

Prevalence of opioid dependence in spine surgery patients and correlation with length of stay

Mohammad Sami Walid, MD, PhD
 Leon Hyer, PhD
 Mohammed Ajjan, MD
 Aaron C. M. Barth
 Joe Sam Robinson, Jr., MD

ABSTRACT

Objective: We addressed the prevalence of opioid dependence (OD) in spine surgery patients and its correlation with length of stay (LOS) as the most important determinant of hospital cost.

Methods: The study took place at Georgia Neurosurgical Institute and the Medical Center of Central Georgia between March 2006 and January 2007. A prospective convenience sample of 150 spine surgery patients (48 lumbar discectomy, 60 cervical decompression and fusion, and 42 lumbar decompression and fusion [LDF]) was assembled. Patients were interviewed before surgery using a questionnaire designed in accordance with the World Health Organization and DSM-IV-TR criteria for the diagnosis of OD. The prevalence of OD was calculated based on questionnaire results. Pain intensity was quantified during admission using a 0-to-10 pain scale. We used pain intensity multiplied by duration of pain in months (WR index) as a new parameter. Lengths of stay were collected following patients' discharge from hospital. Pearson correlation and regression analysis were performed using SPSS software.

Results: Thirty (20.00 percent) patients were opioid dependent. The prevalence was highest among LDF patients (23.81 percent), females (22.78 percent), and, to a lesser degree, Caucasians (20.87 percent). There was no correlation between OD and age ($r = 0.08$, $p > 0.1$) or between OD and LOS ($r = 0.09$, $p > 0.1$). This study proved a very significant positive correlation between OD and pain intensity ($r = 0.24$, $p < 0.01$) and between OD and the WR index ($r = 0.30$, $p < 0.01$). On the other hand, there was a significant positive correlation between LOS and age ($r = 0.42$, $p < 0.01$), between LOS and the number of previous spine surgeries ($r = 0.28$, $p < 0.01$), and between LOS and duration of pain ($r = 0.18$, $p < 0.05$). Regression analysis showed that age, ethnicity, and type of surgery were the main determinants of LOS.

Conclusions: Chronic pain and prolonged use of opioids raise the prevalence of OD in spine surgery patients to 20 percent. The lack of effect of OD on LOS after surgical intervention means that efforts to decrease LOS by trying to satisfy patients' craving for opioids will not be fruitful. Older, African-American LDF patients with a lengthy history of pain and multiple spine surgeries in the past are the most likely to stay longer in hospital.

Key words: opioid, dependence, spine surgery, length of stay, WR index

INTRODUCTION

The first thing they told us in medical school is that no one has ever died from pain, but plenty of physicians have had their careers destroyed trying to help people who are in pain.

—Comment from an emergency room physician requesting anonymity (2001)

Chronic pain and addiction to prescription painkillers are two growing national problems. In 1999, it was estimated that over 86 million Americans suffered from ongoing chronic pain caused by back injuries, arthritis, and other noncancer conditions. Over 66 million individuals were partially or totally disabled due to back pain, and 8 million were permanently disabled. By 2003 the numbers had increased, with approximately 117 million American adults suffering from chronic pain conditions.¹ The director of the National Institute on Drug Abuse, Nora Volkow,² stated in 2005 that if opiates are given for pain, an estimated 5 to 15 percent of patients receiving them will become addicted. When opiates are prescribed for short-term use (one to two weeks), there is little likelihood of addiction, but there is an increased risk of addiction with long-term opiate use.

Fishbain et al.³ reviewed prevalence percentages for addiction in patients with chronic pain. They reported that different authors utilized different definitions and criteria. Overall, the prevalence of drug abuse/dependence/addiction for patients with chronic pain was in the range of 3.2 to 18.9 percent. Other studies have directly or indirectly explored this issue. Hoffmann et al.⁴ found an addiction rate of 23.4 percent, Chabal et al.⁵ found a rate of 34 percent, and Kouyanou et al.⁶ reported a rate of 12 percent. There has also been one report relating to chronic pain populations at a US Veterans' Affairs (VA) facility and in a primary care setting. In this study, Reid et al.⁷ found that prescription opioid abusive behavior was recorded in 24 percent of the VA patients and 31 percent of the primary care patients. As "opioid abusive behavior" does not necessarily translate into addiction, there is some uncertainty as to how to interpret these results and their implications.

Patients with back pain are among those with high potential for prescription-painkiller abuse. The prevalence of opioid dependence (OD) in back pain patients admitted for spine surgery has not been studied before, and its association with length of stay (LOS) in the hospital has not been determined. Therefore, in this article we address two issues: 1) the prevalence of OD in spine surgery patients, and 2) the correlations between different opioid-, pain-, and LOS-related parameters. Our hypothesis was that patients classified as opioid dependent would stay in the hospital for longer periods than those not meeting OD criteria. The study protocol was approved by the Institutional Review Board of the Medical Center of Central Georgia.

METHODS

We prospectively studied 150 preoperative spine surgery patients at Georgia Neurosurgical Institute between March 2006 and January 2007. All eligible patients were using an opioid for pain relief (convenience sample). These participants were between 24 and 78 years of age; 52.67 percent were female and 76.67 percent were Caucasian, and all were diagnosed with either herniated nucleus pulposus in the cervical or lumbar segments or spinal stenosis.

The World Health Organization (WHO) and the fourth revision of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR) both require three or more of the following six criteria for a diagnosis of dependence:

1. a strong desire or sense of compulsion to take the drug in question;
2. difficulties controlling drug-taking behavior in terms of its onset, termination, or levels of use;

3. a physiological withdrawal state when drug use is stopped or reduced, as evidenced by the characteristic withdrawal syndrome for the substance or use of the same (or a closely related) substance with the intention of relieving or avoiding withdrawal symptoms;

4. evidence of tolerance such that increased doses of the drug are required in order to achieve effects originally produced by lower doses;

5. progressive neglect of alternative pleasures or interests because of drug use, as well as increased amounts of time necessary to obtain or take the drug or to recover from its effects; and

6. persisting with drug use despite clear evidence of overtly harmful consequences, such as harm to the liver, depressive mood states, or impairment of cognitive functioning.^{8,9}

The Walid-Robinson Opioid-Dependence (WROD) Questionnaire was designed based on the above mentioned criteria:

1. Which of your drugs helps you most to ease the pain? Which do you desire to continue using?

2. Do you now experience lengthy periods of use or binge patterns of use?

3. Do you have tremors and use substances to relieve withdrawal symptoms?

4. Are you able to take more of the drug without easing the pain?

5. Do you neglect food, hygiene, or healthcare?

6. Do you continue to use the drug despite knowledge of problems caused or exacerbated by it?

The prevalence of OD in our convenience sample was calculated based on the results of this questionnaire. Pain intensity was quantified during admission using a 0-to-10 pain scale. We used pain intensity multiplied by duration of pain suffering in months (Walid-Robinson [WR] index) as a new parameter. Lengths of stay were collected following patients' discharge from hospital (after being able to stand and walk in the absence of complications). Pearson correlation and regression analysis were performed using SPSS software.

Counseling and Pharmacotherapy...

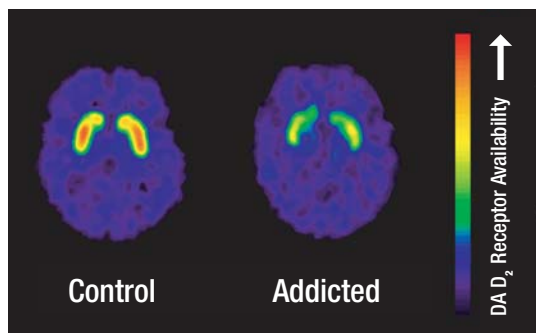
Help Enhance the Recovery Plan for Your Opioid-Dependent Patients

As a counselor, you may often see patients with opioid dependence who come to you for help and are ready to take the next step toward recovery. Many of them may be taken off course by withdrawal symptoms or drug cravings, and ultimately relapse. Some patients feel like they have failed themselves, and you might feel challenged in your efforts to help.

While psychosocial counseling is a cornerstone to successful opioid-dependence treatment, these patients may be candidates for medical treatment as an adjunct to counseling. A treatment option is available to address the biological basis of this disease within the privacy of a physician's office.

Evolving Evidence: Opioid Dependence Is a Biological Brain Disease

Studies document that continued drug use causes neurological and molecular changes in the brain. In fact, these alterations in brain structure and function persist long after drug use has ceased^{1,2}—perpetuating the cycle of drug-seeking behavior and withdrawal avoidance.



PET scans confirm the biological differences between the brain of a healthy volunteer and that of an opioid-dependent individual.³

Implementing an Integrated Treatment Program: Improving Patients' Outcomes

Pharmacotherapy plays an important role in helping control the biological effects of dependency—specifically, withdrawal symptoms and cravings. These are often the driving forces that lead individuals to continued opioid use, despite ongoing counseling. Addressing these symptoms with pharmacotherapy may allow your patients to have a more focused approach, positive attitude, and greater receptivity to counseling.

In fact, studies have shown that treatment using a combined strategy improved outcomes for many patients, including⁴:

- Increase in therapy retention
- Improvement in personal relationships and employment
- Decrease in illicit drug use

For more information about pharmacotherapy that can help you get the results you're seeking, please visit opioiddependence.com, or call 1-877-782-6966.

References:

1. Cami J, Farré M. Mechanisms of disease: drug addiction. *N Engl J Med*. 2003;349:975-986.
2. Leshner AI. Addiction is a brain disease, and it matters. *Science*. 1997;278:45-47.
3. Wang G-J, Volkow ND, Fowler JS, et al. Dopamine D₂ receptor availability in opiate-dependent subjects before and after naloxone-precipitated withdrawal. *Neuropsychopharmacology*. 1997;16:174-182.
4. McLellan AT, Arndt IO, Metzger DS, Woody GE, O'Brien CP. The effects of psychosocial services in substance abuse treatment. *JAMA*. 1993;269:1953-1959.

**RECKITT
BENCKISER**
HEALTHCARE

Copyright © 2006 Reckitt Benckiser Pharmaceuticals Inc.
TF06023 9/06 Printed in USA

RESULTS

Out of 150 preoperative spine surgery patients (48 lumbar discectomy [LMD], 60 cervical decompression and fusion [CDF], and 42 lumbar decompression and fusion [LDF]) on opioids (hydrocodone, acetaminophen plus hydrocodone, acetaminophen plus oxycodone, tramadol, hydromorphone), 30 (20.00 percent) met the criteria for a diagnosis of OD.

Focusing on type of surgery (Figure 1), the percentage of OD was highest among LDF patients (23.81 percent), followed by CDF (21.67 percent) and LMD (14.58 percent). After categorizing the sample according to age (Figure 2), the graph seemed to indicate increased prevalence of OD with age. However, SPSS showed no correlation ($r = 0.08$, $p > 0.1$) between OD and age. Considering gender and ethnicity (Figure 3), rates were higher among females (22.78 percent, $n = 79$) than males (16.90 percent, $n = 71$) and, to a lesser degree, among Caucasians (20.87 percent, $n = 115$) than African Americans (17.14 percent, $n = 35$).

When taking LOS into consideration (Figure 4), we found no significant correlation with OD ($r = 0.09$, $p > 0.1$). Obviously, factors other than drug problems were determining LOS. The correlation coefficients between OD and LOS for each type of surgery were $r = 0.09$, $p > 0.1$ for LMD ($n = 48$); $r = 0.07$, $p > 0.1$ for CDF ($n = 60$); and $r = -0.08$, $p > 0.1$ for LDF ($n = 42$). The average hospital stays for OD patients compared to nondependent patients were as follows: 0.14 ($n = 7$) versus 0.07 ($n = 41$) for LMD, 2.08 ($n = 13$) versus 1.73 ($n = 47$) for CDF, and 4.00 ($n = 10$) versus 4.00 ($n = 32$) for LDF.

This study showed no correlation between OD and LOS ($r = 0.09$, $p > 0.1$) or between OD and age ($r = 0.08$, $p > 0.1$). However, it revealed a very significant correlation between OD and pain intensity ($r = 0.24$, $p < 0.01$) and between OD and the WR index ($r = 0.30$, $p < 0.01$) (Table 1). There were also significant positive correlations between LOS and age ($r = 0.42$, $p < 0.01$), LOS and the number of previous spine surgeries ($r = 0.28$, $p < 0.01$), and LOS and duration of pain ($r = 0.18$, $p < 0.05$) (Table 2).

Regression analysis showed that type of surgery ($p = 0.000$), age ($p = 0.016$), and ethnicity ($p = 0.032$) were the most significant variables affecting LOS (Figure 5). OD ($p = 0.911$) was the least significant factor among all studied variables.

DISCUSSION

Before the 1960s, it was fairly common to ascribe elements of criminality, character deficit, immorality, and weakness of will to drug addiction. Because these attributes were not objective or scientifically based and carried various negative social connotations, the WHO, in

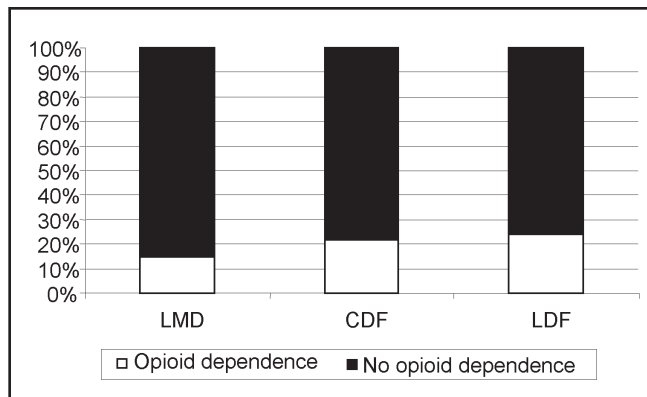


Figure 1. OD prevalence by type of spine surgery. The percentage of OD was highest among LDF patients (23.81 percent), followed by CDF (21.67 percent) and LMD (14.58 percent).

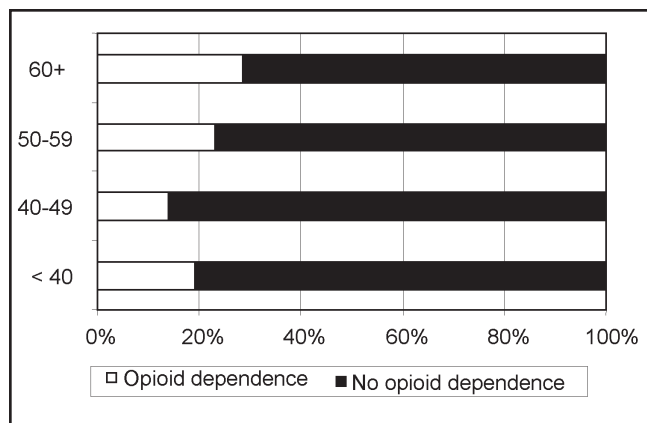


Figure 2. OD prevalence by age group; no correlation between OD and age ($r = 0.08$, $p > 0.1$).

1964, recommended that the term “drug addiction” be replaced with “drug dependence” in an effort to define this problem more precisely.^{10,11}

In 1964, the WHO Expert Committee on Drug Dependence introduced “dependence” as “a cluster of physiological, behavioural and cognitive phenomena of variable intensity, in which the use of a psychoactive drug (or drugs) takes on a high priority. The necessary descriptive characteristics are preoccupation with a desire to obtain and take the drug and persistent drug-seeking behaviour. Determinants and problematic consequences of drug dependence may be biological, psychological or social, and usually interact.”¹⁰ The core concept of the WHO definition of drug dependence requires the presence of a strong desire or sense of compulsion to take the drug, and the WHO and DSM-IV-TR clinical guidelines for a definite diagnosis of dependence require that three or more of the six previously described characteristic features be experienced or exhibited.

Our questionnaire revealed that one-fifth (20.00 percent) of spine surgery patients were opioid dependent. This is likely because opioids are commonly prescribed

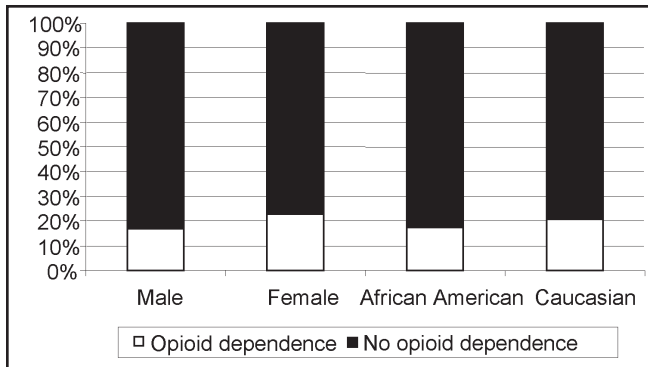


Figure 3. OD prevalence by gender and ethnicity. OD rates were higher among females (22.78 percent) than males (16.90 percent) and, to a lesser degree, among Caucasians (20.87 percent) than African Americans (17.14 percent).

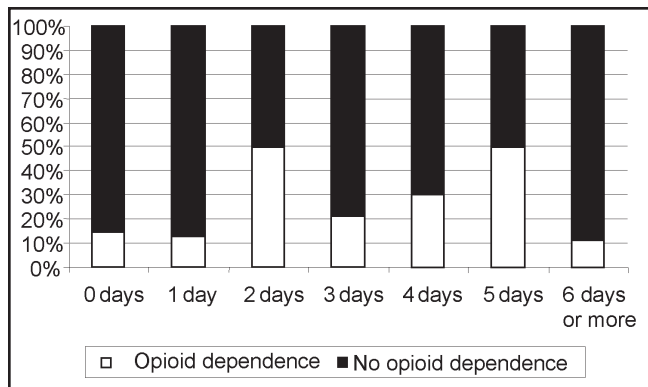


Figure 4. OD prevalence by LOS; no correlation between OD and LOS ($r = 0.09$, $p > 0.1$).

to patients with disk hernia and spinal stenosis. The high percentage of OD in LDF patients (24.39 percent) may be due to their long history of chronic pain accompanied by prolonged use of opioids. That the percentage of OD was higher among female patients (22.37 percent) than males agrees with the observation that women are more likely to be prescribed an abusable prescription drug.¹²

Hospital LOS is dependent on many medical, social, psychological, and institutional factors. In this study, age, number of previous spine surgeries, and duration of pain suffering were correlated with LOS but not OD. The older the patient, the more health problems he or she has, and the more time he or she will need to recover. In addition,

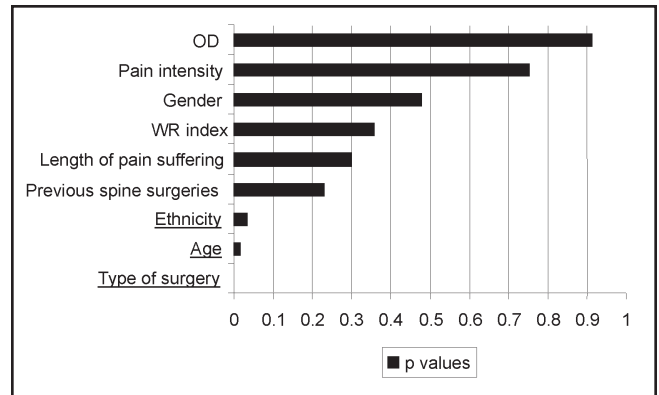


Figure 5. Variables affecting LOS; underlined variables are statistically significant.

elderly patients have more comorbidities, as well as altered drug pharmacokinetics and pharmacodynamics. They are also more likely to be prescribed long-term and multiple medications, which can interact and increase side effects.¹² Regression analysis proved that age, ethnicity, and type of surgery were the main determinants of LOS. Combining results, we concluded that older, African-American LDF patients with a long duration of pain and a history of multiple spine surgeries were the most likely to stay longer in hospital. The role of ethnicity is unclear and requires further investigation. The lack of effect of OD on LOS after surgical intervention was surprising and proved our hypothesis wrong, as we originally anticipated a higher LOS for patients with OD.

Fear of addiction continues to be a barrier to adequate pain control. Patients, families, the public, and healthcare professionals have numerous misconceptions regarding addiction and the use of opioids to control pain. The media continually highlights negative uses of opioids, and this only enhances misconceptions concerning addiction. Unfortunately, relief of back pain is rarely featured in the media as an appropriate and beneficial use for opioids. In 1999, the American Pain Society surveyed 805 people with chronic pain regarding the adequacy of treatment received from their physicians. Only 26 percent of those respondents who had “very severe” pain reported taking opioids at the time of the survey.¹³ In 2005, Mahowald et al.¹⁴ studied opioid use in an orthopedic spine clinic and challenged the concept that opioid treatment is inappropriate for chronic nonmalignant pain. They provided clinical evidence to support and protect

Table 1. OD correlations

		Age	LOS	Number of previous spine surgeries	Pain intensity	Duration of pain	WR index	OD
OD	Pearson correlation	0.077	0.085	0.027	0.236**	0.218*	0.296**	1
	Significance (two-tailed)	0.348	0.299	0.743	0.006	0.012	0.000	0
	n	150	150	149	132	132	150	150

* Correlation is significant at the 0.05 level; ** Correlation is significant at the 0.01 level.

Table 2. LOS correlations

		Age	LOS	Number of previous spine surgeries	Pain intensity	Duration of pain	WR index	OD
LOS	Pearson correlation	0.418**	1	0.284**	-0.008	0.182*	0.175*	0.085
	Significance (two-tailed)	0.000	0	0.000	0.930	0.036	0.033	0.299
	n	150	150	149	132	132	150	150

* Correlation is significant at the 0.05 level; ** Correlation is significant at the 0.01 level.

physicians treating patients with chronic musculoskeletal diseases, who may be reluctant to prescribe opioids because of possible sanctions from regulatory agencies. Additionally, the International Narcotics Control Board has called attention to the inadequate treatment of pain, due in part to overly restrictive laws and regulations that impede the adequate availability and medical use of opioids.¹⁵

Our study showed that spine surgery patients continue to suffer from severe pain despite opioid use. Chronic pain and prolonged use of opioids raise the risk of OD, as was proven by the very significant correlation between OD and the WR index ($r = 0.30$, $p < 0.01$). Further probing of the WR index is important, as it may prove to be a marker of OD in spine surgery patients. The average value of the WR index for OD patients was 660.

CONCLUSIONS

The significant prevalence of OD among spine surgery patients merits attention. Chronic pain and prolonged use of opioids raise the prevalence of OD in spine surgery patients to 20 percent. The lack of effect of OD on LOS after surgical intervention means that efforts to decrease LOS by trying to satisfy patients' craving for opioids will not be fruitful. Older, African-American LDF patients with a long history of pain and multiple spine surgeries in the past are the most likely to stay longer in hospital.

Drug abuse and undertreated pain are both serious public health issues, but finding solutions for one need not undermine the other. Knowledgeable pain practitioners need to educate patients, families, the public, and other healthcare professionals about the differences between addiction, dependence, and tolerance, and the benefit of safely using opioids to relieve back pain.

Mobammad Sami Walid, MD, PhD, Research Fellow, Medical Center of Central Georgia, Macon, Georgia.

Leon Hyer, PhD, Psychologist, Georgia Neurosurgical Institute, PC, Macon, Georgia.

Mohammed Ajjan, MD, Internist, Georgia Neurosurgical Institute, PC, Macon, Georgia.

Aaron C. M. Barth, Decision-Making Analyst, Medical Center of Central Georgia, Macon, Georgia.

Joe Sam Robinson, Jr., MD, Professor and Chairman, Georgia Neurosurgical Institute, PC, Macon, Georgia.

REFERENCES

- Grinstead SF: *War on Drugs—War on Pain Management*. Addiction Free Pain Management Web site. Available at www.addiction-free.com/chronic_pain_management_&_addiction_war_on_drugs.htm. Accessed April 27, 2007.
- Volkow N: What do we know and what don't we know about opiate analgesic abuse? Keynote address, Wednesday, March 30, 2005. Program and abstracts of the 24th Annual Scientific Meeting of the American Pain Society, March 30 through April 2, 2005, Boston, MA.
- Fishbain DA, Rosomoff HL, Rosomoff RS: Drug abuse, dependence, and addiction in chronic pain patients. *Clin J Pain*. 1992; 8(2): 77-85.
- Hoffmann NG, Olofsson O, Salen B, et al.: Prevalence of abuse and dependency in chronic pain patients. *Int J Addict*. 1995; 30(8): 919-927.
- Chabal C, Erjavec MK, Jacobson L, et al.: Prescription opiate abuse in chronic pain patients: Clinical criteria, incidence, and predictors. *Clin J Pain*. 1997; 13(2): 150-155.
- Kouyanou K, Pither CE, Wessely S: Medication misuse, abuse and dependence in chronic pain patients. *J Psychosom Res*. 1997; 43(5): 497-504.
- Reid MC, Engles-Horton LL, Weber MB, et al.: Use of opioid medications for chronic noncancer pain syndromes in primary care. *J Gen Intern Med*. 2002; 17(3): 173-179.
- World Health Organization: *Narcotic & Psychotropic Drugs: Achieving Balance in National Opioids Control Policy*. World Health Organization, 2000. Available at www.painpolicy.wisc.edu/publicat/00whoabi/00whoabi.pdf. Accessed April 27, 2007.
- American Psychiatric Association: *Diagnostic and Statistical Manual of Mental Disorders DSM-IV-TR Fourth Edition (Text Revision)*. Arlington, VA: American Psychiatric Publishing, 2000.
- WHO Expert Committee on Addiction-Producing Drugs: *Thirteenth Report*. World Health Organization Technical Report Series No. 273. Geneva: World Health Organization, 1964.
- World Health Organization: *5th Review of Psychoactive Substances for International Control*. Geneva: World Health Organization, 1981.
- National Institute on Drug Abuse: *Trends in prescription drug abuse*. National Institute on Drug Abuse Web site. Available at www.drugabuse.gov/ResearchReports/Prescription/prescription5.html. Accessed April 27, 2007.
- Portenoy RK: What should we tell the public to do. *APS Bulletin*. 1999; 9(5). Available at www.ampainsoc.org/pub/bulletin/sep99/president.htm.
- Mahowald ML, Singh JA, Majeski P: Opioid use by patients in an orthopedics spine clinic. *Arthritis Rheum*. 2005; 52(1): 6-10.
- International Narcotics Control Board: *Use of Essential Narcotic Drugs to Treat Pain is Inadequate, Especially in Developing Countries*. INCB Annual Report, Press Release No. 6. Vienna: United Nations Information Service, 2004.