Journal of Medical Economics ›
Volume 15, 2012 - Issue 2



Original Article

# The burden of chronic low back pain with and without a neuropathic component: a healthcare resource use and cost analysis

Maneesha Mehra, Kala Hill, Deborah Nicholl & Jan Schadrack

Pages 245-252 | Accepted 14 Nov 2011, Published online: 05 Dec 2011

Cite this article https://doi.org/10.3111/13696998.2011.642090





Abstra

Backgro

This rese n of chronic low back ients with and with

Metho

Data we 006–2008). Patients low back pain, an tive period were inc a neuropa ) based on

ICD-9 codes. Healthcare resources, physical therapy, prescription medication use, and associated costs were assessed for the period January 1–December 31, 2008.

Results:

A number of patients (39,425) were identified with CLBP (90.4% wNP). Patients wNP included more women, were older and more likely to have clinically diagnosed depression, and made significantly greater use of any prescription medication at index event, opioids (particularly schedule II), and healthcare resources. Total direct costs of CLBP-related resource use were ~US$96 million over a 12-month follow-up. CLBP wNP accounted for 96% of total costs and mean annual cost of care/patient was ~160% higher than CLBP patients woNP (US$ 2577 vs US$ 1007, $p < 0.0001$).

Limitations:

This study was descriptive and was not designed to demonstrate causality between diagnosis, treatment, and outcomes. Resource use and costs for reasons other than LBP were not included. Patients with neuropathic pain are more likely to seek treatment; therefore CLBP patients with a non-neuropathic component may be under-represented.

Conclusions:

The disproportionately high share of interventional resource use in CLBP wNP suggests greater
e the range
of pain s
ent
outcome

Keywords

Chronic pa

## Introd

Chronic
a patient
has low
mptoms[1].
Many ca
however,

days in the previous 3 months as a pre-requisite, Schmidt et al.[2] estimated that almost one-fifth of the general German population had persistent back pain.

The pathophysiology of back pain is complex and both nociceptive and neuropathic pain-generating mechanisms are thought to be involved. Estimates of the proportion of CLBP patients with a neuropathic component (wNP) range from 17–54% and vary according to the method of classification used[2–7]. However, given that as many as 28% of patients had an uncertain diagnosis[3], the neuropathic component in chronic back pain may yet be under-estimated.

Back pain is one of the single most costly disorders in many industrialized nations[8]. Estimates of the total national expenditure (US) for the care of LBP range from US$ 20–50 billion in 1998[9] and growing concerns about the high cost of CLBP care has increased interest in the factors associated with CLBP and healthcare service use. Previous studies have found in addition to analgesic use in patients with LBP[10], physical and mental health comorbidities[11], back pain diagnosis (disc disorder/sciatica, arthritis vs other), chronic pain grade, pain persistence, depressive symptomatology, and back pain-related disability compensation are associated with higher healthcare utilization and costs[12]. Higher costs are also associated with surgery, particularly in those patients who do not respond to therapy. However, there is limited evidence on the burden, particularly the costs, associated with CLBP wNP. In a cross-sectional observat to visit their physicia nctioning, despite milarly, a recent m n experien oL) compare between increasi analysis was y modeled the p ast 30 days in the pr ts of a cross-se naire in Germany -to-long-term ba gher than patients

The current study aims to address a need for population-based studies to provide a direct assessment of CLBP wNP and its associated costs in the general population[2]. It examines patterns of healthcare service use and costs for CLBP patients wNP and without a neuropathic component (woNP), in a large US patient commercial insurance claims integrated database with regionally representative coverage.

## Methods

### Source data

Medical and pharmaceutical claims data were obtained from retrospective analysis of the PharMetrics IMS LifeLink™ Health Plan Claims Database (PharMetrics Inc., Watertown, MA) for the period January 1–December 31, 2008. The database is the largest non-payer-owned integrated claims database of commercial insurers in the US. This de-identified, integrated database includes medical and pharmacy claims for more than 55 million unique members from more than 90 health plans across the US. It includes inpatient and outpatient claims, diagnoses, and procedures, including physiotherapy (based on International Statistical Classification of Diseases, Ninth Revision (ICD-9) and Current Procedural Terminology (CPT-4) codes) as well as retail and mail order pharmacy claims. The database includes claims for medical equipment, however vered.

The data tion, and includes type. This longitud spitalization, emerger ry, and prescript were retrie cluded in the a ons were included ment Agency drug sch ), anti-epileptic e period January d to reasons other th

Inclusion criteria were devised to classify patients with CLBP (Figure 1). Patients were included in the analysis if they satisfied all of the following criteria:

- They were aged 18 years or over on January 1, 2008;
- They had continuous enrollment in the database of 36 months; at least 12 months follow-up from the index event (January 1, 2008) and 24 months retrospective data;
- They had an ICD-9 code for diagnosis or treatment of LBP (724.4) during the retrospective period; and
- They had an ICD-9 code for diagnosis or treatment of LBP in at least 3 out of 4 consecutive months during the prospective period in order to establish CLBP.

Patients that satisfied all of the above criteria were classified with CLBP wNP and woNP according to the following definitions:

- CLBP patients wNP (ICD-9 codes primary or supplementary): 720.1, 720.8, 721.0, 721.1, 721.4, 721.8, 721.9, 722.0, 722.1, 722.2, 722.4, 722.5. 722.6, 722.7, 722.8, 722.9, 723.0, 723.1, 723.2, 723.4, 724.0, 724.1, 724.2, 724.3, 724.5, 724.6, 724.8, 724.9, 737.3, 738.5.
- CLBP patients woNP (ICD-9 codes primary or supplementary): 307.89, 720.0, 720.2, 720.9, 3.9, 724.7, 47.2, 847.9, .8, 846.9, 847.1,

Figure 1 , low back pain; ICD n; CLBP, chronic

Display full size

## Statistical analyses

The primary aims of the analyses were to compare the distribution of medical care and costs for CLBP patients wNP or woNP. All those meeting the patient classification were included in the analysis. The statistical analyses were performed using SAS 9.1 statistical software (SAS Institute Inc., Cary, NC). Chi-squared and t-tests were used to compare proportions and means between groups, respectively. Statistical significance was defined at the level of 5% ($\alpha = 0.05$). PROC GLM (General Linear Model) was used to compare resource use between CLBP patients wNP or woNP. The model controlled for differences in gender, age, and prevalence of clinical depression based on ICD-9 diagnosis.

# Results

## Patient demographics

A number of patients (225,259) were identified in the PharMetrics database on January 1, 2008, based on the LBP ICD-9 diagnosis definition; 183,929 of these patients had complet ts had at least 24 008. The criteria f r treatment) were ap 59,084 of these pa d an LBP diagnosi

The de able 1. The majo A higher proporti tion of male patients NP (38.3% vs 36.0% mewhat lower co s, ($p <$ 0.0001)]

Table 1. Patient demographics of CLBP patients at the index event.

Download CSV Display Table

There was a higher level of prior exposure to opioids amongst CLBP patients wNP by comparison with those woNP (71.8% vs 56.3%, $p < 0.0001$). The incidence of a comorbid cancer diagnosis amongst CLBP patients was similar regardless of pain type. A higher proportion of CLBP patients wNP had a diagnosis of clinical depression according to ICD-9 code classification compared with CLBP patients woNP (8.1% vs 3.2%, $p < 0.001$). There was no difference between CLBP patients wNP or woNP in the prevalence of cancer diagnosis. A higher proportion of CLBP patients wNP were receiving prescription medication at the index event compared with CLBP patients woNP (75.2% vs 61.8%, $p < 0.0001$). A higher proportion of CLBP patients wNP who were receiving prescription medication were on schedules II, III, and IV drugs compared with those woNP (62.0% vs 47.0%). Amongst CLBP patients on schedules II, III, and IV drugs, those wNP were more likely to be receiving schedule II drugs (which comprises strong opioids) compared with those woNP (39.4% vs 27.4%). Of the CLBP patients woNP on prescription medication at baseline, a large proportion (42.0%) were receiving AD/AEDs

## Resour

Treatme LBP patients accordin ents wNP were exp e woNP (41.9%). clinical depr onths of expos gnificantly higher th f months not on p patients woNP (5 d not receive

Table 2. Treatment exposure during 12-month follow-up period by CLBP patients according to pain type.

Download CSV Display Table

Medical resource utilization for CLBP patients with and without neuropathic components is shown in Table 3. A significantly higher proportion of CLBP patients wNP made use of healthcare resources, including diagnostic tests (24.3% vs 7.1%; $p < 0.0001$), ER visits (9.3% vs 4.9%; $p < 0.0001$), and hospital visits (5.1% vs 1.0%; $p < 0.0001$) compared with CLBP patients woNP. CLBP patients wNP made greater use of minimally invasive procedures (including the use of nerve blocks, spinal puncture, drainage of spinal abscess) (18.3% vs 6.1% [$p < 0.0001$]) and major procedures (such as artificial disc replacement, nerve repair, partial resection of vertebral components) (5.7% vs. 1.1% [$p < 0.0001$]) than CLBP patients woNP.

Table 3. Comparison of resource use for CLBP patients according to pain type during 12-month follow-up period.

Download CSV Display Table

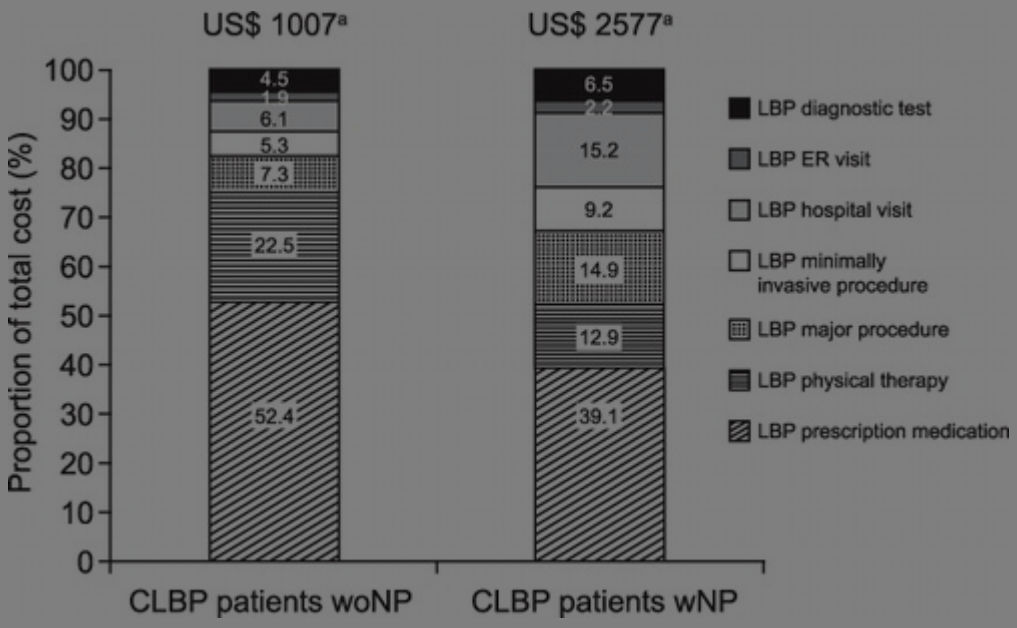


## Health

The tota llion over the 12-m or 90.4% of the total zation. The mean ar ne mean annu an those woNP (

The distr Figure 2. CLBP pa nostic tests (6.5% vs and minimall han CLBP patients nearly 75%

Figure 2. Comparison of proportions of average annual cost of resource use per patient for CLBP patients according to pain type during 12-month follow-up period. [a]Average annual cost of resource use per patient ($p < 0.0001$, CLBP patients woNP vs CLBP patients wNP). CLBP, chronic low back pain; woNP, without a neuropathic component; wNP, with a neuropathic component; LBP, low back pain; ER, emergency room.




Display full size

## Discussion

A variety of this condition ethod of diagnosi he prevalen ed in its classifica nt question port, the prese atients with LBP w

The maj ICD-9 codes (p ven the consider with the distribut entified in this stud n-

are more likely to seek treatment, CLBP patients with a non-neuropathic component may be under-represented in this cohort. However, the classification system of CLBP patients wNP used here may be considered more inclusive, since the patient cohort is defined based on claims for one or more ICD-9 codes for a neuropathic component. Consequently, it is not limited to CLBP patients wNP only, and may include patients where other pain components or mechanisms are involved. Freynhagen et al.[3] found that, in screening CLBP patients with neuropathic pain components attending orthopedic clinics for treatment, 33.5% of patients displayed a combination of any three or more of the listed signs and symptoms; however, this figure increased considerably (60.7%) when a less restrictive definition of two or more characteristic signs for neuropathic pain were considered.

Schmidt et al.[2] suggested that a neuropathic component is substantially more frequent in persons with severe back pain compared to persons with mild back pain. Using the painDETECT questionnaire, the proportion of persons classified as having neuropathic pain differed substantially between pain grades; amongst patients with the lowest pain grade fewer than 10% were assigned with neuropathic pain while nearly half of those in the highest grade pain were classified according to this type[2]. Therefore, the classification system of CLBP used here, requiring patients to experience chronic pain in 3 out of 4 continuous months with either a diagnosis code or treatment for LBP, is relatively stringent and more closely aligned with other clinical definitions of CLBP[15]. By speci ses over time is n population with mo ts wNP.

The CLB uses only on those pa atients identifie defined by their ing treat ince patients nd/or be receiving ype reported significa ed Needs question nd healthca y neuropa y scores

than other chronic non-neuropathic pain sufferers, and were marginally more likely to receive pain-related medication[7].

Notwithstanding the distinct method of classification, the demographics of the CLBP patient cohort in the current study were similar to the other analyses of this patient type. A relatively higher proportion of female patients with a CLBP diagnosis in the PharMetrics Database (63.8%) were also observed in the National Health Interview Survey (NHIS) (54.4%)[16]. The mean age of the CLBP patient cohort in the NHIS of 52.7 years was comparable with that reported here (51.0 years). The level of clinical depression (defined by ICD-9 diagnosis code classification) reported for the total CLBP patient cohort was somewhat lower (7.7%) than one other study in which comorbidities in LBP patients were assessed (13.4%)[11]. However, the latter study uses the RxRisk model, or Chronic Disease Score (a clinically validated algorithm that classifies patients into chronic disease categories based on prescription drug fills) to assess comorbidities[17], and may account for the comparatively higher level of clinical depression. The National Comorbidity Survey[18] reports a mean 12-month prevalence estimate of major depressive disorder of 6.7% in the general population using the Composite International Diagnostic Interview based on DSM-IV criteria, of which ~56.8% of patients seek treatment in any given year[19]. Given <60% of patients with depression seek treatment may explain the low prevalence of depression in our cohort. Nevertheless, there is a relatively higher proportion of CLBP patients wNP (8.1%) with depressi

CLBP pa rescription medicat edules III and IV d , use of schedule ilar to the medicat pain[7], wher n medi er painkillers [e.g., op ts with chronic use amongst ncare services

While th ,[20],

and woNP is scarce. Except for physiotherapy, CLBP patients wNP made significantly greater use of all resources during the follow-up period than patients woNP. The extent of the resource use of this patient cohort suggests that, despite the widespread use of available medications (including schedule II drugs and nerve blocks), their condition appears to remain largely inadequately managed, as indicated by their comparatively heavier reliance on inpatient resources, including ER visits. The difference in resource use between CLBP patient cohorts is most marked in the case of major procedures (relevant to LBP) where an ~5-fold greater proportion of CLBP patients wNP require these interventions compared to those woNP. Moreover, the invasiveness of these major procedures may contribute to the level of hospitalization experienced by the CLBP patients wNP.

The total mean annual cost per patient of US$ 2426 reported is consistent with other studies of the cost of CLBP-related care. The mean annualized costs, for 16,567 patients identified with LBP from a retrospective analysis of a health maintenance organization patient claims database, was US$ 2780 per patient in 199911. Based on a survey of patients with CLBP in primary care in Sweden, the total annual direct costs were estimated at US$ 2900 (€3100) per patient, in 2002 prices20. Average total back pain costs per patient, based on the direct costs from utilization of healthcare services and indirect costs due to back pain-related production losses, were estimated to be €1322 (US$ 1639) per year in Germany (at 2005 prices)21. Schmidt et al.2 calculated the aver to €2456 (US$ 34 osts associat 67% higher than tho

While th y analyzing the reso P contribute a dis rce use far in ex which may reflect th ve and costly su ate the range of mains a consider ver, the cost per patie BP patients woNP in effectively

outcomes in these patients and hopefully reduce burdens on the resources and budget of healthcare systems.

## Limitations

This study was descriptive in nature and was not designed to allow for the demonstration of causality between diagnosis, treatment, and outcomes.

Resource use and associated costs attributed to reasons other than LBP were not included in the analysis. This study captured data for only patients who were actively seeking and receiving medical treatment and, therefore, patients who have been managing their care independently through non-prescription over-the-counter medication may have been excluded. Patients with neuropathic pain are more likely to seek treatment, therefore CLBP patients with a non-neuropathic component may be under-represented in this study. Indirect costs due to lost productivity through sickness absence or early retirement of CLBP patients are not included. The database covers a commercially insured population who are primarily employed, thus CLBP patients who may be unemployed or who have lost employment may be excluded as a result. Similarly, CLBP patients aged over 65 years may be under-represented. Consequently, the overall patient burden reported in this study may under-estimate the full extent of the patie

The clas as such the results a s; indepen ance databas atients in the data

## Conclu

The disp NP suggests greater e the range of pain s ent outcom

## Transparency

### Declaration of funding

This analysis was supported by Johnson & Johnson Pharmaceutical Services, LLC.

### Declaration of financial/other relationships

At the time of conducting the study, all authors were employees of Johnson & Johnson Pharmaceutical Services, LLC.

## Acknowledgments

Medical writing assistance was provided by Iain McDonald, PhD, ApotheCom ScopeMedical Ltd, Sevenoaks, UK, funded by Johnson & Johnson Pharmaceutical Services, LLC.

Previous presentation

The data has been previously presented at American Pain Society, May 19–21, 2011, Austin, Texas (Poster number 140).

Source: Current Pain and Headache Reports

Back pain in primary care: predictors of high health-care costs

Source: Pain

Identifying Neuropathic Pain Among Patients With Chronic Low-Back Pain

Source: Regional Anesthesia and Pain Medicine

Medication and treatment use in primary care patients with chronic pain of predominantly neuropathic origin

Source: Family Practice

Modelling the prevalence and cost of back pain with neuropathic components in the general population

Source: European Journal of Pain

The Epidemiology of Chronic Pain of Predominantly Neuropathic Origin. Results From a General Population Survey

Source: Journal of Pain

Prognosis for patients with chronic low back pain: inception cohort study

Source: BMJ

Narcotic Drug Use Among Patients with Lower Back Pain in Employer Health Plans: A Retrospective Analysis of Risk Factors and Health Care Services

Source: Clinical Therapeutics

Twelve-Month Use of Mental Health Services in the United States

Sour

The

of

healt

Sour

pain

comp

Sour

Ri

S

Costs

Sour

A sys

d

State

Sour

Anal

rvice

Source: Spine

Burden of Illness of Chronic Low Back Pain in Sweden

Source: Spine

Prognose bei chronischen Rückenschmerzen nicht so schlecht wie bisher angenommen

Source: Unknown Repository

The burden of neuropathic pain: results from a cross-sectional survey

Source: European Journal of Pain

Linking provided by Scholexplorer

## References


1. Parthan A, Evans CJ, Le K. Chronic low back pain: epidemiology, economic burden and patient-reported outcomes in the USA. Expert Rev Pharmacoecon Outcomes Res 2006;6:359-69

   PubMed | Google Scholar

2. Schmidt CO, Schweikert B, Wenig CM, et al. Modelling the prevalence and cost of back p… with neuropathic components in the general population. Eur J Pain 2009;…

3. Freynh… …estionnaire to ide… …Res Opin 2006;…

4. Freynh… … back pain. Curr P…

5. Kaki A… …nts with…

Signs pain scale. Reg Anesth Pain Med 2005;30:422-8

PubMed | Web of Science ® | Google Scholar

6. Torrance N, Smith BH, Bennett MI, et al. The epidemiology of chronic pain of predominantly neuropathic origin. Results from a general population survey. J Pain 2006;7:281-9

Google Scholar

7. Torrance N, Smith BH, Watson MC, et al. Medication and treatment use in primary care patients with chronic pain of predominantly neuropathic origin. Fam Pract 2007;24:481-5

PubMed | Web of Science ® | Google Scholar

8. Dagenais S, Caro J, Haldeman S. A systematic review of low back pain cost of illness studies in the United States and internationally. Spine J 2008;8:8-20

PubMed | Web of Science ® | Google Scholar

9. Rhee Y, Taitel MS, Walker DR, et al. Narcotic drug use among patients with lower back pain in employer health plans: a retrospective analysis of risk factors and health care servic

10. Vogt M pact on health

11. Ritzwo es, utiliza uloskelet Disord

PubMed | Web of Science ® | Google Scholar

13. McDermott AM, Toelle TR, Rowbotham DJ, et al. The burden of neuropathic pain: results from a cross-sectional survey. Eur J Pain 2006;10:127-35

PubMed | Web of Science ® | Google Scholar

14. Doth AH, Hansson PT, Jensen MP, et al. The burden of neuropathic pain: a systematic review and meta-analysis of health utilities. Pain 2010;149:338-44

PubMed | Web of Science ® | Google Scholar

15. Costa Lda CM, Maher CG, McAuley JH, et al. Prognosis for patients with chronic low back pain: inception cohort study. BMJ 2009;339:b3829

PubMed | Web of Science ® | Google Scholar

16. Centers for Disease Control and Prevention, National Center for Health Statistics. National Health Interview Survey. 2008 http://www.cdc.gov/nchs/nhis.htm. 2005. [Last accessed 9 September 2010]

Google Scholar

17. Fishm tomated ambul

18. Natior plication (NCS- anuary 20

Googl

19. Wang vices in the Unitec Arch Gen Psychi

20. Ekman M, Jonhagen S, Hunsche E, et al. Burden of illness of chronic low back pain in Sweden: a cross-sectional, retrospective study in primary care setting. Spine (Phila Pa 1976) 2005;30:1777-85

PubMed | Web of Science ® | Google Scholar

21. Wenig CM, Schmidt CO, Kohlmann T, et al. Costs of back pain in Germany. Eur J Pain 2009;13:280-6

PubMed | Web of Science ® | Google Scholar

Download PDF

## Related research

People also read | Recommended articles | Cited by 98