



Changing What's Possible

Redefining the Care Team to meet Population Health Objectives Philip Smeltzer, PhD

#### **Presentation Flow**

# Background

#### • Setting

- Simulation Objectives
- Population Characteristics

# Simulation

- Gaming Concept
- Simulation Blueprint
- Demonstration

# Gaming

- Gaming Scorecards
- Lessons Learned



#### **MUSC At-a-Glance**

4 Hospitals Founded 1824

Just the Facts! Data to Digest

13,000 employees 700 physicians 600 residents & fellows

\$1.2 billion hospital revenue\$275 million physician revenue\$232 million in research grants

2,600 Students 6 Colleges 1,850 Clinical Studies





#### 90% avg. census

45% patients reside outside of tri-county region

12 Surgeries/business hour 98 Admissions/Day 7 Emergency Dept. Visits per Hour



#### Logic Model for Total Population Health





#### **Total Population Health Clinic Health Teams**





### Simul8 Webinar: Population Health Planning and Forecasting in Acute and Chronic Disease

#### **Outcomes and benefits**

- More activated patients have 8% lower costs in the base year and 21% lower costs in the following year than less activated patients
- Health coaching can yield a 63% cost saving from reduced clinical time, giving a potential annual saving of £12,438 per FTE from a training cost of £400
- Coaching and care co-ordination has shown to reduce emergency admissions by 24%
- Improved medication adherence improves outcomes and yields efficiencies, for instance in 6000 adults in the UK with Cystic Fibrosis, could save more than £100 million over 5-years
- Between 20% and 30% of hospital admissions in over 85's could be prevented by proactive case finding, frailty assessment, care planning and use of services outside of hospital

#### Jacquie White, Eileen Pepler



NHS England

# Gaming Simulation for Clinicians

### **Gaming Simulation Objectives**

- Train physicians in principles of population health
- Stimulate physicians to refer to non-MDs
- Influence health care leaders to hire non-MDs into clinical teams
- Produce a tangible representation of population health (applied)
- Include costs into the consideration (real-world)
- Model real-life experience and literature based data (defensible)
- Leverage the competitive nature of physicians (gaming)
- Leverage the science-based approach (quantitative)



### **Gaming Simulation Concept**

- Develop a Gaming Simulation for Training and Awareness of Population Health Concepts
- Model a segment of Diabetes and Pre Diabetes in a Population of 10,000 patients/members
- Develop a training syllabus for 8-24 participants per 2 hour period
- Train Senior Leadership Chairs Initially
- Rollout training to primary care practitioners in convenient groups and times to decrease training impact on productivity



### Simulation Overview

- General Population of 10,000 Adults
- Normal Distribution of Risk in the Population
- Simulation to mimic 48 months of real time
- Each simulation round projects 12 months of real time
- Actual Gaming Simulation Rounds are 30 minutes in length
  - 5 minutes of discussion around the previous round issues
  - 10 minutes for decision making and adjustments to previous decisions
  - 10 minute break, gaming scenario runs for each team
  - 5 minute discussion of each teams decisions and the impact on health and savings
- Four Gaming Rounds in the Simulation



# Population Characteristics

### **Population Costs**



 Average Patients with Diabetes Costs \$12,500 PMPY



### **Population Overview**

#### General Population of 10,000 Adults

- 3,500 Pre Diabetes
- 800 Type 2 Diabetes Mellitus Diagnosis
  - 200 are undiagnosed (no HbA1c available)
  - HbA1c Levels
    - 200with HbA1c >9
    - 200with HbA1c 7-9
    - 200with HbA1c <7</p>
    - 200 with no available HbA1c



#### **Population Costs and Patient Distribution**





- Average Costs \$4,200 PMPY
- \$350 PMPM
- 800 Patients with Diabetes
- Diabetes Cost \$12,500 PMPY

#### PMPY – per member per month



#### Population Risk Profile Patients with a DM Diagnosis (total population)

Category	Distribution Percentage
Risks Addressed by Health Coaching	
Obesity	50% (30%)
Hypertension	70% (35%)
Hyperlipidemia	80% (40%)
Tobacco Use	20% (20%)
Participation in Lifestyle Coaching	3% (1%)
Risks Addressed by Primary Care Practitioners	
Medications Dispensed	90% (50%)
Medication Adherence – Days on Hand >80%	75% (65%)
Issues Addressed by Patient Navigators	
Office Visit within previous 2 years	50% (30%)
Adherent to all Recommended Labs/Screening	50%(40%)
Participation in Case Management	1% (0.5%)



### **Operational Definitions**

- Attributable Risk Fractions
  - The influence on health or costs that are attributed to a disease or condition (diabetes) that would occur in the absence of the disease.
- Etiological fractions
  - Estimates of the proportion of health care services attributed to the disease (diabetes)
- Prevalence
  - Ratio of a condition or disease in a specific population at a moment in time
- Incidence
  - Rate of new disease, previously not diagnosed or not reported within a specific time frame



### Strengths of Influence – Literature Review Factors

- Medical Utilization Rates
  - Office Visit Rates (487 per 100 individuals)
    - Pre-Diabetes (1.5 x normal)
    - Type II (2.9 x normal)
    - Type I (3.5 x normal)
  - Emergency Visits (20 days per 100 individuals)
    - Pre-Diabetes (1.0 x normal)
    - Type II (2.7 x normal)
    - Type I (2.8 x normal)
  - Hospital Inpatient Utilization (32 days per 100 individuals)

44%

30%

26%

- Pre-Diabetes (1.0 x normal)
- Type II (10.3 x normal)
- Type I (12.9 x normal)
- Prescriptions (22 PPPY)
- Diagnostic Tests
  - HbA1c test completed 60%
    - HbA1c <7%</li>
       HbA1c 7%-9%
      - HbA1c> 9%
  - Eye Exam completed 60%
- Prevalence of Diabetes
  - Type I 0.3 Percent
  - Type II 6%
  - Undiagnosed Diabetes 3%
  - Pre-Diabetes 35%
  - At age 60 diabetes prevalence is 20%, 40% pre-diabetes
- Costs (2007/2008 cost year) [2016 adjustment 1.3]
  - Pre-Diabetes (\$443 etiological fraction) [\$576]
  - Undiagnosed Diabetes (\$2,864) [\$3,723]
  - Type II Diabetes (\$9,677) [\$12,580]
  - Type I Diabetes (\$14,856) [\$18,962]
  - Productivity Loss (\$700) [\$918]
  - Post Intervention Savings (\$428) [\$556]

- Medical Utilization Rate
   Intervention Influence
  - Office Visit Rates (1.01)
  - Emergency Visits (1.08)
  - Hospital Inpatient Utilization (0.85)
  - Lifestyle Issues
    - Participation Rate 50%
    - Completion Rate 50%
    - Behavior Change 50%
    - Health / Cost Change 75%
    - Cost Influence (0.93, 7% reduction)

The Economic Burden of Diabetes. Dall, Zhang, Chen, Quick, Yang, Fogli. Health Affairs 29(2), 2010

Outcomes and Lessons Learned from Evaluating TRICARE's Disease management Programs. Dall, Wagner, Zhang, Yang, Arday, Gantt. AJMC 16(6), 2010



# Gaming Concept







### **Simulation Outcomes**

- Total Costs
- Total Savings
- Participants who complete all touchpoints







# Gaming Simulation Input Sheet

#### Population Health Simulation and Gaming Decisions

#### Gaming Inputs (Team Decisions)

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#### Round

- □ One
- □ Two
- □ Three
- □ Four

#### **Basic Infrastructure**

- □ No Investment in Information Technology and Analytics, \$500,000 in Communication
- □ \$175,000 in IT and Analytics, \$325,000 in Communication
- \$325,000 in IT and Analytics, \$175,000 in Communication
- \$500,000 in IT and Analytics, No Investment in Communication

[there is no penalty or cost if infrastructure investments change between rounds]

#### **Staffing Resources**

Patient Navigators \$55,000 per FTE

\_\_\_\_\_\_FTEs x \$60,000 = \$ \_\_\_\_\_\_

Patient Navigator Total \$ \_\_\_\_\_\_

Health Coaches

\$60,000 per FTE

\_\_\_\_\_FTEs x 70,000 = \$ \_\_\_\_\_\_

Health Coach Total \$ \_\_\_\_\_\_

Registered Nurses, Certified Case Managers

\$75,000 per FTE

\_\_\_\_\_FTEs x \$90,000 = \$ \_\_\_\_\_\_

RN Total \$ \_\_\_\_\_\_

Physicians, Nurse Practitioners, Physician Assistants

\$150,000 per FTE

\_\_\_\_\_FTEs x \$175,000 = \$ \_\_\_\_\_\_\_

Physician, Nurse Practitioner, Physician Assistant Total \$ \_\_\_\_\_\_

[rounds 2,3,4 incur a \$100,000 training cost for each FTE moved to a new category]

Onboarding, Training Penalties for Re-allocation \$\_\_\_\_\_

TOTAL STAFFING COST (MAY NOT EXCEED \$1,000,000) \$\_\_\_\_\_



#### Labor Investment

#### • Labor Investment(\$1 million annual rate)

– MD / NP/ PA \$	175,000 salary	<b>3,000</b> patient visits / year
– RN / CCM	\$ 90,000	350 completed patients/year
<ul> <li>Health Educator</li> </ul>	\$ 70,000	750 completed patients/year
<ul> <li>Patient Navigator</li> </ul>	\$ 60,000	4,500 patient contacts / year

#### Labor Investment(\$750,000 annual budget)

#### **Options**

-	MD / NP/ PA	\$175,000 salary	0-5 (whole increments)
-	RN / CCM /PharmD	\$ 90,000	0-11 (whole increments)
_	Health Educator	\$ 70,000	0-14 (whole increments)
_	Patient Navigator	\$ 60,000	U-16 (whole increments)



### **Data and Communications Investments**

- Data Investment Steps
  - No Investment in Round
  - \$175,000
  - \$325,000
  - \$500,000
- Communication Investment Steps
  - Balance of Data Investment (\$500k minus data = communication investment)
  - No Investment in Round
  - \$175,000
  - \$325,000
  - \$500,000



# Gaming Simulation Workflow Model

### **Simulation Flow**





### Simulation Flow







## Live Demo

#### **Genius of Crowds**

We will poll the participants on resource allocation

When we start population health, what area should be over-allocated? a. IT – Analytics

b. Communications

When you hire population health staff – which staffing strategy would you follow?

- a. 4 health coaches, 4 clinical support, 3 patient navigators, 1 MD
- b. 4 health coaches, 2 clinical support, 3 patient navigators, 2 MDs
- c. 2 health coaches, 7 clinical support, 2 patient navigators, 1 MD



#### Outcomes – Savings Range per Round

	Cost/Strata	Total Costs	Savings	
Pre Diabetes	\$576	\$3,563,136	\$231,679	Maximum Saving Opportunity
HbA1c unknown	\$3,723	\$1,377,510	\$90,953	
HbA1c <7%	\$7,500	\$2,610,000	\$168,525	
HbA1c 7-9%	\$12,580	\$4,465,900	\$297,643	
HbA1c >9%	\$17,580	\$6,205,740	\$407,329	
		\$18,222,286	\$1,196,129	\$1,196,129

Pre Diabetes	\$576	\$3,116,736	\$208,374	Minimum Saving (Least Efficient)
HbA1c unknown	\$3,723	\$390,915	\$25,019	
HbA1c <7%	\$7,500	\$742,500	\$46,200	
HbA1c 7-9%	\$12,580	\$1,195,100	\$74,851	
HbA1c >9%	\$17,580	\$1,810,740	\$109,523	
		\$7,255,991	\$463,967	\$463,967



#### **Team Scorecards**





#### Lessons Learned



# Simplicity – Be careful not to over-engineer



The discussion leads to insights, not the game



Test for decoding accuracy (others do not think like you)



# Appendix

### Staffing Capacity Model per Year

Lifestyle Coaching		Populatio Staffing	on Health g Model	
4 call model				
	Hour	Frequency	Total	
intake	0.5	1	0.5	
2 intervention calls	0.25	2	0.5	
Follow up	0.25	1	0.25	
			0	
Prep and Document	0.25	5	1.25	
			2.5	Hours/clien
Client Capacity/yr	480			

Case Management - weekly calls for 90 days & 2 home visits					
Episodic Model					
		Hours	Frequency		
intake		0.5	1	0.5	
weekly calls		0.25	12	3	
Home Visits		2	2	4	
Prep and Doc	ument	0.25	15	3.75	
			Hours/client	11.25	
Client Capacit	ty/yr	107			

Patient Navigator			
Episodic Model			
	Hours	Frequency	
Non adherence calls	0.35	4	1.4
Problem Solving calls	0.35	5	1.75
Investigate Prep and			
Document	0.5	9	4.5
		Hours/day	7.65
Calls per Year	1800		
Average Calls per Patient	4		
Unique Patients	450		

Physic	Physician, Nurse Practitioner, Physician Assistant					
Episod	lic Model					
		Hours	Frequency			
	Care Plan Coordination	0.4	6	2.4		
	Complex Management	0.5	6	3		
	Investigate Prep and					
	Document	0.17	12	2.04		
			Hours/day	7.44		
	Calls per Year	2400				
	Average Calls per Patient	4				
	Unique Patients	600				

