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Medicines, Markets and the Flash Mob:

Issues and Implications for Tomorrow's Biopharma Enterprise

SLA Pharma Health Tech Meeting

Baltimore, MD

June 9, 2018

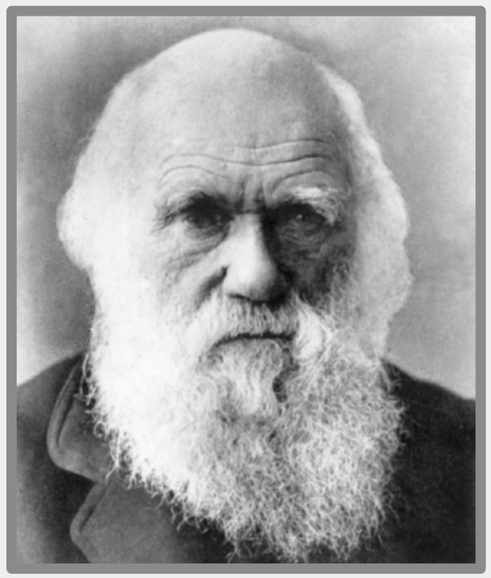
Today’s Messages

Medicines
…Put a Ring on It

Markets
…Just Meh

The Flash Mob
…That “Blue Ocean” Strategy?
Forget it!

Biopharma Today: Evolution or Revolution?



THE CHOICE

?

- Health care is messy and institutionalized
- High barriers to entry: a risky, public good
- Innovation: a partnering series of cumulative steps
- Will pharma retain its capacity to adapt – at its own historically leisurely pace?

- Efficiency gains from BIG DATA
- Serial disrupter: Amazon is a ”loss leader” taking out retail segments with full price transparency
- Exploitable gaps in Rx distribution – mail order and cash pay generics
- Challenge: health care is built on silo third-party transactions –alignment on incentives?

Our 2018 Predictions…So Far

M&A is Back on the Table

Federal Legislation: A Mixed Bag for Pharma

Trump's Pharma Policy: Still No Medicare Price Negotiations

Working with a Re-Energized FDA

Payers Get Serious: Define and Deliver Value

Manage a Controlled Rollout for Advanced Therapies

Threats to US Lead in World-Class Drug Innovation

Trump's Teflon Tweets: Pharma Discovers it Doesn't Stick

Pharma Faces the Fiscal Cliff: Gross US Federal Debt 2018-2028

DRUG	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
DEBT Trillions $	21.4	22.5	23.7	24.9	26.2	27.5	28.7	30.0	31.4	32.5	33.9
DEBT % GDP	78.0	79.3	80.9	83.1	85.7	87.9	89.6	91.5	93.1	94.5	96.2

“The federal debt is projected to approach 100 per cent of GDP by 2028 –

the percentage would be the largest since 1946 and well more than twice the average over the past five decades, raising the likelihood of a federal fiscal crisis.”

Source: CBO, April 2018

Projected Mandatory Federal Health Outlays 2018-2028
(Billions of $)

DRUG	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Medicare	**707**	**776**	**830**	**893**	**996**	**1032**	**1062**	**1181**	**1267**	**1358**	**1521**
Medicaid	**383**	**401**	**417**	**437**	**465**	**493**	**524**	**554**	**587**	**620**	**655**

“An aging population and rising health costs per beneficiary will push Medicare outlays up by more than 115 per cent to 2028 – but interest payments on the federal debt will grow more quickly than any other component of federal spending between now and then.”

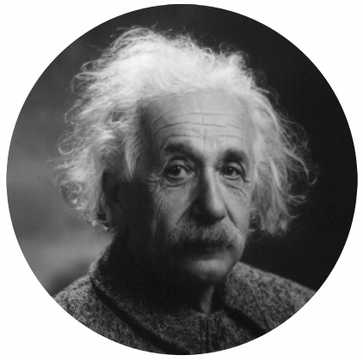
Source: CBO, April 2018

Reputation: Biopharma's Black Box

From the Ridiculous… to the Sublime?

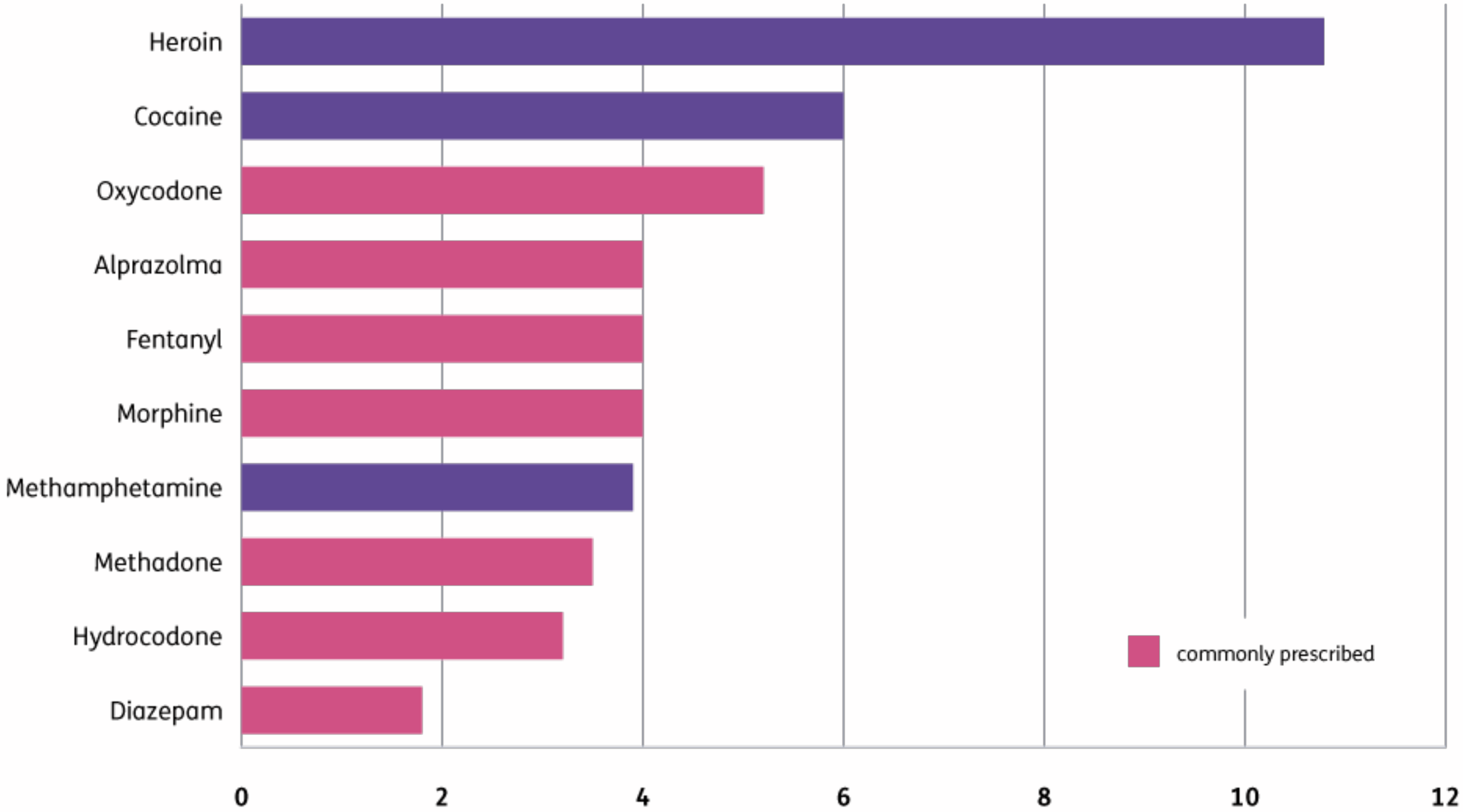
Social Media and the CEO Brand – it's Personal

…and a Few Wild Cards



Top 10 Drugs Involved In US Drug Overdose Deaths

Number of deaths, 2014 (‘000)



Sources: CDC, Institute for Medicine Innovation

Compliance: Pharma's Soft Underbelly

Federal and state governments on track to secure $1 billion+ in penalties for false product claims from pharma this year

- $17.5 billion in cumulative penalties against the major pharma firms since 2009

Just a "cost of doing business?"

- Pharma companies have dominated investigations under the False Claims Act for the past decade
- Doubling of penalties for fraud violations enacted by Congress in 2016

Corporate Integrity Agreements (CIA) in place in most of big pharma

- CIA gives effective veto power to DOJ and HHS over marketing, promotion and rebate practices

Competitive one-upmanship

- Sanofi blows whistle against Mylan on EpiPen and takes home $40 million of $465 million penalty

New target areas for DOJ

- Anti-trust impacts – (Shire vs. Allergan) (Pfizer vs. J&J)
- Patient assistance programs and charities that administer them

False Claims Act Settlements: Pharma Industry 2009 – 2017

COMPANY	PENALTY	CATEGORY	YEAR
Pfizer	$2.3 B	Off-Label/Kickbacks	2009
Eli Lilly	$1.4 B	Kickbacks	2009
GSK	$750 M	Adulterated Drugs	2010
Allergan	$ 600 M	Off-Label	2010
AstraZeneca	$520 M	Off-Label	2010
Novartis	$425 M	Off-Label/Kickbacks	2010
GSK	$3.0 B	Off-Label/Kickbacks *	2012
Abbott	$1.5 B	Off-Label *	2012
Merck & Co.	$963 M	Off-Label *	2012
Amgen	$762 M	False Pricing *	2012
Sanofi/Genzyme	$109 M	Kickbacks	2012
J&J	$2.2 B	Off-Label/Kickbacks *	2013
Ranbaxy	$508 M	Manufacturing	2013
Pfizer (Wyeth)	$495 M	Off-Label/Illegal Promotion	2013
Novartis	$410 M	Kickbacks *	2016
Pfizer	$785 M	Medicaid pricing *	2016
Galena Biopharma	$8 M	Kickbacks (opioids)	2017
Mylan	$465 M	Medicaid pricing *	2017
Shire	$350 M	Kickbacks (med device)	2017
Novo-Nordisk	$58 M	REMS compliance	2017

*Corporate Integrity Agreement

Source: US Department of Justice

Transition Time: US Drug Patent Expirations, 2017-2020

2017

Brand Name	Company
Alimta	Eli Lilly
Sandostatin	Novartis
Evista	Eli Lilly
Geodon [injection]	Pfizer
Somavert	GSK
Iressa	AstraZeneca
Arcoxia	Merck & Co.
Humira	AbbVie
Relpax	Pfizer
Cialis	Eli Lilly
Prolia	Amgen

2018

Brand Name	Company
Nasonex	Merck & Co.
Apidra	Sanofi
Caduet	Pfizer
Revlimid	Novartis
Torisel	Pfizer
Lyrica	Pfizer

2019

Brand Name	Company
Gilenya	Novartis
RotaTeq	Merck & Co.
Gazyva	Roche
Blincyto	Amgen
Avelox	Bayer
Brilique	AstraZeneca

2020

Brand Name	Company
Calcijex	AbbVie
Simulect	Novartis
Afinitor	Novartis
Nplate	Amgen
Tykerb	GSK
Cubicin	Merck & Co.
Intelence	J&J
Xarelto	J&J
Xeljanz	Pfizer

Burden of Disease, US, 2017

Obesity 80 million	**Osteoarthritis** 70 million	**Respiratory** 55 million	**Chronic Pain** 50 million	**Back Pain** 45 million	
Diabetes (type 2) 25 million	**Depression** 20 million	**Incontinence** 20 million	**Coronary Heart Disease** 15 million	**Cancer** 15 million	**Cardiac Arrhythmias** 15 million
Peripheral Vascular Disease 10 million	**Stroke** 5 million	**Dementia** 5 million	**Heart Failure** 5 million	**Chronic Wound** 4 million	**Renal Disease** 2.5 million
Structural Heart Disease 2 million	**Aneurysm** 2 million	**Diabetes** (type 1) 1.5 million	**Epilepsy/ Movement Disorder** 1 million	**Deafness** 1 million	**Blindness** 1 million

Sources: CDC, Jefferies LLC

Strong Science is Delivering on New Therapies

FDA approves 15 novel drugs so far this year vs. 21 in 2017

- Focus continues on high unmet need
- Four drugs with Orphan status – rare hematology conditions
- Only three specifically indicated for cancer
- First in new class of migraine drugs that fight pain before it starts
- Newest advanced opioid withdrawal treatment
- Two HIV options for hard to treat patients
- **Better mechanisms of action:**
  greater therapeutic effect at lower doses
  = fewer side effects

Future of innovative drug approvals looks equally strong

- NDA's average more than 13 per month for last 4 years

2018 FDA Novel Drug Approvals

DRUG	COMPANY	REVIEW DESIGNATION	PRIORITY STATUS
Lutathera	Advanced Accelerator App.	Gastro-enteropancreatic cancer	Priority review, **Orphan**
Biktarvy	Gilead Sciences	HIV first treatment or replacement	
Symdeko	Vertex Pharmaceuticals	Cystic fibrosis	Accelerated Approval, **Orphan**
Erleada	Janssen Pharmaceuticals	Prostate cancer	Priority review
Trogarzo	TaiMed Biologics	HIV for patients with limited options	Breakthrough, Fast-Track, Priority review, **Orphan**
Ilumya	Merck & Co.	Plaque psoriasis	
Tavalisse	Rigel Pharmaceuticals	Chronic immune thrombocytopenia	
Crysvita	Ultragenyx Pharmaceuticals	X-linked hypophosphatemia (rickets)	Breakthrough**, Orphan**, Rare Pediatric Voucher
Akynzeo	Helssin Pharmaceuticals	Emotegenic cancer chemotherapy IV	
Lucemyra	US WorldMeds	Opioid withdrawal	Fast-Track, Priority review
Aimovig	Amgen	Migraine headache	
Doptelet	AkA Rx	Chronic liver disease bleeds	Priority review
Lokelma	AstraZeneca Pharmaceuticals	Treatment of hyperkalaemia	
Palynziq	BioMarin Pharmaceuticals	Rare genetic disease phenylketonuria	
Olumiant	Eli Lilly & Co.	Moderate to severe rheumatoid arthritis	

FDA's Forward Moves on Drug Price and Access

- **Drug Competition Action Plan**

  Gottlieb's strategy to cut drug shortages and promote competitive pricing

  Patient Access is a "public health" (and FDA) priority

  Guidance on speeding review of complex generics

- **Backlog of ANDA's gets smaller – 2017 record year for approvals – 927**

- **Yes to 80 "first-time" generics for high-profile branded drugs - another record**

- **Accelerated action on Biosimilars – 11 approved to date**

- **Follow-up to joint public hearing on drug competition with FTC November 2017**

- **Modernization plan for CDER to speed drug time to market**

- **REMS program changes to bar its use to delay generic entry**

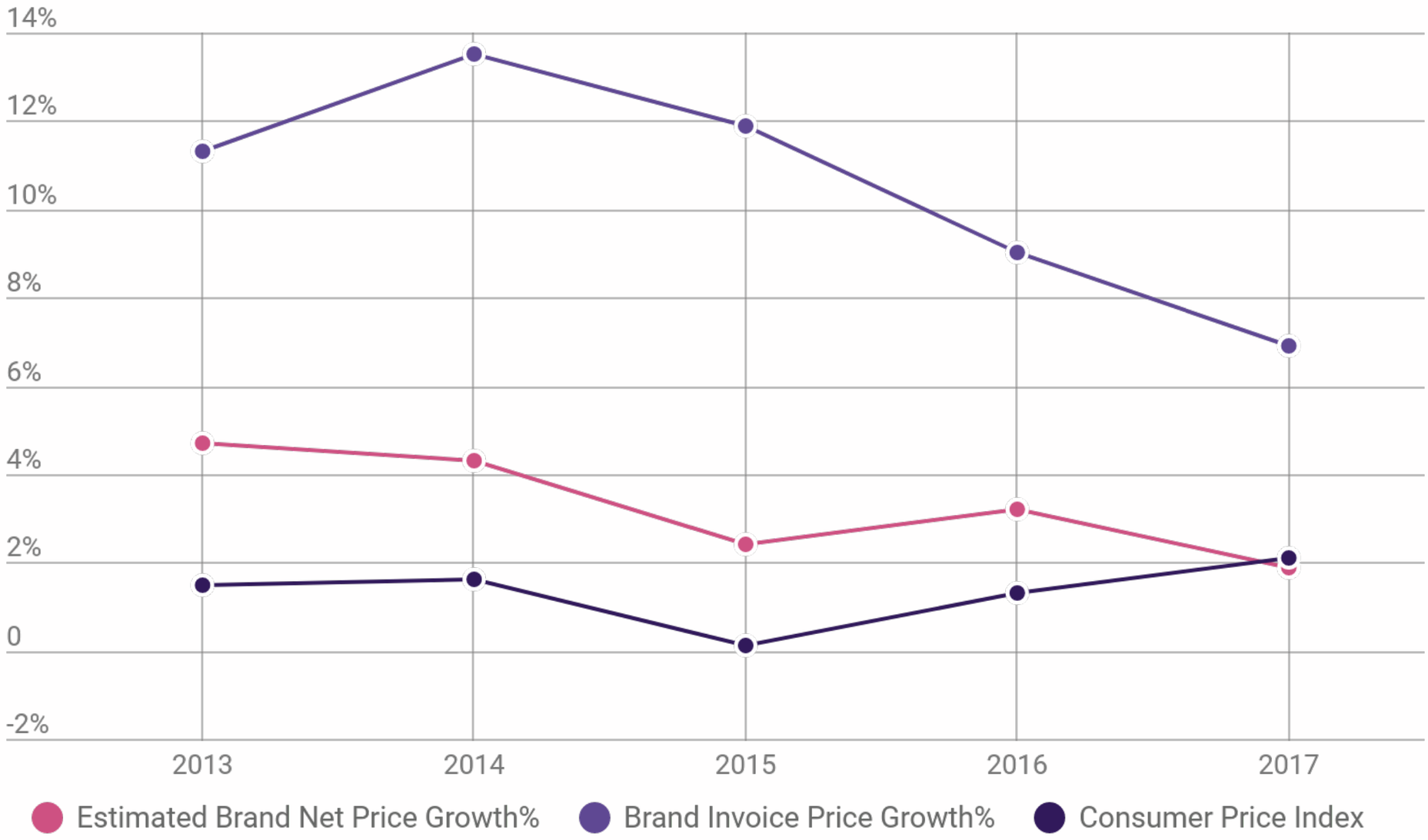
Declining Period of Market Exclusivity for New Pharmaceuticals

First-in-class approval period	Small Molecule (mean length)	Large Molecule (mean length)
1998 - 2004	5.5 years	4.0 years
2005 - 2011	2.5 years	2.2 years

Time from first-in-class approval to second entrant by molecule size, in 16 therapeutic classes, 1998 to 2004 compared to 2005 to 2011

Source: Tufts Center for the Study of Drug Development, Clinical Pharmacology and Therapeutics, December 2016

Fake News? Brand net prices increased by 1.9% on average in 2017, now lower than inflation

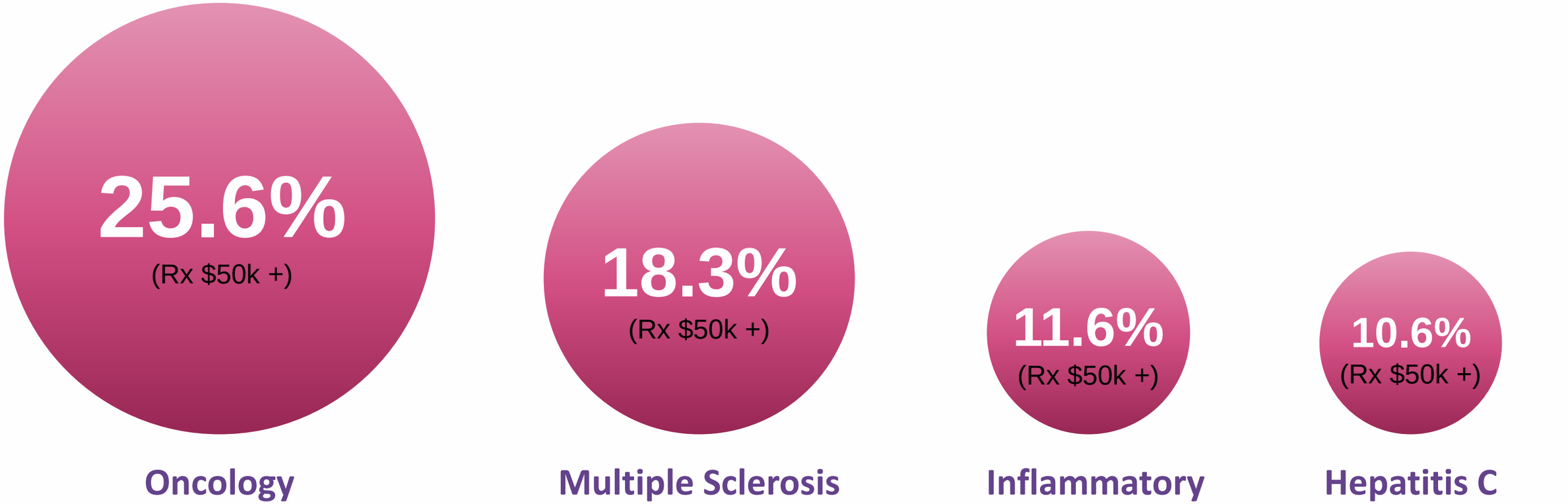


Source: Morgan Stanley

Drug Costs: The Super Spending Patient

- **0.3% of Express Scripts members had annual Rx costs greater than $50k in 2016, a 35% increase from 2014**
- **Extrapolating to the U.S. population overall, an estimated 870,000 Americans accounted for $80 billion of 2016 U.S. pharmacy spend.**

ESRX Members with 2016 Rx Spend of $50k or more, by Disease



National Catastrophic Claims Conditions – Top 10

Sun Life Stop-Loss Claims Reimbursements Provided to Policy Holders 2013-2016

RANK	MEDICAL CONDITION	VALUE OF STOP-LOSS CLAIMS REIMBURSEMENTS 2013-2016	% OF TOTAL STOP-LOSS CLAIMS REIMBURSEMENTS 2013-2016	% EMPLOYERS WITH AT LEAST ONE STOP-LOSS CLAIM FOR THIS CONDITITON
1	Malignant Neoplasm (cancer)	$487.4 M	18.4%	48.7 %
2	Leukemia/lymphoma/multiple myeloma (cancer)	$219.2 M	8.3 %	17.6 %
3	Chronic/end-stage renal disease	$148.3 M	5.6 %	16.4 %
4	Congenital anomalies (at birth)	$108.9 M	4.1 %	10.8 %
5	Transplants	$ 81.6 M	3.1 %	6.9 %
6	Gestation and low birth weight disorders (premature)	$75.9 M	2.9 %	7.0 %
7	Septicemia (infection)	$62.9 M.	2.6 %	9.9 %
8	Surgery/medical complications	$62.9 M	2.4 %	13.5 %
9	Cerebrovascular disease	$58.8 M	2.2 %	10.9 %
10	Pulmonary collapse and respiratory failure	$57.4 M	2.2 %	10.6 %
TOTAL TOP 10		**$1.4 B**	**51.7 %**	**70.0 %**

Sources: Sun Life Stop-Loss Research Report, June 2017

Employer Cost Exposures: Sunlife's Million $ Claimants

EMPLOYEE CLAIMANTS WITH $ 1 MILLION + CLAIMS				
	2013	**2014**	**2015**	**2016**
$1 – 1.5 M	71	80	107	130
$1.5 – 2 M	17	13	25	39
$2 – 3 M	20	10	16	16
$3 M +	6	1	5	7
Total	**114**	**104**	**153**	**192**
% of total claimants	1.9	1.7	1.9	2.2
Paid Stop-Loss Claims	$129.8 M	$83.5 M	$146.3 M	$192.5 M
% of total paid Stop-Loss claims	23.6	15.3	20.3	23.2

Million dollar claimants increased 26 % during period 2013-2016 compared to the previous three years.
The group represented only 2.2 % of claimants but 23 % of all Stop-Loss claims reimbursements.

Source: Sun Life Stop-Loss Research Report, June 2017

New Access Realities: Long Slog to the Patient

First Question after Proof of Concept: *Who is Your Customer and How Will You Get Paid?*

1. **The PBM Formulary Fight**
   - Three PBMs – ES, CVS and UHC – control Rx access to 80 % of US commercial insured population
   - Listing and placement in a tiered formulary system is critical to market success

2. **Integrated Delivery Networks – New Face of Health Provision**
   - IDNs are key influencers of clinical decisions – the practice guideline gatekeepers
   - 80 % of hospitals and 65% of physicians operate through IDNs
   - Business model favors interventions with long-term patient impact

3. **Value Assessment: From “Nice” to Have to “Must” Have**
   - ICER’s deal with the Veteran’s Administration

4. **The Patient as Customer: Who Owns the Patient?**
   - Cost-sharing on drug benefit is rising – 15 % of pharmacy transactions are zero reimbursed
   - Scrip fulfillment and persistency is a challenge requiring more spend on support **services**

Drug Launch Cycle: The Biogen *Spinraza* Template

Spinal Muscular Atrophy (SMA)

- A disabling and usually fatal disease with few options for patients

Spinraza (nusinersen)

- Early FDA approval with high proof of efficacy, first-in-class and a broad label
- Slows SMA progression with improved Q-of-L for 9,000 US patient cohort, from infants to adults

Challenges to Market Uptake

- High pricing for a maintenance therapy
- Three distinct SMA genotypes requiring variations in treatment protocol and reimbursement
- Complex delivery in a monitored sequence of spinal injections at 145 specified sites
- Significant early government role in paying for SMA – 2/3rd of patients receive Medicaid

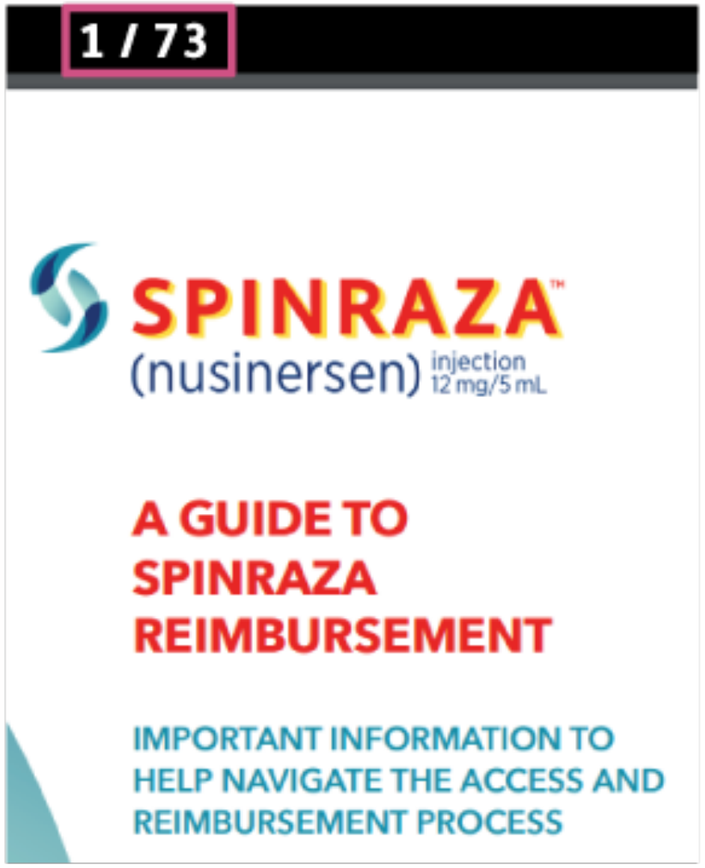
A Strong Launch – But Exclusivity is Becoming Harder to Defend

- Early consultation with regulators, payers, motivated patient advocates and **Providers**
- Communication to payers on ongoing positive trial data – CHERISH
- Subsidies to increase access to patients – 20+% of post-launch script provided free
- Big-Time Competitors on the way - **Novartis** buys biotech *AveXis* and its one-shot gene therapy

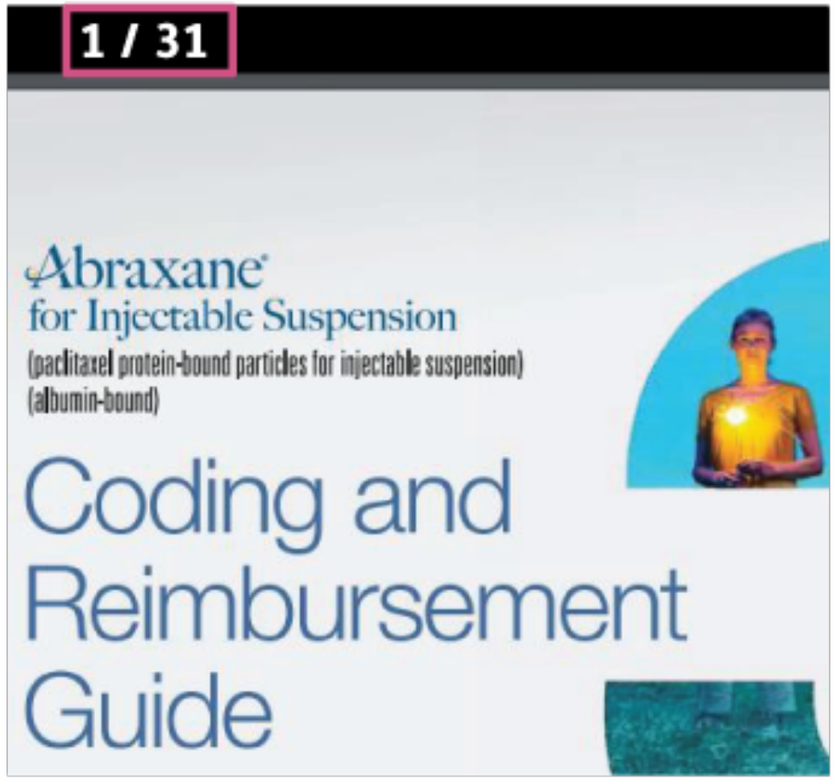
Good Science and Great Data = Relevance in the Clinic

Today's reimbursement protocols are a lengthy read…

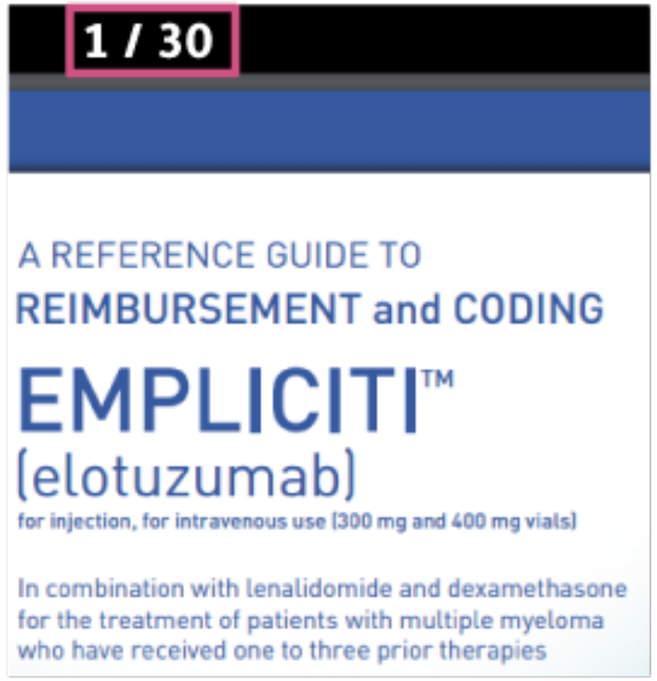
BIIB's Spinraza



CELG's Abraxane



BMY's Empliciti



Source: BIIB reports, CELG reports, BMY reports, MSUSA Research

Biogen's *Spinraza*: Commercial Payer Guidelines for Coverage

Managed Care	Date	Initial Therapy	Continuation Therapy
United Healthcare	4-17	*Covers SMA type I, II or III.* Diagnosis by neurologist with expertise in SMA or by physician in consultation with a neurologist. **Initial Approval:** no more than 4 loading doses.	Patients should show positive clinical response from pre-treatment baseline status to *Spinraza* therapy. Reauthorization will be for no more than 3 maintenance doses (12 months).
Aetna	3-17	*Covers SMA type I, II or III.* Medication prescribed by or in consultation with physician specializing in treatment of SMA. **Initial Approval:** 4 loading doses of Spinraza considered medically necessary for initiation of treatment.	Continued use of *Spinraza* considered medically necessary for members who have responded to therapy, as demonstrated by maintenance or improvement in motor milestones. Maintenance dose as considered medically necessary once every 4 months thereafter.
Humana	2-17	*Covers SMA type 1.* Patients with diagnosis of SMA: by SMN1 gene deletion or 5q SMA homozygous gene deletion and ≤2 SMN2 and clinical signs consistent with SMA ≤6 months. **Initial Approval:** 6 months	Continuation therapy for patients showing improvement in HINE or prevention of permanent ventilation. **Continuation therapy approval:** every 6 months.
Anthem	2-17	*Covers SMA type 1.* Patients with diagnosis of SMA by SMN1 gene deletion or 5q SMA homozygous gene deletion and ≤2 SMN2 (Type 1) or SMA-associated symptoms before 6 months of age **Initial Approval:** 6 months	Continuation therapy for patients with clinically significant improvement in SMA-associated symptoms. **Continuation therapy approval:** every 6 months.

Bending The Cost Curve: Employers Step Up

Employer-based self-insurance has been the bedrock of US health system since WW II

- More than half non-elderly population have employer insurance but numbers are declining as benefit costs rise
- Mounting impact of pass throughs to employees on drug co-pays and deductibles

Not just a “cost of doing business”

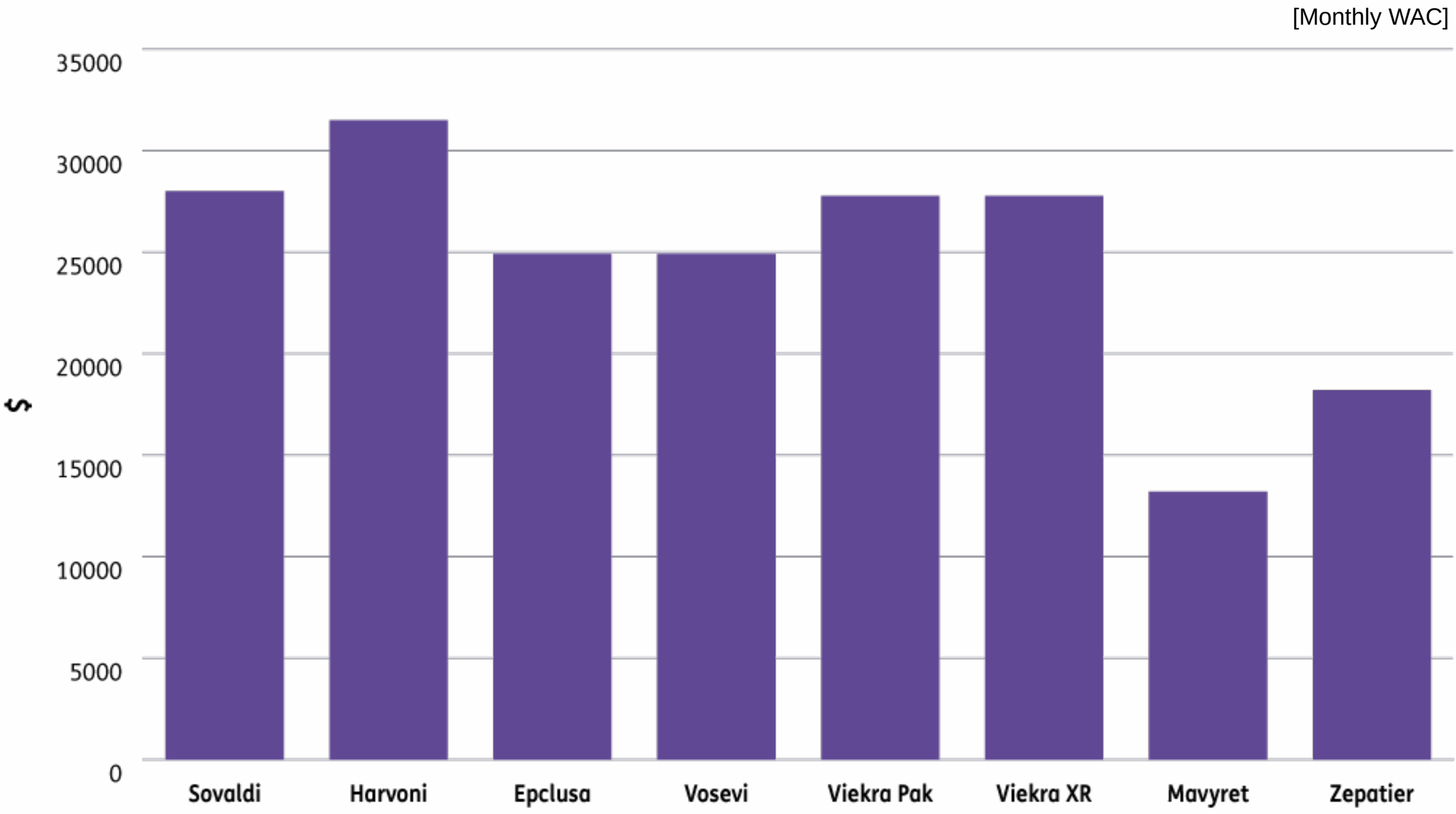
- Warren Buffet – funding health care is the biggest drag on US corporate competitiveness, not taxes
- Tax burden as % of GDP is 1.9 – while health care % is 17 +
- Productivity, employee satisfaction and talent retention impacts

Employers are joining to leverage their market power in the health system

- **Health Transformation Alliance** – 20 big companies with 6 million covered lives and $25 billion annual health spend Drug purchasing contracts with CVS and UHC with systems analysis support from IBM Watson

- **Amazon, JP Morgan and Berkshire Hathaway** create new JV to set precedents in managing employee health High profile CEO appointment, with experiments underway in wellness, big data and consumer choice

Market Trend in HCV Therapy: Cure, Compete, Consolidate



Sources: EvercoreISI

Trump's "*American Patients First*" Plan: Shot Across the Pharma Bow?

A campaign promise kept – package of 50 policy proposals finally unveiled for public discussion on May 11

- Lower patient out-of-pocket costs, increase medicines access and promote more industry price competition
- Simplify the drug supply chain through more transparency and reducing the role of the "middleman"
- Direct dialogue with stakeholders to implement Executive Actions to bypass congressional gridlock

Revision of rules limiting price competition in the Medicare Part B and Part D drug programs

- Incorporate Medicare Part B's higher margin, physician-administered drugs into the Part D outpatient program

- End Medicare mandate for automatic coverage of all FDA-approved drugs in six "protected" classes of significant medical need

More transparency and cost-sharing

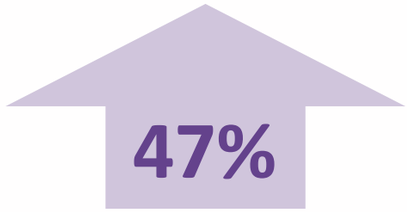
- Health plans to give back a portion of manufacturer-negotiated rebates to patients at pharmacy point-of-sale
- Review of foreign country free-riding" on US drug innovation
- Should DTC ads include price information?

Medicare changes could cost innovative drug producers considerably

- Deadline for stakeholder comments on July 16 - some reform initiatives already underway

Health Care as a Public Entitlement: The Way Forward?

Government-sponsored share of total US health spending will reach **47%** by 2025



US Insured Population by Source of Coverage and Percent of Total 2017	
Employer	49
Individual	6
Medicaid	20
Medicare	15
Other Public	2
Uninsured	8

Spending Projections 2016 to 2025: Annual Average % Growth by Source of Coverage	
Medicare	7.1
Medicare Part D Prescription Drug	5.8
Medicaid	6.0
Employer and Individual	5.4

Source: CMS, Office of the Actuary

Innovation Imperative – I
Efficiency/Relevance of Clinical Trials

PROBLEM: Are trials relevant beyond FDA approval?

- Cost and complexity of trials is soaring
- Standard RCT measures efficacy only – hard proof of treatment effect in an ideal population
- Market acceptance now depends on proof of a real-world intangible: value for money

SOLUTION: The Efficacy to Effectiveness [E2E] clinical trial model

- One trial protocol with two integrated, translational elements

  (1) RCT on efficacy

  (2) Adaptive RCT on effectiveness in actual practice settings with observational, patient-reported evidence

Tufts UNIVERSITY | School of Medicine

STATUS: E2E Study Project

- Tufts CTSI work program of regulators (FDA, EMA), industry (Merck, Pfizer) and academia (MIT, Harvard)
- Peer-reviewed concept paper in *Clinical Pharmacology and Therapeutics*
- Plan for pilot trials – GSK “throws down the gauntlet”

And a Nagging Policy Question…

Who’s in charge of industry work on today’s key strategic business challenge – R&D efficiency?

Innovation Imperative II - The Human Capital Advantage

New Informa Report *"Future-Proofing Human Capital in the Global Life Sciences"*

EBD ACADEMY

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Survey of 300 C-suite biopharma executives on functional, staffing and talent needs to 2020 and beyond

HR, talent and skills retention rank in top three strategic business challenges

Top skills for the future:

- Cross-functional orientation and experience
- Emotional intelligence to manage diverse teams
- Regulatory science and data analytics expertise

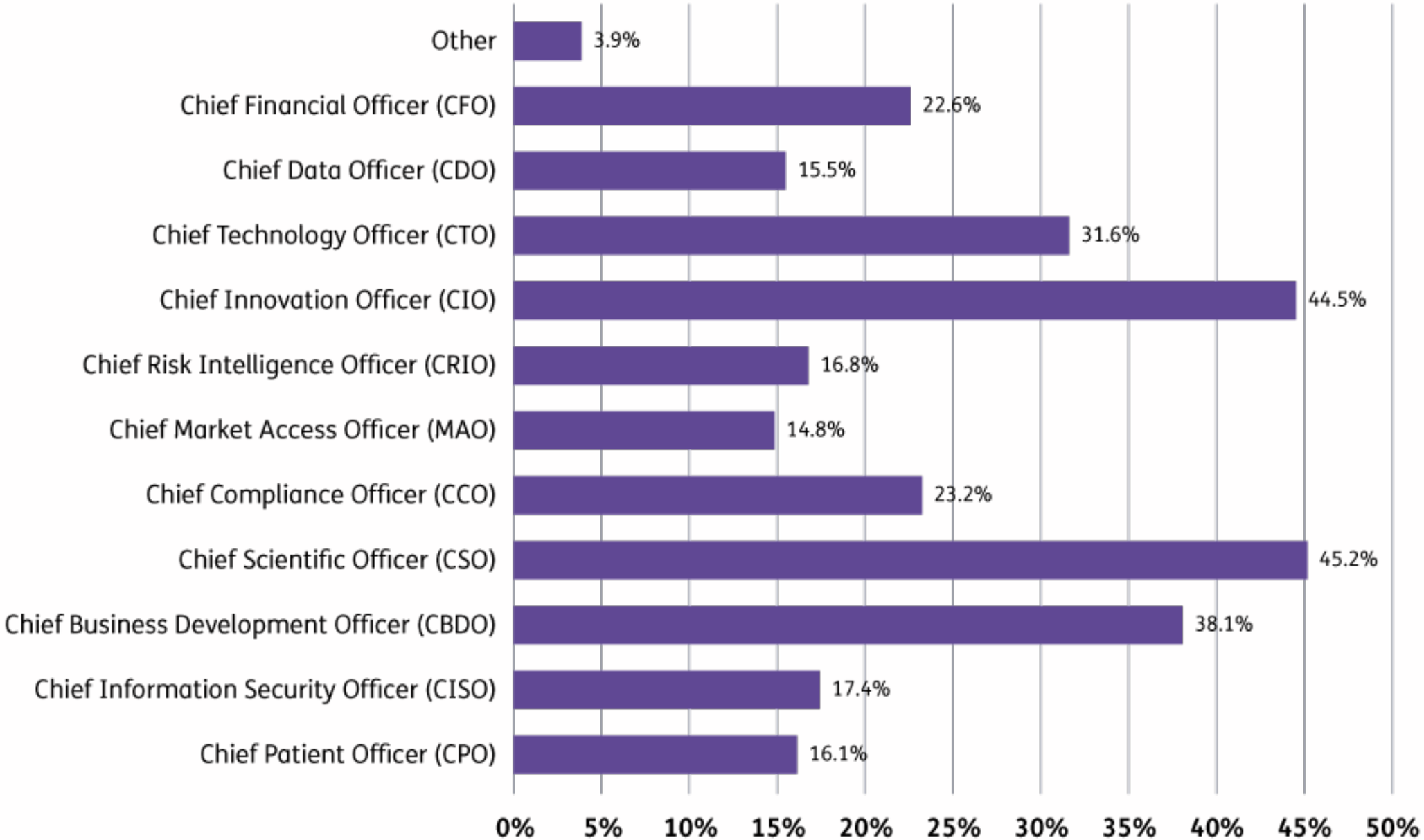
Millennials want continuous learning, collaborative work and shared employer goals

Pressure point for biopharma CEO's into the next decade?

- Technology change
- Loss of market autonomy
- Competition for talent from adjacent industries
- Risk intelligence

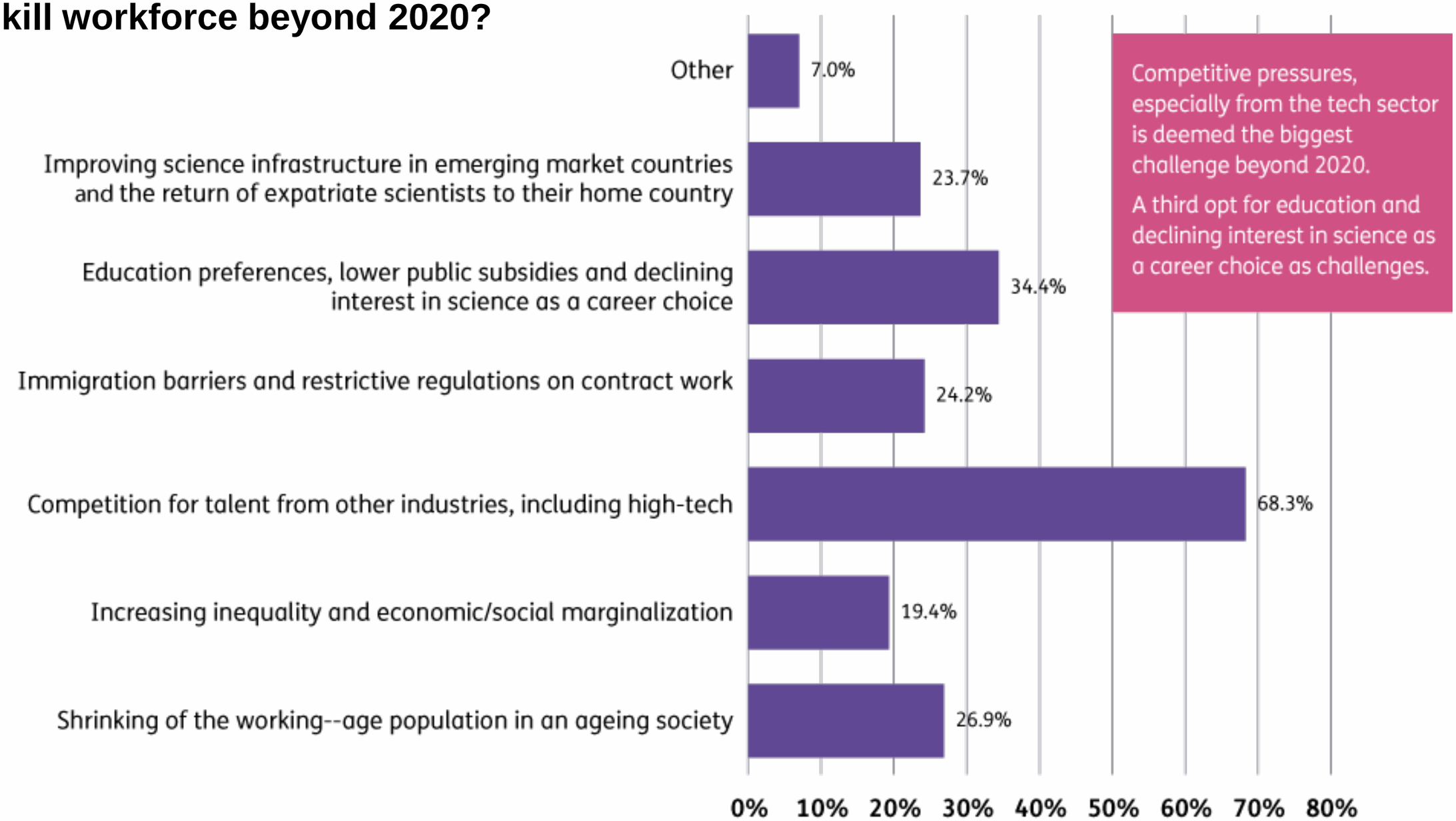
Future-Proofing Human Capital: Survey Results

Which of the following functions do you see being more important in the C-Suite in the next five years?



Future-Proofing Human Capital: Survey Results

What are the biggest challenges in attracting a high-skill workforce beyond 2020?

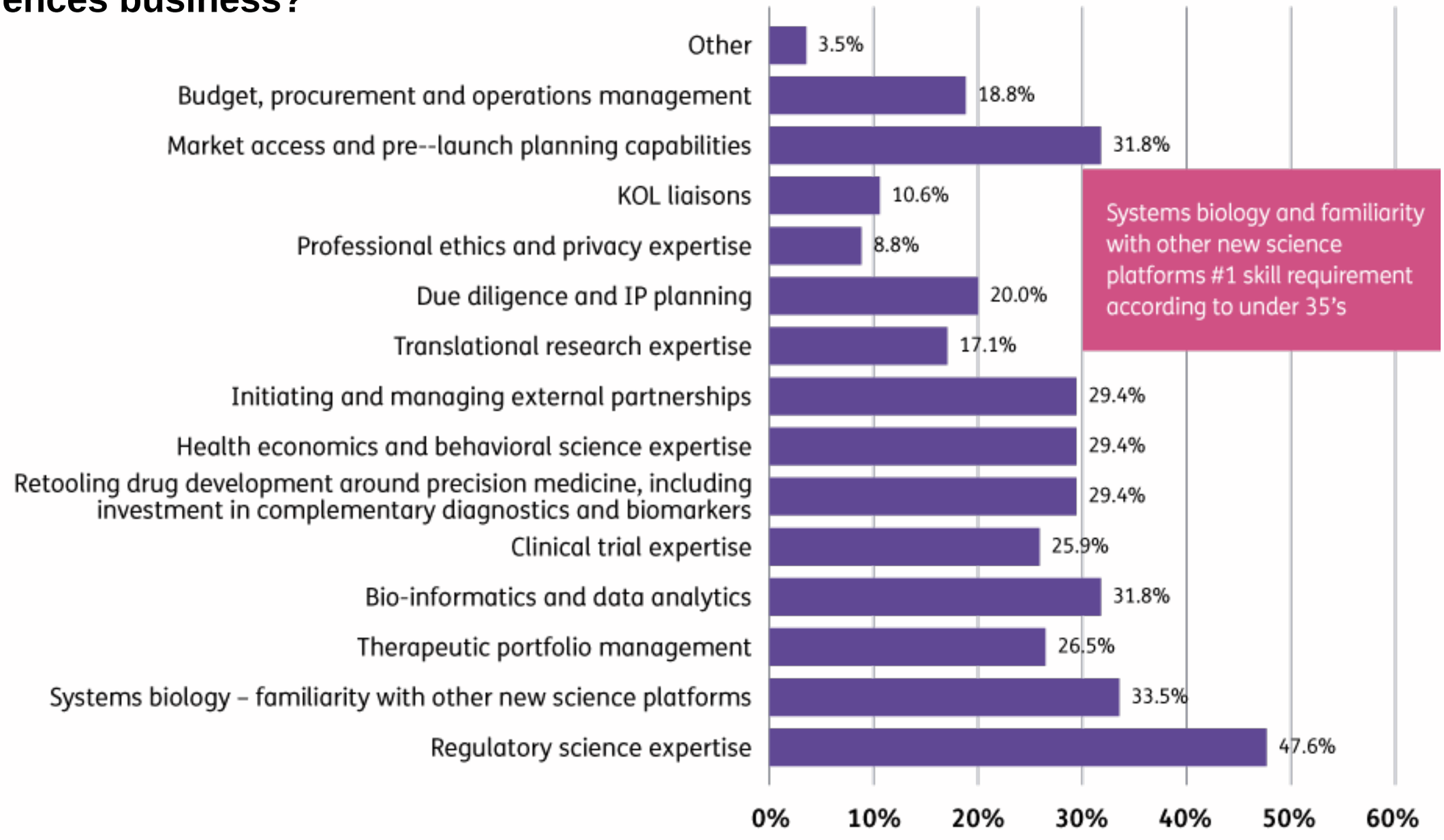


Competitive pressures, especially from the tech sector is deemed the biggest challenge beyond 2020.

A third opt for education and declining interest in science as a career choice as challenges.

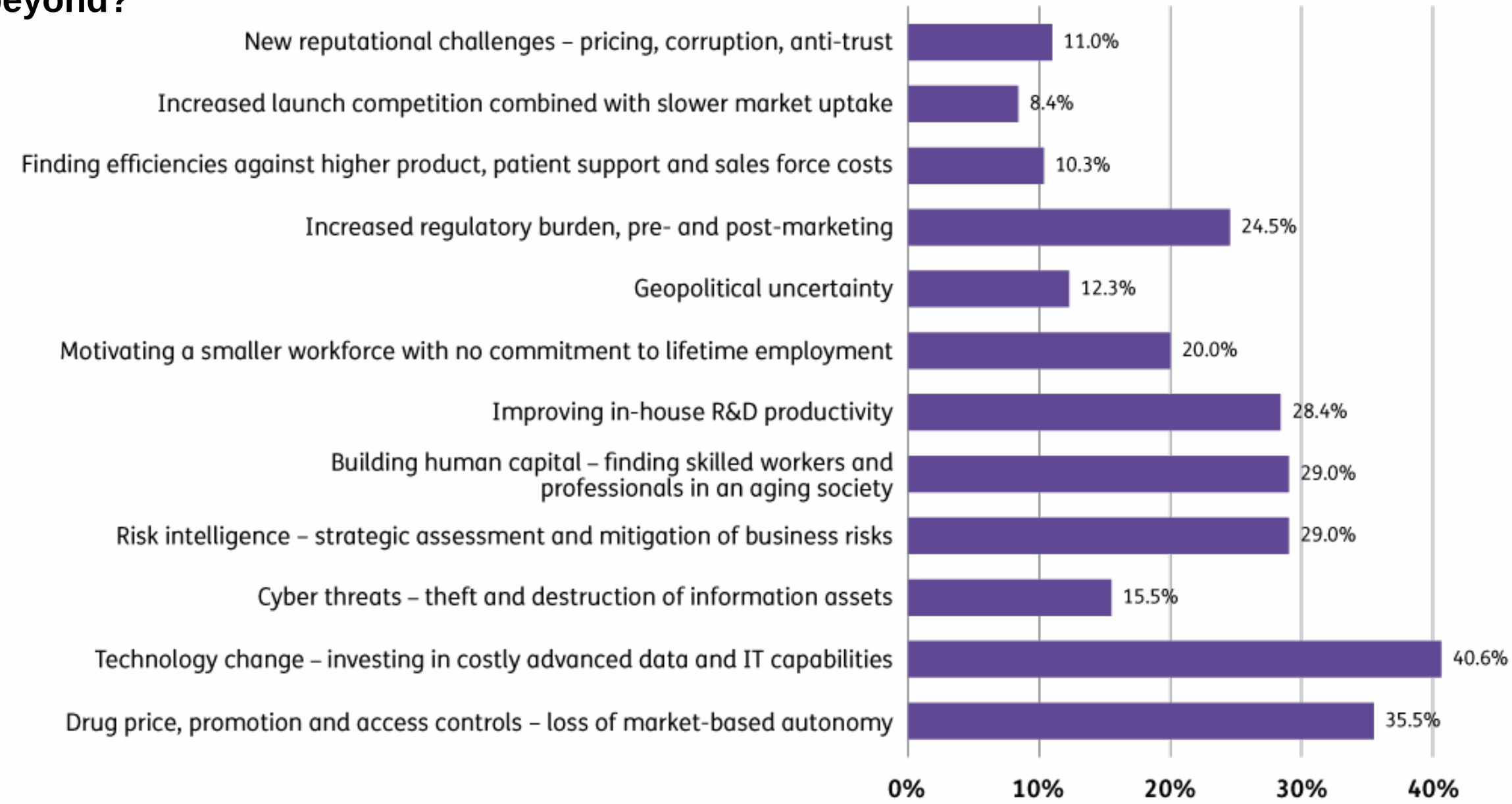
Future-Proofing Human Capital: Survey Results

Which key skills and capabilities do you consider to be requirements in tomorrows life sciences business?



Future-Proofing Human Capital: Survey Results

What will be the key issues and pressure points for the Life Sciences CEO in 2020 and beyond?



Innovation Imperative – III Front-lining Market Access

November 2017 Roundtable with 5 Pharma Market Access VP's

- Top of Mind: *Paying for the next wave of cures*

Its *Patient* Access, not Market Access

- Anticipate, engage and inform a widening circle of stakeholders

Value Frameworks are Becoming Institutionalized: ICER and the VA formulary

- Impact on payer mgmt. and physician utilization could cascade (VA > CMS > Commercial)

Strategic Options and Opportunities

- Build internal talent and address leadership gap (connectivity to the C-suite)
- Take ownership of price transparency – with a rationale based on *relative* therapeutic value
- Customize value proposition to interests and concerns of each stakeholder
- More $$ for patient-friendly Rx support services
- Understand each payer's business model – define creative ways to finance individual therapies

Three Themes for the Future – Pharma's Productivity Challenge

Relentless pressure to drive revenue growth

- Wall Street expects the Big 10 to add revenues equivalent to a mid-size biotech – every year
- Disruptive threats from adjacent industries and emerging countries – "frugal innovation"
- Shift from price-maker to price-taker

Under current business model, *everything* is becoming more expensive

- **R&D:** "New Science" and the complexity of trial design – 15 years and $2 billion+ per successful drug
- **Marketing:** 50 % of launches in past 8 years have underperformed market expectations
- **Operations support:** IT, compliance, patient assistance, manufacturing, sales force redeployment
- **"Value based" contracts:** can you quantify buyer's remorse?

A template for change

- Rigor in pipeline evaluations down to the "core"
- Targeted investment in advanced IT and data science

…Creating a culture and workforce able to integrate and apply that science where it counts

- Getting it right: Procurement as a strategic priority – not just back office

…Done wrong, "savings" can lead to organization disruption and cost increases

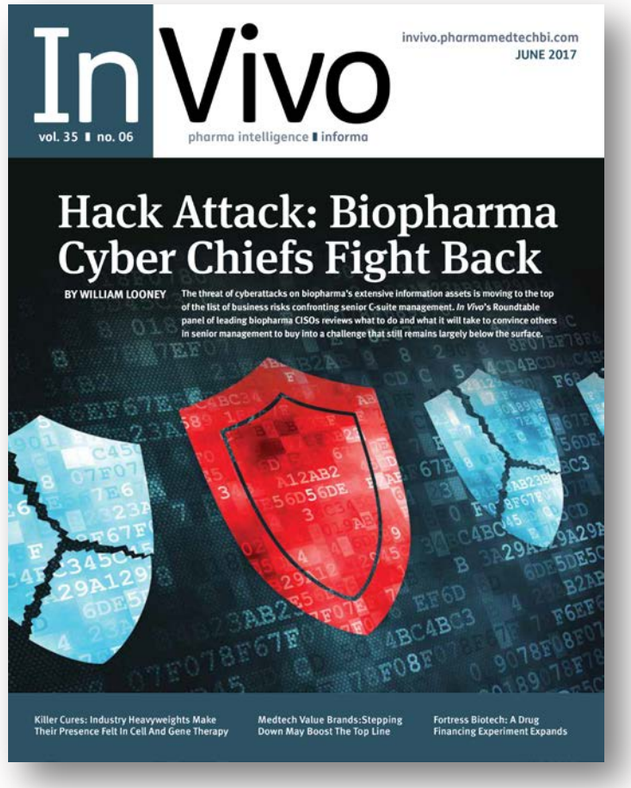
Three Themes for the Future: Data's Dark Side

"Data is the new oil"

- A contested resource…and a new tool of war
- Cyberactivity is covert with no rules of engagement – anyone can play

Inserting software into hardware – Internet of Things

- 6.4 billion medical devices are now online - soft spot in cyberdefense?



June 2017 In Vivo Roundtable with 4 health care CISOs

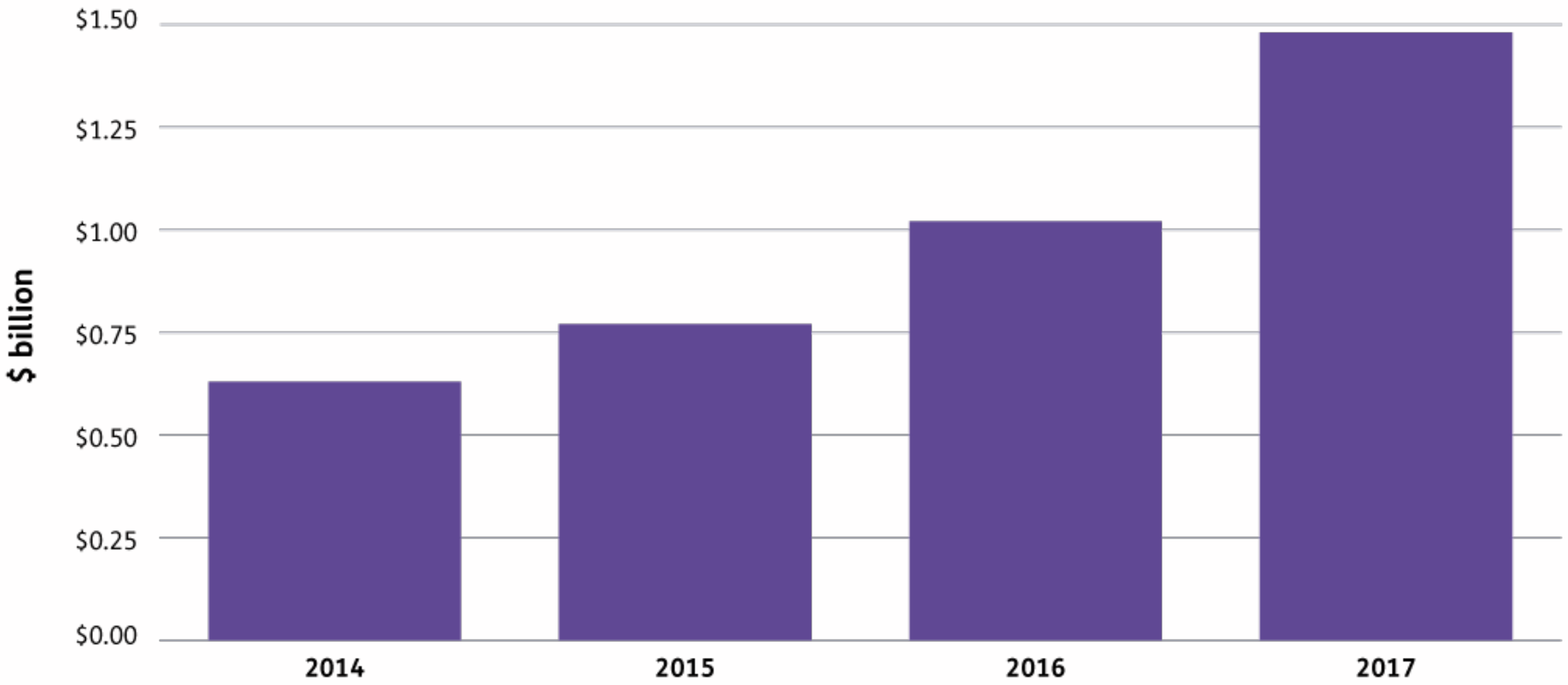
- Industry has underinvested in cybersecurity
- Non-strategic: IT as a cost-center with a focus on compliance monitoring
- Vulnerable entry points – small, under-resourced biotechs
- More cooperation needed among big drug companies on cybersecurity
- Prevention with patch ware is not enough – time to upgrade with $$$
- Companies must apply the same "rogue player" tactics to make life harder for hackers

Regulatory action is possible

- Congress is worried about drug shortages
- Merck reports "worldwide disruptions to operations" from June *Not Petya* malware attack

Data Density: Don’t Bury the Provider and Patient in “Noise”

Global spending on AI and cognitive computing systems in health care.



Source: Frost & Sullivan

Three Themes for the Future: The Happy Truth about Health

…it's Getting Better

From the 2016 Global Burden of Disease Study:

- For the first time this year, # of deaths of children under age 5 will drop below 5 million
- 6.1 year gain in average global life expectancy between 1990 and 2015
- Deaths from major CDs fall (except Dengue), along with some NCDs like certain cancers (Leukemia)
- Global spending on health care projected to rise from under $10 trillion in 2014 to more than $25 trillion in 2040

From the National Cancer Institute:

- Overall US cancer death rate has fallen 13 % since 2004
- Overall US cancer 5-year survival rate rises from 49 % in 1977 to 69 % today

Does your CEO talk about preventive health?

- Medicines must be repositioned as part of a larger community of progress
- Social determinants of health are biggest driver of health costs today

Agree or Disagree?

One college drop-out's view on health care innovation…

« …Find something that people are doing already and make it simpler… »

– **Mark Zuckerberg**

Conclusion:
How a Biologist and Two Physicists Changed the World

...Good science as a way of life is often difficult. It is important to remember that science does not stand by itself, but is the creation of very human people. We must continue to work in the humane spirit in which we were fortunate to grow up. If so, we shall help ensure that science continues and that our civilization will prevail…

James Watson

1962 Nobel Prize in Physiology and Medicine

Questions?

Thank you!

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