Emerging Technologies in Healthcare
Strategies for Digital Health

Françoise Simon, PhD

Agenda

- Social Trends
    - Usage and Demographics
    - New Role of Social Media in Research
- Measuring Patient Engagement
- New Regulation
    - FDA guidance
- Strategic Approaches
    - Social Content Risk Assessment
    - Best Practices
- Provider & Biopharma Cases
    - Sanofi/Biogen
    - Mayo Clinic
- Conclusion/Key Success Factors

Summary

- Social media show high growth
    - Facebook is used by 71% of online adults, vs. 28% for LinkedIn, 28% for Pinterest and 23% for Twitter
    - Multi-platform use is rising (52% use 2 or more sites)
    - Facebook membership showed no change in 2013-2014, and Twitter growth and engagement have stalled (only 36% daily use)[1].
- Providers and manufacturers have retreated from branded presence (90% of biopharmas stopped it, Facebook eliminated its sales force)
    - New regulation released by FDA and Europe, but still incomplete, mostly negative feedback (warning letters)
    - Company strategies can be assessed by a social risk meter, measuring risk/reward for levels of participation, from active listening to unbranded and branded approach
- Social media spending in US expected to reach $27.4B by 2020 (vs.$12.3B in 2015),with 5 years annual CAGR of 17.4% (Forrester Research Social Media Forecast, 2015)

1. Pew Research Center Social Media Update 2014
www.pewinternert.org/2015/01/09/social-media-update-2014

Social Trends

- Of the 87% of US adults using the internet, 72% have searched for health information in past year[1]

- 25% of Web users have consulted online reviews of providers, such as Healthgrades, RateMDs.com and Vitals

- Study of 1425 PCPs in 3 cities showed 800 were rated at RateMDs.com; high correlation between online and offline quality measures[2]

- Web use cuts across age groups[3]
  - 81% of adults age 65+ track weight, diet, exercise and health indicators
  - 68% of those age 50-64
  - 61% age 30-49
  - 64% age 18-29

1. www.pewinternert.org/data-trend/interner-use/lateststats,2014
2. Gao GG et al. *J Med Internet* Res. 2012 14(1):e38
3. www.pewinternet.org/reportts/2013/tracking-for-health.aspx

Intended target	Features	Example of Internet sites	Associated social networks					
			f	**Twitter**	**g+**	**YouTube**	**in**	Others
Patients	Physician evaluation, search for competencies and advice from other healthcare users	http://www.healthgrades.com/	X	X	X	X	X	X
		https://www.ratemds.com /	X	X	X			
		http://www.vitals.com/	X	X			X	X
		http://www.drscore.com/	X	X				X
		http://www.ratemymd.ca/	X	X	X			
		http://www.doctor.com/	X	X	X			
Health care providers (HCPs)	Sites exclusively dedicated to physicians. Exchange of medical opinions and diagnoses.	http://www.sermo.com/	X	X		X	X	
		http://www.doccheck.com/	X	X	X	X		X
		https://secure.quantiamd.com/	X	X		X	X	
		http://www.medscape.com/	X	X	X	X	X	
Patients (mainly) but open to all	Sharing site among patients and caregivers, but open to HCPs. Exchanges on innovation (new treatments)	http://www.patientslikeme.com/	X	X		X		X
		https://www.rareconnect.org/	X	X				
		http://www.carecloud.com/	X	X	X	X		
		http://www.acor.org/		X				
		http://www.mdjunction.com/			X	X		
		http://www.healingwell.com/	X	X		X		X
		http://www.askapatient.com/	X	X	X			
		http://www.healthetreatment.com/	X	X				
		https://www.healthtap.com	X	X	X	X		X

New Competition for Physician Practices

- Quantified Self trend: High growth of wearables such as Fitbit, but no data integration with EHRs
  - Issues: Mass scalability, data analyses, actual behavior change
- "Convenience revolution": Real-time communication
  - MDLive.com, DoctorOnDemand.com, AmericanWell.com (national network for primary care)
- Services extend to lab testing
  - AmeriDoc.com (kit shipped to house), InteractiveMD.com (annual wellness testing at LabCorp location)
- Payment structure and standard of care vary
  - Pay per visit (NowClinic.com: $45 for 10 min) or monthly (CallTheDoc.com, $19.95 per household)
  - Most sites do not allow continuity of care
  - MDLive.com: e-consults "Reviewed by Internal Medical Board" (C. DeJong et al, "Websites That Offer Care Over the Internet", *JAMA*, April 2, 2014, 311, 13, 1287-8)

Implementation Options

▸ Physicians may face a choice: Optimize access to their practices, or accept parallel online e-consults by their patients

▸ Several startups offer online practice support

– Sherpaa started in 2012, now has 500 customers from 30 companies, and refers to 100 specialists ($50 monthly charge per employee)

– PingMD launched app for iOS and Android to enable doctor/patient and peer-to-peer communication; Ring a doc offers a similar service

– IBM's Watson focuses on cancer care to support complex clinical decisions (MD Anderson's Oncology Expert Advisor uses it)

▸ Steps to develop e-consults for PCPs in Ontario: choose specialist partners and platform, define reimbursement ($200/hr), ensure patient privacy, track outcomes

– Small program (300 PCPs/ 26 specialist services), but high satisfaction (4.6 out of 5) (C. Liddy, "Ten Steps to Establishing an E-Consultation Service", *Telemedicine & Ehealth*, Dec. 2013: 982-90)

Social Networks Engage in Research

- Several online patient communities are now engaging directly in research
  - Leukemia and Lymphoma Society has invested over $17M in small companies, with an additional $600M from pharma firms.
  - Cystic Fibrosis Foundation invested $75M in Aurora Bioscience (acquired by Vertex in 2001)to develop Kalydeco for patients with G551D gene mutation (only 4% of the 70,000 worldwide population); over 30 treatments now in pipeline
  - Multiple Myeloma Research Foundation is linked to a research consortium of 16 academic medical centers sharing access to the largest tissue bank (over 4000 bone marrow samples)[1].

1.Rob Loft "New Players Join the Drug Development Game", Health Affairs, October 2014, 33:10, 1711-13

Value of Social Networks in Patient Recruitment

Name	Approach	Impact
Mayo Clinic	• Sought to develop a DNA biobank of SCAD[1] patients, a rare disease. • Launched a post in online community seeking participants.	• Enrolled initial target 18 patients within 1 week. • Additional volunteer participants may be enrolled in later study.
Lilly	• Implemented social media recruiting strategy for diabetes and head/neck cancer. • Used a range of sites including Facebook, Click-it-Forward, YouTube, and proprietary health networks.	• Faster rate of recruitment for social media versus traditional media at a 10% cost savings.
Army of Women	• Sponsored by the Dr. Susan Love Foundation. • Online community dedicated to breast cancer has 360,000 patients.	• 61 researchers met patient recruitment targets by partnering with Army of Women. • One study was able to recruit 1,200 patients per month.

Source: Adapted from: McKinsey & Company, Digital Health Case Compendium, 2015

1.SCAD: Spontaneous Coronary Artery Dissection
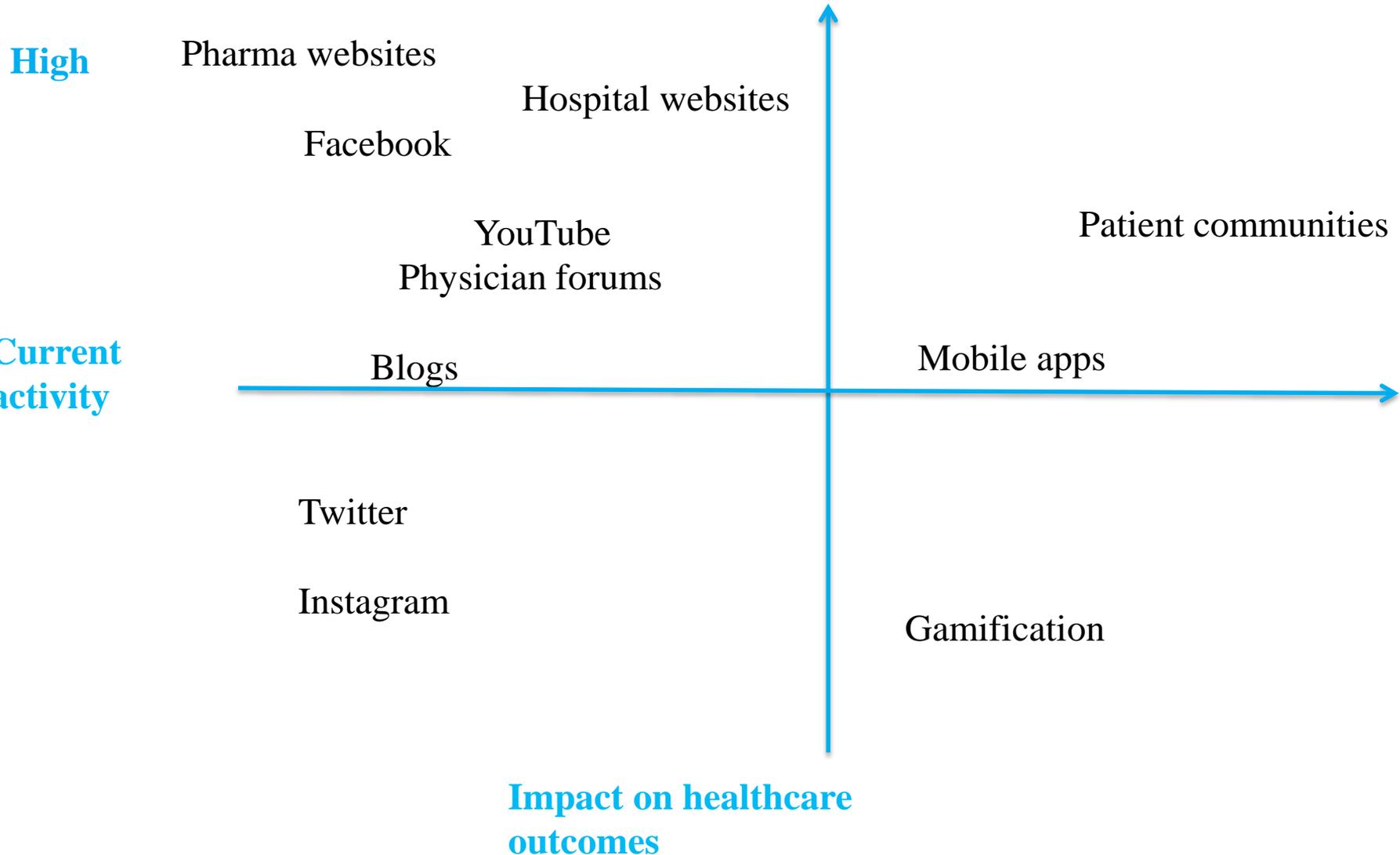
Patient-To-Patient vs. Patient-To-Provider

- PatientsLikeMe.com was partially funded through VC in 2004 as a "health data- sharing platform to transform the way patients manage their own conditions and improve patient care"
  - Launched Open Research Exchange, connecting patients with scientists at early research design stages[1]
- Over 1200 US hospitals engage with patients via social media
  - Mayo Clinic launched in 2010 the Social Media Network, with 100 affiliates and media including blogs, Twitter posts, conferences and webinars[2]
  - Kaiser Permanente has implemented since 2008 a suite of internet, mobile and video tools for its 3.4 million members and 8000 physicians--over 100 apps to review health data, make appointments and exchange secure email through kp.org[3]
  - Ideabook is KP's internal social network that supports blogs, chats, videos, and cross-functional work teams

1. L. Schwamm, *Health Affairs*. 33:2, Feb. 2014.
2. M. Househ, *Health Informatics Journal*, 20:1, 2014.
3. R. Pearl, *Health Affairs*. 33:2, Feb 2014.

Potential Impact of Social Media on Outcomes

High

Pharma websites

Hospital websites

Facebook

YouTube

Patient communities

Physician forums

Current activity

Blogs

Mobile apps

Twitter

Instagram

Gamification

Impact on healthcare outcomes

Patient and Physician Barriers for Mobile Health

Consumer usage 1.	%	Physician concerns about mobile heath 2.	%
Not comfortable sharing personal information	42%	Privacy & security of patient information	45%
Exercise	25%	No reimbursement	39%
Track health	23%	Connectivity issues	29%
Track weight	15%	Setup too expensive	24%
Dietary intake	14%	No support from hospital/ practice leaders	16%
Sleep patterns	12%	No patient interest	15%
Medication schedule	12%	Too complicated	14%

1.PWC Health Research Institute, Health Wearables: Early Days, 2014
2.PWC/HRI Clinician Work Force Survey, 2014

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MEASURING PATIENT ENGAGEMENT

- Patient engagement : Knowledge, skills and ability to manage one's health + culture that prioritizes patient activation and shared decision making

- Patient experience touchpoints:

Awareness ➔ Appointment wait time ➔ Copayment (cost for entire episode of care) ➔POC wait/decision aids ➔ Consult time/interaction quality/shared decision ➔ Nursing responsiveness/education ➔ Treatment adherence/remote Rx monitoring ➔ Clinical outcomes ➔ Next appointment

- Research firms propose comprehensive surveys
  - Press Ganey Patient Voice/Physician Voice/Employee Voice
  - Myers Group : Time-analysis worksheets tracking patient visit timing
  - Key survey points: Quality, access and interpersonal issues (NCQA shows that patients prioritize access)

FRAMEWORK FOR PATIENT ENGAGEMENT

CONSULTATION	INVOLVEMENT	SHARED LEADERSHIP
Patient info about Dx	Patient Treatment preferences	Shared decisions
Patient survey about experience	Patients on advisory councils	Patients co-lead quality improvement

- Some studies linked enhanced decision-making to lower costs and fewer hospital admissions (Veroff D. et al, Health Affairs 32, 2,(2013):285-93
- Other studies show reporting discrepancies: For spinal surgeries, physicians reported a 2.6% complication rate, vs. 29% for patients (www.ncbi.nlm.nih.gov/pmc/articles/PMC 2899315)
- HCAHPS survey's communication questions are limited to whether a dialogue occurred, not whether the patient's view was understood
- A prospective cohort study of 52,000 patients linked higher patient satisfaction to greater inpatient care use & drug spending (Arch. Int. Med., March 2012)

Variance in Economic Impact

▸ Cost savings for patients are best measured

- Hospital at Home model (Johns Hopkins) achieved comparable outcomes vs. inpatients, and yielded savings of 19% (L. Cryer et al, "Costs for Hospital at Home Patients were 19% lower", *Health Affairs*, June 2012, 31: 61237 – 1243)

- VA e-consults to more than 608,000 patients in FY 2013 reduced bed days by 59% and cut admissions by 35%; patients saved close to $2000 each. (Dan Bowman, "VA Telehealth Efforts Cut Patient Costs"; *Pierce Health IT*, June 19, 2014)

▸ Revenue impact for practices is unclear

- Survey of 49 practices in Mass. E-Health Collaborative (2013) found that only 27% would achieve a positive ROI after adoption of EHR

- Full functionality (patients getting paperless statements and paying bills online) could lead to improved payment yield and reduced days in account receivables

E-Health Effectiveness

▸ Many offline/online comparisons focus on diabetes, CVS and ophthalmology

– **U. of Maryland Mobile Diabetes Intervention Study**: 26 primary care practices with 163 patients included m-health transmission of glucose values, drugs and behavioral coaching: Mean decline in HbA1c was 1.9% in e-health group, vs. 0.7% in usual care group. (C. Quinn et al, "Cluster – Randomized Trial of a Mobile Phone Personalized Behavioral Intervention for Glucose Control", *Diabetes Care* 34: 1934 – 1942, 2011)

– **Health Partners** enrolled 450 adults with uncontrolled blood pressure across 16 primary care clinics in Minnesota; compared with usual care group, systolic BP decreased more in telemonitored patients at 12 months (K. Margolis et al, "Effects of Home BP Monitoring & Pharmacist Management on BP Control", *JAMA*, 2013; 310(1): 45 – 56)

– **Diabetic teleretinal screening at Emory Eye Center / Atlanta VA** compared face to face exams and tele – eye protocol for 52 patients; percentage agreement for cataract was 100%, macular degeneration 96%, and glaucoma suspect 87% (Y. MaaApril et al, "A Novel Tele-Eye Protocol for Ocular Disease Detection and Access to Eye Care Services", *Telemedicine and e-Health*, April 2014, 20(4): 318 – 323)

Evolution of FDA Regulation

- FDA has issued several recent guidances
- Sept. 2013: It may regulate "mobile medical apps". i.e.apps used as accessory to a regulated device, or transforming a phone into one
- Jan. 2014: A firm must submit material on sites that it owns ,controls or influences; the firm is not responsible for user-generated content on sites it does not control or influence
- March 2015: FDA guidance on electronic informed content in clinical trials
  - Need to give subjects adequate info about trials, in understandable language
  - Consent may take place at study site or remotely (need to verify subject's identity)
  - Support system must be secure with restricted access
  - Patient recruitment: Outside the scope of guidance

Implications of new regulation

- Fair balance is mandatory for any content a firm produces or controls, either on an owned property (brand.com) or a 3rd party such as Facebook

- Companies may provide online communities or bloggers with educational material, but they are not responsible if they have no editorial control over how the content is used

- Transparency is a must for companies, who have to clearly identify their affiliation with any medical product

- FDA submissions of real-time interactions do not have to be sent prior to deployment, but they are required on a monthly basis

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Industry Trends

- Biopharmas have retreated from branded presence, but participate broadly for unbranded and corporate information
    - J & J on YouTube: Several playlists (diabetes, lifestyle, autism); over 7000 subscribers also linked to Facebook and Twitter
    - AstraZeneca on Twitter: Corporate information at #RXSave, on patient access
- All uncontrolled social media have several limitations and should be handled with a stepwise approach
    - Interactivity not possible on Facebook, due to adverse effect reporting requirements to biopharma
    - Twitter issue = 140 characters vs. fair balance, useful mostly to track conversations and direct patients to correct information sources

Social Best Practices

Listen	Audit	Create content	Integrate
What conversations are happening about your product/service or disease state?	What social platforms does your organization already use? Based on listening exercise, determine the platforms your customers are using	Create content to address customer pain points and under communicated areas	Pilot new initiatives and integrate into social publishing schedule

Emerging Trends in Healthcare Biopharma and Provider Strategies

- Sanofi and Welldoc in diabetes
- Mayo Clinic/Apple/MD Anderson
- Biogen

Sanofi Diabetes

First long-acting basal insulin

The company's highest-selling brand ($7.8 billion sales in 2013)

Patent expiration in 2014-15
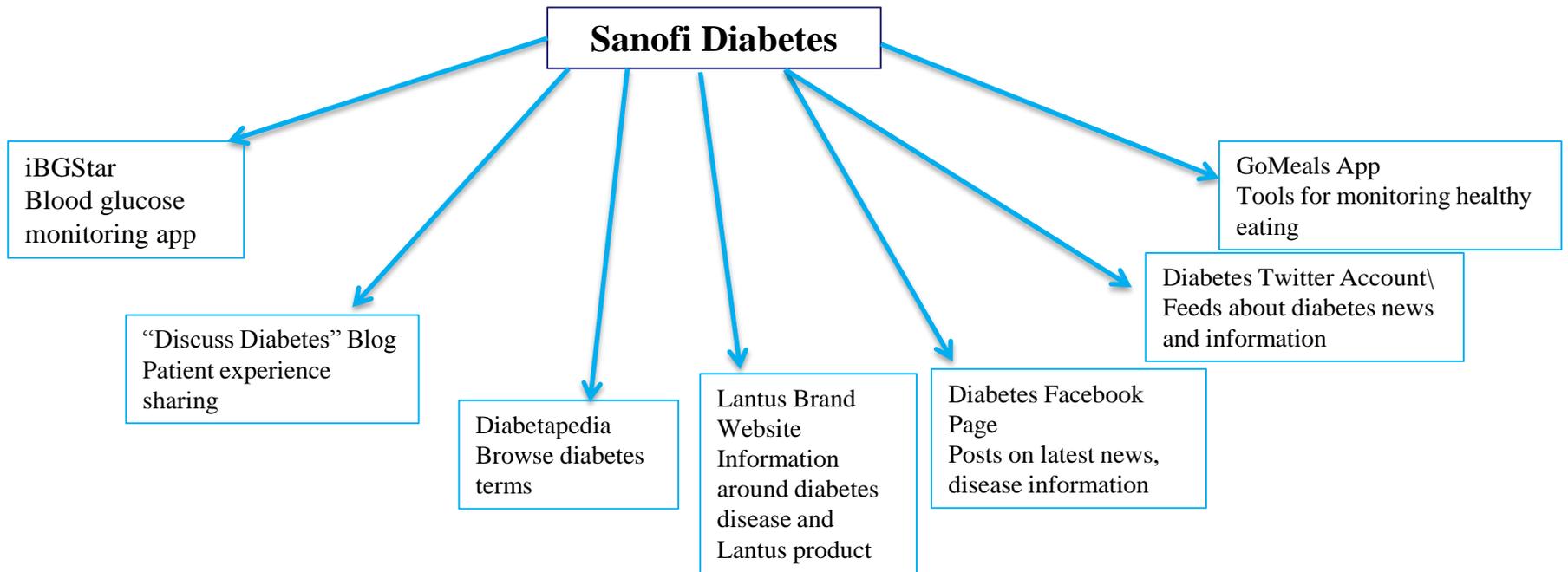
Distant third rapid-acting insulin

Fourth-to-market GLP-1 agonist

A new formulation of Lantus is critical to protect the diabetes franchise

Sanofi Crowdsourcing Innovation

- In addition to product development, Sanofi wanted to demonstrate its commitment to innovation through co-creation and partnership with innovators and creators

- With its blockbuster drug reaching patent loss, Lantus and the Sanofi diabetes team needed to demonstrate innovation in different ways

- Sanofi Diabetes came up with the Sanofi diabetes challenge

- An open call for innovative diabetes products and services for the diabetes community

- The inaugural prize in 2011 for the winner was $100,000: Ginger.Io, app using a mobile phone to self-monitor real-time movement patterns and social interactions

Sanofi Integrated Communications in Diabetes

Sanofi Diabetes

iBGStar
Blood glucose
monitoring app

"Discuss Diabetes" Blog
Patient experience
sharing

Diabetapedia
Browse diabetes
terms

Lantus Brand
Website
Information
around diabetes
disease and
Lantus product

Diabetes Facebook
Page
Posts on latest news,
disease information

GoMeals App
Tools for monitoring healthy
eating

Diabetes Twitter Account\
Feeds about diabetes news
and information

Source: Adapted from: McKinsey & Company, Digital Health Case Compendium, 2015

WellDoc BlueStar: FDA-approved app for diabetes

Context

- Drugs alone are not sufficient to treat diabetes patients
- Continual reinforcement and education are needed to keep patients engaged and adherent

Innovation

- WellDoc launched BlueStar, FDA approved app
- Tracks glucose levels, calculates insulin doses, and provides recommendations
- App also sends quarterly health information to physicians

Impact

- First to be eligible for insurance reimbursement and is already accepted by self-insured companies such as Ford and Rite Aid
- Trials showed an average two-point drop in HbA1c within 90 days

Mayo Clinic Innovation

- Founded in 1889; values: patients' interest above all and team work
  - Mission: To transform the experience and delivery of health care
  - 4000 physician-scientists, over 1 million patients across campuses
- Focus on the human experience to identify needs and design services
  - Collaborate openly—internally and externally
- Generate economic value by demonstrating financial return from sustainable delivery models services and products
- Philosophy: Thing big. Start small. Move fast.

Mayo/Apple Healthkit Partnership

- Development of a healthcare information repository in partnership with Apple called the HealthKit
  - Integration has already been worked out for major EMR/EHR systems like Epic
- Apart from integrating information from devices like Fitbit, it will also allow users to input information like their glucose level and heart rate

Apple ResearchKit Enables Consumers to Share Medical Data for Research

Features

- Apple announced in March 2015 the launch of an open-source platform that enables iPhone owners to share health data with medical researchers.
- 700 million iPhones in circulation/massive potential pool of data.
- ResearchKit apps target Parkinson's, breast cancer, diabetes, asthma, and cardiovascular diseases.
        - Parkinson's mPower app uses the iPhone's sensors to monitor symptoms including tremor, balance and gait, vocal characteristics and memory

Impact for researchers

- Massachusetts General Hospital is using Apple's software on diabetes patients to monitor and analyze trends from glucose levels, activity, and diet.
- Study tracking patients after atrial fibrillation repair surgery is launching a ResearchKit app to track efficacy of the surgery by patient population and outcomes by physicians.

Source: Adapted from: McKinsey & Company, Digital Health Case Compendium, 2015

Mayo Clinic Digital / Social Summary

- 40 million visits per month to the mayoclinic.org website
- Facebook, Twitter, YouTube, Pinterest, Google+, LinkedIn are used to amplify news and events, build awareness, engage deeply with customers, and foster innovation
- Exclusive partnership with Apple and its new "Health" mobile health record platform
- Clinical News still drives the largest spikes in social traffic
- Goal to reach 200 million patients by 2020

Use of Apple Watches by MD Anderson and Polaris

Context	Big Data Application	Impact
• MD Anderson at Cooper (NJ) uses Apple Watches on 30 breast-cancer patients to refine treatment plans and improve outcomes. • MD Anderson healthcare professionals will review and analyze data using Polaris's Polestar, a behavioral health outcomes management platform.	• Sensors will collect behavioral data (heart rate and patient activity) and Polaris will apply analytics to provide insights for patients and care teams. • Patients will also use the Apple Watch to answer multiple-choice questions about their mental health and treatment side effects. • The Apple Watch aims to help physicians to better coordinate care with patients.	• Nine-month feasibility study expected to have significant impact. • "The timeliness of the Apple Watch … and the ability to have that regular connection with patients is just awesome. As opposed to me having to help patients put out fires after problems already exist."- Cori McMahon, Psy.D. • Project findings will be jointly published.

Source: Adapted from: McKinsey & Company, Digital Health Case Compendium, 2015

Biogen, PatientsLikeMe use Fitbit wearable to track MS progress

Description

- Biogen and PatientsLikeMe cooperated to track MS activity by Fitbit
- Biogen maybethe first to conduct a study using wearable technology in a specific patient population
- For MS patients, walking is an indicator of well-being and disease progression

Application

- Fitbit measures number of steps, distance walked, and sleep quality
  -May one day be capable of nuanced measurements of patients' gait and dexterity
- Patient data can be synchronized with PatientsLikeMe online portal
- For relapsing MS, changes could be detected earlier
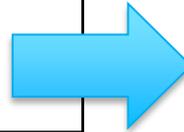- Biogen also plans an iPad app that gauges cognitive function and vision

Impact

- Collected data could supplement office visits

- May promote behavioral change (walk more)

- In a non-controlled study of 248 MS patients, 88 percent reported that the device was easy to use and 83 percent agreed that they would continue to use it.

Merck's multi-channel launch of Januvia

Context

- Little differentiation between two DPP-4 inhibitors to be approved by FDA for type 2 diabetes
- Januvia (Merck) approved first, needed to rapidly gain market share
- Approval for Galvus (Novartis) expected soon after
- Potential $6 Billion value at stake
- Merck's 5 year cost reduction cycle resulted in fewer sales people, more alternative channels

Overall launch strategy

- Early disease perception building:
  - Pioneered use of social peer influence profiling and constructed a new peer influence community
  - Invested heavily in early disease/MoA education
- Strong sales-force deployment:
  - Significant reduction in number of reps promoting in-line brands/offset by video detailing

Key multi-channel activities

- Satellite symposium broadcast to over 7,000 healthcare professionals
- Januvia.com- site live 1.5 hours post approval; 60k hits in first 3 weeks
- Targeted ~50k physician offices where physicians opted-in to video detailing
- Call centers:90 reps and liaisons available within 24 hours of approval
- Heavy sampling use in first few months

Source: Merck Investor Presentations, Manhattan Research, McKinsey

Key Findings

- Social media are growing, but at a slower pace, and with uneven consumer engagement

- Increasing direct role in research (Patients Like Me/ observational studies), several online communities funding drug development)

- Barriers remain for mobile health, for consumers and physicians (privacy, reimbursement, liability, cost)

- Pharma firms have retreated from branded presence, but engage in unbranded and corporate information

- Sanofi, Biogen, Mayo Clinic have successfully developed multi-channel communications including social networks

Key Success Factors

- Analyze consumer social behaviors via listening tools and surveys

- Match their channel preferences to marketing objectives (reach, depth, relationship)

- Engage patients & influence behavior (real-time input from case manager)

- Aggregate data from all sources, such as listening platforms and patient communities

- Build a database of best practices from successful social programs

- Implement analysis that provide predictive and real-time measurements

  - Metrics for social depth include: time spent on site, ease of access, consumption/number of views/ ratings, participation/sharing and conversions/adoption of health services.

- Integrate social platforms with all marketing activities, including offline communications

- Document outcomes (improvements in adherence and therapy personalization)