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How to Drive Change in Your Healthcare Organisation Through the Power of Data

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Every single life is impacted by healthcare, so we must keep it affordable and equitable. At Morecambe Bay, we believe that the potential of data will define the future of healthcare. We have already begun the important work of learning to use data to properly drive our decisions. Whether using macro data or tracking an individual's health, more analysis can lead to smarter choices. These smarter choices lead to better outcomes for our patients.

Known formally as the University Hospitals of Morecambe Bay NHS Foundation Trust, we are a network of medical facilities serving areas in Northwest England. We provide a wide array of services ranging from acute and emergency care to long-term conditions. Our organisation offers direct treatment to individuals and community services through a variety of clinics and community centres.

Beginning with an academic background in computing, a few years ago I also completed a digital leadership program at Imperial College London. For the past 8 years, I have had the pleasure of working with Morecambe Bay where I have served as head of analytics at the institution. I love being in a situation where my skills can so directly improve individuals' circumstances.

Recently, the critical importance of medical care was made more personal upon the passing of my father-in-law. He died early in 2021 due to a massive stroke at the age of 71. While it was a sudden and tragic circumstance for my family and me, it is by no means a unique phenomenon. In fact, hypertension affects 1 in 4 adults, and is linked with greater than 50% of heart attack and stroke incidents.

Despite the seriousness of the condition, many cases of hypertension go undiagnosed. However, the great news is that thanks to our ability to harness data, we may now be able to predict hypertension. That is just one of the powers of data. It provides the ability to accurately predict medical needs before the diagnosis.

Data and Medical Care in the Post-Pandemic World

Healthcare institutions are currently dealing with a massive backlog of procedures that were put on hold while hospitals were fully engaged with COVID-19 patients. As a result of this waiting, hospitals are once again being forced to reconsider how they operate as traditional approaches to business planning are no longer enough. Medical professionals know they need to increase the level of precision with which they operate.

Hospitals facing the need to adjust to making data-driven decisions do not necessarily have to start from scratch.

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Fortunately, hospitals facing the need to adjust to making data-driven decisions do not necessarily have to start from scratch. They can learn from the data journeys of other institutions. To those organisations, I offer a blueprint for embedding predictive analytics into the heart of healthcare: lead, excite, innovate, disrupt, persist, and repeat.

First, **lead** with data. Don't be afraid to stand up and articulate a vision or co-design a strategy for change. This includes taking an active role in the implementation. **Excite** the organisation by formulating a plan that includes some quick wins. Creating the expectation of success can help to secure emotional investment and the continuation of any funding.

Innovate by discovering the existing problems and using predictive tools to deliver solutions. Focusing on solving the existing real-life problems is a great way to keep the transformation grounded. Be aware that you will encounter some resistance against changing practices, so don't be afraid to **disrupt** by offering novel solutions. You will also need to **persist** as cultural changes sometimes take longer than desired. Finally, after the conclusion of a specific change, **repeat** the process with the next area that can benefit from a new approach.

Creating a Clear Analytics and AI Strategy

Of course, cultural change is just part of the equation. You also need to create a strategic plan that can communicate exactly how to implement analytics data tools. The first step is to create a data repository. Every great analysis begins with good data, so this step is the foundation of everything to come. Identify what sources of data to incorporate and any data arrangements necessary.

Every analytics journey starts with good data.

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Once the plan for managing the data is in place, the next step is to formalise the data pipelines and integration platforms. Make sure you understand how the data will flow through your system, and who will monitor that process. With the data chains situated, you can now begin the actual work of creating the analytical solutions. It is critical that these are impactful and add tangible value to the organisation.

From this point, it's time to begin enhancing the effectiveness of the data model. Artificial intelligence (AI), autonomous machine learning (ML), and natural language processing (NLP) all provide benefits beyond the potential of a basic working model. This is also the point to connect with peers to engage with the industry best practices.

Once the complete analysis strategy is in place, it is time to work on data literacy within the organisation. Do this part as the last step of the implementation plan because people can get discouraged by being onboarded into a non-working design.

As for the technology, the data architecture employed must be integrated, resilient, responsive, and flexible. There are lots of choices out there, but personally I think the maturity of cloud analytics and AI has happened. Accordingly, I would always recommend a cloud-first approach. No other structures offer the same combination of ease of access, mobility, security, and a frictionless user experience.

> Cloud-based analytics tools can help harness the ever-growing amounts of data.
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Cloud-based technology is also critical to establish an elastic data platform. As we continue to incorporate analysis into healthcare, we can expect the amount of data to grow exponentially. Plan for this eventuality by constructing an architecture designed to harness ever-growing amounts of data.

It is also worth mentioning that the traditional rules are out. Data structures must be elastic both in their ability to scale and integrations. Today's organisations should assume rapid changes in where and how data storage platforms will need to deliver information. People doing analytics need to be able to interconnect software as needed. Cloud-based resources are usually easier to update and maintain as service combinations change.

For example, Morecambe Bay currently works using a combination of Qlik, Snowflake, and DataRobot. We can use Qlik apps to extract data and create models in DataRobot. We also use Snowflake to process data. The need to integrate multiple platforms into the same process should not be a barrier to your design.

The Harmony of Qlik and DataRobot

DataRobot is an automated ML platform that we selected in part because it was easy to integrate into our Qlik systems. DataRobot outputs data science models that are available to Qlik users. Accordingly, we avoid significant time wasted by our users attempting to operate two standalone data resources.

As an example, we wanted to create a model to predict the number of patients arriving at our emergency department each hour. We started by speaking to operational and clinical colleagues and looking at other similar efforts to create a list of factors to consider. We found potential influences such as temperature, bed occupancy, and whether the day was a bank or student holiday. Based on this research, we fed DataRobot a list of variables we believed could potentially influence emergency department attendance.

DataRobot analyses the variables and provides a ranked list of models based on predictive ability. The platform lets us examine the predictive importance of each of the considered factors. These predictions are loaded into Qlik data files, and then visualised to create a full picture of the potential emergency room demand. Our staff can view a command centre app that provides charts to track expected arrivals, actual arrivals, and other relevant information.

We also created another model to predict hypertension risk. The model can examine personal factors like BMI and age to predict whether a person who has not had their blood pressure

measured may be at risk. We can again take the data from Qlik and allow DataRobot to make predictive models. From a practice level view, Qlik dashboards can use the model to predict the number of patients at the practice that likely have hypertension.

From a patient level, the doctors can view the patient's high-risk demographic information along with the prediction. That allows a prescriptive analysis so that doctors can consider the treatment based on the most influential factors.

What we love about this process is that DataRobot can consider and test hundreds of models before providing a list of options. We can then use Qlik to present the data to staff in an easily digestible way. At a glance, a person starting their shift can know if they will be busy or whether the daily visits are on track to meet the average. Being able to forecast activity like this and integrate it into their existing Qlik dashboards allows them to seamlessly introduce predictive analytics into their reporting.

Qlik Tools for Staff Engagement

At the end of the day, the tools won't work unless staff are interested. From my experience, the best results come from allowing the business to guide the development of the analytical and predictive solutions. The people involved have to see the direct benefit of the transformation by connecting it to information that can improve their performance.

Qlik's visualised approach and easy-to-read dashboards make conversational analytics comfortable for people who are not used to data. Qlik Data Alerts, such as alerts about patient movements, are also useful to engaging staff who fear staring at charts.

I have also found that people tend to focus on the accuracy of a model from a negative perspective. It is useful to reframe the conversation by comparing the model to past methods. Another helpful approach is encouraging discussions about different factors or models that may help to increase accuracy. Finally, cross-silo discussions are an important way to encourage innovations. Easy-to-read data visualisations can lead to great discussions across groups about interpretations and potential changes in practice.

The net result of this effort is to allow healthcare providers to become more proactive. The powerful dashboards in Qlik connected to the predictive models of DataRobot can lead to transformation work that directly improves patient care. After all, better patient outcomes are what it's all about.