



Scientific Contribution

The undertreatment of pain: Scientific, clinical, cultural, and philosophical factors

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Abstract. This essay provides an explanation and interpretation of the undertreatment of pain by discussing some of the scientific, clinical, cultural, and philosophical aspects of this problem. One reason why pain continues to be a problem for medicine is that pain does not conform to the scientific approach to health and disease, a philosophy adopted by most health care professionals. Pain does not fit this philosophical perspective because (1) pain is subjective, not objective; (2) the causal basis of pain is often poorly understood; (3) pain is often regarded as a “mere” symptom, not as a disease; (4) there often are no “magic bullets” for pain; (5) pain does not fit the expert knowledge model. In order for health care professionals to do a better job of treating pain, some changes need to occur in medical philosophy, education, and practice.

Key words: cultural aspects, medicine, pain, philosophy, science, undertreatment

1. Introduction

Pain is the principal reason why patients see physicians but it is routinely undertreated in health care. Many recent studies have demonstrated inadequate pain management in many different circumstances, including pain in terminal illness (SUPPORT, 1997; Emanuel, Daniels, Fairclough, and Clarridge, 1998), pain in elderly populations (Cleeland, 1998) cancer pain (Cleeland, 1994, Foley 1997), chronic pain (Martino, 1998), pain in emergency care (Todd, Samaria, and Hoffman, 1993), and post-operative pain (Ng, Dimsdale, Sharagg and Deutsch, 1996; Owen, McMillan, and Rogowski, 1990). This is by no means a new problem in health care: for more than 25 years researchers have documented the undertreatment of pain (Marks and Sachar, 1973; Cohen, 1980; McGivney and Crooks, 1984; Foley, 1985; Melzack, 1990). In the last decade, many health care professionals (HCPs), professional organizations, and scholars have decried this problem and have championed the cause of better pain control (Cassell, 1991; Hill, 1995; World Health Organization, 1996; American Medical Association, 1997; Foley, 1997, Byock, 1997; Rich, 1997).

To better understand this problem, pain specialists, social scientists, and policy researchers have identified

a long list of reasons why pain is often undertreated. These include:

- HCPs receive inadequate education on pain assessment, pain treatment and palliative care (Cassell, 1991; Atkinson and Davies, 1993; Byock, 1997; Martino, 1998);
- HCPs face legal and regulatory pressures to restrict the use of narcotics to treat pain (Starr, 1992; Agency for Health Policy Research, 1994; Horgan, 1997; Rich, 1997; McCabe, 1997; Martino, 1998);
- HCPs, patients, and families are concerned about the probable or possible side-effects of analgesics, such as sedation, dizziness, nausea, constipation, increased cardiac load, decreased renal function, tolerance, physical dependence, addiction (Knoben and Anderson, 1988; Atkinson and Davies, 1993; Bilkey, 1996; Rich, 1997; McAbe, 1997; Martino, 1998; Hawthorn and Redmond, 1998);
- HCPs sometimes think that patients are overstating, imagining, or faking their pain (Cassell, 1991; Bilkey, 1996);
- Patients are hesitant to talk to HCPs about pain because they do not want to distract HCPs from their “real” diseases or they think an increase in pain means that their disease is getting worse

(Cassell, 1991; Agency for Health Policy and Research, 1994; Martino, 1998);

- Patients want to feel some pain because they view pain as an overall indicator of their health or they think it is virtuous to suffer (Cassell, 1991; Byock, 1997; Rich, 1997);
- Health care organizations, government agencies, and insurers do not provide adequate funding for pain control (McCabe, 1997; Martino, 1998; Jost, 1998; Ingham and Foley, 1998);
- The medical community has not conducted enough research on pain management and palliative care (Horgan, 1997; Martino, 1998; Ingham and Foley, 1998).

In response to the problem of pain undertreatment, advocates for better pain control have made a number of different proposals, including more research and education on pain assessment and treatment, better funding for pain control, and legal and regulatory reforms to support adequate pain control (Cassell, 1991; American Medical Association, 1997; Foley, 1997; Deshano, 1997; McCabe, 1997; Martino, 1998). These calls for better pain control come in the wake of a widespread recognition of the role of palliative care in caring for dying patients, and the importance of adequate palliation in reducing the demand for euthanasia and physician-assisted suicide (Goldstein, 1997; American Medical Association, 1997; Foley, 1997; Byock, 1997; Emanuel, 1998; Emanuel, Daniels, Fairclough, and Clarridge, 1998; Lynn and Wilkinson, 1998).

Despite reams of data on the undertreatment of pain and a chorus of voices calling for better pain control, the problem persists. Although the reasons mentioned above help to explain the phenomena of undertreated pain, they do not tell the whole story. If the undertreated condition were an objective health problem, such as diabetes, then researchers would seek to understand the disease and develop new treatments, HCPs would take the time to learn how to manage diabetes, patients would insist on being treated for diabetes, and insurance companies and government agencies would provide adequate funding to support therapy and prevention.

The crux of the problem of pain undertreatment is that pain is not like other objective medical problems, such as diabetes. To understand why pain is so often undertreated, we must place pain in its larger scientific, clinical, cultural, and philosophical context. By viewing the problem from this perspective, one can see that one reason why HCPs undertreat pain is that it does not fit in well with the scientific approach to health and disease, a philosophy adopted by most HCPs. Pain is fundamentally subjective and does not

fit neatly into the causal/explanatory/clinical structure of scientific medicine. Pain is therefore often viewed as “unreal,” “unimportant,” or “merely psychological.” In this essay, we will expand on these points by exploring the relationship between pain and the scientific approach to medicine.

2. Scientific aspects of pain

To understand how a scientific approach to medicine can encourage HCPs to undertreat pain, it is important to give a brief overview of our current scientific understanding of pain. Obviously, we cannot cover this vast topic in any depth here, but we can at least mention some aspects of pain that encourage undertreatment in a clinical setting. For further discussion of pain, we refer the reader to some useful resources (Aronoff, 1992; World Health Organization, 1996; Cahill, M. 1997; Hawthorn and Redmond, 1998). As the reader shall see, pain is a very complex phenomenon with biochemical, pharmacological, physiological, psychological, social, cultural, medical, and philosophical dimensions. Most pain experts therefore endorse a multi-disciplinary approach to pain (Hawthorn and Redmond, 1998).

2.1 Pain sensation

We begin with the assumption that pain is a kind of feeling or sensation (IASP, 1979). Each sensation of pain has different causes and effects, which we will discuss later, but for now we are concerned with the sensation itself. Pain is subjective, private, and highly variable. Only the person sensing pain can determine whether they are having that sensation. In a clinical setting, pain is what the patient says it is and exists whenever the patient says it does (McCaffery and Beebe, 1989). The response to pain may vary a great deal from one person to another. One person may find a particular kind of stimulus to be very painful, e.g. walking on coals, while another person may regard the stimulus as not at all painful. One person may find a particular kind of pain, e.g. childbirth, to be very meaningful, while another person may not attach any meaning to the experience. One person may have a high tolerance for pain, another may not (Pitcher, 1976, Shaffer, 1976; Cupples, 1992).

Pain is a complex sensation with many different qualities. The pain of childbirth is very different from the pain of a toothache, a bee sting, a broken hip, or sunburn, yet all of these experiences are classified as pains. Individuals may describe their pains as ‘throbbing,’ ‘burning,’ ‘stinging,’ ‘dull,’ ‘sharp,’ ‘stabbing,’ and so on. Pain can be felt in specific areas of the

body, such as the forehead or lower, right abdomen, and it can be experienced as localized (in one place) or spread out (over a larger area). Pain may increase or decrease with physical activity, it may wax and wane during different hours of the day, and it may come on gradually or suddenly. Individuals may rate the intensity of their pains using a variety of methods. These include numerical scales, visual analog scales, and color scales. However, intensity is only one dimension of pain that should be assessed. In the past two decades, pain specialists have developed sophisticated tools for describing and assessing pain (Kerns, Turk, and Rudy, 1985; Caudill, 1994; Hawthorn and Redmond, 1998).

In thinking about the conscious awareness of pain, it is important to realize that any painful sensation occurs as a *part* of a *whole* experience. We never experience pains in isolation from other perceptions, but we experience them in combination with other perceptions. A person who is sensing pain is also simultaneously processing a great deal of other sensory, cognitive and emotive information. For example, when a person eats food that is very hot and spicy, he may be aware of pain in his mouth and tongue at the same time that he is aware of other qualities of his experience, such as the food's taste and texture. A person who is listening to loud music may be aware of pain in his ears at the same time that he is enjoying the music.

2.2 Pain expression

People express pain through various behaviors, such as doubling-over, favoring a limb, limping, restlessness, bending over, wincing, teeth clenching, groaning, or crying. People may express pain through forms of verbal communication, such as yelling "ouch!" or "that hurts!" Finally, pain may be expressed through various physiological responses, such as tachycardia, hypertension, pallor, nausea, perspiration, reduced blood flow to peripheral areas, nausea, and dilation of the pupils. However, a person may have pain without expressing it, and a person could behave as if they are having pain even though they are not. Since pain is private and subjective, it is possible for a person to fake, deny, exaggerate, or minimize pain. The expression of pain may also vary considerably from one individual to another or across different cultures (Hawthorn and Redmond, 1998).

2.3 Pain physiology

During the last thirty years, neurobiologists, neurologists, neurochemists, and anesthesiologists have discovered many of the physiological mechanisms relating to the sensation of pain or 'nociception.'

Nociception occurs in four stages, transduction, transmission, modulation, and perception. Human beings (and other animals) have special chemical receptors (nociceptive receptors) on the surface of free nerve endings that are designed to respond to various stimuli, such as pressure, injuries, tissue damage, chemical irritants, or extremes of heat or cold. These receptors are distributed throughout the body. *Transduction* occurs when nociceptive receptors respond to stimuli by triggering the depolarization of neurons.

During *transmission*, nociceptive receptors relay the nerve signal to the central nervous system (CNS) via afferent (or sensor) neural pathways. The two main types of afferent nociceptive nerves are unmyelinated C-fibers, which conduct slowly and transmit dull pain, and myelinated A-fibers, which conduct quickly and transmit stinging pain. Different neurons relay nerve signals by means of chemical messengers known as neurotransmitters. Many neurotransmitters play a role in nociception. One of the most important of these is substance P, a peptide composed of eleven amino acids (Hawthorne and Redmond, 1998).

Once the nerve signal reaches the CNS, *modulation* of the signal may occur when the afferent neuron is influenced by other afferent or efferent (motor) neurons. Excitatory neurons amplify the nerve signal, while inhibitory neurons dampen the signal. Neurons can also modulate pain by "confusing" the signal received by the CNS. If we think of the CNS like a radio receiver, then excitatory neurons modulate pain information by turning up the volume, inhibitory neurons modulate pain information by turning down the volume, and other neurons can confuse pain information by adding noise or static to the signal. This is the basis for the Gate Control Theory (Melzack and Wall, 1965). It is believed that some effective non-pharmacological techniques for pain control, such as massage, acupuncture, and transcutaneous electrical stimulation, can modulate pain by inhibiting or confusing nociceptive signals (Hawthorne and Redmond, 1998). The body has its own analgesics, serotonin, noradrenaline, and opiates, which can modulate pain by inhibiting nociceptive pathways. Natural opiates include endorphins, enkephalins, and dynorphins.

Pain perception occurs when the CNS transmits pain signals to the higher parts of the brain via the thalamus. Once pain is perceived, the brain can also modulate nociception by activating efferent, inhibitory neurons (Hawthorne and Redmond, 1998). Since the brain and CNS play a key role in the modulation and perception of pain, the response to pain can vary greatly from one individual to another.

Pain specialists distinguish between pain that is caused by the presence of painful stimuli, *nociceptive*

pain, and pain that is caused by a disruption of the nociceptive system, *pathological or neuropathic pain*. Nociceptive pain usually serves an important biological (or evolutionary) function in that it warns the organism of impending danger, informs the organism of tissue damage or injury, or deters the organism from interfering with healing or causing further tissue damage. Pathological pain, on the other hand, appears to serve no useful function, and is an abnormal condition. Since pathological pain can occur without the presence of any painful stimuli, it is often difficult to diagnose and treat. Some of the most baffling types of chronic pain, such as Phantom Limb Pain, Postherpetic Neuralgia, and Fibromyalgia, are pathological. When pathological pain occurs, stimuli that are normally perceived as innocuous may be processed as painful. Pathological pain may occur as a result of damage to the peripheral nervous system or CNS (Hawthorne and Redmond, 1998).

Other important physiological distinctions worth noting include *acute vs. chronic pain*, *referred vs. local pain*, and *malignant vs. benign pain*. Acute pain is pain that occurs for a definite time and then goes away. It is usually associated with specific stimuli or injuries. Chronic pain is pain that persists more than several months or goes away and comes back. It often occurs as a result of damage to tissues, bones, or nerves, or tumor growth. Patients with chronic pain often develop chronic pain syndrome as a result of their response to chronic pain (see below). Local pain is pain that occurs in a specific part of the body; referred pain is pain that radiates throughout the body and causes nociception beyond the source of the painful stimulus. For example, appendicitis may cause pain perception throughout the abdomen. Malignant pain is pain associated with a malignancy (a disease process or pathological condition), such as cancer or heart disease; benign pain is pain that is not associated with a malignancy. "Benign" pain is a bit of a misnomer, since many of the most difficult kinds of pain, such as migraine headache pain and low back pain, are classified as "benign" (Hawthorne and Redmond, 1998; Cahill, 1997).

3. Cultural aspects of pain

Pain also has important psychosocial and cultural dimensions, which play an important role in the response to pain. Our responses to pain are determined, in part, by how we *attend to* and *interpret* our painful sensations (Hawthorn and Redmond, 1998). Attention is an aspect of conscious awareness that allows a person to choose to focus his experience on different parts. If we think of pain as a sensation that is part

of a whole experience, then persons can focus their attention on the painful part of the experience or on other parts. A person who is enjoying the pleasant taste of hot pepper may be paying less attention to the pain it inflicts. A person who is receiving a massage for lower back pain may pay less attention to the pain and more attention to the massage. In both of these cases, attending to non-painful stimuli distracts the person from pain. On the other hand, a person who has chronic pain may have learned to pay too much attention to his pain. Many of the non-pharmacological methods for treating pain, such as massage, music therapy, relaxation, biofeedback, and hypnosis, may work by helping patients learn to pay less attention to pain. This does not mean that the pain is not real or is "in their heads," only that distractive techniques can be very useful in helping that person to cope with the pain. Many of these strategies also help the person to have some control over a seemingly uncontrollable situation.

Interpretation occurs when a person assigns meaning or value to an experience. The assignment of meaning or value to a painful experience depends, in part, on a person's beliefs and attitudes. A person may believe that pain is an indicator of disease, of impending doom, or of a loss of control or dignity. Another person may believe that their pain is a sign of a desirable event, such as childbirth or muscle fatigue due to weightlifting. Attitudes to pain range from aversion to acceptance. Our interpretation of pain affects our emotional response to pain, which can also affect our interpretation as well as our attention to pain. Persons who believe that they are dying of cancer may become more fearful and anxious if their pain increases. A person with chronic pain may become depressed because they feel that the pain is uncontrollable. Chronic pain syndromes occur when chronic pain leads to depression and disability, which leads to an excessive attention to pain (or obsession). A masochist may enjoy certain types of pain, and a healthy person may regard some types of pain as rewarding or meaningful, such as the pain of childbirth or pain in extreme exercise (Hawthorn and Redmond, 1998).

The interpretation of pain can have a profound impact on *suffering*. Although we often speak of pain and suffering in the same breath, these are distinct ideas (Shaffer, 1976; Cassell, 1982, 1991). Pain, as we have said, is a specific kind of sensation. Suffering is a much broader notion. Suffering involves the awareness of something that threatens (or is perceived to threaten) the existence of the whole person (Cassell, 1991). Pain, illness, disability, the anticipation of death, frustration, isolation, grief, depression, and many other conditions can cause a person to suffer. Pain can lead to

suffering when it is chronic, uncontrolled, or disabling, or when the person reacts to pain with anxiety, anger, fear, or depression.

It is also worth noting that some types of pain have psychological causes. A person who suffers or experiences emotional distress may also feel pain as a result of their suffering or distress. For example, a person may develop a headache in response to stresses on the job. A widow may ache all over while grieving. Some men report that they feel sympathetic pain while assisting their wives in labor. Pain with psychological origins may respond to psychotherapy or the placebo effect. However, even when a person's pain has psychological origins or aspects, this does not prove that the person's pain is not "real." As long as a person feels pain, then that sensation is real to them, even if it has psychological origins (Hawthorn and Redmond, 1998).

Cultural beliefs, social groups, and religious traditions can play an important role in the response to pain by affecting how we interpret and attend to pain. In some non-Western cultures, pain and suffering are regarded as facts of life that must be accepted. In Western cultures, many people regard pain as a pathological condition that should be eliminated. There is some evidence that Western attitudes toward pain have changed over time; people have become less accepting of pain as medicine has provided them with more effective ways of controlling pain. For some people, such as cancer patients, support groups and other social networks can help them to cope with pain by providing them with a positive interpretation of pain and by helping them to pay less attention to pain. For many people, religious beliefs play a key role in their interpretation of pain and suffering. A person who has pain may believe that the pain (or suffering) is God's punishment for sin, or they may believe that accepting the pain (or suffering) will help them to become virtuous or pious. Virtually all of the great world religions attempt to make sense of human suffering (Hawthorn and Redmond, 1998).

Another important point to note is that past experiences can impact a person's reaction to pain or the anticipation of pain. A child, who has a negative experience with a procedure, will be less cooperative the next time the procedure is performed. For example, if a HCP performs a venapuncture on a child without anesthetic, the child may become agitated the next time the HCP merely enters the room, whether they will be performing a procedure or not (AHCP, 1992). Therefore, previous experience can influence the ability to tolerate and cope with painful stimuli.

Taken together, these different psychological, social, and cultural aspects of pain help to explain the tremendous *variation* that has been observed in

pain tolerance *and expression*. Two different people may have very different responses to the same noxious stimulus because they may attend to and interpret the stimuli in very different ways. For example, women show a great deal of variability in the tolerance for labor pain (Melzack, 1984). Some years ago, Beecher (1956) reported that soldiers wounded in battle have less pain than civilians who have similar injuries do. Non-psychological factors, such as the body's reaction to trauma, certainly help to explain Beecher's observation, but psychological factors are also relevant: soldiers tolerate pain because they attach a positive value to their pain, since pain is an indicator of injury and removal from combat.

4. Clinical aspects of pain

4.1 Pain treatments

In the last two decades, pain experts have developed a variety of ways to treat pain. We have already mentioned some of the ways of treating pain, such as narcotic and non-narcotic analgesics, massage therapy, transcutaneous electrical stimulation, biofeedback, support groups, psychotherapy, music therapy, relaxation, acupuncture. We will also mention some other interventions, including surgical nerve blocks, local and topical anesthesia, exercises, accupressure, and art therapy. Pain can also be relieved by using pharmacological and surgical techniques to treat pathological conditions that contribute to pain. For example, chemotherapy can be used a treatment for pain in so far as it kills tumors that are causing pain. Anti-inflammatory medications can also relieve pain when pain is caused by inflammation. We do not intend to discuss any of these methods here and we refer the reader to some useful sources (Caudill, 1994; World Health Organization, 1996; Cahill, 1997; Hawthorne and Redmond, 1998). However, we would like to emphasize the following points. First, different types of pain respond better to different types of treatment; no single treatment method will work for all types of pains. Second, since pain has many different aspects, it is appropriate to use a multi-disciplinary approach to assessing and treating pain. A person with chronic pain, for example, may require a variety of interventions, such as analgesia, psychotherapy, support groups, and exercise (Hawthorne and Redmond, 1998; Cahill, 1997). Although not all pains require a variety of treatment modalities, many do.

4.2 Diagnosis and assessment

Although clinicians have many ways of treating pain, diagnosing and assessing pain can still be very diffi-

cult. If a person has pain that is not well diagnosed or assessed, then they are not likely to get effective treatment, even if a treatment exists. Although clinicians can frequently understand the causes of pain, many painful conditions, especially those that involve neuropathic pain, are difficult to diagnose due to the paucity of our current understanding of pain. As our scientific understanding of pain continues to improve, some of the difficulties of diagnosing pain will abate. For example, advances in our understanding of neuropathic pain have allowed HCPs to diagnose conditions that would have been ignored ten years ago, such as fibromyalgia. However, other difficulties, such as pain assessment, may remain. Since pain diagnosis relies on information obtained in pain assessment, HCPs have developed a variety of different tools to assess pain, such as pain questionnaires or surveys, pain diaries, and pain sensitivity tests. All of these tools rely on 1st person, subjective reports of pain: patients must tell their HCPs how much they hurt, where they hurt, when they hurt, and so on (Hawthorne and Redmond, 1998). In the last decade, clinicians have attempted to develop pain assessment tools that would provide objective measures of pain. However, these tools suffer from some philosophical difficulties.

The first problem is that it is very difficult to identify a type of mental state, such as the sensation of pain, with a particular type of physical cause, such as a specific nociceptive pathway (Dennett, 1991). The physical causes of painful sensations exhibit a great deal of variation. If we could make this kind of identification, then we could (in theory) develop tests that would provide objective measurements of different kinds of pain, just as we have developed tests to measure heart function, lung function, liver function, kidney, function, and so on. These tests could measure activity of the peripheral nervous system, CNS, or brain. But we are far from developing these objective measurements of pain, and even if we could develop these tests, they could be very unreliable, due to variations between different people. Since people modulate, perceive, and respond to pain in different ways, the nociceptive pathway that produces tremendous pain in one person might produce little pain in another person. Until we can make more progress in identifying specific types of pains with specific nociceptive pathways, we may have to settle for subjective measurements of pain, i.e. first person reports.

The second problem is that mental states have content and meaning, that is, they are about something. When we are angry, we are angry about something, e.g. that we lost money in the stock market (De Sousa, 1991). Painful sensations, as we have seen, can also have content and meaning: we may interpret pain as a

sign of a change in health, as punishment from God, as an excuse to be removed from battle, etc. In order to understand the meaning and content of mental states, we need to explain how they represent things in the world. To understand mental representation, we need to be able to relate a person's beliefs, attitudes, desires, wants, goals, and plans relate to the external world. Thus, to understand how a person responds to pain, we need to understand their beliefs about pain, their attitudes toward pain, their goals relating to pain, such as pain relief, and so on. Once again, no type of objective test will allow us to pursue this kind of inquiry; we must rely on first person, subjective reports.

The upshot of these two philosophical problems is that while it is important to understand the physical causes of pain, physiological and biochemical explanations and descriptions of pain have limitations. To describe, explain, and treat pain, we must understand the psychological, social, and cultural aspects of pain. No objective measurement or causal explanation of pain will be very helpful to us unless we also understand how people respond to painful sensations. Nothing short of interviews, discussions, counseling, and other forms of person-to-person communication will allow us to meet this goal.

5. The philosophy behind modern medicine

Having reviewed some scientific, clinical, and cultural aspects of pain, we can now return to the main thesis of our paper in more depth. Our thesis is that the philosophy behind modern medicine, the scientific approach to health and disease, plays a key role in explaining why HCPs undertreat pain. This raises some important questions, "is modern medicine scientific?," "do most HCPs subscribe to the scientific approach to health and disease?," and "what is science?" These questions raise issues that we cannot address here fully, and we refer the reader to other resources (Popper, 1963; Ziman, 1984; Little, 1995; Schaffner, 1994; Resnik, 1995; Pellegrino and Thomasma, 1981; Albert, Munson, and Resnik, 1988; Bradley, 1993; Clouser and Zucker, 1974; Caplan, 1986; Munson, 1981; Porter 1997). For the purposes of this paper we will assume that most HCPs subscribe to the scientific approach to health and disease. We would like to discuss five aspects of this philosophy of medicine that our crucial for understanding the undertreatment of pain.

5.1 *The objective approach to diagnosis*

Today's health care professionals use objective methods to develop and confirm diagnoses, such as

blood tests, urinalysis, x-rays, CT scans, and biopsies. These tests allow clinicians to observe, measure, quantify, and compare various anatomical, biochemical, and physical properties, structures, and functions to determine the presence of a specific disease. Statistical methods allow clinicians to develop normal ranges for various measurements, such as blood pressure, and normal images for various structures, such as the lung. Medical testing has become highly technological, specialized, and expensive (Albert, Munson, and Resnik, 1988; Judge, Zuidema, and Fitzgerald, 1989; Sox, Blatt, Higgins, Marton, 1988).

5.2 *The casual-mechanical approach to medicine*

For today's HCPs, diseases are specific entities, structures, processes, or properties that produce various symptoms, including pain, injury, and disability. Diseases affect the body and mind by means of various biochemical, biomechanical, and physiological mechanisms. For example, ear infections are diseases caused by specific pathogens, such as a bacteria causing otitis media. It produces various symptoms, such as an earache and a fever. Diabetes mellitus is a disease caused by the body's failure to respond to insulin. Its symptoms include elevated blood sugar, excess urination, and the presence of sugar in the urine (Albert, Munson, and Resnik, 1988).

5.3 *Treating disease vs. managing symptoms*

One natural implication of the causal-mechanical approach to medicine is a commitment to understand and control underlying causes, such as diseases, not mere effects, such as symptoms. Although medicine attempts to relieve *symptoms*, the goal of therapy is to diagnose, cure or prevent underlying *diseases* that produce symptoms (Cassell, 1991; Albert, Munson, and Resnik, 1988; Little, 1995). Clinicians are taught to do more than merely "manage" symptoms: they are taught to diagnose, treat, and cure diseases.

5.4 *"Magic Bullets"*

Modern medicine has developed an impressive array of surgical and pharmaceutical interventions (or "magic bullets") that can be used to treat and cure diseases. This approach to treatment fits in well with the causal-mechanical approach to disease, since pharmaceutical methods treat the body as a biochemical system, and surgical methods treat the body as a biomechanical system (Little, 1995). Although this approach has been very successful in treating and preventing a variety of acute illnesses and injuries, such as appendicitis, a broken arm, or polio, it has had less success in treating chronic conditions, such as arthritis, diabetes,

lower back pain, which often can be controlled but not cured (Cassell, 1991). This approach also has limited success with conditions that require a multidisciplinary framework, such as clinical depression, asthma, and alcoholism.

5.5 *The expert model of knowledge*

Health care professionals, like scientists, are regarded as having expert knowledge, skills, experience, and judgment. This expertise imposes additional responsibilities on HCPs, but it also grants them extra privileges and authority. Professional, legal, social, and ethical norms also reflect this expert model of health care. To become a health care expert, one must undergo many years of education and training, subscribe to an ethical code, and meet licensing requirements (Beauchamp and Childress, 1994). Like scientists, HCPs have developed a highly specialized technical language (or jargon) pertaining to their areas of expertise. Patients see doctors, in part, because they believe that doctors have some special, expert knowledge of health and disease (Little 1995).

6. Pain and scientific medicine

We will now explain how these five characteristics of the scientific approach to medicine can encourage HCPs who adopt this philosophy to undertreat pain.

6.1 *Pain and objectivity*

Pain, as we have already mentioned several times, is subjective and private. In order to assess pain, one must rely on first-person reports from patients. Although we all know what pain feels like, we will never be able to experience someone else's pain. We can no more experience another person's pain than we can experience their joy, their love of Mozart, their aversion to anchovies, or their suffering. This aspect of pain, perhaps more than any other, interferes with its incorporation into modern medicine. Although health care professionals are taught to talk to patients about pain and to include pain assessment in the initial examination and case history, they tend to put more weight on objective tests and measurements. A high blood pressure reading, and an abnormal Pap smear, or a fever tends to speak more loudly and forcefully than a report of unremitting pain. Medical charts include dozens of entries pertaining to lab values, x-rays, vital signs, and other objective tests, but pain is rarely mentioned (Hawthorne and Redmond, 1998). For better or worse, HCPs place a great deal of faith in objective (i.e. scientific) tests and measurements. Since pain is subjective, it is often viewed as less

important. In medicine, facts tend to drive out feelings (Cassell, 1991).

In order to overcome this problem, pain specialists have developed a variety of pain assessment tools, which we have already discussed. Some organizations have even proposed that pain be viewed as a “fifth vital sign” (Greenville Daily Reflector, 1999). We endorse these tools and this proposal. However, pain assessment tools will never achieve the degree of objectivity that one finds in most medical tests, since pain will still be a subjective sensation or feeling. As long as we rely on first-person reports of pain, we cannot expect to develop useful, reliable, and objective tests of pain, and many people will continue to underrate its importance.

One might argue that one can solve this conundrum by circumventing first-person reports of pain. In theory, one could also develop objective tests of pain based on current and expected advances in medicine and neurobiology. For example, suppose that it is one day possible to use instruments to determine the activity of the nociceptive system, i.e. that we could scan the nervous system for pain in the way we can use an EEG to detect Alzheimer’s disease or epilepsy. As we noted in our earlier discussions, however, there are inherent limits to physiological tests for pain, since pain is a sensation that is consciously experienced. Some types of painful sensations of pain *may be associated* with specific types of physiological mechanisms, such as noxious stimuli, the firing of nociceptors, etc., but pain cannot *be identified* with types of physiological mechanisms. A test for a “pain mechanism” could tell us, at best, that a person is probably in pain or probably not in pain, but since pain is subjective, it would not give us any definite answers. We can no more test for pain than we can test for a person’s enjoyment of Mozart, distaste for anchovies, or fear of the IRS. To describe and explain subjective qualities of the human experience, such as pain, we must rely on first-person reports (Dennett, 1991).

6.2 Pain and causality

We noted earlier that the causal mechanisms of many types of pain, especially neuropathic pain, are not well understood. However, one can recognize that pain can be real even when we do not understand its causal basis. As far as the sensation of pain is concerned, the axiom “to be is to be perceived” applies. This view does not square with the causal-mechanical approach to disease, however, which embodies that axiom, “to be is to have a causal basis.” When HCPs do not know or understand the causal basis for a medical condition, they frequently view that condition as *not real*. Reports of pain may be viewed as imaginary,

fraudulent, or “merely” psychological (Hawthorne and Redmon, 1998; Bilkey, 1996). It should be noted that pain is not unique in this respect, since HCPs have had a difficult time coming to terms with other similar medical conditions, such as chronic fatigue syndrome and Gulf War syndrome.

This approach to pain, though common, is fallacious and simplistic. This approach is fallacious because understanding the causal basis for a medical condition should not be a requirement for assigning that condition reality or existence. For many years physicians did not understand that causal basis of epilepsy and cerebral palsy, yet these conditions were real and continue to be real. Until the 19th century, physicists for many years did not understand the causal basis of electricity and magnetism, yet these phenomena are and were real. Neurobiologists still do not understand the causal basis of human consciousness, yet consciousness is real (Dennett, 1991). These same points apply to the reality of pain.

This approach to pain is simplistic as well, since sensations of pain which lack a physiological basis may still have psychological causes (Gatchell and Turk, 1996). *Psychological causes*, even if highly complex, are still real causes (Dennett, 1991). A person’s headache may be caused by emotional stress, but this does not mean that the headache (or its causes) is not real. Even “faked” may pain have a psychological cause, such as addiction. As long as we accept a materialistic approach to the mind-body problem, then we should assume that mental phenomena, such as pain and other sensations, fit into the causal structure of the world.

6.3 Pain as a symptom, not a disease

Even if pain is recognized as real, medicine’s emphasis on treating diseases instead of symptoms may encourage some HCPs to take pain less seriously than a disease. Since pain is a “mere” symptom and not a disease, pain treatment may be given less emphasis in a patient’s *plan of care* (Cassell, 1991). Other important concerns in therapy, such as prolonging life and restoring health, may be viewed as more important than pain management. Pain control, on this view, is icing on the medical cake (Cupples, 1992).

This view also rests on a misunderstanding of medical practice and the goals of medicine. For conditions that can be cured or effectively treated, such as appendicitis, gallstones, or a deep laceration, promoting life and restoring health should be the primary goals of therapy. However, many conditions cannot be cured or effectively treated. When a patient is terminally ill, the primary goals of therapy should be *palliative*, not curative (Byock, 1997; Foley, 1997;

World Health Organization, 1996). When a patient suffers from chronic pain due to a disease or a chronic pain syndrome, pain may be the only problem that can be effectively treated. When curative goals cannot be effectively achieved, medicine should become more palliative in its approach (Cassell, 1991; Aronoff, 1992; World Health Organization, 1996).

6.4 *Pain and magic bullets*

We have already noted that HCPs now have a variety of pharmaceutical and surgical techniques for relieving pain. These “magic bullets” produce analgesia by treating the body of as biochemical/biomechanical system. However, since there are also important psychological, social, cultural, and spiritual aspects to pain, this approach to pain control has inherent limitations. To achieve effective pain relief, it is often necessary to use non-pharmacological and non-surgical treatment modalities, such as psychotherapy, massage, exercise, and so on. Pain control is a complex problem that requires a multi-disciplinary approach (Cahill, 1997).

Unfortunately, it is often not easy for HCPs and patients to adapt to this multi-disciplinary model, since non-pharmaceutical and non-surgical methods may require considerable education, patient responsibility and compliance, and follow-up. It is much easier for a physician to write a prescription for low back pain or recommend surgery, than it is for her to develop and implement a plan of care that involves exercise, massage, music therapy, and psychotherapy. It is also easier for the patient take a drug for pain than it is to follow a multi-disciplinary program for pain management. The remarkable advances in medicine that have occurred in this century have led us to expect a “magic bullet” for all of our medical problems, including pain. Unfortunately, we still lack easy and quick fixes for many of our difficult medical problems, such as pain.

6.5 *Pain and expert knowledge*

Finally, pain does not completely fit the model of expert knowledge that we find in medicine, science, and other professions. Although expert knowledge is required in order to understand the causal basis of pain and recommend treatments for pain, no expertise is required to observe pain. This point can be related to the subjectivity issues we have already discussed at length: as far as their own sensations of pain are concerned, *patients are the experts*. Patient expertise reverses the usual model of doctor-patient relationships by placing knowledge and authority in the hands of patients, not health care professionals. Although pain experts have developed some specialized terms

relating to pain assessment and treatment, this terminology has not yet been completely adopted health care professionals. Moreover, pain expertise, such that it is, has not propagated very far in the medical profession, since there is still very little discussion of pain management in medical, nursing, and pharmacy education (Hawthorne and Redmond, 1998).

One might argue that HCPs can solve the expertise problem by conducting more research on pain, by promoting pain education in medical, nursing, and pharmacy schools, and by developing and refining the terminology (or jargon) used to discuss pain. We agree with these proposals. However, there are some inherent limits to the applicability of the expertise model to pain. Even if health care professionals develop and adopt an expert language (or jargon) for talking about pain, it is likely that the majority of patients will not understand or use this language, since many people find medical jargon to be baffling and intimidating. ‘Pain,’ ‘itch,’ ‘red,’ ‘loud,’ ‘soft,’ and other terms that describe sensations are likely to remain part of our *common vernacular* or “folk” psychology (Dennett, 1991). Since health care professionals must rely on first-person reports of pain in order to assess and treat pain, any expert language for talking about pain must allow HCPs to explain and interpret reports of pain that are expressed in vernacular. Thus, even “scientific” or “expert” theories and concepts of pain must still maintain strong ties to the common experience of pain, since the usefulness of these theories and concepts will depend on their applicability to the clinical setting. Since pain research and education are based on our theories and concepts of pain, the common experience of pain also restricts or shapes pain research and education. Pain experts, unlike experts in physics, mathematics, cardiology, or molecular genetics, cannot stray very far from the common experience of pain.

7. **Conclusions: Reforming medicine**

In this essay we have argued that one reason why HCPs often undertreat pain is that pain does not fit in well with the scientific approach to medical practice. Pain does not fit this approach because (1) pain is subjective; (2) the causal basis of pain is often poorly understood; (3) pain is often viewed as a “mere” symptom, not as a disease; (4) there often are not “magic bullets” for pain; (5) pain does not fit the expert knowledge model. In order for health care professionals to do a better job of treating pain, some changes need to occur in medical philosophy, education and practice. As we noted earlier, other writers have recommended legal, regulatory, financial changes in health care in order to promote better pain manage-

ment. We also believe that some changes need to occur in health care in order to support and improve the quality of pain control. Our discussion of the relationship between pain and scientific medicine suggests that the required changes should go far beyond legal, regulatory, and financial remedies, since these solutions fail to address some of the deeper causes of inadequate pain medicine. Since the inadequate treatment of pain is due, in part, to the nature of modern medicine, adequate pain treatment depends on a deliberate effort to rethink medical education, practice, and philosophy. Some of the assumptions that work so well for so many medical problems need to be dropped or relaxed when it comes to the assessment and treatment of pain. To help bring about this transformation, we suggest the following steps:

1. Health care professionals should receive more education on pain management. Discussion of pain management should take place in pre-professional and post-professional settings.
2. Health care professionals should talk about pain more in a clinical setting. Discussions should take place between patients and the medical team as well as among team members. Conferences about the plan of care for a patient should address pain management issues.
3. Health care professionals should become more comfortable with the subjective aspects of pain. HCPs should be willing to believe patient's reports of pain even when the causal basis of the pain is poorly understood.
4. Pain assessment results should be treated like other test results and should be recorded in the patient's medical record. Pain should become a "fifth vital sign."
5. Health care professionals and patients should be more open to an inter-disciplinary approach to pain management, especially when pharmaceutical and surgical techniques are not effective. Other techniques, such as psychotherapy, hypnosis, distraction, and massage, should be employed in pain treatment. HCPs and patients should not expect a "magic bullet" exists that can cure any pain.

These steps will not solve all the problems with pain undertreatment, but they will help HCPs do a better job of dealing with pain. Since pain undertreatment is due, in part, to beliefs and attitudes that play a foundational role in modern medical philosophy and practice, it will not be easy for our society to take these steps. However, the end result – better pain management – will be worth the effort.

References

- Agency for Health Care Policy and Research: 1992, *Acute Pain Management in Infants, Children, and Adolescents: Operative and Medical Procedures. Quick Reference Guide for Clinicians*. AHCPR Pub. No. 92-0020. Rockville, MD: US Department of Health and Human Services.
- Agency for Health Policy and Research: 1994, *Clinical Practice Guideline: Management of Cancer Pain*. US Department of Health and Human Services Rockville, MD.
- Albert, D., Munson, R. and Resnik, M.: 1988, *Reasoning in Medicine*. Baltimore: Johns Hopkins University Press.
- AMA, Council on Scientific Affairs: 1997, 'Good Care of the Dying Patient', *Journal of the American Medical Association* 275(6), 474–478.
- Aronoff, G (ed.): 1992, *Evaluation and Treatment of Chronic Pain*, 2nd edn. Baltimore: Williams and Wilkins.
- Atkinson, R. and Davies, G.: 1993, 'Issues in Pain Management', in: D. Clark (ed.), *The Future of Palliative Care*. Buckingham: Open University Press, pp. 148–166.
- Beauchamp, T. and Childress, J.: 1994, *Principles of Biomedical Ethics*, 4th edn. New York: Oxford University Press.
- Beecher, H.: 1956. 'Relationship of Significance of Wound to the Pain Experience', *JAMA* 161, 1609–1613.
- Bilkey, W.: 1996, 'Confusion, Fear, and Chauvinism: Perspectives on the Medical Sociology of Chronic Pain', *Perspectives in Biology and Medicine* 39 (2), 270–280.
- Block, N., Flanagan, O. and Guzeldere, G. (eds.): 1997, *The Nature of Consciousness*. Cambridge, MA: MIT Press.
- Bradley, G.: 1993, *Disease, Diagnosis, and Decisions*. New York: John Wiley and Sons.
- Byock, I.: 1997, *Dying Well*. New York: Riverhead Books.
- Cahill, M. (ed.): 1997, *Expert Pain Management*. Springhouse, PA: Springhouse.
- Camus, A.: 1955, *The Myth of Sisyphus*. New York: Vintage Books.
- Caplan A.: 1986, 'Exemplary Reasoning? A Comment on Theory Structure in Biomedicine', *Journal of Medicine and Philosophy* 11, 93–105.
- Cassell, E.: 1982, 'The Nature of Suffering and the Goals of Medicine', *New England Journal of Medicine* 306, 639–645.
- Cassell, E.: 1991, *The Nature of Suffering*. New York: Oxford University Press.
- Caudill, M.: 1994, *Managing Pain Before it Manages You*. New York: Guilford Press.
- Cleeland, C.: 1998, 'Undertreatment of Cancer Pain in Elderly Patients', *Journal of the American Medical Association* 279 (23), 1914–1915.
- Cleeland, C. et al.: 1994, 'Pain and Its Treatment in Outpatients with Metastatic Cancer', *New England Journal of Medicine* 330, 592–596.
- Clouser, K. and Zucker, A.: 1974, 'Medicine as an Art: An Initial Exploration', *Texas Reports on Biology and Medicine* 2, 267–274.
- Cohen, F.: 1980, 'Post-surgical pain Relief: Patients' Status and Nurses' Education Choices', *Pain* 9, 265–274.
- Culver, C. and Gert, B.: 1982, *Philosophy in Medicine*. New York: Oxford University Press.
- Cupples, S.: 1992, 'Pain as a Hurtful Experience: A Philosophical

- ical Analysis and Implications for Nursing Care', *Nursing Forum* 27 (1), 5–11.
- Dennett, D. 1991, *Consciousness Explained*. Boston: Little and Brown.
- Deshano, C.: 1997, 'Michigan Moves Toward Better Pain Management', *Michigan Medicine* 96 (1), 16–21.
- De Sousa, R.: 1991, *The Rationality of Emotion*. Cambridge, MA: MIT Press.
- Emanuel, E., Daniels, E., Fairclough, D. and Clarridge, B.: 1998, 'The Practice of Euthanasia and Physician-assisted Suicide in the United States', *Journal of the American Medical Association* 280, 507–513.
- Emanuel, L.: 1998, 'Facing Requests for Physician-assisted Suicide', *Journal of the American Medical Association* 280, 643–647.
- Foley, K.: 1985, 'The Treatment of Cancer Pain', *N Eng J Med* 313, 84–95.
- Foley, K.: 1997, 'Competent Care for the Dying Instead of Physician-assisted Suicide', *New England Journal of Medicine* 336 (1), 54–58.
- Gatchell, R. and Turk, D.: 1996, *Psychological Approaches to Pain Management*. New York: Guilford Press.
- Goldstein, N.: 1997, 'Inadequate Pain Management: A Suicidogen', *Journal of Clinical Pharmacology* 37 (1), 1–3.
- Gorovitz, S. and MacIntyre, A.: 1976, 'Towards a Theory of Medical Fallibility', *Journal of Medicine and Philosophy* 1, 51–71.
- Greenville Daily Reflector: 1999, 'VA Doctors and Nurses will Treat Pain as "Fifth Vital Sign"', *Greenville Daily Reflector*, 1 February, A2.
- Hardwig, J.: 1994, 'Toward an Ethics of Expertise', in: D. Wueste (ed.), *Professional Ethics and Social Responsibility*. Landham, MD: Rowman and Littlefield, pp. 83–101.
- Harrold, J. and Lynn, J.: 1998, *A Good Dying*. New York: The Haworth Press.
- Harvey, W.: 1993, *On the Motion of the Heart and Blood in Animals*, R. Willis (trans.), Buffalo: Prometheus Books.
- Hawthorne, J. and Redmond, K.: 1998, *Pain: Causes and Management*. Oxford: Blackwell.
- Hill, C.: 1995, 'When Will Adequate Pain Control Be the Norm?', *Journal of the American Medical Association* 274, 1881–1882.
- Horgan J.: 1997, 'Seeking a Better Way to Die', *Scientific American* 276 (5), 100–105.
- Ingham, J. and Foley, K.: 1998, 'Pain and the Barriers to its Relief at the End-of-life: A Lesson for Improving End-of-life Care', *The Hospice Journal* 13 (1 & 2), 89–100.
- Jaquette, D.: 1994, *Philosophy of Mind*. Englewood Cliffs, NJ: Prentice-Hall.
- Jost, T.: 1998, 'Public Financing of Pain Management: Leaky Umbrellas and Ragged Safety Nets', *Journal of Law, Medicine, and Ethics* 26, 290–307.
- Judge, R., Zuidema, G. and Fitzgerald, F. (eds.): 1989, *Clinical Diagnosis*, 5th edn. Boston: Little, Brown, and Company.
- Kerns, R., Turk, D. and Rudy, T.: 1985, 'The West Haven-Yale Multidimensional Pain Inventory', *Pain* 23, 345–356.
- Kitcher, P.: 1993, *The Advancement of Science*. New York: Oxford University Press.
- Knoben, J. and Anderson, P.: 1988, *Clinical Drug Data*, 6th edn. Hamilton, IL: Drug Intelligence Publications.
- Little, M.: 1995, *Humane Medicine*. Cambridge: Cambridge University Press.
- Lynn, J. and Wilkinson, A.: 1998, 'Quality End-of-life Care: The Case for a Medicaring Demonstration', *The Hospice Journal* 13 (1 & 2), 151–163.
- Marks, R. and Sachar, E.: 1973, 'Undertreatment of Medical Inpatients with Narcotic Analgesics', *Annals of Internal Medicine* 78, 173–181.
- Martino, A.: 1998, 'In Search of a New Ethic for Treating Patients with Chronic Pain: What Can Medical Boards Do?', *Journal of Law, Medicine, and Ethics* 26, 332–349.
- McCabe, M.: 1997, 'Ethical Issues in Pain Management', *The Hospice Journal* 12 (2), 25–32.
- McCaffery, M. and Beebe, A.: 1989, *Pain: Clinical Manual for Nursing Practice*. St. Louis Mosby.
- McGivney, W. and Crooks, G.: 1984, 'The Care of Patients with Severe Chronic Pain in Terminal Illness', *Journal of the American Medical Association* 25, 1182–1188.
- Meadows, J.: 1992, *The Great Scientists*. New York: Oxford University Press.
- Melzack, R.: 1984, 'The Myth of Painless Childbirth', *Pain* 19, 321–337.
- Melzack, R.: 1990, 'The Tragedy of Needless Pain', *Scientific American* 262, 27–33.
- Melzack, R. and Wall, P.D.: 1965, 'Pain Mechanisms: A New Theory', *Science*, 150, 971–975.
- Merton, R.: 1973, *The Sociology of Science*. Chicago: University of Chicago Press.
- Morris, D.: 1991, *The Culture of Pain*. Berkeley: University of California Press.
- Munson, R.: 1981, 'Why Medicine Cannot be a Science', *Journal of Medicine and Philosophy* 6, 183–208.
- Ng, B., Dimsdale, J., Sharagg, G. and Deutsch, R.: 1996, 'Ethnic Differences in Analgesic Consumption for Postoperative Pain', *Psychosomatic Medicine* 58, 125–129.
- Owen, H., McMillan, V. and Rogowski, D.: 1990, 'Post-operative Pain Therapy: A Survey of Patient's Expectations and their Experiences', *Pain* 41, 303–307.
- Pellegrino, E. and Thomasma, D.: 1981, *A Philosophical Basis of Medical Practice*. New York: Oxford University Press.
- Pellegrino, E. and Thomasma, D.: 1993, *The Virtues in Medical Practice*. New York: Oxford University Press.
- Pitcher, G.: 1976, 'Pain and Unpleasantness', in: S. Spicker and T. Engelhardt (eds.), *Philosophical Dimensions of the Neuro-Medical Sciences*. Dordrecht: Reidel, pp. 181–196.
- Popper, K.: 1963, *Conjectures and Refutations*. New York: Harper and Row.
- Porter, R.: 1997, *The Greatest Benefit of Mankind*. New York: WW Norton.
- Quill, T., Cassell, C. and Meier, D.: 1992, 'Care of the Hopelessly Ill: Proposed Clinical Criteria for Physician-assisted Suicide', *New England Journal of Medicine* 327, 1380–1384.
- Quill, T., Lo, B. and Brock, D.: 1997, 'Palliative Options of Last Resort', *Journal of the American Medical Association* 278, 2099–2104.
- Resnik, D.: 1995, 'To Test or not to Test: A Clinical Dilemma', *Theoretical Medicine* 16, 1–12.
- Rich, B.: 1997, 'A Legacy of Silence: Bioethics and the Culture of Pain', *Journal of Medical Humanities* 18, 233–259.
- Rollin, B.: 1997, 'Pain and Ideology in Human a Veterinary

- Medicine', *Seminars in Veterinary Medicine and Surgery* 12 (2), 56–60.
- Rosenberg, A.: 1995, *Philosophy of Social Science*, 2nd edn. Press, Boulder, CO: Westview.
- Schaffner, K.: 1994, *Discovery and Explanation in Biology and Medicine*. Chicago: University of Chicago Press.
- Schaffner, K.: 1986, 'Exemplary Reasoning about Biological Models and Diseases: A Relation Between the Philosophy of Medicine and the Philosophy of Science', *Journal of Medicine and Philosophy* 11, 63–80.
- Shaffer, J.: 1976, 'Pain and Suffering', in: S. Spicker and T. Englehardt (eds.), *Philosophical Dimensions of the Neuro-Medical Sciences*. Dordrecht: Reidel, pp. 222–233.
- Singer, P. and Siegler, M.: 1990, 'Euthanasia: A Critique', *New England Journal of Medicine* 322, 1881–1883.
- Sox, H., Blatt, M., Higgins, M. and Marton, K.: 1988, *Medical Decision Making*. Boston: Butterworths.
- Starr, S.: 1992, 'The Politics of Pain: A New Attitude Toward Treatment', *Drug Topics* 136 (18), 60–70.
- SUPPORT Principal Investigators: 1997, 'A Controlled Trial to Improve Care for Seriously Ill Hospitalized Patients', *Journal of the American Medical Association* 274 (20), 1591–1598.
- Sullivan, M., Rapp, S., Fitzgibbon, D. and Chapman, C.: 1997, 'Pain and the Choice to Hasten Death in Patients with Painful Metastatic Cancer', *Journal of Palliative Care* 13 (3), 18–28.
- Todd, K., Samaria, N. and Hoffman, J.: 1993, 'Ethnicity as a Risk Factor for Inadequate Emergency Department Analgesia', *Journal of the American Medical Association* 269, 1537–1539.
- Whitbeck, C.: 1995, 'Teaching Ethics to Scientists and Engineers: Moral Agents and Moral Problems', *Science and Engineering Ethics* 1, 299–308.
- World Health Organization: 1996, *Cancer Pain Relief*. Geneva: World Health Organization.
- Ziman, J.: 1984, *An Introduction to Science Studies*. Cambridge: Cambridge University Press.