Gen Re

LIFE UNDERWRITING

Evaluating ExamOne's LabPiQture

Will LabPiQture Work as a New Tool for Life Underwriting?

Gen Re Account Representatives are offering to help our clients with analyzing how best to incorporate LabPiQture into their underwriting workflow to improve their business results.

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Evaluating ExamOne's LabPiQture – and How We Think It Could Help

Insurance exams and fluid specimens reveal important evidence for risk assessment of life insurance applications. Fluidless underwriting gives up this value - and insurance carriers need to offset the loss. LabPiQture is a new tool that reports clinical lab results in the extensive data of Quest Diagnostics and LabCorp, and it could be useful for fluidless underwriting.

So, we set out to evaluate the usefulness of LabPiQture clinical laboratory tests to recover some of the value lost in fluidless underwriting.

OVERVIEW

What is LabPiQture?

ExamOne's data product LabPiQture provides access to a report of clinical laboratory requisitions and test results for procedures performed over the last seven years by Quest Diagnostics and LabCorp. Data is collected over the course of ordinary medical care, as well as certain other contexts such as wellness screenings.

The majority of the data is test results. In addition, LabPiQture provides doctor and facility identifiers, doctors' specialties, and provider-generated ICD diagnosis codes submitted as part of the test requisition process.

Improving Fluidless Underwriting

The hardest challenge in accelerated underwriting (AU) is to compensate for the loss of information previously derived from blood and urine tests.

A 2016 SOA survey confirms insurance companies struggle with incomplete data in an AU environment.[1]

LabPiQture contains many typical insurance panel tests. Gen Re chose to assess the utility of LabPiQture as a substitute for insurance fluid tests in assessment of mortality risk.

Key Findings

Gen Re determined that a subset of LabPiQture data includes some standard insurance laboratory tests for nearly 30% of our sample applicants. Of those applicants with insurance tests, we identified adverse information among 15%. This underwriting value varied by age and gender but had a mortality impact of greater than 10% for all age and gender combinations. This indicates that LabPiQture provides a significant mortality benefit.

Gen Re recommends conducting a comprehensive cost-benefit analysis based on a company's specific portfolio to determine the value LabPiQture could bring to its business.

Other Uses

Although we explored laboratory tests that insurers typically require, LabPiQture reports other information that is useful in assessing risk of life insurance applicants, including:

- Insight from clinical tests that insurers do not typically require
- Analysis of sequential laboratory test values over time
- Ratings based on specialties visited and/or ICD diagnoses codes
- Limited preferred class assessment with lipid tests

We plan to explore some of these uses in a future study.

DATA

Description of the Data

ExamOne provided LabPiQture de-identified data on nearly 100,000 recent life insurance applicants. These individuals were identified by consecutive paramedical exams, dating from August 2016 to January 2017. The search did not include the records of LabCorp for this study.

The LabPiQture dataset contains each applicant's age, gender, and any clinical test results from 2012 until the extraction date, July 9, 2019. Although true paramed dates vary for each applicant, for this research we assume all applied for life insurance on the extraction date.

Cleaning the Data

Preparation of the data for analysis required extensive standardization and normalization, which included:

- Standardization of LOINC codes*
- Categorization of qualitative and quantitative result values
- Conversion to uniform units of measure

METHODOLOGY

Selected Laboratory Tests

The LabPiQture sample contained thousands of unique tests. We chose to analyze 28 tests of blood and urine that insurers typically require. These tests primarily come from the metabolic panel, lipid panel, and urinalysis.

** a unique identifier for laboratory tests; similar to ICD code for diagnoses.*

Each of the 28 insurance tests was grouped into 11 mortality rating groups.

Figure 1.
List of 28 labs grouped into 11 rating groups.

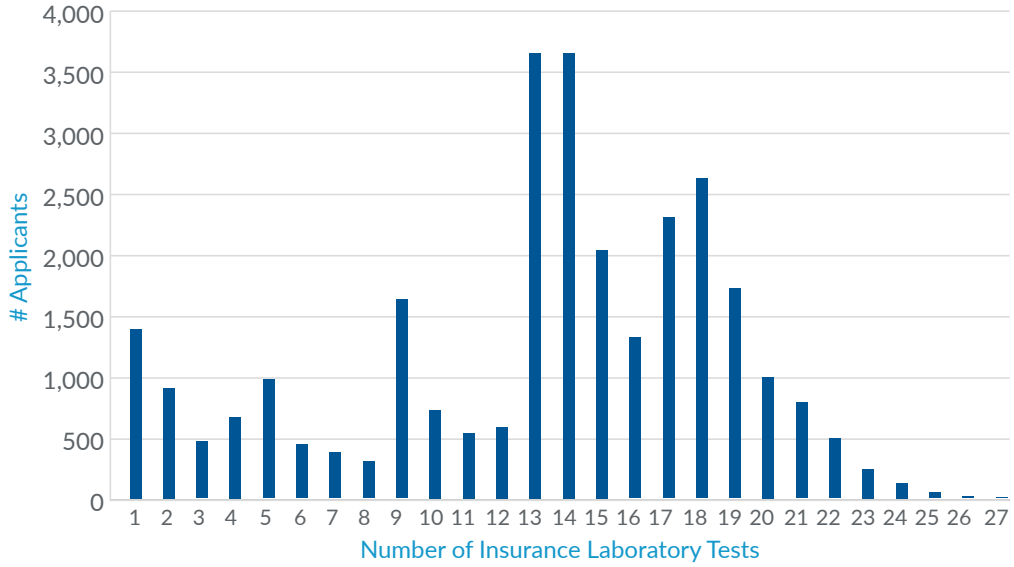
Liver Test	Diabetes	Proteinuria	Hematuria	Serum Albumin
• AST • ALT • GGT • ALP • Bilirubin • Hepatitis B • Hepatitis C • HDL Cholesterol	• HbA1c • Serum Glucose • Urine Glucose	• Urine Creatinine • Urine Microalbumin • MALB/Creat Ratio • Urine Protein • Protein/Creat Ratio	• Urine RBC • Urine WBC • Hemoccult Screen	Triglycerides
	Cholesterol / HDL Ratio • Total Cholesterol • HDL Cholesterol • Cholesterol/HDL Ratio		eGFR • Serum Creatinine • eGFR	Cocaine
				PSA
				Globulin

Mortality Estimation

The underwriting criteria from SOURCE-Life, Gen Re's underwriting manual, were applied to each mortality group of clinical laboratory tests to calculate debit ratings. The overall mortality rating adds the most recent rating for each group, although they may not have been all collected at the same time. More recent ratings more accurately represent current health risk.

Not every applicant has clinical lab data for all 28 tests examined. Our analysis shows that among the applicants with any insurance laboratory tests, 70% had at least 13 of the 28 tests done. Missing tests contributed no debits to an applicant's final rating.

Figure 2.
Applicants based on the number of available laboratory test values.

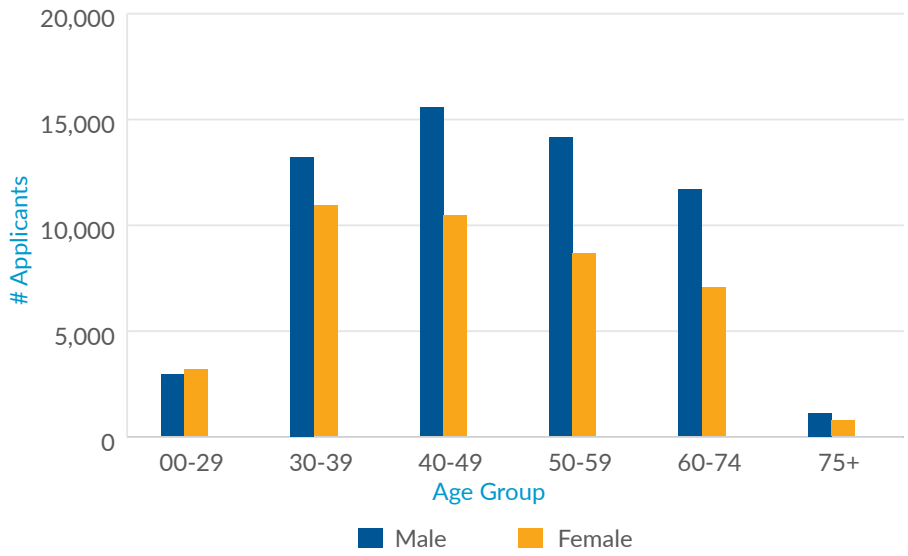


ANALYSIS AND RESULTS

Sample Statistics

Gender was skewed toward male at 59%, with 41% being female. Only in ages less than 30 did females comprise of a majority of applicants.

Figure 3.
Age and gender breakdown of the 99,380 applicants.



Hit Rate

We found 38% (38,149) of applicants have clinical lab information and nearly 30% of applicants have insurance labs. This represents 75% of those with any lab information.

Figure 4.
A selection flow of applicants used in analysis.

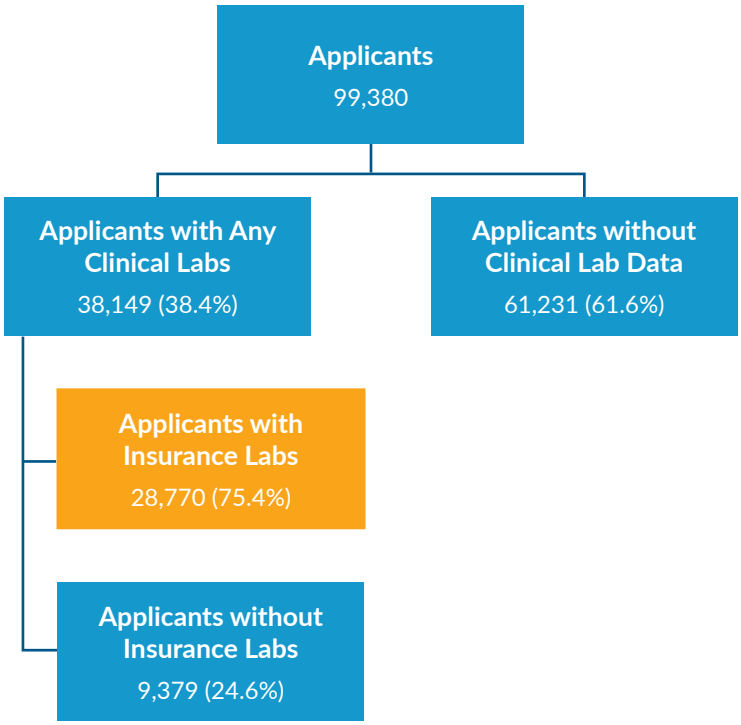
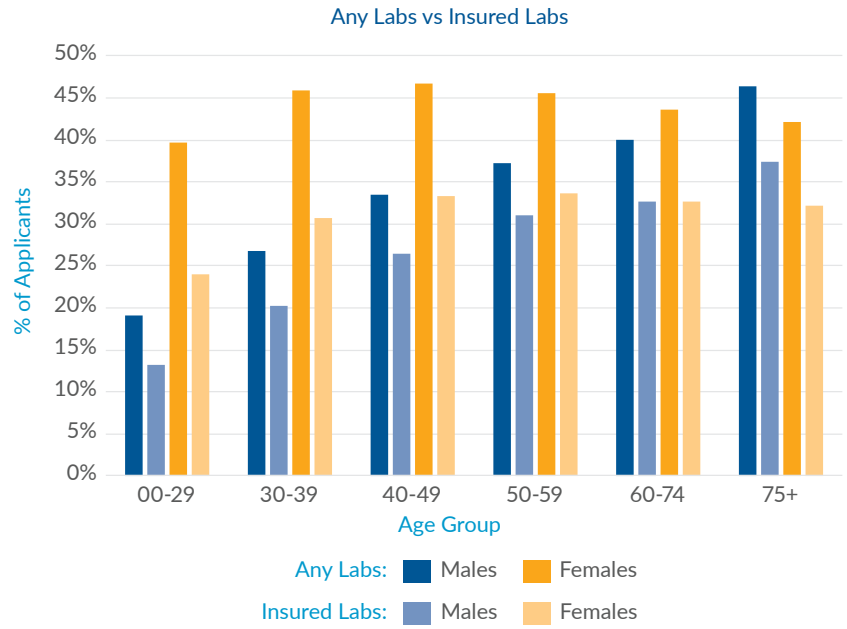


Figure 5 illustrates the age and gender distribution of applicants with clinical lab tests. The overall hit rate is defined as the percentage of applicants who had any clinical laboratory test in the LabPiQture dataset. The insurance hit rate is defined as the percentage of applicants who had at least one insurance laboratory test in the data.

Both hit rates vary by age and gender. The data suggests females are more likely to have clinical lab values at a younger age than males. Tests ordered by OB/GYN specialists does not fully explain this trend.

Figure 5.

Insurance hit rate as a subset of the overall hit rate, by age and gender.



Impact on Mortality

Applicants were split into three underwriting classes based on their underwriting debits using LabPiQture data and Gen Re's underwriting criteria.

- Standard* – no underwriting debits
- Substandard – between 25 and 375 debits
- Decline – uninsurable, or 400 debits or more

Figure 6.

Distribution of applicants based on mortality rating.

Calculated from LabPiQture clinical laboratory data.

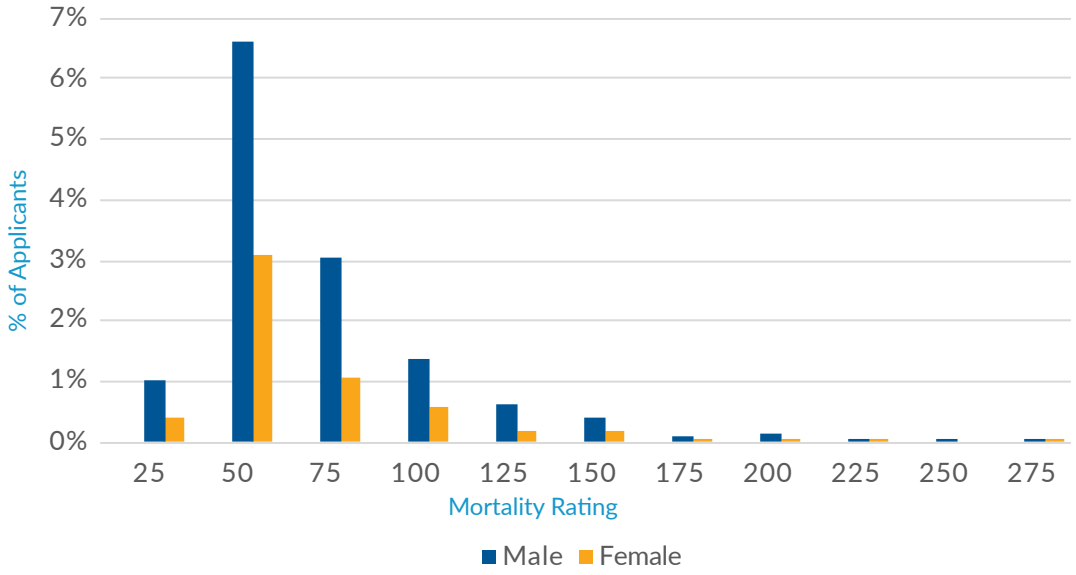
Rating	Male	Female	Total
Standard	80.5%	89.1%	84.4%
Substandard	13.4%	5.7%	9.9%
Decline/Uninsurable	6.1%	5.2%	5.7%

Overall, 84.4% of applicants showed no additional mortality based on their typical insurance lab results, and the results showed that 5.7% would be declined due to extreme lab values (Figure 6).

** The Standard group includes applicants classified as Preferred Not Available (PNA).*

Of the substandard cases, most showed extra mortality ranging from 25 to 150 debits; few applicants earned more than 150 debits (Figure 7).

Figure 7.
Distribution of substandard applicants based on mortality rating.
Calculated from LabPiQture data.



MORTALITY RESULTS

With these extra mortality ratings, we analyzed the increase in mortality across the portfolio of applicants who had any clinical laboratory tests in the LabPiQture data.

We used age/duration specific annual mortality from the 2015 VBT unismoke tables as the baseline mortality rates (q^{base}). Adjusted mortality rates (q^{adj}) and mortality ratios (MR) are calculated from the extra mortality ratings determined from the clinical lab data.

$$q^{adj} = q^{base} * (1 + \text{debits}/100) + \textit{flat extra mortality}$$

$$MR = \frac{q^{adj}}{q^{base}}$$

We aggregated mortality by summing the adjusted and base mortality across age and gender.

$$\textit{Mortality ratio (MR)} = \frac{\sum q^{adj}}{\sum q^{base}}$$

Figure 8.
Example of adjusted mortality rate calculation given age, gender.
LabPiQture clinical data.

A 40-year-old male has a duration 1 mortality rate of 0.26 per thousand, based on the 2015 VBT. Extra mortality is +150 debits and a flat extra of 4 per $1,000 of face amount.

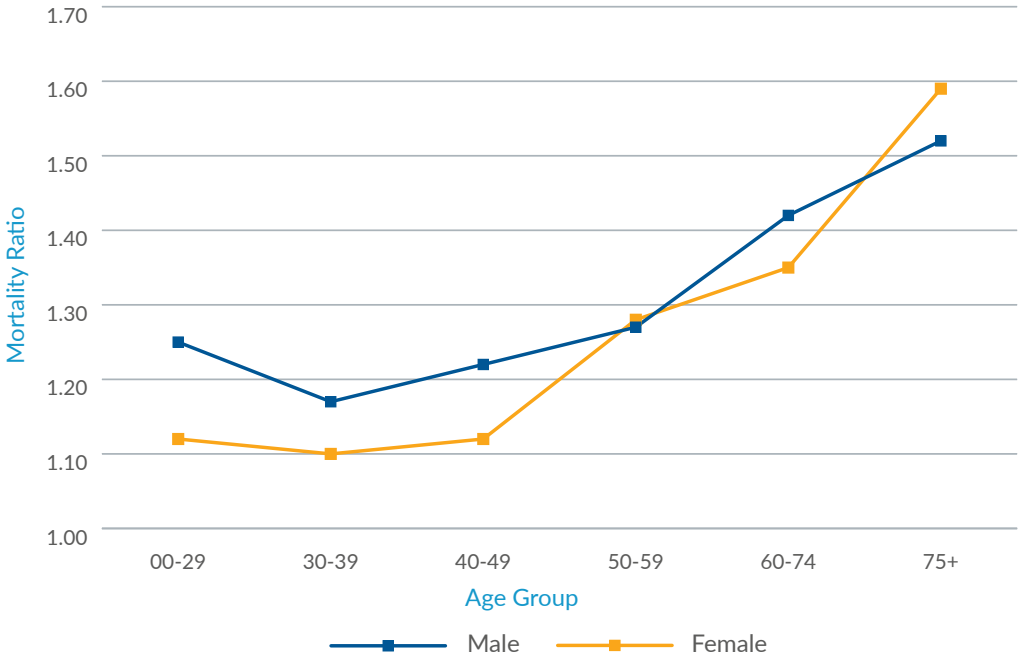
This individual's adjusted mortality, expressed in terms of per 1,000 would be:

$$q^{adj} = q^{base} * (1 + \text{debits}/100) + \text{flat extra}$$

$$.26 * (1 + \frac{150}{100}) + 4 = 4.65$$

Figure 9.

Mortality ratio by age and gender based on the 38,149 with clinical laboratory tests.



The information in LabPiQture represents a minimum of 10% of baseline mortality in the youngest females and ranges up to 60% of baseline mortality at the highest ages. Males almost uniformly have higher extra mortality than females.

ADDITIONAL CONSIDERATIONS

Hit Rate

The hit rate in this study is below the true performance of LabPiQture because our data contains only the results from Quest Diagnostics and does not contain results from LabCorp. The quality of information may not change because physicians and patients who use LabCorp are similar to customers of Quest Diagnostics. Therefore, we anticipate approximately equal mortality value for the full LabPiQture data.

Overlap with Other Data Sources

The tests evaluated provide similar information to insurance laboratory tests. The observed mortality impact probably overstates the true effect of LabPiQture as some evidence in LabPiQture overlaps with other risk assessment measures. For example, prescription history and MIB provide clinical history that overlaps with the selected tests in LabPiQture.

The other underwriting assessment measures will partially dilute the observed mortality effect.

If a carrier has already declined an applicant due to prescription history, LabPiQture provides no additional benefit. Alternatively, the prescription history and LabPiQture may reveal the same impairment. Similarly, MIB reports may lead the underwriter to develop evidence that correlates with LabPiQture. Furthermore, an AU algorithm outcome may indirectly correlate to LabPiQture data.

In this phase of analysis, we addressed only the tests that a fluidless process eliminates. For AU or even fluid-based underwriting, LabPiQture will generate additional mortality protection because of the numerous other clinical tests in the history. A future report will extend our analysis to these tests.

Need for Cost-Benefit Analysis

To ensure LabPiQture brings benefit to the accelerated underwriting process, a cost-benefit analysis should be performed on the company's desired portfolio.

Because we studied a cross section of insurance applicants, the mortality effects observed roughly match any carrier applicant pool. We can apply these measurements rather than query LabPiQture retrospectively for each carrier.

According to our study, the hit rates and mortality ratios vary by gender and age groups. A portfolio with higher male prevalence, or that targets older applicants, will demonstrate increased usefulness from LabPiQture. The cost-benefit analysis should reflect actual age/gender/face amount distribution specific to the carrier.

CONCLUSIONS

Our analysis demonstrates that the typical insurance lab test results contained in LabPiQture represent material mortality value. In an AU environment, LabPiQture can "replace" some of the evidence lost by the elimination of fluids tests, though the substitution is not one-for-one.

The value of LabPiQture will vary among insurance carriers. A cost-benefit analysis joining our mortality results with the specific age/gender/face amount distribution of the insurer's portfolio will determine the utility of LabPiQture for each company as well as clarify the threshold to maximize the benefits for that insurer.

Furthermore, this study examined only a fraction of the information in LabPiQture. The vast universe of clinical tests that insurers do not typically order has additional value. We will report subsequently on our analysis of this evidence.

Endnote

1 Table B.6, Predictive Analytics and Acceleration Underwriting Survey Report, SOA, 2016.

References

Predictive Analytics and Accelerated Underwriting Survey Report, SOA; https://www.soa.org/resources/experience-studies/2017/predictive-analytics-underwriting.

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