



WOLFRAM CONSULTING SERVICES

# Improving Hospital Safety with Multiparadigm Operational Data Analysis

Industry: Healthcare

Applications: Integrated Data Analysis



## ABOUT

The NHS in England deals with over one million patients every 36 hours and employs over 1.5 million people. Naturally, this results in a huge amount of data being generated every single day that could be used to optimise workflows and improve patient outcomes. This data is, however, fragmented over multiple disparate databases across a range of hospitals, trusts, clinical care groups and multiple other organisations, making it difficult to utilise effectively.

**10**

The Wolfram Consulting Team delivered actionable results in just **10 days**, including importing, cleaning and analysing the data.

**1000**

The Wolfram Consulting Team identified and analysed **1000** parameter pairings with the Wolfram Language.

**120 MILLION**

The NHS provided Wolfram with **120 million** anonymised patient records to analyse, collected over six years.

## THE CHALLENGE

Like the majority of organisations that collect large amounts of operational data, getting valuable, actionable insights from that data has not appeared to be feasible. Even if all

the data could be brought together, it was not clear what could be learned from it or how it could be put to use to make improvements within the NHS.

As world leaders in multiparadigm data science, the Wolfram Consulting Team were the ideal partners for an explorative technical project to combine and clean the NHS's data

and extract the information decision makers need to improve patient outcomes and keep the service running efficiently.

## WHAT IS MULTIPARADIGM DATA SCIENCE?

*Multiparadigm data science is a rapidly advancing new approach of using modern analytical techniques, automated machine learning and human-data interfaces to arrive at better answers. Using a broader range of data science techniques together enables the Wolfram Consulting Team to find the signal in the noise and get real quantifiable answers for problems too complex for traditional methods. Find out more at [mpdatascience.com](http://mpdatascience.com).*

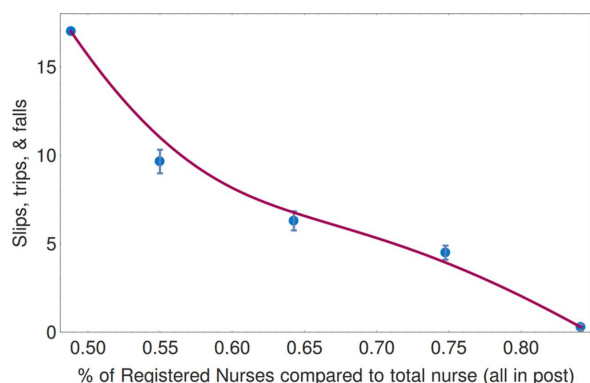
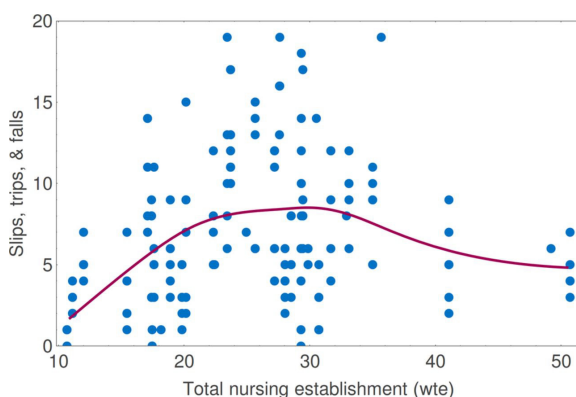
## THE APPROACH

The Wolfram Technical Consulting Team brought together over 120 million anonymised records from four different databases collected over the previous six years. With the Wolfram Language, the team was easily able connect directly to SQL databases, as well as pull in data from Excel, CSV and text files as needed.

Working closely with a steering committee comprising of healthcare professionals, academics and patients, the Wolfram Technical Consulting Team identified a range of parameters to investigate, including the level of nurse staffing and training, average patient heart rate and the rate at which patients suffered slips and falls.

With over 1000 parameter pairings available, the data manipulation, statistics and visualisation tools built into the Wolfram Language enabled the team to rapidly scale up the analysis across the complex dataset, allowing more time to consider the validity of the relationships and signals that emerged.

This rapid analysis enabled Wolfram's consulting team to uncover some unexpected insights, such as the number of slips, trips and falls. Through further analysis of the parameter pairings, the consulting team uncovered a strong relationship between patient safety indicators and the percentage of highly trained nurses present.



## ACHIEVEMENTS



### Uncovering Actionable Insights from Convoluted Operational Data

The Wolfram Consulting Team brought together multiple disparate data sources, combining off-the-shelf clinical databases with hospital trusts' bespoke offerings. Using multiparadigm, integrated data analysis, the team uncovered hidden signals to provide clear, actionable insights to improve hospital safety.



### Delivering Results in Just Ten Days with Rapid Analysis Techniques

The Wolfram Consulting Team aren't just experts in multiparadigm data science; they also have unparalleled experience with Wolfram's world-leading computational tools and technology. This combination enables the team to deliver projects and results quickly and efficiently. Despite the huge volume of data in this project, results were delivered within ten days. Having this fast analysis provided the NHS with more time to consider practical responses to the insights.



### Challenging Conventional Assumptions with Fresh Analysis

As with many industries, modern digital workflows have made a wealth of operational data available to healthcare providers. However, traditional analysis techniques have struggled to provide useful insights at this scale. By investigating the data with cutting-edge technology and a new, multiparadigm approach, novel and unexpected patterns emerged, enabling innovative solutions to endemic problems.

## MADE POSSIBLE BY WOLFRAM

*“Using the Wolfram Language allowed us to combine a huge amount of disparate data kept in multiple, inconsistent databases, analyse it and provide actionable analysis in just ten days. This project helps highlight how having an outside, data-led perspective can provide unexpected results and uncover the solutions to the problems that continually hold organisations back—all using data passively collected through day-to-day operations.”*

—Jon McLoone  
Director of Consulting  
Wolfram Research Europe

## LET'S TAKE YOUR PROJECT TO THE NEXT LEVEL

Find out how the Wolfram Consulting Services team can jump-start your project with in-depth troubleshooting, code optimisation, custom training or production deployment.