

2017 Predictive Analytics Symposium

Session 12, Success Stories From Companies and Actuaries

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2017 SOA Predictive Analytics Symposium

Session 12: Success stories from companies and actuaries

9/14/2017



SOCIETY OF ACTUARIES

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Accelerated Underwriting: A Partial Success Story

David Moore, FSA, MAAA

Sept 14, 2017



“Vision without action is a daydream. Action without vision is a nightmare.”

– Japanese Proverb

“Day 2 is stasis. Followed by irrelevance. Followed by excruciating, painful decline. Followed by death. And that is why it is always Day 1.”

- Jeff Bezos

Identify the Problem

Problem Statement: Buying Life Insurance Sucks!

Ask Why?

- Underwriting takes forever
- We need medical labs and APS data
- We need this data to make risk decisions about the customers
- We don't have the infrastructure to pull existing 3rd party data, nor to allow the customer to provide accurate data to us
- We didn't design the process to enable real time decisions

.... and so on

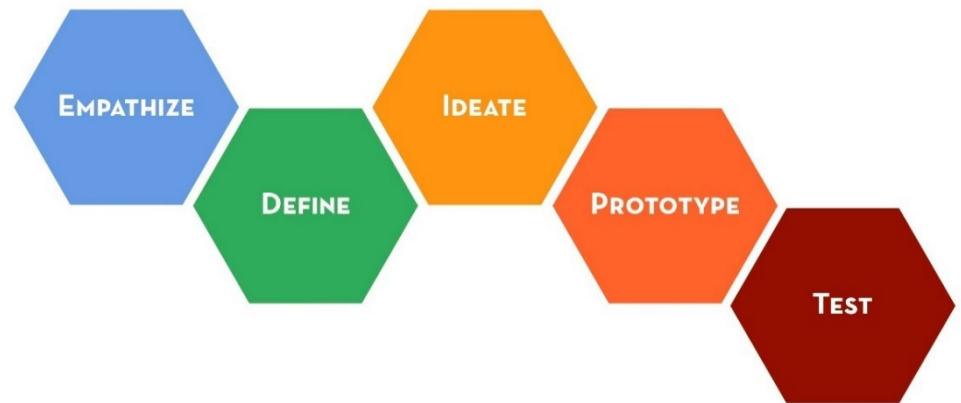
When the underlying problem is identified, then you can apply data and models with maximum effectiveness

Addressing the problem

Apply design thinking:

We applied the following high level steps in order to build, test and implement a predictive model

- Identify Problem
- Build a Predictive Model
- Redesign the Application process
- Engage the end users
 - Insurance Applicant
 - Advisors
 - Underwriters
- Implement Model
- Pilot Program
- Update



Aside – since this is a predictive analytics symposium...

2 minutes on predictive model development for Life Underwriting

Model Type

- Model type is less important than fit, but Machine Learning techniques have supplanted GLMs
- The model is less important than the process built around it

Data

- You need a lot of data
- Don't let a lack of data slow you down

Testing

- Use the robust techniques you learn in this seminar – train/test/validate
- The typical IT regression testing will not capture everything – something will go wrong and you will need to fix it quickly

Going To Market

- Prepare a process that lets you test and learn quickly
- Failure can be part of an effective innovation process

Evaluate the Process

During the pilot program, the results are evaluated to identify what has been successful and what has not. Issues can then be addressed and process improvements made.

- Identify implementation and process issues
- Data quality
- Review Adoption and Acceleration rates
- Success by channel
- Products available

Expected Challenges

- IT & Implementation
- Adoption by sales force
- Change management
- Competition

Unforeseen Challenges

- Data consistency
- Creating bias
- Change management
- Details matter
- Disruption in the Industry is happening now!



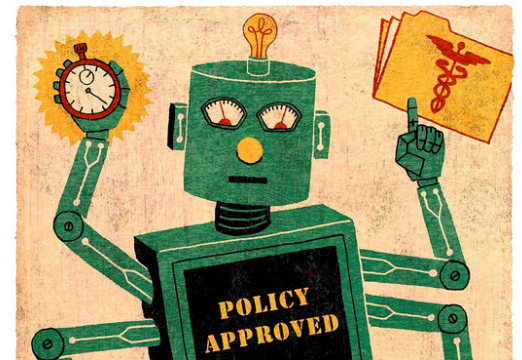
Fabric

Life insurance made easy.

Future State Vision

What does the future hold for Life Insurance and Underwriting?

- Digital engagement & direct business
 - will the insurance agent go the way of the travel agent?
- Electronic Health Records
 - Use existing data to simplifying the application process
- Aligning customer needs with product/process
 - be customer obsessed!



WSJ, 3/11/2011
"Would You Buy a Life-Insurance Policy
From This Machine?"

Actuaries and Data Science

Actuaries can make an impact on your organization!

- The expansion of Data Science in insurance, as well as almost every industry, presents both a threat and an opportunity for actuaries
- Actuaries are uniquely positioned to understand the tools of data science, because they are statistical in nature, and to define the business problems that need to be solved

Preparing for the future

- Embrace change and new trends
- Challenge the current way of thinking – can data and analytics be used to solve the problem or improve the process?
- Challenge the data scientists – are you solving the right question?
- Build teams of specialists – today's Big Data can not be handled by an individual

Beware of actuarial blind spots

- Customer focus
- Fast decision making

Lessons Learned

- Focus on the business – use predictive analytics as a tool to enhance your business
- Embrace AI and Machine Learning – they are here to stay
- Actuaries are still leading the risk professionals – however we must adapt, and understand the changing risks and the tools to manage them in order to remain relevant
- It's still day 1!

SOA Predictive Analytics Symposium Success Stories: Using Statistical Models to Help Lower LTC Insurance Claims

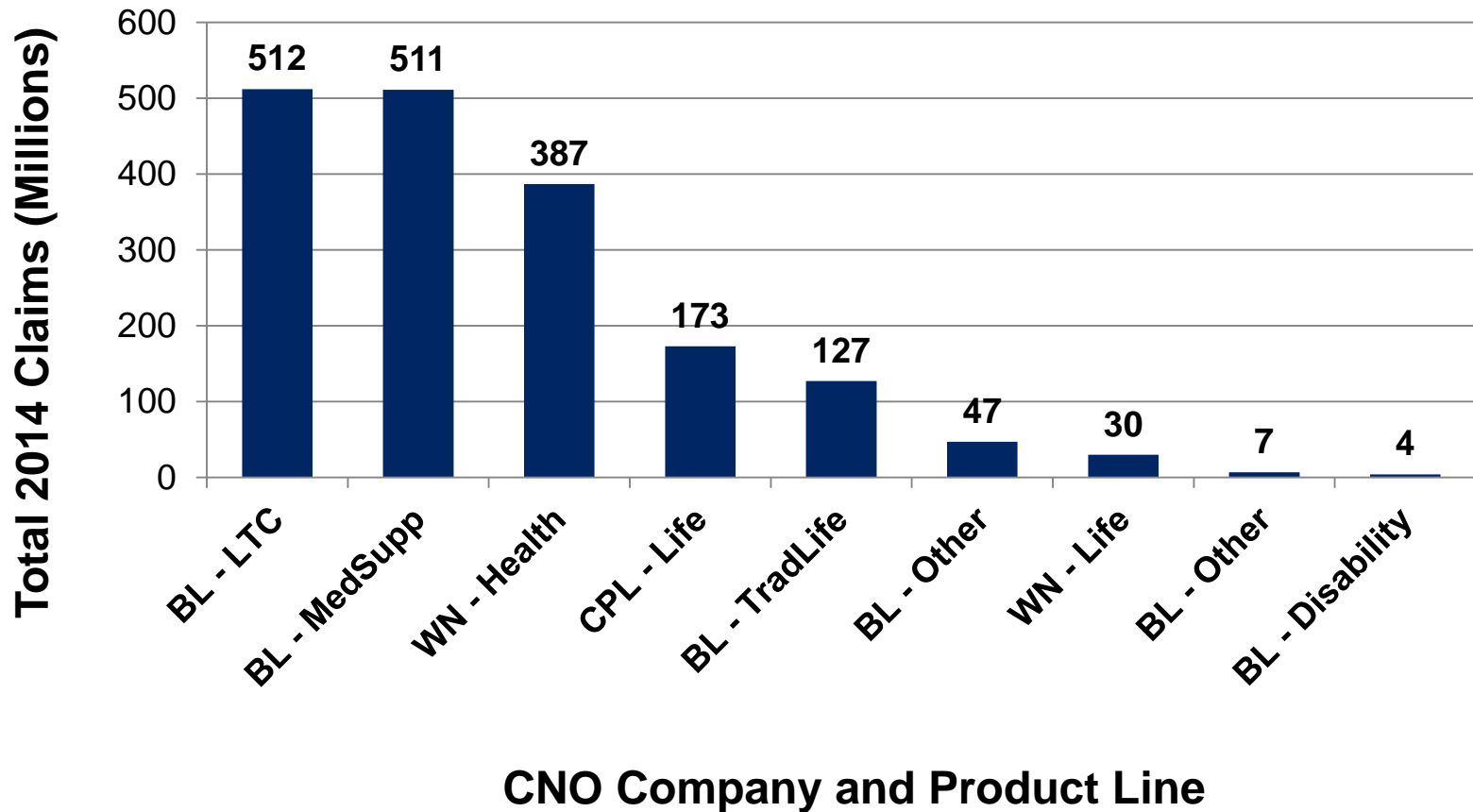


Bankers Life and Casualty Company, Chicago, IL | Colonial Penn Life Insurance Company, Philadelphia, PA | Bankers Consec Life Insurance Company, Jericho, NY

The Business Problem - Background

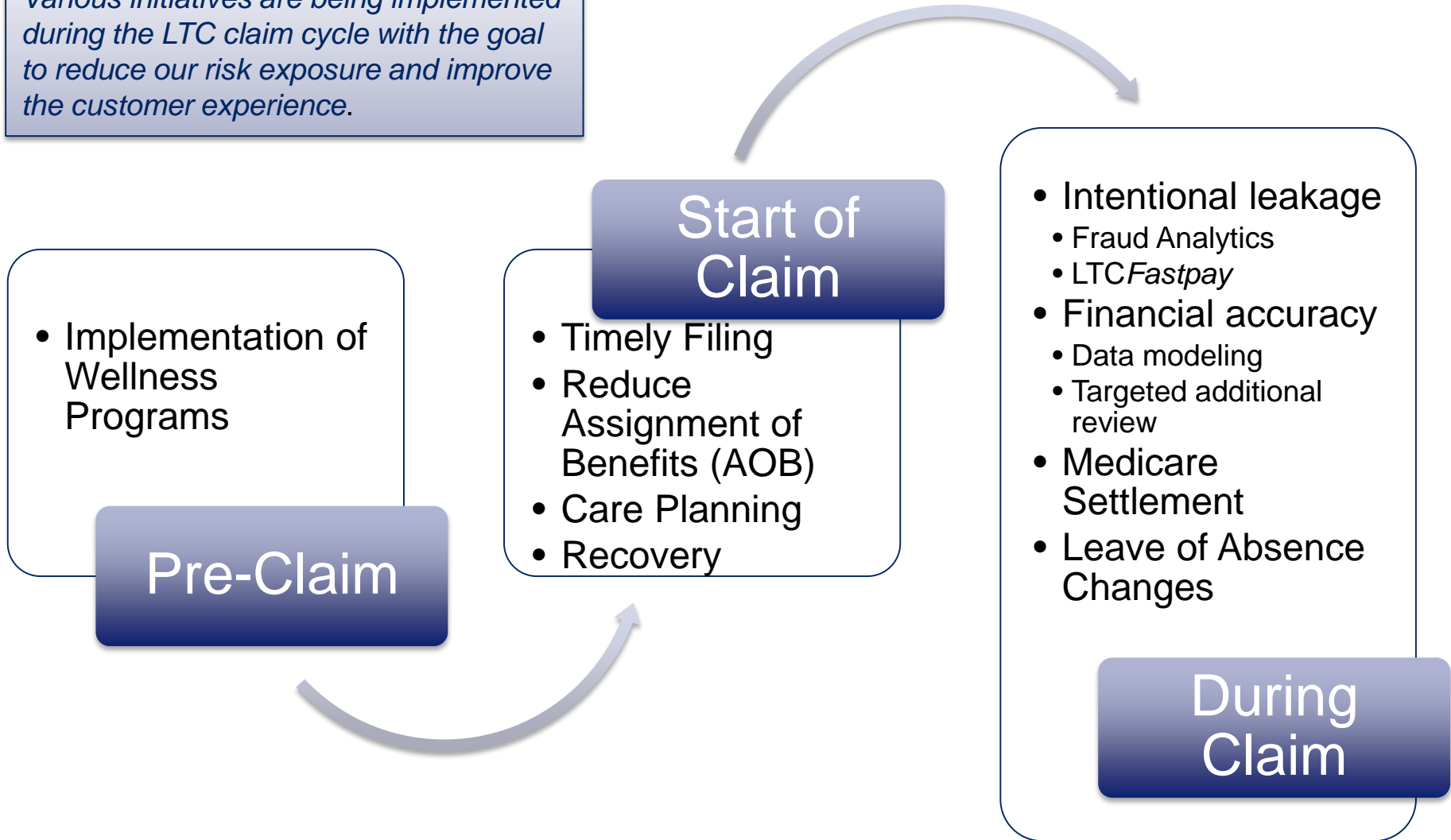
- Claim payments under CNO LTC insurance policies are the highest of any CNO line of business.
- LTC insurance claim payments are rising and are expected to continue to rise in the near future.
- There is industry wide concern regarding LTC insurance profitability and viability.
- Questions:
 - Is there a way to change the trajectory of LTC claims?
 - Can wellness initiatives/early intervention protocols be a part of such an integrated claims improvement strategy?

The Business Problem – Background, continued



LTC Claims Initiatives

Various initiatives are being implemented during the LTC claim cycle with the goal to reduce our risk exposure and improve the customer experience.



Wellness/Early Intervention – what to do?

- Identify people at elevated risk
 - Predictive Modeling
 - Claims experience in other lines of business
- Devise strategies to mitigate risk
 - Focus on changes that are expected to improve outcomes (chronic disease management, diet, exercise, smoking cessation, health screenings to raise awareness)
- Encourage insureds to utilize mitigation strategies – e.g. address blocked carotid artery

LTC Claims Predictive Modeling Process



- Modeling team created 20 statistical models to identify customers of varying likelihoods of being claimants.
- Data included 281k customers who have never been claimants and 6k initial claimants in 2013 to model against.
- Used iterative process to find most predictive model:
 - Started by predicting being a claimant across age and diagnosis and found that being age 81+ was an overwhelming factor.
 - Then, created separate models by age (≤ 70 , 71-80, 81+). Models had good fit but predicting diagnosis took priority.
 - Next, predicted by diagnosis (Arthritis / injury, Alzheimer's, stroke / circulatory) across age and again found age 81+ dominant.
 - The final set of models included age and diagnosis, e.g., predicted stroke/circulatory claimants aged 81+.
 - Strongest model predictors are higher home values, longer benefit and elimination periods, longer-term customers.

Significant Model Predictors (Age 81+)



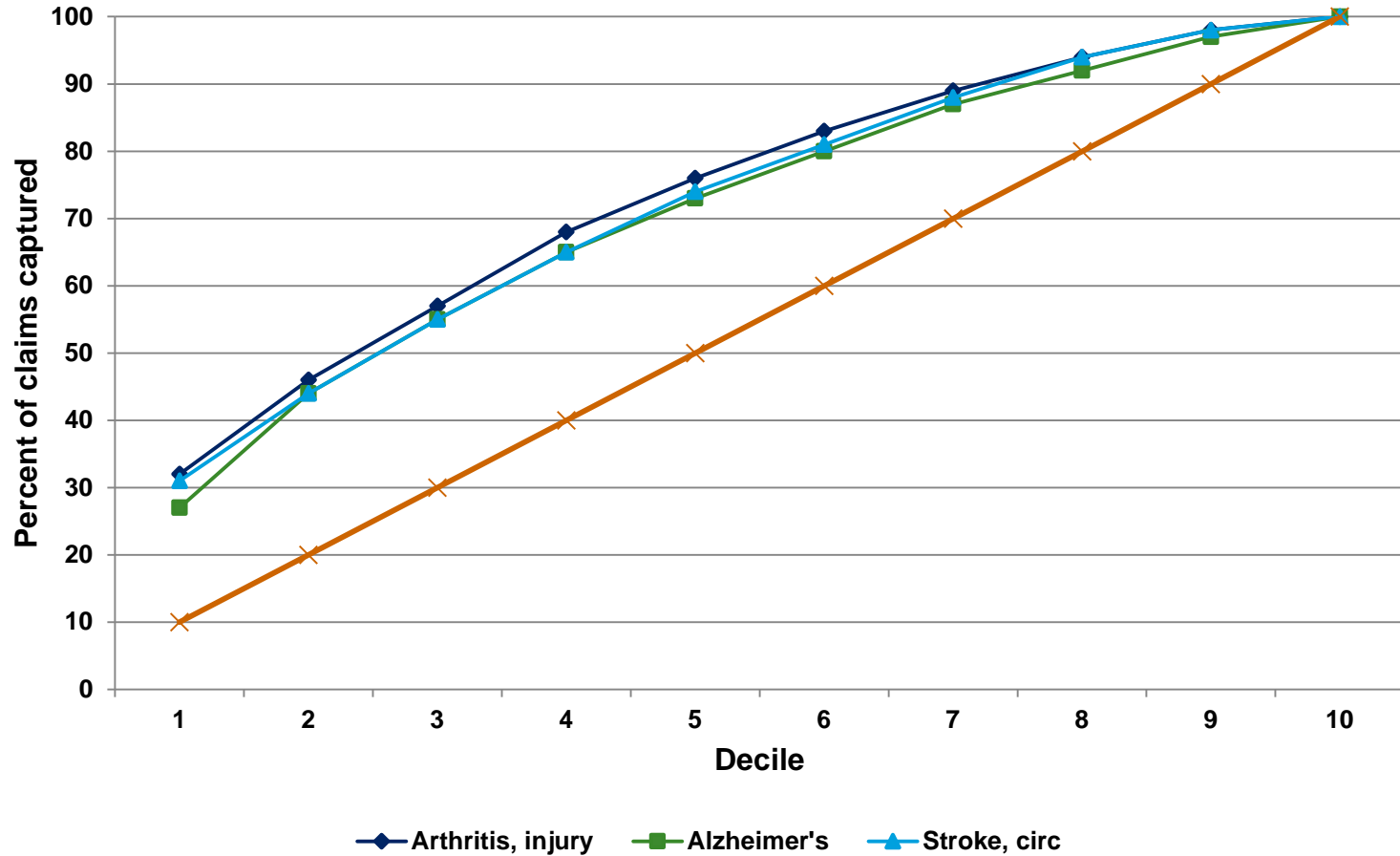
Arthritis/Injury		Alzheimer's		Stroke/Circulatory	
Variable	P/N	Variable	P/N	Variable	P/N
HHC	+	Presence of children	+	Length customer > 20 yrs	+
Female	+	Home value > \$200k	+	Home value > \$200k	+
Multiple dwelling	+	Gardening	+	Home video recording	-
Home value > \$200k	+	STC	-	Length customer 11-20 yrs	+
Truck owner	-	Length residence < 7 yrs	+	Form code 410 (HHC)	+
Benefit period > 1 yr to <= 3 yr	+	HHC	-	Income > \$100k	+
Benefit period > 3 yr	+	Pool owner	+	New car buyer	-
Form code 400 (HHC)	-	Income < \$30k	-	Professional occupation	-
Household size = 3	+	Form code 410 (HHC)	+	Graduate school education	+
Benefit period unlimited	+	Household size = 1	+	STC	+
Pool owner	+	Benefit period > 1 yr to <= 3 yr	+	Retired	-
Home value < \$75k	+	Benefit period > 3 yr	+	Benefit period > 1 yr to <= 3 yr	+
Elimination period 30-89 days	-	Benefit period unlimited	+	Benefit period > 3 yr	+
Elimination period 90 days	-	Elimination period 90 days	-	Pool owner	+
Income < \$30k	-	Home value \$125k to \$200k	+	Form code 085 (HHC)	+

Lift Chart

The models shows good “lift” in predicting beyond a random model

Decile	Arthritis/Injury			Alzheimer’s			Stroke/Circulatory		
	N	Claim	Cum % Claim	N	Claim	Cum % Claim	N	Claim	Cum % Claim
1	7,931	189	31.66%	7,919	296	26.98%	7,907	143	30.62%
2	7,887	83	45.56%	7,905	183	43.66%	7,920	63	44.11%
3	7,907	71	57.45%	7,892	128	55.33%	7,905	49	54.60%
4	7,906	62	67.84%	7,900	110	65.36%	7,900	47	64.67%
5	7,910	47	75.71%	7,891	80	72.65%	7,903	42	73.66%
6	7,906	41	82.58%	7,909	83	80.22%	7,913	34	80.94%
7	7,900	36	88.61%	7,907	69	86.51%	7,901	34	88.22%
8	7,901	31	93.80%	7,904	65	92.43%	7,908	25	93.58%
9	7,902	25	97.99%	7,904	46	96.63%	7,899	22	98.29%
10	7,904	12	100.00%	7,923	37	100.00%	7,898	8	100.00%
	79,054	597		79,054	1,097		79,054	467	

Cumulative % of Claims by Decile



Stroke/Circulatory Age 81+ Model Lift Chart



BANKERS LIFESM

The model shows good “lift” in predicting beyond a random model

Decile	# Ref	Claims	% Claims	Cum % Claims	Claims Rate	Total Claims Modeled Claims	Average Claim for Modeled Claims
1	7,907	143	30.62%	30.62%	1.81%	\$3,956,665	\$27,669
2	7,920	63	13.49%	44.11%	0.80%	\$2,040,600	\$32,390
3	7,905	49	10.49%	54.60%	0.62%	\$1,374,137	\$28,044
4	7,900	47	10.06%	64.67%	0.59%	\$1,603,914	\$34,126
5	7,903	42	8.99%	73.66%	0.53%	\$1,091,831	\$25,996
6	7,913	34	7.28%	80.94%	0.43%	\$931,421	\$27,395
7	7,901	34	7.28%	88.22%	0.43%	\$928,043	\$28,295
8	7,908	25	5.35%	93.58%	0.32%	\$598,237	\$24,927
9	7,899	22	4.71%	98.29%	0.28%	\$678,705	\$29,509
10	7,898	8	1.71%	100.00%	0.10%	\$238,226	\$29,778
	79,054	467			0.59%	\$13,441,778	\$28,783

- Not trying to find actual claimants, but rather people at risk for claim. Do these models accomplish this?
- Some of the variables are inherently obvious (e.g. higher age, higher duration, female gender, higher benefit policy). Are these models really “value added” tools?
- Models need to be tested to provide proof of concept.

Testing the Predictive Model for Stroke and Circulatory Disease



- Identified individuals at highest and lowest end of the risk spectrum per the stroke and circulatory disease predictive model.
- Offered free Life Line Vascular Disease Screening to members of each group.
- Compared aggregated screening results for the “high risk” and “low risk” customers.
- Compared LTC claims experience that has emerged since 1/1/2016.

Testing the Predictive Model for Stroke and Circulatory Disease



Bankers LTC Stroke and Circulatory Disease Predictive Model Testing

Bankers Screening Results	Modeled Lowest Risk	Modeled Highest Risk	LTC Full Year 2014 Voluntary Screening Results
Policyholders Screened	129	142	832
Carotid Screening			
Moderate or worse finding:	76.0%	76.8%	65.0%
Abdominal Aortic Aneurysm Screening			
% with Aneurysm:	3.1%	0.7%	1.2%
Peripheral Arterial Disease Screening			
Abnormal or Critical %:	6.2%	12.7%	4.1%
Atrial Fibrillation Screening			
% with A-Fib:	3.1%	2.8%	2.2%

Focusing specifically on the PAD screening (strong marker of Heart Disease), the difference between the High Risk and Low Risk Results are statistically significant.

Testing the Predictive Model for Stroke and Circulatory Disease



- Rubber meets the road in future claims experience. For the screened population:
 - Low Risk Group:
 - Only 1 claim attempted since screening and it was denied
 - 0.00% claims incidence rate.
 - High Risk Group:
 - 8 claims attempted/6 approved since screening.
 - 3.72% claims incidence rate.

Testing the Predictive Model for Stroke and Circulatory Disease



- For those offered screenings but didn't take them:
 - Low Risk Group:
 - 840 insureds
 - 29 claims incurred since 1/1/2016.
 - 2.35% claims incidence rate.
 - High Risk Group:
 - 1,057 insureds.
 - 81 claims incurred since 1/1/2016.
 - 5.24% claims incidence rate.

Testing the Predictive Model for Stroke and Circulatory Disease



LTC Claims Incidence Rate Comparison			
Exposure Period 1/1/2016 to 6/30/2017			
	Predictive Model Risk Group		
<u>Life Line Screening Conducted?</u>	<u>High</u>	<u>Low</u>	<u>All</u>
Yes	3.72%	0.00%	1.97%
No	<u>5.24%</u>	<u>2.35%</u>	<u>3.95%</u>
All	5.05%	2.03%	3.70%

LTC Total Claims Cost Comparison			
Exposure Period 1/1/2016 to 6/30/2017			
	Predictive Model Risk Group		
<u>Life Line Screening Conducted?</u>	<u>High</u>	<u>Low</u>	<u>All</u>
Yes	16.34	-	8.64
No	<u>23.92</u>	<u>13.80</u>	<u>19.26</u>
All	22.97	11.95	17.87

- In Summary:
 - Both Life Line Screening results and actual claims results that emerged support notion that the “high” risk group is indeed more risky than the “low” risk group
 - Those who elected the Life Line Screening have had better claims results, regardless of risk tier, than those who didn’t elect the screening.
 - We conclude the predictive model for stroke and circulatory disease does provide value.