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Precision Medicine for Rare Disease

The Leadership Institute

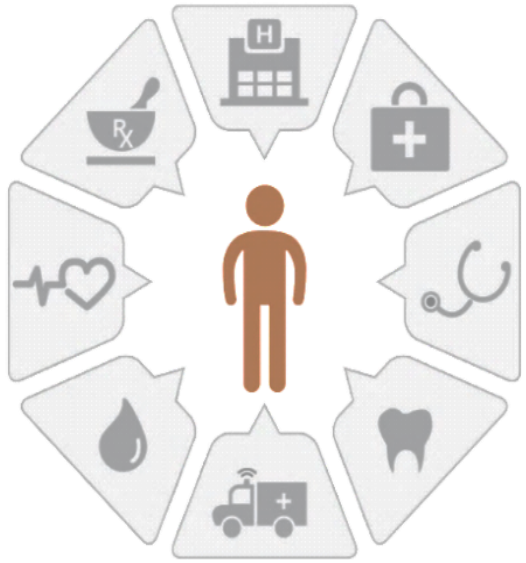
Nashville, TN

February 15, 2019

Th Leadership Institute


In 20 minutes I am going to show you a new business model for health care that may be the greatest disruption we will ever see in our industry.

WAVE 1
PATIENT-CENTERED CARE
2010-2016

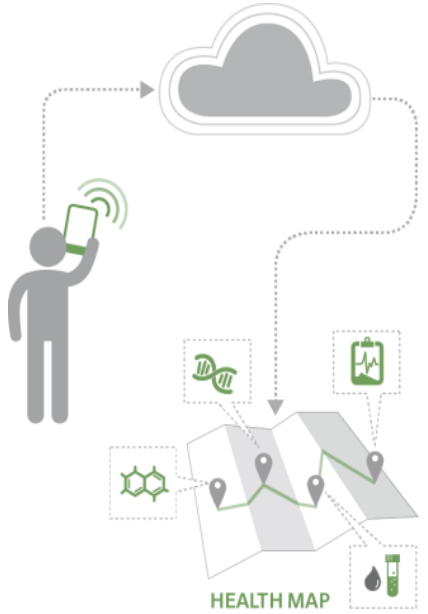


FROM	TO
Physician-centered	Patient-focused
Transactional, isolating	Care team managed
Sick-care	Health and well-being
Inaccessible	Convenient and 24/7
Patient turnover-volume	Patient health-value
Unwarranted variation	Evidence-based standard

WAVE 2
CONSUMER ENGAGEMENT
2014-2020

FROM	TO
Uninformed	Informed, shared decisions
Limited engagement	Highly engaged/empowered
Isolated individual	Socially connected
Limited consequence	Financial rewards/incentives
Bricks, office hours	Virtual, mobile, anytime
Physician opinion	Informed shared decisions

WAVE 3
SCIENCE OF PREVENTION
2018-2025



FROM	TO
Basic health management	Genome-linked life plan
Symptom treatment	Monitoring and prevention
One-size-fits-all	Personalized therapies
Limited biomarkers	100% accurate diagnostics
Big pharmaceuticals	Tailored gene/microbiome therapies
Medical competencies	Life, social, and ethics competencies

2010 → **2025**

WAVE ONE:

Accountable Care Organizations
Convenience Care Clinics
Electronic Health Records
Patient centered medical home
Pay-for-performance
Smart Care Teams
Telemedicine

OLIVER WYMAN

VOLUME-TO-VALUE REVOLUTION
2010-2016 PATIENT-CENTERED CARE

WAVE 1

Healthcare moves toward patient-centered, value-based care. Reimbursement is for **value** created, not services provided. The **health team expands** to include health coaches, nutritionists, and other non-traditional members.

Source: Oliver Wyman analysis

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WAVE TWO:

iTriage
Kardia
Livongo
Mevii
Open Notes
Population Health Management
Shared Decision Making
Wireless monitors

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VOLUME-TO-VALUE REVOLUTION
2014-2020 CONSUMER ENGAGEMENT

WAVE 2

Consumers vote with their healthcare dollars for the care that gives them the best value. There is a focus on **consumer engagement** – involving people in their own health. With the help of technology, healthcare moves toward "**anywhere/anytime**" model. Consumer expectations rise.

Source: Oliver Wyman analysis

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WAVETHREE:

Big Data links insights from exposome with genome, proteome, and microbiome

Digital doctors of the future assessing a patient biologic and DNA sequence data in the EHR and the patient's PHR, indicating all pharmacogenomic interactions to target personalized therapies

"Socialized" medicine vs "n of 1". Widespread genomic sequencing

OLIVER WYMAN

VOLUME-TO-VALUE REVOLUTION
2018-2025 SCIENCE OF PREVENTION

WAVE 3

With a **consumer health and wellness** market at last in place, expect to see new products and services that use technology and new scientific insight to prevent diseases through informed personalized precision treatments creating a new **science of prevention**.

Source: Oliver Wyman analysis

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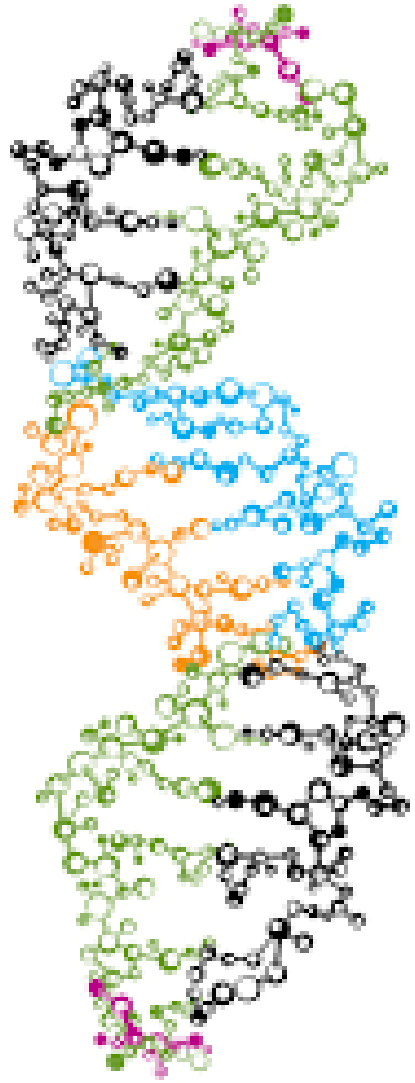
Are we ready for wave three?

Are providers ready for wave three?

- Evidence-based practice guidelines have not been developed for most genetic testing.
- In an AMA survey of over 10,000 physicians, 98% are aware that patient genomics influence response to drug therapy, but only 10% believe they are adequately informed and comfortable with the use of genetic information to guide treatment in clinical practice.
- There are currently over 70,000 individual genetic testing products on the U.S. market ten new tests a day entering the market.
- There are currently fewer than 1000 practicing clinical geneticists in the United States and only 2000 genetic counselors.

Are the pharmaceutical and biotechnology communities ready for wave three?

- Blockbuster drugs are based on research evaluating average patient efficacy and safety data.
- Diagnostic tests, biomarkers, and targeted treatments alter traditional research methods and economic funding models on which the industry has been based.
- Molecular diagnostics can determine which patients may benefit or be harmed by a drug which narrows the indications and market for some therapies while permitting some medications previously deemed too unsafe to be reintroduced with companion diagnostics.



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Are payers ready for wave three?

- Although there are over 70,000 genetic tests, there are only 500 separate CPT codes under which they are billed.
- Actuarial science predictive risk and economic models are not well-designed to integrate with the science of individuality ("n of one") inherent in personalized medicine.
- Studies linking companion diagnostics to improved health outcomes are often not available or are poorly understood by the payer community.
- Typically there is no payment for diagnostics that stratify the population.
- Unit costs of individual tests do not necessarily coordinate with total cost of care.

Are policy-makers ready for wave three?

- Genetic data has implications not only for individual patients but also for their family members.
- Policy balancing the need for data-sharing to advance medical knowledge with privacy issues for genomic data has not been completely implemented.
- Regulatory bodies must ensure that frameworks are in place to safeguard patients while ensuring that scientific progress is not hampered.

“The trouble with change is that it usually arrives before we are ready for it”

-Arnold Glasow-

Health care system clinical needs evolve over time.

Year	Life Expectancy	Death Rate (per 100,000)	Leading Causes of Death	Clinical Need
1900	47	1,719	Pneumonia Influenza Tuberculosis Diarrhea GI disease	Acute
1950	68	963	Heart Disease Cancer Cerebrovascular	Acute Chronic
2000	77	865	Heart Disease/Cancer Cerebrovascular	Chronic Acute Prevention
2050	?	?	?	Prevention Chronic Acute

Every practicing physician knows that every single day we see patients that just don't fit into neatly stratified categories.

It is the quintessential component of real medical practice.

It gets us back to our roots of making sure the patient in front of use is getting the best care possible

A lot of the frustration physicians have experienced over the past twenty years is based upon our instinctual understanding that much of contemporary medical practice disrupts our ability to do this.

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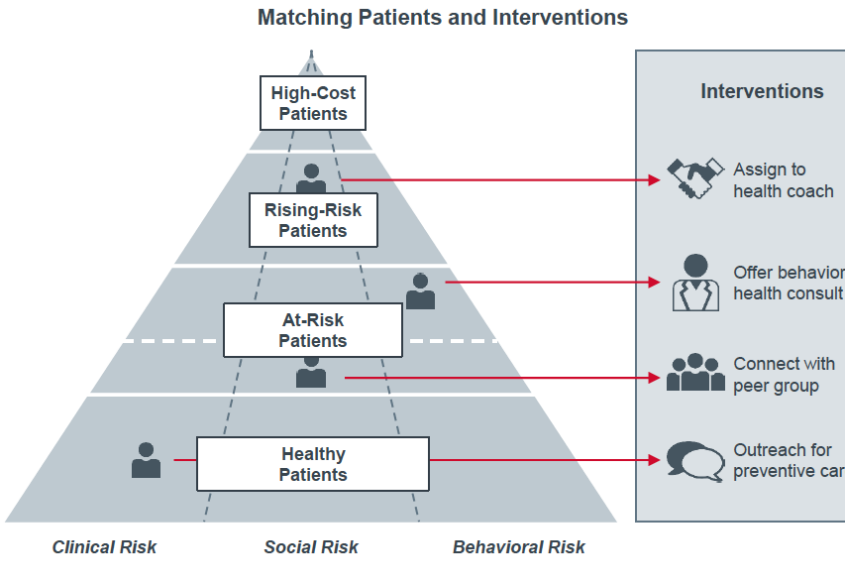
But our understanding of what we have recently been calling the Triple Aim has evolved over time.

Whole-person care integrates behavioral, clinical and social risk into models of care that provide superior value.



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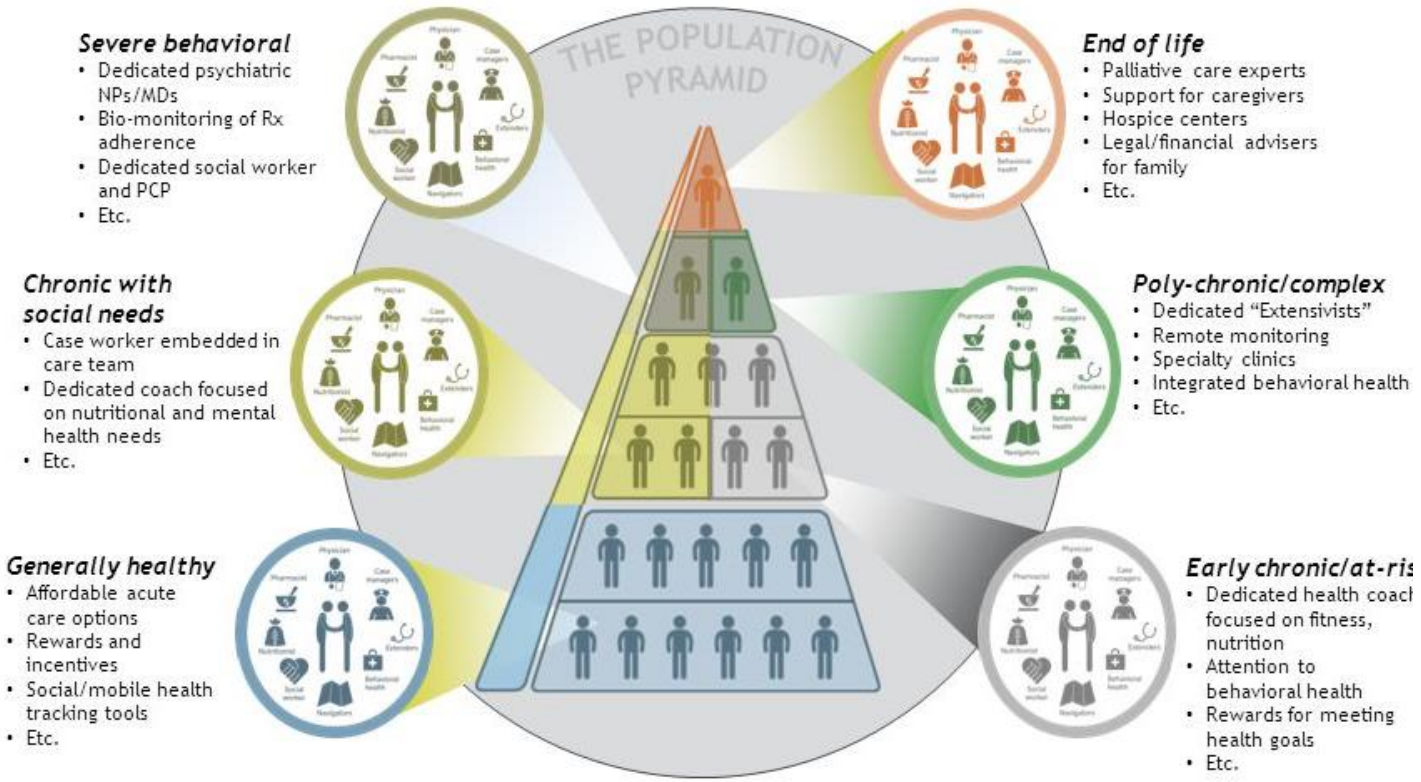
The focus of the fast few years on population health has been about risk stratifying patients and developing models of care integrated with value-based payment models.

Successful Population Health Management Must Be Highly-Tailored to Particular Segments of the Population



Specialized care models will be supported by new population-specific ecosystems

But the qualitative methods we have been using have been based upon 20th-century scientific approaches.

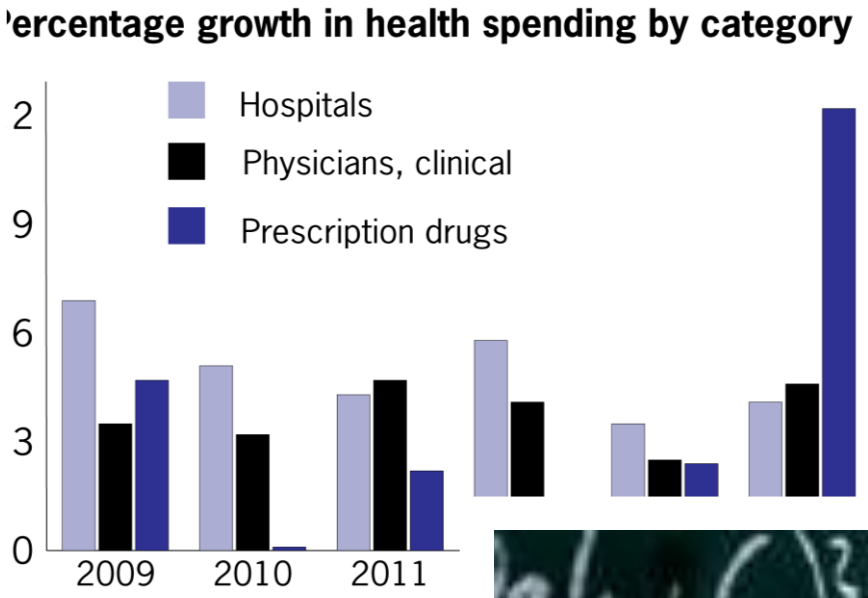
Likewise, the assumptions underlying health care payment systems have been modeled on 20th-century methodology.

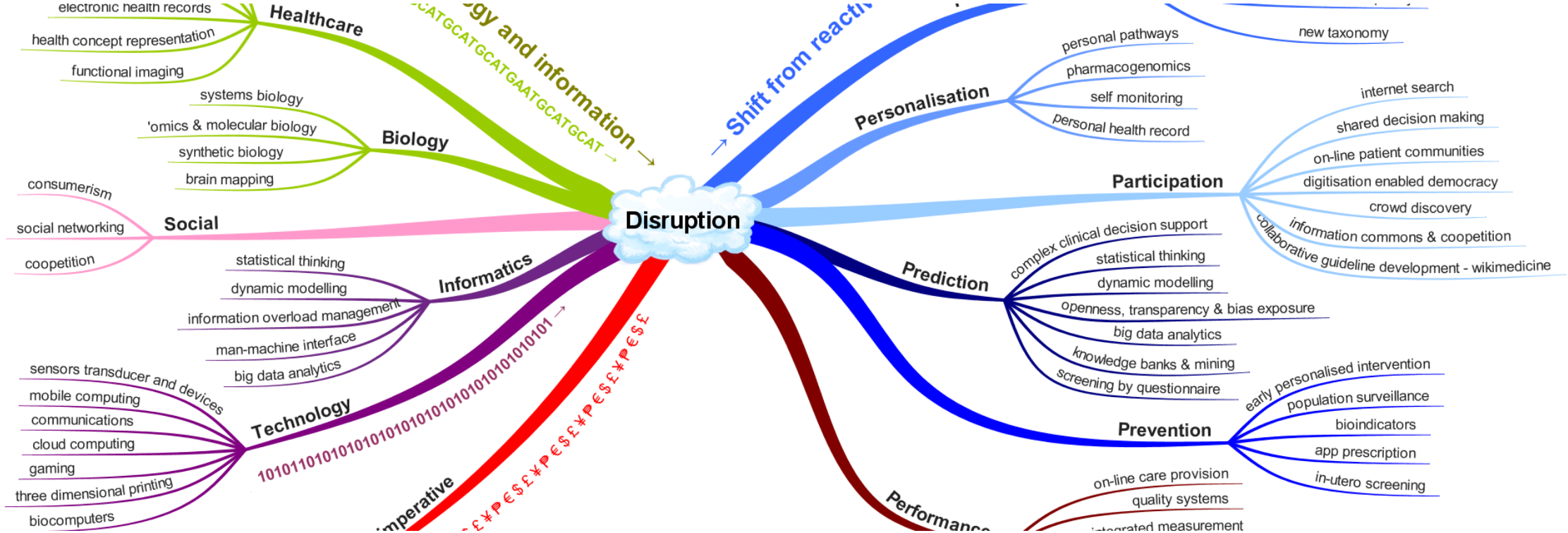
01

Actuarial risk projections are based upon population averages

02

Trend in spending sets insurance prices.





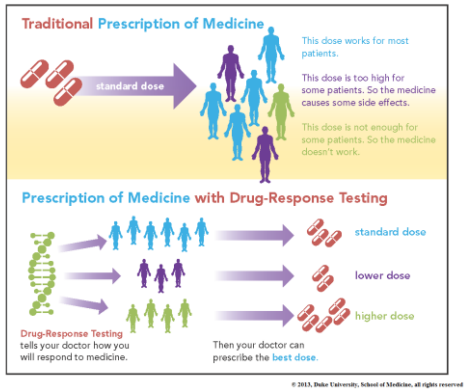
The capabilities inherent in 21st century technology will substantially disrupt the health care ecosystems built on these older analytic methods.

Precision medicine holds enormous promise in transforming health care.

Precision medicine enables better DIAGNOSTICS:

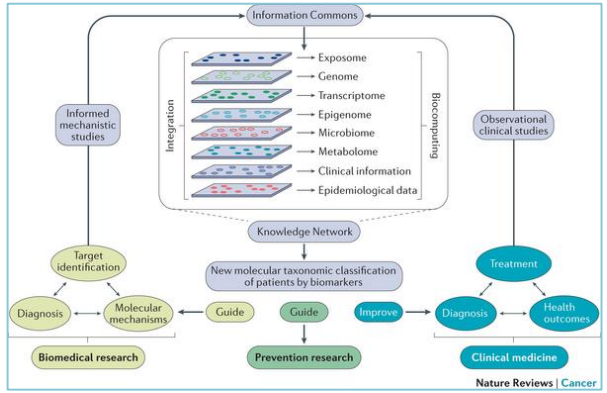
- ✓ **Diagnostic odysseys will diminish as idiopathic conditions will be mapped to specific genetic variances.**
- ✓ **GWAS will improve the understanding of complex disease risk factors.**
- ✓ **More precise diagnostics can eliminate unnecessary testing and enhance patient safety.**

Precision medicine improves THERAPEUTICS:



- ✓ **Greatly improved adherence for patients with schizophrenia with companion diagnostic tests screening for side effects.**
- ✓ **Pharmacogenomics more accurately predicts therapeutic response in patients with major depression and bipolar dx**
- ✓ **Targeted cancer drugs are improving long-term survival in metastatic disease.**

Precision medicine creates better approaches to PREVENTION.



- ✓ **Convergence of biology and information will shift traditional health system approaches from reactive to proactive healthcare.**
- ✓ **Early personalized interventions can integrate with population surveillance to enable robust complex clinical decision support.**
- ✓ **Predictive modeling with open, dynamic knowledge banks can create a democratized health information commons.**

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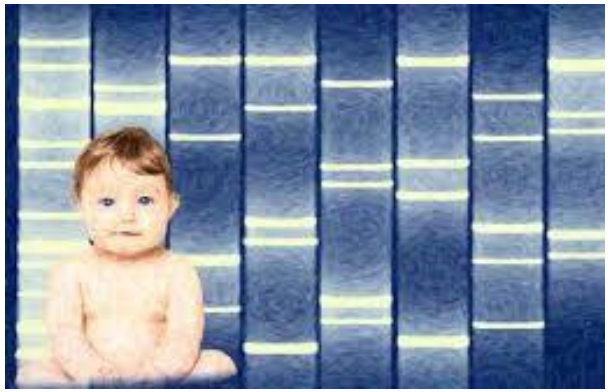
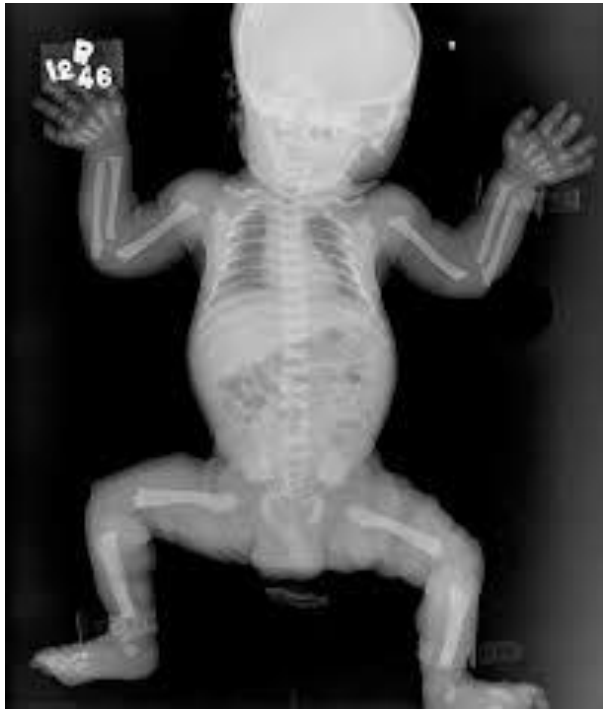
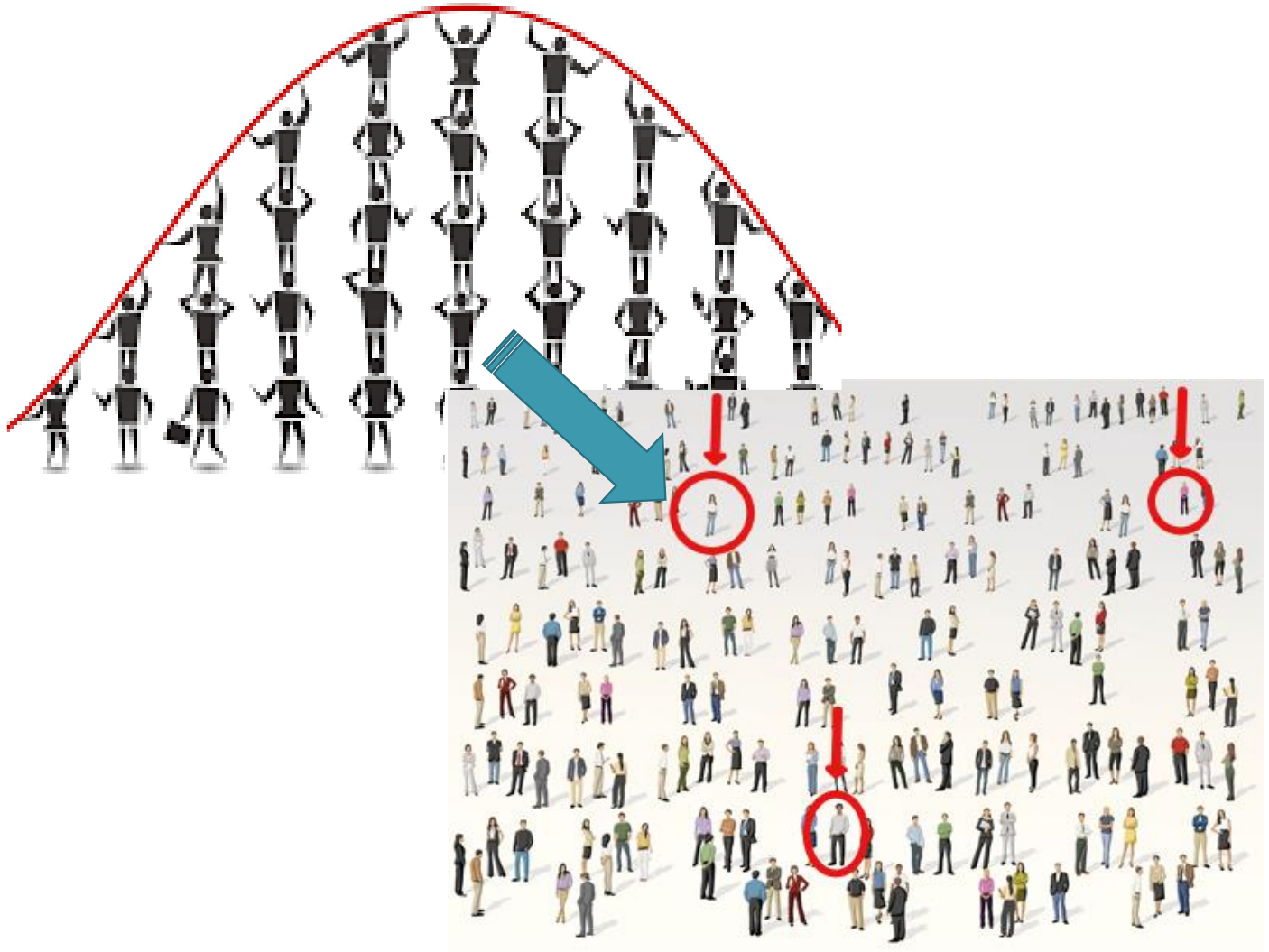
Predictably, the industry's response has been slow to understand the implications of these changes.





With proper design, these new technologies can return medicine to our core mission.



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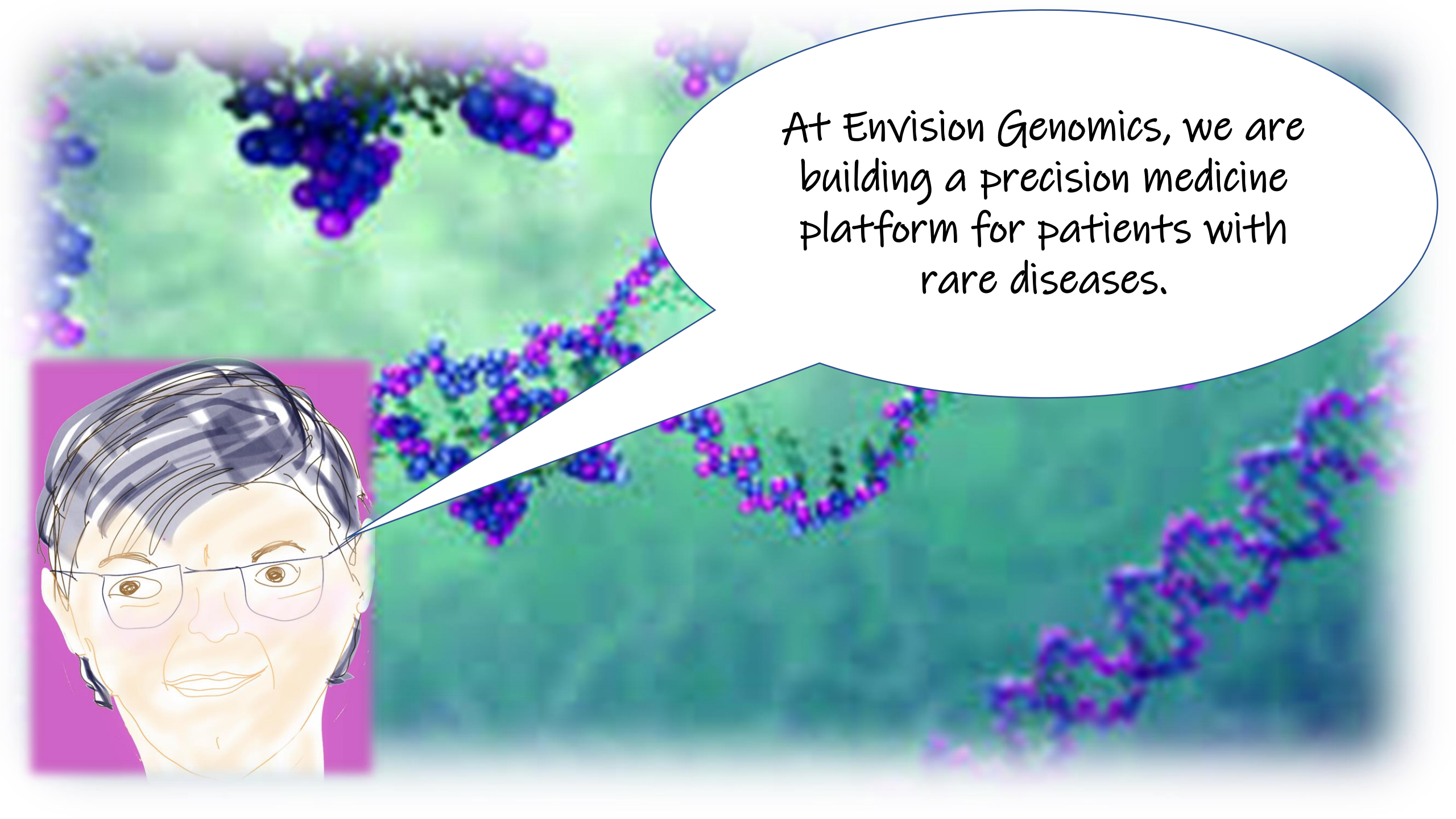
Our first step in precision medicine ecosystem design is understanding the critical differences in the business models underlying health care delivery models.

	Volume Based	Value Based	Precision Based
Reimbursement	▪ FFS/DRGs ▪ Penalties for readmits, never events	▪ P4P Measures ▪ Shared savings/risk payments	▪ APMs based on outcomes
Organizational Model	▪ Departments	▪ Populations ▪ Conditions ▪ Focused Factories	▪ Care Models ▪ Consumer/patient Engagement
Value Drivers	▪ Volume ▪ Efficiency at the procedure level	▪ Efficiency at the population level ▪ Low variability ▪ Quality process measures	▪ Efficiency at the individual patient level ▪ "n" of one analytic modeling ▪ Quality outcomes measures
Profit Pools	▪ Admissions/Discharges ▪ Ancillaries services ▪ Surgeries/procedures ▪ Visits	▪ Chronic condition management ▪ Population management ▪ Wellness and prevention	▪ Information management ▪ Patient differentiation capabilities
Investments	▪ Capacity ▪ Patient referrals ▪ Revenue-producing assets	▪ Clinical integration ▪ Commercialization ▪ Health IT	▪ Information Integration ▪ Predictive analytics ▪ Whole person focused design


At Envision Genomics, we are building a precision medicine platform for patients with rare diseases.

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Rare and undiagnosed diseases have enormous, unrecognized impact on one in ten patients and families worldwide.

30 million people in US and 400 million globally with rare disease

5% of children are born with a rare disease

50% of those affected by rare disease are children

80% of rare disorders are genetic in origin

Children with rare disease account for 10% of pediatric admissions

More than 7500 known rare disease types

25-30% of patients wait 5 to 30 years for a correct diagnosis

95% of rare diseases have no FDA approved drug treatment

Rare disease accounts for 25% of the total cost of care in children.

On average it takes 7 years and 8 physicians to make a diagnosis

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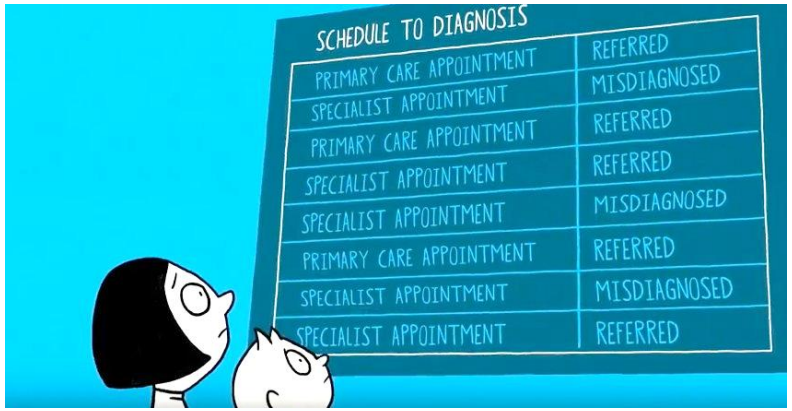
The diagnostic odyssey rare disease patients and their families currently face is a nightmare.

- >7000 rare diseases
- 8 physician visits before diagnosis
- 4 primary care physicians
- 4 specialists
- 21% had to borrow money from family or friends
- 31% depleted savings
- >8 years to make a diagnosis

PATIENTS:

- 82% anxiety/stress
- 57% isolation
- 69% depression



CAREGIVERS:

- 88% anxiety/stress
- 54% isolation
- 65% depression

PCP → Single Specialist ? → Focused Testing ? → No Diagnosis ? → Single Specialist ? → Focused Testing ? → Possible Diagnosis ? → Fragmented Care/No Counseling → ?

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Envision Genomics is creating a technology-enabled, end-to-end clinical services platform delivering precision medicine-based care & solutions to the rare and undiagnosed disease community.

There is a solution…

We integrate comprehensive, genomic-focused information into mainstream medical practice and develop whole-person models of care to improve the lives of people with rare and undiagnosed diseases.

Our Core Strategy:

Identify appropriate patients for patient intake into clinical workflow.

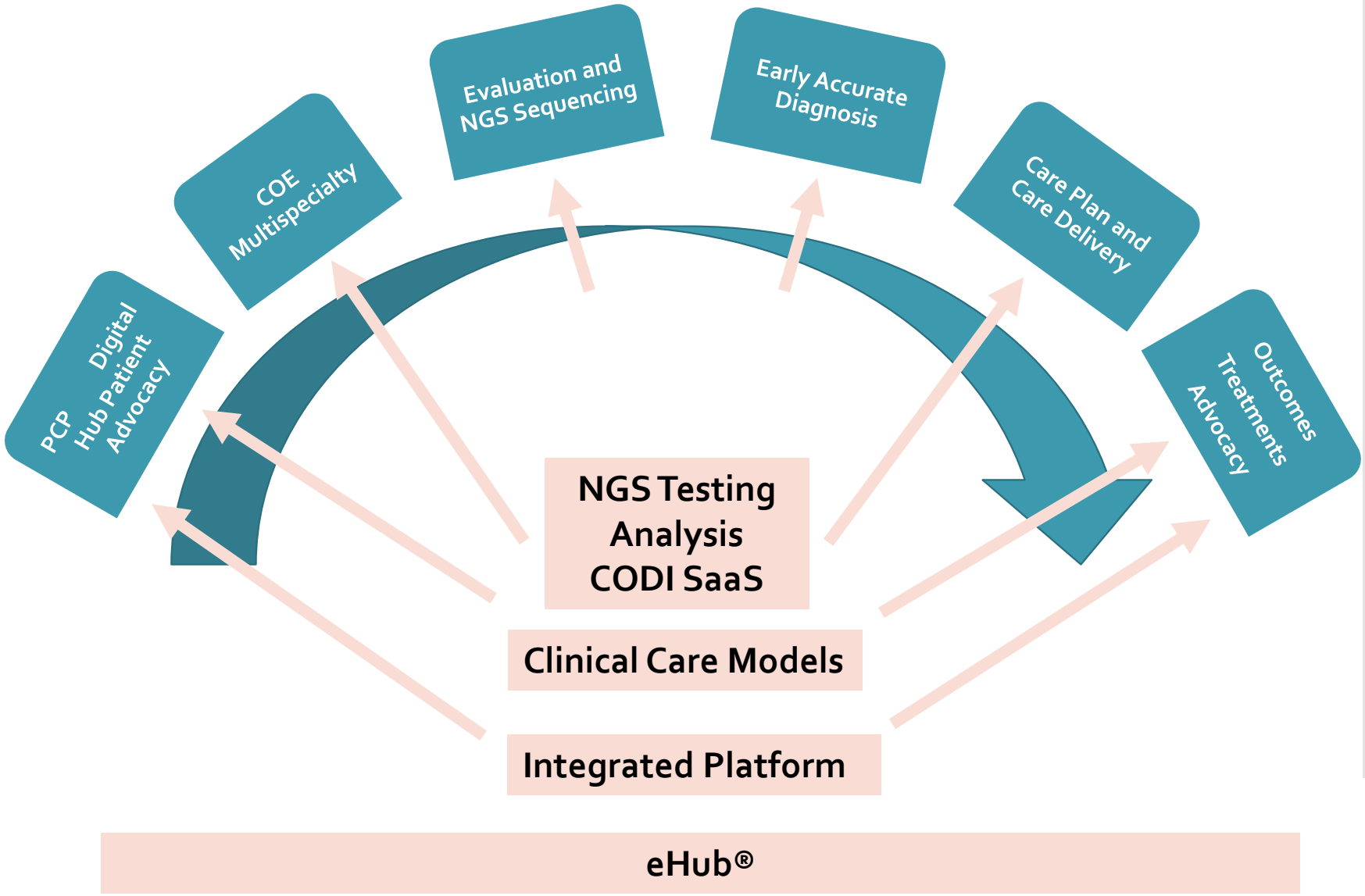
Focus on interpretation and analytics to increase the diagnostic rate to drive the development of a far more effective care models.

Integrate learnings from data into effective models of whole-person care.

Leverage integrated genomic and clinical data sets to drive therapeutic development.

The First Best Case for Precision Medicine.

Comprehensive whole person care solution for patients with rare disease and the healthcare delivery spectrum & ecosystem at large.



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Eliminating the diagnostic odyssey in rare disease patients will have an large impact on total health care costs.

- 1 out of 250 of babies are born with rare genetic conditions.
- Whole genome sequencing has a diagnostic yield of 50% in patients with undiagnosed diseases.
- The total cost of care of patients with undiagnosed rare diseases is around $250,000 in the U.S. The cost of WGS is only 2% of these costs.
- Rapid WGS of acutely ill enfants in the NICU produced changes in management that reduced inpatient costs by $800,000 to $2M.
- The direct costs accrued within a health system for adults patients with rare undiagnosed disease prior to genetic assessment is estimated to be $36,000 at a minimum.

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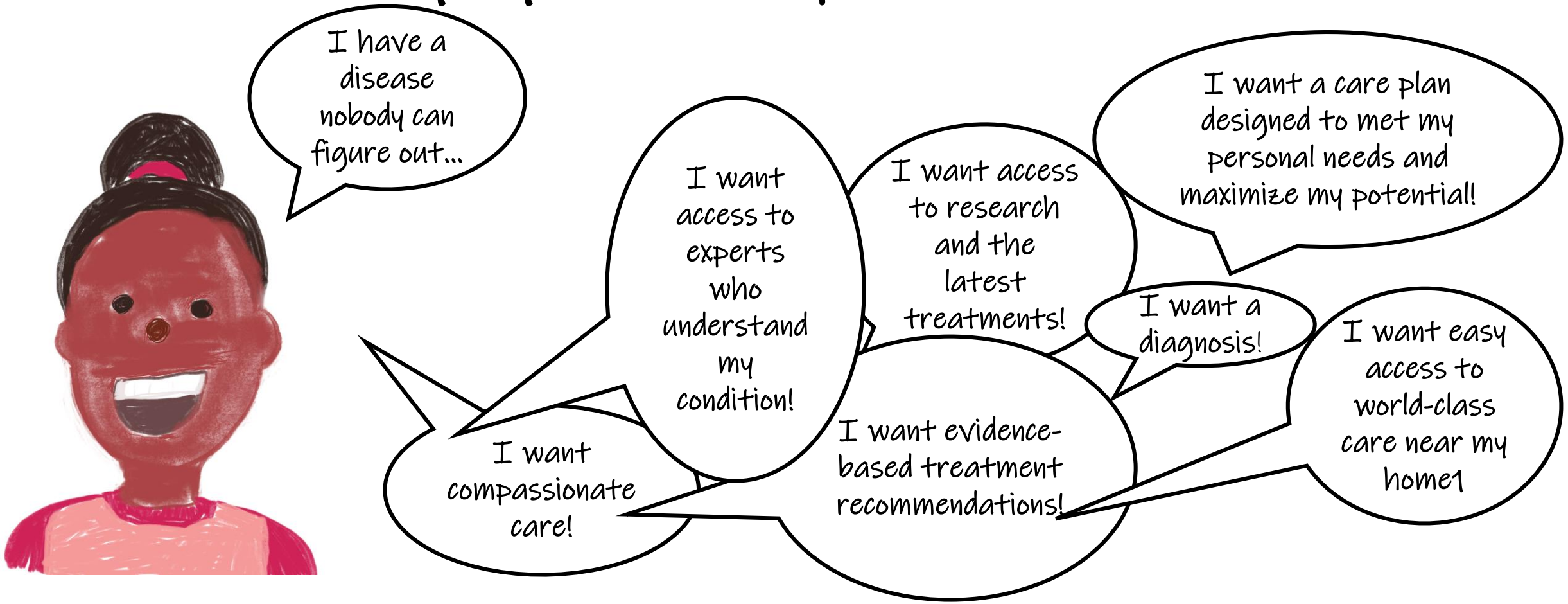
We integrate comprehensive, genomic-focused information into mainstream medical practice and develop whole-person models of care to improve the lives of people with rare and undiagnosed diseases.

- Access to clinical expertise, research, and treatments unlimited by geography
- Care navigation and coordination
- Content education
- Financial aid
- Social community
- Special schools

Rare disease patients will finally get the care that is so hard for our current health care delivery system to provide.



Families will get world-class care in their local communities.

We want access to world class care integrated with our local health care community!

We want a cure!

We want timely reanalysis when new knowledge is discovered!

We want to be able to afford her care!

We want to understand the implications for our child's condition for other family members!

We want information about our child's condition to be known by all health care providers seeing our child!

We are desperate for answers for our child...

Front-line health care providers will have the resources they need to treat rare diseases more effectively.

I want to be able to more effectively diagnose and treat my patients with rare and undiagnosed diseases!

I want easy access to relevant information when seeing my patients!

I want to understand the benefits of the latest technology and order the right tests!

I want to be able to keep up with the latest medical evidence!

I want to be able to order the right tests and treatments for my patients without worrying about the costs!

Genetic counselors will take on a far more crucial role in the health care ecosystem...

I want easily understood reports that help me counsel my patients effectively!

I want access to reanalysis on an ongoing basis so I can help my patients when new discoveries and cures are made!

I want access to my remote patients through telemedicine!

I want a trusted partner who provides me with the most accurate information on individual genetic diseases!

Lab directors will integrate genetic information directly in their clinical work flow.

I need seamless processes integrating next generation sequencing into my lab workflow!

I want clinicians ordering genetic testing to order the right tests!

I want a high-quality, efficient CAP/CLIA wet lab for WES/WGS!

I want the costs of these tests to be reimbursed!

I am going to need a workable solution for storing large amount of genetic data!

The health system CEO has a new business strategy.

I want trusted partners when I invest in innovation!

I want to grow market share!

I need better ways of managing patients with rare diseases in my health system!

I want to be reimbursed fairly for the services we offer!

I want a culture of patient safety!

I want my health system to be know for the highest quality care!

I want my health system to be a Center of Excellence!

I need long-term strategies for my health system as the market shifts!

Of course, we can't leave out the health plan executives...

I need to incorporate precision medicine effectively into health plan products!

I want clear evidence of efficacy before I pay for new technologies like whole genome sequencing!

I want to be able to effectively manage utilization of new expensive technologies!

I want to be competitive with other health plans.

I want to pay for health care that is cost effective and improves outcomes!

The the biotechnology, pharmaceutical, and scientific communities will accelerate discoveries and solutions.

Rich data sets from cohorts of patients with rare diseases are a treasure trove in advancing science!

Orphan drugs get to market faster than others and have a higher ROI!

I want access to genomic data from patients with rare diseases to accelerate drug discovery!

Data from rare genetic variances accelerate scientific discovery!

Policy and privacy concerns will be solved.

I want to make sure genetic data is secure!

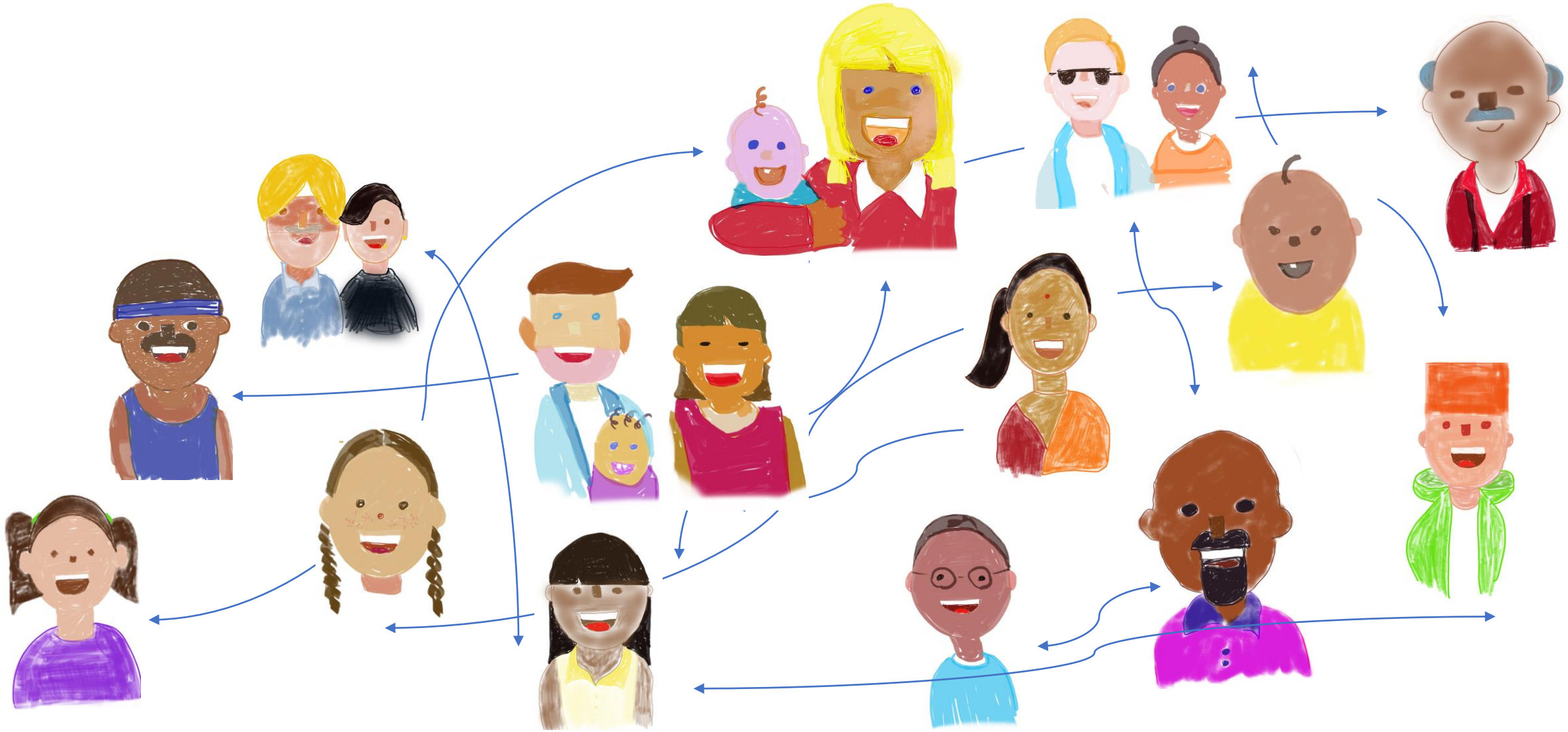
I want HIPPA and GINA regulations adapted for genetic data!

I only want my data used for research when I give permission!

I don't want the Russians and Mark Zuckerberg getting my genetic data!

I don't want to be discriminated against for insurance, employment, or housing based upon my genetic data!

People will be able to network with other families that share their rare disease...



Thank you!

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