



## SUCCESS STORY

Mastercard® Healthcare Solutions



# Milliman Payment Integrity and Mastercard AI identified \$239 million in healthcare fraud, waste and abuse

**"These are exactly the kinds of insights we were hoping an AI tool would produce."**

**David Cusick**  
Principal, Milliman Inc.

Every day, in countries around the globe, Milliman works with clients to improve healthcare systems, manage emerging risks and advance financial security. The healthcare industry is experiencing a growing fraud, waste and abuse (FWA) problem. Up to 10 percent of U.S. healthcare claims are fraudulent, totaling an estimated \$450 billion in 2022.<sup>1</sup>

Milliman developed a multifactor, rules-based solution called Milliman Payment Integrity (MPI) that audits health claims according to custom rules and algorithms, and standard edits such as those associated with the National Correct Coding Initiative (NCCI). Scenarios from over 90 different categories are analyzed using claims, eligibility, provider and benefits information. For example, claims data and rules can determine likely impossible situations, such as a patient who is biologically male having a hysterectomy. Other clinically unlikely situations include service units of particular procedures exceeding expected values or are part of a bundled service. Milliman's goal was to take its auditing capabilities a step further.

The Milliman Payment Integrity group wanted to use advanced artificial intelligence (AI) to identify incremental FWA savings for their clients through non-discreet testing methods (methods that do not use a test to look at a specific issue).

<sup>1</sup> U.S. Department of Justice, "976. Health Care Fraud—Generally," (accessed September 13, 2023).



Internally, Milliman developed AI models to look for waste, but weren't fully satisfied with the results. Building AI models that look for healthcare claims and provider patterns has been historically difficult and not seen wide success. Models are often over-biased on results of discreet testing or identify patterns that are just not actionable.

Milliman engaged Mastercard® Healthcare Solutions to build an AI model using its proprietary technology, which is used in the Mastercard payment network to identify card fraud on a real-time basis. Mastercard was asked to run an AI Express, its six-step AI model development process, to demonstrate a strong return on investment in detection of fraudulent providers.

Mastercard's team included data scientists skilled at designing custom AI models who have experience in both payments and healthcare fraud schemes, healthcare claims investigation expertise and strong project management oversight to ensure the solution stayed on track with Milliman's business objectives in the agreed upon timeline.

### Six-step AI model development process

1

#### Business understanding

Determine business objectives and success criteria

2

#### Data understanding

Collect, describe, explore and validate data (provided by customer)

3

#### Data preparation

Select, clean, construct and integrate data

4

#### Modeling

Select modeling techniques and determine model building iterations

5

#### Evaluation

Evaluate results and review processes to determine next steps

6

#### Deployment know-how

Review deployment options and create a high-level deployment plan

● **MASTERCARD & CUSTOMER** ● **MASTERCARD**

CRISP-DM METHODOLOGY



# Milliman's model development

—  
**Milliman's objectives were to modernize, increase detection and become more efficient on behalf of their clients.**

—  
**"We started with a sample of data and then worked with the full dataset to tease out the fraud results over and above what the legacy system had been detecting."**

## 1

### Business understanding

The Milliman and Mastercard teams worked together to determine the business objectives and success criteria of the project. This interdisciplinary team collaborated to ensure all aspects of the business challenge were considered. Milliman's objectives were to modernize, increase detection and become more efficient on behalf of their clients.

Milliman is unique because of its audit and analytics expertise. While there was not an immediate need for real-time risk scoring, it would be available if required. The team established that success would be determined by increased provider and claim fraud detection, and scalability for production.

## 2

### Data understanding

With business understanding established, Mastercard worked with the customer-supplied de-identified data and MPI's audit results to build data labels to work within AI Express.

Milliman provided a detailed list of data points they would like considered, and the two teams reviewed them to confirm HIPAA compliance. Data was anonymized accordingly, enabling effective FWA analytics. Milliman was able to provide claim data with additional labels, identifying potentially problematic claims. This enabled Mastercard to create properties, characteristics and classifications to train the model to accurately identify FWA.

"We worked in heavy collaboration with Milliman's team to formulate our list of questions and hypotheses," says Tim McBride, Mastercard's Director of Healthcare Product Development and Innovation and an accredited healthcare fraud investigator (AHFI). "We started with a sample of data and then worked with the full dataset to tease out the fraud results over and above what the legacy system had been detecting."

## 3

### Data preparation

With a clear understanding of the use case and data to be used, the Mastercard team set to work using proprietary techniques on selecting, cleaning, deduplicating and enhancing the data to be used in the AI model, selecting the most impactful data for the desired results and combining it to derive new conclusions. At the end of this step, the team had a refined dataset with limited extraneous information and productive labels, and was ready to build several AI models that ultimately were combined for a comprehensive FWA model.



**"We typically do three iterations, going back to the client after each."**

**Top 10 provider specialties identified**

- Family practice
- Cardiology
- Internal medicine
- Hospice and palliative care
- General acute care hospitals
- Laboratory
- Neurology
- Ophthalmology
- Psychiatry
- Nurse practitioner

**Provider FWA example #1**

**Mastercard AI model identified suspicious billings and unnecessary prescriptions**

The AI model identified a cardiology physician who was billing services using incorrect "place of service codes" (a residential address), submitting unusual procedure codes and prescribing drugs that are inconsistent with the provider's specialty.

As a result, \$51,019 was identified as a potential recovery.

4

**Modeling**

The Mastercard team built three sub-models: a provider risk scorer, a claim evaluator and a decision enhancer based on NCCI codes that compared claims to the list of high scoring (frequently offending) healthcare providers. The three sub-models looked at the data from different perspectives, then combined them to arrive at a final risk score and actionable reason codes.

"We typically do three iterations, going back to the client after each," says McBride. "Based on the feedback, we made adjustments to improve the models." After the final iteration, the comprehensive model was at its peak performance.

5

**Evaluation of results**

Evaluating results and reviewing processes is an important step in model development. The Mastercard team reviewed the quantifiable results to ensure the customer would receive an optimal ROI.

"We looked at the top ten provider specialties using scores above 800 (out of 1000, which is the highest risk score)," McBride says. "We then took the top two of each of those ten specialties and reviewed the data, creating a summary of those results. Among those were laboratories, family practice and oncology."

The results were astounding. The final proof of concept showed that 70-80% of claims paid to the flagged providers raised concerns about risk. The new model uncovered more than \$239 million in potential savings from 2,700 high-risk providers (with a score of 800 or above on a scale of 1-1000) for fraudulent claims for just one mid-sized Milliman payer client.

Milliman's client was excited to see such strong results and is now reviewing cases based on the findings. The accepted proof of concept was ready for full production and deployment for Milliman's clients.

**Results**

**\$239M+**

**2,700 HIGH RISK PROVIDERS**

Identified over \$239M in potential savings and 2,700 high-risk providers

**3x DETECTION**

Increased detection at the claim level

---

**Improved Customer Experience**

Increased FWA detection for their existing auditing and payment integrity solution customers

**12 WEEKS**

Drove efficiency by creating a continuously evolving AI model in 12 weeks vs. developing and maintaining single-purpose, hard-coded algorithms



## Provider FWA example #2

### Laboratory identified billing unnecessary tests

Drug testing is generally performed in two stages: presumptive (qualitative) and definitive (quantitative). Presumptive testing is performed first to determine the presence of a drug/metabolite within the specimen. When the results are positive, definitive testing is used to understand the quantity of the identified drug within the sample for care planning and treatment options.

The AI model, trained using labeled data, identified a clinical laboratory routinely billing for presumptive and definitive drug testing for the same metabolites, regardless of positive or negative outcomes on presumptive testing.

The provider routinely submitted the same 28 individual definitive drug screening codes across claims/patients regardless of presumptive testing outcomes or patient diagnosis, ignoring the protocol and thus increasing reimbursement.

## 6

### Deployment know-how

After reviewing options, Mastercard prepared a high-level deployment plan as a blueprint for Milliman as they move forward. Milliman and Mastercard are collaborating to deploy the AI for FWA solution to be made available to all Milliman clients and prospects.



### Conclusion

Milliman engaged with Mastercard to build an AI model that would improve its fraud detection capabilities and operational efficiencies, with the potential to save millions of dollars in fraudulent or inappropriate claims to Milliman's clients. An ensemble model was built that combined a provider risk scorer, a claim evaluator and a decision enhancer using both supervised and unsupervised methodologies.

The AI model test results identified 2,700 high-risk providers and more than \$239 million of recoverable claims paid, three times the results of its legacy fraud detection solution for the same data. Milliman and Mastercard are working together to move to deployment, making Mastercard's AI technology available to Milliman's clients and prospects.



To learn more contact one of our [AI experts](#) → Visit our [website](#) →



©2024 Mastercard | All Rights reserved  
Mastercard is a registered trademark, and the circles design is a trademark, of Mastercard International Incorporated.