

## Ten-year survey reveals differences in GP management of neck and back pain

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### Abstract

**Purpose** Clinical guidelines provide similar recommendations for the management of new neck pain and low back pain (LBP) but it is unclear if general practitioner's (GP) care is similar. While GP's management of LBP is well documented, little is known about GP's management of neck pain. We aimed to describe GP's management of new neck pain and compare this to GP's management of new LBP in Australia between April 2000 and March 2010.

**Methods** All GP–patient encounters for a new (i.e. first visit to any medical practitioner) neck pain or LBP problem were compared in terms of treatment delivered, referral patterns and requests for laboratory and imaging investigations.

**Results** General practitioners in Australia have managed new neck pain and LBP problems at a rate of 3.1 and 5.8 per 1,000 GP–patient encounters, respectively. GP's primarily utilised medications, in particular non-steroidal anti-inflammatory drugs, to manage new neck and LBP problems and referred approximately 25% of all patients for imaging. Patients with new neck pain are more frequently managed using physical treatments and were referred more often to allied health professionals and

specialists. In comparison, patients with new LBP were managed more frequently with medication, advice, provision of a sickness certificate and ordering of pathology tests.

**Conclusions** This is the first time GP management of a new episode of neck pain has been documented using a nationally representative sample and it is also the first time that the management of back and neck pain has been compared. Despite guidelines endorsing a similar approach for the management of new neck pain and LBP, in actual clinical practice Australian GPs manage these two conditions differently.

**Keywords** Primary care · General practice · Low back pain · Neck pain

### Background

Neck pain and low back pain (LBP) are conditions that are commonly managed by general practitioners (GPs). These conditions present major social and economic burdens due to their prevalence, chronicity and resultant disability [1]. In many countries, including Australia, The Netherlands, Denmark and the UK, GPs are identified as the gate keepers of government-subsidised health care. They provide first-line care and referrals to medical specialists, allied health care, pathology, imaging and other investigations [2, 3]. In Australia, allied health care e.g. physiotherapy, occupational therapy, speech pathology are primary service providers and patients do not need a referral to seek care at their own expense, however, a GP referral is required for these services to be subsidised as part of the chronic disease management scheme [4]. Patterns of care and referral have been shown to vary

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greatly between GPs and this has a large impact on the cost and quality of care patients receive [5, 6].

While neck pain and LBP are distinct conditions anatomically, the recommendations for the diagnosis and management of these non-specific spinal conditions are remarkably similar [7]. For both conditions, routine imaging is not recommended and instead GPs are encouraged to restrict diagnostic work-up to those patients in whom the presence of red flags indicates a higher likelihood of serious spinal pathologies (e.g. fracture or tumour) [7]. Key treatment recommendations include reassurance (of the favourable prognosis for non-specific spinal pain), advice (to stay active and avoid bed rest) and analgesia. Paracetamol is recommended as the first line of analgesia as it is well tolerated and has minimal side effects unlike non-steroidal anti-inflammatory drugs (NSAIDs) and stronger opioid medications. NSAIDs are recommended as an adjunct in cases where paracetamol is insufficient [8–10]. While patterns of GP management are well documented for patients with a new episode of LBP [2] there are no studies which report on GP management of a large and representative group of patients presenting with a new episode of neck pain [11]. A lack of good quality research means that it is currently unclear how GPs manage patients with a new episode of neck pain and if this is similar to how they manage LBP. This study aims to compare GP's usual management of patients presenting with a new episode of neck pain to the management of those with a new episode of LBP. We considered treatment delivery, referral patterns and requests for laboratory and imaging investigations.

## Methods

We compared GP management of all new presentations of neck pain (including whiplash) and LBP in Australia over a 10-year period (April 2000–March 2010) using the Bettering the Evaluation and Care of Health (BEACH) database. BEACH is a continuous national cross-sectional study of GP activity, involving ever-changing random samples of approximately 1,000 GPs per year (drawn by the Australian Government Department of Health and Ageing from insurance claims data). Each GP participant completes a questionnaire about themselves and their practice, and uses structured paper-based encounter forms to record details of 100 consecutive patient encounters. This produces information for approximately 100,000 GP–patient encounters each year. Information collected includes: (i) details about the encounter (e.g. date, payment method), (ii) patient demographics (e.g. age, sex, postcode, ethnicity, etc.), (iii) up to three patient reasons for encounter and up to four diagnoses/problems managed, (iv) whether each problem is

(in the GP's opinion) work related, (v) the status of the problem to the patient (e.g. a new problem or old problem) and (vi) the management provided for each problem during the consultation (including medications, clinical treatments, procedures, referrals and orders for pathology and imaging). Reasons for encounters, problems managed, clinical treatments, procedures, referrals and investigations are classified according to the International Classification of Primary Care-Version 2 [12] but coded more specifically with the Australian general practice interface terminology, ICPC-2 Plus [13]. Medications are coded according to an in-house coding system known as the Coding Atlas for Pharmaceutical Substances (CAPS) [14] and mapped at the generic level to the Anatomic Therapeutic Chemical (ATC) classification [15]. Patient geographic location of residence (i.e. major city and non-major city) was categorised according to the Australian Standard Geographical Classification [16].

Completed encounter forms are returned to the BEACH research team for coding and data entry [17]. Quality control measures are applied regularly [18], for example, data for a minimum of one in ten coded forms are checked against the original recording form; data entry (Microsoft Access) and statistical software (SAS version 9.13; SAS Inc, Cary, North Carolina) are also employed to check accuracy and completeness. From its inception in April 1998 to date, the BEACH database contains over 1.2 million records of GP–patient encounters collected from almost half of all the practising GPs in Australia [19, 20]. In 2009–2010 approximately 83% of the Australian population claimed at least one GP service from Medicare with the average person visiting their GP 5.3 times between March 2009 and April 2010 [21]. In Australia, payment for GP visits is on a fee-for-service system with the majority of costs covered by Medicare, the universal Australian government funded medical insurance scheme.

## Participants

We identified all new (i.e. the first visit to any GP for the problem, or the first visit for a new episode of a recurrent problem) neck pain and LBP GP–patient encounters by searching the BEACH database for specific ICPC-2 Plus terms [13], as LBP and neck pain problems were spread across a number of ICPC-2 rubrics. The terms and their codes are listed in Appendix 1. We then extracted demographic data on the patients and their GPs and on the management provided for new cases of neck pain and LBP.

## Statistical methods

The BEACH study is a cluster sample design with a cluster of 100 patient encounters around each GP. We adjusted the 95% confidence intervals reported for the single stage

clustered study design using procedures in SAS statistical software (version 9.1.3 SAS Inc, Cary, North Carolina). Data are presented as a rate per 1,000 patient encounters or as proportions of new problems for which at least one of the selected management actions was given. Statistical significance of differences between management of new neck pain and new LBP is judged by non-overlapping 95% confidence intervals.

## Results

At the 984,200 recorded GP–patient encounters in the 10-year period (April 2000–March 2010), GPs managed LBP at a rate of 21.7 per 1,000 encounters, significantly more often than the rate at which neck pain problems were managed (8.7 per 1,000). More than one-third (35.7%) of the neck pain problems managed, and one quarter (26.6%) of LBP problems were new cases. A greater proportion of the new LBP problems were considered by GPs to be work related (6.8% compared to 4% of new neck problems). Approximately 25% of all the participating GPs saw at least one new case of neck pain, and 40% saw at least one new LBP problem in their cluster of 100 encounters. Male GPs managed significantly more new cases of both neck pain and LBP than female GPs. The management rate of new cases of LBP was steady across all GP age groups but the management rate of new neck pain problems significantly increased with GP age group (Table 1).

New neck pain problems were managed at a rate of 3.1 per 1,000 encounters and new LBP problems at almost double the rate, 5.8 per 1,000 encounters (Table 2). Extrapolating this average 10-year rate to the 116.8 million Government paid GP–patient encounters [14] in 2009–10, we estimate that in that year there were about 365,000 encounters for new neck pain, and a further 675,000 for new LBP problems among the 22.16 million people in Australia [14].

### Patient demographic data

While male and female patients presented with similar rates of new neck pain, males presented with marginally higher rates of new LBP. The pattern of the age-specific presentation rates of new neck pain and new LBP was similar for the two conditions with patients of working age (25–44 years and 45–64 years) having significantly higher presentation rates than younger (0–24 years) and older patients (65+ years). There was no difference in the presentation rate of new LBP problems between patients living in major cities and those living outside major cities, however, patients living in major cities had a significantly

higher presentation rate of new neck pain problems than those living outside major cities (Table 2).

### Management of new spinal pain

#### Medications

Medications were the treatment most often utilised by GPs to manage patients presenting with a new episode of neck pain and LBP, but at least one medication was advised or prescribed for a significantly larger proportion of patients with LBP (64.5% cf 58.1%). NSAIDs were the medication type most often chosen by the GPs for new cases of both neck pain and LBP, again this medication was selected significantly more often for patients with LBP (36.1%) than for those with neck pain (32.1%). For patients with neck pain GPs used paracetamol more often than opioid medications, however, for patients with LBP, opioid medications were equally likely to be selected. All other oral and topical medications were used infrequently for both problems (Table 3).

#### Other treatments

Therapeutic procedures such as manual therapies/rehabilitation (e.g. application of heat/ice, provision of exercises) were more likely to be provided to patients presenting with a new episode of neck pain, while clinical treatments (largely advice, education and reassurance) were more likely for patients presenting with LBP. Only a small proportion of patients received a sickness certificate but this was nearly twice as likely for patients with LBP (3.1%) than for those with neck pain (1.7%) (Table 2).

#### Referrals

Patients with neck pain were more commonly referred to allied health professionals (17.6% cf 15.0% for LBP), primarily physiotherapy. Referrals to specialists were infrequent, but were more common for patients presenting with new neck pain (2.4%) than for new LBP (1.3%) (Table 2).

#### Tests/Investigations

Nearly one in every four patients presenting with neck pain and LBP had imaging ordered, the vast majority being for diagnostic radiology (plain x-rays) while orders for ultrasound and computerised tomography were uncommon. Pathology test orders were infrequent, but were more likely for patients with new LBP (4.2%) than for new neck pain (2.1%) presentations.

**Table 1** Management rates of new presentations of neck pain and lower back pain, per 1,000 encounters and as a proportion (%) of problems managed

	Total encounter sample		984,200	
	Total number of GP participants		9,842	
	Neck pain problem		LBP problems	
	<i>n</i>	Rate per 1,000 encounters (95% CIs)	<i>n</i>	Rate per 1,000 encounters (95% CIs)
Back or neck encounters	8,591	8.7 (8.4–9.0)	21,350	21.7 (21.2–22.1)
Proportion of problems				
New	3,070	35.7% (34.6–36.9)	5,675	26.6% (25.9–27.3)
Work related	794	9.2% (8.5–10.0)	2,559	12.0% (11.4–12.6)
New and work related	124	4.0% (3.3–4.8)	384	6.8% (6.0–7.5)
% of GPs who managed	2,453	24.9% (24.1–25.8)	3,937	40.0% (39.0–41.0)
GP characteristic-specific management of new cases, rate per 1,000 encounters				
Gender				
Male	2,138	3.4 (3.2–3.5)	3,862	6.1 (5.8–6.3)
Female	932	2.7 (2.5–2.9)	1,813	5.2 (5.0–5.5)
Age				
<35 years	159	2.5 (2.1–2.9)	369	5.8 (5.1–6.5)
35–44 years	642	2.8 (2.6–3.0)	1,307	5.7 (5.3–6.0)
45–54 years	1,118	3.2 (3.0–3.4)	2,010	5.8 (5.5–6.1)
>55 years and older	1,140	3.4 (3.1–3.6)	1,959	5.8 (5.5–6.1)
Missing	11		30	

**Table 2** Patient characteristic-specific management of new presentations of neck pain and LBP, rate per 1,000 encounters

Patient characteristic	New neck pain		New lower back pain	
	Number	Rate per 1,000 encounters (95% CIs)	Number	Rate per 1,000 encounters (95% CIs)
Gender				
Male	1,221	3.1 (2.9–3.3)	2,436	6.1 (5.9–6.4)
Female	1,828	3.2 (3.0–3.3)	3,177	5.5 (5.3–5.7)
Missing	21		62	
Age				
0–24	473	2.3 (2.1–2.5)	699	3.4 (3.1–3.6)
25–44	931	3.9 (3.7–4.2)	1,766	7.5 (7.1–7.9)
45–64	1,015	3.8 (3.5–4.0)	1,946	7.3 (6.9–7.6)
65+	629	2.4 (2.2–2.6)	1,231	4.7 (4.4–4.9)
Missing	22		33	
Residence*				
Major city	2,189	3.3 (3.2–3.5)	3,825	5.8 (5.6–6.0)
Rural	811	2.7 (2.5–2.9)	1,704	5.7 (5.4–6.0)
Total	3,070	3.1 (3.0–3.2)	5,675	5.8 (5.6–5.9)

\* Defined according to the Australian Statistical Geographic Classification [16]

## Discussion

Over the last 10 years GPs in Australia have seen new neck pain and LBP problems at a rate of 3.1 and 5.8 per 1,000 GP–patient encounters, respectively. In 2010, this is equivalent to one new GP–patient encounter for LBP for every 33 people in Australia and one new neck pain

GP–patient encounter for every 60 people in Australia. The recommendations for the diagnosis and management of new neck pain and LBP are similar. However we found that in clinical practice, apart from the common management choice of medication (NSAIDs) and high imaging order rates, these conditions are in fact managed differently. Patients with new neck pain are more frequently treated

**Table 3** GP management of new neck pain and LBP problems, proportion of problems that receive at least one of the listed management actions at encounter (CI%)

Management action	New neck pain problem (%) (95% CI) (n = 3,070)	New low back pain (%) (95% CI) (n = 5,675)
Medication advised/prescribed	58.1 (56.1–60.1)	64.8 (63.3–66.2)
NSAID*	32.1 (30.3–33.8)	36.1 (34.7–37.5)
Opioid total	11.5 (10.4–12.7)	18.6 (17.5–19.7)
Codeine/Paracetamol†	7.7 (6.7–8.7)	11.9 (11.0–12.8)
Paracetamol	15.8 (14.4–17.1)	17.1 (16.0–18.2)
Diazepam	3.2 (2.5–3.8)	2.3 (1.9–2.7)
Topical (musculoskeletal)	3.7 (3.1–4.5)	2.8 (2.3–3.3)
Muscle relaxants	0.3 (0.1–0.5)	0.1 (0.0–0.2)
Clinical treatments‡	20.3 (18.6–21.8)	23.1 (21.9–24.3)
Sickness certificate	1.7 (1.2–2.1)	3.1 (2.6–3.6)
Procedures§	25.1 (23.3–27.0)	18.5 (17.3–19.2)
Referrals (all)	20.3 (18.8–21.8)	16.5 (15.5–17.6)
Allied health provider	17.6 (16.1–19.0)	15.0 (14.0–16.0)
Physiotherapy	16.1 (14.7–17.5)	13.9 (12.9–14.9)
Specialists	2.4 (1.8–2.9)	1.3 (1.0–1.6)
Imaging orders	22.8 (21.3–24.4)	24.1 (22.9–25.3)
Diagnostic radiology orders	17.1 (15.7–18.5)	19.2 (18.1–20.3)
Pathology tests orders	2.1 (1.6–2.6)	4.2 (3.7–4.7)

\* NSAID—non steroid anti-inflammatory agent

† Codeine/paracetamol includes all combinations of codeine and paracetamol

‡ Clinical treatments include advice, education, counselling, reassurance, administration

§ Procedures include all physical treatments (i.e. manual therapy, injection and splinting)

with physical treatments and more likely to be referred to allied health professionals (e.g. physiotherapists) and to specialists. In contrast, patients with new LBP are managed more frequently with medication, advice, provision of a sickness certificate and pathology testing.

This is the first time GP management of a new episode of neck pain has been documented using a large representative sample and it is also the first time that the management of new neck pain and LBP has been compared. Strengths of this study include the size of the dataset and the rigorous data management procedures employed which mean that these findings provide an excellent description of GP-management actions for new episodes of neck and low back pain in Australia [17]. The focussed data collection using the standardised encounter form may be seen as a limitation of the study due to the absence of condition specific (e.g. pain severity, pain duration) information which limits the number of inferences that can be made between the treatment provided and the symptoms reported (e.g. are stronger pain medications prescribed to patients who report higher levels of pain). Furthermore, procedural and clinical treatments are recorded as free text which may result in an under reporting of these treatments as it requires GPs to recognise that any advice they are giving is a distinct part of the management and should be recorded, however, some GPs will not see this distinction believing the advice is part of usual care.

Similar rates of patient–physician consultations for a new episode of neck pain (1–2% [11, 22]) and LBP (2–4% [23, 24]) have been reported from other countries. When

comparing the results of this study to GP management which has been previously reported, our results suggest that Australian GPs deliver advice less often and refer patients more frequently for imaging. Previous studies have reported that advice is delivered to up to 97% [11] of patients for new neck pain and to between 32 and 76% [23–26] for LBP. It is important to consider the method in which these data are collected as it can significantly alter the rates reported. As discussed above our study may potentially underestimate the use of advice when compared with other studies that specifically ask whether advice was given (e.g. via a tick box option). We believe that asking specific questions may prime a GP to respond more often than they otherwise would. While the rate of reported advice is much higher elsewhere we have little indication as to the quality of the advice delivered. For example, Vos et al. [11] found that while 97% of patients with a new episode of neck pain received advice, 18% were advised to rest. In Australia, referrals for imaging as identified in this and other studies [2, 27] were much higher than those previously reported for patients with new neck pain (9% [11]) and new LBP (2–18% [24, 26]). These findings suggest an overutilization of imaging by GPs in Australia, especially in light of the low prevalence (<1%) of serious spinal pathology (fracture, tumour) [28] and of the fact that routine imaging has been shown to not have a beneficial influence on clinical outcomes [29]. Overuse of imaging may be due to GPs' fear of litigation, patient request or diagnostic uncertainty. However, it does translate into increased personal and societal financial costs, excessive and unnecessary exposure to

radiation and personal emotional stress all of which may be reduced through appropriate screening [7, 30].

Our study identifies that GPs manage new neck pain and LBP differently despite similarities in guideline recommendations for the management of these conditions. In the 10-year sample period GPs managed new LBP twice as often as they did new neck pain and this may partly explain GPs management practices as they may be more confident in managing this condition themselves with medications and clinical treatments such as advice, education and reassurance. In the case of neck pain, the higher levels of procedural treatments involving manual therapy (e.g. application of heat/cold, exercises) and referrals to allied health professionals (primarily to physiotherapists), and specialists, may reflect GPs' uncertainty in managing this problem. Future research may be directed to explaining these differences, better understanding the influences involved in the clinical decision making processes and identifying factors affecting the implementation of guideline recommendations. Consistent with studies conducted in other countries we found NSAIDs to be the medication most frequently recommended in the management of new neck pain and LBP [11, 23–25, 31] despite the strong association with gastrointestinal side effects [32, 33]. Our study found paracetamol to be the second most recommended medication for neck pain while it was the third most recommended medication for LBP. Of the opioids used to manage both new neck pain and LBP, the majority were codeine/paracetamol combination medications. The preferential use of medications other than guideline-recommended paracetamol for the management of LBP may reflect GPs' belief that paracetamol is an insufficient form of pain relief for this condition, concerns about patient satisfaction, or be due to patient requests for stronger pain medicines possibly because of the influences of media campaigns advertising pain medications [34, 35]. It is, however, interesting to note, the infrequent use of muscle relaxants in our study compared to that reported internationally [24, 31]. Muscle relaxants, alone or in combination with other medications, are listed as an optional treatment in some international guidelines which may explain their frequent use in other studies [8, 10, 24, 31, 36].

Undoubtedly GPs have a large workload and face challenges keeping up to date with guideline recommendations especially in the case of spinal pain, where there is a large degree of uncertainty surrounding the diagnosis and effectiveness of many therapeutic interventions [5]. The breakdown in the translation of guideline recommendations into clinical practice may not be the sole responsibility of GPs but rather reflect an overload of information. Specific issues include multiple guidelines available for the same condition [8, 10], the extensive detail contained in each, and inefficient and ineffective implementation and

dissemination by researchers and governments. It has been suggested that practitioner education should be simplified to contain a few key management messages and be implemented more systematically with emphasis on approaches which are interactive, multifaceted and closely linked to the primary clinical decision making process [8, 37, 38]. Future research is needed to identify the most effective strategies to improve the dissemination and implementation process of guideline recommendations (e.g. through the use of electronic decision aids which are in accordance with guideline management) [8, 26] and to increase community awareness and knowledge of appropriate neck and low back management.

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## References

1. Woolf A, Pfleger B (2003) Burden of major musculoskeletal conditions. *Bull World Health Org* 81(9):646–656
2. Williams CM, Maher CG, Hancock MJ, McAuley JH, McLachlan AJ, Britt H et al (2010) Low back pain and best practice care: a survey of general practice physicians. *Arch Intern Med* 170(3):271–277
3. Coole C, Watson P, Drummond A (2010) Work problems due to low back pain: what do GPs do? A questionnaire survey. *Fam Prac* 27:31–37
4. Australian Government Department of Health and Aging (2010) What Medicare covers (updated 7 Oct, 2010; cited 2011 31 Aug). <http://www.medicareaustralia.gov.au/public/claims/what-cover.jsp>
5. Cowen ME, Zodet MW (1999) Methods for analyzing referral patterns. *J Gen Intern Med* 14(8):474–480
6. Nutting PA, Franks P, Clancy CM (1992) Referral and consultation in primary care: do we understand what we're doing? *J Fam Pract* 35(1):21–23
7. Australian Acute Musculoskeletal Pain Guidelines Group (2003) Evidence-based management of acute musculoskeletal pain. National Health and Medical Research Council, Australia
8. Koes B, van Tulder M, Ostelo R, Burton A, Waddell G (2001) Clinical guidelines for the management of low back pain in primary care. An international comparison. *Spine* 26(22):2504–2514
9. Australian Medicines Handbook Pty Ltd and Health Communication Network (2010) Australian medicines handbook
10. Koes B, van Tulder M, Lin C, Macedo L, McAuley J, Maher C (2010) An updated overview of clinical guidelines for the management of non-specific low back pain in primary care. *Eur Spine J* 19(12):2075–2094
11. Vos C, Verhagen A, Passchier J, Koes B (2007) Management of acute neck pain in general practice: a prospective study. *Br J Gen Pract* 57(534):23–28
12. Classification Committee of the World Organization of Family Doctors (1998) ICPC-2: international classification of primary care, 2nd edn. Oxford University Press, Oxford
13. Britt H (1997) A new coding tool for computerised clinical systems in primary care-ICPC plus. *Aust Fam Phys* 26(Suppl 2): S79–S82
14. Britt H, Miller G, Charles J, Henderson J, Bayram C, Pan Y et al (2010) General practice activity in Australia 2009–10. Australian

- Institute of Health and Welfare, Canberra (contract No.: Cat. no. GEP 27)
15. World Health Organization Collaborating Centre for Drug Statistics Methodology (1997) Anatomical therapeutic chemical (ATC) classification index with defined daily doses (DDDs), Jan 1998 edn. World Health Organisation
  16. Australian Bureau of Statistics (2008) Australian standard geographical classification. Australian Institute of Health and Welfare
  17. Britt H, Miller G, Bayram C (2007) The quality of data on general practice: a discussion of BEACH reliability and validity. *Aust Fam Phys* 36(1–2):36–40
  18. Britt H (1998) Reliability of central coding of patient reasons for encounter in general practice, using the International Classification of Primary Care. *Inform Prim Care* 3–7
  19. Britt H, Miller G, Charles J, Henderson J, Bayram C, Valenti L, et al (2010) General practice activity in Australia 2000–01 to 2009–10: 10 year data tables. <http://www.aihw.gov.au/publications/index.cfm/title/12119>
  20. The Family Medicine Research Centre (2010) The BEACH project, bettering the evaluation and care of health (internet) (updated 14 July 2010 cited 2010). <http://www.fmrc.org.au/beach.htm>
  21. Australian Government Department of Health and Ageing (2009) Medicare statistics, March quarter 2009, Group B tables. Australian Government Department of Health and Ageing, Canberra. [www.health.gov.au/internet/main/publishing.nsf/Content/medstat-mar09-tablesb](http://www.health.gov.au/internet/main/publishing.nsf/Content/medstat-mar09-tablesb)
  22. Binder AI (2008) Neck pain. *Clin Evid* (Online)
  23. Hart L, Deyo R, Cherkin D (1995) Physician office visits for low back pain. *Spine* 20(1):11–19
  24. Gonzalez-Urzelai V, Palacio-Elua L, Lopez-de-Munain J (2003) Routine primary care management of acute low back pain: adherence to clinical guidelines. *Eur Spine J* 12(6):589–594
  25. Schroth WS, Schectman JM, Elinsky EG, Panagides JC (1992) Utilization of medical services for the treatment of acute low back pain: conformance with clinical guidelines. *J Gen Intern Med* 7(5):486–491
  26. Schers H, Braspenning J, Drijver R, Wensing M, Grol R (2000) Low back pain in general practice: reported management and reasons for not adhering to the guidelines in the Netherlands. *Br J Gen Pract* 50:640–644
  27. McGuirk B, King W, Govind J, Lowry J, Bogduk N (2001) Safety, efficacy, and cost effectiveness of evidence-based guidelines for the management of acute low back pain in primary care. *Spine* 26(23):2615–2622
  28. Henschke N, Maher CG, Refshauge KM, Herbert RD, Cumming RG, Bleasel J et al (2009) Prevalence of and screening for serious spinal pathology in patients presenting to primary care settings with acute low back pain. *Arthr Rheum* 60(10):3072–3080
  29. Chou R, Fu R, Carrino JA, Deyo RA (2009) Imaging strategies for low-back pain: systematic review and meta-analysis. *Lancet* 373(9662):463–472
  30. Stiell I, Wells G, Vandemheen K, Clement C, Lesiuk H, De Maio V et al (2001) The Canadian C-spine rule for radiography in alert and stable trauma patients. *JAMA* 286(15):1841–1848
  31. Cherkin DC, Wheeler KJ, Barlow W, Deyo RA (1998) Medication use for low back pain in primary care. *Spine* 23(5):607–614
  32. Roelofs PD, Deyo RA, Koes BW, Scholten RJ, van Tulder MW (2008) Non-steroidal anti-inflammatory drugs for low back pain. *Cochrane Database Syst Rev* 1:CD000396
  33. Griffin M (1998) Epidemiology of nonsteroidal anti-inflammatory drug-associated gastrointestinal injury. *Am J Med* 104(3A):23S–29S, 41S–42S
  34. Kravitz R, Epstein R, Feldman M, Franz C, Azari R, Wilkes M et al (2005) Influence of Patients' Requests for Direct-to-Consumer Advertised Antidepressants: A Randomized Controlled Trial *JAMA*. 293(16):1995–2002
  35. Weissman J, Blumenthal D, Silk A, Newman M, Zapert K, Leitman R, et al (2004) Physicians report on patient encounters involving direct-to-consumer advertising. *Health Affairs*. doi: 10.1377/hlthaff.W4.219
  36. Chou R, Qaseem A, Snow V, Casey D, Cross J, Shekelle P et al (2007) Clinical Efficacy Assessment Subcommittee of the American College of Physicians American College of Physicians American Pain Society Low back pain Guidelines Panel Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College of Physicians and the American Pain Society. *Ann Intern Med* 147(7):478–491
  37. Bekkering GE, van Tulder MW, Hendriks EJ, Koopmanschap MA, Knol DL, Bouter LM et al (2005) Implementation of clinical guidelines on physical therapy for patients with low back pain: randomized trial comparing patient outcomes after a standard and active implementation strategy. *Phys Ther* 85(6):544–555
  38. Roberts C, Adebajo AO, Long S (2002) Improving the quality of care of musculoskeletal conditions in primary care. *Rheumatology* (Oxford) 41(5):503–508