

USING INTELLIGENT AUTOMATION TO REDUCE WASTE AND IMPROVE ACCURACY

BSG assisted a leading South African hospital group optimise their billing processes using machine learning to identify and resolve billing issues before submitting for payment.

WHAT WAS NEEDED

- Strategic shift in how data can be better used to drive operational efficiency in medical billing
- Reduce the high number of medical billing errors resulting from multiple people / departments contributing to each bill
- Reduce time and hard cost of managing billing corrections with medical aids and patients
- Ensure all services that should be included on the bill are included upfront, reducing waste and write-offs

HOW WE HELPED

- Use predictive analytics to improve the consistency and accuracy of billing before final submission
- Develop a machine learning solution and a custom-built business rules engine to highlight probable billing errors and inconsistencies based on 2 years' worth of historical billing data
- Deploy and operationalise the data-driven systems and upskill / train staff to effectively use the system

THE POSITIVE CHANGE

- Ability to identify and remediate billing errors before final submission resulting in millions of Rands saved in corrective actions post billing due to billing errors and under-billing
- Significant time saving resulting from efficiencies in the upfront billing processes
- Improved billing accuracy resulted in shorter payment turnaround from medical aid scheme providers
- The machine learning solution investigates each billing case (over 1000 per day) in detail in a short space of time, which was not otherwise possible due to the previous manual review and assessment procedures



Engagement Overview

BSG was approached a leading South African hospital group to help them improve their ability to process and recover revenue through their medical billing processes. This engagement was based on work previously completed by BSG where value was already being realised within the client's [debt collections space](#).

The purpose was to implement more proactive mechanisms to improve billing, building on the reactive prioritisation of debt collection efforts previously delivered by BSG.

The group's billing process was based on manual review and assessment processes, requiring significant time and effort before bills could be finalised and submitted to patients and/or medical aid schemes for payment. Manual processes, and the fact that multiple people and departments were involved in the bill origination process, resulted in highly inefficient, error-ridden billing practices.

Through other work with the group, BSG uncovered a solution to a known issue, one the group had not yet considered how to solve. By assisting the group to implement an insight-led solution, we enabled proactive identification of billing errors and prediction of where errors and omissions are likely to appear. BSG recommended a practical phased approach to pilot the solution in a controlled environment to ensure rapid feedback, and allow for improvements to be made as needed.



Solution

A Microsoft Azure-based machine learning solution was implemented encompassing the entire machine learning lifecycle, from data ingestion through to model deployment and operationalisation. The following core solution components were developed:

- **Azure Data Factory** automated data ingestion pipeline to source data for both machine learning model training and production usage
- **Azure Machine Learning Services** were used to develop a regression model used to predict variability in bills highlighting inconsistencies. R2 and Root Mean Squared Error (RMSE) were used to evaluate the performance of the model.
- **A custom-built business rules engine** was developed to incorporate business intuition and domain expertise as an additional layer of logic adding value to the outputs of the overall solution



BSG used **2-years' worth of historical billing data** to build an **insight-driven solution** to **reduce billing errors** and **improve payment turnarounds**.

- The regression machine learning model and business rules engine were deployed for the client to be accessed through both real-time and batched end-points, allowing for individual bills to be “pushed” in real-time through the model and for batches to periodically be “pulled” through the model, as needed
- **A PowerBI dashboard** was implemented to monitor the medical bills curated by the solution and highlight exceptions and recommendations for remediation

The result of the solution was a fully automated machine learning solution, capable of processing hundreds of medical bills each day and providing recommended corrective action, in many cases before the patient had even left the hospital. All-in-all a much-improved experience for patients and for administrative staff.



Making a difference

BSG continues to help our client's solve critical business challenges using our leading insight-led thinking and proven methodologies. By incorporating data, insight and analytics, the BSG team have been able to save our client valuable time, effort and ultimately money in streamlining their medical billing processes.



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