The University of Texas at Austin Dell Medical School — A Vital, Inclusive Health Ecosystem

Safe and Effective Alleviation of Pain

David Ring MD PhD

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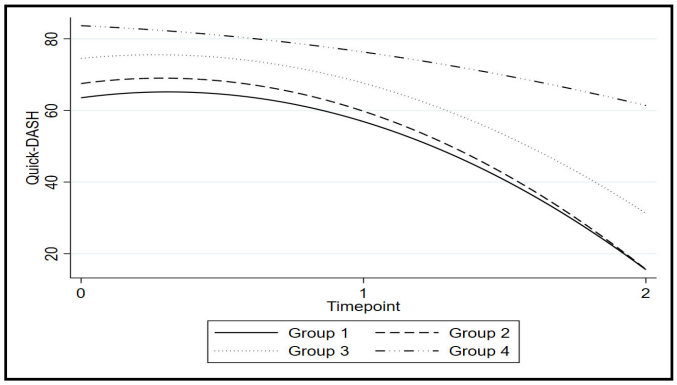

5

Misperception of Disease Onset in People with Gradual-Onset Disease of the Upper Extremity

Maartje Lemmers, MD, Yvonne Versluijs, MD, Joost T.P. Kortlever, MD, Amanda I. Gonzalez, MD, and David Ring, MD, PhD

Perceived onset *(no. of patients)*	
Gradually	99 (82%)
Suddenly	22 (18%)
Perceived cause *(no. of patients)*	
Expected/age-related	92 (76%)
Injury/event-related	29 (24%)
Gradual impact of activities	20 (69%)
A specific injury	9 (31%)

J Bone Joint Surg Am. 2020;102:2174-80 • http://dx.doi.org/10.2106/JBJS.20.00420

6

Clin Orthop Relat Res (2017) 475:2360–2365
DOI 10.1007/s11999-017-5401-y

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A Publication of The Association of Bone and Joint Surgeons®

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CLINICAL RESEARCH

Patients Older Than 40 Years With Unilateral Occupational Claims for New Shoulder and Knee Symptoms Have Bilateral MRI Changes

Tiffany C. Liu BA, Nina Leung PhD, Leonard Edwards BS, David Ring MD, PhD, Edward Bernacki MD, MPH, Melissa D. Tonn MD, MBA, MPH

7

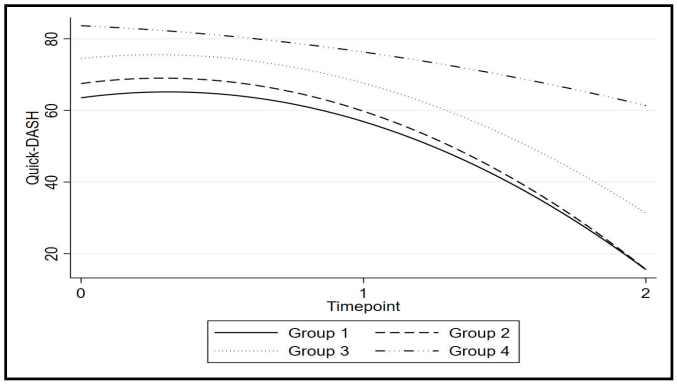
Table 2. Congruency of MRI findings with unilateral symptoms

Joint affected	Congruent MRI findings	Incongruent MRI findings		p value, congruent versus incongruent
	Structural changes worse on symptomatic side	Structural changes worse on asymptomatic side	Structural changes equal bilaterally	
Shoulder	90 (48%)	67 (35%)	32 (17%)	0.36
Knee	45 (43%)	27 (26%)	33 (31%)	0.038

8

Injury	Not an Injury
Acute, traumatic rotator cuff tendon rupture (large defect, extends to infraspinatus, good muscle)	Rotator cuff tendinopathy (thinning, small supraspinatus defect)
Tendon laceration	De Quervain tendinopathy
Fractured radial head	Elbow enthesopathy (tennis elbow)
Lumbar muscle strain	Lumbar arthritis
Median nerve laceration	Idiopathic median neuropathy at the carpal tunnel (carpal tunnel syndrome)

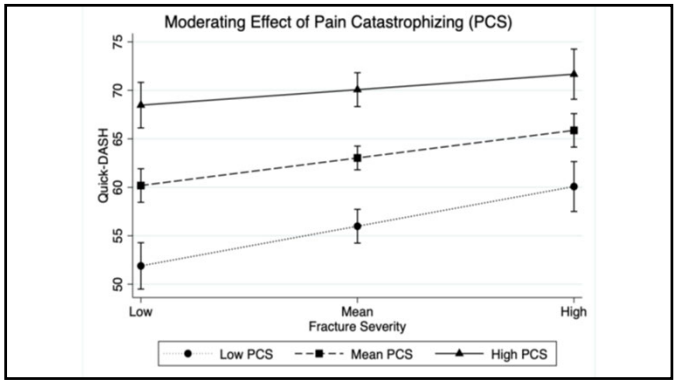
9



10

Distress / Unhelpful Thinking	Symptoms of Distress		Unhelpful thinking	
	Depression	Anxiety	Pain Catastrophizing	Kinesiophobia
Group 1: (n=168) LOW	(z = -1.27) 38 +/- 4	(z = -1.11) 40 +/- 5	(z=-0.67) 15 +/- 3	(z=-0.47) 23 +/- 7
Group 2: (n=270) AVERAGE	(z = 0.08) 53 +/- 6	(z = -0.25) 49 +/- 6	(z=-0.26) 18 +/- 4	(z=-0.42) 27 +/- 6
Group 3: (n=202) NOTABLE	(z = 0.40) 56 +/- 6	(z = 0.82) 60 +/- 6	(z=0.28) 21 +/- 4	(z=0.46) 30 +/- 4
Group 4: (n=63) MARKED	(z = 1.77) 70 +/- 5	(z = 1.41) 66 +/- 6	(z=2.06) 33 +/- 8	(z=1.57) 38 +/- 3

11



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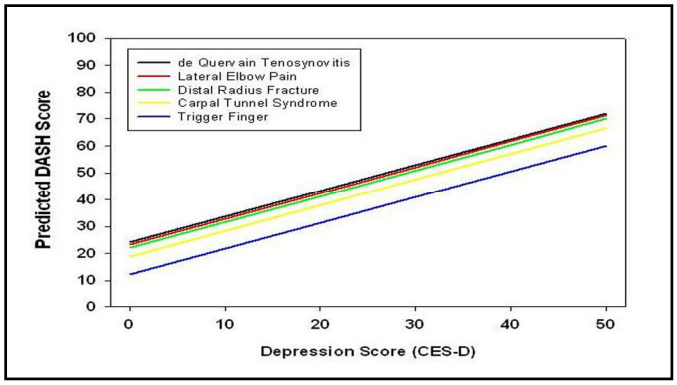
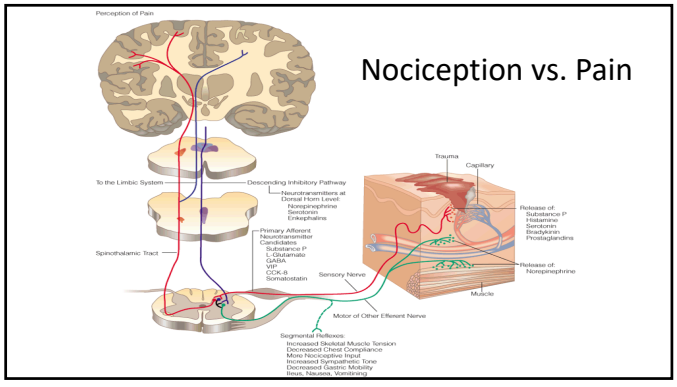

Predicted DASH Score
Depression Score (CES-D)
de Quervain Tenosynovitis
Lateral Elbow Pain
Distal Radius Fracture
Carpal Tunnel Syndrome
Trigger Finger
0
10
20
30
40
50
60
70
80
90
100

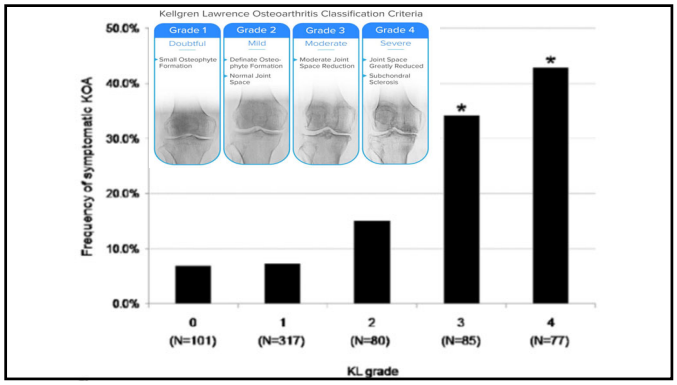
13


Disease vs. Illness

14


Nociception vs. Pain
Perception of Pain
To the Limbic System
Descending Inhibitory Pathway
Spinothalamic Tract
Primary Afferent
Sensory Nerve
Motor of Other Efferent Nerve
Trauma
Capillary
Muscle

15

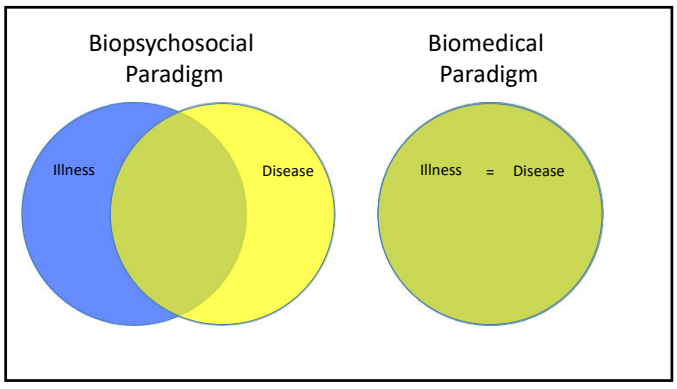


16

TABLE III Risks of Symptomatic Knee Osteoarthritis Conferred by the Severity of Radiographic Knee Osteoarthritis or by Comorbid Depressive Disorders

	Odds Ratio*
Depressive disorders†	
Absent	Referent group
Present	5.9 (3.0 to 11.4)‡
Kellgren-Lawrence grade	
0 or 1	Referent group
2 or 3	2.6 (1.4 to 4.8)§
4	7.2 (3.5 to 15.0)‡

17



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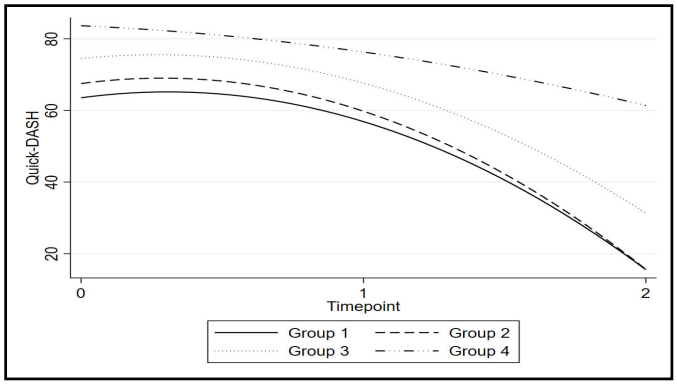

19

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Opioid Refills 1-2 Months After Surgery

- PTSD
- Symptoms of anxiety
- Symptoms of depression
- Catastrophic thinking

Helmerhorst GT, Vranceanu AM, Vrahas M, Smith M, Ring D. Risk factors for continued opioid use one to two months after surgery for musculoskeletal trauma. J Bone Joint Surg Am. 2014 Mar 19;96(6):495-9. doi: 10.2106/JBJS.L.01406. PMID: 24647506.

20

Clin Orthop Relat Res
DOI 10.1007/s11999-014-3660-4

Clinical Orthopaedics and Related Research®

Opioid Use After Fracture Surgery Correlates With Pain Intensity and Satisfaction With Pain Relief

Arjan G. J. Bot MD, PhD, Stijn Bekkers BSc, Paul M. Arnstein PhD, R. Malcolm Smith MD, David Ring MD, PhD

Table 3. Multivariable analysis for pain intensity

Model	Adjusted R^{2*}	p value	Partial $R^{2\dagger}$
	0.26	< 0.001	
Oral morphine equivalents		0.001	0.082
Depression/anxiety		0.019	0.044
Smoker		0.047	0.031

21

THE NEW YORKER

22

23

24

25

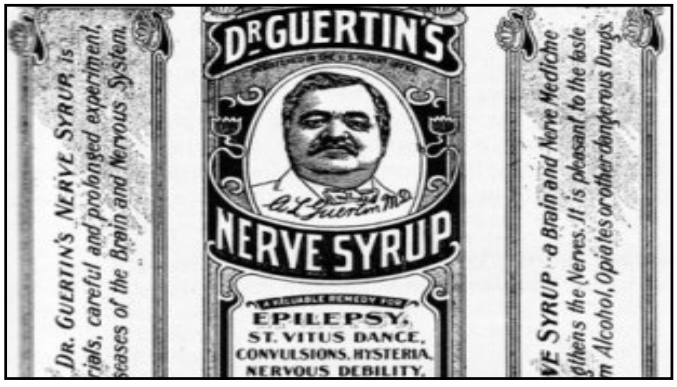
26

27

28


MRS. WINSLOW'S
SOOTHING
SYRUP
MRS WINSLOW'S
Soothing
Syrup
FOR
CHILDREN
TEETHING
FOR CHILDREN TEETHING

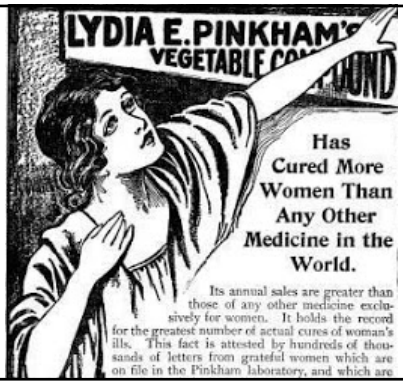
29


DR GUERTIN'S
NERVE SYRUP
EPILEPSY,
ST. VITUS DANCE,
CONVULSIONS, HYSTERIA,
NERVOUS DEBILITY.

30


ST. JACOBS OIL
CONQUERS
PAIN.

31


LYDIA E. PINKHAM'S
VEGETABLE
Has
Cured More
Women Than
Any Other
Medicine in the
World.
Its annual sales are greater than those of any other medicine exclusively for women. It holds the record for the greatest number of actual cures of woman's ills. This fact is attested by hundreds of thousands of letters from grateful women which are on file in the Pinkham laboratory, and which are

32

33

34

Legislation

- Opium Exclusion Act 1909
- Harrison Narcotics Tax Act 1914
- Heroin Act 1924
- Food, Drug, and Cosmetic Act 1938
- Controlled Substances Act 1970
- DEA formed 1973

35

ADDICTION RARE IN PATIENTS TREATED WITH NARCOTICS

To the Editor: Recently, we examined our current files to determine the incidence of narcotic addiction in 39,946 hospitalized medical patients[1] who were monitored consecutively. Although there were 11,882 patients who received at least one narcotic preparation, there were only four cases of reasonably well documented addiction in patients who had no history of addiction. The addiction was considered major in only one instance. The drugs implicated were meperidine in two patients,[2] Percodan in one, and hydromorphone in one. We conclude that despite widespread use of narcotic drugs in hospitals, the development of addiction is rare in medical patients with no history of addiction.

JANE PORTER
HERSHEL JICK, M.D.
Boston Collaborative Drug Surveillance Program
Boston University Medical Center
Waltham, MA 02154

36

Pain, 25 (1986) 171–186
Elsevier

PAI 00878

Chronic Use of Opioid Analgesics in Non-Malignant Pain: Report of 38 Cases

Russell K. Portenoy and Kathleen M. Foley

Pain Service, Department of Neurology, Memorial Sloan-Kettering Cancer Center, and Department of Neurology, Cornell University Medical College, New York, NY 10021 (U.S.A.)

(Received 10 June 1985, accepted 28 October 1985)

Summary

Thirty-eight patients maintained on opioid analgesics for non-malignant pain were retrospectively evaluated to determine the indications, course, safety and efficacy of this therapy. Oxycodone was used by 12 patients, methadone by 7, and levorphanol by 5; others were treated with propoxyphene, meperidine, codeine, pentazocine, or some combination of these drugs. Nineteen patients were treated for

37

38

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"Pain is the 5th Vital Sign"

- International Association for the study of pain (IASP)
- Initial wide adoption in VA hospitals

39

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JACHO (now the Joint Commission)

- 2000 release standards on pain management
  - Do not mention opioids
- Released pain CME booklet sponsored by Purdue that said:

"Some clinicians have inaccurate and exaggerated concerns" about addiction, tolerance and risk of death, the guide said. "This attitude prevails despite the fact there is no evidence that addiction is a significant issue when persons are given opioids for pain control."

40

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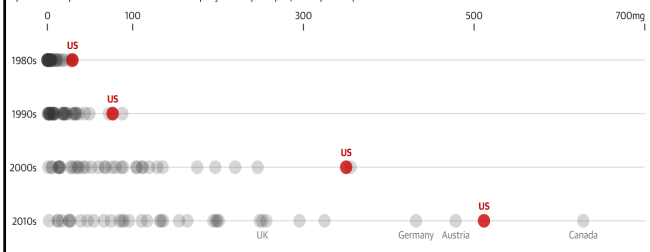
Iatrogenic & Advocatogenic

- You undertreat pain
- You over-worry addiction

41

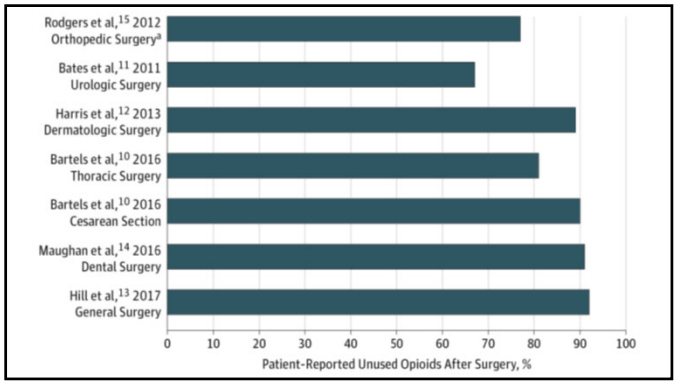
The US medical sector ranks second in the world for opioid use

Opioid consumption in the medical retail sector per year and per capita, in morphine equivalents

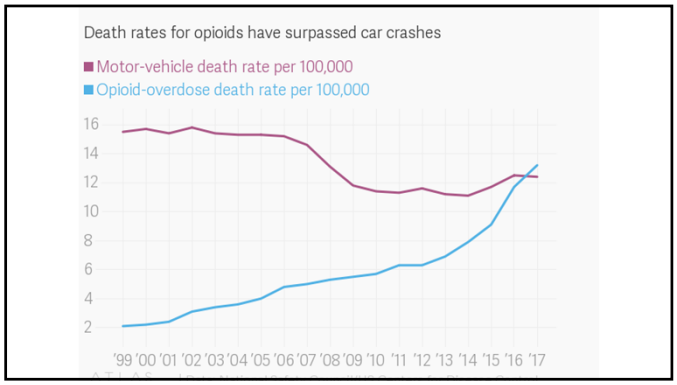


As a result, medical opioid consumption more than tripled, soaring far beyond levels seen in other countries. Today, the US medical sector ranks second in the world for opioid use behind only Canada, which is struggling with its own overdose crisis.

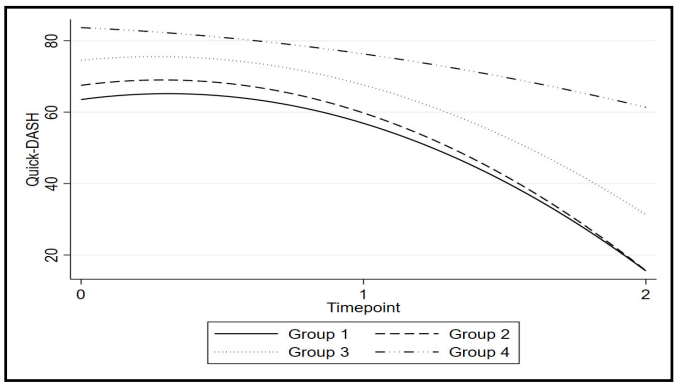
42


Rodgers et al,[15] 2012
Orthopedic Surgery[a]
Bates et al,[11] 2011
Urologic Surgery
Harris et al,[12] 2013
Dermatologic Surgery
Bartels et al,[10] 2016
Thoracic Surgery
Bartels et al,[10] 2016
Cesarean Section
Maughan et al,[14] 2016
Dental Surgery
Hill et al,[13] 2017
General Surgery
0 10 20 30 40 50 60 70 80 90 100
Patient-Reported Unused Opioids After Surgery, %

43


Death rates for opioids have surpassed car crashes
Motor-vehicle death rate per 100,000
Opioid-overdose death rate per 100,000
16
14
12
10
8
6
4
2
'99 '00 '01 '02 '03 '04 '05 '06 '07 '08 '09 '10 '11 '12 '13 '14 '15 '16 '17

44


Quick-DASH
80
60
40
20
0
1
2
Timepoint
Group 1
Group 2
Group 3
Group 4

45

46

Ring D, Barth R, Barsky A. Evidence-based medicine: disproportionate pain and disability. J Hand Surg Am. 2010 Aug;35(8):1345-7. doi: 10.1016/j.jhsa.2010.06.007. PMID: 20684932.

International Association for the Study of Pain

1. The presence of an initiating noxious event or a cause of immobilization.
2. Continuing pain, allodynia (perception of pain from a nonpainful stimulus), or hyperalgesia disproportionate to the inciting event.
3. Evidence at some time of edema, changes in skin blood flow, or abnormal sudomotor activity in the region of the pain.
4. CRPS is excluded by the existence of conditions that would otherwise account for the degree of pain and dysfunction.

47

48

Catastrophic Thinking Is Associated With Finger Stiffness After Distal Radius Fracture Surgery

Teun Teunis, MD, Arjan G. J. Bot, MD, PhD,† Emily R. Thornton, BSc,* and David Ring, MD, PhD**

Objectives: To identify demographic, injury-related, or psychologic factors associated with finger stiffness at suture removal and 6 weeks after distal radius fracture surgery. We hypothesize that there are no factors associated with distance to palmar crease at suture removal.

Design: Prospective cohort study.

Setting: Level I Academic Urban Trauma Center.

Patients: One hundred sixteen adult patients underwent open reduction and internal fixation of their distal radius fractures; 96 of whom were also available 6 weeks after surgery.

Intervention: None.

Main Outcome Measurements: At suture removal, we recorded patients' demographics, AO fracture type, carpal tunnel release at the time of surgery, pain catastrophizing scale, Whiteley Index, Patient Health Questionnaire-9, and disabilities of the arm, shoulder, and hand questionnaire, 11-point ordinal measure of pain intensity, distance to

Conclusions: Catastrophic thinking was a consistent and major determinant of finger stiffness at suture removal and 6 weeks after injury. Future research should assess if treatments that ameliorate catastrophic thinking can facilitate recovery of finger motion after operative treatment of a distal radius fracture.

Key Words: catastrophic thinking, distal radius, finger stiffness, fracture, predictors, trauma

Level of Evidence: Prognostic Level I. See Instructions for Authors for a complete description of levels of evidence.

(*J Orthop Trauma* 2015;29:e414–e420)

INTRODUCTION

Finger stiffness is common after fracture of the distal radius. Variations in pathophysiology such as trauma mechanism or fracture type do not seem to adequately account for the variability in finger stiffness. For example, low- and medium-energy trauma leads to substantial finger stiffness

49

50

51

52

	NOCICEPTIVE/ INFLAMMATORY	NEUROPATHIC	CENTRAL SENSITIZATION/ NOCIPLASTIC
Stimulus	Injury or inflammation	Neural damage, pinching, irritation	Central nervous system dysfunction
Neurons	Nociceptor and non-nociceptor	Nociceptor and non-nociceptor	Non-nociceptor
Site	Peripheral and central nervous system	Peripheral and central nervous system	Central nervous system
Clinical setting	Acute trauma, post-operative, arthritis	Nerve lesions, diabetic neuropathy, shingles, carpel tunnel	Fibromyalgia and a variety of other pain disorders
Function	Protective, healing/repair, pathological	Pathological	Pathological

53

VIEWPOINT

Changing Mindsets to Enhance Treatment Effectiveness

Alia Crum, PhD
Department of Psychology, Stanford University, Stanford, California.

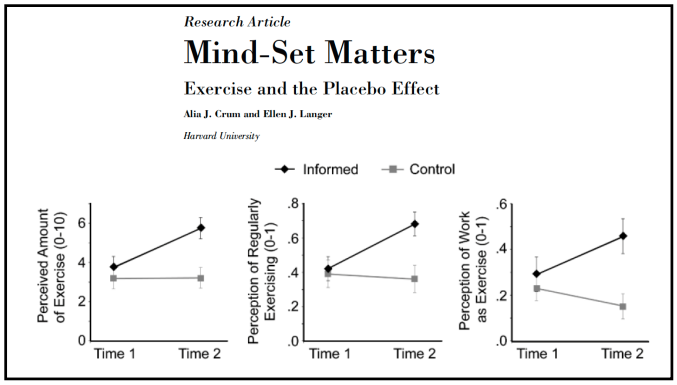
Barry Zuckerman, MD
Department of Pediatrics, Boston Medical Center, Boston, Massachusetts; and Center for Advanced Study of Behavioral Sciences, Stanford University, Stanford, California.

During the past few decades, significant biomedical advances have increased diagnostic and treatment effectiveness. Recent research from psychology provides a special opportunity to add value to the traditional cornerstone of medicine: the patient-clinician relationship.

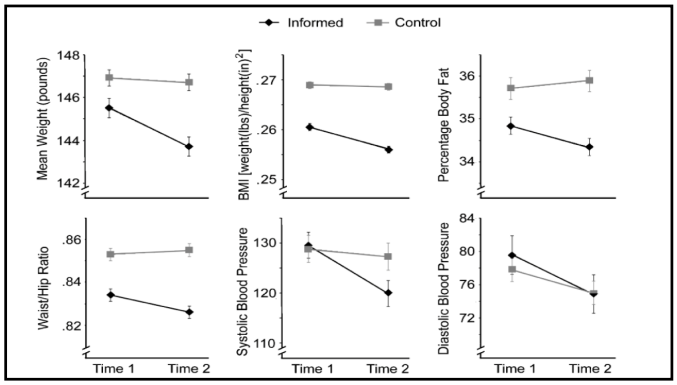
What is it about the conversation between patient and physician that gives it therapeutic value? At the most basic level, physicians and other clinicians gather information and communicate disease and treatment information. At an emotional level, the conversation can evoke a sense of mutual trust, empathy, support, and reassurance. This Viewpoint discusses research on mindsets, a critical feature of the conversation between patients and physicians because of their ability to drive motivation and alter physiology to enhance clinical outcomes.

to heal, similar to placebos, can trigger specific neurobiological correlates including the immune, cardiovascular, and neuroendocrine systems.[1] In fact, placebos are driven in large part by the mindset that the pill is effective. Unlike placebos, which are fraught with deception, however, mindsets can be changed nondeceptively to improve the effectiveness of active medications and behavioral treatments.[2] For example, morphine is more effective for reducing pain after thoracic surgery when the physician tells the patient, "I'm giving you morphine, a strong pain reliever," compared with administering the same dose of morphine intravenously without the patient's awareness.[3] The benefits of the same amount of physical activity are greater when people are made aware that "this work is good exercise."[3] Positive effects of the

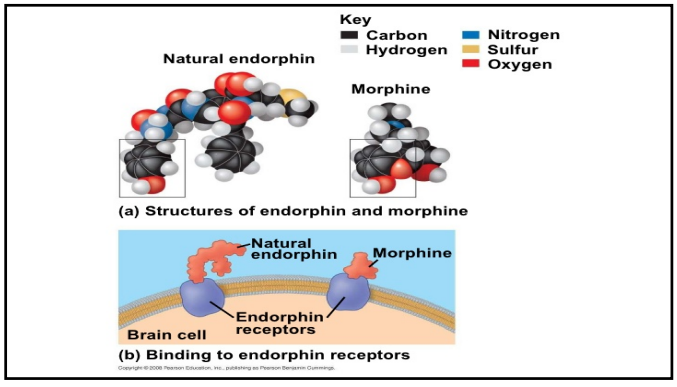
54


Research Article
Mind-Set Matters
Exercise and the Placebo Effect
Alia J. Crum and Ellen J. Langer
Harvard University
Informed
Control
Perceived Amount of Exercise (0-10)
Perception of Regularly Exercising (0-1)
Perception of Work as Exercise (0-1)
Time 1
Time 2

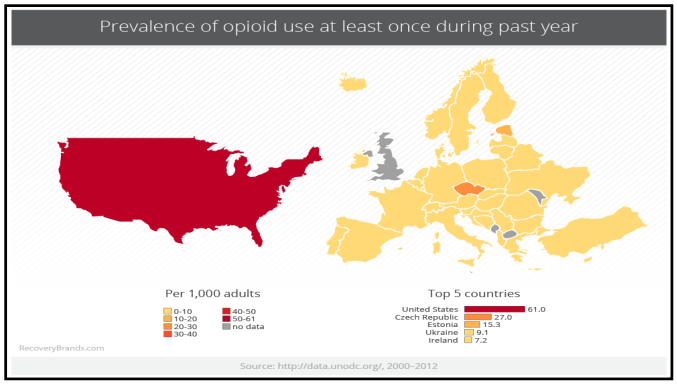
55


Informed
Control
Mean Weight (pounds)
BMI [weight(lbs)/height(in)^2]
Percentage Body Fat
Waist/Hip Ratio
Systolic Blood Pressure
Diastolic Blood Pressure
Time 1
Time 2

56

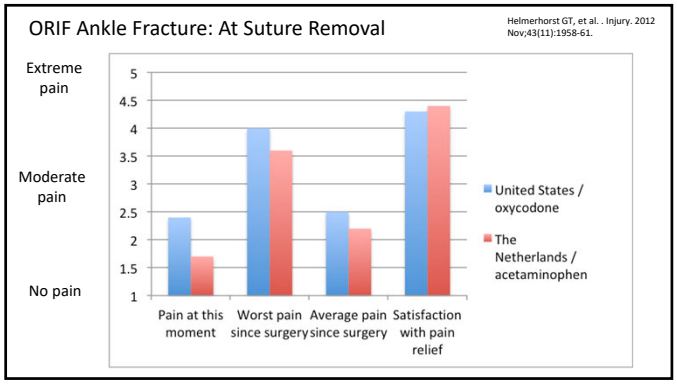

Key
Carbon
Hydrogen
Nitrogen
Sulfur
Oxygen
Natural endorphin
Morphine
(a) Structures of endorphin and morphine
Natural endorphin
Morphine
Endorphin receptors
Brain cell
(b) Binding to endorphin receptors

57

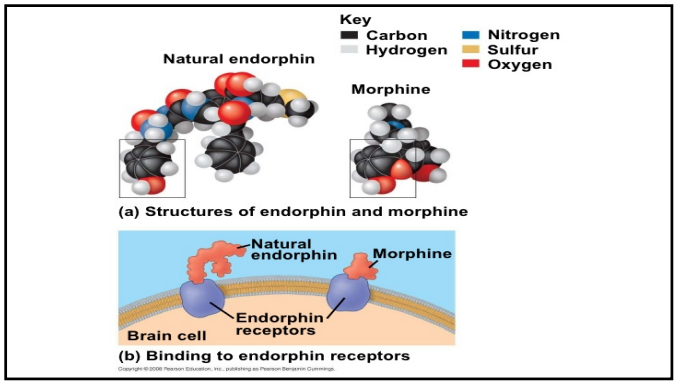

Prevalence of opioid use at least once during past year
Per 1,000 adults
0-10
10-20
20-30
30-40
40-50
50-61
no data
Top 5 countries
United States 61.0
Czech Republic 27.0
Estonia 15.3
Ukraine 9.1
Ireland 7.2
RecoveryBrands.com
Source: http://data.unodc.org/, 2000–2012

58

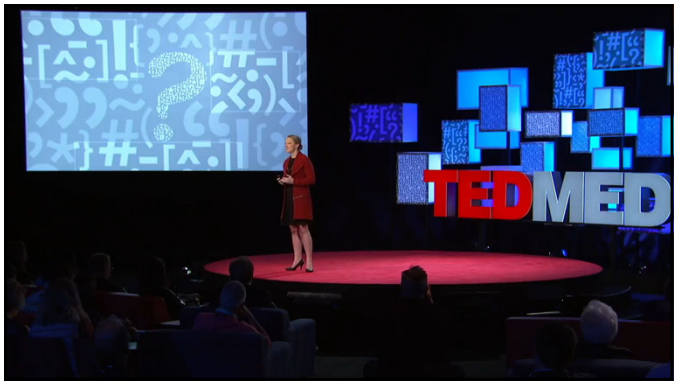
59


ORIF Ankle Fracture: At Suture Removal
Helmerhorst GT, et al. . Injury. 2012 Nov;43(11):1958-61.
Extreme pain
Moderate pain
No pain
5
4.5
4
3.5
3
2.5
2
1.5
1
Pain at this moment
Worst pain since surgery
Average pain since surgery
Satisfaction with pain relief
United States / oxycodone
The Netherlands / acetaminophen

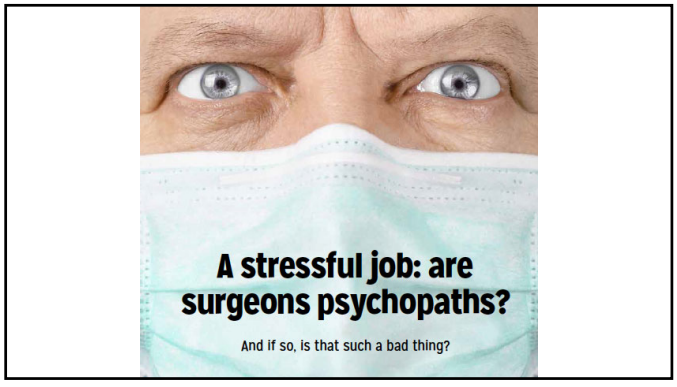
60


Key
Carbon
Hydrogen
Nitrogen
Sulfur
Oxygen
Natural endorphin
Morphine
(a) Structures of endorphin and morphine
Natural endorphin
Morphine
Endorphin receptors
Brain cell
(b) Binding to endorphin receptors

61


TEDMED

62


A stressful job: are surgeons psychopaths?
And if so, is that such a bad thing?

63

VIEWPOINT

The Iatrogenic Potential of the Physician's Words

Arthur J. Barsky, MD
Department of Psychiatry, Brigham & Women's Hospital, Boston, Massachusetts.

Supplemental content

Some of the information that physicians convey to their patients can inadvertently amplify patients' symptoms and become a source of heightened somatic distress, an effect that must be understood by physicians to ensure optimal management of patient care. This effect illustrates the iatrogenic potential of information, as opposed to the iatrogenic potential of drugs and procedures.

Somatic symptoms and underlying disease do not have a fixed, invariable, one-to-one equivalence. Symptoms can occur in the absence of demonstrable disease, "silent" disease occurs without symptoms, and there is substantial interindividual variability in the symptoms resulting from the same pathology or pathophysiology. One mediator of this variability between symptoms and disease is the patient's thoughts, beliefs, and ideas. These cognitions can amplify symptoms and bodily distress. Although cognitions may not cause symptoms, they can amplify, perpetuate, and exacerbate them, making symptoms more salient, noxious, intrusive, and bothersome.

Several common clinical scenarios exemplify the iatrogenic potential of the physician's words—for knowledge of adverse effects influences the reported incidence of these symptoms. Thus, the frequency and profile of adverse effects manifested by patients randomized to receive placebo in controlled, double-blind clinical trials are similar to those they have been told may occur with the active comparator drug.

Providing test results of dubious clinical significance also can lead to increased symptoms. For example, in a randomized study of acute low back pain, one group (n = 210) underwent spine imaging, whereas the other group (n = 211) did not. A treatment plan of conservative medical management was implemented in both groups. At 3-month follow-up, the former group had significantly more pain, greater functional impairment, and more physician visits.[4] The problems involved in conveying equivocal test results or anatomical abnormalities of unknown clinical significance ("incidentalomas") are likely to increase in importance as the volume and resolution of diagnostic testing accelerate.

Pain is particularly sensitive to the beliefs, thoughts, and expectations of patients. The specific language used in describing and preparing patients for painful proce-

64

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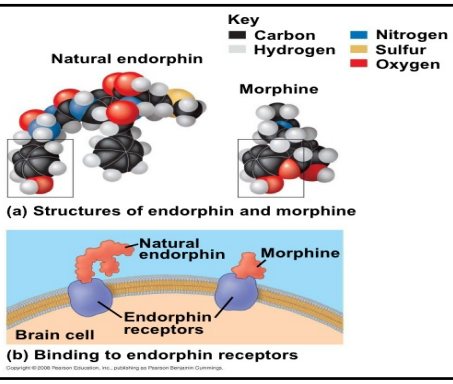
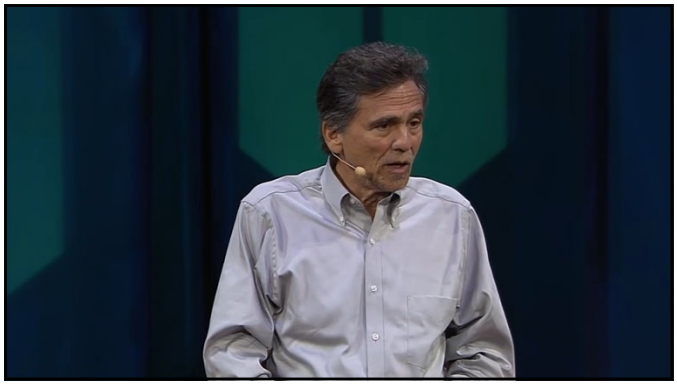
Types of harm
- Iatrogenic
- Psychological
- Financial
- Medical error
  - Misdiagnosis of patient preferences

65



66



67

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Possibilities for More Pain Than Expected:
- Not an injury
- Psychosocial factors

Accurate Diagnosis
Appropriate Treatment

68