J.S. “Nik” Gravenstein

Gravenstein Award Recipients

- 2015 - Jeffrey Cooper, MD, for his visionary understanding of the role of technology in anesthesia care and lifetime commitment to patient safety.
- 2014 - Chester Phillips, III, MD, for his longstanding, visionary leadership in the development of electronic anesthesia record-keeping systems.
- 2013 - Takuo Aoyagi, MD, for his discovery of the principle behind the pulse oximeter.
- 2012 - Kevin Tremper, MD, for achievement in monitoring technology, use of electronic health records in anesthesia, multicenter collaboration and the development of the MPOG Center.
- 2011 - David Gaba, MD, for launching the field of simulation training within the field of Anesthesia.
- 2010 - Maynard (Mike) Ramsey III, medical device entrepreneur and inventor of the Dinamap noninvasive blood pressure monitor.
- 2009 - William New, founder and former chairman of Nellcor, and a pioneer in pulse oximetry.
- 2008 - Dwayne R. Westenskow, for sustained research, leadership, and mentoring in the field of anesthesia technology.
- 2007 - Michael Cudahy, co-founder and former president of Marquette Electronics, and a visionary who fostered engineer-clinician collaboration.
- 2006 - Susan E. Dorsch and Jerry A. Dorsch, contributions to the understanding of the theory and operation of anesthesia equipment.
- 2005 - Stanley Weitzner, for his advancement of national and international anesthesia equipment standards.
- 2004 - Peter Schreiber, founder and former president of North American Dräger and pioneer in patient safety.
- 2003 - N. Ty Smith, a pioneer in blood gas analysis and respiratory physiology.
- 2002 - N. Ty Smith, a pioneer in computer modelling of human physiology.
- 2001 - John Severinghaus, a pioneer in blood gas analysis and respiratory physiology.
- 2000 - Stephen Abrahmson, a pioneer in medical simulator technology.

My Favorite Quote:

Original: “Those who cannot remember the past are condemned to repeat it.”
-- George Santayana, in The Life of Reason, 1905.

Popular form: “Those who fail to learn from history are doomed to repeat it.”

And that leads us to:

Barker Who?

- Before anesthesia:
  - PhD: Aeronautics, Caltech 1972.
  - Assoc. Prof. of Engineering, UCLA.
  - Consultant for govt. and industry.

- Second career – Anesthesiologist:
  - Dept. Chairman X 23 years.
  - Consultant for ~15 biotech companies.
  - I’ve learned a few lessons, and one is....

Lessons from life of STEVE BARKER

Steven J. Barker, PhD, MD
Professor Emeritus of Anesthesiology and Aerospace Engineering, Univ. of Arizona
Chief Science Officer, Masimo Corp.

Lesson #1

SJB’s Two Levels of Wisdom:

- Level I: Learn from your mistakes.
  - Analyze them – understand all causes and effects.
  - Make plans for NOT repeating them.

- Level II: Learn from MY mistakes!
  - And everyone else’s too.
  - I’ve made more than you have, especially if you’re < 60.
Flying the Anesthesia Machine: “So easy a caveman can do it?”

Steven J. Barker, PhD, MD
Professor Emeritus of Anesthesiology
The University of Arizona

OODA Loop
Developed for air combat, but applies to any “real-time” decision process.

No, I have not totally lost it!


Available on Kindle too!

Boyd’s “OODA Loop”

So, to learn anything from this talk, you need to know how I got here:....

Harvey Mudd College, 1962-1967

B.S. - Physics

Caltech: 1967-1974

MS-1968, PhD-1972

California Institute of Technology

Barker’s guaranteed cure for insomnia!
Lesson: If you have a dream, and an opportunity……GO FOR IT!
The times they are a-changin’!

Chair Lessons + other administrator positions

- Why do you really want to do this?
  - Is this the best use of your skills?
  - If “moving-up” is on your reasons list, DON’T!
- Will you have the controls to do the good things that you need to do?
- Remember who put you there (the dean) – he/she can take you out!
- If your top five priorities include “keeping your job,” it’s time to quit!

Regrets?

- No! Glad I did it.
  - Many good years – I think I accomplished some things.
- What would I change?
  - Maybe quit a little sooner (3-5 years).
  - Lesson: Have a timeline in mind – don’t make administration your career!
- Get out when one of the following:
  - Your timeline is up; it’s not fun anymore; you get a dean/organization you can’t work with.

Riding the “rapids” of industry and academics!

I have always been involved with industry, but now it’s more of my time/effort.

Dr. Barker’s Disclosure:

- Masimo:
  - Member of BOD.
  - Chief Science Officer.
  - Financial interest.
- Consulted for ~14 other med-tech companies.
Chapter X: Biomedical Industry

- Then in 1990, two young fellows came to my office....

Masimo goes public: 2007

Masimo “Rainbow” Rad-7 Pulse CO-oximeter

(released in April 2005)

- "Rainbow Technology“™
- Eight (8) wavelengths!
- Provides SpCO (COHb%), SpMet (MetHb%), and SpO2

Why don't pulse ox's measure MetHb & COHb?

Carboxyhemoglobin


Fig. 2. \(\text{SpO}_2\) and \(\text{O}_2\text{Hb}\) versus carboxyhemoglobin (COHb) at \(\text{FIO}_2 = 1.0\). \(\text{SpO}_2\) consistently overestimates saturation in the presence of COHb. At COHb = 76%, \(\text{SpO}_2\) is still roughly 99%, while \(\text{O}_2\text{Hb}\) has fallen to 30%.

Methemoglobin


Why don't pulse ox's measure MetHb & COHb?
MetHb by Rad-57 vs. MetHb by CO-oximeter

Linear regression: 
\[ Y = 0.999X - 0.004 \]
Bias = 0.01
Precision < 0.50


10 subjects, pooled.

Next Step: Heads-Up Display?
Remember STA – 1990, US Grant Hotel, San Diego?
F-35 cockpit

Well, why not?
The possibilities are limitless!

We already have Google Glass

HUD at the ASA, 2015

Lessons:
- **WE** can directly influence directions taken by med-tech industry. *That’s the fun part!*
- The “American Dream” is still possible!
- It’s becoming more difficult: increasing gov’t “involvement” and our litigious society.
- Question: “Will it still be possible for our grandkids?”
Chapter 6: The Narrowing Path!

COI

Bias
Corruption
Kickbacks

Acknowledgements

Thank you for your help and materials on COI.

- Bruce Gingles
  Vice President, Global Technology and Health Policy
  Cook Medical Group

- Lance Stell, PhD
  Professor of Medicine, UNC School of Medicine
  Thatcher Professor of Philosophy, Davidson College

- Tom Stossel, MD
  Hematology Division, Brigham and Women’s Hospital
  Professor of Medicine, Harvard Medical School.

COI: Definition

"A conflict of interest is a set of circumstances that creates a risk that professional judgment or actions regarding a primary interest will be unduly influenced by a secondary interest."

COI As an academician:

- What is an “interest”?
  - Financial: Stockholder, options, income.
  - Control: BOD, officer, even consultants?
  - Nepotism: Family member (friend?) has interest!

- When is there a “conflict”?
  - When the responsibilities of your academic position or the interests of your academic institution may conflict with or be influenced by your industrial relationship.
  - Usually, just the appearance of a possible COI is enough to cause you trouble!

Corruption Story Tsunami

Articles per Year Concerning “Conflict of Interest”


400
300
200
100

(Courtesy: Lance Stell)
**Regulatory Prophylaxis**

- Corporate Compliance Programs
- NIH Consulting Ban
- Medical School Policies
- AMSA Report Cards
- IOM Commission
- NIH Revised Policy
- Mass. "Gift" Ban
- ACA “Sunshine” Law

**Are docs really bought by “pens and pizza”?**

- COI lobby says YES!
- Therefore, academic docs should not enjoy freedom of association with industry reps.
- At least one program does not allow residents to speak with reps unless a faculty “chaperone” is present.

**Are “Conflicts of Interest” Harmful or Helpful?**

**Disclosure:**

- When in doubt, DISCLOSE!
- Even when it seems terribly obvious.

**Disclosure:**

- When in doubt, DISCLOSE!
- Even when it seems terribly obvious.

**According to Stossel:**

- The “COI Movement” assumes all academic-corporate relationships are driven by greed.
- All results of such relationships are suspect.
- Medicine is treated differently from all other professions in this regard.

**Best Book on this Subject!**

Yes, it’s available on Kindle.
Interesting contrast:
As Asst. Professor of Engineering at UCLA, 1975
- Total salary: $15K per year!
- We were encouraged to spend 20% time consulting for industry.
- Consulting income ~ academic salary.
- COI issues were discussed, managed.
- Industry and academics both benefited, was a true “win-win”!
- Why is medicine different?

Can we do better?
(at controlling bias & COI)
- Yes, but there is a cost.
- If we over-regulate, we can destroy our partnership.
- FIND THE BALANCE between oversight and creative productivity!

Has the pendulum swung too far?
Definitely a nerd’s view of pendulum!

What makes US medicine great?
A common scenario:
- Either academics or industry comes up with new idea.
- Academics: How would it improve patient care?
- Industry: How can we build it and make it work?
- Academics: Try it in patients! Result?
- Industry: Refine it, make it better.
- Academics: Educate consumers (MD’s hospitals, patients)
- Industry: Produce it!
- Academics: Measure the outcomes.

And that’s TRANSLATIONAL RESEARCH!
**EXAMPLE:**

Pulse Oximetry

**SUMMARY:**

- Pulse ox invented by industry.
- Developed and applied by academics.
- Back to industry for improvements.
  - At least three cycles of this.
- **BOTH** required for success.

**This marriage is productive!**

Some recent “children” of academic-industry marriage:

- Sevoflurane, Desflurane, Propofol.
- High-potency narcotics.
- Outpatient anesthesia.
- Pulse oximetry & other O₂ monitors.
- Capnography & agent monitoring.
- Processed EEG (BiS, SedLine).
- TEE.
- Electronic medical records.
- Cardiac output.

*A relationship to be cultivated, not persecuted!*
Almost anything with the suffix “-fentanyl” involved Dr. Stanley + industry.

Now let me think, what anesthesia societies were founded as a partnership of academics and bio-tech industry, from their first beginnings?

Why does industry need academics?

- They really need the clinical perspective, orientation, priorities. *For example:*
  - What drugs are needed; what side effects are tolerable?
  - What should monitors measure? How accurate and reliable?
  - How are the data presented? How do clinicians use them?
- Human subject data.
  - They need access to our patients and volunteers for development studies.
  - They need us to conduct these studies — scientifically, objectively and safely.
- Clinical application.
  - We show whether the final product has an impact on patient care and outcomes.

Why does academics need industry?

- Because there is no “National Institute of Anesthesiology”!
  - Only 17% of US academic anesthesia depts have any NIH support!
  - We need their financial support.
- Most of our research relates to DRUGS or TECHNOLOGY.
  - We don’t develop the new drugs, and we don’t invent most of the new technology.

CONCLUSIONS?

- Yes, academics and industry are an “odd couple,” but they make great children!
- Including nearly every important new development in US medicine!
- Like any marriage, this one requires negotiation and adaptability.
- Maybe even some marriage counseling?

STA should lead:

- The development of even stronger relationships between academic medicine and industry.
- A “reality-check” of the COI issue, which is compromising that relationship. *Discussion?*
- Development of standard procedures (algorithms, checklists) for managing academic-industry relationships.
- *Put it in writing!*

Hypothesis: Other fields (e.g., aerospace) are managing this relationship better than we are.
And Finally….

- With Pro-Con debate on IP by Shelley & Barker.
- Published through efforts of Maxime Cannesson, Section Editor.
- Accompanied by an excellent editorial by Steve Shafer.
- STA DOES IT AGAIN! Makes the academic-industry partnership happen!

Ride off into the sunset?

NO WAY!

For every door that closes, another opens.

THANK YOU!