2015 Meet the Management

Care Coordination

New York & London
Welcome to 2015 Meet the Management
New York & London


**Agenda**

- **08:15**
  - Registration / Welcome Breakfast

- **09:00 – 09:10**
  - Introduction

- **09:10 – 09:30**
  - Global Overview and Strategy

- **09:30 – 09:50**
  - Care Coordination Overview North America

- **09:50 – 10:20**
  - Sound Physicians

- **10:20 – 10:40**
  - Break

- **10:40 – 11:10**
  - Health Plans

- **11:10 – 11:40**
  - Care Coordination: How it all works for patients?

- **11:40 – 12:10**
  - Q&A Session

- **12:10 – 13:00**
  - Lunch
Today’s Presenters

- Rice Powell
  Chairman & CEO

- Ron Kuerbitz
  CEO, North America

- Robert Bessler
  CEO & Founder, Sound Physicians

- William McKinney
  President, Integrated Care Group

- Frank Maddux
  Chief Medical Officer
Care Coordination

Rice Powell
CEO, Fresenius Medical Care
Overview

2020 target of $28bn of revenue … high single digit EAT growth

Value-based care in the U.S. is a reality. This environment helps us drive forward our care coordination strategy and developed markets around the world are adapting in their own way

Our focus is chronically ill patients; by coordinating the network and organizing care, we can actively manage the medical cost

Care coordination is the only way to manage high cost chronic illness
Care Coordination

Ron Kuerbitz
CEO, North America

New York and London
Our first goal is for 30% of all Medicare provider payments to be in alternative payment models that are tied to how well providers care for their patients, instead of how much care they provide – and to do it by 2016. Our goal would then be to get to 50% by 2018.

We commit to have 75% of our respective businesses operating under ‘triple aim’ focused contracts that address the total cost of care by January 2020. We will advocate for policies by all payers to meet this goal.
2010 Value-Based Care Distribution

Fewer than 50 providers nationally embraced value-based care

Source: Oliver Wyman analysis
2015 Value-Based Care Distribution

600 across the country, reaching 2/3 of available patients

Source: Oliver Wyman analysis
Expansion Into Acute & Post-Acute Care

Bundled Payments for Care Improvement (BPCI) initiative program promises $250M of savings to Medicare annually

Source: Centers for Medicare & Medicaid Services
States & Consumers Embrace Value-Based Care

72% of Medicaid members are enrolled in managed care plans 2012

Medicare beneficiaries continue to select coordinated care in record numbers

Total Medicare private health plan enrollment, 1999-2015 (M)

Source: kff.org/medicaid/state-indicator/total-medicaid-mc-enrollment/#table  
Source: kff.org/medicare/fact-sheet/medicare-advantage/
Focus on Chronic Care
High Cost of Chronic And Post-Acute Care

- Chronic care accounts for 86% of U.S. healthcare spending
- Almost ~50% of healthcare spending in inpatient and post-acute spending

Source: NIHCM Foundation analysis of data from the 2009 Medical Expenditure Panel Survey
Patients Want Organized Support For Managing Care

The healthcare system needs specialized integrated networks to better meet the needs of the chronically ill.

90% of patients say that they are prepared to take care of their needs arising from their disease.

66% of physicians say they would treat patients more effectively if they had more access to integrated care networks.

86% of the general population says that a coordinated treatment experience is important.

66% of patients are non-compliant which is a significant obstacle for two-thirds of physicians.

Source: FMC North America Survey Results 2015
### Average spend Per Member Per Month (PMPM)

#### Total Medicare population

<table>
<thead>
<tr>
<th>Place of Service</th>
<th>Healthy</th>
<th>Sick</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpatient Hospital</td>
<td>$0</td>
<td>$2,597</td>
<td>$549</td>
</tr>
<tr>
<td>Post Acute (LTC, Home, Rehab)</td>
<td>$2</td>
<td>$1,114</td>
<td>$254</td>
</tr>
<tr>
<td>Outpatient Hospital</td>
<td>$8</td>
<td>$557</td>
<td>$175</td>
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<tr>
<td>Office / Retail</td>
<td>$23</td>
<td>$352</td>
<td>$157</td>
</tr>
<tr>
<td>Other Ambulatory / Standalone³</td>
<td>$4</td>
<td>$166</td>
<td>$60</td>
</tr>
<tr>
<td>Other⁴</td>
<td>$2</td>
<td>$8</td>
<td>$4</td>
</tr>
<tr>
<td>Total</td>
<td>$37</td>
<td>$4,794</td>
<td>$1,199</td>
</tr>
</tbody>
</table>

#### Medicare population with ESRD

<table>
<thead>
<tr>
<th>Place of Service</th>
<th>Healthy</th>
<th>Sick</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpatient Hospital</td>
<td>$130</td>
<td>$12,379</td>
<td>$3,615</td>
</tr>
<tr>
<td>Post Acute (LTC, Home, Rehab)</td>
<td>$231</td>
<td>$2,481</td>
<td>$938</td>
</tr>
<tr>
<td>Outpatient Hospital</td>
<td>$196</td>
<td>$895</td>
<td>$604</td>
</tr>
<tr>
<td>Office / Retail</td>
<td>$122</td>
<td>$418</td>
<td>$333</td>
</tr>
<tr>
<td>Other Ambulatory / Standalone³</td>
<td>$40</td>
<td>$1,435</td>
<td>$428</td>
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<tr>
<td>Other⁴</td>
<td>$2</td>
<td>$9</td>
<td>$5</td>
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<tr>
<td>Dialysis⁵</td>
<td>$1,845</td>
<td>$1,761</td>
<td>$2,055</td>
</tr>
<tr>
<td>Total</td>
<td>$2,566</td>
<td>$19,377</td>
<td>$7,977</td>
</tr>
</tbody>
</table>

Source: Medicare 5% Database 2012 data, OW Research and Analysis
Opportunity In Post-Acute Medical Management

Significant opportunity to reduce variability

**Post acute spend & variability for select condition**

*90 day bundles, based on DRGs with no complications or comorbidities*

*2013 $’s*

Source: MEDPAC

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**FRESENIUS MEDICAL CARE**

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Distribution Of Managed & Unmanaged Claims Costs

(1) A wider distribution would be expected for a shorter period, such as a month or a quarter.
Delivering Care Coordination
Delivering Care Coordination

- Care Navigation
- Financial Management
- Medical Management
The Key to Success

- Experience & expertise
- Care navigation
- Evidence-based protocols
- Research

- National provider network
- Geography
- Diversified participation in value-based care

- Process design & redesign
- Data analytics
- Technology

Focus & Scale

Quality Systems

Innovation
The Key to Success

- **Focus & Scale**
  - Understand individual patient treatment goals
  - Predict & identify outliers
  - Identify bright spots and develop evidence-based best practices
  - Standardize to best practices based upon patient specific information
  - Monitor process & outcomes

- **Quality Systems**

- **Innovation**
Power Of Focus And Scale

- 2,200 Clinics
- 26m Treatments
- Care to >1.25m Patients
- >$9bn Services Revenue
- >$11bn Revenue
- ~$2bn Care Coordination
- 70% of Overall Revenue

Rolling 12 month average
Targeted care coordination results in reduced hospital admissions

### Power Of Focus And Scale

Identify high risk ESRD patients (>5 hosp days. in next 12 months)

**Goal**
- Identify high risk ESRD patients (>5 hosp days. in next 12 months)

**Model**
- Clinical predictors yield 90% accuracy
- Targeted care coordination/clinical interventions

**Hospital admissions per annum**
- 6 months before: 7.27
- 6 months after: 5.0

31% Reduction

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Quality Through Process Improvement

Better outcomes...  ... due to better lab values

Control

1.86

24% Reduction

Rx

1.41

Hospital admissions per annum

FMC Rx VS CONTROL

Comparisons were made between FMC Rx and matched control patients in the percent of patients with mean 6 month BMJ laboratories in target range using Chi-Square tests.

<table>
<thead>
<tr>
<th>Test</th>
<th>FMC Rx</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium</td>
<td>93.7%</td>
<td>92.4%</td>
</tr>
<tr>
<td>Phosphorous</td>
<td>54.2%</td>
<td>51.0%</td>
</tr>
<tr>
<td>iPTH</td>
<td>68.5%</td>
<td>64.7%</td>
</tr>
<tr>
<td>ALL</td>
<td>37.5%</td>
<td>33.4%</td>
</tr>
</tbody>
</table>

After enrollment in the FMC Rx program, there were significantly more patients within target range for mean 6 month blood calcium, phosphorous, and iPTH goals, as compared to concurrently matched control patients.
Quality Through Process Improvement

Care navigation and case management have demonstrated success in reducing hospitalizations.

**Hospital reduction through in-unit protocols**

*Hospital admission/1000*

- **6 months before:** 29.5
- **6 months after:** 14.9
- **50% Reduction**

**ESRD patients in telephonic management programs**

*Hospital admission/1000*

- **No case management**
- **Case managed patients**

Source: FMCNA analysis

*Care navigation Unit (CNU) patients versus randomly chosen non-CNU Medicare Advantage patients of the same states with a smoothed spline (dots are weekly numbers). Admissions are per 1000 per week.*
Technological Innovation

- **5%** reduction in EPO dose per HD tx
- **25%** reduction in fluid-related admissions
- **11%** reduction in all-cause hospital admissions
- **6%** reduction in % of patients with IDWG > 4.5%
FMC Delivering Care Coordination

Focus & Scale

Quality Systems

Innovation

Care Navigation

Financial Management

Medical Management
Sound Physicians

Robert Bessler, MD
CEO & Founder, Sound Physicians
Who We Are

Largest acute episode of care performance management organization

Physician-led organization, founded 2001

2100 physicians in 187 acute care hospitals nationwide

Key focus on Physician Engagement and Performance

Vision is to be the unmatched leader in improving quality and reducing the cost of healthcare for patients in the communities we serve
Geographic Footprint

Strong network across North America

[Map showing locations with yellow dots representing Sound Physicians' network across North America]
What We Do

Manage care from hospital admission to 90 days after discharge (episode)

The right care at the right time in the most cost effective manner

- Improve quality outcomes
- Improve the patient experience
- Reduce inpatient costs
- Reduce readmission

Intensivists programs in 25 hospitals

- Standardize intensive care practice in the hospital
- Lower ICU length of stay/costs
- Improve quality outcomes

Post-acute care services

- Post-acute care nurses in the hospital
- Nurse Practitioners visit the home for Medicare patients after inpatient discharge
- Nurse Practitioners and Physicians in the nursing facility/Long term acute care hospital (LTAC) and rehab/assisted living
Consistent Quality Outcomes Over Time

Five year Sound quality measures trend

AMI: Acute Myocardial Infarction  HF: Heart Failure  PN: Pneumonia  STR: Stroke
Consistent Return On Investment For Hospitals

Organization-wide LOS and CMI performance (% of Medicare)
All sites started after Jan 2011

- Improvement in illness documentation drives hospital revenue
- Longer working relationship, lower LOS

Average margin improvement of $340/case
### What Are The Differentiators?

<table>
<thead>
<tr>
<th>Engagement</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Path to partnership</td>
<td>• Clinical process</td>
</tr>
<tr>
<td>• Leadership development</td>
<td>• Web based workflow solution - Sound Connect</td>
</tr>
<tr>
<td>• Sound Institute training</td>
<td>• Performance management process/Analytics</td>
</tr>
<tr>
<td>• Meaningful data</td>
<td>• Dedicated hospitalist RN workforce</td>
</tr>
</tbody>
</table>
The Road to 2018 → Expanding Our Practice

Acute episode of care
From admission to 90 days after discharge from hospital
(50% of Healthcare Spend)

EM: Emergency Medicine

Hospitalists
Intensivists

35%

Post-Acute Care

65%
Bundle Payment For Care Improvement Program

Payment model for acute and post-acute care

4. separate models to drive down costs of providing care while improving or maintaining quality of care

Model 2

Retrospective Acute Care Hospital Stay plus post-acute care – inpatient stay & all related services 90 days post discharge

185. DRG’s* are grouped into 48 bundles

50%. of which are medical bundles

2%. guaranteed savings to CMS** from the baseline measurement period by bundle by tax id#

Individual providers paid as normal but at end of episode of care total spending compared retrospectively to target price

As an episode initiator in the program we can drop bundles each quarter but can’t add bundles

*DRG: Diagnostic Related Group  **CMS: Center for Medicare Services
Post-Acute Care Services

Inpatient care is only part of a patient’s road to health

- Much of patient recovery as well as the variability in cost happen outside the hospital
- Inpatient care cost is fixed as a DRG payment from Medicare to the hospital regardless of the cost of the episode

Sample 90-Day Medicare Spending Breakdown
Cost of Skilled Nursing Facility (SNF)

The biggest area of inefficiency → SNF utilization

- 25% of episode costs, with significant variation
- Post-acute care planning + home visits + SNF presence = success

Sample 90-Day Medicare Spending Breakdown
The Cost Of Readmissions

The biggest adverse outcome → Readmissions

- 12% of all episode costs
- Most are failed discharges; many avoidable
- Post-acute care planning + home visits + SNF presence = success

Sample 90-Day Medicare Spending Breakdown
Three Key Interventions To Lower Costs

- **Care At the Right Location – CARL Tool**
  - Evidence based tool of where patients should be discharged to

- **Improve outcomes in skilled nursing facilities**
  - Docs and NP’s (nurse practitioner) round daily at a post-acute care network we set up

- **Prevent Readmissions**
  - Mobile work force in the home and SNF to improve the hand off to primary care and improve outcomes
Post-Acute Care: Our Next Step

The TCS (transitional care services) Transformation

Discharge

Transitional Care MD/DO
Supervising TCS team (90 days post discharge)

Post Acute MDs/NPs
Round in SNFs

Transitional Care NPs
Home visits to patients

Hospitalists
Primary medical decision maker

HRNs
Drive acute care performance

Transitional Care RN
Drive performance through 90 days post discharge (e.g. patient risk assessments, patient/family education, coordinate w/PCP & post acute providers)

Sound Care Coordination Technology Platform
Skilled Nursing Facility Model

1 MD: 4 NP/PA managing 4–6 facilities
Improving Quality & Reducing Cost Of Healthcare

- Care Navigation
- Financial Management
- Medical Management
Break
Alternative Payment Model Strategies

William McKinney
President of Integrated Care Group
New Payment Models

Federal policymakers are driving a shift to new payment models

Setting Value-Based Payment Goals — HHS Efforts to Improve U.S. Health Care

Now that the Affordable Care Act (ACA) has expanded eligibility coverage and made it through greater teamwork and integration, more effective coordination of providers across settings possible, our target is to have 30% of Medicare payments tied to quality or value through alternative payment models by the end of 2016, and 50% of payments by the end of 2018...

...Our goal is to have 85% of all Medicare fee-for-service payments tied to quality or value by 2016, and 90% by 2018.

Perhaps even more importantly, our target is to have 30% of Medicare payment tied to quality or value through alternative payment models by the end of 2016 and 50% of payments by the end of 2018...
FMC Can Manage Across Healthcare System
Alternative Payment Models

FMC has significant experience for renal disease

- CMS ESRD Demo
- ESRD Medicare Advantage (MA) Plan
- Subcontracted Shared Savings
- Subcontracted Full Risk
- ESCO
- ESRD MA

- Capitation Model
- Shared Savings Model
Shared Savings Models

Popular mechanism to engage providers

- Financial exposure generally limited
- Revenue recognized is share of gross savings
- Program period completion and claims run-out before savings can be calculated and recognized
- Gross savings often shared with other parties (e.g., CMS)
- Quality modifiers retrospective and often impact final savings recognition
FMC is pursuing alternative payment models through several strategies.

**FMC Shared Savings Models**

- **ESCO**
  - Client: CMS
  - Membership: Attributed
  - Geography: Concentrated
  - Revenue: Savings (lag)
  - Population: ESRD

- **Subcontracted Shared Savings**
  - Client: Health System
  - Membership: Attributed
  - Geography: Concentrated
  - Revenue: Savings (lag)
  - Population: Renal
Capitation Models

Common with insurance companies and other financially sophisticated entities

- Financial exposure not limited
- Revenue estimable and recognized during program period
- Quality and other modifiers generally prospective
FMC Capitation Model

FMC is pursuing alternative payment models through several strategies

- **ESRD C-SNP**
  - Client: CMS
  - Membership: Enrollment
  - Geography: Concentrated
  - Revenue: Premium
  - Population: ESRD

- **Subcontracted Full Risk**
  - Client: Health Plan
  - Membership: Attributed
  - Geography: Distributed
  - Revenue: Premium
  - Population: Renal
Accurate calculation of “expected cost” is critical

Credible population required to increase predictability

Must understand savings sources and potential
Building Infrastructure For Risk Management

- **Financial**
  - Actuarial & Data Analysis
  - Statutory Reporting

- **Regulatory**
  - Insurance Licensure
  - Regulatory Relations

- **Operational**
  - Claims Payment
  - Network Development

- **Clinical**
  - Utilization Management
  - Care Navigation
Managing Costs Through Care Navigation

- High Risk
- Missed Treatment
- Dialysis Surveillance
- Post-Acute
- Non-Dialysis
Reducing Costs In Alternative Payment Models

FMC has shown strong results in reducing costs in alternative payment models.

**Baseline**
- Admissions / '000: 1,917
- Readmissions / '000: 527

**FHP Performance**
- Admissions / '000: 1,528
- Readmissions / '000: 381

Readmission rate: 27.5% △ (27.8%)
Readmissions rate: 24.9% △ (20.3%)

**Savings Categories**
- Inpatient
- Transportation
- Post Acute
- Professional
- Other

Source: FMC care navigation engagement improvement; performance quarters (starting in Q2 2014 compared to baseline years 2011-2013)
Alternative Payment Models Position FMC As A Provider Of Choice

Alternative Payment Models

Network of Choice

Care Improvement
Care Coordination

Franklin W. Maddux, MD FACP
Chief Medical Officer, Fresenius Medical Care North America
What Makes High Cost Chronic Care Different?

**UNIQUE CHARACTERISTICS**

- Persistent
- Measureable
- Multifactorial
- Multiple meds
- Multiple problems
- Known risks to health or lifestyle
- Continuous need not episodic need

**GOALS OF CARE**

- Health crisis avoidance
- Enhance life outside of therapy
- Enhance quality of life
- Promote safe health decisions
- Use resources wisely

Source: NIHCM Foundation analysis of data from the 2009 Medical Expenditure Panel Survey

Mean annual expenditure per person

- Total spend $275 bn
- Top 1%: 90.061
- Total spend $623 bn
- Total spend $821 bn
- Top 1%: 40.682

% Civilian non-institutionalized population ordered by health care spending

- Lowest 50%: 236
- Top 50%: 7.980
- Top 30%: 12.265
- Top 10%: 26.767
- Top 5%: 40.682
- Top 1%: 90.061

Total spend

- $275 bn
- $623 bn
- $821 bn
High Cost Renal Disease Care

Dependent on stage and trajectory of disease

MEDICARE SPEND DURING TRANSITION FROM CKD TO ESRD
Renal Disease Is The Exemplar For A Chronic Illness

An average patient

<table>
<thead>
<tr>
<th>Years of age</th>
<th>Hypertension rate</th>
<th>Hospitalizations per year</th>
<th>Hospital days per year</th>
<th>Annual mortality rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>63</td>
<td>78%</td>
<td>1.5</td>
<td>10</td>
<td>18%</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Medications per day</th>
<th>Cardiovascular disease</th>
<th>Miles distance to dialysis</th>
<th>Medical problems</th>
<th>Cost per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>99%</td>
<td>12</td>
<td>5</td>
<td>$90K</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>ER visits per year</th>
<th>Visits per year</th>
<th>Minutes annually on dialysis</th>
<th>Diabetes rate</th>
<th>30 day readmission rate</th>
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<tbody>
<tr>
<td>1.5</td>
<td>159</td>
<td>34,565</td>
<td>60%</td>
<td>29%</td>
</tr>
</tbody>
</table>
Coordinating Care Where It Counts

A provider at risk needs clinical leverage during patient high risk life transitions
Vertically Integrating Our Care Platform

Building a portfolio of assets that:

- Recognize the venues of care where patients need to receive their care
- Leverages specific expertise beyond the dialysis unit and nephrologist
- Offers a platform for technology evolution in therapies for renal patients
- Enable a migration of health decision making by the patient at their home
- Sensitive to the patient’s ESRD vintage in the context of duration of therapy and life expectancy
- Leverages the Big Data resource that FMC has in developing standardized models of care
- Converges existing technology toward more personalized and on demand healthcare that is expected by patients
FMC Portfolio Of Healthcare Assets

Extending the portfolio of assets: Preparing for integrated care since 1996

**FMCNA care coordination and management capabilities**

<table>
<thead>
<tr>
<th>Category</th>
<th>Brands</th>
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</thead>
<tbody>
<tr>
<td>Care management</td>
<td>Fresenius Health Partners, Sound Health Solutions</td>
</tr>
<tr>
<td>Vascular access centers</td>
<td>Fresenius Vascular Care, NCP</td>
</tr>
<tr>
<td>Nephrology EHR</td>
<td>Acumen EHR</td>
</tr>
<tr>
<td>Oral renal pharmacy</td>
<td>FreseniusRx</td>
</tr>
<tr>
<td>Dialysis facilities</td>
<td>UltraCare, Frenova</td>
</tr>
<tr>
<td>Integrated dialysis IT platform</td>
<td>Cube</td>
</tr>
<tr>
<td>Dialysis supplies / equipment</td>
<td>20081, Liberty, CRIT-LINE</td>
</tr>
<tr>
<td>Renal clinical laboratory</td>
<td>Spectra Laboratories, Shiel</td>
</tr>
<tr>
<td>Renal pharmaceuticals</td>
<td>Venofer, Phoslyra, Velphoro</td>
</tr>
</tbody>
</table>
Integration

Developing an organized, measurable system of care

Cardiovascular Disease

Cognitive/Behavioral Health

End of Life & Supportive Care

Ambulatory Hospital
Post-Acute Care
Dialysis Facility
Home

Diabetes

Obesity

Hypertension
Integrating Analytics With Sound

Adjusted Length of Stay (LOS): Sound LOS results better than expected

Integrating Analytics With Sound

Adjusted Mortality: Sound mortality results better than expected

<table>
<thead>
<tr>
<th>Year</th>
<th>Expected Mortality Rate</th>
<th>Actual Mortality Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013_4</td>
<td>4.20%</td>
<td>3.60%</td>
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<tr>
<td>2014_1</td>
<td>4.30%</td>
<td>4.00%</td>
</tr>
<tr>
<td>2014_2</td>
<td>3.90%</td>
<td>3.50%</td>
</tr>
<tr>
<td>2014_3</td>
<td>3.80%</td>
<td>3.60%</td>
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**FMCRx Vs Control Patients**

Bone and mineral metabolism markers are better in FMC patients

### FMCRx VS CONTROL

Comparisons were made between FMCRx and matched control patients in the percent of patients with mean 6 month BMM laboratories in target range using Chi-Square tests.

<table>
<thead>
<tr>
<th>Marker</th>
<th>FMCRx</th>
<th>Control</th>
<th>Improved #</th>
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</thead>
<tbody>
<tr>
<td>Ca</td>
<td>37,756</td>
<td>37,756</td>
<td>491</td>
</tr>
<tr>
<td>P</td>
<td>92.4%</td>
<td>93.7%</td>
<td></td>
</tr>
<tr>
<td>iPTH</td>
<td>51.0%</td>
<td>54.2%</td>
<td>1208</td>
</tr>
<tr>
<td>ALL</td>
<td>64.7%</td>
<td>68.5%</td>
<td>1435</td>
</tr>
<tr>
<td>ALL</td>
<td>33.4%</td>
<td>37.5%</td>
<td>1548</td>
</tr>
</tbody>
</table>

(Chi-Sq test p-value <0.0001)

After enrollment in the FMCRx program, there were significantly more patients within target range for mean 6 month blood calcium, phosphorous, and iPTH goals, as compared to concurrently matched control patients.
Predictive Modeling Progress

23 requested

16 given green light

11 completed

5 actively used

4 in progress

1 not started
Modeling Patient Behavior

The Concept of a Patient Avatar

Peter Kotanko, MD
Doris Fuertinger, PhD

\[
\frac{\partial}{\partial t} \int_{\Omega} \int_{\mathbb{K}} P(\xi, \zeta, \gamma, \delta, \Theta) \, d\delta \, d\Theta = \text{2 (rate entering iron class \( \gamma \) from class \( \eta \))}
\]
- (rate of cells leaving iron class \( \gamma \))
- (death rate) + (rate of maturation in)
- (rate of maturation out)
+ (rate of hemoglobinization in)
- (rate of hemoglobinization out)

\[
\frac{\partial}{\partial t} \int_{\Omega} \int_{\mathbb{K}} P(\xi, \zeta, \gamma, \delta, \Theta) \, d\delta \, d\Theta = 2
\]

Source: Panal Research Institute data
Q&A
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Thank You