Technology Assessment at KP

California Research Bureau

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Today's Objectives

- Technology Assessment at KP
  - **What, Why, and How**
- A Current Example
  - **The State of the Evidence**
  - **KP's Approach… a work in progress**

Technology Assessment at KP

New

- Entirely new technology
- New applications of existing technology

Medical Technology

- Devices, Equipment, Tests, Supplies and Medical and Surgical Procedures
- Drugs and biologics
- Organizational Systems including IT

Assessment

- Systematic and comprehensive evaluation of the medical (safety, efficacy, ethics and effectiveness), social, and economic implications of dissemination and appropriate usage

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The Committee

- 18 members, all regions represented
- Inter-regional and inter-entity
- Over half of the members are physicians
- Quarterly meetings with approx. 8 topics each
- Internal and external evidence reviews
- PMG expert opinion gathered for all topics
- PMG experts as clinical guests for select topics

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The Committee's Charge

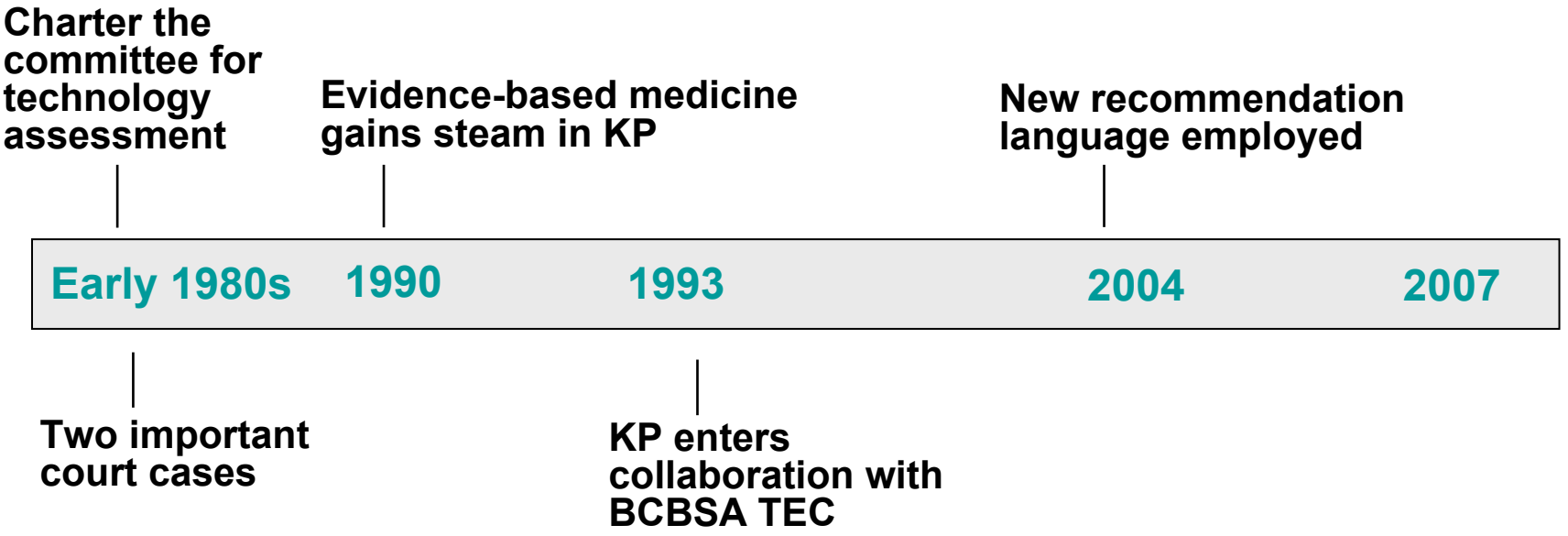
- Monitors new, and new applications of existing, medical and behavioral technologies
- Evaluates medical appropriateness based on demonstrated safety, efficacy and comparative utility
- Compares the new technology to alternatives
- Makes recommendations not decisions
- Supports an inquiry line (>400 inquiries in 2008)

What the INTC Does Not Do

- **Cost-effectiveness studies**
- **Clinical practice guidelines**
- **Consultation for individual patient cases**
- **Operational decisions**
- **Coverage policies**

Evolution of Technology Assessment at KP

Charge to develop an explicit process for evaluating new medical technologies. Scope and language have changed over time. However, the goal has always been to evaluate available scientific evidence, determine if a new technology is safe and effective, and make recommendations. This effort provided a model for enterprise-wide collaboration.



In the other case (in the former KP Texas Region), the parents of twins with severe congenital liver disease requested liver transplantation for the infants. The request was denied on the grounds that the procedure was experimental in infants. At the time, liver transplantation in adults was still new and was widely considered experimental; liver transplantation in infants had not yet been done. Nonetheless, a media storm of bad publicity attended the Region's denial, and a settlement of $5 million was awarded to the family of the twins. Both twins received liver transplantation, and both ultimately died.

Why KP Does Technology Assessment

FDA's Scope

- Safety
- Efficacy
  - **Benefit of using a technology for a particular health problem in ideal conditions**
- Substantial equivalence or comparison to placebo
- Intermediate, short-term outcomes

KP's Interests

- Everything to the left plus
- Effectiveness
  - **Benefit of using a technology for a particular health problem in general or routine conditions**
- Comparison to standard of care and experience for members
- Long-term health outcomes
- Technology beyond FDA scope

The FDA does not address all of KP's interests .

Topic Selection

- Needs and ideas from committee members
- Feedback from regions
- Member and physician demand
- Inquiry line database
- Internal and external assessment topics
- New evidence
- FDA statements, approvals, panel meetings
- Agenda planning calls including non-KP colleagues

Strict criteria are NOT used to select topics.

Generous input and judgment are used to determine topic priority.

How It Is Done: Preparing a Topic

- Determine interest level in new technology
- Gauge potential operational impact and demand
- Raise relevant benefit, media, legal and ethical issues
- Gather Permanent physician input
- Determine source of assessment
  - Internal and external resources, public and private
- Supplement most current assessment, as needed
- Select a speaker and prepare a presentation

Rationale for Using Multiple Sources

- KP can't do it all and why should it when …
- Several credible, evidence-based sources exist. Methods vary but differences are explicit and workable
- Public assessments have increased but are not enough. Many relationships (contractual and collaborative) yield the greatest breadth and currency of topics
- KP maintains internal assessment capacity to meet its unique or urgent needs and to tailor or update external work

Collaboration is about the evidence, not coverage.
Collegial relationships are key to managing resources.

Technology Assessment: Basic Principles

- Base clinical and policy decisions on evidence of effectiveness and benefit (David Eddy, MD, PhD)
- Evidence of benefit ➡ Do it
- Evidence of no benefit/harm ➡ Don't do it
- Insufficient evidence ➡ Be conservative
  - Use discretion
  - If it is new, recommend only within well designed trials

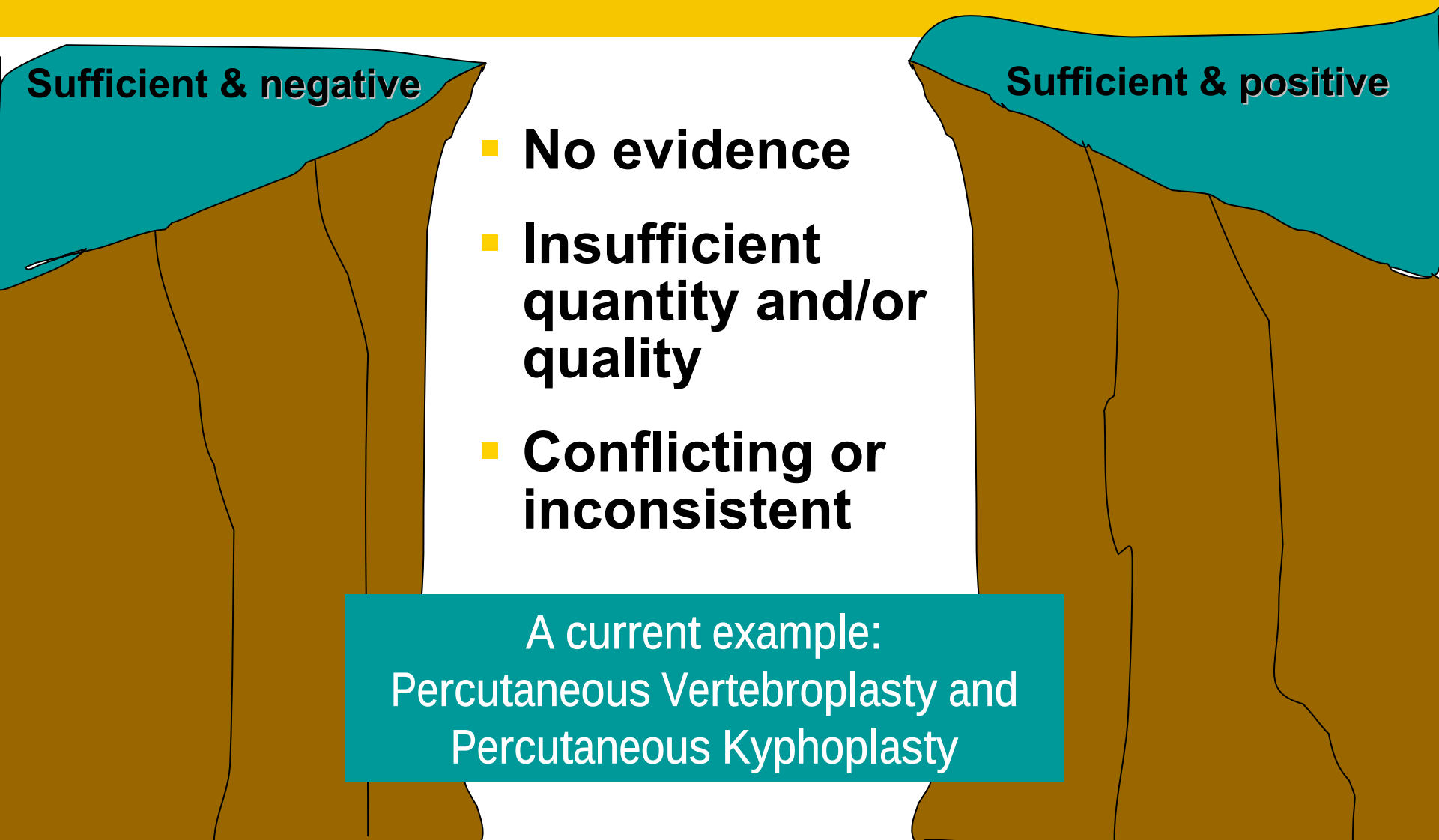
Do things that work, don't do things that don't, use resources wisely.

The Committee's Work Product: Recommendations

- There is sufficient evidence to determine that the technology is medically appropriate for select patients.
- There is insufficient evidence to determine whether the technology is medically appropriate for any patient:
  a) no evidence
  b) insufficient quantity and/or insufficient quality
  c) conflicting or inconsistent
- There is sufficient evidence to determine that the technology is generally not medically appropriate for any patients.

KP's internal Web site of new technology recommendations and assessments receives about 50 hits per day.

The Chasm of Insufficiency

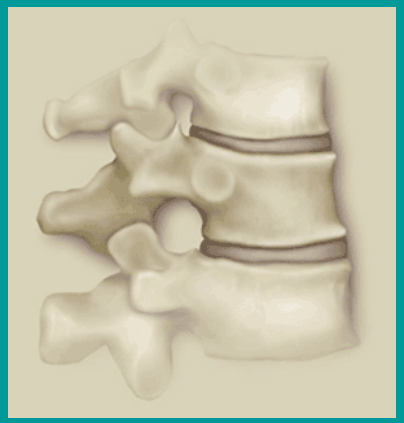


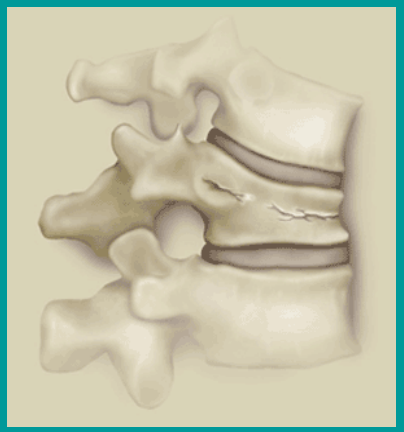
- **No evidence**
- **Insufficient quantity and/or quality**
- **Conflicting or inconsistent**

A current example:
Percutaneous Vertebroplasty and Percutaneous Kyphoplasty

Vertebral Fracture

Healthy Vertebra





Compression Fracture

- An estimated ½ of women and ¼ of men will have a vertebral fracture in their lives, with only about one third of these cases reaching clinical diagnosis
- Most common causes of vertebral fracture are osteoporosis, malignancy, and trauma
- Goals of interventional procedures are to alleviate back pain and stabilize and strengthen the spine — Kyphoplasty also attempts to restore vertebral height

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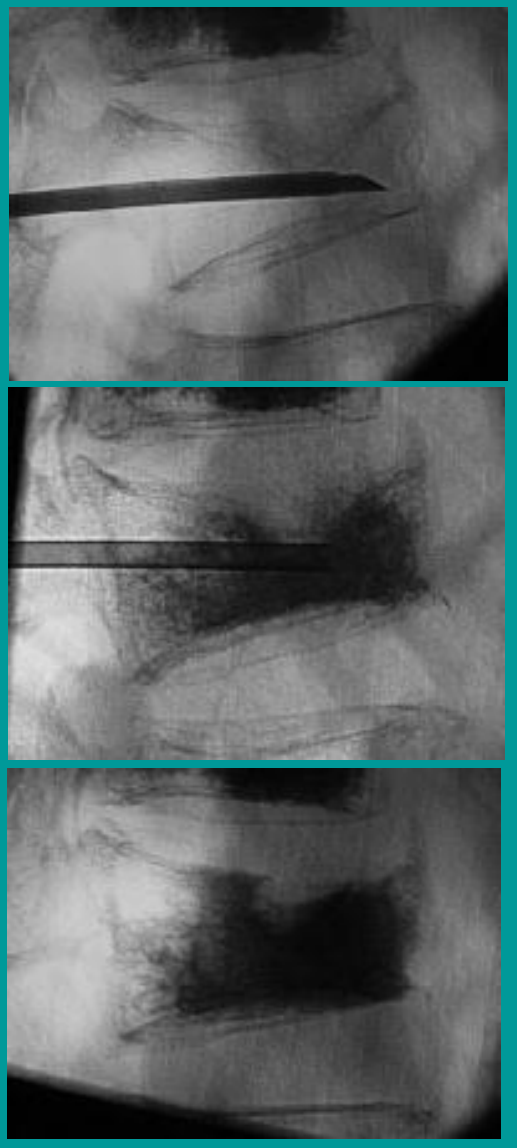
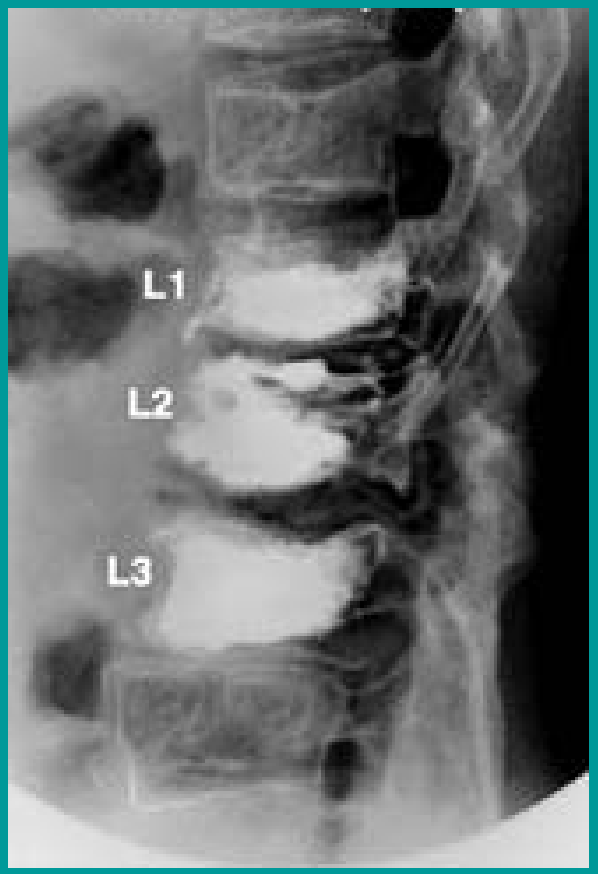
Percutaneous Vertebroplasty

Bone cement is injected into a diseased vertebral body to provide mechanical support and symptomatic relief.



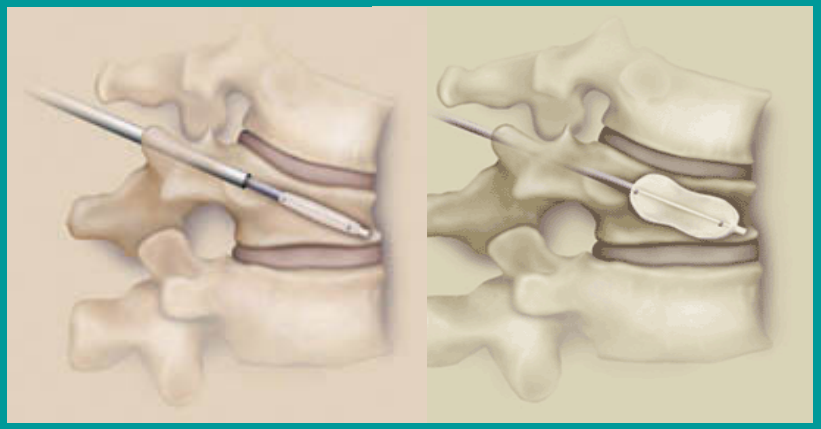
After Verterbroplasty

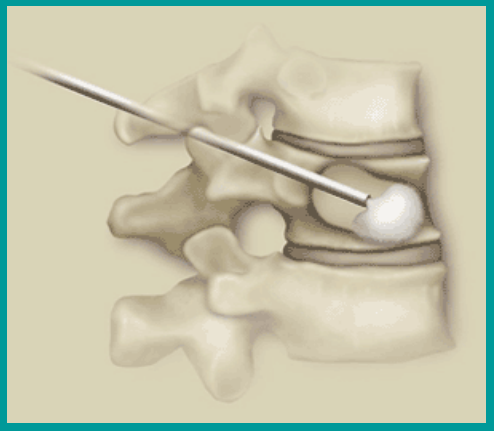


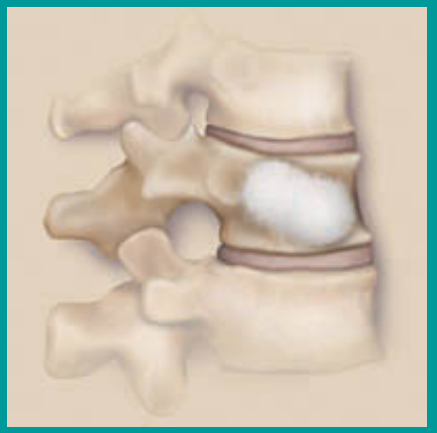
Percutaneous Kyphoplasty

A Variation of Vertebroplasty

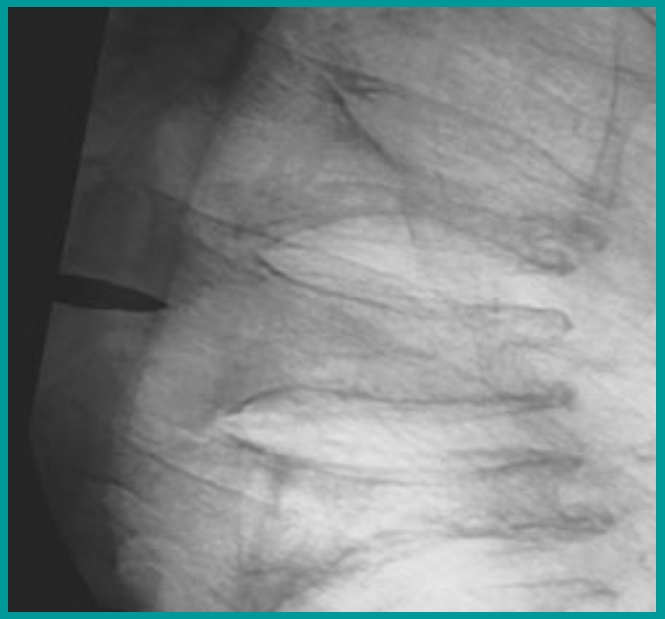
A balloon is inserted into the diseased vertebral body, inflated until the collapsed vertebral body is close to its natural height, and then injected with bone cement.

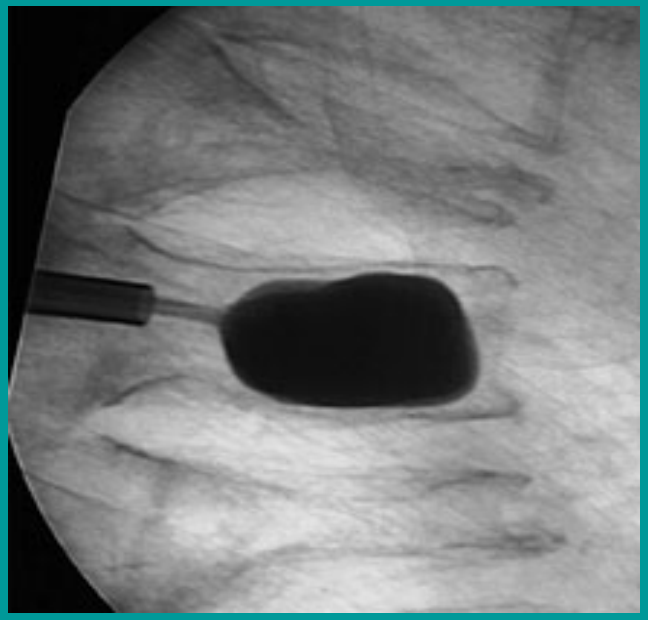






Kyphoplasty
Radiographic Images





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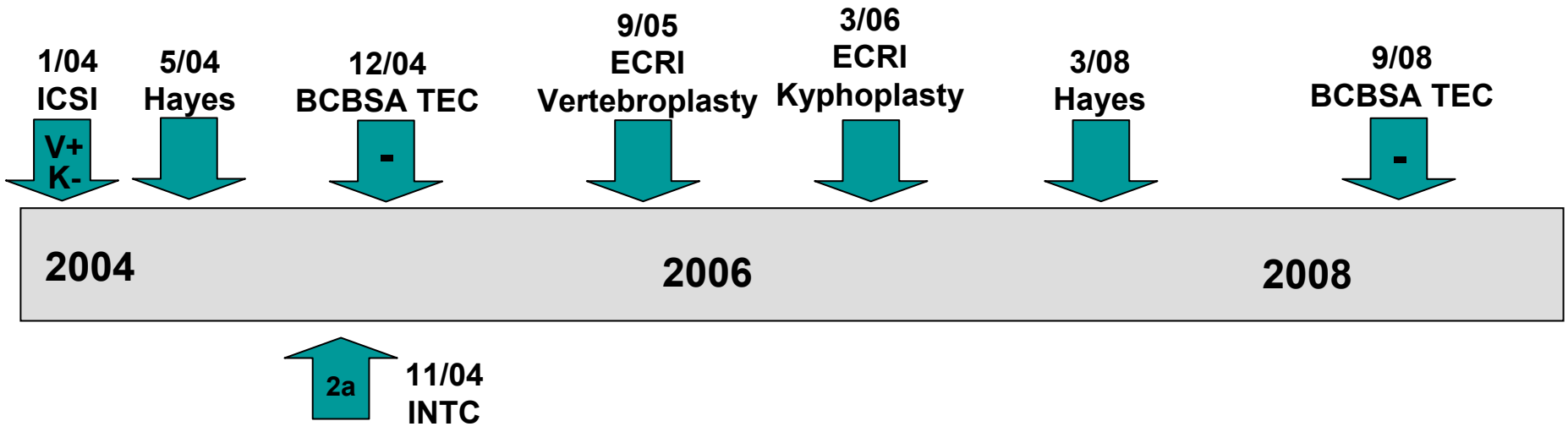
Vertebroplasty and Kyphoplasty *At-A-Glance*



CMS

2004 no national coverage; however, in 2001 approved specific codes allowing local Medicare carriers to cover percutaneous vertebroplasty if deemed appropriate and medically necessary. (CMS 2004, AMA 2004)

FDA

2/01 KyphX Bone Tamp; 4/04 KyphX Hv-R Bone Cement; 10/02 and 5/04, FDA warning

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Review of the Evidence:
Vertebroplasty vs. Kyphoplasty

1 nonrandomized controlled trial (Grohs et al 2005)

- Patients enrolled after 8 weeks of symptoms
- Pain scores improved for both. Differences in disability scores were observed only for kyphosplasty patients but were not sustained at 2 years follow-up
- No formal statistical analysis compared patient outcomes
- Authors concluded kyphoplasty is superior

Review of the Evidence:
Vertebroplasty

2 controlled trials comparing to medical management

- 1 randomized trial of 34 patients after 6 weeks of medical management. Only 2 week follow-up to allow patient to have vertebroplasty. Outcomes were mixed. (Voormolen et al 2007)
- 1 nonrandomized trial of 79 consecutive acute fracture patients. If they declined vertebroplasty they were offered medical management. Although 24 hour outcomes were superior with vertebroplasty, there were no differences in pain scores at 6-12 weeks post-op. Authors claim faster resolution of symptoms with vertebroplasty. (Diamond et al 2003)

6 published case series

- Results are generally consistent in showing statistically significant decreases in pain and improvements appear to be durable in studies reporting long-term outcomes beyond 1 year although most studies had large losses to follow-up.

Findings suggest short-term improvement in pain after vertebroplasty but study limitations exist.

Review of the Evidence:
Kyphoplasty

2 nonrandomized trials comparing to medical management

- 1 controlled trial of 60 patients after 12 months of medical management. Patients who declined kyphoplasty were offered medical management. In primary clinical outcomes the kyphoplasty patients had greater improvements. (Kasperk et al 2005)
- 1 controlled trial of 36 patients approx. 6 weeks after suspected injury. Kyphoplasty patients showed greater improvement in pain and disability at 6 months but formal statistical analysis was not conducted. (Komp et al 2004)

7 published case series

- Results are generally consistent in showing statistically significant decreases in pain and improvements appear to be durable in studies reporting long-term outcomes.

Findings suggest benefit of kyphoplasty when compared to conservative management, but study limitations exist.

Weighing the Evidence Overall

Vertebroplasty

- 1 randomized, controlled trial
- 1 controlled trial
- 6 case series

Kyphoplasty

- 2 uncontrolled, non-randomized trials
- 7 case series

Vertebroplasty vs. Kyphoplasty

1 small non-randomized, controlled trial

Remarkably similar, findings suggestive of benefit, but studies shared many study limitations.

Evidence Issues

- All studies show large pain decrease — good enough?
- Sources of study bias:
  - No randomization/ blinding/ control groups
  - Patient selection
  - Unknown natural history
  - Length of study (long term effects?)
  - Incomplete reporting of complications
  - Funding source
  - Non-standardized techniques
  - Non-standardized medical treatment

Adverse Events and Unknowns

- Localized bleeding, infection and/or resultant pain or neurological symptoms following cement leakage. Leakages have the potential for pulmonary embolism. Leakages infrequently necessitate therapy or surgery.
- It is unknown whether subsequent fractures in adjacent vertebrae is a complication.
- Bone cement is subject to minimal FDA oversight and there have been public health notifications to physicians about the types of complications that can occur.

Search for “Kyphoplasty” in the FDA MAUDE Database on Dec 15, 2008

36 records with duplicates included:

- 7 deaths
- 6 cement leakage reports with long-term damage
- 4 cement leakage reports without long-term damage
- 4 balloon ruptures without long-term damage (balloons left in patient in most cases)
- 1 balloon rupture with long-term damage
- 1 pulmonary embolism
- 2 cases of pulmonary complications
- 1 report of new vertebral compression fracture directly after procedure
- 1 report of reaction to cement
- 1 report of spinal cord puncture
- 2 reports of infection
- 1 report of device issue with no injury report

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Search for “Vertebroplasty” in the FDA MAUDE Database on Dec 15, 2008

Reports received in 2008 revealed 8 records.
With duplicates removed, the records include:

- **1 report of paralysis**
- **1 report of symptomatic cement leakage**
- **1 report of allergic reaction**
- **2 reports of delivery system breakage, no injury**
- **1 report of needle breakage, with needle successfully removed**

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Conclusions of IMR Reviewers: The Vertebroplasty Overturn

- "Vertebroplasty and kyphoplasty have been shown to be very effective for immediate and lasting pain relief. Vertebroplasty has been used for over 10 years with excellent results."
- "Vertebroplasty and kyphoplasty have a proven place in the treatment of compression fractures."
- "The clinical efficacy of vertebroplasty and kyphoplasty has not been clearly established. It is unclear whether these procedures will provide significant benefit to the patient."

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Can the State Help?

- Support the practice of tech assessment in CA (including mandates)
- Apply to publicly funded programs
- Avoid conflicting messages
- Foster a hunger for evidence amongst our citizens

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Technology Assessment: Basic Principles

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- Evidence of benefit ➡ Do it
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- Insufficient evidence ➡ Be conservative
  - Use discretion
  - If it is new, recommend only within well designed trials

Do things that work, don't do things that don't, use resources wisely.

What does that mean in KP?

- Be conservative
  - An experienced team of 9 Permanente spine surgeons wants to be sure the new technology is used appropriately, even in the absence of completely clear evidence.
  - This team is the primary source of input on new tech, is educated on COI, contract terms, standardization, compliance and can influence practice.
- Use resources wisely
  - This team has an opportunity to use both evidence and subsequently cost and utilization data to inform and influence clinical practice, deployment and contracting discussions.

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The Spine Team's Work-in-Progress

- ✓ Review and discuss technology assessment and primary evidence
- ✓ Agree there is no evidence to show superiority of one technique
- ✓ Acknowledge the incremental cost associated with kyphoplasty
- ❑ Circulate technology assessment to all physicians using either technique and seek feedback. Gather utilization and cost data.
- ❑ Educate about all findings including cost. Influence clinical practice based on findings.

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Conclusions

- Astonishing pace of advances requires consumers, health plans, and practitioners to seek help to understand the evidence
- KP's experienced new technology assessment program utilizes the evidence and benefits from Permanente input
- In KP's integrated delivery system:
  - **Evidence is being integrated into deployment, resource and contract discussions**
  - **Cost can inform practice discussions after the evidence has been thoroughly reviewed**
  - **Both cost and evidence can be actionable even if imperfect, resulting in evidence-informed and cost-informed strategies.**

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Appendix

How It Is Done: Anatomy of an Assessment

- Background
- Problem Formulation
- Literature Search Strategy
- Evidence Summary/Tables
- Regulatory Information including FDA
- External assessments, all sectors
- Conclusion/Rationale
- Bibliography

Supplemented with PMG expert opinion and professional societies

The BCBSA TEC/KP Collaboration

TEC's collaborative relationship with Kaiser Permanente began in 1993. This relationship has given TEC staff ready access to Kaiser's clinical experts on a wide range of topics. As a result of TEC's collaboration with Kaiser, David M. Eddy, M.D., Ph.D., Senior Advisor for Health Policy and Management, served for over 10 years as TEC's Scientific Advisor, until his retirement from the position in 2004. In addition, one Permanente physician, Jed Weissberg, M.D., is a voting member of TEC's Medical Advisory Panel.

TEC Assessments and other publications are provided to Kaiser Permanente staff as drafts. Dr. Weissberg participates actively in the MAP discussions, sharing clinical opinion from Permanente physicians on the draft TEC products. TEC staff works with Kaiser Permanente's Technology Assessment staff to obtain input on topic selection and to gain access to Permanente's physician experts on a wide range of topics. Permanente clinical expertise may be used to help shape the actual research questions in TEC Assessments. In many cases, these are the same physicians that either chair or sit on committees that are responsible for developing practice guidelines at Kaiser Permanente.

More on BCBSA TEC

- Founded in 1985 and pioneered the development of scientific criteria for assessing medical technologies through comprehensive reviews of clinical evidence.
- TEC provides comprehensive evaluation of the clinical effectiveness and appropriateness of a given medical procedure, device or drug, averaging 20 to 25 assessments a year. TEC serves a wide range of clients in both the private and public sectors, including KP and the CMS.
- TEC Assessments are scientific opinions, provided solely for informational purposes and should not be construed to suggest that the BCBSA, KP or the TEC Program recommends, advocates, requires, encourages, or discourages any particular treatment, procedure, or service; any particular course of treatment, procedure, or service; or the payment or non-payment of the technology or technologies evaluated.
- TEC is headed by Executive Director, Naomi Aronson, Ph.D. Its core staff of research scientists consists of experienced physicians and doctorate-level scientists with a history of academic and primary research affiliations.
- A Medical Advisory Panel, comprising independent, nationally recognized experts in technology assessment, clinical research and medical specialties, has scientific accountability for all TEC assessments.

BCBSA TEC content is available at: http://www.bcbs.com/betterknowledge/tec/

BCBSA TEC Criteria

- TEC Assessments routinely use the five TEC Criteria to evaluate whether drugs, devices, procedures and biological products improve health outcomes such as length of life, quality of life and functional ability.

1. **The technology must have final approval from the appropriate governmental regulatory bodies.**
2. **The scientific evidence must permit conclusions concerning the effect of the technology on health outcomes.**
3. **The technology must improve the net health outcome.**
4. **The technology must be as beneficial as any established alternatives.**
5. **The improvement must be attainable outside the investigational settings.**

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New Technology Inquiry Line

- Funded by Southern California Permanente Medical Group and The Permanente Federation to support the needs of KP regions for evidence-based information on new technologies
- Volume of Inquiries . . .
  - **Total inquiries (1999-2006) – 4,531**
  - **In 2006, average number inquiries per day was 2.2**
- In 2006, clients used the inquiry line for . . .
  - **Patient-specific inquiry – 44%**
  - **General technology inquiry – 46%**

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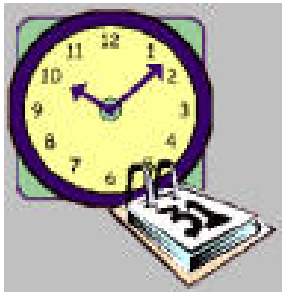
Why So Many Assessments and Conclusions?

Timing



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Problem Formulation

Evidence

Analytical Methods

Clinical Expertise

Values

"The Answer"

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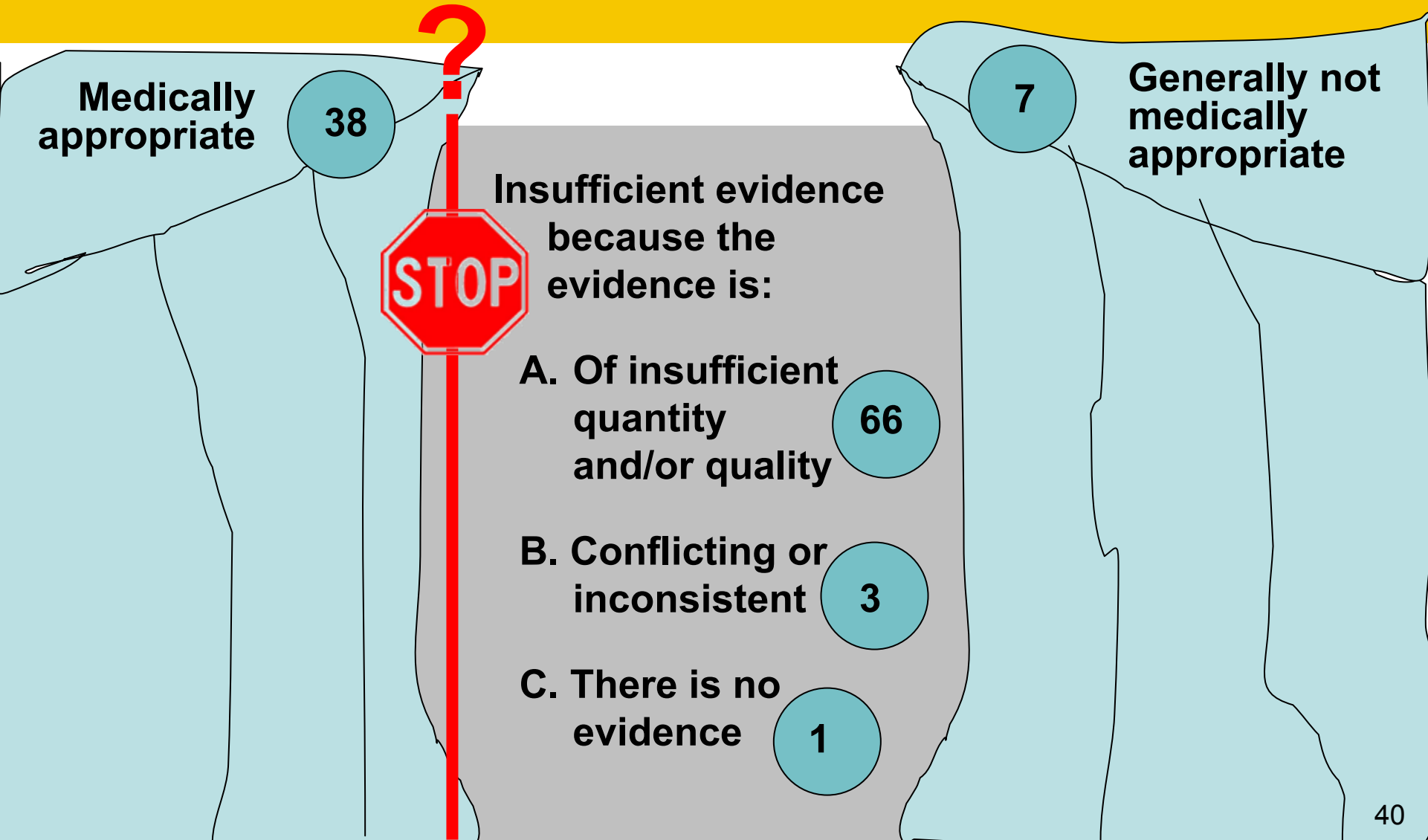
Managing the "Gray Areas"...

The last 115 new technologies examined:



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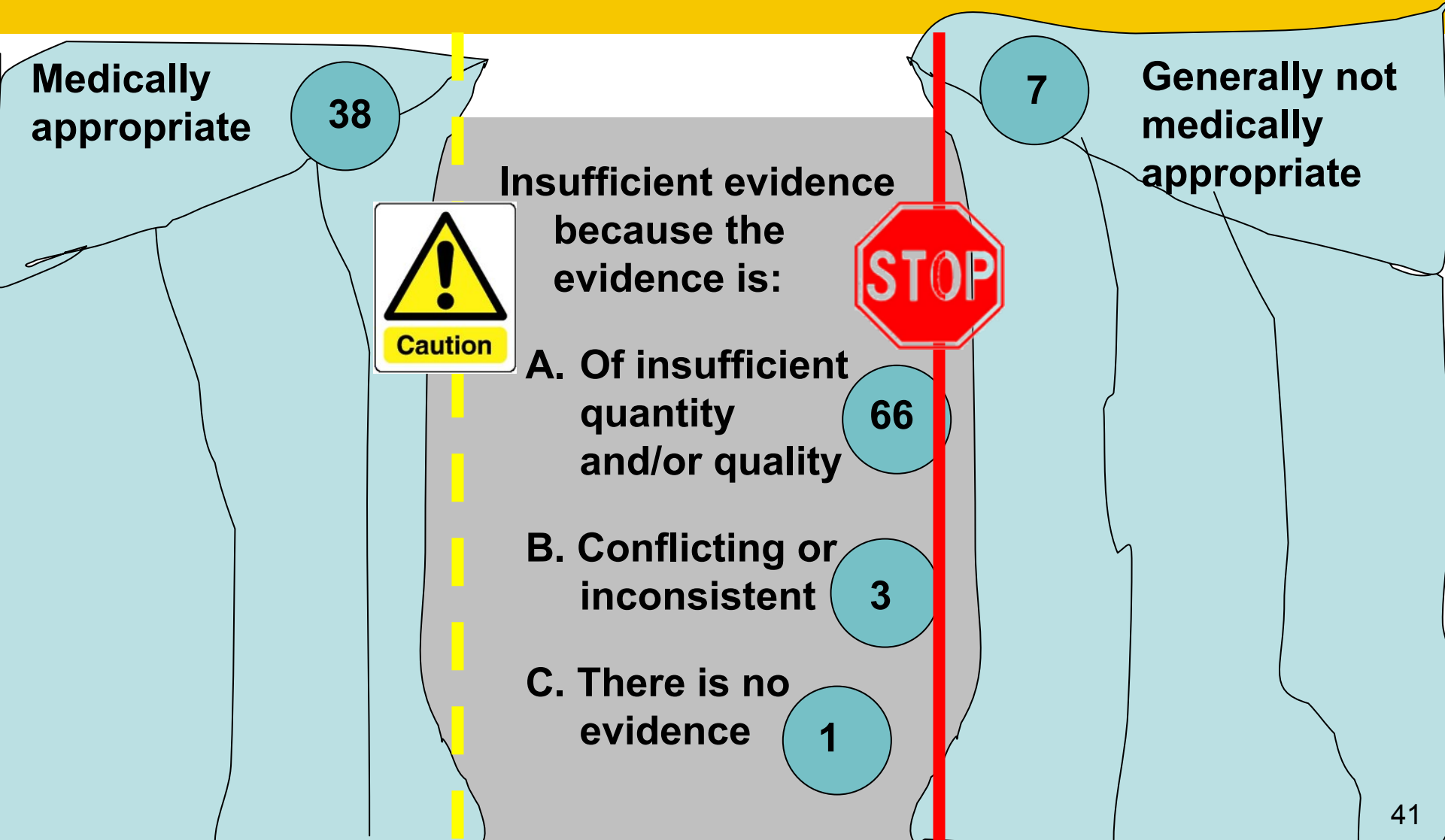

What You Need To Make It Work

- Evidence-based culture, or the makings of one
- Supportive medical group leadership
- Respected source of technology assessments
- Effective physician/analyst partnerships
- Resources and process that enable timely and relevant information and recommendations
- Courageous physician opinion leaders
- Realization that this is the grey-zone and uncertainty is the norm and decisions have to be made
- Willingness to start somewhere and be persistent

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Percutaneous Vertebroplasty and Kyphoplasty — FDA Public Health Notification

10/02 Advised health care community of serious complications from use of acrylic bone cements in treating spinal compression fractures, an indication for which the products had not been cleared

5/04 A bone cement was cleared by the FDA for treatment of pathological fractures of the vertebral body due to osteoporosis using a kyphoplasty procedure

2002 2003 2004

4/04 Reported complications for vertebroplasty and kyphoplasty (pulmonary embolism, respiratory and cardiac failure, abdominal intrusions/ ileus and death)

4/04 Expanded previous public health notification to include all bone cements (polymethylmethaacrylate and calcium phosphate) and bone void fillers that are not specifically cleared and labeled for vertebroplasty and kyphoplasty

CMS

2004 no national coverage; however, in 2001 approved specific codes allowing local Medicare carriers to cover percutaneous vertebroplasty if deemed appropriate and medically necessary. (CMS 2004, AMA 2004)

FDA

2/01 KyphX Bone Tamp; 4/04 KyphX Hv-R Bone Cement; 10/02 and 5/04, FDA warming

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High-Level Evidence Table Kyphoplasty

Study/yr	Study Design	N	Length of follow-up	Outcome Measure - Pain	Pre-treatment	Post-treatment	Pain
Rhyne 2004	Retrospective case series	49	9 mo	0-10 VAS	9.16	2.91	↓
Crandall 2004	Prospective case series	47	18 mo	0-10 VAS	Acute 7.3 Chron 7.3	4.3 (2 wk) 4.3 (2 wk)	↓
Berlemann 2004	Prospective case series	24	>= 1 yr	0-10 VAS	8.4	3.8 (post-op) 1.5 (1 yr)	↓
Phillips 2003	Prospective case series	29	NR	0-10 VAS	8.6	2.6 (1 wk) 0.6 (1 yr)	↓
Liebermann 2001	Prospective case series	30	12 wk	SF-36	11.6	58.7	↓
Coumans 2003	Prospective case series	78	>= 1 yr	0-10 VAS	7	3.2 (post-op) 3.4 (1 yr)	↓
Ledlie 2003	Retrospective case series	96	1 wk – 1 yr	0-10 VAS	8.6	2.7 (1 wk) 1.4 (1 yr)	↓

VAS: Visual Analogue Scale for pain assessment

High Level Evidence Table Vertebroplasty

Study/yr	Study Design	N	Follow-up length	Outcome Measure - Pain	Pre-treatment	Post-Treatment	Pain
Chen 2004	Retrospective case series	70	>= 1 yr	0-100 VAS	80	38 (1 day) 30 (1 yr)	↓
Winking 2004	Prospective case series	38	1 yr	0-10 VAS	6.9	1.8 (1 day) 2.7 (1 yr)	↓
Diamond 2003	Prospective case series w/ comparison group	79	6.8 mo	0-25 VAS	VP 19 Ctrl 20	VP 9 (1 day) 4 (6 mo-1yr) Ctrl 19 (1 day) 4 (6 mo- 1yr)	↓
McGraw 2002	Prospective case series	100	Post-op	0-10 VAS	8.9	2.0	↓
Zoarski 2002	Prospective case series	30	15-18 mo	0-10 VAS	9.7	1.7 (2 wk) 2.6 (15-18 mo)	↓
Chen 2002	Retrospective case series	50	1 mo	1-100 VAS	82	37 (1 day) 32 (1 mo)	↓
Kauffman 2001	Retrospective case series	75	7 days	0-10 VAS	9.4	1.9	↓
Cytevel 1999	Retrospective case series	20	Post-op	0-10 VAS	8.5	3.7	↓

VAS: Visual Analogue Scale for pain assessment

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