



On the Need for an 'Evidence Reversibility Index' or 'Evidence Sufficiency Index'

To Better indicate when there is 'Enough Evidence' to warrant KT?

Dr. Janet Martin

Director, MEDICI Centre

Assistant Professor, Dept of Anesthesia & Perioperative Medicine

and Department of Epidemiology & Biostatistics

Schulich School of Medicine & Dentistry

Western University, London, Ontario, CANADA



Medical Evidence
Decision Integrity
Clinical Impact

A Litany of Evidence Reversals

- Flecainide/Encainide
- Hormone replacement therapy
- Cancer screening (PSA, Mammography, Thyroid)
- Intensive glucose management
- Hypothermia for cardiac arrest, TBI, stroke
- Beta-blockers, Clonidine perioperatively
- Aprotinin vs TXA or EACA
- Knee Arthroscopy
- PCI for stable angina
- Off-pump CABG vs conventional CABG
- Thyroid cancer nodules
- And many more! (shaken to the core)

Today's Random Medical News

from the New England
Journal of
Panic-Inducing
Gobbledygook

JIM FRYMAN
© 1997



CAN CAUSE

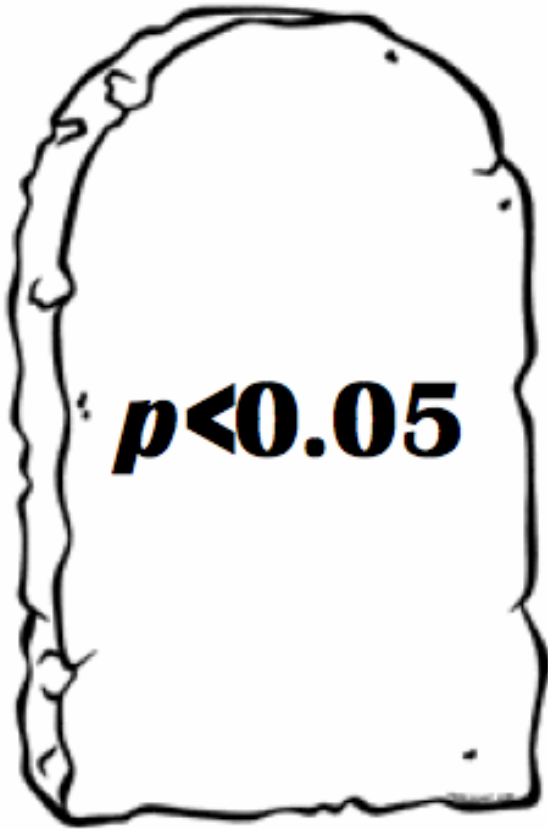


IN



ACCORDING TO A
REPORT RELEASED
TODAY....





Is Evidence-Informed Decision-Making Even Possible?

...many of these reversed drugs and technologies were the very things I helped to implement using 'best evidence' in that era

A Decade of Reversal: 146 Contradicted Medical Practices



Dr. Vinay Prasad

ORIGINAL ARTICLE

Mayo Clinic Proc 2013



A Decade of Reversal: An Analysis of 146 Contradicted Medical Practices

Vinay Prasad, MD; Andrae Vandross, MD; Caitlin Toomey, MD; Michael Cheung, MD;
Jason Rho, MD; Steven Quinn, MD; Satish Jacob Chacko, MD; Durga Borkar, MD;
Victor Gall, MD; Senthil Selvaraj, MD; Nancy Ho, MD; and Adam Cifu, MD

Abstract

Objective: To identify medical practices that offer no net benefits.

Methods: We reviewed all original articles published in 10 years (2001-2010) in one high-impact journal. Articles were classified on the basis of whether they addressed a medical practice, whether they tested a new or existing therapy, and whether results were positive or negative. Articles were then classified as 1 of 4 types: replacement, when a new practice surpasses standard of care; back to the drawing board, when a new practice is no better than current practice; reaffirmation, when an existing practice is found to be better than a lesser standard; and reversal, when an existing practice is found to be no better than a lesser therapy. This study was conducted from August 1, 2011, through October 31, 2012.

Results: We reviewed 2044 original articles, 1344 of which concerned a medical practice. Of these, 981 articles (73.0%) examined a new medical practice, whereas 363 (27.0%) tested an established practice. A total of 947 studies (70.5%) had positive findings, whereas 397 (29.5%) reached a negative conclusion. A total of 756 articles addressing a medical practice constituted replacement, 165 were back to the drawing board, 146 were medical reversals, 138 were reaffirmations, and 139 were inconclusive. Of the 363 articles testing standard of care, 146 (40.2%) reversed that practice, whereas 138 (38.0%) reaffirmed it.

Conclusion: The reversal of established medical practice is common and occurs across all classes of medical practice. This investigation sheds light on low-value practices and patterns of medical research.

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For editorial
comment, see

We expect that new medical practices gain popularity over older standards of care on the basis of robust evidence indicating clinical superiority

designed than their predecessors—contradict current practice.⁴ In a prior investigation of 1 year of publications in a high-impact journal, we found that of 35 studies testing standard of care,

Medical Reversals

Medical reversal is when a **currently accepted practice is overturned**

- Found to be **no better than the therapy it replaced**
- Found to be no better than **no treatment**

Prasad et al. Mayo Clin Proc 2013

Evidence Reversals – An Update of Prasad *et al*

Qureshi, Sutton, Cheng, Martin, Submitted 2017

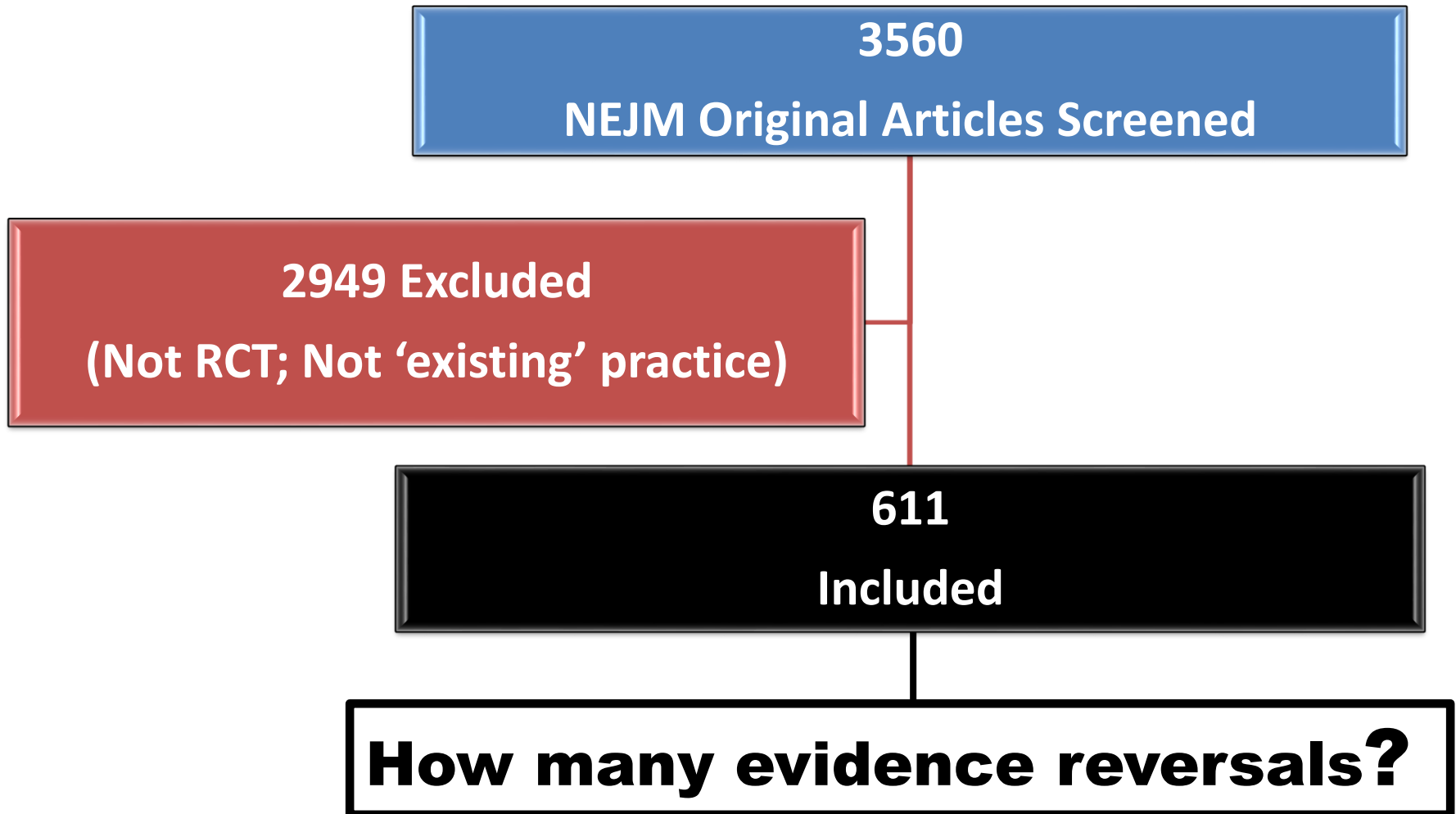
What is Evidence Reversal?

Definition:

When **new evidence for an established practice** that is methodologically stronger than previously conducted research **finds that the practice is less effective or more harmful** than originally believed (Sutton, Qureshi, Martin, JCE 2017)

Evidence Reversals in NEJM 2000-2016

Qureshi, Sutton, Cheng, Martin, submitted 2017



Risk Factors for Reversal?

Qureshi, Sutton, Cheng, Martin, submitted 2017

Regression analysis of 20 candidate variables in 611 RCTs suggested an association between 'reversal' and:

- **p-value**
- **Effect size**
- **Loss to follow-up**
- **Risk of bias (RoB)**

Premature Translation

...the practice was **prematurely adopted** based on **fragile, unstable, immature evidence**, leading to wasted effort, costs, suboptimal outcomes

Martin, Qureshi, Sutton. Submitted 2017
Sutton, Qureshi, Martin. JCE 2017 (epub)

Evidence reversals are common, then, if we adopt new practices prematurely based on $p\text{-value} < 0.05$ from an insufficient # of studies, with insufficient events accrued over sufficient duration, before the known net balance of benefits vs risks is known, and sufficiently stable, and mature

Qureshi, Sutton, Cheng, Martin, submitted 2017

WANTED:

**A Framework to Inform an
'Evidence Reversibility Index' or
'Evidence Sufficiency Index'**

What is Fragility Index?

Definition:

The number of non-events in one arm that need to become events **in order to turn a significant result to 'non-significant'**.

A threshold for the number of additional events required to change the conclusion to $p > 0.05$

Walsh M, Srinathan SK, McAuley DF, et al. The statistical significance of randomized controlled trial results is frequently fragile: a case for a Fragility Index.

J Clin Epidemiol. 2014 Jun;67(6):622-8.

A Framework to Inform an 'Evidence Reversibility Index'

Fragility Index

Living SR/MA

Bayes Factor

Sufficient
events
accrued
(TSA)

RoB

Value of
Further
Information
Analysis

Sufficient duration
accrued?



Reversibility Index

After more research to identify and validate predictors of reversibility, **develop a reversibility index**

- analogous to translating risk of bias and additional domains into more intuitive information regarding **fragility, maturity, and sufficiency of the evidence available**
- Analogous to having a metric that is more **'clinically relevant'** and **'research relevant'** (actionable; decision-ready regarding KT)



Without a reversibility index

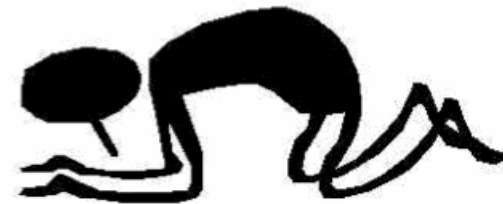
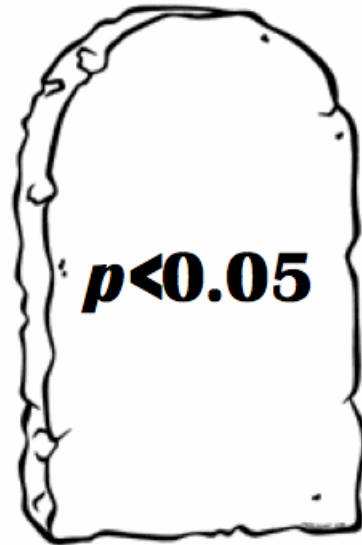


The decision arbiter will remain as . . .

Without a reversibility index



The decision arbiter will remain as . . .



Many thanks to Riaz Qureshi and Desiree Sutton



**Medical Evidence
Decision Integrity
Clinical Impact**

janet.martin@lhsc.on.ca

Techno Hype Cycle

