Vaccines in the 21st Century: A 12 Step Program to Achieving Adult Immunization

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Agenda

- Discuss the concept of extraordinary and the enabling nature of disruptive innovation
- Motivate you toward deeper conversations around the concept of innovation and transformation as applied to vaccine delivery
- One Apology: some may be satisfied with the *status quo* – I apologize but I won't be able to accommodate their needs
  - "Comfort the afflicted and afflict the comfortable"

A Different Viewpoint

- **People are most comfortable with:**
  - Incremental approaches *("slow but steady")*
  - Paradigms they are familiar with *("I trust what I know, distrust what is new")*
  - Less than transparent with their agendas *("Progress is ok as long as it doesn't take anything away from me")*
  - Moderation in everything

I again apologize but I won't be able to accommodate any of these needs today…

Let's look at the data and determine whether we are successful in delivering adult vaccines in the US

Estimated proportion of adults aged ≥19 years who ever received pneumococcal vaccination — National Health Interview Survey, United States, 2018

Characteristic	Sample size	% (95% CI)	Simple difference from 2017
19–64 yrs at increased risk			
Overall	**5,851**	**23.3 (22.0–24.6)**	**–1.2**
White	4,048	23.6 (22.1–25.2)	–1.3
Black	696	25.7 (21.8–30.0)	3.1
Hispanic	656	18.5 (15.2–22.4)¶	–4.5
Asian	192	25.0 (17.3–34.5)	1.7
Other	259	25.8 (19.3–33.5)	–6.5
≥65 yrs			
Overall	**7,064**	**69.0 (67.5–70.4)**	**–0.1**
White	5,434	72.6 (71.1–74.0)	–0.6
Black	706	59.8 (54.7–64.6)¶	2.5
Hispanic	509	54.3 (49.2–59.2)¶	3.2
Asian	263	55.0 (47.4–62.4)¶	–0.6
Other	152	66.1 (55.8–75.1)	4.8
19–64 yrs at increased risk, at least 2 doses**	**5,733**	**7.5 (6.7–8.4)**	**NA**
≥65 yrs, at least 2 doses**	**6,669**	**32.3 (30.8–33.9)**	**NA**

Lu, 2021

Estimated proportion of adults aged ≥50 years who ever received herpes zoster vaccination— National Health Interview Survey, United States, 2018

Characteristic	Unweighted sample size	% (95% CI)	Vaccinated population size (weighted)	Simple difference from 2017
≥50 yrs				
Overall[§]	**13,486**	**24.1 (23.1–25.1)**	**26,687,664**	**0.2**
Race/Ethnicity				
White	10,087	28.0 (26.9–29.1)	22,290,713	0.4
Black	1,417	12.4 (10.6–14.5)[¶]	1,398,925	1.1
Hispanic	1,146	12.2 (10.0–14.7)[¶]	1,487,592	−0.1
Asian	509	19.6 (15.8–24.2)[¶]	1,062,651	−4.6
Other	327	19.8 (15.0–25.6)[¶]	447,783	1.3
≥60 yrs				
Overall	**9,401**	**34.5 (33.2–35.8)**	**24,356,476**	**−0.4**
Race/Ethnicity				
White	7,231	38.6 (37.2–40.1)	20,582,442	−0.7
Black	945	18.8 (16.0–21.9)[¶]	1,204,795	1.7
Hispanic	691	19.5 (15.9–23.8)[¶]	1,288,214	−0.4
Asian	332	29.1 (23.6–35.4)[¶]	893,689	−2.7
Other	202	30.9 (23.3–39.8)	387,336	3.0
60–64 yrs				
Total	**2,310**	**22.5 (20.4–24.8)**	**4,681,477**	**0.1**
White	1,761	25.4 (23.0–28.1)	3,895,942	0.7
Black	241	10.8 (7.0–16.3)[¶]	225,333	−1.9
Hispanic	183	15.3 (8.9–24.9)[¶]	342,136	−2.0
Asian	73	19.7 (12.0–30.7)	161,164	−2.6
Other	52	—[§§]	—	—
≥65 yrs				
Total	**7,091**	**39.5 (37.9–41.1)**	**19,674,999**	**−0.8**
White	5,470	44.0 (42.3–45.7)	16,686,500	−1.0
Black	704	22.6 (19.2–26.4)[¶]	979,462	3.1
Hispanic	508	21.7 (17.8–26.3)[¶]	946,078	0.3
Asian	259	32.5 (25.8–40.1)[¶]	732,525	−4.3
Other	150	35.5 (26.2–46.1)	330,434	4.2

Lu, 2021

Estimated proportion of adults aged ≥19 years who received any tetanus vaccination* during the preceding 10 years — National Health Interview Survey, United States, 2018

Characteristic	Sample size	% (95% CI)	Simple difference from 2017
Any tetanus vaccination			
Overall	**23,813**	**62.9 (61.8–64.0)**	**−0.5**
White	16,360	68.3 (67.2–69.4)	−0.4
Black	2,649	50.2 (47.7–52.8)¶	−0.9
Hispanic	2,933	54.0 (51.5–56.5)¶	0.3
Asian	1,174	54.7 (50.6–58.8)¶	0.7
Other	697	61.9 (57.1–66.4)¶	−6.9
Age (yrs)			
19–49	10,739	64.5 (63.1–65.8)	0.7
50–64	6,246	62.8 (61.2–64.5)	−1.9
≥65	6,828	58.9 (57.2–60.5)	−1.9
Tdap vaccination			
Overall	**15,118**	**31.2 (30.0–32.5)**	**−0.5**
White	10,174	36.7 (35.3–38.2)	0.2
Black	1,791	20.1 (17.9–22.6)¶	−0.1
Hispanic	1,911	20.5 (18.2–23.1)¶	−0.5
Asian	802	25.6 (22.2–29.4)¶	−4.2
Other	440	32.0 (26.2–38.3)	−8.4**
Age (yrs)			
19–64	10,850	33.5 (32.1–34.9)	0.1
≥65	4,268	22.2 (20.5–24.0)	−2.2

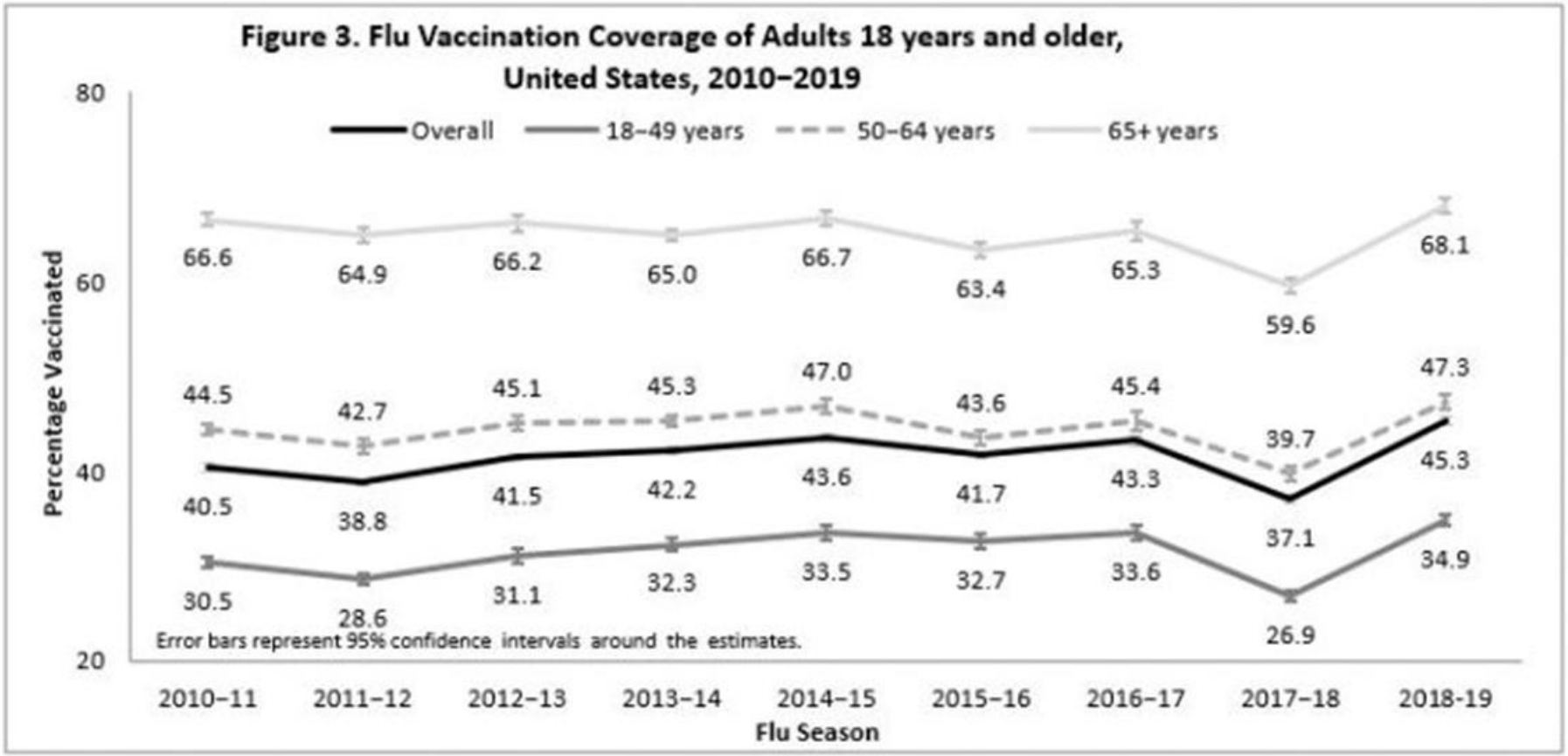
Lu, 2021

Vaccination coverage estimates using an age-appropriate composite* adult vaccination quality measure and individual component measures, by age group — National Health Interview Survey, United States, 2018

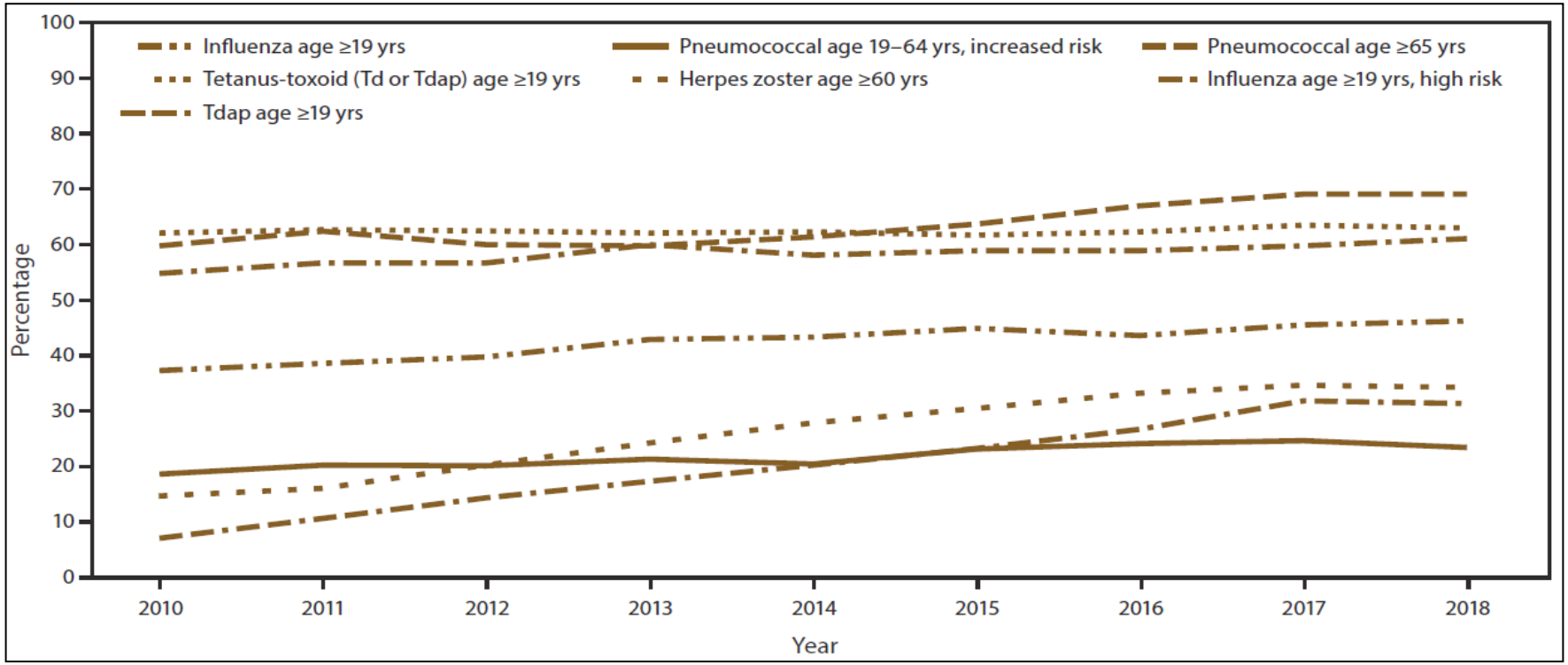
Characteristic	% (95% CI) ≥19 yrs (n = 25,207)†	19–49 yrs (n = 11,318)†	50–64 yrs (n = 6,592)†	≥65 yrs (n = 7,297)†
Composite measure				
Includes influenza during preceding 12 months				
Tdap only§	13.5 (12.7–14.3)	18.7 (17.4–19.9)	3.9 (3.2–4.8)	11.2 (10.0–12.5)
Td or Tdap¶	20.2 (19.4–21.0)	25.7 (24.5–26.9)	6.7 (6.0–7.6)	22.6 (21.2–24.0)
Does not include influenza during preceding 12 months				
Tdap only**	24.0 (22.9–25.2)	36.9 (35.2–38.6)	4.8 (4.1–5.7)	12.1 (10.9–13.5)
Td or Tdap††	42.3 (41.3–43.3)	64.5 (63.1–65.8)	8.7 (7.9–9.7)	25.4 (23.9–26.8)
Component measures§§				
Influenza during preceding 12 months	44.7 (43.8–45.6)	34.2 (33.0–35.4)	46.9 (45.3–48.4)	68.8 (67.4–70.1)
Td or Tdap	62.9 (61.8–64.0)	64.5 (63.1–65.8)	62.8 (61.2–64.5)	58.9 (57.2–60.5)
Tdap	31.2 (30.0–32.5)	36.9 (35.2–38.6)	26.0 (24.2–27.9)	22.2 (20.5–24.0)
Herpes zoster¶¶	24.1 (23.1–25.1)	—	11.5 (10.5–12.5)	39.5 (37.9–41.1)
Pneumococcal***	69.0 (67.5–70.4)	—	—	69.0 (67.5–70.4)

Lu, 2021

Flu Vaccine Coverage 2010-2019, US



Estimated proportion of adults aged ≥19 years who received selected vaccines, by age group and risk status — National Health Interview Survey, United States, 2010–2018

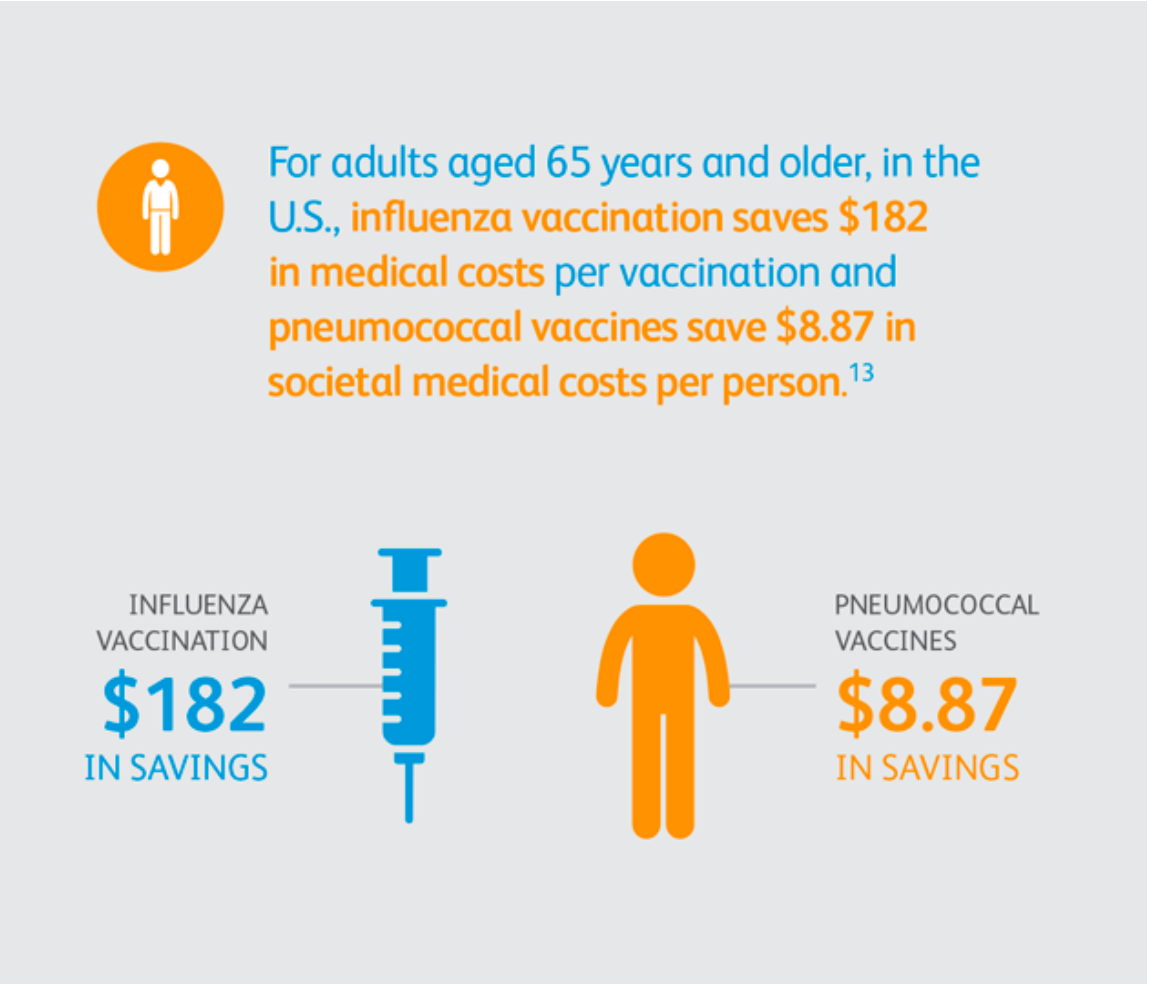


Seasonal Influenza in the US

Less than half of the U.S. population is vaccinated for influenza each year, leading to direct health care costs and indirect productivity costs related to absenteeism from paid employment. Based on 2015 population numbers, **there were 26.2 million cases of seasonal influenza in the U.S. with a total annual economic burden of $11.2 billion. Of those costs, $3.2 billion were for direct healthcare costs and $8.0 billion for indirect costs.** Persons aged 65 and older had the largest share of total direct costs, primarily due to hospitalizations.[20]

Putri, W.C.W.S., et al. (2018). Economic burden of seasonal influenza in the United States. Vaccine. 36(27):3960-6.

Influenza and Pneumococcal Vaccines are Cost-Saving



Cost of VPDs in the US

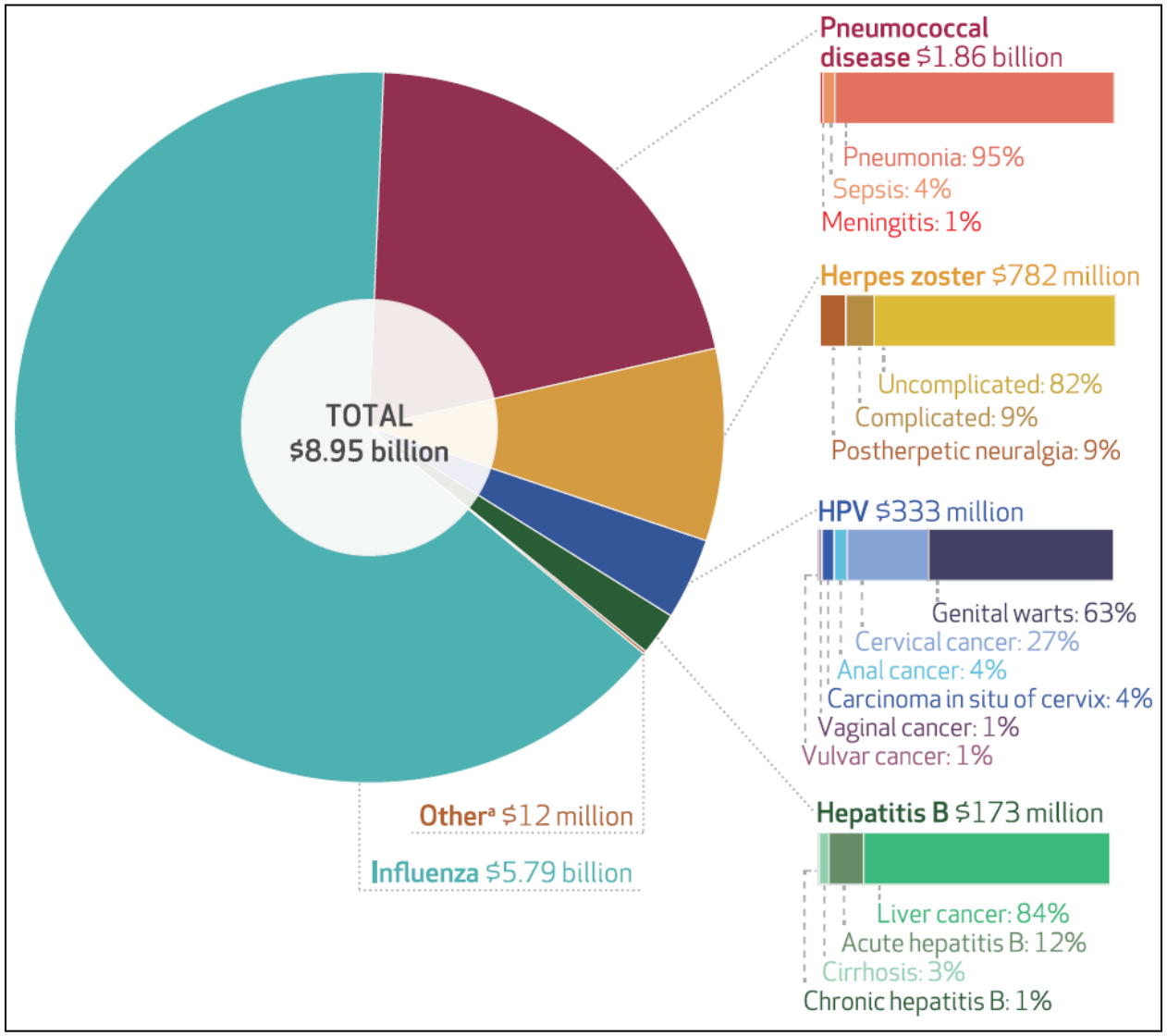
In 2015, **infections from vaccine-preventable diseases in unvaccinated individuals cost approximately $7.1 billion in the US…that number in 2020 for adults covered by Medicare was estimated at $33 billion!**

Total annual cases and economic burden of VPDs by pathogen, 2015

		Direct costs			Productivity loss		
Pathogen	Cases	Inpatient cost	Outpatient cost	Medication cost	Inpatient	Outpatient	Total costs
Hepatitis A	1,930	$ 2,160,000	$ 682,000	$ 0	$ 58,200	$ 98,500	$ 3,000,000
Hepatitis B	43,400	141,000,000	24,300,000	4,800,000	2,410,000	985,000	173,000,000
Herpes zoster	1,100,000	197,000,000	477,000,000	41,600,000	10,600,000	55,700,000	782,000,000
Influenza	16,600,000	3,770,000,000	1,580,000,000	175,000,000	86,100,000	178,000,000	5,790,000,000
Measles[a]	95	79,100	10,300	0	1,930	2,750	233,000
Mumps	394	72,400	42,600	0	964	11,400	127,000
Rubella	1	3,330	60	0	97	16	3,500
Tetanus	26	134,000	1,040	5,820	5,410	279	147,000
Diphtheria[b]	<1	3,900	5	23	112	13	4,100
Pertussis	4,450	1,580,000	482,000	445,000	40,900	129,000	2,680,000
Varicella	9,220	528,000	985,000	412,000	19,100	254,000	2,200,000
Meningococcal disease	303	4,750,000	65,600	16,900	102,000	17,600	5,000,000
Pneumococcal disease	283,000	1,760,000,000	27,400,000	14,000,000	49,000,000	8,220,000	1,860,000,000
HPV[c]	447,000	29,200,000	244,000,000	19,500,000	472,000	40,000,000	333,000,000
Total	18,500,000	5,910,000,000	2,360,000,000	256,000,000	149,000,000	283,000,000	8,950,000,000

Ozawa, 2016

Annual economic burden of VPDs by pathogen, 2015



Ozawa, 2016

Result? VPD Deaths in the US

- Adults: 50,000 – 90,000
- Children: 100 – 300
- Do you see the problem now?

Adult Immunization in the US

- Low priority
- Low compliance
- Low confidence and trust
- Low accessibility
- High cost
- High obstacles

Is this really what success looks like?

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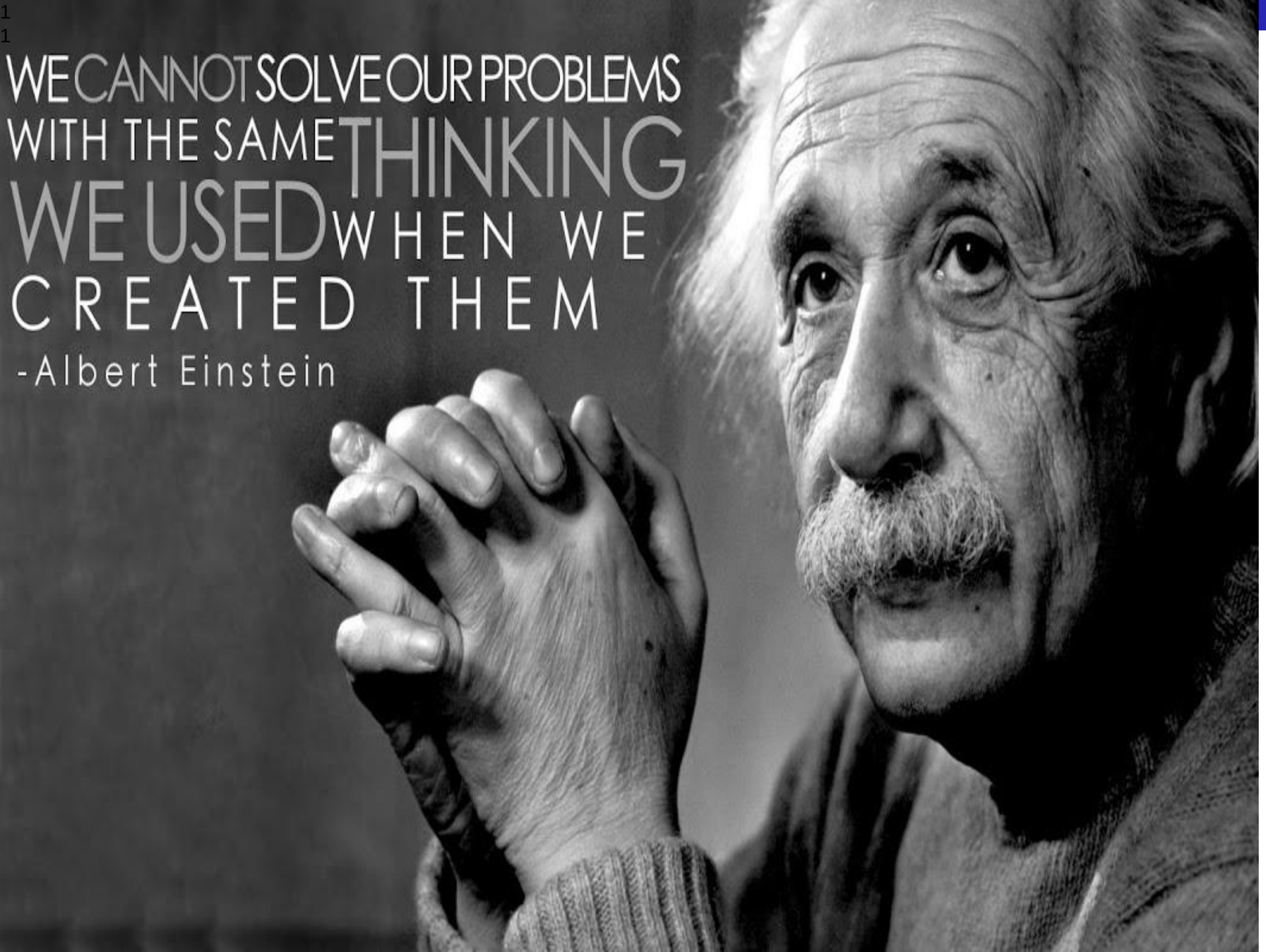

WE CANNOT SOLVE OUR PROBLEMS
WITH THE SAME THINKING
WE USED WHEN WE
CREATED THEM
-Albert Einstein

Adult Vaccine Programs in the US

- A vast sea of mediocrity with identifiable islands of excellence
- Bloated bureaucracy
- Predominantly “politically”–focused rather than “people”–driven
- Expensive with only moderate clinical outcomes
- Passive rather than active
- No system incentives or disincentives

Adult Immunization– Challenges

- Competition with childhood programs
- Lack of information on burden of disease
- The new demographics – a rapidly approaching “silver tsunami”
- Inadequate vaccines in the setting of immunosenescence
- An increasingly unhealthy society
- The tyranny of the “status quo”
- Premature cognitive narrowing

Current State – The Seven P's

- Providers uninformed about vaccines
- Public health disconnected from demographics, patients, and delivery of vaccines
- Payers with a short-term focus
- Public that is suspicious and mistrustful
- Politicians who mislead for political agendas
- Pharma with insufficient innovation
- Pathos throughout the system

…But many urge follow the majority…

Blaise Pascal

“The majority opinion is the best way because it can be seen and is strong enough to command obedience; but it is the opinion of the least clever.”

My Theses

- We should abandon most current vaccine program efforts – they are inefficient and aren't resulting in significant gains in vaccine use or coverage
- We have not created a compelling – nor memorable – metanarrative for *adult* immunization
- Many (? most) in the health care field have woefully inadequate knowledge about vaccines
- Leadership is an issue…

What Is Needed

- An over-arching metanarrative that galvanizes efforts
- A priority matrix
- A tactical plan informed by the science of motivation, transformation and innovation
- 21st century transformation teams
- Create demand – scientifically, politically, socially, psychologically, economically, emotively

Do We Make Good Decisions? Are We Wise?

- Goal: universal vaccine coverage
- We devote $>10^7$ dollars/yr to develop "programs" to increase immunization rates
- These programs are neither highly innovative, nor highly successful
- Yet we keep on doing them…using the same assumptions…same techniques…same teams…same way…"eating soup with a fork" (D Berwick)
- In the meantime VPDs are costing us billions/year…

The “12 Step Program” to Transforming Adult Vaccine Coverage in the US

Poland, GA et al. Vaccine, 2010;28:7137-7139

Start with the truth – what we are doing isn't working – so the first step is overcoming denial…and stop trying to serve soup with a fork…

Step1: Decide on Extraordinary

Extraordinary:

- ✓Intention
- ✓Resources
- ✓Ability to change
- ✓Knowledge/skill set
- ✓Data

What Does Extraordinary Care Look Like?

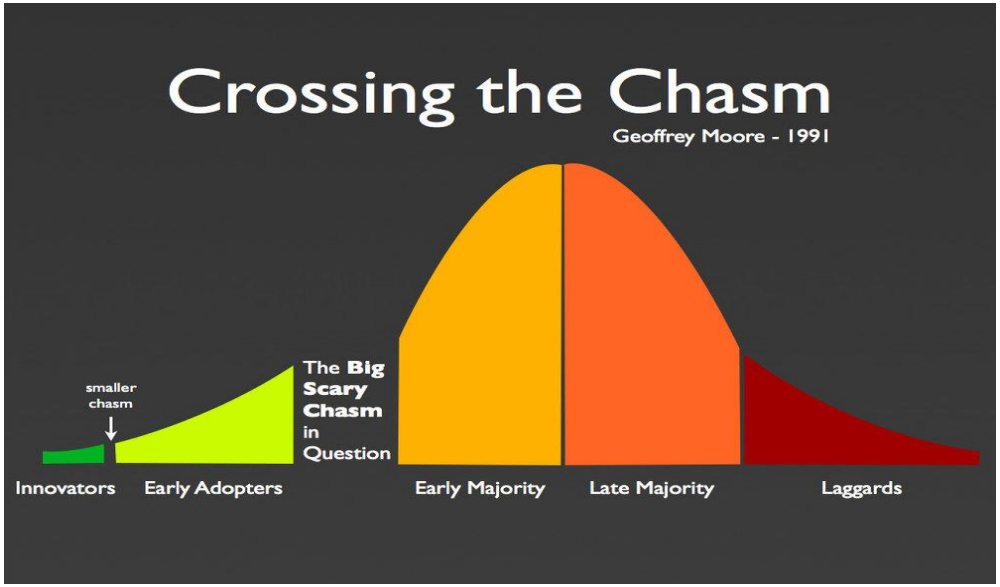
- Transformational
- Intentional
- Evidence-based
- Systems-based
- Monitored metrics of care
- Accountable
- Extraordinary learning culture
- Innovation

Imperative Opportunity

- Vaccines save lives and costs
- Disruptive innovation: game-changing, curve-bending opportunities to drive impact through vision, adaptation, openness, and a die-hard commitment to collaboration and transformative progress

Answers That Determine Our Future

- What does the immunization program and policy of the future look like?
- Will we design this, continuing struggling, or simply follow the leaders?



"Every system is perfectly designed to achieve exactly the results it gets."

– Dr. Don Berwick

Why Isn't Everyone Extraordinary?

- Apathy
- Inertia
- Cost
- "Good enough is good enough"
- Lack of incentives (will change)
- Uncertain, lack of knowledge, fear
- Conflicts of Interest
- Lack of leadership

Let's Begin! (The 5 D's)

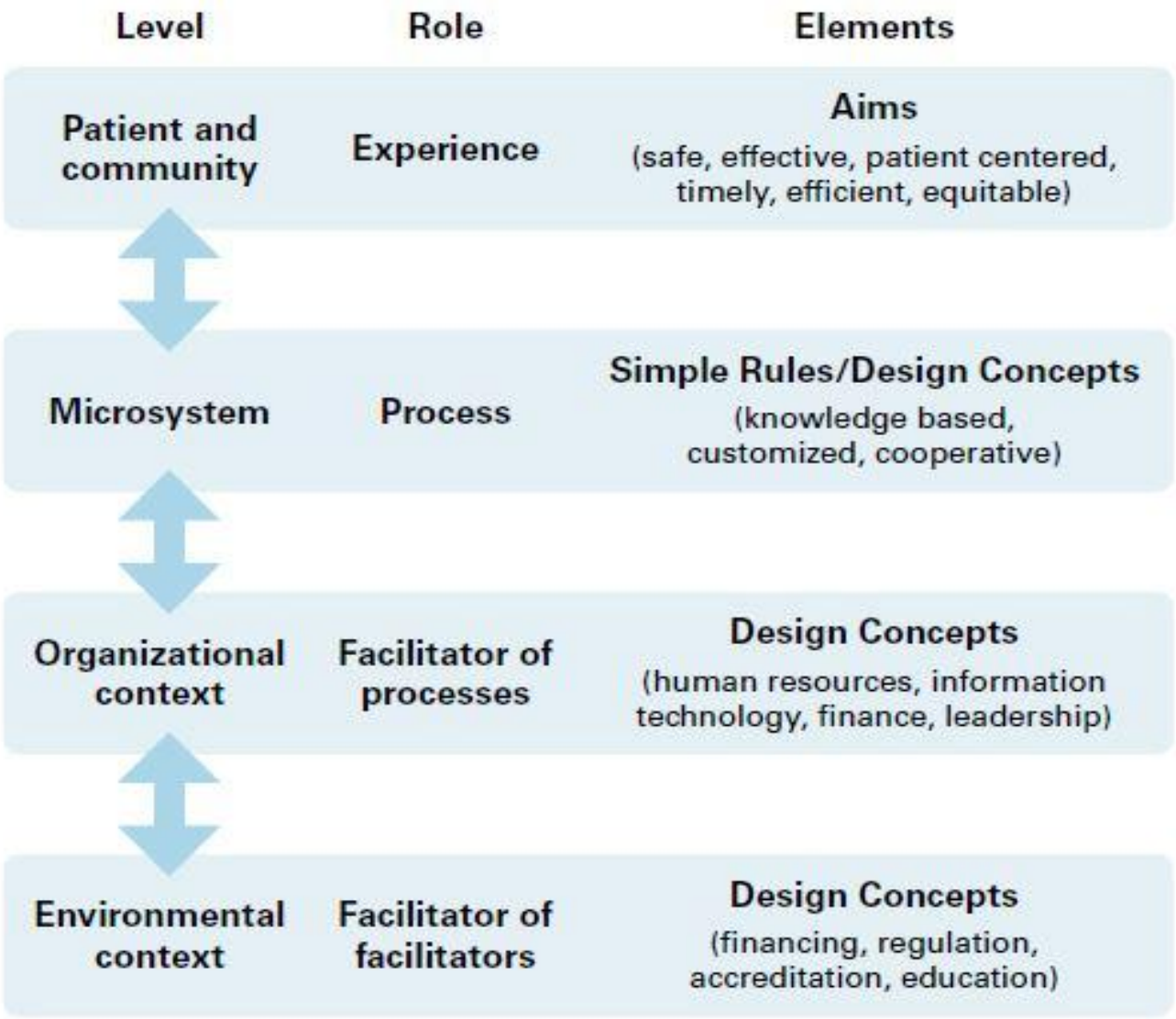
- **Decide – to be extraordinary**
- **Define – (conceptually and operationally) what extraordinary looks like**
- **Design – extraordinary policies and processes**
- **Do – implement the above**
- **Document – measure results, metrics, dashboard**

Fundamental *changes* in culture, people, process, and policies

Next Steps

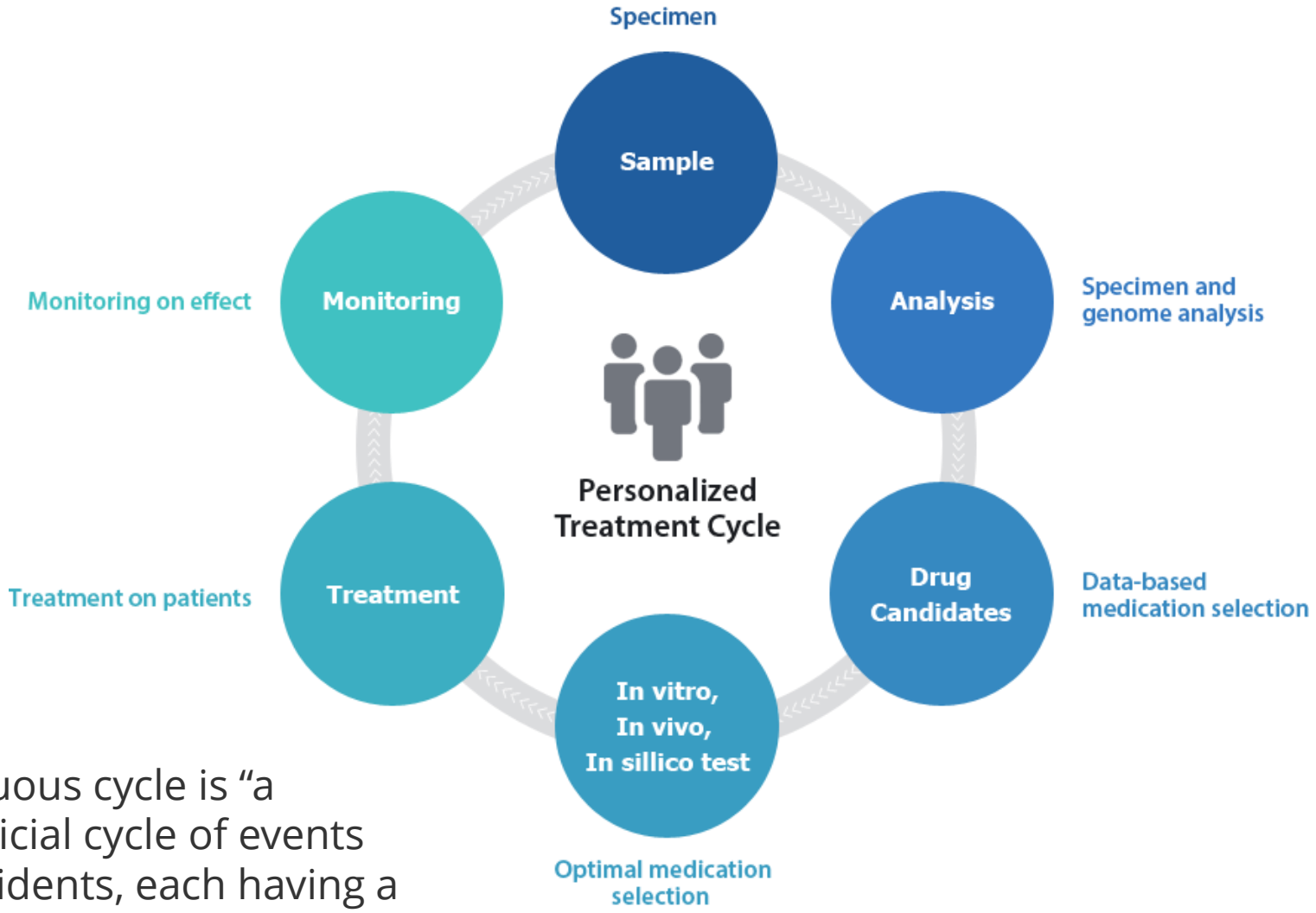
- **Develop and resource a Vaccine Clinic of Excellence in your institution**
  - Pilot programs to identify scalable interventions
  - Develop specialty champions
- **Appoint a Director who is accountable**
- **Develop and agree upon a foundational "Blueprint for Transformation"**
- **Identify and prioritize major goals**
- **Advisory Committee (donors, nurses, allied health, designer, futurist, others)**

Figure. The Chain of Effect in Improving Healthcare[2]



It takes a team

Care of the Future – Virtuous Cycle



A virtuous cycle is “a beneficial cycle of events or incidents, each having a positive effect on

I Believe

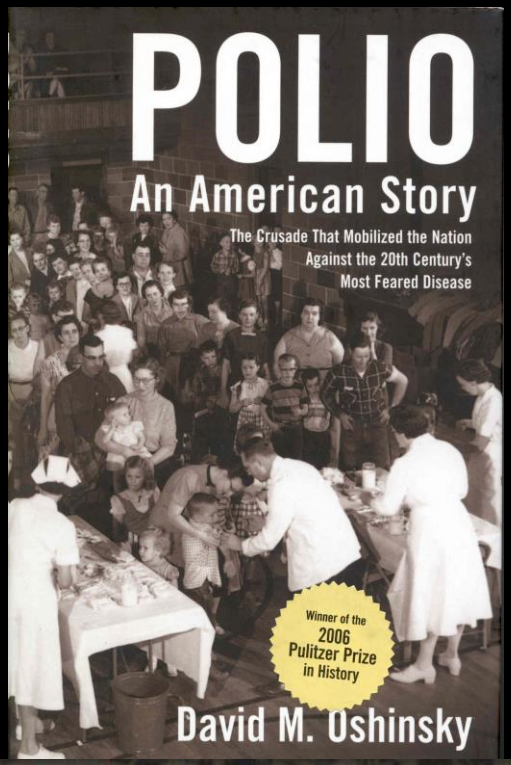
- Entities outside government can, and should, lead the way and create the standard for community-based immunization programs
- The timing, fiscal environment, external environment, demographics, and leadership, are sufficient to the task
- We must articulate a vision, create the environment, create functional collaborations, motivate change, set metrics, measure and report what we do, involve all, and *create virtuous cycles*

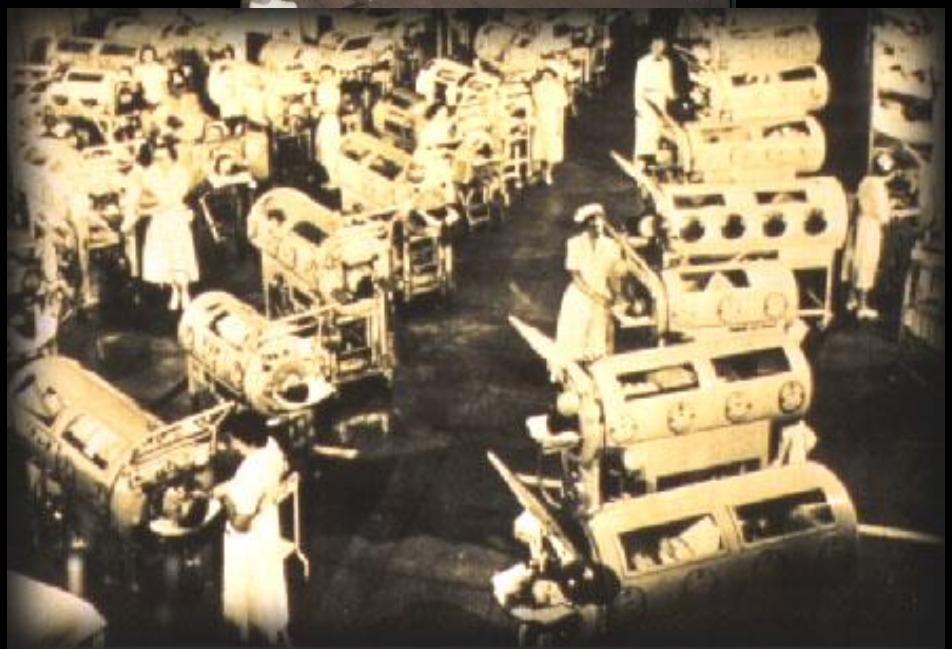
Consider the Alternative…

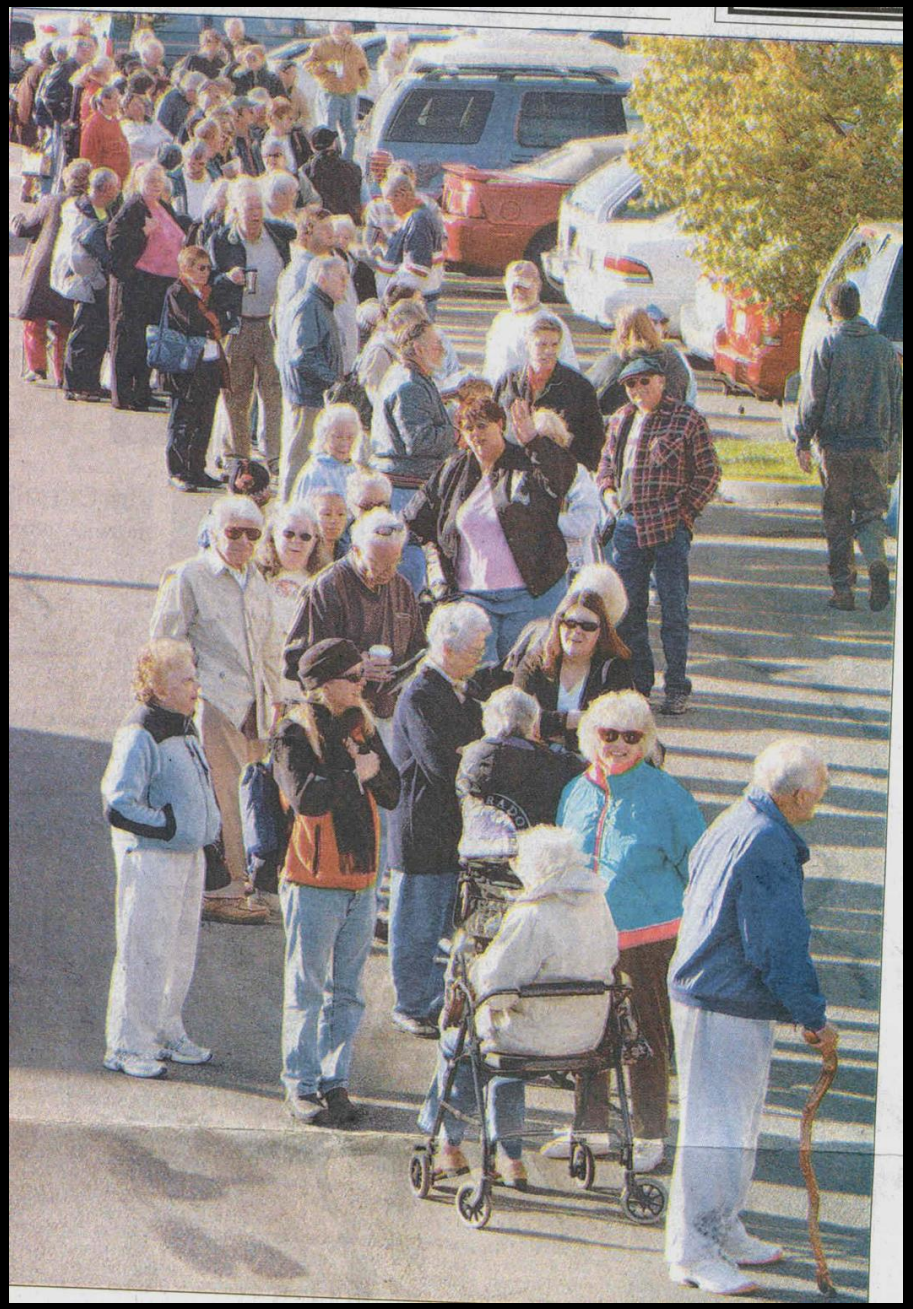
Might it cost too much to *not* be extraordinary?

Step 2

- **Create and build demand!**
  - No sustained progress will be made without this…
- **Greatness begins with *passion* (Jim Collins)**
- **So how are *you* creating demand?**
- **And what motivates *you*?**
- **Mass customization**


POLIO
An American Story
The Crusade That Mobilized the Nation Against the 20th Century's Most Feared Disease
Winner of the 2006 Pulitzer Prize in History
David M. Oshinsky





Step 3: EDUCATE!

- New education methods – educate the public (and providers) about the value of vaccines
- Abandon most current efforts
- Harness *meaningful* media
- Use behavioral research to inform and direct efforts


HPV IS
SEXUALLY
TRANSMITTED
CANCER

39 y/o Single Mom of Three Children

Vaccine 29 (2011) 2227–2228

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Vaccine

journal homepage: www.elsevier.com/locate/vaccine

Editorial

The day that Jack died☆

Jack was likeable enough. A 50 year old male—some would say in the prime of life. Jack was a somewhat thoughtful, friendly, and productive guy. Most everyone liked him. I got to know Jack when he came in for a routine check-up. True, he needed more exercise and less food, but otherwise he was in moderately good health – except for one thing—Jack was a smoker—a habit he started over 30 years ago. Now he was a pack or two a day smoker. I finished the history and exam—nothing unusual discovered. After he dressed I spent some time talking to him about the risks of smoking, and the possible treatment options that could help him stop smoking—if he wanted to. And because it was October, and because I am a vaccinologist, we spent another 15 min discussing influenza vaccine. He thought flu vaccine was only for "old and sick people". I explained that as a smoker, he was in fact at much higher risk for complications due to influenza, and that influenza was a common infection leading to hundreds of thousands of excess hospitalization, and tens of thousands of death each year. As we discussed flu vaccine it became clear that Jack's real reason for refusing flu vaccine was fear. He had "heard" that the vaccine caused the flu and could make you sick. I answered his questions, giving him a quick course in influenza biology. He politely declined and went on his way.

I saw Jack about a week later to go over his lab results. No surprises or concerns. I talked to him again about the importance of annual seasonal influenza vaccination. We covered the same ground—he just did not really believe he was at risk and that flu vaccine was safe. I inquired how he developed those beliefs—had he read the scientific data and come to that conclusion? Of course, he had not. Rather his decisions were informed not by reason or by data, but by an emotional gestalt of sensationalist media, old wives tales, and off-hand unthinking comments by innumerate acquaintances. But importantly, Jack operationalized his decision-making informed by those "data". I saw Jack again about 6 weeks later. He had developed a cough two and a half weeks ago that he could not seem to shake. More important to me was that in the last week it was productive of yellow phlegm that, as Jack put it "sometimes looked rusty." He was febrile and a bit tachypneic on exam. He felt poorly. We got a chest X-ray and CBC. He had an elevated white count, with a marked left shift. His chest X-ray revealed a left middle and lower lobe pneumonia. We collected sputum for culture and started him on an appropriate antibiotic for what was likely post-influenza pneumococcal pneumonia. I got a call from Jack's wife the middle of the next day. Jack had a pretty sleepless night, looked terrible, and now felt short of breath and "hot." I asked her to take Jack to the ER where I would meet him and perform additional tests. By the time I got there a chest X-ray had been performed, CBC and metabolic panel performed, and sputum and blood cultures taken. His chest X-ray looked bad—the pneumonic process now involving most of his left lung with a probable pleural effusion.

He was admitted to the hospital on oxygen and broad spectrum IV antibiotics.

The next 4 days were a whirlwind of tests, more tests, and progressive clinical detioration with ventilatory failure, intubation, more antibiotics, hypotension requiring pressor support, a chest tube draining thick purulent fluid, and then, in the early morning hours, the end-death.

I barely knew Jack's wife or children, except for these last 4 days. Now I had to tell them what I suspect was already known to them. There was nothing more we could do. Despite all the plans for the future, dreams of retirement together, and so very many other spoken and unspoken dreams Jack and his family had together, it was over. Jack's life was over, he was dead.

We take our lives into our own hands. We make good and bad decisions. We make, and sometimes fail to make, decisions at all. Decisions made and unmade, they come back like embedded memories to haunt us, to define us and our futures. That process, in turn, is predestined by our worldview and biases. Jack never really believed in statistics, risks and probabilities. He emotionally valued what he had "heard" about flu vaccine rather than what the data demonstrated or what his physician tried repeatedly to teach him. Like so many, Jack reflexively thought of himself as "the exception". Things like cancer, heart disease, influenza, pneumonia, COPD, and other maladies happened to others, but it was inconceivable that it would not only occur to him, but define him and even the very day his life would end.

Jack belongs to another realm now, but I cannot get Jack, and the many like him, out of my mind. I cannot help thinking that behind Jack's death is a woman lonely, broken, and sobbing—*her* life now re-defined by the consequences of decisions she had no part in making. Behind her are four children lost, fatherless, bewildered. One of them went on to became profoundly depressed. Another is struggling in school and beginning to make some very bad choices. The other two are simply sad. One confesses to often crying in the night when she is alone—sometimes going to department stores just to sniff a bottle of the cologne her father often wore. They all miss him terribly. And I do too. I have reconciled the thought of "is there something else I could have said or done to convince Jack to have gotten immunized" knowing that I gave him all the data and

☆ Jack is a fictional character, with individual elements pulled from across my 30 years of medical practice. Any resemblance to an actual person is coincidental and unintentional.

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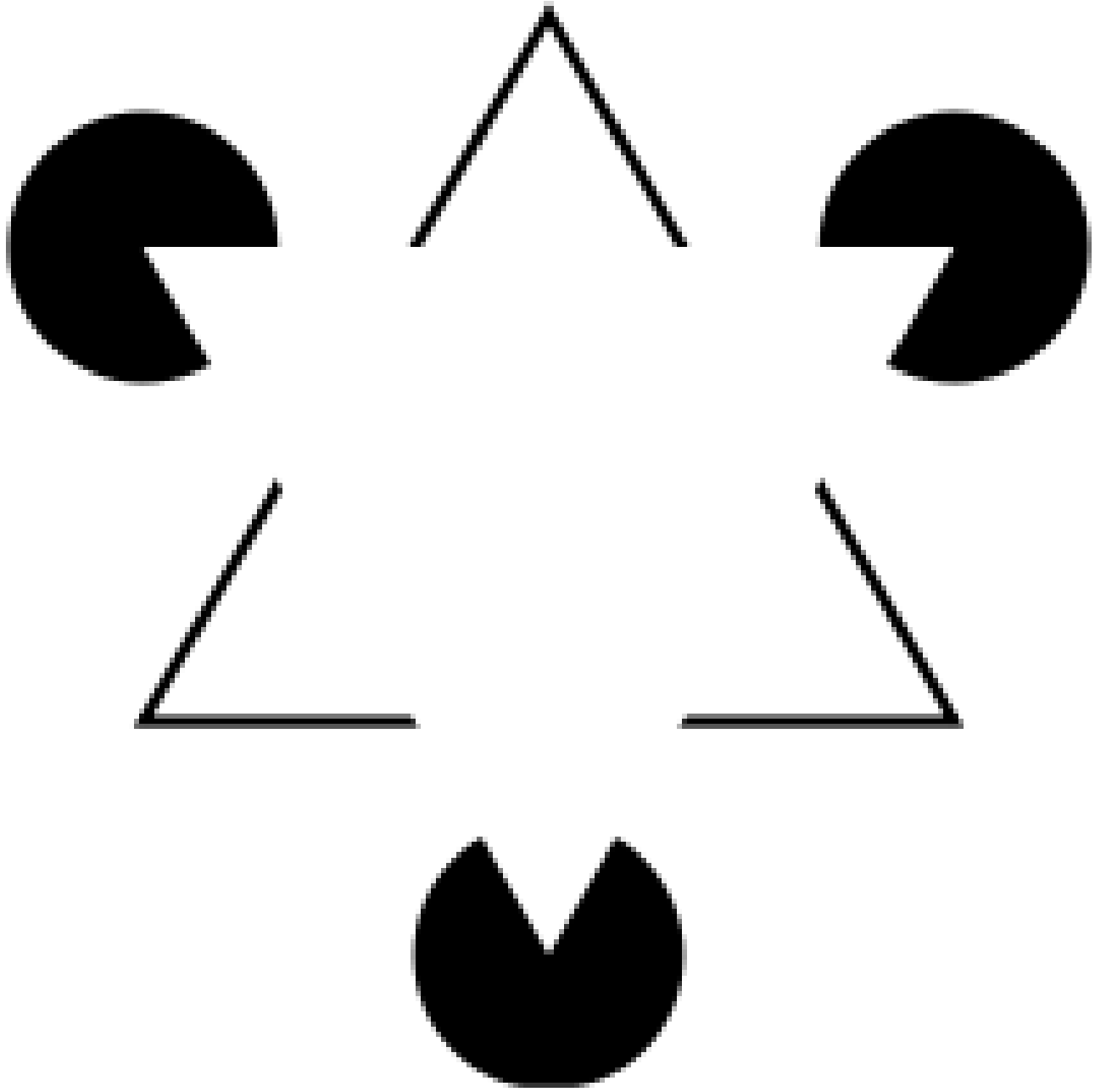
doi:10.1016/j.vaccine.2011.01.045

Poland GA. The day that Jack died. Vaccine 2011;29:2227-2228.

Oh…but we have a problem…cognitive biases…

1
2



What is Steve?

- Steve is a healthy man in his mid-40's who lives in New York City.
- He is described as a quiet, meek, and tidy soul, with a need for order and structure, and a passion for detail. He enjoys reading and indoor activities.
- Steve is:
  - A car salesman
  - A farmer
  - A librarian
  - A physician

Simple Problem

- **Representativeness Heuristic**
- **Your cognitive biases told you this story fits your stereotype of a librarian**
- **You decided to solve the problem you could do, rather than the one you were asked to do**
  - You failed to account for base-line data
- **Your cognitive bias misled you into over-confidence in your intuitive response to the problem**

Behavioral Psychology

- My point is that if I can use behavioral psychology and your innate biases to deliberately mislead you into personally making *errors* in judgment and decision-making…is it possible I could do the opposite?
- Could I use behavioral psychology to lead you into making good choices?
- The data points to a definitive "YES"!

Step 4: Determine What is Important

- **Develop a "priority matrix"**
  - On a single page display the major VPD priorities (which in turn map to priorities, strategies and tactics) for public health
  - Matrix informed by risk, current status, goal, feasibility, "over the horizon threats", etc.
  - This single page becomes the "war plan" which focuses attention, activities, resources
  - Similarly, develop a "doctrine" for how vaccines get deployed and delivered – make assumptions, goals, and tactics explicit and evidenced-based
  - Stress test the matrix and doctrine…

Priority Matrix

- **Relentless focus on priorities (start with the end in mind)**
  - Periodic *outside* review of progress and accountability
  - Progress milestones with incentives/disincentives for reaching/not reaching milestones
  - Consider military model (put someone in charge and give authority) at local, state, and federal levels
  - IT'S A BLUEPRINT!

“Every system is perfectly designed to achieve exactly the results it gets.”

Step 5: Coming Soon – The Future

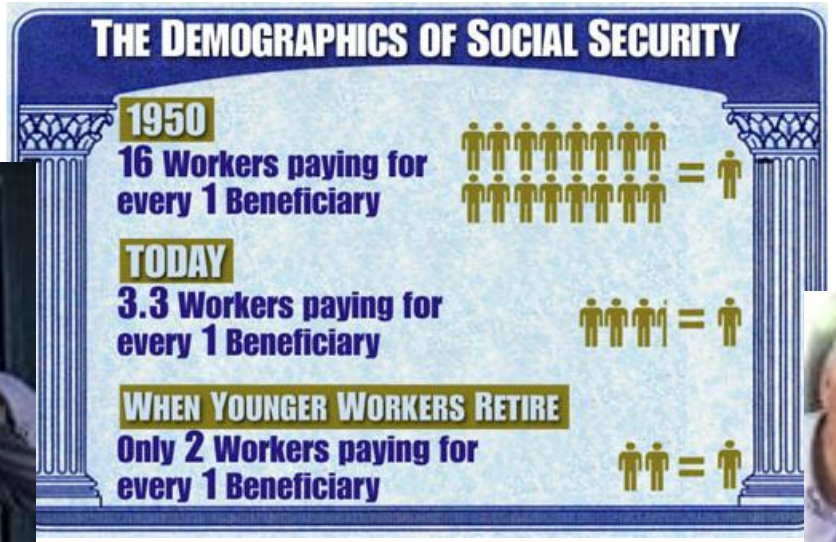
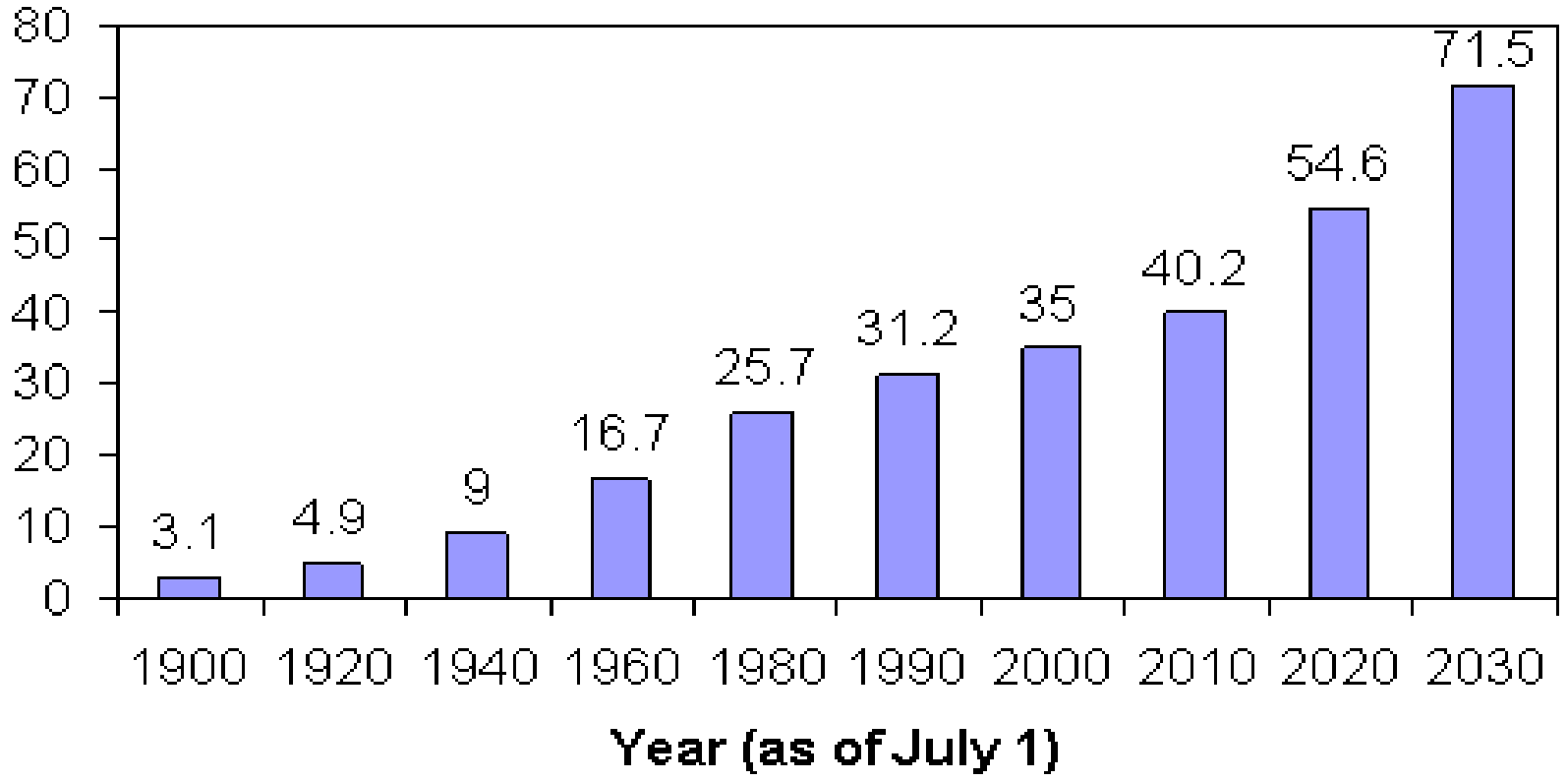
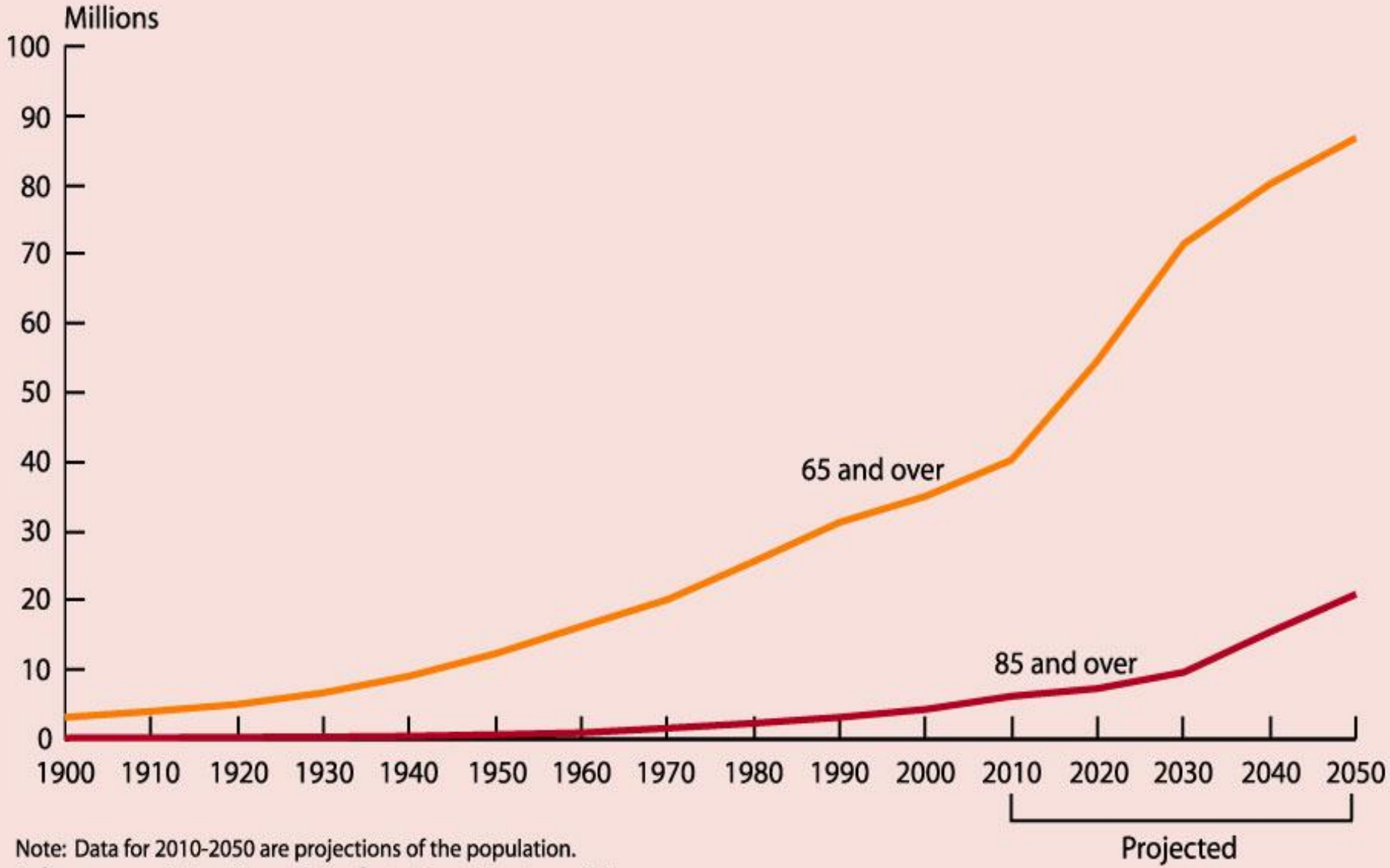


Figure 1: Number of Persons 65+, 1900 - 2030 (numbers in millions)



Source: CDC

Number of people age 65 and over, by age group, selected years 1900-2000 and projected 2010-2050



Note: Data for 2010-2050 are projections of the population.
Reference population: These data refer to the resident population.
Source: U.S. Census Bureau, Decennial Census and Projections.

There are Three Types of People in The World:

1. **Those who can count.**
2. **Those who cannot.**

The Silver Tsunami

- **We had better focus our priorities, time and resources on:**
  - Understanding immunosenescence
  - Designing vaccines against diseases which primarily afflict the elderly
  - Improving vaccine immunogenicity and efficacy in the elderly
  - Funding vaccine *delivery* (even unconventional ways) for all elderly
    - UberHealth
    - Skin patch through the mail
    - Other

Step 6 – New Tools

- **Make *TRANSFORMATION*, not (glacial) creeping incrementalism, the mission and the tool for improving immunization rates**
  - Ask consumers – not bureaucrats
  - Prevent pre-senile innovation dementia
  - Make innovation a metric in accountability
  - There is a science and methodology to innovation and transformation – use it!

The word "innovation" rarely shows up in national immunization plans, and the word "transformation or "transformative" apparently do not exist…

COVID-19 in the US

- **As of Monday, 706,317 deaths**
  - 1:464 people now dead
  - Equivalent to 22 airplanes carrying 400 people crashing and killing all aboard every week for 80 weeks straight
  - US males have lost 2 years of life expectancy – WWII
  - More deaths than due to the 1918 influenza pandemic
  - Approx. 1,900 American die of COVID-19 per day
- **Only 65% of eligible Americans are fully vaccinated against COVID-19**

We learn geology the morning after the earthquake

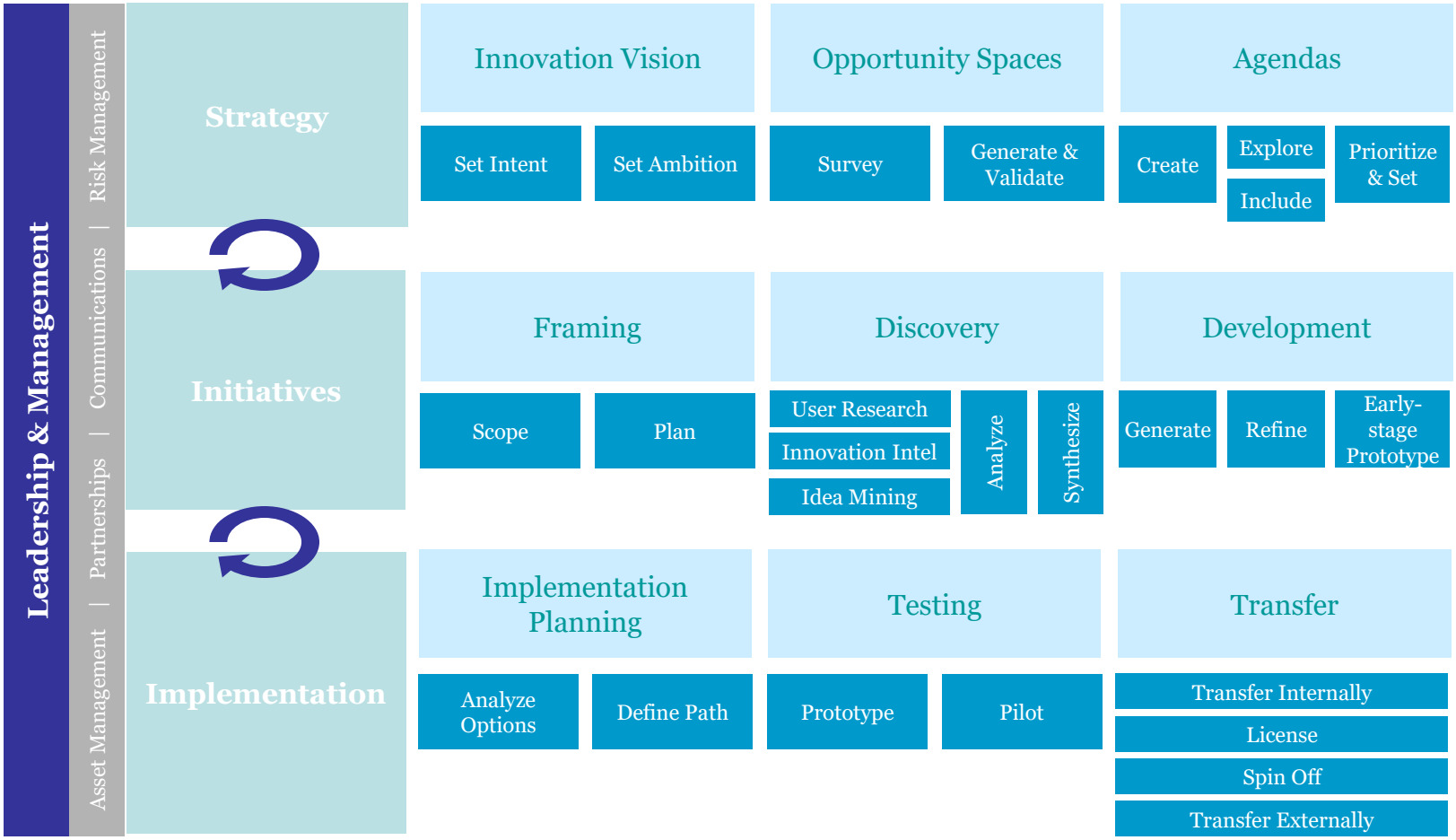
The State of Reality

- **One day we woke up and reality dawned on us:**
  - Stable or even dropping population vaccine coverage rates
  - “Alternative facts”
  - Worldwide vaccine mistrust
  - Health Care Providers shockingly ignorant of vaccine science
  - Populations failed by poorly informed and inadequately motivated governments and health care systems
  - Tremendous dis- and mis-information

We learn from history that men never learn anything from history.”

– George Bernard Shaw

Innovation Methodology



Examples and a Suggestion

- **Entities which achieve transformative changes in their programs/products:**
  - Science: DARPA
  - Electronics: Apple
  - Shoot the Moon: Obayashi Corporation
  - Idea: Public health and Pharma formally partners with academia to design and fund RFP/RFA/BAA's that map to vaccine priority areas that need transformative change

Step 7

- **Learn and utilize the science of motivation, change, and communication**
  - How do people think and make decisions?
  - The power of story…projection…parable
- **Relentlessly rebut and expose dangerous and uninformed opinions for what they are…**
- **Understand cognitive biases and how humans are wired to think and make decisions**

Vaccine 39 (2021) 1547–1550

Contents lists available at ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine

Editorial

Improving COVID-19 vaccine acceptance: Including insights from human decision-making under conditions of uncertainty and human-centered design

"We form our beliefs for a variety of subjective, emotional and psychological reasons in the context of environments created by family, friends, colleagues, culture and society at large. After forming our beliefs, we then defend, justify and rationalize them with a host of intellectual reasons, cogent arguments and rational explanations. Beliefs come first; explanations for beliefs follow." [1]

Poland CM, Matthews AKS, Poland GA. Improving COVID-19 vaccine acceptance: Including insights from human decision-making under conditions of uncertainty and human-centered design. Vaccine. 2021 Mar 12;39(11):1547-1550.

Forming Beliefs

- If beliefs come first, and explanations for beliefs follow later…
- Then why not first try and form beliefs, rather than our current approach – providing data (i.e. providing an explanation for belief) – using new ways of thinking?
- Seat belt and smoking examples

Vaccine 29 (2011) 6145–6148

Contents lists available at ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine

Editorial

Vaccine education spectrum disorder: the importance of incorporating psychological and cognitive models into vaccine education

Caroline M. Poland (M.A., NCC)
Mental Health Counseling Center, Taylor University, Upland, IN, USA

Editor-in-Chief, VACCINE
Gregory A. Poland (MD, MACP)
Mary Lowell Leary Professor of Medicine, Mayo Clinic, Rochester, Minnesota, USA
E-mail addresses: poland.caroline@gmail.com (C.M. Poland), poland.gregory@mayo.edu (G.A. Poland)

What Motivates Us?

- A new meta-narrative: start by creating a change in values, attitudes, and beliefs
- What we have now: “A legion of small narratives that compete with each other, rather than the grand meta-narrative of reason. Eventually small narratives compete, and grow into larger agendas that control.” (W. Hoffman)

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—Tom Peters, author of *In Search of Excellence*

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Daniel H. Pink

author of the *New York Times* bestseller
Whole New Mind

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5 CDs • Unabridged

DRIVE

The Surprising Truth About What Motivates Us

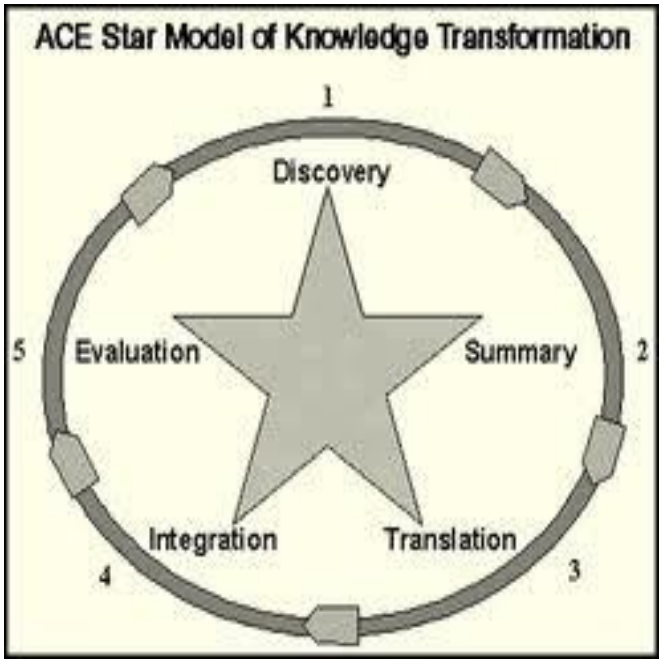
How We Think

- "The clearest way to see through a culture is to attend to its tools for conversation…our languages are our media. Our media are our metaphors. Our metaphors create the content of our culture."
- Point: We need new tools, new languages, new media, and new metaphors!

Postman, Neil. Amusing Ourselves to Death. NY, 1985

Step 8

- **Build 21st century transformation teams**
  - **Designers**
  - **Sociologists**
  - **Cultural anthropologists**
  - **Behavioral psychologists**
  - Risk communication
  - Communication experts
  - Social media and social marketing experts



Vaccine 33 (2015) 277–279

Contents lists available at ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine

Commentary

The need for a multi-disciplinary perspective on vaccine hesitancy and acceptance

Caroline M. Poland[a,*], Emily K. Brunson[b,1]

[a] Taylor University Counseling Center, 236 W. Reade Ave, Upland, IN 46989, USA
[b] Department of Anthropology, Texas State University, 601 University Dr., San Marcos, TX 78666, USA

Poland CM and Brunson EK. Vaccine 2015;33:277-279

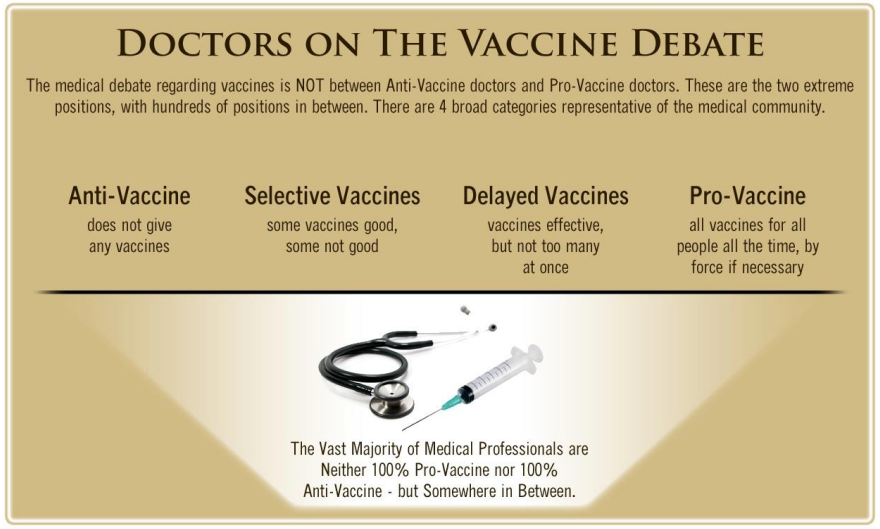
Immunized….Or Not?

- **People get vaccines for three reasons:**
  - Fear
  - Bandwagoning
  - Required/coercion

What can we learn from this and how should it inform our efforts?

Step 9

- **Change the culture of adult health care and vaccines**
  - Insure HCP vaccine competency and compliance
  - HCP vaccine requirements
  - Medical, nursing, dentistry, podiatric, pharmacy, other health field curricula
  - Board exams
  - CME
  - Recertification exams
  - Bench-marking norms



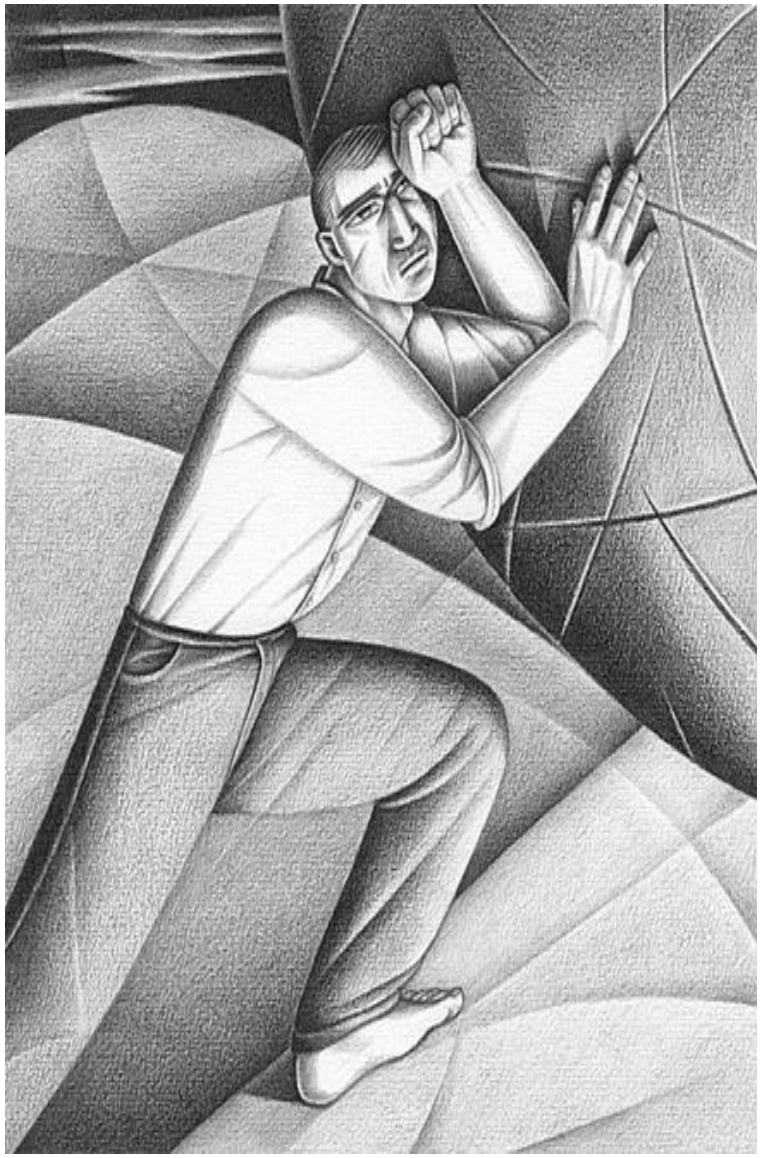
GAO Report – 26 Years Ago!

"Efforts to improve *health care providers' compliance* with adult immunization guidelines are more promising than attempts to influence consumers' knowledge and attitudes"

GAO Report: Immunization 1995

Don’t shoot the one pointing to the target…

Step 10: Fight the War of Misinformation



Cultural Context

- Risk intolerant
- Information-rich, knowledge-poor, but viral communication
- Anti-authority/conspiracy stance toward government, public health, pharma, healthcare, etc.
- Failure of public health and health systems to educate and create a meta-narrative of vaccine value
- Media- and eminence-based rather than evidence-based
- One size fits all approach

Background

- **A story of the co-collusion of belligerents**
  - Anti-vaccine groups
  - Uncritical media
  - Unscrupulous physicians/scientists/chiropractors/naturopaths
- **A story of contrasting values and worldviews**
- **A belief that science is a democracy**
- **A fundamental communication and belief divide between the hesitant and science**

Culture Wars

Two or more defined groups with differing pre-suppositions, differing values, using different data, interpreted through different worldviews, and leading to diametrically opposed outcomes.

The Starting Point

The science of vaccinology, like all science, has uncertainties; applying science in policy entails value judgments, and people can disagree on the implications of scientific evidence.

A History of Shared Arguments

- **From Jenner to today, vaccine objections have included the following shared concerns:**
  - Vaccines cause life-threatening disorders
  - Vaccines have highly toxic constituents
  - Vaccines fail to impart durable immunity, unlike “natural” diseases
  - (More recent) – Vaccines cause autoimmunity, infertility, or include government trackers (nanobots, microchips, etc.)

The NEW ENGLAND JOURNAL of MEDICINE

Perspective

The Age-Old Struggle against the Antivaccinationists

Gregory A. Poland, M.D., and Robert M. Jacobson, M.D.

N Engl J Med 2011; 364:97-99 | January 13, 2011

“Those who fail to learn the lessons of history are doomed to repeat them.”

George Santayana, 1923

Reality

- **Individuals get vaccines for these reasons only:**
  - Fear
  - Bandwagoning*
  - Coercion

**vaccine uptake is heavily dependent upon the sense that those around you, whom you respect, are also taking vaccines…"*

Streefland, et al. Soc Sci Med 1999;49:1705-06

Epistemology

- Science as a way of knowing has a long history of methodologic rigor, peer review, and demonstrated generalizability, repeatability, and efficacy.
- Vaccine deniers who reject science must demonstrate an approach that is more rigorous than the approach they reject.
- Simply rejecting science cannot provide a supportable, reasoned, or sustained basis for public health decisions.
- Such efforts to simply reject science cannot stand on their own and must borrow intellectual capital from the scientific method.

Public Trust

- Absolute transparency of the scientific foundation for public health policy is essential for sustaining trust.
- The evidence base is necessarily incomplete – therefore values and tradeoffs must be made.
- Science is complex, evidence sometimes conflicting, and absolute certainty elusive.
- Transparent presentation of the science is imperative to sustain public confidence.

VIEWPOINT

Preserving Civility in Vaccine Policy Discourse
A Way Forward

Gregory A. Poland, MD
Mayo Vaccine Research Group, Mayo Clinic, Rochester, Minnesota; and Division of General Internal Medicine, Mayo Clinic, Rochester, Minnesota.

Jon C. Tilburt, MD
Division of General Internal Medicine, Mayo Clinic, Rochester, Minnesota; and Biomedical Ethics Research Program, Mayo Clinic, Rochester, Minnesota.

Edgar K. Marcuse, MD
Department of Pediatrics, University of Washington, Seattle.

Vaccine policy-making meetings, advisory committees, and legislative hearings at the local, state, and national levels have become increasingly uncivil. Many who object to vaccines have resorted to shouting, threats, and other disruptive behaviors.[1] These behaviors erode the premise of civil society and undermine the goals of most vaccine-hesitant persons, who are thoughtful and law abiding. Civil skepticism in public discussions about vaccine policy can lead to productive discussion. The science of vaccinology, like all science, has uncertainties; applying science in policy entails value judgments, and people can disagree on the implications of scientific evidence. Skepticism reminds all individuals that intellectual humility is important and reinforces the value of democratic debate and transparent procedure.

Good Public Health Policy

Good public health vaccine policy results from the interaction between science and values. Good science is the foundation for good policy. But science is complex, the evidence is sometimes conflicting, and

Science as a way of knowing benefits from a long history of methodologic rigor, peer review, and demonstrated generalizability, repeatability, and efficacy. Vocal vaccine deniers who reject science should propose an approach that is more rigorous than the approach they reject. Absent this, simply rejecting science cannot provide a supportable, reasoned, or sustained basis for public health decisions. Such efforts to simply reject science cannot stand on their own and must borrow intellectual capital from the scientific method.

Lost in the disruptive, uncivil behavior are the voices of concerned citizens who responsibly participate in the policy-making process. When Mr John Salamone shared with members of the Centers for Disease Control and Prevention's Advisory Committee on Immunization Practices the story of his son who experienced a rare vaccine-associated paralytic polio (VAPP) adverse event, vaccine policy makers took note and changed course (John Salamone; personal communication; April 25, 2019). Although 1 in 4 million persons develop VAPP due to oral polio vaccine, this

Poland GA, et al. Preserving Civility in Vaccine Policy Discourse: A Way Forward. JAMA 2019 Jul 16;322(3):209-210.

Principled Pluralism

- **Principled pluralism asserts the following:**

  (1) There is no "neutral" scientific ground, knowing about vaccine risk/benefit is through measurement and the scientific method;

  (2) Individuals with different views must be respected;

  (3) Civil and responsible dialogue regarding evidence and values is the best way to integrate society's values

Principled Pluralism

- **Principled pluralism asserts the following:**

  (4) Public health authorities have a responsibility to balance their authority to protect public health and individual freedom

  (5) The elements of "just policy" must be central and inviolable in establishing public health policy

Summary

- **Next steps in countering vaccine hesitancy and anti-vaccine thinking?**
  - The power of *story and parable* in creating and framing metanarratives
  - The inability of public health leaders to counter the above…
  - The lack of civil discussion and consensus
  - Failure to develop and implement ways forward such as “Principled Pluralism”

Next Steps

- What About Steps 11 and 12?

Two Rules For Success:

1. Never tell everything you know.

In The Final Analysis

- Science must move forward
- Truth must be told
- The right things must be done
- Lives must be protected (public health)
- Decisions must be made
- Action must be taken

The Future

- **Individualized vaccinology in the 21st century**
  - Radically informed by the results of clinical and systems-based research
  - Focused on research-derived “signatures”
  - Superior clinical outcomes with higher benefit-risk ratios
  - Involves
    - Cultural anthropologists
    - Cognitive psychologists
    - Designers
    - Others

Summary

- Develop a priority matrix…
- Use the tools of innovation and transformation…
- Communicated as *story* and *parables*…
- Developed by 21st century teams…
- Who have aligned champions…
- And developed a new meta-narrative…that creates demand politically, psychologically, socially, economically, emotively…
- That results in near universal vaccine coverage!

Thank-you!

poland.gregory@mayo.edu