

# The Evidence for Evidence-Based Medicine

**Brian Kavanagh**

*Hospital for Sick Children  
University of Toronto*



# *-Perspective-*

Evidence-Based Medicine is Natural

“EBM” is an Arbitrary System – A Pyramid



*Ranks the methods  
independent of the  
question*

I will discuss “EBM”

# *Lessons for “EBM” from Studies of PEEP*



**No PEEP APPLIED**



**Halter *et al*, Am J Respir Crit Care Med 2003**

**PEEP APPLIED**



**Halter *et al*, Am J Respir Crit Care Med 2003**

## “Patchy” ARDS

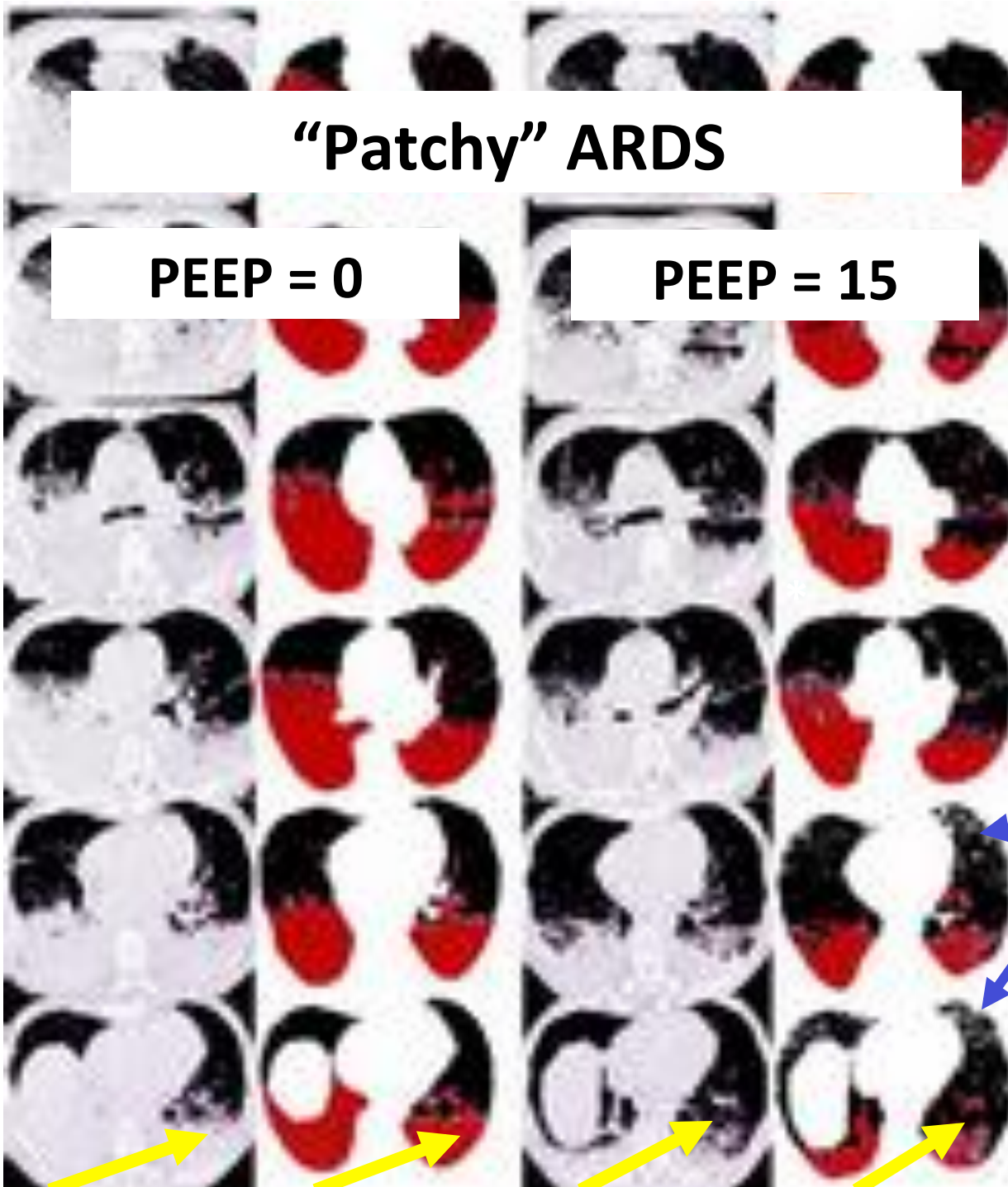
PEEP = 0

PEEP = 15

-  Poorly Aerated
-  Non-Aerated
-  Over-Inflated

Over Inflated

Rouby et al, CCM 2003

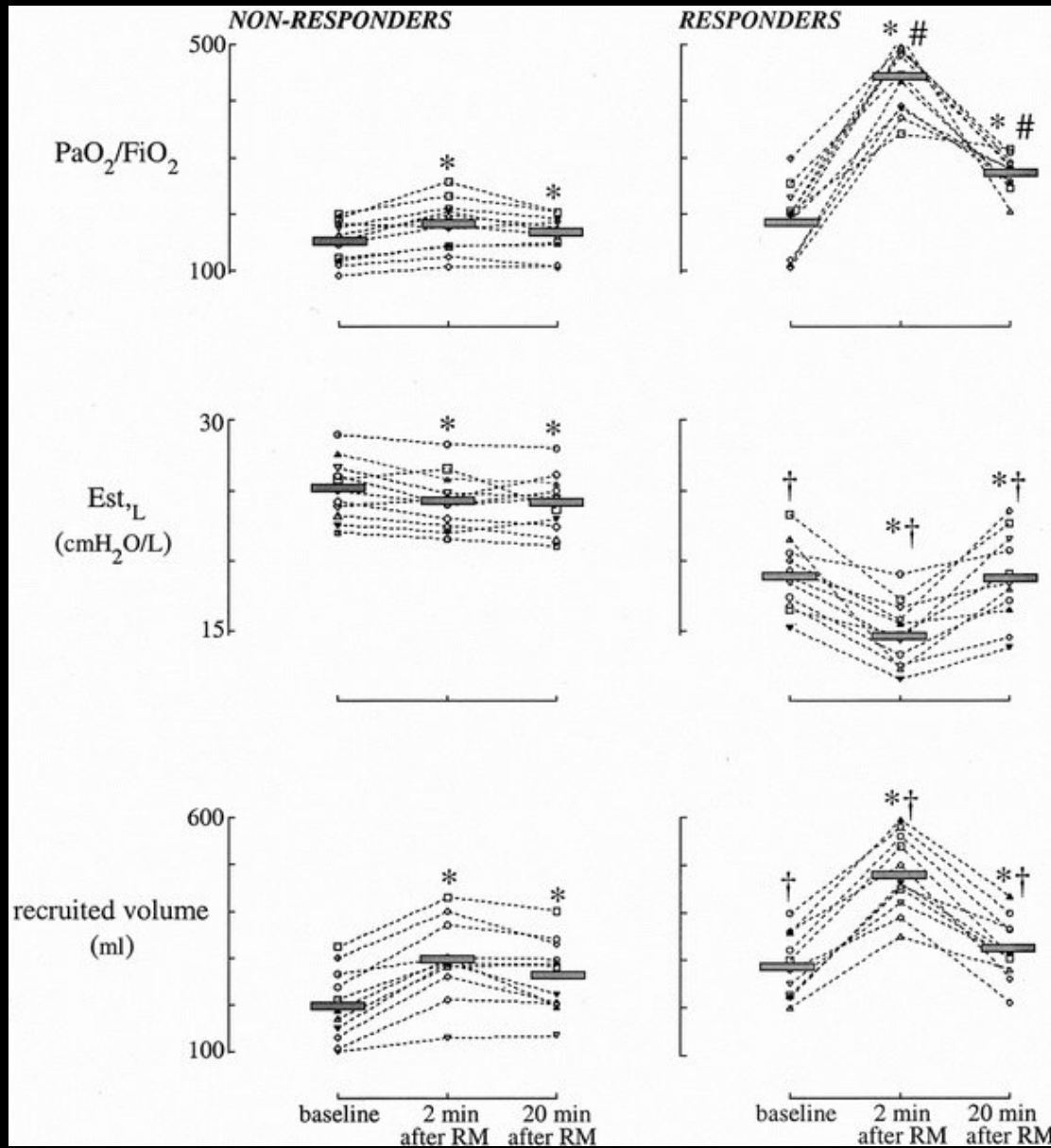


# ***PEEP***

***Good for some lung regions***

***Bad for other lung regions***





Grasso *et al*, Anesthesiology 2002



# ***PEEP***

***Good for some patients***

***Not so good for other patients***

# “EBM” - Error #1

**Ignore the experimental data**

**Ignore the patient-to-patient variability**

***Perform RCTs of ‘PEEP for everyone’***

# The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812

JULY 22, 2004

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## Higher versus Lower Positive End-Expiratory Pressures in Patients with the Acute Respiratory Distress Syndrome

The National Heart, Lung, and Blood Institute ARDS Clinical Trials Network\*

### ABSTRACT

#### BACKGROUND

Most patients requiring mechanical ventilation for acute lung injury and the acute respiratory distress syndrome (ARDS) receive positive end-expiratory pressure (PEEP) of 5 to 12 cm of water. Higher PEEP levels may improve oxygenation and reduce ventilator-induced lung injury but may also cause circulatory depression and lung injury from overdistention. We conducted this trial to compare the effects of higher and lower PEEP levels on clinical outcomes in these patients.

#### METHODS

We randomly assigned 549 patients with acute lung injury and ARDS to receive mechanical ventilation with either lower or higher PEEP levels, which were set according to different tables of predetermined combinations of PEEP and fraction of inspired oxygen.

#### RESULTS

Mean (±SD) PEEP values on days 1 through 4 were 8.3±3.2 cm of water in the lower-PEEP group and 13.2±3.5 cm of water in the higher-PEEP group ( $P<0.001$ ). The rates of death before hospital discharge were 24.9 percent and 27.5 percent, respectively ( $P=0.48$ ; 95 percent confidence interval for the difference between groups, -10.0 to 4.7 percent). From day 1 to day 28, breathing was unassisted for a mean of 14.5±10.4 days in the lower-PEEP group and 13.8±10.6 days in the higher-PEEP group ( $P=0.50$ ).

#### CONCLUSIONS

These results suggest that in patients with acute lung injury and ARDS who receive mechanical ventilation with a tidal-volume goal of 6 ml per kilogram of predicted body weight and an end-inspiratory plateau-pressure limit of 30 cm of water, clinical outcomes are similar whether lower or higher PEEP levels are used.

The members of the Writing Committee (Roy G. Brower, M.D., Johns Hopkins University, Baltimore; Paul N. Lanken, M.D., University of Pennsylvania, Philadelphia; Neil MacIntyre, M.D., Duke University, Durham, N.C.; Michael A. Matthay, M.D., University of California, San Francisco, San Francisco; Alan Morris, M.D., LDS Hospital, Salt Lake City; and Marek Ancukiewicz, Ph.D., David Schoenfeld, Ph.D., and B. Taylor Thompson, M.D., Massachusetts General Hospital, Boston) of the National Heart, Lung, and Blood Institute Acute Respiratory Distress Syndrome (ARDS) Clinical Trials Network assume responsibility for the integrity of the article. Address reprint requests to Dr. Brower at Johns Hopkins University, 1830 East Monument St., Rm. 549, Baltimore, MD 21205.

\*The participating institutions are listed in the Appendix.

N Engl J Med 2004;351:327-36.

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## CARING FOR THE CRITICALLY ILL PATIENT

## Positive End-Expiratory Pressure Setting in Adults With Acute Lung Injury and Acute Respiratory Distress Syndrome A Randomized Controlled Trial

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for the Expiratory Pressure (ExPres)  
Study Group

**POSITIVE END-EXPIRATORY PRESSURE (PEEP)** is an essential component of the management of acute lung injury (ALI) and acute respiratory distress syndrome (ARDS).<sup>1</sup> PEEP improves hypoxemia and decreases intrapulmonary shunting, and these effects have been the basis for titrating PEEP in clinical practice.<sup>2</sup>

Numerous experimental studies showed that PEEP protected the lung in various models of ventilation-induced lung injury.<sup>3-6</sup> Although the

**Context** The need for lung protection is universally accepted, but the optimal level of positive end-expiratory pressure (PEEP) in patients with acute lung injury (ALI) or acute respiratory distress syndrome remains debated.

**Objective** To compare the effect on outcome of a strategy for setting PEEP aimed at increasing alveolar recruitment while limiting hyperinflation to one aimed at minimizing alveolar distension in patients with ALI.

**Design, Setting, and Patients** A multicenter randomized controlled trial of 767 adults (mean [SD] age, 59.9 [15.4] years) with ALI conducted in 37 intensive care units in France from September 2002 to December 2005.

**Intervention** Tidal volume was set at 6 mL/kg of predicted body weight in both strategies. Patients were randomly assigned to a moderate PEEP strategy (5-9 cm H<sub>2</sub>O) (minimal distension strategy; n=382) or to a level of PEEP set to reach a plateau pressure of 28 to 30 cm H<sub>2</sub>O (increased recruitment strategy; n=385).

**Main Outcome Measures** The primary end point was mortality at 28 days. Secondary end points were hospital mortality at 60 days, ventilator-free days, and organ failure-free days at 28 days.

**Results** The 28-day mortality rate in the minimal distension group was 31.2% (n=119) vs 27.8% (n=107) in the increased recruitment group (relative risk, 1.12 [95% confidence interval, 0.90-1.40];  $P=.31$ ). The hospital mortality rate in the minimal distension group was 39.0% (n=149) vs 35.4% (n=136) in the increased recruitment group (relative risk, 1.10 [95% confidence interval, 0.92-1.32];  $P=.30$ ). The increased recruitment group compared with the minimal distension group had a higher median number of ventilator-free days (7 [interquartile range (IQR), 0-19] vs 3 [IQR, 0-17];  $P=.04$ ) and organ failure-free days (6 [IQR, 0-18] vs 2 [IQR, 0-16];  $P=.04$ ). This strategy also was associated with higher compliance values, better oxygenation, less use of adjunctive therapies, and larger fluid requirements.

**Conclusions** A strategy for setting PEEP aimed at increasing alveolar recruitment while limiting hyperinflation did not significantly reduce mortality. However, it did improve lung function and reduced the duration of mechanical ventilation and the duration of organ failure.

**Trial Registration** clinicaltrials.gov Identifier: NCT00188058

JAMA. 2008;299(6):646-655

www.jama.com

mechanisms of this protective effect are not fully elucidated, they may be mediated by PEEP-induced alveolar recruitment, which avoids cyclic air-

Author Affiliations are listed at the end of this article.

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See also pp 637, 691, and 693.

646 JAMA, February 13, 2008—Vol. 299, No. 6 (Reprinted)

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## CARING FOR THE CRITICALLY ILL PATIENT

## Ventilation Strategy Using Low Tidal Volumes, Recruitment Maneuvers, and High Positive End-Expiratory Pressure for Acute Lung Injury and Acute Respiratory Distress Syndrome A Randomized Controlled Trial

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Investigators

**ACUTE LUNG INJURY AND ACUTE respiratory distress syndrome (ARDS), the most severe form of acute lung injury, are potentially devastating complications of critical illness.<sup>1</sup> Arising in response to direct lung injury (eg, pneumonia) or intense systemic inflammation (eg, sepsis),<sup>2</sup> the pathogenesis involves pulmonary edema, diffuse cellular destruction, alveolar collapse, and disordered repair. Mor-**

**Context** Low-tidal-volume ventilation reduces mortality in critically ill patients with acute lung injury and acute respiratory distress syndrome. Instituting additional strategies to open collapsed lung tissue may further reduce mortality.

**Objective** To compare an established low-tidal-volume ventilation strategy with an experimental strategy based on the original "open-lung approach," combining low tidal volume, lung recruitment maneuvers, and high positive end-expiratory pressure.

**Design and Setting** Randomized controlled trial with concealed allocation and blinded data analysis conducted between August 2000 and March 2006 in 30 intensive care units in Canada, Australia, and Saudi Arabia.

**Patients** Nine hundred eighty-three consecutive patients with acute lung injury and a ratio of arterial oxygen tension to inspired oxygen fraction not exceeding 250.

**Interventions** The control strategy included target tidal volumes of 6 mL/kg of predicted body weight, plateau airway pressures not exceeding 30 cm H<sub>2</sub>O, and conventional levels of positive end-expiratory pressure (n=508). The experimental strategy included target tidal volumes of 6 mL/kg of predicted body weight, plateau pressures not exceeding 40 cm H<sub>2</sub>O, recruitment maneuvers, and higher positive end-expiratory pressures (n=475).

**Main Outcome Measure** All-cause hospital mortality.

**Results** Eighty-five percent of the 983 study patients met criteria for acute respiratory distress syndrome at enrollment. Tidal volumes remained similar in the 2 groups, and mean positive end-expiratory pressures were 14.6 (SD, 3.4) cm H<sub>2</sub>O in the experimental group vs 9.8 (SD, 2.7) cm H<sub>2</sub>O among controls during the first 72 hours ( $P<.001$ ). All-cause hospital mortality rates were 36.4% and 40.4%, respectively (relative risk [RR], 0.90; 95% confidence interval [CI], 0.77-1.05;  $P=.19$ ). Barotrauma rates were 11.2% and 9.1% (RR, 1.21; 95% CI, 0.83-1.75;  $P=.33$ ). The experimental group had lower rates of refractory hypoxemia (4.6% vs 8.9%; RR, 0.56; 95% CI, 0.34-0.93;  $P=.03$ ), death with refractory hypoxemia (5.1% vs 9.3%; RR, 0.61; 95% CI, 0.38-0.99;  $P=.045$ ).

**Conclusions** For patients with acute lung injury and acute respiratory distress syndrome, a multifaceted protocolized ventilation strategy designed to recruit and open the lung resulted in no significant difference in all-cause hospital mortality or barotrauma compared with an established low-tidal-volume protocolized ventilation strategy. This "open-lung" strategy did appear to improve secondary end points related to hypoxemia and use of rescue therapies.

**Trial Registration** clinicaltrials.gov Identifier: NCT00182195

JAMA. 2008;299(6):637-649

www.jama.com

**Author Affiliations:** are listed at the end of this article.  
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ality and health care costs are high.<sup>3</sup>

and long-term survivors experience serious morbidity.<sup>4</sup>

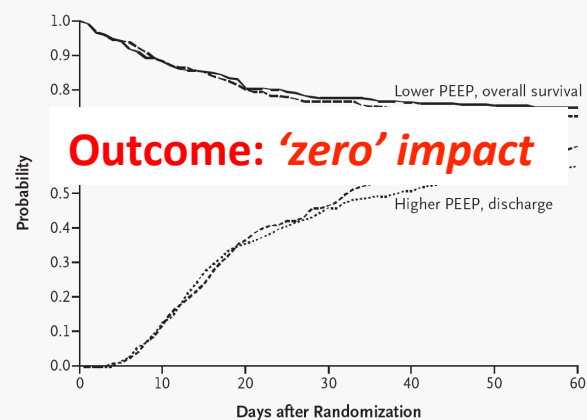
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(Reprinted) JAMA, February 13, 2008—Vol. 299, No. 6 637

# A lot of patients (2,300) A lot of effort

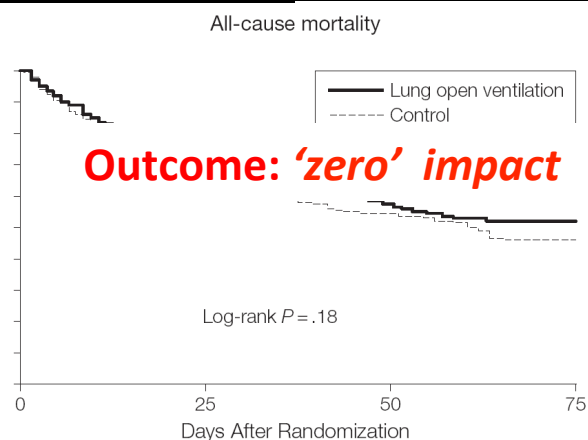
# Higher versus Lower Positive End-Expiratory Pressures in Patients with the Acute Respiratory Distress Syndrome

The National Heart, Lung, and Blood Institute ARDS Clinical Trials Network\*



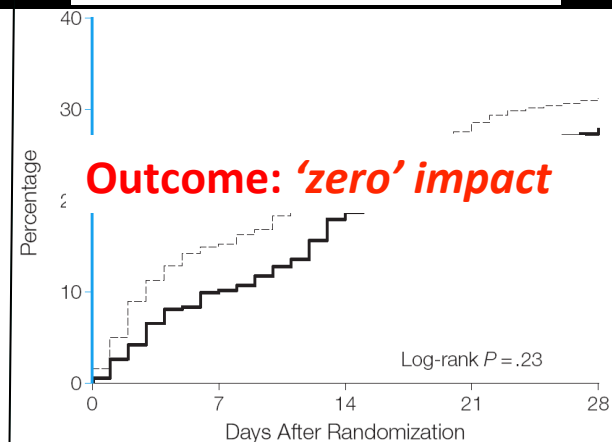
ARDS Network, *N Engl J Med* 2004

# Ventilation Strategy Using Low Tidal Volumes, Recruitment Maneuvers, and High Positive End-Expiratory Pressure for Acute Lung Injury and Acute Respiratory Distress Syndrome



Meade *et al*, *JAMA* 2008

# Positive End-Expiratory Pressure Setting in Adults With Acute Lung Injury and Acute Respiratory Distress Syndrome A Randomized Controlled Trial



Mercat *et al*, *JAMA* 2008

Briel *et al*, *JAMA* 2010

## **“EBM” - Error #2**

**Assume that sufficient numbers will outweigh shortcomings in design ...**

***Perform a Meta-analysis of the RCTs***

# Higher vs Lower Positive End-Expiratory Pressure in Patients With Acute Lung Injury and Acute Respiratory Distress Syndrome

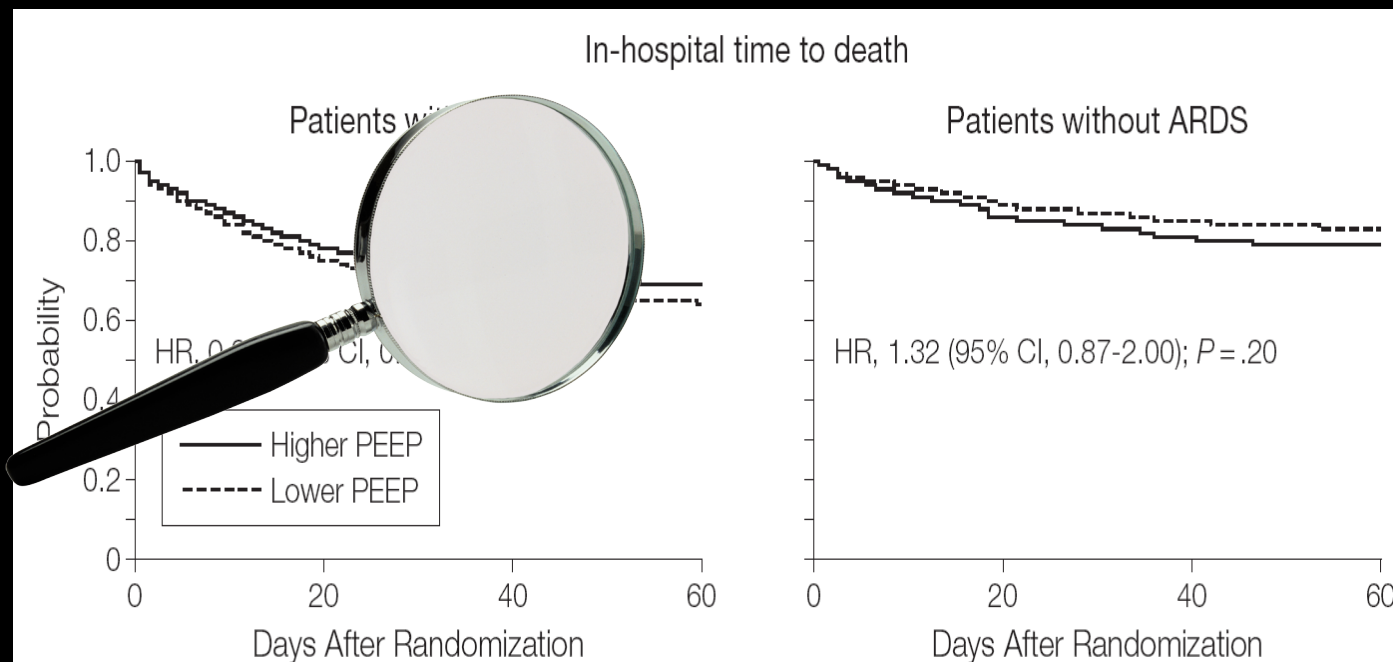
## Systematic Review and Meta-analysis

Matthias Briel, MD, MSc

Maureen Meade, MD, MSc

**Context** Trials comparing higher vs lower levels of positive end-expiratory pressure (PEEP) in adults with acute lung injury or acute respiratory distress syndrome (ARDS)

**Apparently decreases mortality in subgroup with ARDS**



**JAMA 2010**

## SUMMARY:

**PEEP does nothing ...**  
*(at least not very much)*



## CONCLUSION:

**Remove the PEEP knob from ventilators?**



## ***ACTUALLY: PEEP does lots of things ...***

**Some people think that PEEP effects are complicated (*and that you need clinician knowledge and presence*)**

**Others think that PEEP is very simple (*and you can set the switch and leave the ICU ...*)**

# **“EBM” – *Lesson #1***

**How is PEEP like Furosemide?**

# Furosemide



# Edema

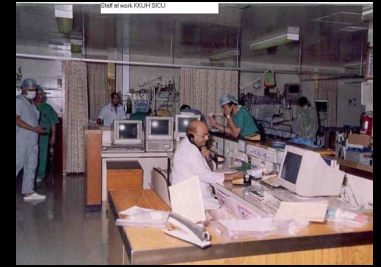


# Dehydration





*Imagine Lots of Patients in ICU*



**Hypothesis:**

***A higher-dose diuretic regimen would have better outcome than a lower-dose diuretic regimen ...***

**Include**



**Exclude**



*...Content Expertise*



## So, How's Furosemide like PEEP?

***Big doses when the need is great ...***

***Lower doses when the need is less ...***

***NONE where there's no need - - - to avoid harm***

***And CLINICIANS always ASSESS the RESPONSE***

- *Plausibility* -

Could this be the *question* asked  
about PEEP in ARDS?



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## Higher versus Lower Positive End-Expiratory Pressures in Patients with the Acute Respiratory Distress Syndrome

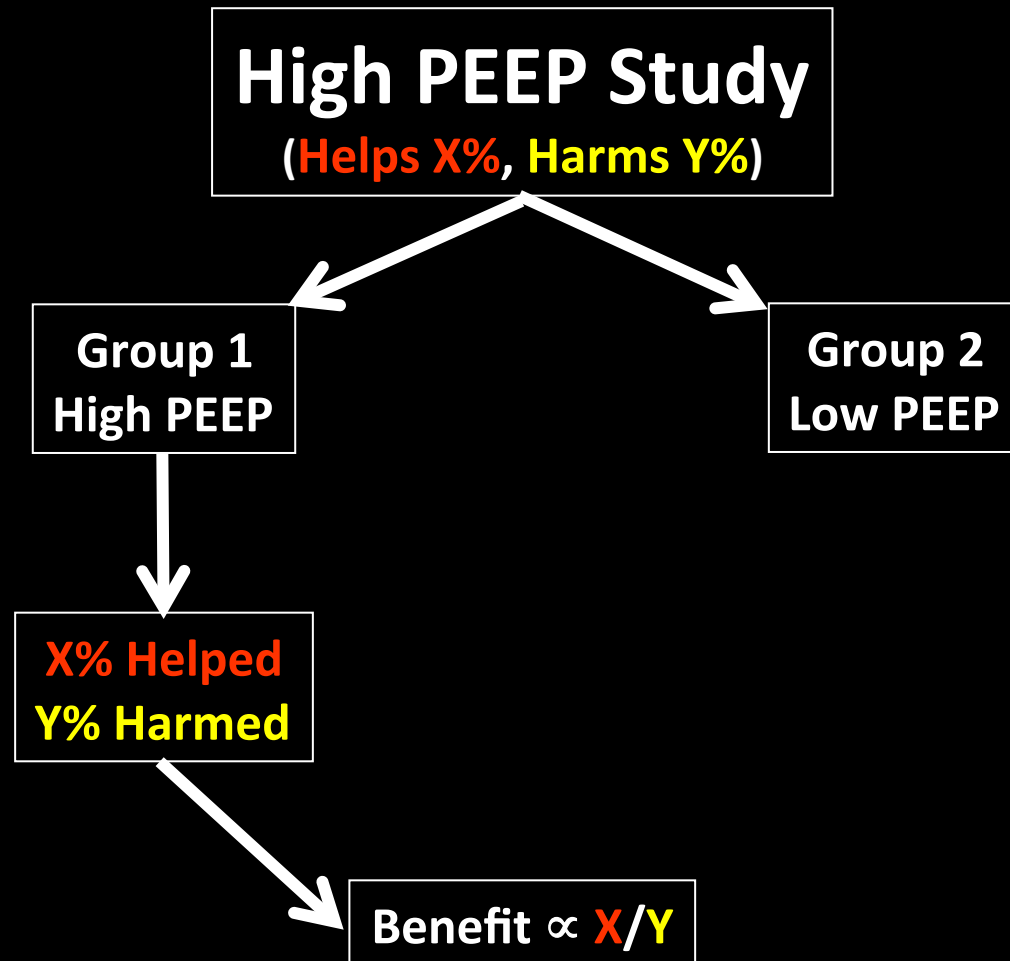
The National Heart, Lung, and Blood Institute ARDS Clinical Trials Network\*

### ABSTRACT

#### BACKGROUND

Most patients requiring mechanical ventilation for acute lung injury and the acute respiratory distress syndrome (ARDS) receive positive end-expiratory pressure (PEEP) of 5 to 12 cm of water. Higher PEEP levels may improve oxygenation and reduce ventilator-induced lung injury but may also cause circulatory depression and lung injury from overdistention. We conducted this trial to compare the effects of higher and lower PEEP levels on clinical outcomes in these patients.

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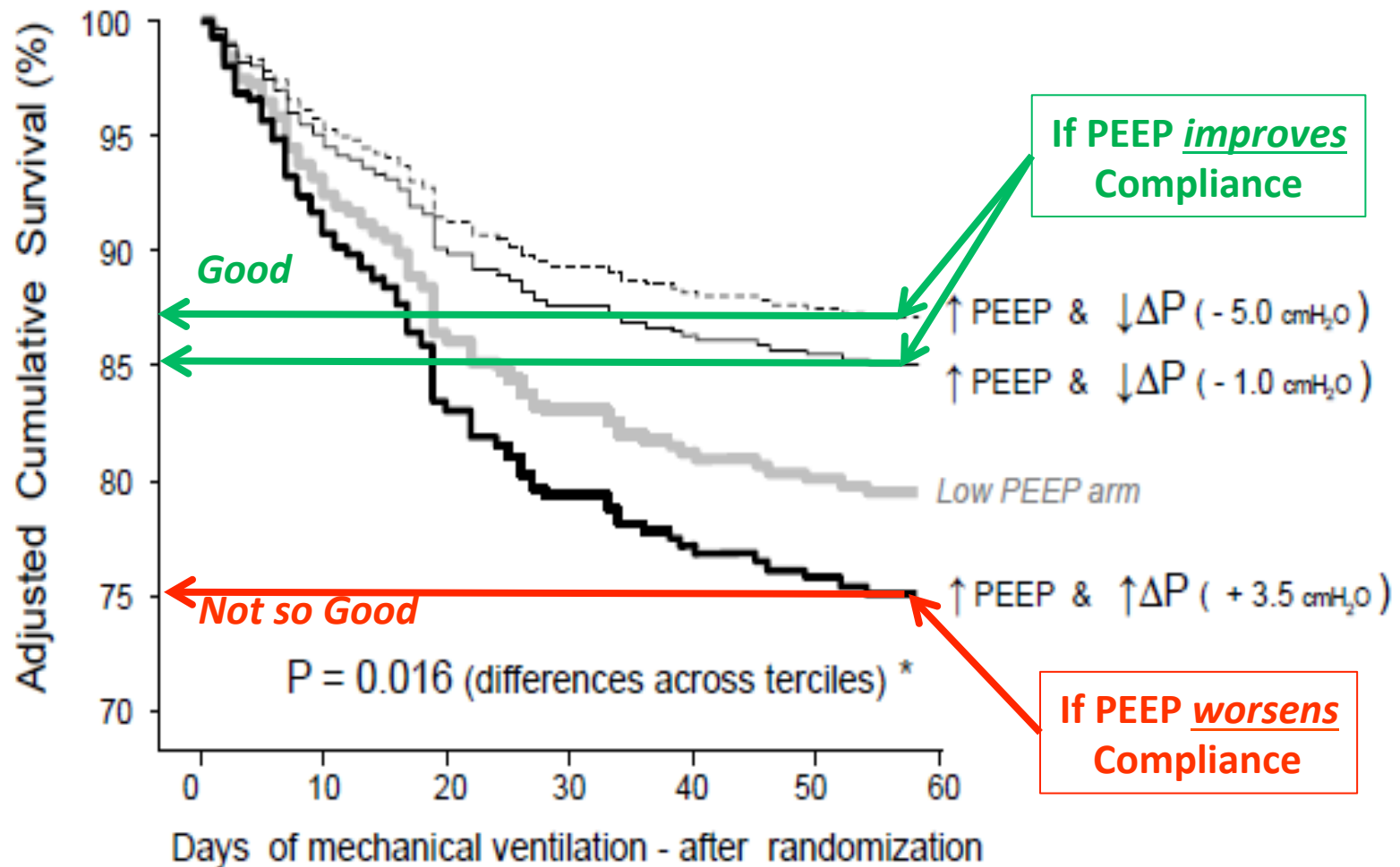
Randomizing and counting survival ...

Make it almost impossible to understand

- *Plausibility* -

Could this *answer* be true for  
PEEP in ARDS?

# Mortality with Higher PEEP: *Impact on Compliance*



*Thanks to Drs M Amato & BT Thompson*

- *Plausibility* -

Looks like the paradigm is true

## **- *Plausibility* -**

**This is where “EBM” lets us down**

**There's no 'insight' – only a population  
average**

**For managing PEEP in my patients, I think that *'insight'*  
trumps *'research methods'***

**So, I will decline to manage PEEP in my patients based  
on an EBM-driven *'definitive'* meta-analysis.**





*Does this suggest that RCTs  
are not useful?*

***ABSOLUTELY NOT!***  
***RCTs are Immensely Useful***

# Is it Fair to Rely on RCTs?



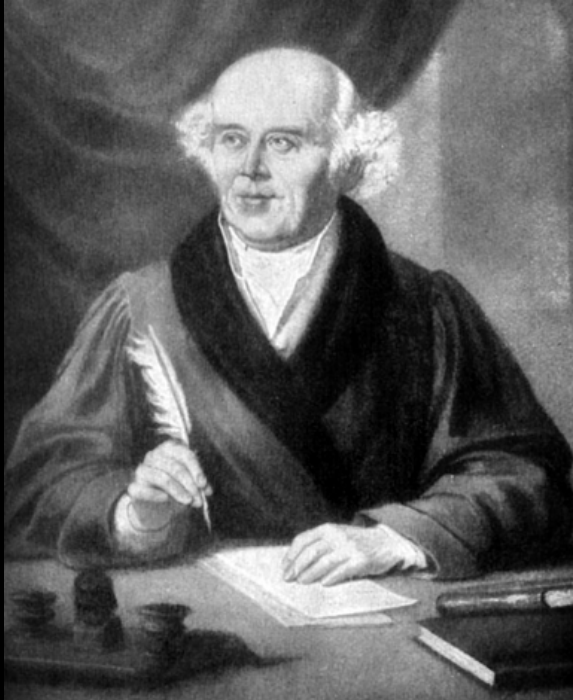
Austin Bradford Hill (1897-1991)

Yes: If we understand  
the question ...

## What does an RCT Achieve?

- Minimizes Allocation Bias
- Does not shape the Question
- Does not shape the Relevance

# ***-EBM & Homeopathy-***



Samuel Hahnemann (1796)

- 'Like' cures 'Like'
- Miasims
- Dilution increases potency
- Avogadro's Number  $6 \times 10^{23}$
- Many cures  $>10^{60}$  Dilution

# Are the clinical effects of homoeopathy placebo effects? A meta-analysis of placebo-controlled trials

Klaus Linde, Nicola Clausius, Gilbert Ramirez, Dieter Melchart, Florian Eitel, Larry V Hedges, Wayne B Jonas

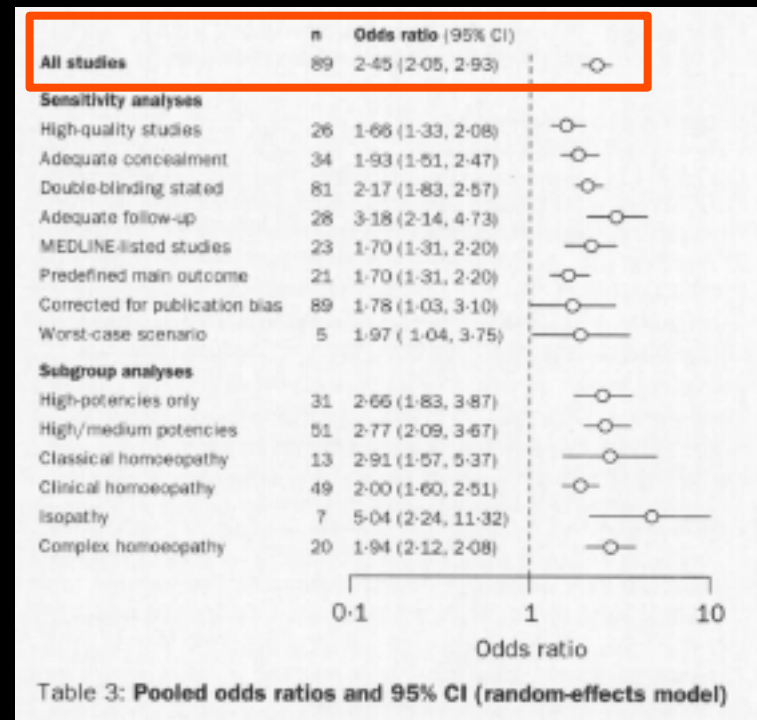
## EBM in Action: Meta-analysis of 89 'high quality' RCTs

**Background** Homoeopathy seems scientifically implausible, but has widespread use. We aimed to assess whether the clinical effect reported in randomised controlled trials of homoeopathic remedies is equivalent to that reported for placebo.

If Homeopathy is 'implausible', then major doubt about EBM

Believers in Homeopathy  
--- Pleased

Believers in 'EBM'  
--- Alarmed



***Make the Guidelines,  
Then grade them***

## What is GRADE?




GRADE is a systematic and explicit approach to making judgements about quality of evidence and strength of recommendations.

It was developed by the **Grading of Recommendations, Assessment, Development and Evaluations (GRADE)** Working Group, and it is now widely seen as the most effective method of linking evidence-quality evaluations to clinical recommendations.

## Conclusion

Based on the results of this pilot study we have been able to considerably improve our system for grading the quality of evidence and strength of recommendations [16].

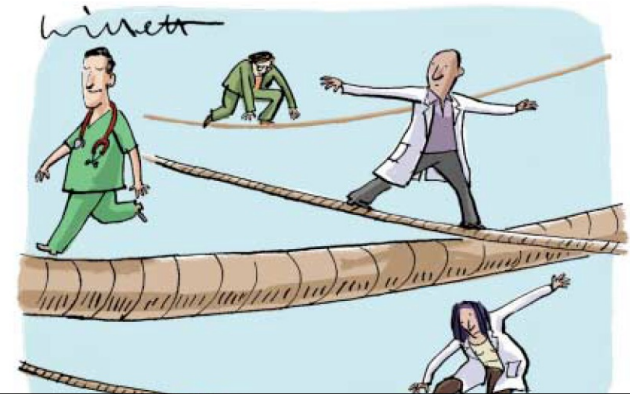
**Kappa for agreement beyond chance for the 12 judgments about the quality of the evidence was 0.27 ...**

16. Atkins D, Best D, Briss PA, Eccles M, Falck Ytter  Corp S, Guyatt GH, Harbour RT, Haugh MC, Henry D, Hill S, Jaeschke R, Leng G, Liberati A, Magrini N, Mason J, Middleton P, Mruk  D'Connell D, Oxman AD, Phillips B, Schunemann HJ, Edejer  onen H, Vist GE, Williams JW Jr, Zaza S, Grade Working Group. **Grading quality of evidence and strength of recommendations.** *BMJ* 2004, 328(7454):1490.

**Then there was no more testing - just words**

Education and debate

**... and a Picture**



**Read this, and as you do, ask yourself: “Is there any evidence”?**

**No Data**

**No Testing**

**No Investigation**

**No Validation**

Assessment, Development, and Evaluation (GRADE) Working Group

good as the evidence and judgments they are based on. The GRADE  
r for users to assess the judgments behind recommendations



***GRADE***  
**Invalid**  
***(surely not mandatory)***

Clinicians, patients, third-party payers, institutional review committees, other stakeholders, or the courts should never view recommendations as dictates.

### **Strong Recommendations**

- For patients: Most individuals in this situation would want the recommended course of action and only a small proportion would not. Formal decision aids are not likely to be needed to help individuals make decisions consistent with their values and preferences.
- For clinicians: Most individuals should receive the intervention. Adherence to this recommendation according to the guideline could be used as a quality criterion or performance indicator.
- For policy makers: The recommendation can be adapted as policy in most situations.

**Schünemann *et al* AJRCCM, 2006**

# ***Impact of High-Grade Guidelines***

## **Intensive Insulin Therapy in Critical Illness**

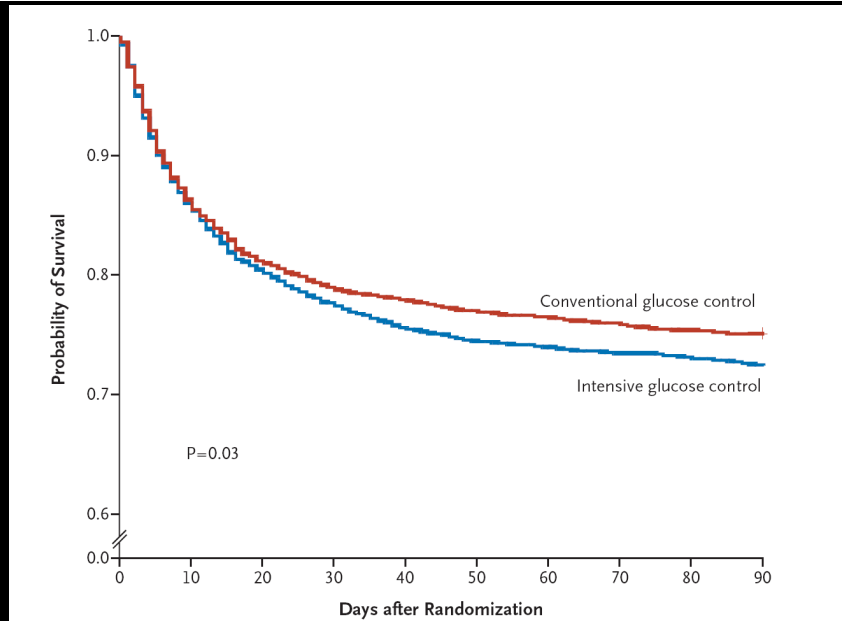
When Is the Evidence Enough?

On the basis of these studies, several groups recommended that glycemic control with intensive insulin therapy become standard of care for the critically ill. The Joint Commission on Accreditation of Healthcare Organization recently proposed tight glucose control for the critically ill as a core quality of care measure for all U.S. hospitals that participate in the Medicare program ([www.jcaho.org](http://www.jcaho.org)). The Institute for Healthcare Improvement, together with an international initiative by several professional societies, including the American Thoracic Society, is promoting a care “bundle” for severe sepsis that also includes intensive glycemic control (<http://www.ihl.org/IHI/Topics/CriticalCare/Sepsis/SepsisSubtopicHomepage.htm>). The Volunteer Hospital Association, a consortium of more than 400 U.S.

**Angus & Abraham,  
AJRCCM 2005**

## Intensive versus Conventional Glucose Control in Critically Ill Patients

The NICE-SUGAR Study Investigators\*



NEJM, 2009

**6,100 Patients  
Mortality**

**IIT 27.5%**

**Control 24.9%**

**Excess 2.6%**

*At least we know the answer ...*

***Perhaps >5m Patients in ICU in US [SCCM]***

***Perhaps 20% Mechanically Ventilated***

***IF: TGC caused deaths in 2.6% of patients***

***THEN:   -compliance would cause ?? deaths  
          -non-compliance would save ?? lives***

# PROTOCOLS

**Doing Research vs. Applying Research**

# Scientist



**William Hamilton  
(1805-1865)**

***Discover Knowledge***

# Clinician



**Dominic Corrigan  
(1802-1880)**

***Use Knowledge***

**Research**

```
graph TD; A[Research] --> B[Rigidity]; B --> C["Why?  
To know WHAT  
was done"]; C --> D["Point ?  
To gain INSIGHT"]
```

**Rigidity**

**Why?**

**To know WHAT  
was done**

**Point ?**

***To gain INSIGHT***

**Practice**

```
graph TD; E[Practice] --> F[Flexibility]; F --> G["Why?  
To use ALL your  
knowledge"]; G --> H["Point ?  
To best treat  
THIS patient"]
```

**Flexibility**

**Why?**

**To use ALL your  
knowledge**

**Point ?**

***To best treat  
THIS patient***



## Editorials

---

### Of Principles and Protocols and Weaning

In research, the protocol must be followed exactly - “*no flexibility ... no weasel words*”

The insight gained -not the protocol- is the point

Tobin MJ, AJRCCM 2004

Kavanagh & Nurok, AJRCCM 2015

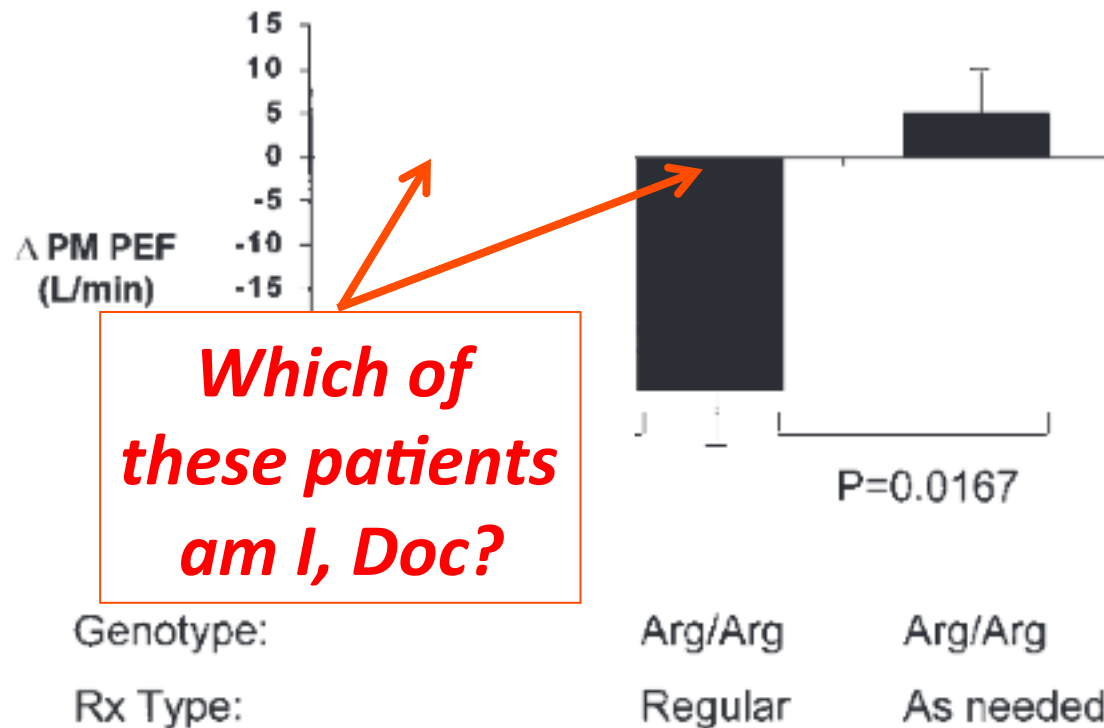
***The Opposite of “EBM”***

***Personalized Medicine***

***Based on Insight, not on statistics***

# The Effect of Polymorphisms of the $\beta_2$ -Adrenergic Receptor on the Response to Regular Use of Albuterol in Asthma

ELLIOT ISRAEL, JEFFREY M. DRAZEN, STEPHEN B. LIGGETT, HOMER A. BOUSHEY, REUBEN M. CHERNIACK, VERNON M. CHINCHILLI, DAVID M. COOPER, JOHN V. FAHY, JAMES E. FISH, JEAN G. FORD, MONICA KRAFT, SUSAN KUNSELMAN, STEPHEN C. LAZARUS, ROBERT F. LEMANSKE, Jr., RICHARD J. MARTIN, DIANE E. McLEAN, STEPHEN P. PETERS, EDWIN K. SILVERMAN, CHRISTINE A. SORKNESS, STANLEY J. SZEFLER, SCOTT T. WEISS, and CHANDRI N. YANDAVA for the National Heart, Lung, and Blood Institute's Asthma Clinical Research Network



*Some Patients don't do well with regular BA*

*BAR has Polymorphisms (Gly/Gly vs. Arg/Arg)*

**Where did it all come from?**

# Evidence-Based Medicine

## A New Approach to Teaching the Practice of Medicine

Evidence-Based Medicine Working Group

A NEW paradigm for medical practice is emerging. Evidence-based medicine de-emphasizes intuition, unsystematic clinical experience, and pathophysiologic rationale as sufficient grounds for clinical decision making and stresses the examination of evidence from clinical research. Evidence-based medicine requires new skills of the physician, including efficient literature searching and the application of formal rules of evidence evaluating the clinical literature.

**The paradigm was new – and arrogant**

**Experience and Physiology = Bed Rock**

***(Ask any Physician ...)***

**Arbitrary = *claimed ownership of epidemiology ... and made up the rest***

**JAMA 1992**

**No, they need to learn  
clinical 'practice' ...**

**No, please recruit  
competent doctors ...**

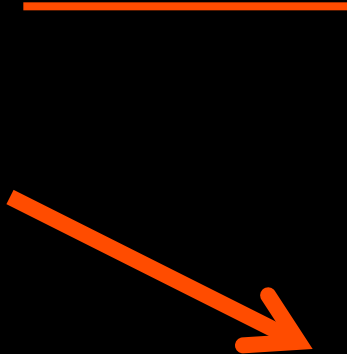
**Encouraging more and  
more and more**

**... may have destroyed a  
generation of doctors**

**JAMA 1992**

## Is basic science disappearing from medicine? The decline of biomedical research in the medical literature

Benjamin E. Steinberg,<sup>\*,†</sup> Neil M. Goldenberg,<sup>\*,†</sup> Gregory D. Fairn,<sup>†,‡</sup> Wolfgang M. Kuebler,<sup>†,‡</sup>  
Arthur S. Slutsky,<sup>†,§</sup> and Warren L. Lee<sup>†,§,1</sup>



# What's EBM based on?

## The Medical Literature

# Users' Guides to the Medical Literature

## Users' Guides to the M

## I. How to Get Started

# Evidence-Based

## A New Approach to Teach

Evidence-Based Medicine Working Group

A NEW paradigm for medicine is emerging. Evidence-based medicine de-emphasizes the role of clinical examination and rational decision-making in favor of clinical research. Evidence-based medicine requires new skills for the physician, including efficient literature searching and the application of formal rules of evidence evaluation to the clinical literature.

An important goal of our medical residency program is to educate physicians in the practice of evidence-based medicine. The purpose of this study was to determine the effect of a 12-month, case-based, evidence-based medicine curriculum on the clinical examination of patients with focal neurological signs.

Medical practice is constantly changing. The rate of change is accelerating, and physicians can be forgiven if they often find it dizzying. How can physicians learn about new information and innovations, and decide how (if at all) they should modify their practice?

Possible sources include summaries of literature (review articles, practice guidelines, editorials, and commentaries); consultation with experts; and

...information might be valuable. It is subject to its own particular biases.<sup>1,2</sup> These arise when, as is often the case, these sources of information provide different suggestions about patient care. Concerned about his risk of seizure recurrence. How might the resident proceed?

## The Way of the Past

Faced with this situation as a clinical clerk, the resident was told by her senior resident (who was supported in his view by the attending physician) that the work of a coronarographer is to perform a mature coronary heart disease (CHD). You repeat his cholesterol test and schedule a follow-up appointment. The test confirms an elevated cholesterol

although the guides are useful, they are not... and clinically... new users, colleagues... together to create... published in JAMA over the... have been inspired by the need for... focus on using the medical literature to... real patient problems. This reflects an approach to medical practice that has been called "evidence-based medicine" and involves an ability to access, summarize, and apply information from the literature to day-to-day clinical problems.<sup>5</sup> The Readers' Guides have therefore been transformed into a set of Users' Guides.

What differences can readers who are familiar with the previous guides expect to find in the new series? As before, the guides aim to assist physicians' reading in order to keep abreast of the literature, to identify the cause and the adverse outcome, and to assess the relevance to patients in their practice (Table 1). In this article we will emphasize key points from the perspective of the clinician needing to make a decision about patient care. In the next article in our series of "Users' Guides to the Medical Literature" we will evaluate an individual article for an issue of harm. To fully as-

You can use the first two validity guides in Table 1 to quickly screen out most published review articles.<sup>7</sup> The discrepancies between the results of systematic meta-analyses and the recommendations made by clinical experts in nonsystematic review articles<sup>8</sup> reflects

## A PARADIGM SHIFT

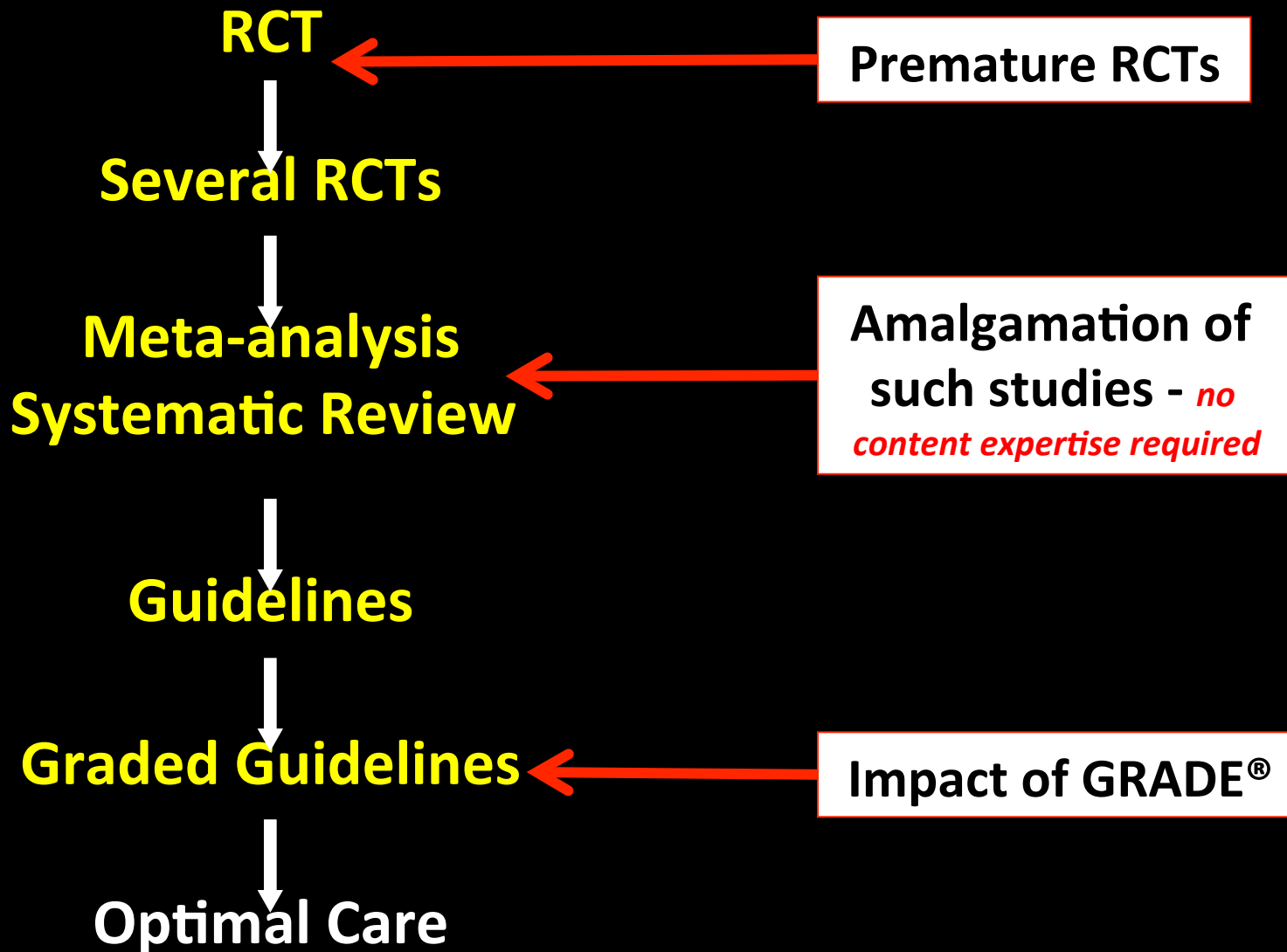
Thomas Kuhn has described scientific revolutions as paradigm shifts. You start with a paradigm, you find it's definitely on target, and you decide to examine both.<sup>12</sup>

## INTRODUCTION

Systematic overviews of the medical



# *-How it 'Works'-*



# In Conclusion ...

- **“EBM” ‘Steals the Lexicon’**
- **The “EBM” Hierarchy is Arbitrary**
- **Statistics Never Trump Insight**
- **Evidence comes in Multiple Forms**
- **‘Averaged’ Rx not Ideal for Individuals**

# Epilogue

*The Story of Mr 'O'*

## The Tyranny of Guidelines

We need a system that rewards the physician who understands the limitations of guidelines.

Requests for Single Reprints: George A. Sarosi, MD, Minneapolis Veterans Affairs Medical Center, One Veterans Drive,

In retrospect, he got into a relentless downhill medical care spiral fueled by interventions based on "evidence-based" guidelines to tightly control both the blood sugar and the blood pressure. He was started on physical therapy and eventually transferred to a rehabilitation facility where he remained 3 months after the fall, unlikely to ever live independently. Meanwhile, his brother with dementia had to be admitted to a nursing home with a memory care unit. During this ordeal, Mr. O exhausted his meager savings and required Medicaid funding, which resulted in a lien being placed on his home.

maintained stubbornly elevated, and a calcium-channel blocker was prescribed. A second oral hypoglycemic

plications, including *C. difficile* colitis and an increase of creatinine to 2.0 mg/dL. He was started on physical

level was 0.9 mg/dL).

We need a system that rewards the physician who understands the limitations of guidelines.

The brochure was printed on shiny, multicolored paper, and on the top of the first page in big, bold letters was the name of the parent organization of the clinic

His doctor may have received a bonus for adhering to the guidelines, but Mr. O lost his home and independence.

**Thank You**