Chronic, nonmalignant pain is a substantial public health problem in the United States. Research over the past 2 decades has defined chronic pain by using a “biopsychosocial model” that considers a patient’s biology and psychological makeup in the context of his or her social and cultural milieu. Whereas this model addresses the pathology of chronic pain, it also places many demands on the physician, who is expected to assess and manage chronic pain safely and successfully. There is a growing body of evidence suggesting that opioids can be effective in the management of chronic pain, but there has also been a rise in opioid-related overdoses and deaths. Clinicians should be aware of assessment tools that may be used to evaluate the risk of opioid abuse. A basic understanding of chronic pain pathophysiology and a uniform approach to patient care can satisfy the needs of both patients and physicians.

But pain is perfect misery, the worst Of evils and, excessive, overturns All patience…
—John Milton, Paradise Lost

Pain is the most common reason a patient sees a physician. For most patients, pain is of short duration and quickly forgotten. Unfortunately, for some the pain does not pass but becomes a continuous burden, an unrelenting suffering, and the “perfect misery” described in Paradise Lost. With these patients, however, the physician faces one of the greatest challenges: the relief of chronic pain. In a 2011 report, authors at the Institute of Medicine underscored that “effective pain management is a moral imperative, a professional responsibility, and a duty of people in the healing profession.” Nonetheless, few physicians are formally trained in effectively managing pain, and achieving this goal remains problematic.

In the current review we examine chronic pain, discuss theories regarding its cause, evaluate nonpharmacologic and pharmacologic therapy, address the unique aspects of prescribing opioids, and provide a list of take-home points regarding the problem of chronic pain (Figure 1).
The Dilemma of Chronic Pain

Approximately 100 million individuals in the United States have chronic pain. This condition accounts for an estimated $560 billion to $635 billion per year in health costs and lost productivity. Despite the high prevalence of chronic pain, physicians are often poorly trained in managing the condition and have expressed considerable frustration as part of the emotional toll of that management. Upshur et al surveyed patients from 4 primary care facilities, who reported feeling distrusted and disrespected; physicians were also perceived as dismissive of pain symptoms that patients reported.

Chronic pain is defined as pain that persists for longer than 3 to 6 months, or the “normal healing” time of an injury. A physician may be frustrated by the lack of objective findings in a patient with chronic pain, because the extent of an injury does not always correlate with the severity of the patient’s discomfort.

The “biopsychosocial model” is currently accepted as the optimal conceptual approach, one that envisions chronic pain in terms of the biological parameters in conjunction with the psychological, social, and cultural contexts of the patient.

Evidence suggests that genetic factors influence pain expression. These factors include variations in the transmission of nociceptive signals, differences in opioid receptor responsiveness, and differences in pain sensitivities. Functional neuroimaging has revealed a complex network of different areas of the brain in pain processing. Melzack developed the “neuromatrix theory,” which suggests that pain is “produced by the output of a widely distributed neural network that is genetically determined and modified by sensory experience.” Accordingly, chronic pain is affected by neural output and not only by sensory input from tissue injury.

The psychosocial context of chronic pain suggests a close relationship between a patient’s emotional state and his or her chronic pain experience. Negative emotions can increase the perception of chronic pain, whereas a positive emotional state can lead to a more favorable therapeutic response. In a study of 1323 individuals with chronic, disabling occupational spinal disorders, 65% of patients had at least 1 psychiatric disorder and 56% had a major depressive disorder.

Chronic pain is defined as pain that persists for longer than 3 to 6 months with persistence beyond “normal healing time” of an injury.

A biopsychosocial model of chronic pain is the accepted model to understand the patient’s experience; the model allows the clinician to envision the biological and psychological makeup of the patient in light of a patient’s social and cultural milieu.

The neuromatrix theory of chronic pain suggests that the condition is a result of a complex networking of different areas of the brain, with neural output that is both genetically determined and modified by sensory experience.

Chronic pain is closely linked to depression and anxiety. One study of patients with chronic, disabling occupational spinal disorders demonstrated that 65% of patients had at least 1 psychiatric disorder and 56% had a major depressive disorder.

The care of a patient with chronic pain is best performed in collaboration with an interdisciplinary team (eg, primary care physicians, physical or occupational therapists, psychologists or psychiatrists, and pain specialists).

Opioids can be effective in selected patients with chronic pain, but all patients being considered for opioid therapy should be initially screened with an opioid risk assessment tool.

Setting a maximal threshold dose for opioid use is recommended because it decreases the risk of overdose and because higher doses (>200 mg of oral morphine equivalents per day) are generally not associated with improved pain control or improved functional status.

Universal precautions in the management of chronic pain include an opioid risk assessment tool, psychological assessments, informed consent, use of state prescription drug monitoring programs, and frequent reassessments of pain and functional status.
Nonpharmacologic Treatment

The biopsychosocial model requires a different approach to chronic pain than is commonly used with acute pain. Chronic pain management is more complex and may require the input of multiple disciplines rather than a single provider. Chou et al., working as a multidisciplinary panel convened by the American Pain Society, published guidelines for the management of chronic low back pain. They found strong evidence for noninvasive, interdisciplinary rehabilitation with a cognitive-behavioral emphasis in patients who do not respond to more invasive, single-provider interventions. Such intensive programs typically include physical and occupational therapy along with psychological or behavioral support.

Pharmacologic Therapy

Ideally, chronic pain management begins with a clear diagnosis, resulting in a specific therapy addressing the

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**Figure 1.** A structured approach for the optimal assessment and treatment of patients with chronic pain.
pain) is typically managed with short-acting doses that are 10% of the 24-hour opioid requirement (eg, if a patient requires 100 mg of long-acting oxycodone per day, a breakthrough dose should be 10 mg of short-acting oxycodone every 4 hours as needed). Physicians should prescribe extended-release formulations of a drug for most pain control applications. Most of the pain control comes from the extended-release formulations, with relatively infrequent need for breakthrough doses. If large doses of breakthrough medications are needed on a regular basis, then the physician should consider increasing the long-acting medication and evaluating whether the underlying problem is worsening. Discussion of opioid dosing and dose conversions can be complex and is beyond the scope of the present article. Many excellent resources exist, such as the National Cancer Institute’s pain website.

Dangers of Chronic Opioid Therapy

Although opioid therapy can be safely used in well-selected patients with chronic pain, problems remain. The most profound danger is unintentional drug overdose. Many factors place patients at risk for overdose, including a dose of greater than 100 mg/d of oral morphine equivalents, prescriptions from multiple providers or from nonmedical sources, and polysubstance abuse. A study by Webster and Webster of fatal overdoses in Canada revealed that 56% of the patients had received an opioid prescription within 4 weeks of their deaths. From 1999 to 2008, more overdose deaths involved opioid analgesics than heroin and cocaine combined. Numerous clinical trials and guidelines on chronic pain therapy have been published. In 2010, Noble et al concluded that opioid therapy can cause significant pain reduction but found that long-term efficacy was inconclusive and difficult to evaluate. According to Noble et al, opioid therapy can be effective in reducing chronic nonmalignant pain, but the authors noted that published studies and reviews of long-term opioid therapy are scarce.

Optimal Doses for Opioid Therapy

In most trials of opioids for chronic pain, the dose was 200 mg/d or less of oral morphine equivalents. Balbanyne and Mao reported that patients who received higher doses rarely reported satisfactory analgesia or improved function. Kahan and colleagues, summarizing the guidelines of a 49-researcher panel in Canada, suggested that physicians use a maximum dose of 200 mg/d of an oral morphine equivalent for patients. The authors noted a lack of efficacy above that threshold, as well as a rise in opioid-related deaths.

Initially, short-acting opioids should be used to establish daily requirements. These requirements are then used to calculate an equivalent dose of a long-acting opioid. Pain occurring between doses (ie, breakthrough pain) is typically managed with short-acting doses that are 10% of the 24-hour opioid requirement (eg, if a patient requires 100 mg of long-acting oxycodone per day, a breakthrough dose should be 10 mg of short-acting oxycodone every 4 hours as needed). Physicians should prescribe extended-release formulations of a drug for most pain control applications. Most of the pain control comes from the extended-release formulations, with relatively infrequent need for breakthrough doses. If large doses of breakthrough medications are needed on a regular basis, then the physician should consider increasing the long-acting medication and evaluating whether the underlying problem is worsening. Discussion of opioid dosing and dose conversions can be complex and is beyond the scope of the present article. Many excellent resources exist, such as the National Cancer Institute’s pain website.

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The rate of drug addiction as a result of opioid therapy is low. In the review by Noble et al, the rate of addiction was calculated to be 0.27%. In another meta-analysis that specifically evaluated abuse behaviors, the rate of abuse or addiction was 3.27%.
undergo opioid therapy are common. Although respiratory depression is often encountered, its risk is low when opioids are initiated at a low dose and titrated slowly. Other adverse effects include sedation, cognitive dysfunction, constipation, and myoclonus. Patients typically develop tolerance to sedation, whereas cognitive changes tend to resolve within 7 days after a dosage increase.\textsuperscript{14} Constipation occurs in most patients and should be managed aggressively because patients do not develop tolerance to this adverse effect. Myoclonus is infrequently seen but can be treated by changing to a different opioid or decreasing the dosage.

\textbf{A maximum dose of 200 mg oral morphine equivalent per day is recommended.}

The use of transdermal fentanyl presents unique problems because the drug has a variable rate of absorption (ie, peak concentrations do not occur for 12-16 hours) and a prolonged half-life.\textsuperscript{27} Transdermal fentanyl should not be initiated unless a patient has demonstrated tolerance to an alternative opioid. Initial dosing should be calculated from the daily maintenance dose of shorter-acting opioids.

Methadone is often used in a patient whose condition requires a high dosage of opioids. Numerous drug and food interactions, nonlinear kinetics, and a widely variable half-life are a few of the challenges associated with methadone, and only physicians who are experienced with its complex pharmacology should prescribe the drug.

\textbf{Universal Precautions}

When assessing chronic pain, a physician should take a standardized approach that has become known as \textit{universal precautions} (Figure 2).\textsuperscript{28} An initial evaluation should include a complete history and physical examination, an assessment of coincident psychiatric or addictive disorders, and an exploration of reversible causes of pain. The patient should work in tandem with the physician to understand the conditions of informed consent, implement possible treatment contracts, and set realistic goals for pain reduction and functional improvement.

\textbf{Tools to Screen for Substance Abuse}

Researchers have developed several tools to assess the risk of substance abuse. The Opioid Risk Tool\textsuperscript{29} (\textit{Appendix}) is a 5-item tool designed for the primary care setting that assesses the risk of aberrant behaviors for patients with chronic pain who have prescriptions for opioids. The Opioid Risk Tool allows providers to stratify patients into low-, moderate-, or high-risk categories on the basis of a participant’s responses to questions regarding age, family and personal history of substance abuse, history of preadolescent sexual abuse, and psychological disease.

\begin{tabular}{l}
Make a diagnosis with appropriate differential. \\
Perform a psychological assessment that includes screening for risk of addictive disorders. \\
Obtain informed consent. \\
Use a treatment agreement (eg, verbal or written pain contract). \\
Conduct assessment of pain level and function before and after intervention. \\
Consult the literature for trials of opioid therapy or adjunctive medication. \\
Re-evaluate a patient’s pain score and level of function. \\
Regularly assess the “Four A’s” of pain medicine: analgesia, activity, adverse effects, and aberrant behavior. \\
Periodically review pain diagnosis and comorbid conditions, including addictive disorders. \\
Document all factors of the patient’s chronic pain. \\
\end{tabular}
Role of Opioid Contracts and Urine Drug Screening

Starrels et al. in a systematic review from 2010, found little evidence to support the effectiveness of urine drug screening and opioid treatment agreements (ie, pain contracts) in reducing opioid misuse. However, some physicians find drug testing and pain contracts helpful in establishing dialogue and setting expectations, using them either routinely or selectively for high-risk patients.

Before performing urine drug screening, physicians should understand how to recognize false-positive and false-negative test results, as well as how changes in drug metabolism can distort findings.

Role of State Monitoring Programs

Currently in the United States, 49 states and 1 territory have legislation authorizing the creation of a Prescription Monitoring Program, with 42 states having an operational system. These programs help prevent prescription drug abuse by identifying patients who have obtained multiple prescriptions from different physicians or from multiple pharmacies. These programs are not, however, designed to identify a patient who obtains an excessive quantity of a drug from a single provider or who obtains medications across state lines.

Conclusion

Milton’s apt description of pain as “perfect misery” is one that the physician might keep in mind when treating a patient with chronic pain. Pain, by its nature, demands considerable attention and draws an individual away from friends, family, and personal interests, often leading to protracted suffering and isolation from activities that enhanced the patient’s life. Nationwide, the successful management of chronic pain remains a profound challenge because of inadequate medical training, the potential for patient drug abuse, and the risk of prescribing potentially addictive drugs. Physicians should strive to overcome these challenges and, by doing so, realize the opportunity they have to mitigate suffering and restore a patient’s quality of life.

References


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Appendix

An opioid risk assessment tool, which physicians can use to evaluate potential aberrant behavior in a patient who has been prescribed opioids.

| Date _______________________________ |
| Patient Name ____________________________ |

**OPIOID RISK TOOL**

<table>
<thead>
<tr>
<th></th>
<th>Mark each box that applies</th>
<th>Score if Female</th>
<th>Score if Male</th>
</tr>
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<tbody>
<tr>
<td>1. Family History of Substance Abuse</td>
<td>Alcohol [ ]</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Illegal Drugs [ ]</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Prescription Drugs [ ]</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>2. Personal History of Substance Abuse</td>
<td>Alcohol [ ]</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Illegal Drugs [ ]</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Prescription Drugs [ ]</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>3. Age (Mark box if 16 – 45)</td>
<td>[ ]</td>
<td>1</td>
<td>1</td>
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<tr>
<td>4. History of Preadolescent Sexual Abuse</td>
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<td>0</td>
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<tr>
<td>5. Psychological Disease</td>
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</tr>
<tr>
<td></td>
<td>Obsessive Compulsive Disorder</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bipolar</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Schizophrenia</td>
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<tr>
<td></td>
<td>Depression [ ]</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

**TOTAL** | [ ] |

**Total Score Risk Category**

| Low Risk 0 – 3 | Moderate Risk 4 – 7 | High Risk ≥ 8 |