High? Low? Fast or slow?
Blood pressure, medical science, and the art of asking questions

Dena Rifkin, MD, MS
Division of Nephrology and Hypertension
Division of Family and Preventive Medicine
University of California, San Diego
VA San Diego Healthcare System
• **Think fast:** What is high blood pressure?

• The joy of data, from simple to complex

• **Think slow:** What is high blood pressure... really?
Logic - Complexity Pyramid

- Mathematics
- Physics
- Chemistry
- Physiology
- Psychology
- Social Sciences
- Theological Studies
- Philosophy
What is blood pressure?
Blood Pressure, a Reading With a Habit of Straying

By GINA KOLATA  NOV. 30, 2015

Reading blood pressure seems like a simple matter of putting on a cuff. But your numbers can change several times a day. Lucy Nicholson/Reuters
Blood Pressure Variation in a 7-day Week

- **Model**
- **Low-bp**
- **High-bp**

**SBP (mmHg)**

**Time (day hour: min)**

- 01 00:00 to 08 00:00
What’s the message in the noise?

Rifkin et al. Blood Pressure Monitoring 2010
Ambulatory blood pressure

Figure 2. 24-Hour Blood-Pressure Tracing in a Patient with Hypertension.

The white zones indicate the normal ranges of systolic pressure (top) and diastolic pressure (bottom). Adapted from the dabl 24-hour Ambulatory Blood Pressure Measurement reporting system, dabl Disease Management Systems (Ireland) (www.dabl.ie).

Pickering et al, NEJM 2006
To treat or not to treat...

“The greatest danger to a man with high blood pressure lies in its discovery, because then some fool is certain to try and reduce it.”
Hay, Brit Med J, 1931

“Hypertension may be an important compensatory mechanism which should not be tampered with, even were it certain that we could control it.”
Paul Dudley White, 1931

Hypertension is the most common condition seen in primary care and leads to myocardial infarction, stroke, renal failure, and death if not detected early and treated appropriately. Patients want to be assured that blood pressure (BP) treatment will reduce their disease burden, while clinicians want guidance on hypertension management using the best scientific evidence. – JNC 8 report, 2014
“In theory there is no difference between theory and practice. In practice there is.”
What is blood pressure... really?

I think the high pressure pills [are most important]... if I’m in trouble now it’s because of the pressure. I don’t want that to cause any more problems for me. One day I had 120. The next day I had 200. I say whoa, what’s going on inside me. I don’t want a heart attack, a stroke.

[I prioritize the BP meds] because my pressure is naturally high... I maybe miss a day or something, I just forget. Not really forget. I just don’t take them. The next day, I go back to it... I don’t feel nothing. I keep saying I’m gonna take them, I’m gonna take them... and then I’m rushing out.

Rifkin et al, AJKD 2010; and Bezareh, Rifkin et al Patient Preferences 2012
From the ‘skeptical patients’

Adults have agency and can decide for themselves... In other fields, people use consultants all the time whose advice they blatantly ignore, when the advice doesn’t fit with their worldview.

If you read what’s on the prescription [insert] you’d be dead... but they should’ve said, ‘If you have any side effects such as’... They acted as if they were getting paid to [ prescribe it ].

Rifkin et al, AJKD 2010; and Bezareh, Rifkin et al Patient Preferences 2012
We’re paid to fix this...

I certainly didn't realise that you got an extra payment for taking somebody's blood pressure, good heavens!

I know what it's like to gear your operation towards hitting targets, you ignore some of the other issues.
Quantifying the Utility of Taking Pills for Cardiovascular Prevention

Robert Hutchins, MD, MPH; Anthony J. Viera, MD, MPH; Stacey L. Sheridan, MD, MPH; Michael P. Pignone, MD, MPH

Background—The decrease in utility attributed to taking pills for cardiovascular prevention can have major effects on the cost-effectiveness of interventions but has not been well studied. We sought to measure the utility of daily pill-taking for cardiovascular prevention.
“The greatest benefit to the greatest number…” or… “For the greater good?”

Expected remaining lifetime: < 1 year

121/50
Three pills
Meds twice a day

165/75
Two pills
Meds once a day
“Not everything that can be counted counts, and not everything that counts can be counted.”

– William Bruce Cameron, The Elements of Statistical Confusion, Or: What Does the Mean Mean?
“Anyone who understands knows that you can't understand it. It's too complicated. That's what's so simple about it.”