

# Healthcare at Crossroads



# Improving the Safety and Quality of Health Care: The Impact of the National Academy of Medicine on Research and Collaboration

**Victor J Dzau, MD**

President, National Academy of Medicine

AHRQ Research Summit: Improving Diagnosis  
in Health Care

September 28, 2016



NATIONAL ACADEMY OF MEDICINE

Leadership • Innovation • Impact | *for a healthier future*

# U.S. National Academy of Sciences (1863)

*“The academy shall, whenever called upon by any department of the government, investigate, examine... and report upon any subject of science or art,...”*



**1970 Institute of Medicine** founded to advise & improve health of people everywhere.

*The New York Times describes the IOM as “the most esteemed and authoritative adviser on issues of health and medicine, and its reports can transform medical thinking around the world.”*

**July 1, 2015 IOM** is reconstituted as **the National Academy of Medicine**

# Early IOM Healthcare Quality Initiatives

## MEDICARE

*A Strategy for Quality Assurance*

**Volume I**

*Committee to Design a Strategy for Quality Review and  
Assurance in Medicare*

*Division of Health Care Services*

INSTITUTE OF MEDICINE

Kathleen N.Lohr, editor

NATIONAL ACADEMY PRESS

Washington D.C.

1990

## IOM Health Care Quality

*America's Health in Transition*

**Protecting and Improving Quality**

*A Statement of the council of the*

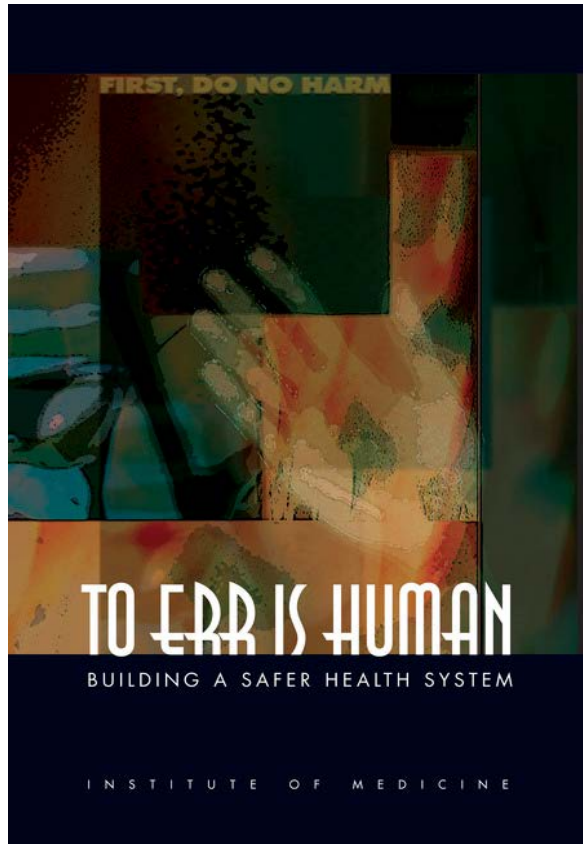
*Institute of Medicine*

Washington, D.C. 1994

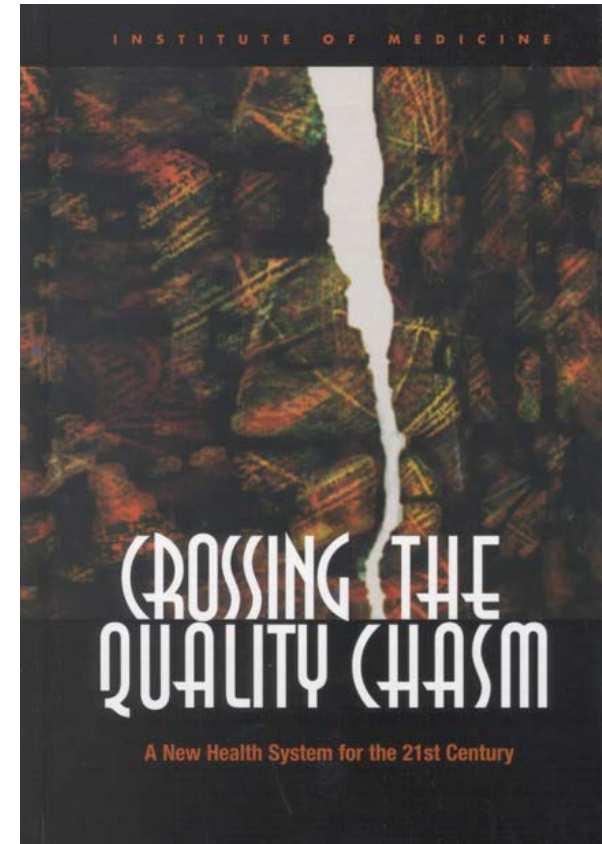


# The IOM Quality Series

## Foundational Reports

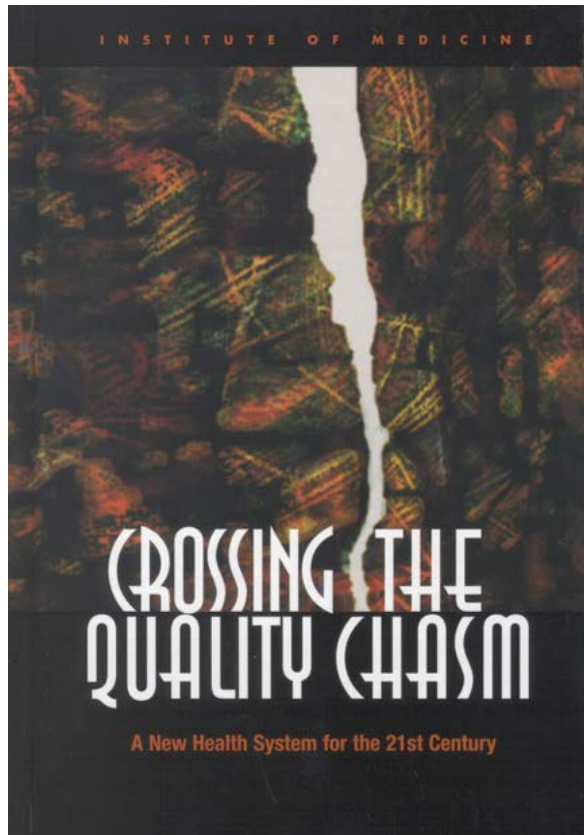


1999



2001

# Crossing the Quality Chasm: A New Health System for the 21<sup>st</sup> Century (2001)



2001

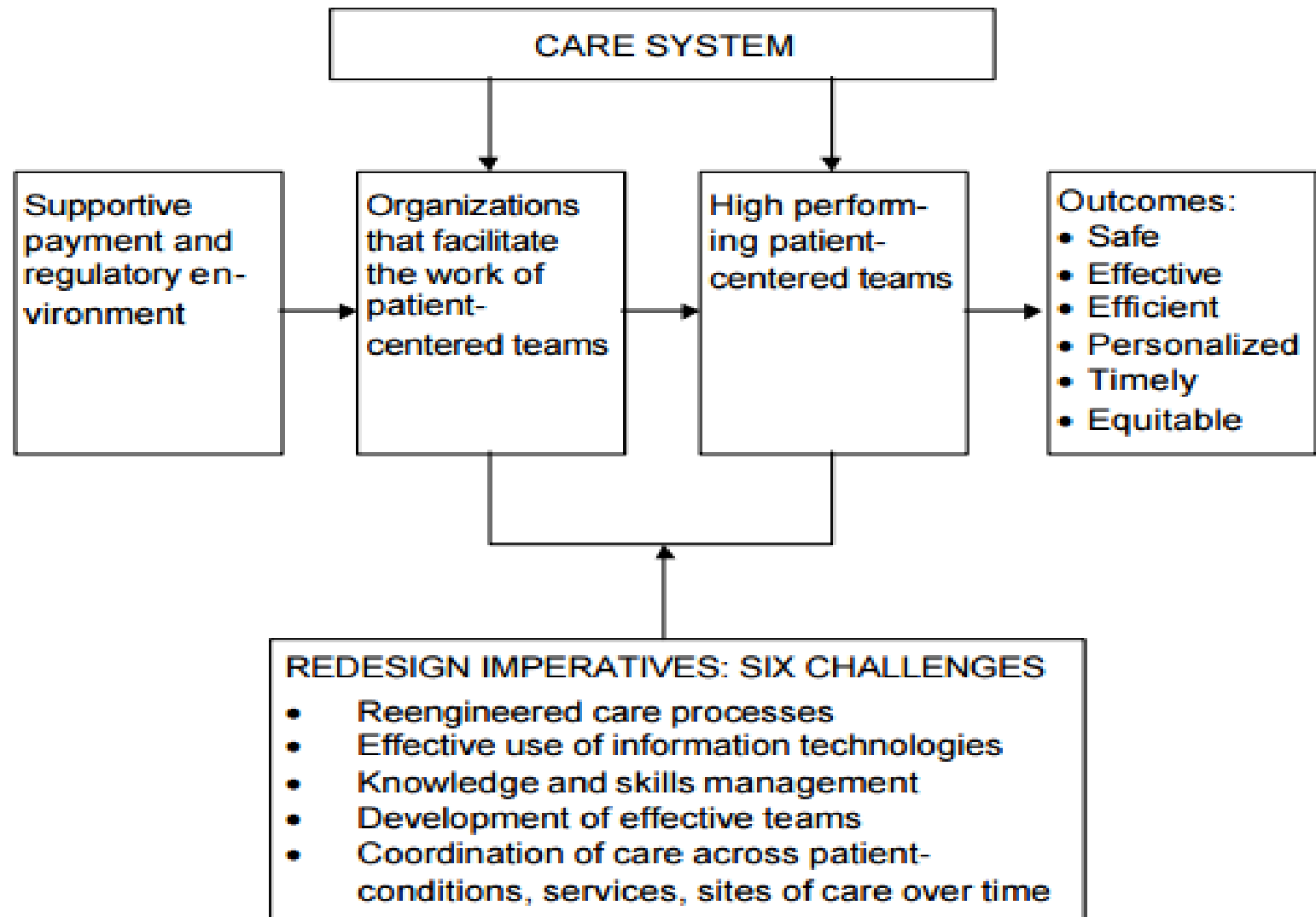
- Described broader **quality issues** and defines six aims—care should be
  - safe,
  - effective,
  - patient-centered,
  - timely,
  - efficient and
  - equitable



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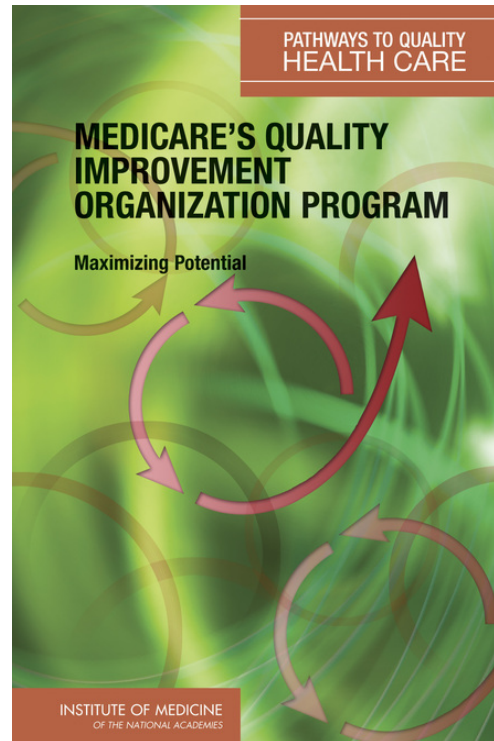
# Crossing the Quality Chasm: Redesign a New Health System for the 21<sup>st</sup> Century



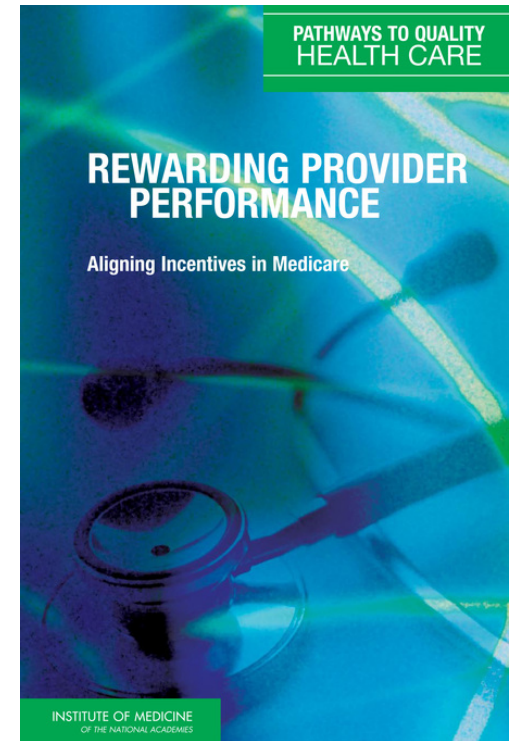
# Redesigning Health Insurance: Performance Measures, Quality Performance Improvement & payment



2005



2006



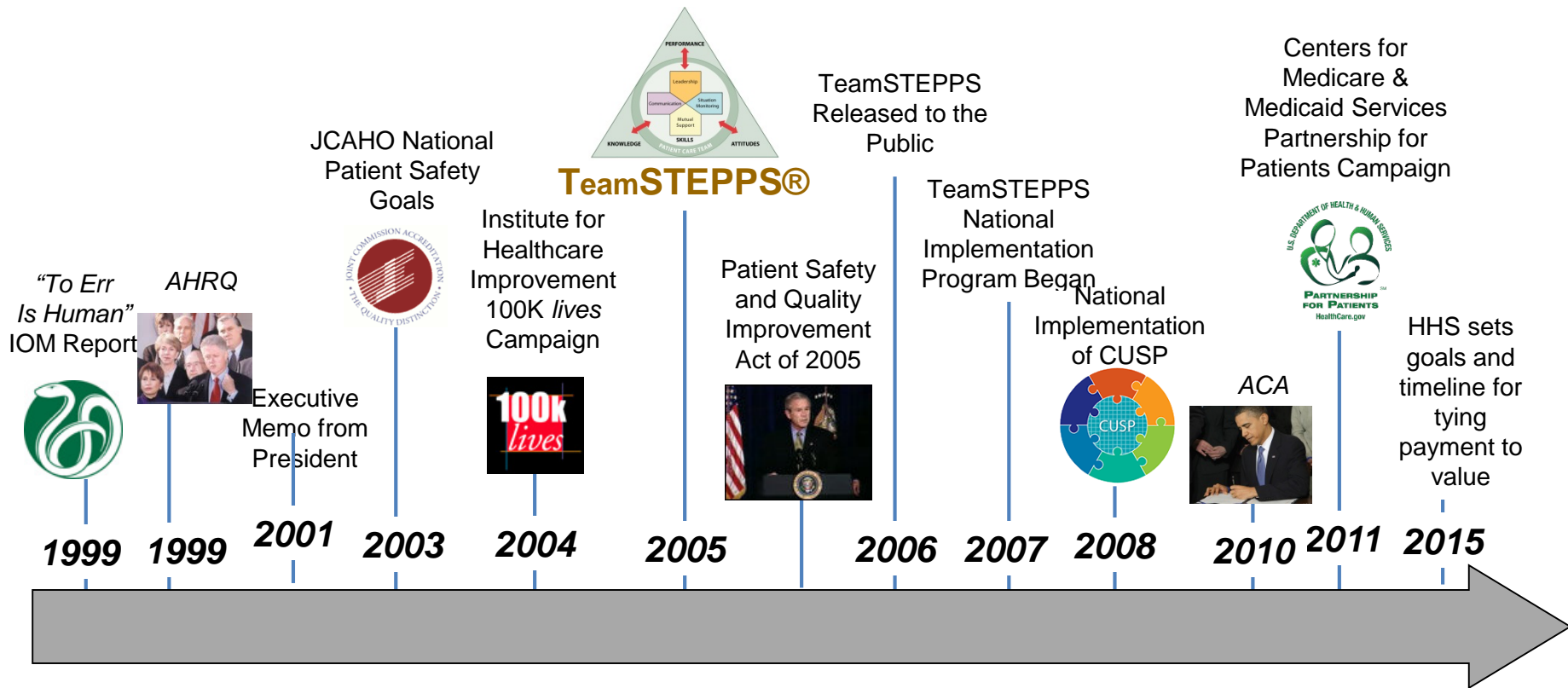
2007



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# Patient Quality & Safety Movement



# HHS

## ***Better Care. Healthier People. Smarter Spending.***

*From current FFS to FFS linked to quality to APM to population based payment*

### Payment Taxonomy Framework

**Category 1:  
Fee for Service  
-No Link to  
Quality**

**Category 2:  
Fee for Service -  
Link to Quality**

**Category 3:  
Alternative Payment Models  
Built on Fee-for-Service  
Architecture**

**Category 4:  
Population-Based  
Payment**

Medicare FFS

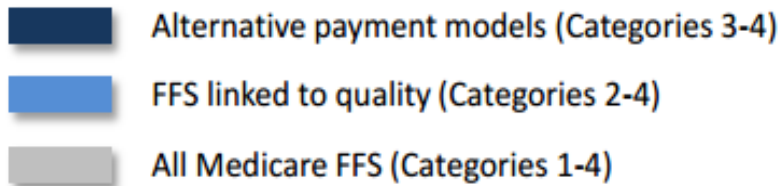
- Limited in Medicare fee-for-service
- Majority of Medicare payments now are linked to quality

- Hospital value-based purchasing
- Physician Value-Based Modifier
- Readmissions/Hospital Acquired Condition Reduction Program

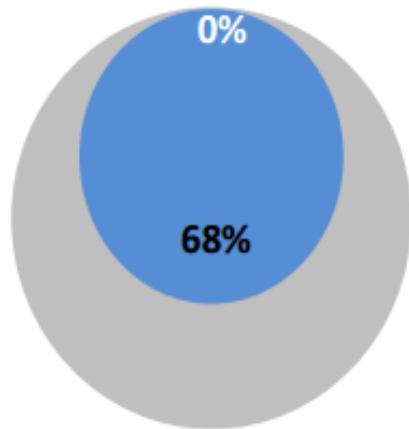
- Accountable care organizations
- Medical homes
- Bundled payments
- Comprehensive primary care initiative
- Comprehensive ESRD
- Medicare-Medicaid Financial Alignment Initiative Fee-For-Service Model

- Eligible Pioneer accountable care organizations in years 3-5

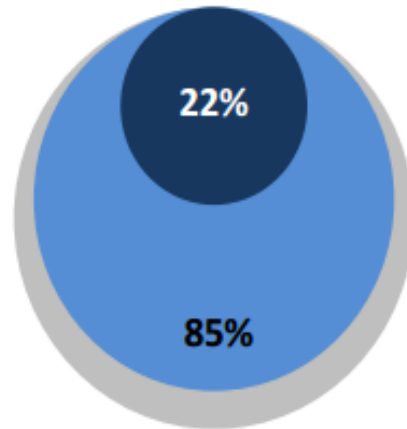
# HHS Value-Based Payment Goals



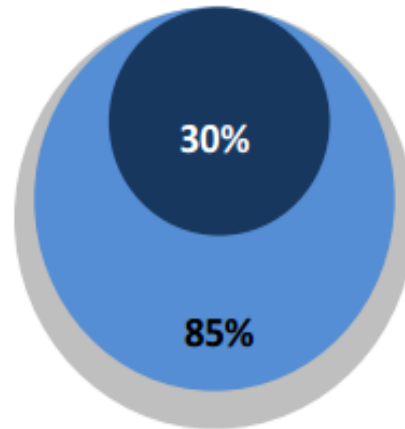
**2011**



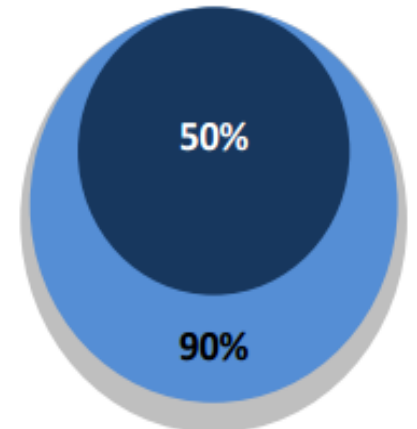
**2014**



**2016**



**2018**



**Historical Performance**

**Goals**

# Are we doing any better?

- 1999 IOM: 98,000 people die each year from adverse events
- 2005: IHI launched first national campaign (100,000 Lives Campaign) and claimed to have saved an estimated 122,300 lives over 18 months

## Hospital Acquired Conditions 2010-2014

- Interim estimates for 2014 show a sustained **17 percent decline** in hospital-acquired conditions (HACs) since 2010
- A cumulative total of **2.1 million fewer HACs** were experienced by hospital patients over the 4 years
- **Nearly 87,000 fewer patients died** in the hospital as a result of the reduction in HACs and that approximately **\$19.8 billion** in health care costs were saved from 2010 to 2014

Adverse Drug Events	Pressure Ulcers	Catheter Associated Urinary Tract Infections	Surgical Site Infections	Falls
39.8% ↓	28.0% ↓	16.1% ↓	2.9% ↓	2.4% ↓

# The Journey Continues

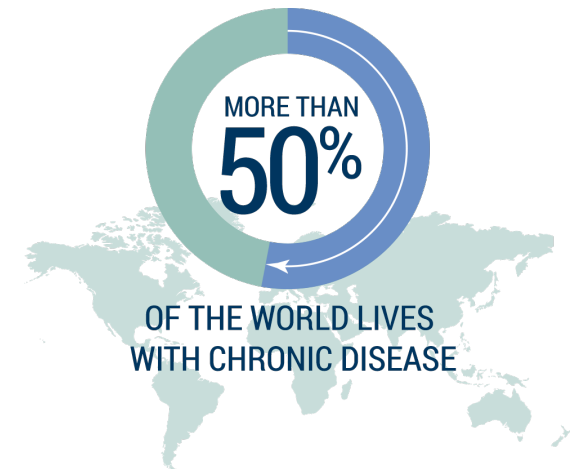




Panelist: Scott Weigand  
Associate Systems Engg. Advisor  
Eli Lilly and Company

# How are you?

- ◆ Half of all adults in the US have one or more chronic health condition<sup>1</sup>
  - *9.3% of all people living in the US have diabetes<sup>2</sup>*
- ◆ 86% of all Health Care Spending in 2010 was for people with one or more chronic medical conditions<sup>3</sup>
  - *Diabetes alone accounts for 20% of all Health Care Spending and 33% of all Medicare Dollars<sup>4</sup>*



**BE KIND**  
*for*  
**EVERYONE**  
YOU MEET *is*  
**FIGHTING**  
*a* **HARD BATTLE**

<sup>1</sup> Ward BW, Schiller JS, Goodman RA. Multiple chronic conditions among US adults: a 2012 update. *Prev Chronic Dis.* 2014;11:130389. DOI: <http://dx.doi.org/10.5888/pcd11.130389>

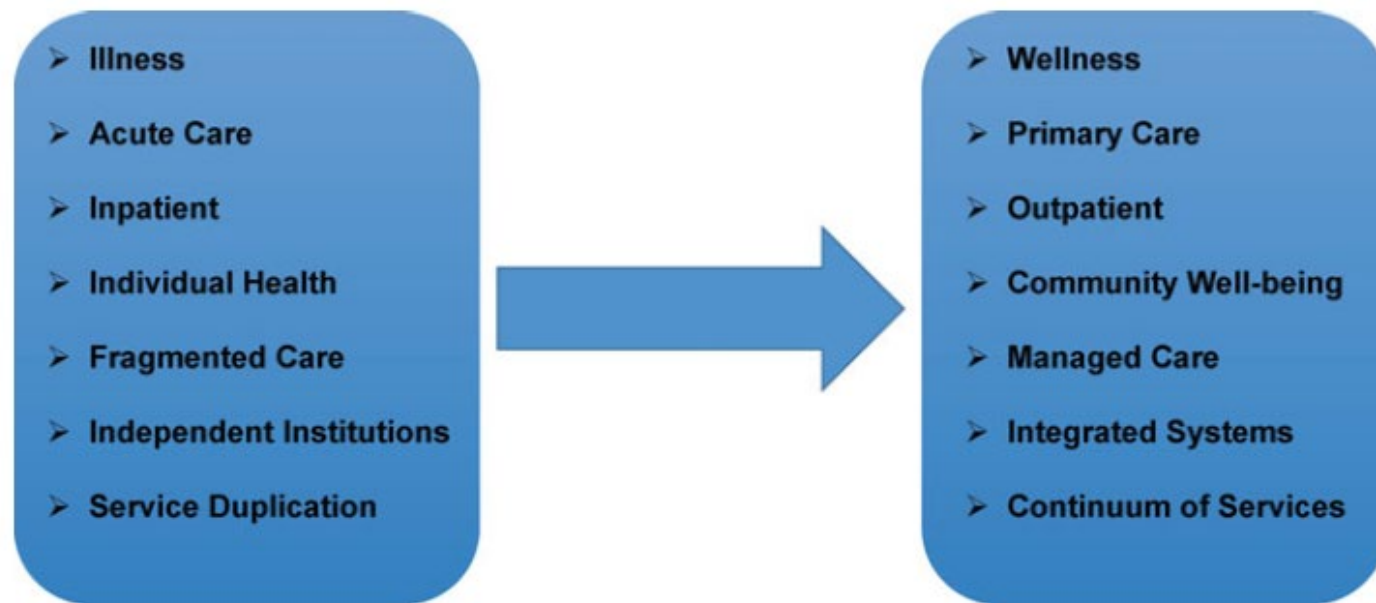
<sup>2</sup> Center for Disease Control, National Diabetes Statistics Report, 2014

<sup>3</sup> Gerteis J, Izrael D, Deitz D, LeRoy L, Ricciardi R, Miller T, Basu J. [Multiple Chronic Conditions Chartbook.\[PDF - 10.62 MB\]](#) AHRQ Publications No, Q14-0038. Rockville, MD: Agency for Healthcare Research and Quality; 2014. Accessed November 18, 2014.

<sup>4</sup> American Diabetes Association

# Shift in Health Care

- ◆ Less focus on diagnosis and treatment and more emphasis on patient-centered and managed care to promote prevention.
- ◆ Rise in Home Health Care solutions to offset costs



**Source:** "The U.S. Health System" by Hannah L. Maxey , Connor W. Norwood , and Leisha L. Osburn BW, Schiller JS, Goodman RA. In book: Clinical Informatics Study Guide, Edition: First, Chapter: 2, Publisher: Springer International Publishing, Editors: John Finnell, Brian Dixon, pp.23-46

# Medical Devices

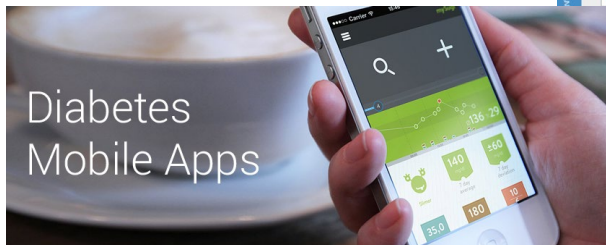
## Shifting Health Care to the Home

- ◆ Technology enables patients to self manage care at home

### Auto injectors (Self Administer Delivery)



### Mobile Apps (Help manage care)



### Wearable Drug Delivery



### Chemotherapy

medGadget

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#### Neulasta On-body Injector Makes Sure Drug Administered Following Chemo

MARCH 5TH, 2015 EDITORS ONCOLOGY

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Neulasta (pegfilgrastim) is administered to patients the day after chemotherapy to boost the production of white blood cells that help fight infection. Now a new product from Amgen, the manufacturer of Neulasta, will allow clinicians to stick a patch to a patient's skin right after chemo that will deliver the full dose of the medication a day later.

This will guarantee that the patients receive the Neulasta while letting them rest comfortably at home after therapy. Additionally, one less visit per patient will free up a lot of valuable time at the clinic.

Some details from Amgen:

*In addition to the On-body Injector, the Neulasta Delivery Kit includes a specifically designed Neulasta prefilled syringe along with H&P and*



# Improvements to Sensing Technology

- ◆ Advances in Bio-signal sensors provide additional insights and enable better management of care

FDA Approvals > Medscape Medical News

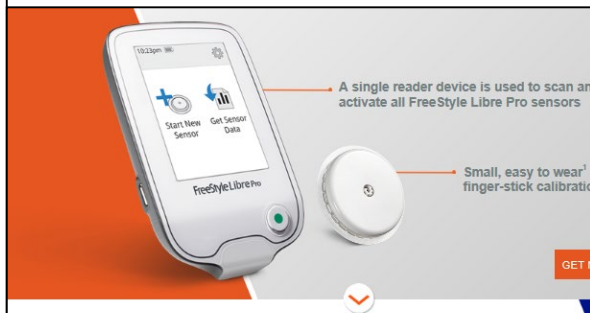
## FDA Approves Abbott's FreeStyle Libre Pro System for Diabetes

Miriam E Tucker

Disclosures | September 28, 2016

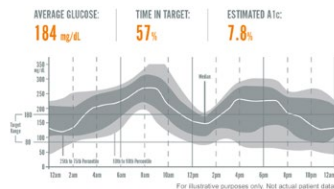
1 comment

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Simple reports show glucose patterns at a glance

SEE REPORTING INFORMATION



### The Thinnest CGM Ever, from Dexcom and Verily

Another standout in Dexcom's pipeline is its partnership with **Alphabet Inc.** formerly known as Google Life Sciences to develop smaller, less expensive **CGM** devices. Earlier this month, the company shared pictures of the "thinnest CGM ever," with less volume than the size of a penny – check out the picture below of the device. This would dramatically reduce the size of CGM on the body, making it less expensive, and bring the technology to far more people (only about 1-in-5 people with type 1 in the US use CGM, and only about 1-in-5 people with type 2 diabetes).

## Dexcom's G6 Sensor Shines in Early Accuracy Study

11/25/16 - NEW NOW NEXT

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TYPE

By Lynn Kennedy and Adam Brown

Earlier this month, Dexcom shared compelling new details on its longer-wear, less calibration G6 sensor and its partnership with **Verily** to develop a bandage-like continuous glucose monitoring (**CGM**) device. The G6 sensor is expected to launch in 2018, while the first-gen Verily sensor will launch in late 2018, with a second-gen version coming as early as 2020. Read on for the new details!



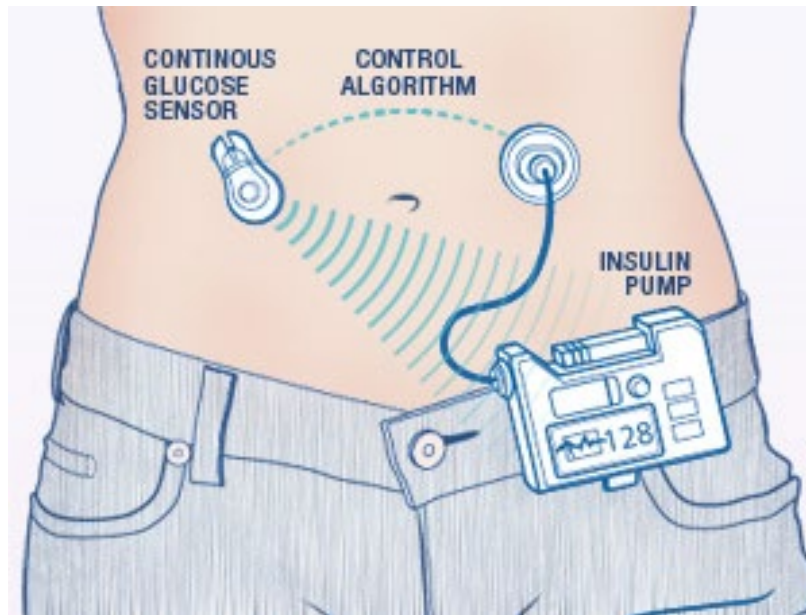
**The New G6 Sensor: Longer Wear (10-14 days) and the Potential for No Fingertick Calibrations**





# Control Systems / Closed Loop

- ◆ FDA recently approved the first closed loop drug delivery system for personal use
- ◆ Provides greater control of patients therapy



## The FDA Approves Medtronic's MiniMed 670G Hybrid Closed Loop System

10/12/16 - NEW NOW NEXT

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1  
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By Ava Runge and Adam Brown

*Coming to US in Spring 2017: What it is, what it isn't, and how to get it*

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In earlier-than-expected and very good news for people with diabetes, [the Food and Drug Administration \(FDA\)](#) approved Medtronic's MiniMed 670G hybrid closed loop insulin pump and more accurate Guardian continuous glucose monitoring (CGM) sensor, Guardian Sensor 3.

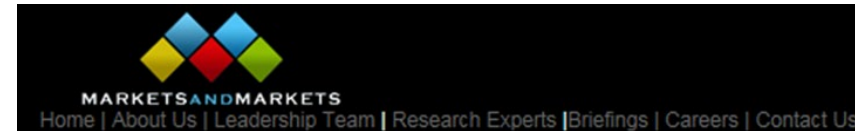


This news represents a major milestone for diabetes technology a little over a decade after [JDRF](#) launched the “artificial pancreas” project in 2005. It can't be emphasized enough how exciting this development is for anyone who takes insulin and has access, since it's definitely one step closer to the long-term goal of the artificial pancreas – the “ultimate” closed loop.

# Connectivity

## Internet of Things (IoT)

- ◆ Medical Devices not unlike consumer markets in targeting IoT
- ◆ Connectivity enables creation of integrated systems for better management of care

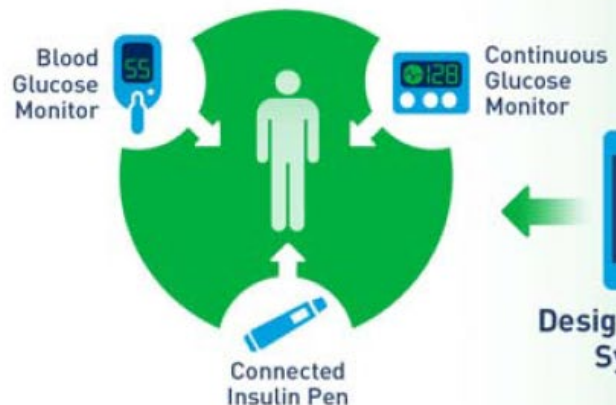


IoT Healthcare Market worth 163.24 Billion USD by 2020

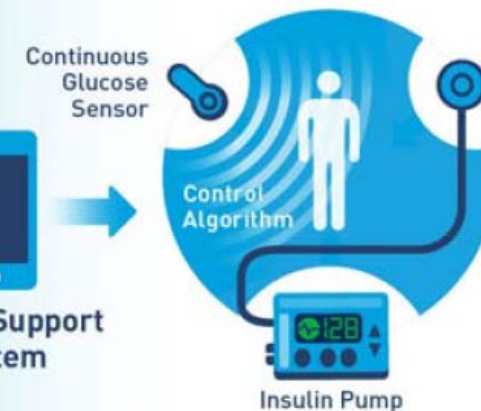
The report "IoT Healthcare Market by Components (Medical Device, System and Software, Service, and Connectivity Technology), Application (Telemedicine, Workflow Management, Connected Imaging, Medication Management), End-User - Global Forecast to 2020", the global IoT in healthcare market is expected to grow from USD 32.47 Billion in 2015 to USD 163.24 Billion by 2020, at a Compound Annual Growth Rate (CAGR) of 38.1% during the forecast period. In the current scenario, North America is expected to be the largest market on the basis of market size and technological advancements.



**A. Connected Pen: No direct interaction between BGM/CGM and insulin pen/pump**



**B. Connected Pump: Direct interaction between CGM/sensor and insulin pump**



# Software

- ◆ Major Software companies starting to enter Health market
- ◆ Software playing a bigger role.

**Insulin pump maker Insulet launches educational tablet app for kids, plans connected app**

By Jonah Comstock | July 13, 2016



**Amazon partners with Philips to unite medical device, app and EMR data in the cloud**

by Stacy Lawrence | Oct 9, 2015 9:36am



**Lifescan, WellDoc finalize commercial partnership for diabetes management platform**

By Jonah Comstock | September 16, 2016



**Google partners with Harvard Medical School, Mayo Clinic for symptom search**

Bernie Monegain | June 22, 2016



**Pfizer Launches New "Moodivator" App to Help Support, Encourage and Motivate People with Depression**



**Apple partners with pharmaceutical giant GlaxoSmithKline for first clinical study**

By James Vincent - @jvincent - Jul 08, 2016, 10:32a



**Sanofi, Verily invest \$500M in diabetes management joint venture Onduo**

By Heather Rich | September 10, 2016

Verily Life Sciences, a division of Google parent company Alphabet, has teamed up with French healthcare company Sanofi to launch Onduo, a diabetes management joint venture. The partnership combines Sanofi's pharmaceutical expertise and Verily's command of personalized medicine, analytics and consumer software development. The two companies together invested about \$500 million in Onduo.

The joint venture is based in Cambridge, Massachusetts and will combine a mix of devices, software, medicine and professional care to help people with diabetes manage their condition.

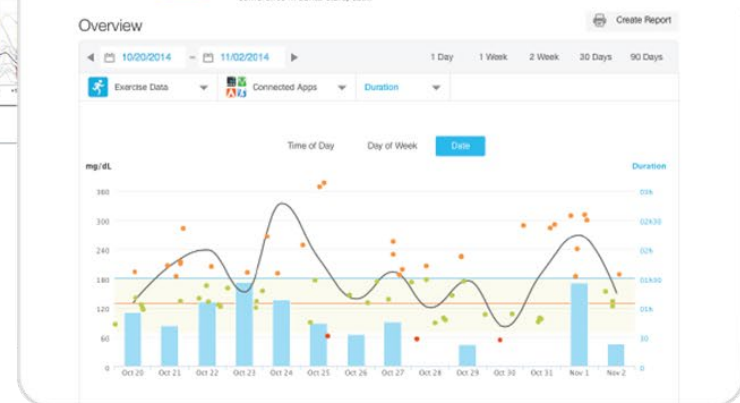
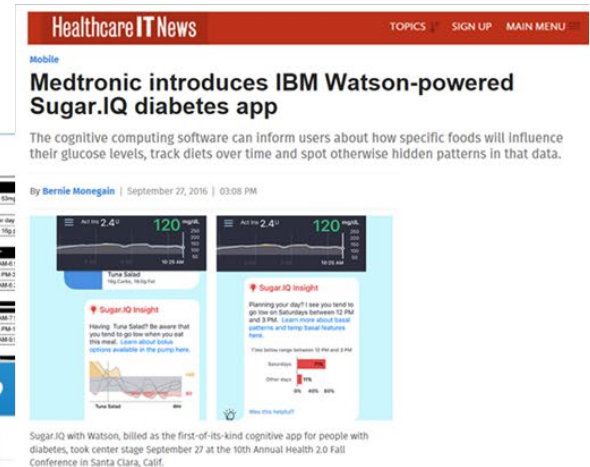
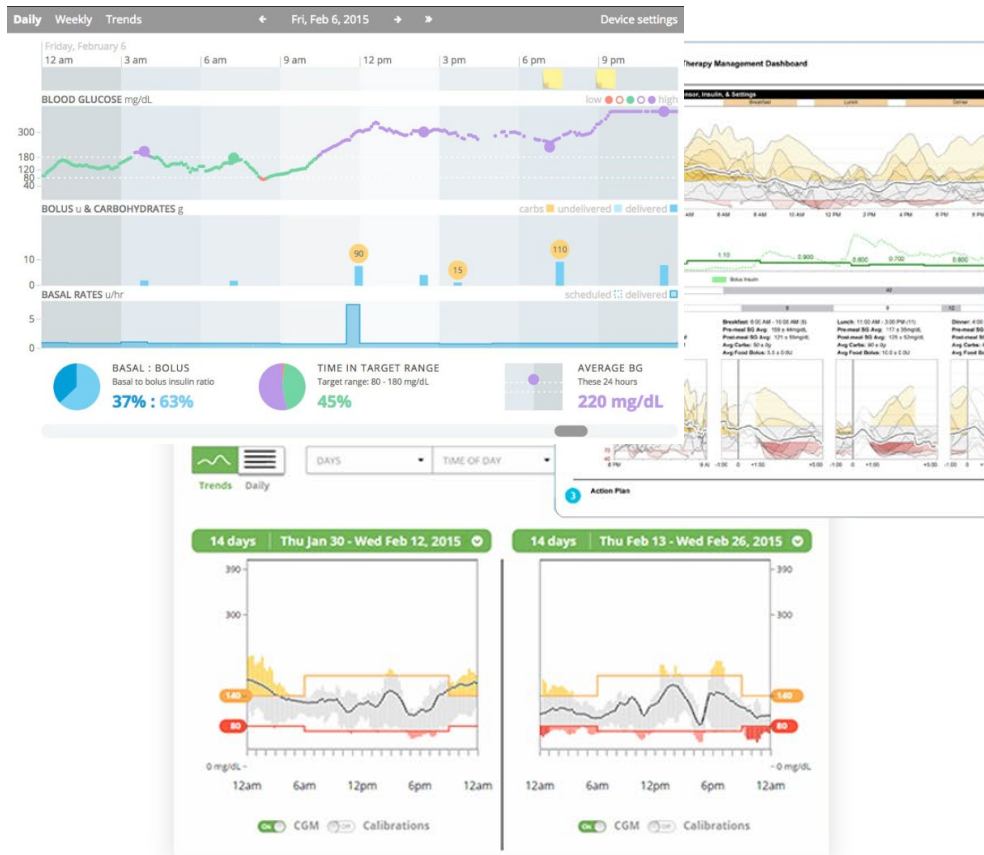
"The integration of multiple interventions, such as data-driven patient support and devices in addition to treatment, can help improve outcomes, which is important from the perspective of patients, healthcare professionals and the overall healthcare system," Peter Dierkes, Sanofi's executive vice president and head of the global diabetes and cardiovascular business, said in a statement. "The new company Sanofi and Verily invested in will adopt a more service-centric approach and support doctors in their efforts to treat their patients more effectively."

**Pfizer, Brigham and Women's test remote monitoring app for arthritis in clinical trial**



# Analytics

- ◆ Connected systems capable of providing advanced Data Analytics to aid in managing care
- ◆ Benefits to Patient & Health Provider





# Summary

- ◆ Care shifting to the home & outcome based
- ◆ Medical Devices are enablers to:
  - Home based care
  - Creation of outcome based solutions
- ◆ Monitoring and Sensing improvements provide improved safety, quality of life and better insights
- ◆ Connectivity is enabling broader solutions
- ◆ Software & Analytics can help reduce the burden to find solutions and drive improved future actions



Panelist: Frank Shen  
Marketing Manager  
Roche Diabetes Care, Inc.

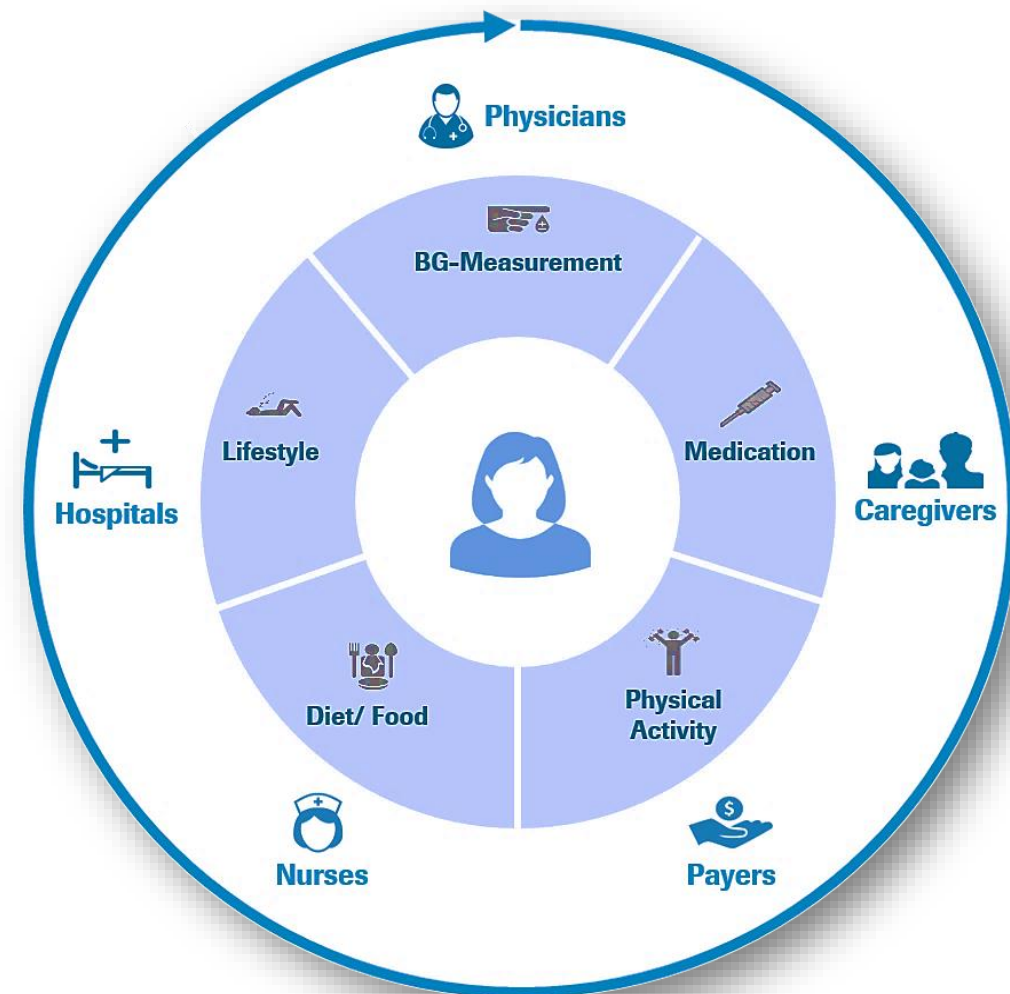
# Looking Ahead

# Integrated Diabetes Management

*A holistic approach in diabetes treatment*



- ✓ Enable patients to master the complexity of managing diabetes to **improve Time in Range**
- ✓ **Support treatment decisions and delay disease progression**
- ✓ Offer **integrated solutions** for diabetes management



\* 'Lifestyle' includes contextual factors such as sleep, stress, infections, that impact diabetes treatment

## 1 Capture data



## 2 Consolidate data



## Smartphone as the Hub

### 3 Interpret & Act upon data



## Augmented intelligence



## Smart Data





## Marketing & Development Services

Business modeling, patient pathway, market access, value office, innovation, lifecycle Management



## Research & Development Services

Specialize development services, user experiences, Bigdata analytics, advance reporting, customer segmentation



## Digital Operations Services

Global around clock support for all new Digital Products and existing ones



“I’m addicted!!!  
This app has made  
tracking fun”



- Joined the Roche Family June 30th
- Over 1 million users
- Estimated HbA1c, exciting challenges and motivating feedback
- Personalized advice anytime, anywhere with Proactive help from highly trained CDEs



# Delivering Integrated Diabetes Management



*What does it mean for our customers?*



Person with Diabetes  
(PwD)



Healthcare Professional  
(HCP)



Healthcare Systems  
(Payers)

---

Experience **true relief**,  
improved quality of life  
and more time in  
range

Deliver **effective  
care** & improve  
clinical results

Ensure efficient &  
**sustainable  
healthcare**

# Integrated Diabetes Management – Solution Components



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**Supply** Meters and test strips

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**Coaching** 1:1 Coaching by  
Certified Diabetes  
Educators & HCPs

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**Insights** Insights for population  
management from data  
and EHR integration

# Our Ultimate Goal



*“To help people with diabetes everywhere in the world think less about their daily diabetes routine so they can get true relief, day and night.”*

# The iPDM concept

*Which elements, considerations and principles were included?*



## **Assessment:**

where does a patient stand, what goals does a patient have, what would he/she like to achieve, what would he (not) like to change...?



## **Collaborative care, participative decision-making:**

inclusion of the patient in the evaluation and adaptation or modification of the therapy as required



## **Feedback:**

regular feedback on the achievement of therapeutic goals and adherence (compliance with self-monitoring of blood glucose recommendations)



## **Training, counseling, positives error management:**

joint, structured analysis of the course of therapy



## **Agreements:**

written agreement on therapeutic measures until the next appointment

Dr. Charles Miramonti  
Medical Director, ED  
Eskenazi Health



# Eskenazi Health

The transition from revenue-based healthcare delivery to a value-based system is a major paradigm shift that opens opportunities to impact healthcare delivery using systems approaches. However, healthcare delivery differs from the medical device and pharmaceuticals arenas in a few key aspects and with major changes in thinking comes a lack of understanding of the value of potential systems engineering contributions.