





Engaging Patients Throughout the Life Cycle of Drug Development

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Conflict Disclosures

	PROBE study principal investigator, an independent investigator initiated research study, supported by Shire part of Takeda, Bayer, Bioverativ a
	Sanofi company, CSL Behring, Novo Nordisk, Roche, Sobi, National
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Director, Officer, Employee	WFH USA, ICER
Shareholder	None
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Honoraria	Roche/Genentech
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Advisory Committee	Roche/Genentech, Pfizer (DMC), Spark (DSMB)
Consultant	NHF













2010s-2020s

2000s-2010s

Extended Half-Life Clotting

Human cell line

"Biosimilars"

Factors

1980s-1990s

1960s-1970s

1950s-1960s

Blood, Plasma Cryoprecipitate

Comprehensive Care pioneered

Plasma-derived Clotting **Factors**

- On-demand Treatment
- Widespread viral contamination

Recombinant Clotting Factors

- aPCC / FVIIa
- Improved pathogen safety
- Home treatment / prophylaxis
- HTC network expanded

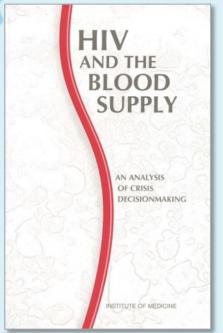
Novel Therapies

- Non-factor replacement
- Gene therapy
- Gene editing
- Cell therapy

Evolution of Hemophilia Care



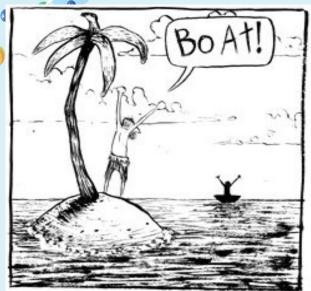




Blood safety is a shared responsibility of many diverse organizations. They include ... manufactures, groups like the NHF, and others.







Patients have a unique perspective and will consider issues differently than regulators, manufacturers, scientists, clinicians and payers.







Patient-Focused Drug Development

What burdens of disease/treatment matter most to patients? How to measure?	What aspects of trials could be better tailored for the patients?	How to integrate patient reported outcomes or preferences into Benefit-Risk assessments?	How to communicate information to patients and prescribers?
Translational	Clinical Studies	Pre-market review	Post-market
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Integrate patients' perspectives starting in the translational phase





- What matters to patients are outcomes that encompass the whole cycle of care
- Historically, outcomes measurement has focused on clinical status and left out functional status

Value in Healthcare = Value Created for Patients

Porter ME, et al. N Engl J Med 2010, 2016



Patient Reported Relevant Outcomes

Traditional Clinical Outcomes	Patient-Centric Outcomes	
Lifespan (survival)	Educational pursuit	
Factor levels (peaks & troughs)	Work / Career opportunities	
Bleeding frequency (annualized bleed rate, target joints)	Family / Social life engagement	
Joint outcomes (structure, range of motion)	Activity / Sports goals	
Function and mobility	Decreased burden of illness	





It is clear that although there have been great advances ..., more needs to be done not only to develop new therapies ..., but to <u>address</u> <u>broader economic, social, and educational</u> <u>barriers that still remain</u>.

FDA Voice of the Patient Report Conclusion May 2016





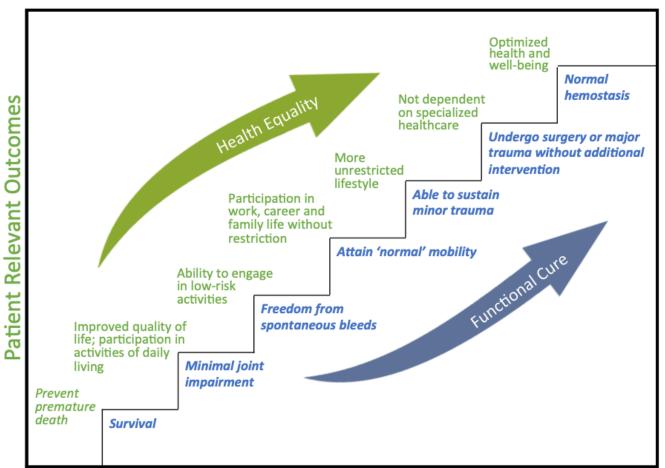
Comparing Outcomes Patients Deem Relevant

- Pain chronic/acute, interference, occurrence
- Independence limitations, impact on activities of daily living
- Education attainment, attendance
- Employment duration, underemployment, attendance
- Family life marriage, children
- Mobility assistance required, impairment
- Current health status (EQ-5D-5L VAS)





Achieving the Unimaginable: Health Equity



Level of Protection



Core Outcomes	 Frequency of bleeds Factor activity level Duration of expression Chronic pain Mental health status Utilization of healthcare system (direct costs)
Additional Outcomes	Duration/frequency/type of physical activity/sport/play Physical health/general health perception
Adverse Events	Short-Term, Long-Term, Mortality





	Increase predictability	
Collect and report well specified outcomes within clinical trials	and consistency of payer / HTA appraisal when making coverage decisions	Shared decision-making using outcomes meaningful to the quality of life and functioning of patients
Market Authorization	Market Access	On-Market Use

Consistent collection and reporting of relevant and well-specified outcomes







Patients as subjects (passive recipient)

Patients as partners (actively involved)

Patient engagement will drive the development of innovative medicines that deliver more relevant and impactful patient outcomes and make medicine development faster, more efficient, and more productive.