

# Quantifying the Risk of Disability and Death using Medical Claims Data

(US patent 7,249,040 and patents pending)

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# Overview

- Challenges
- Enhanced Risk Selection
- Loss Ratio Analysis and Model Validation
- Clinical profiling for disease management
- Summary and discussion

# Challenges for Disability and Life

- Risk selection
  - Manual rates—little discrimination
  - Experience—little credibility and the Lexian PDF implies credibility worse than you thought
  - Competition—wild variability in pricing the same case
- Risk management
  - Pricing multiple lines
  - Clinical profiling for disease management
- Solution—use clinical information from medical claims for more accurate forecasts, pricing and DM

# Enhanced Risk Selection

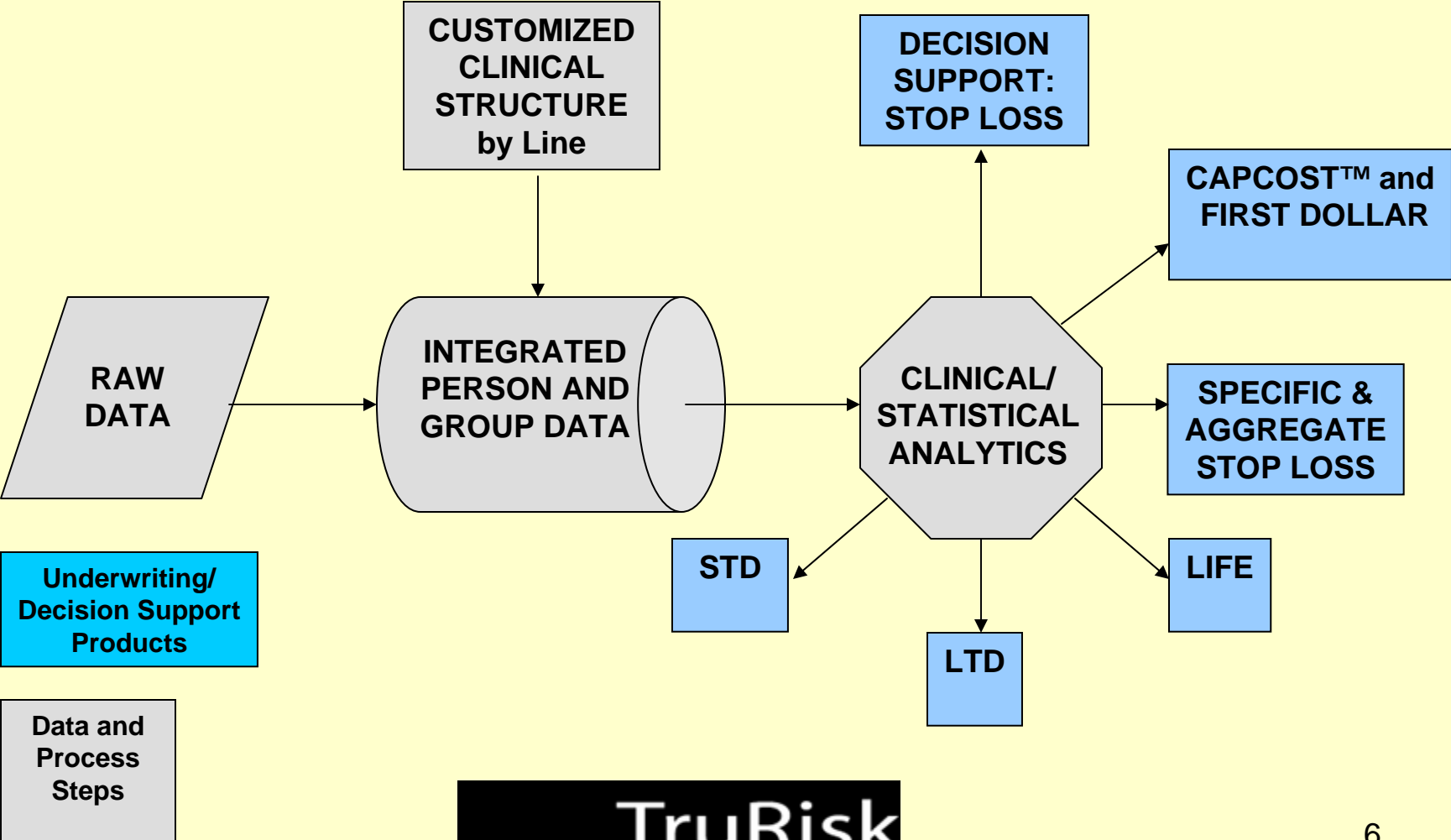


# Strategy—Winning by Changing the Rules

- Using better information (all medical claims and diagnoses)
- Forecasting claim cost more accurately using proprietary Clinical/Statistical Models
- Modifying the distribution system—review all groups in medical plan or TPA then quote on groups with the greatest profit potential



# More Accurate Risk Selection— All Lines, All Groups



# Paradigm Shift

- Evaluate risk and target favorable groups using Clinical/Statistical Models
  - Provide more accurate pricing of Disability and Life for medical customers
  - Lower loss ratio and its variability
  - Cross-sell with first dollar or medical stop loss coverage
- Lower future risks—target high risk Disability and Life employees for disease management



# Evaluating Disability and Life Risk

- Medical claims and eligibility data required for cases to be underwritten
- Medical and Disability or Life claims do not need to be linked at the person or group level for model development—key breakthrough
- Different Clinical/Statistical Models required for different insurance products
- Compare clinical risk to demographic and experience—Clinical/Demographic Ratio

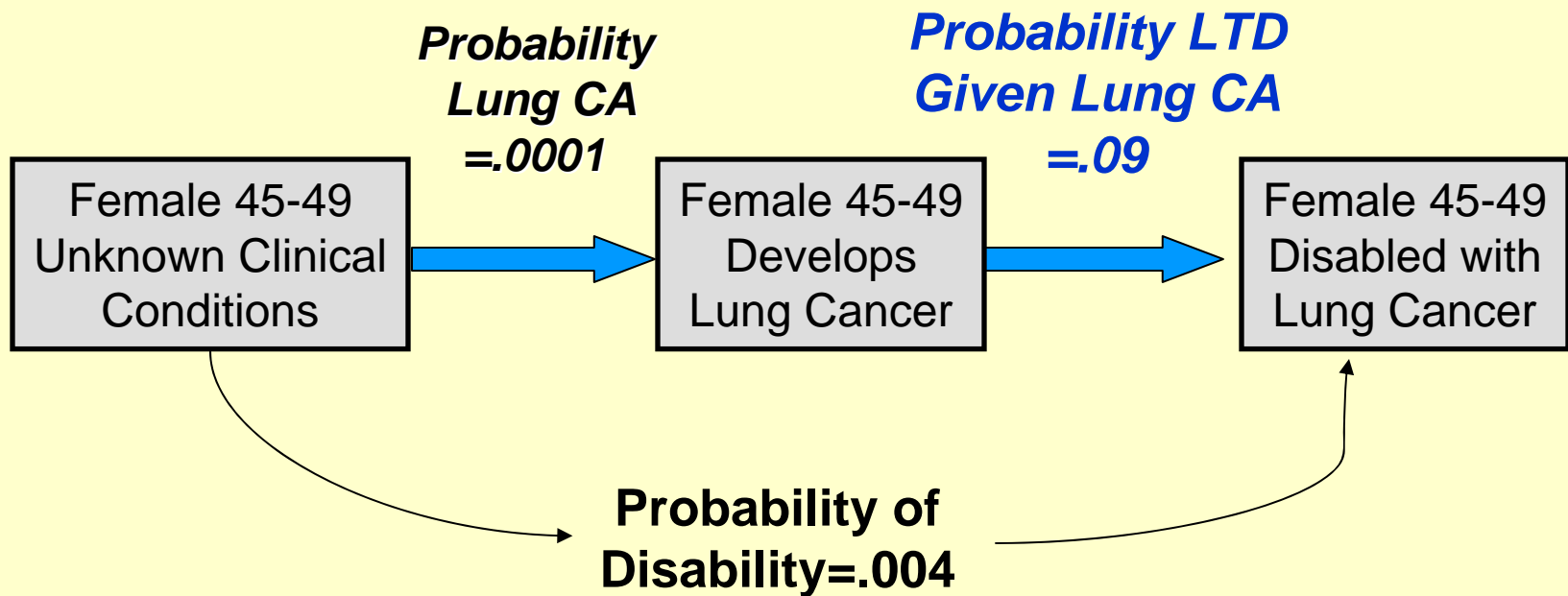


# Clinical/Statistical Models

- Benefits of medical underwriting without the cost or intrusion
- Far greater range in the person-level estimate of incidence rates and severity
- Direct estimate of future risk—forward looking
- Clinical profile for disease management

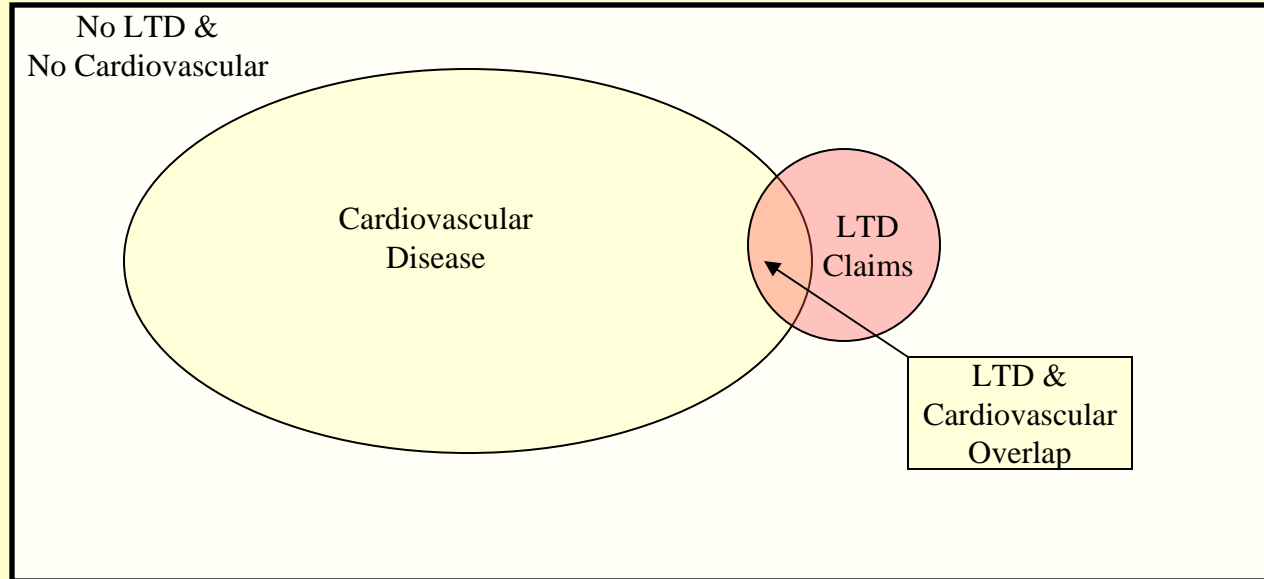
# Chain of Events for Disability/Death—

No Clinical Condition → Condition Develops → Diagnosis and Treatment (usually) → Disability/Death



# Need Probability of LTD claim, Given Medical Condition (e.g., Cardiovascular)

$$\text{Probability (LTD claim|Cardiovascular)} = \frac{\text{Prob(LTD claim \& Cardiovascular)}}{\text{Prob(Cardiovascular)}}$$



# Bayes' Theorem

## Example for Cardiovascular Disease and LTD

Probability of (LTD Claim | Cardiovascular)=

$$\frac{[\text{Prob}(\text{Cardiovascular} | \text{LTD Claim}) * \text{Prob}(\text{LTD Claim})]}{\text{Prob}(\text{Cardiovascular})}$$



# Life Clinical vs. Demo Models—

Group Forecast Accuracy Improves due to Increased Precision at Person Level

<b>Female 45-49</b>	
<b>Life Type</b>	<b>Incidence</b>
<b>Demo</b>	0.00118
<b>Lung CA</b>	0.10362
<b>AMI</b>	0.02396
<b>HIV</b>	0.01734
<b>Breast CA</b>	0.00676
<b>Preg Comp</b>	0.00002

# LTD Clinical vs. Demo Models—

Group Forecast Accuracy Improves due to  
Increased Precision at Person Level

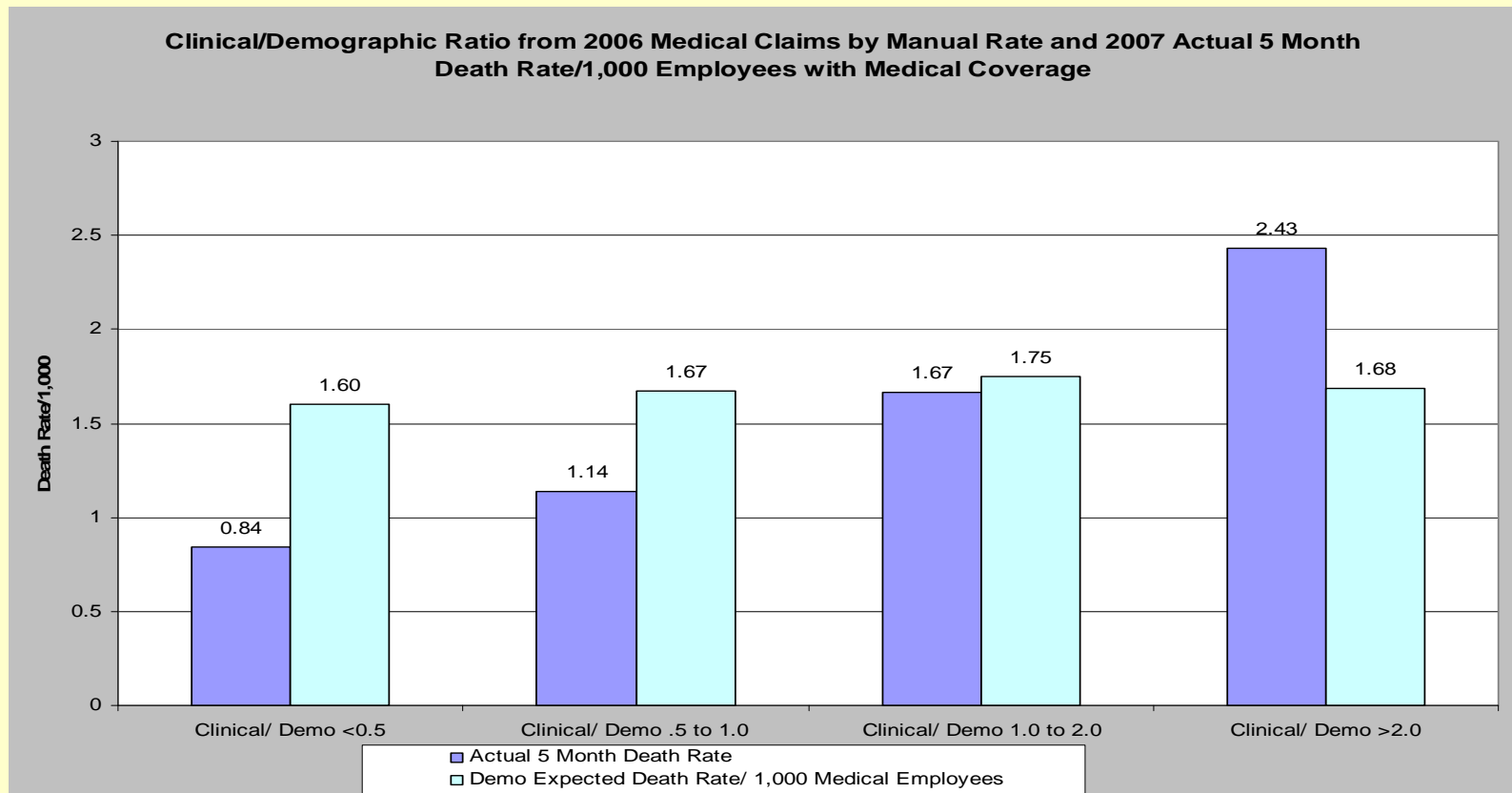
## Female 45-49

### LTD EP 90 Days

Type	Incidence	Duration	Expected Months	Expected Cost
Demo	0.004	50.8	0.20	\$198.00
MS	0.036	101.0	3.31	\$3,309.00
CVA	0.033	74.0	2.22	\$2,222.00
Lung CA	0.092	25.5	2.14	\$2,135.00
Preg Comp	0.003	1.8	0.01	\$5.00

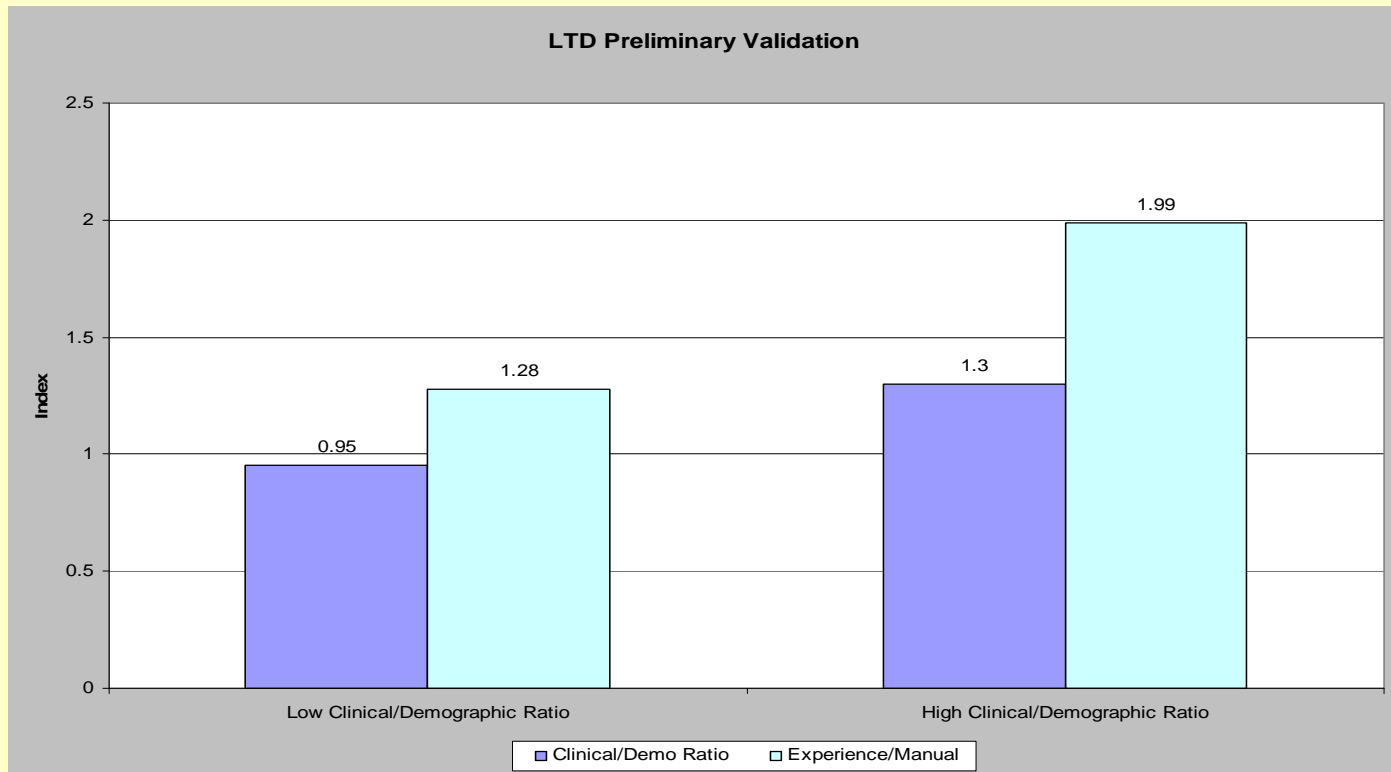
# Preliminary Validation for Life

Groups with High Clinical/Demo Ratios have much higher actual death rates than Low Clinical/Demo Groups but similar Demographic Risk



# Preliminary Validation for LTD

Groups with High Clinical/Demo Ratios have 55% Greater Experience/Manual Ratio than Low Clinical/Demo Groups

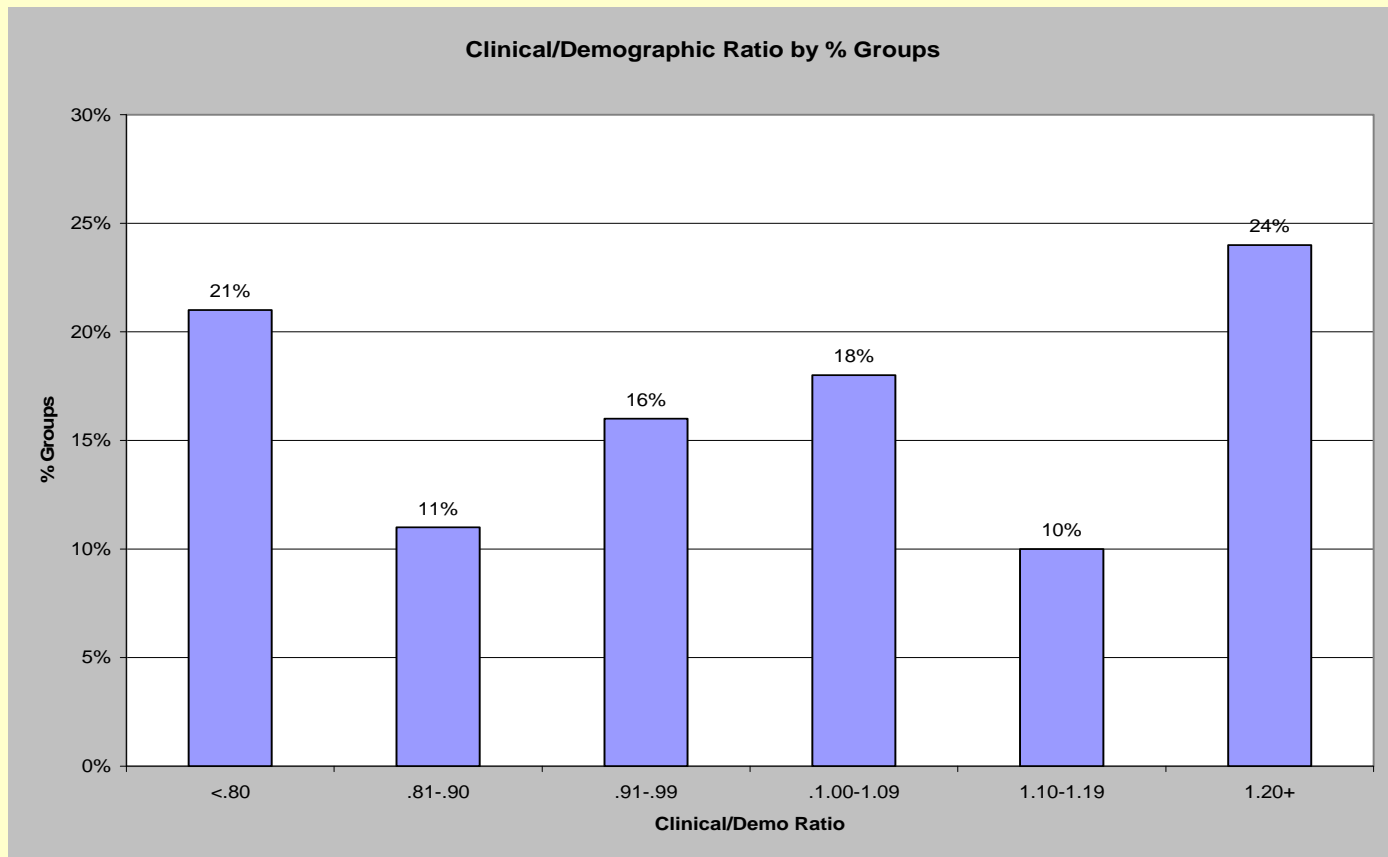




# Group Level Clinical Risk—

About 1/3 Groups 10%+ Over,

1/3 Groups 10%+ Under Demo Average



# Potential Profit Impact

- Based on one client's LTD data for cases under 1,000 lives
  - Avoiding the worst 5% of cases would result in increasing margins from 14% to 36%
  - Assume avoid ½ of bad groups, margin becomes 25% or 11% increase
- Profit improved by targeting groups with low clinical risk compared to demographic risk
  - 21% groups have clinical/demo ratio < .80
  - 10% premium reduction gives clinical loss ratio =  $(.8/.9) * (\text{current loss ratio}) = .89$  or lower of current

# Potential Profit Impact (cont.)

- Life validation
  - Groups with Clinical/Demo Risk < 2.0
    - 75% claims
    - 86% premium
    - Implies 13% reduction in current Loss Ratio =  $[(.75 \text{ claims}) / (.86 \text{ premium})] * (\text{current LR}) = 87\% \text{ current LR}$
  - Groups with Clinical/Demo Risk > 2.0
    - 25% claims
    - 14% employees or premium in those groups
    - Implies 79% increase over current Loss Ratio
- 10% reduction in loss ratio is target for LTD and Life

# Pricing Strategy

- Current manual and process flow remain as foundation for underwriting
- Blend Clinical/Demographic Ratio into pricing using credibility theory—include experience if reasonable credibility
- Pricing considerations
  - Price sensitivity and persistency rates
  - Competitors and their strategy
  - New vs. renewal for ancillary lines—note all groups are medical renewals due to data requirements
  - Discounts for multiple ancillary lines

# Example Pricing Grid LTD: Clinical/Demo Ratio

Clinical/ Demo Ratio	% Groups	% Employees	Discount/ Load
<.25	0%	0%	?
.25-.69	15%	8%	-20%
.70-.79	20%	17%	-15%
.80-.89	10%	11%	-10%
.90-.99	10%	15%	-3%
1.00-1.09	15%	15%	10%
1.10+	30%	34%	15%

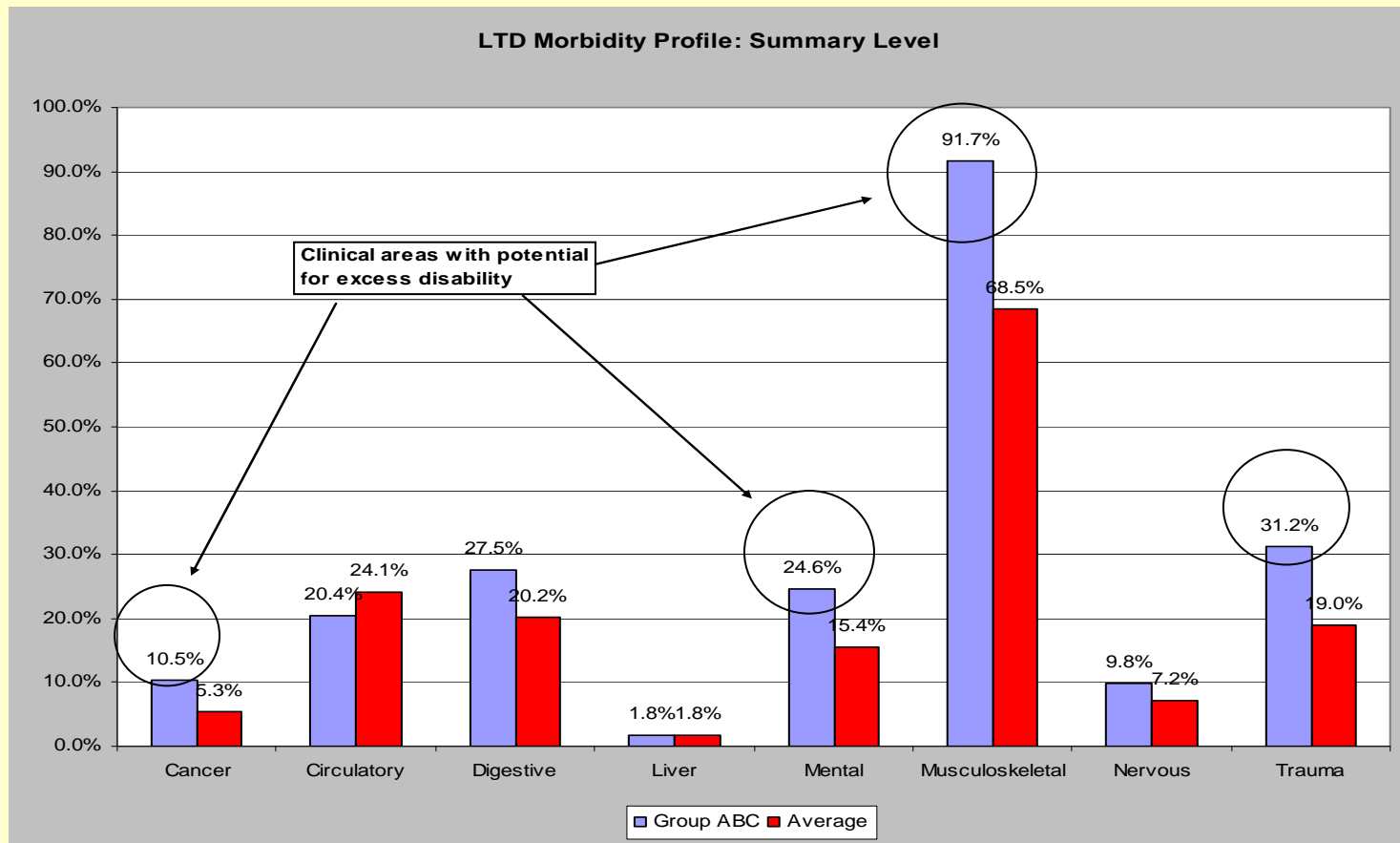
# Pricing Considerations— Correlations between Lines

	LTD	STD	Life	Med
LTD	1.0			
STD	.68	1.0		
Life	.64	.21	1.0	
Med	.75	.65	.35	1.0

# Clinical Profiling for DM

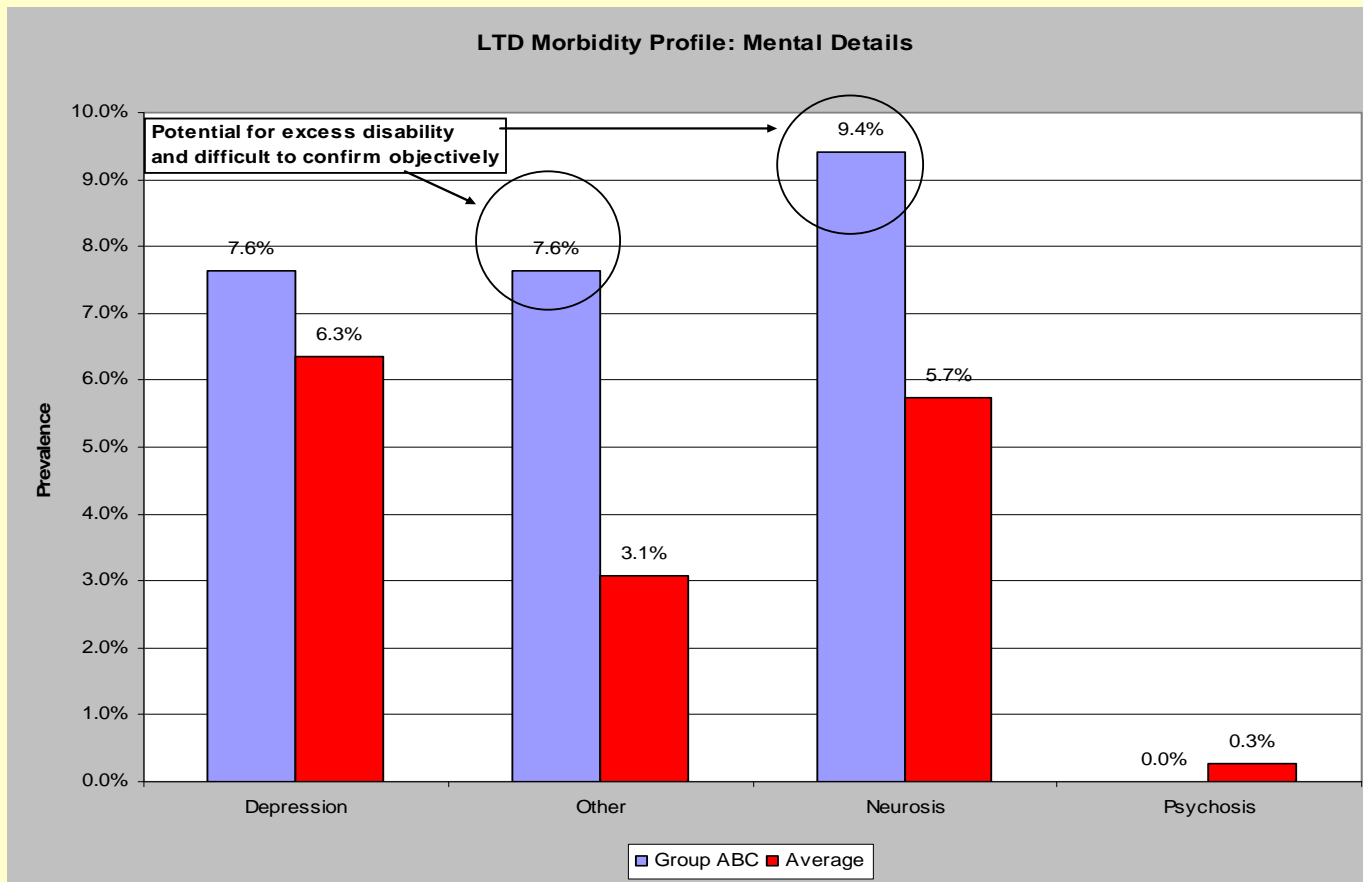


# Example Clinical Profile for Disease Management—Summary

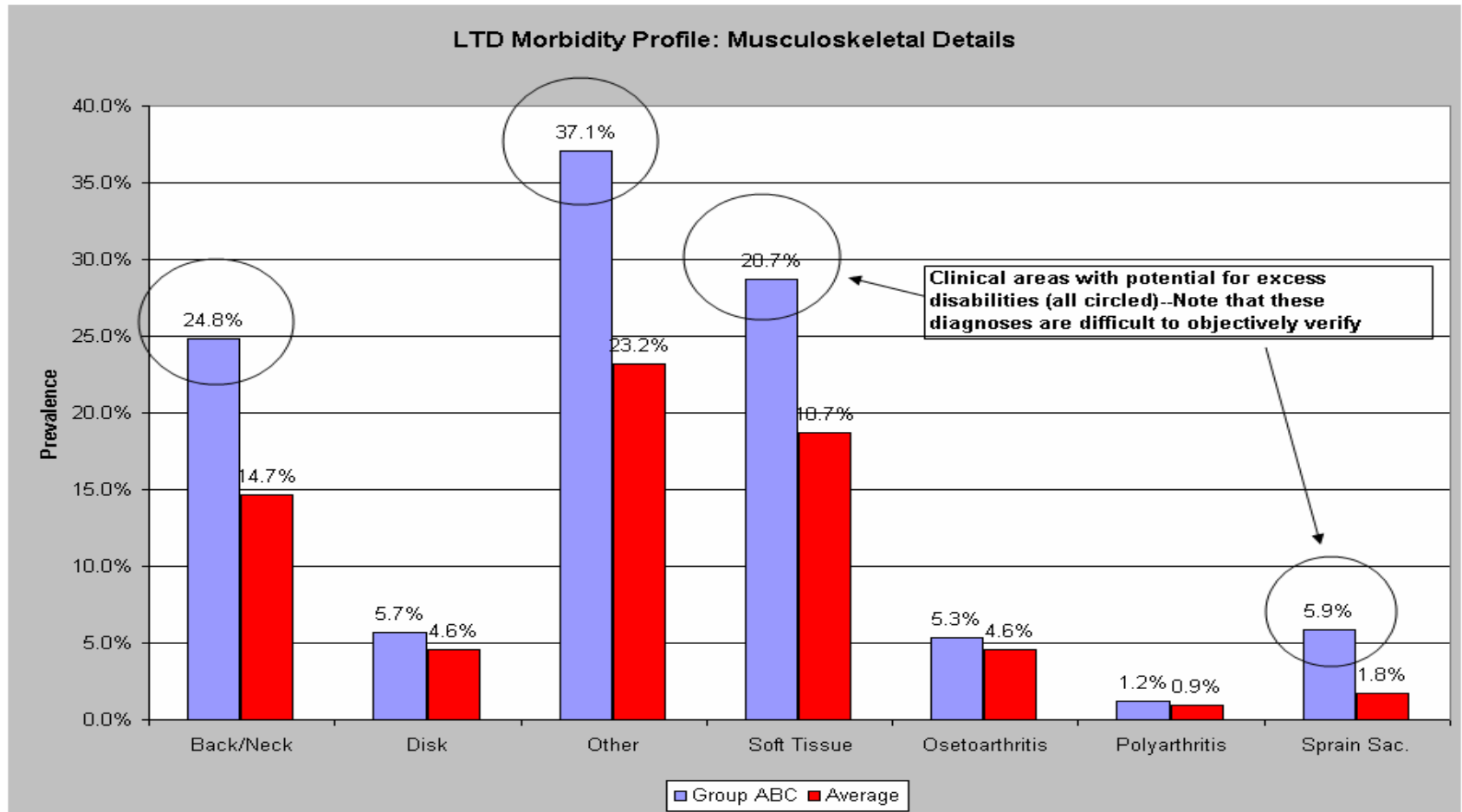




# Example Clinical Profile for Disease Management—Mental Disorders



# Example Clinical Profile for Disease Management—Musculoskeletal Disorders



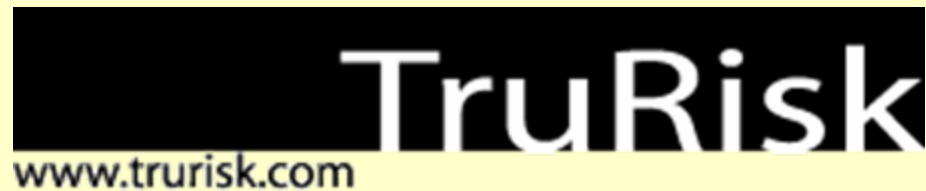
# Summary

- Medical plans will have huge competitive advantage
  - Superior risk selection using medical claims
  - Cross-sell with medical or stop loss coverage
  - Cash flow—Life and LTD premium about 3% medical
- High persistency rates favor incumbent—change is slower than anticipated but inevitable
- Future risk mitigation through disease management

# Additional Topics

- Privacy issues
  - Individuals
  - Groups
- Modeling other lines
- Other?

# Thanks



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