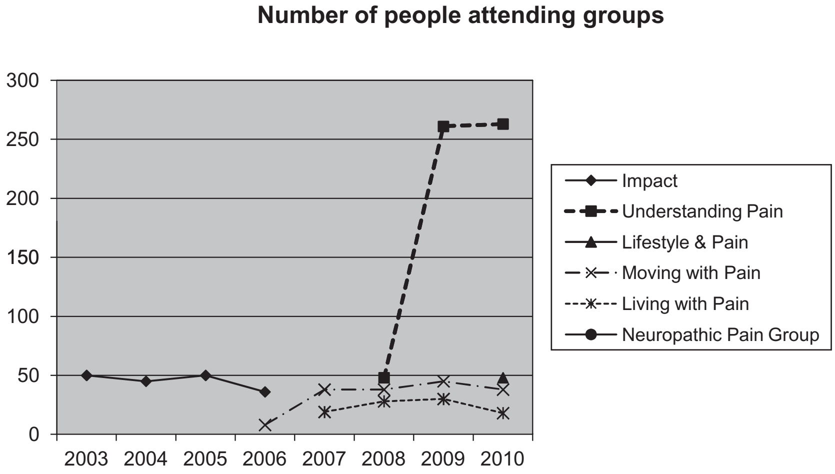

Figure 8 Group attendance. Notes: (i) "IMPACT", high-intensity group, closed late 2006; (ii) "Moving with Pain" group commenced late 2006; (iii) "Living with Pain" group commenced early 2007; (iv) "Understanding Pain" seminar commenced late 2008; (v) "Lifestyle and Pain" group commenced early 2010.

sitting, Z(124) = –3.5, $P < 0.001$), walking 20 m (2 seconds, Z(134) = –4.5, $P < 0.000$) and in the use of passive coping strategies as measured on the Pain Self-Management Checklist [63] (35–30, Z(58) = –4.5, $P < 0.000$). Reductions in health care use (from 7 to 5 visits in a 3 month period; Z(40) = –1.985, $P = 0.047$), and psychological distress as measured on the Kessler 10 (from 28 to 25, Z(40) = –2.860, $P = 0.004$) were also noted in a smaller sample followed up some months after completing Moving with Pain.

To extend the perspective gained by simply measuring pre and post data around a single intervention, a more comprehensive overall picture was gained from analyzing changes from point of entry to discharge from HIPS. A sample of 42 people, on average took 18.5 months (SD = 8.10, range 8–55 months) from time of referral to discharge, which occurred following completion of both Moving with Pain and Living with Pain groups (N = 31), or Living With Pain alone (N = 11). Over this time, significant reductions were reported in health care use (from 13 to 5 visits in a 3-month period; Z(32) = –3.56, $P < 0.000$); pain interference as measured by the Brief Pain Inventory (from severe to moderate range; Z(34) = –4.375, $P < 0.000$) and psychological distress as measured on the Kessler 10 (very high to moderate; Z(39) = –4.849, $P < 0.000$). There was also significant improvement in self-efficacy as measured on the Pain Self Efficacy Questionnaire [64] (Z(32) = –4.314, $P < 0.000$).

Discussion

The redesign of a model of care at both macro and micro levels proved a challenging yet rewarding undertaking. The limited resources available across a hard-pressed health care system inevitably resulted in untapped opportunities for intervention and inadequate outcome data. Yet despite the difficulties, positive changes resulted and the 8-year study period saw the transition from a nonfunctional multidisciplinary pain center to a functional one. While outcomes from the tertiary system perspective were dramatic, the perspectives of primary and community care and of the person in pain were more difficult to measure given available resources. There is clearly a need for further research to better define the impact of model of care redesign across the entire health care system and on clinical outcomes.

The idea that a whole-person approach can be used to "retrain the brain" and nervous system, with the potential at times to completely abolish pain, is a powerful concept that underlies much of the emerging paradigm in pain medicine. In both individual and group treatments the idea translated very differently to the traditional belief that persistent pain is biologically fixed and that therefore the best one can do is to learn to cope effectively. A sense of increased therapeutic optimism was developed.

At a health care systems level, the redesign combined grass roots intuition with translation of the emerging evidence base. During the study period, there was no national consensus on model of care or appropriate staffing. Subsequently, the National Pain Summit [30] held in March 2010 highlighted the need for integration of pain services across Australia and individual states have begun to develop more detailed strategic plans. Planning for national benchmarking of clinical outcome data is underway. The need for appropriate information technology platforms to facilitate flow of data between primary care and hospital-based systems has been recognized. Had such activities been underway in 2004 the redesign process would have been greatly assisted.

From a HIPS system perspective, there were marked improvements in key areas following the implementation of new strategies. Waiting times fell dramatically and the ratio of new assessment to review appointments was reversed indicative of increased flow through the system. A central aim of HIPS redesign was to balance referral rate with service capacity. However, it was difficult to make precise calculations, particularly when estimating service capacity in terms of numbers referred. The typical pattern across the study period was that 20% of people referred did not return the referral questionnaire and were therefore removed from the wait-list (the elderly and those with dementia were exceptions to this policy). Of those offered a place at Understanding Pain, 10% did not attend. Again this resulted in removal from the waiting list. Following attendance at Understanding Pain, 6% elected not to progress to clinic assessment, preferring a letter sent to their GP with management recommendations. In addition, triaged GP telephone contact for selected new patients provided another early intervention with only a 50% progression to clinic assessment. All of these filtering processes served to reduce the number referred toward the number of available new assessment clinic appointments. Thus, the relative stability of waiting times from 2005, despite staff reduction in 2008, inferred a degree of success in meeting the ongoing challenge of balancing referral rate with service capacity.

Despite improvement in system outcomes from HIPS perspective, there were significant limitations in interpreting the impact of change across the broader spectrum of health care. We did not have readily accessible information about community or health professional utilization of HIPS website. Likewise, a lack of pre-2004 data meant an inability to comment on whether patient complexity increased, as desired, in the context of a more appropriately triaged cohort. Furthermore, we could not analyze the wider significance of reduced referral rates. On one hand, it was possible that provision of website resources, improvements in GP education and definition of referral criteria were key positive contributors. On the other hand, it was possible that there was residual discouragement of referrers because of previous long waiting times or diversion to other providers such as private practice specialists.

HIPS clinical outcome measurement strategy involved sending out review questionnaires 3 months post discharge. Resource limitations precluded longer-term outcome measurement and the proportion of people who did not progress and continued to cycle through the system with recurrent referrals was not documented.

The implementation of the Understanding Pain seminar brought the opportunity for early active management and was thought to facilitate the subsequent process of clinic assessment. Over the course of the study period it became routine practice at multidisciplinary clinic assessment to work with the person in pain to develop a PMAP. There was a consistent opinion amongst HIPS staff that PMAP development was easier following attendance at Understanding Pain, however this was not formally evaluated. An additional unplanned benefit of the Understanding Pain seminar was that it provided an efficient means of providing education for interested local or visiting health professionals. It was commonplace to have two to four health professionals attend each seminar in that capacity.

Detailed outcomes from implementation of the shorter and more flexible group programs will be reported elsewhere. However preliminary analysis revealed positive clinical outcomes and this combined with the increased participation provided an endorsement of the policy of redeveloping the group program.

There are many future challenges in continuing to develop an integrated, whole-person model of care. These include formulation of public health strategy; partnership with appropriate health professionals to deliver short group interventions in the community; further clarification of complexity assessment and referral criteria for MPCs and related specialist services; development of persistent pain "tool kits" for use in primary care and consolidation of a culture of outcome measurement and benchmarking. Clearly it will be beneficial if the necessary funding is forthcoming to facilitate this integration of services across the spectrum of what is in reality a single unified health care system.

Acknowledgments

We would like to thank the team at HIPS, both administrative and clinical, who have all been involved in developing the whole-person model of care. We would like to thank Meredith Jordan, clinical psychologist at HIPS, for assistance with clinical outcome data.

References

1 Davies SJ, Hayes C, Quintner JL. Promoting system plasticity: Towards an integrated model of care for people in pain. Pain Med 2011;12(1):4–8.

2 Davies SJ, Quintner JL, Parsons R, et al. Preclinic group education sessions reduce waiting times and costs at public pain medicine units. Pain Med 2011;12(1):59–71.

3 Wall PD, Melzack R. On nature of cutaneous sensory mechanisms. Brain 1962;85:331–56.

4 Melzack R, Wall PD. Pain mechanisms: A new theory. Science 1965;150(3699):971–9.

5 Engel GL. The need for a new medical model: A challenge for biomedicine. Science 1977;196(4286): 129–36.

6 Engel GL. The clinical application of the biopsychosocial model. Am J Psychiatry 1980;137(5):535–44.

7 Loeser JD. Perspectives on pain. In: Turner P, ed. Proceedings of the First World Congress on Clinical Pharmacology and Therapeutics. London: Macmillan; 1980:313–6.

8 Waddell G, Bircher M, Finlayson D, Main CJ. Symptoms and signs: Physical disease or illness? BMJ 1984;289:739–41.

9 Quintner JL, Cohen ML, Buchanan D, Katz JD, Williamson OD. Pain medicine and its models: Helping or hindering? Pain Med 2008;9(7):824–34.

10 Siddall PJ, Cousins MJ. Persistent pain as a disease entity: Implications for clinical management. Anesth Analg 2004;99(2):510–20.

11 Angst MS, Clark JD. Opioid-induced hyperalgesia: A qualitative systematic review. Anesthesiology 2006;104(3):570–87.

12 Ballantyne JC, Shin NS. Efficacy of opioids for chronic pain: A review of the evidence. Clin J Pain 2008;24(6):469–78.

13 Hutchinson MR, Bland ST, Johnson KW, et al. Opioid-induced glial activation: Mechanisms of activation and implications for opioid analgesia, dependence, and reward. ScientificWorldJournal 2007;7:98–111.

14 Turner JA, Sears JM, Loeser JD. Programmable intrathecal opioid delivery systems for chronic non cancer pain: A systematic review of effectiveness and complications. Clin J Pain 2007;23(2):180–94.

15 Molloy AR, Nicholas MK, Asghari A, et al. Does a combination of intensive cognitive-behavioral pain management and a spinal implantable device confer any advantage? A preliminary examination. Pain Pract 2006;6(2):96–103.

16 Kemler MA, de Vet HC, Barendse GA, et al. Effect of spinal cord stimulation for chronic complex regional pain syndrome Type I: Five-year final follow-up of patients in a randomized controlled trial. J Neurosurg 2008;108(2):292–8.

17 Abdi S, Datta S, Trescot AM, et al. Epidural steroids in the management of chronic spinal pain: A systematic review. Pain Physician 2007;10(1):185–212.

18 Boswell MV, Colson JD, Sehgal N, Dunbar EE, Epter R. A systematic review of therapeutic facet joint interventions in chronic spinal pain. Pain Physician 2007;10(1):229–53.

19 Flor H, Fydrich T, Turk D. Efficacy of multidisciplinary pain treatment centers: A meta-analytic review. Pain 1992;49:221–30.

20 Morley S, Eccleston C, Williams AC. Systematic review and meta-analysis of randomized controlled trials of cognitive behaviour therapy and behaviour therapy for chronic pain in adults, excluding headache. Pain 1999;80:1–13.

21 Guzmán J, Esmail R, Karjalainen K, et al. Multidisciplinary rehabilitation for chronic low back pain: Systematic review. BMJ 2001;322(7301):1511–6.

22 Eccleston C, Williams AC, Morley S. Psychological therapies for the management of chronic pain (excluding headache) in adults. Cochrane Database Syst Rev 2009;(2):CD007407.

23 Mann L. From “silos” to seamless healthcare: Bringing hospitals and GPs back together again. Med J Aust 2005;182(1):34–7.

24 Blyth FM, March LM, Nicholas MK, Cousins MJ. Self-management of chronic pain: A population-based study. Pain 2005;113(3):285–92.

25 Low J. Back injuries, getting injured workers back to work. Aust Fam Physician 2006;35(12):940–4.

26 Hogg M, Gibson S, Helou A, Degabriele J. Waiting in pain: A systematic investigation into the provision of persistent pain services in Australia. Sponsored by the Australian Pain Society, Interim report prepared for National Pain Summit, March 2010.

27 Lynch ME, Campbell F, Clark AJ, et al. A systematic review of the effect of waiting for treatment for chronic pain. Pain 2008;136(1–2):97–116.

28 Hayes C, Davies SJ. Managing demand: Applying concepts at the coal face. Paper presented at Australian and New Zealand College of Anaesthetists Annual Scientific Meeting, Cairns 2009.

29 Department of Health and Ageing. National health and hospitals reform commission: A healthier future for all Australians. Canberra: Commonwealth of Australia; 2009.

30 National Pain Strategy. Available at: http://www.painaustralia.org.au/strategy/ (accessed October 24, 2011).

31 Mead N, Bower P. Patient-centeredness: A conceptual framework and review of the empirical literature. Soc Sci Med 2000;51:1087–110.

32 Epstein RM. The science of patient-centered care. J Fam Pract 2000;49:805–7.

33 Stewart M. Towards a global definition of patient centered care. BMJ 2001;322:444–5.

34 Pruitt SD, Epping-Jordan JE. Preparing the 21st century global healthcare workforce. BMJ 2005;330:637–9.

35 Broom B. Meaning-Full Disease. London: Karnac Books; 2007.

36 Sarno JE. The Divided Mind: The Epidemic of Mind-body Disorders. New York: Harper Collins; 2006.

37 Kiecolt-Glaser JK, Glaser R. Psychoneuroimmunology and health consequences: Data and shared mechanisms. Psychosom Med 1995;57(3):269–74.

38 Hsu M, Schubiner H. Recovery from chronic musculoskeletal pain with psychodynamic consultation and brief intervention: A report of three illustrative cases. Pain Med 2010;11:977–80.

39 Stewart M, Brown JB, Donner A, et al. The impact of patient-centered care on outcomes. J Fam Pract 2000;49:796–804.

40 Woolf CJ. Recent advances in the pathophysiology of acute pain. Br J Anaesth 1989;63:139–46.

41 Flor H. Cortical reorganisation and chronic pain: Implications for rehabilitation. J Rehabil Med 2003;(41 suppl):66–72.

42 Ramachandran VS, Altschuler EL. The use of visual feedback, in particular mirror visual feedback, in restoring brain function. Brain 2009;132(7):1693–710.

43 Doidge N. The Brain that Changes Itself. New York: Penguin Books; 2007.

44 Egger G, Binns AF, Rossner SR. The emergence of "lifestyle medicine" as a structured approach for management of chronic disease. Med J Aust 2009;190(3):143–5.

45 Egger G. Health, "illth," and economic growth: Medicine, environment, and economics at the crossroads. Am J Prev Med 2009;37(1):78–83.

46 Egger G, Dixon J. Inflammatory effects of nutritional stimuli: Further support for the need for a big picture approach to tackling obesity and chronic disease. Obes Rev 2009;11:137–49. [Epub ahead of print].

47 Egger G, Dixon J. Obesity and chronic disease: Always offender or often just accomplice? Br J Nutr 2009;18:1–5.

48 Esposito K, Giugliano D. Diet and inflammation: A link to metabolic and cardiovascular diseases. Eur Heart J 2006;27:15–20.

49 Willis CL, Davis TP. Chronic inflammatory pain and the neurovascular unit: A central role for glia in maintaining BBB integrity. Curr Pharm Des 2008;14:1625–43.

50 Marchand F, Perretti M, McMahon SB. Role of the immune system in chronic pain. Nat Rev Neurosci 2005;6:521–32.

51 Cao H, Zhang YQ. Spinal glial activation contributes to pathological pain states. Neurosci Biobehav Rev 2008;32(5):972–83.

52 Curtis CL, Rees SG, Little CB, et al. Pathologic indicators of degradation and inflammation in human osteoarthritic cartilage are abrogated by exposure to n-3 fatty acids. Arthritis Rheum 2002;46(6):1544–53.

53 Curtis CL, Rees SG, Cramp J, et al. Effects of n-3 fatty acids on cartilage metabolism. Proc Nutr Soc 2002;61(3):381–9.

54 Goldberg RJ, Katz J. A meta-analysis of the analgesic effects of omega-3 polyunsaturated fatty acid supplementation for inflammatory joint pain. Pain 2007;129(1–2):210–23.

55 Chapman-Kiddell CA, Davies PS, Gillen L, Radford-Smith GL. Role of diet in the development of inflammatory bowel disease. Inflamm Bowel Dis 2010;16: 137–51. (epub ahead of print).

56 Ozgocmen S, Ozyurt H, Sogut S, Aykol O. Current concepts in the pathophysiology of fibromyalgia: The potential role of oxidative stress and nitric oxide. Rheumatol Int 2006;26(7):585–97.

57 PM1: Principles regarding the use of opioid analgesics in patients with chronic non-cancer pain. Available at: http://www.fpm.anzca.edu.au/resources/professional-documents (accessed October 24, 2011).

58 Hunter Integrated Pain Service website. Opioid quick steps. 2011. Available at: http://www.hnehealth.nsw.gov.au/pain (accessed October 24, 2011).

59 Donovan MI, Evers K, Jacobs P, Mandleblatt S. When there is no benchmark: Designing a primary care-based chronic pain management program from the scientific basis up. J Pain Symptom Manage 1999;18(1):38–48.

60 Slaughter J. Kaiser permanente: Integrating around a care delivery model. J Ambul Care Manage 2000;23(3):39–47.

61 Buchbinder R, Jolley D. Effects of a media campaign on back beliefs is sustained 3 years after its cessation. Spine 2005;30(11):1323–30.

62 Andrews G, Slade T. Interpreting scores on the Kessler psychological distress scale (K10). Aust N Z J Public Health 2001;25:494–7.

63 Nicholas MK, Molloy A, Tonkin L, Beeston L. Manage Your Pain: Practical and Positive Ways of Adapting to Chronic Pain. Sydney: ABC Books; 2000.

64 Nicholas MK. The pain self-efficacy questionnaire: Taking pain into account. Eur J Pain 2007;11(2):153–63.