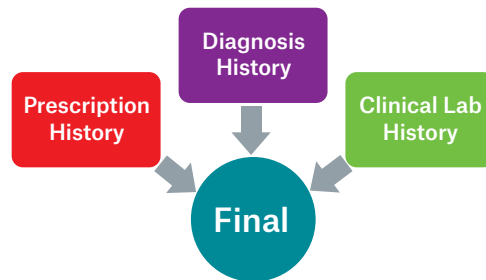# Leveraging ExamOne HealthPiQture™ Scores to Stratify Mortality Risk

Munich Re Life US recently evaluated mortality risk scores from the ExamOne HealthPiQture™ suite to assess their impact in segmenting mortality as part of the life insurance underwriting process. The product suite included 4 scores: a score based on prescription history as derived from the ScriptCheck® data product, a score based on clinical lab testing results from LabPiQture™, a score based on diagnosis (Dx) codes from medical claims and/or LabPiQture, and a composite final score. This article provides a high-level analysis of the results.

NOT IF, BUT HOW

Munich RE

Executive summary

HealthPiQture, an ExamOne tool based on proprietary rules and data, outputs separate mortality risk scores for prescription history, clinical lab test results and medical diagnosis codes. Additionally, the tool combines these individual scores into a final composite score (Figure 1). Carriers have the ability to choose to use one or a combination of these scores in their underwriting process.

Figure 1: HealthPiQture score components

Munich Re's analysis of the HealthPiQture scores confirmed that the four scores were each effective in segmenting mortality for the ExamOne data set, with higher scores indicating worse mortality. Given the uniqueness of each insurer's business, insurers should validate these scores by performing a retrospective study based on their own experience data. We can work with insurers to set up the validation study and incorporate the scores in their underwriting process.

Data

ExamOne initially provided Munich Re 4,204,932 de-identified unique records from 2005 to 2019, comprising both life insurance applicants and individuals undergoing clinical laboratory tests. The data included gender, age, study entry, exit dates, death indicator and four mortality risk scores that range from -80 to 4,900. 63,357 deaths were observed during the follow up through December 17th, 2019. The hit rate for the final composite score is greater than 95%. For the cases with a final composite score, at least one component score is also populated.

According to ExamOne, the individual component scores are populated to a lesser degree compared to the final composite score and are linked to data types as shown in Table 1. For the diagnosis history scores, one important aspect is that medical claims will be a key data source in the future, however in this study these diagnosis history scores were based strictly on codes found in the clinical laboratory data.

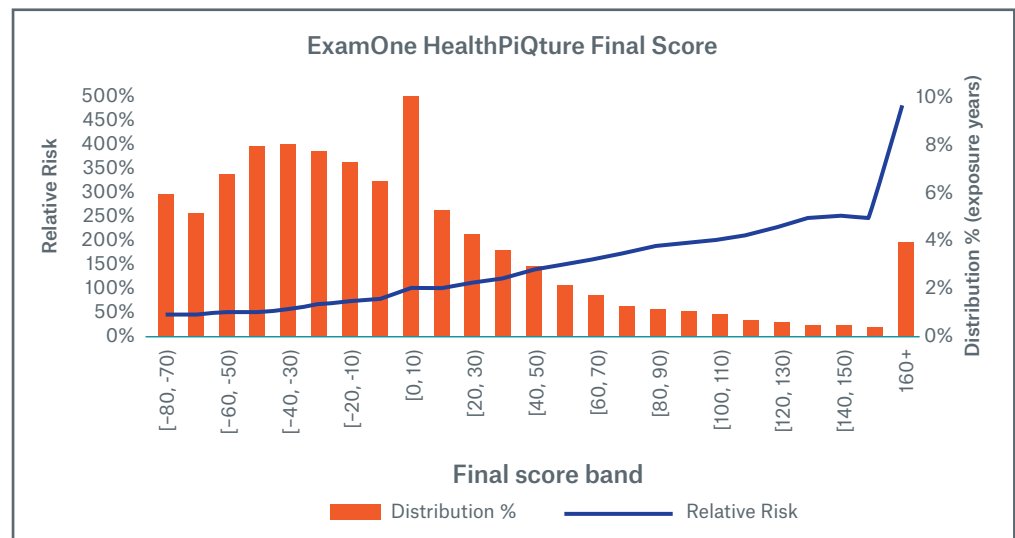**Table 1: Mapping of HealthPiQture scores to data types**

Data Type	Component Score		
	Prescription History Score	Diagnosis History Score	Clinical Lab History Score
Prescription data (ScriptCheck)	Yes	No	No
Clinical Lab data (LabPiQture)	No	Yes (usually but not always)	Yes
Medical claims	No	Yes (in the future)	No

Munich Re performed a mortality study on a final, clean version of the ExamOne data set with 62,415 deaths. The expected basis was the Society of Actuaries (SOA) 2015 Select and Ultimate Valuation Basic Table (VBT) with mortality improvement from 2015 onwards and dis-improvement prior to 2015. In the absence of smoking status information, a 85% / 15%, nonsmoker / smoker split was assumed.
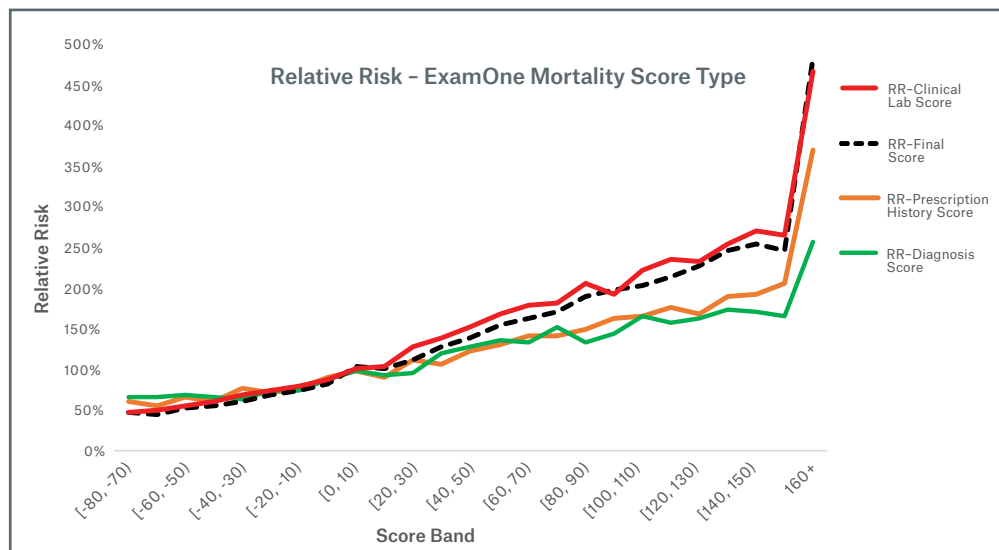
Results and key findings

- The final score, a combination of prescription history, clinical lab history and diagnosis history scores, effectively segments mortality risk (Figure 2). The lower scores indicate better relative mortality risk.

- A score of 0 is the most frequent value, driven primarily by individuals with only a ScriptCheck score and where the prescription history did not provide mortality segmentation.

- A large proportion of scores 160 (close to the 95th percentile) and higher had a relative risk of 500% or higher. This trend is generally consistent across gender and decennial age bands.

Figure 2: ExamOne HealthPiQture final score relative mortality risk

- The hit rate for the final composite score is greater than 95%. The relative risk for the cases missing final scores is greater than 500%. Among the component scores, diagnosis codes currently have the lowest hit rates, but are expected to increase in the future with medical claims being incorporated into HealthPiQture.

- The same relative risk trend as seen for the final score is observed for each of the three component scores (Figure 3). Among the component scores, clinical lab scores are best at segmenting mortality followed by prescription history and diagnosis scores. This trend needs monitoring going forward, as diagnosis scores will also incorporate medical claims information in the future.

Figure 3: Mortality trends across ExamOne HealthPiQture scores

Summary

The analysis in this article, based on the data provided by ExamOne, demonstrates that the HealthPiQture scores (final and individual component scores) effectively segment mortality risk. Future versions of HealthPiQture that also incorporate medical claims will give us an even more refined picture of the scores' potential for use in underwriting.

It is important to keep in mind that a company-specific insured population is not expected to have identical underlying characteristics to the population discussed in this article, which represents a combination of insurance applicants and individuals undergoing clinical laboratory tests. We recommend that individual carriers perform a retrospective study on their own experience data to validate and assess the value of these scores in their own underwriting process.

In addition, Munich Re separately performed a detailed analysis of ExamOne's LabPiQture that focuses on the prevalence of insurance-relevant clinical labs included in the LabPiQture records. The paper also examines the potential differences between insurance lab and clinical lab testing.

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