

## Using Simulation Modelling to improve Emergency Services at the Royal Devon and Exeter Foundation Trust

### Background

Following discussions with clinicians and managers across all specialties, the Royal Devon and Exeter Foundation Trust was interested in exploring whether the integration of services to Emergency patients (The 'hub' model-later known as The Integrated Emergency Centre, IEC) would improve patient care. As with many hospitals, emergency patients were admitted either through the Emergency Department, the Emergency Medical Unit (EMU), the Surgical Assessment Unit (SAU) or the Trauma Admissions Unit (TAU) based on presenting condition.

The aim of this improvement work was to ensure that all patients receive the same high quality of care, regardless of medical condition, day of the week or time of day that they presented, whilst supporting the requirements of the European Working Time Directive (EWTD) 2009 through more flexible rostering of junior doctor staff and ensuring the Trust financial position remained viable.

The RD&E has significant experience in redesign work and a culture of improvement. A key driver for this work was the emergent thinking around application of Lean Thinking within healthcare and the team had already been working closely with Kate Silvester and others formerly of the Modernisation Agency to apply principles such as the 'Glenday' Sieve to patient flows within the RD&E.

It was clear from the outset that the tried-and-tested method of "PDSA" (Plan-Do-Study-Act) was not going to be appropriate for this type of whole scale system change. This was not something that could be implemented in small, easily reversed steps with little or no cost implications and we faced the paradox that "Big improvements require tried-and-tested methods that have never been done before."

It was decided to test these methods, not by putting them into practice with staff, building works, moving equipment and re-directing patients, but with the help of a computer simulation model which might help us understand the dynamics of the proposals being discussed.

It was likely that redesigning the service model for Emergency patients across the Trust would result in a requirement for significant changes to the way in which medical and non-medical teams were staffed, to the way diagnostic tests were demanded, and how Patients got access to the right clinical expert at the right time, and then ensure they swiftly moved to the best possible destination for their clinical needs or were promptly and safely discharged.

### The Big Question

How can we be confident, before it is even approved, that a brand new Integrated Emergency Centre (the "Hub") would improve our operation in the following respects:

1. enhanced Patient Experience
2. continue to meet the requirements of the NHS Plan targets
3. enable us to meet the new EWTD 2009 requirements
4. maintain or improve the Trust's financial position
5. develop a flexible workforce fit for the 21st century

### The Approach

The Trust Service Development team co-ordinated extensive discussions with a wide range of clinicians, managers and other key stakeholders to identify the problems with the current system and to develop the project aspirations. These were explained to an external organisation. In work such as this, an understanding of NHS language is really important and due to their specialist experience, we engaged the services of an external partner, Focused\_On Health.

For months, the concept of the 'Hub' wasn't understood, but everyone intuitively agreed that it would be able to solve the problems with the current system. However when the Hub was described by key individuals, it was clear that it was becoming many things to many people. Every one seemed to have a different perception as to what they meant by the term 'hub'. It sounds simple with hindsight, but one

of our key moments to defining what was meant by a 'Hub Model' came when the Lead Physician and the Director of Operations were asked to draw it on a flipchart!

We broke the task down into 12 key questions that a simulation FlowModel would help us to answer with demonstrable evidence. Armed with this information, we would be confident of :

- And,
- Why the Hub should be created
  - Which cohorts of Patients can be best served.

Focused\_On introduced us to their "PatientFlow Planning" software which is a visual process for mapping and recording information about different pathways. The result of the ensuing discussions is that everyone understands the assumptions, what the Hub is trying to achieve and there is a high level of clinical ownership and engagement for the project.

Having decided the twelve key questions to be answered, Focused\_On Health developed the simulation model and guided us through their 7 Steps to Successful Modelling. The result of this work is a model within which we can vary demand from different Patient cohorts, vary the provision of Staff resources (medical, non-medical and other staff), vary the provision of Physical resources (Beds, Recliners, Chairs, Diagnostic resources etc). The model then estimates the impact of these changes in Patient, Staff and Financial respects.

### **The value of simulation modelling and key lessons learnt**

The key strengths of using a Patient Flow Planning tool is that it enhances communication and effective strategic decision-making by enabling a shared understanding of risks, delays and benefits of the proposed system. The ability to ask the 'what if' question also proved invaluable.

Lessons learnt:

- The tool enabled us to produce a series of drawings that could store all of the important data relating to the likely pathways of emergency admissions via the Emergency Department and GP referrals through EMU. Front-line medical and non medical staff were involved throughout the process which enabled clinical ownership for the work. *This is critical for the final success of the proposal.*
- Although the mapping and simulation is much more than raw data analysis, you must ensure that all data inputted into the model is consistent with historically recorded data. All assumptions built into the model must be based on the subjective experiences of the front-line staff involved. *Data quality is the key to a robust foundation for modelling work.*
- Working with a partner who understands NHS processes and nuances is essential. This partner will meet a lot of your staff and must present credibility.

### **Where Are We now?**

Our PatientFlow pathways for the 5 cohorts of Patients who will be admitted to the Hub are now fully documented, agreed and validated by the clinical team. This shows us the process dynamics of these PatientFlows in our Percept FlowModel which was designed and built to our specification by Focused\_On Health.

We are now able to identify and isolate any critical issues that might constrain our patient flows and to test the likely consequences if service demand or resource availability changes. It is quick and easy to make "what-if" changes, which means everyone involved can influence and see the basis upon which we will decide our staffing profiles.

From the outset, we can be confident that bed occupancy rates will be sensible and that Patient length-of-stay is managed to agreed protocols.

We have also taken great regard of staff utilisation in this model to try to ensure that there are no categories of staff who might be placed under inappropriate, stress causing workloads.

By documenting our PatientFlows and using a Percept FlowModel to simulate them, we have gained a high level of consensus from the doctors, nurses, and managers involved and we can confidently implement a solution already 'proven' to be in the best interests of our Patients, Staff, and Finances.

### **Conclusions**

Simulation modelling isn't about data analysis – its about crisp thinking and sound strategic planning.

Patient flow planning and modelling tools can be visually powerful tools, helping us to understand the real process dynamics and so gain new insights.

Creating the Hub is a Strategic step towards establishing and sustaining excellent PatientFlow and is supported by the lasting benefit of defined and documented procedures.

Importantly, these procedures are supported by everyone involved, are designed to deliver safe and clinically efficient services to our Patients, and we know they are good value-for-money.

### **What Next?**

As a leading Foundation Trust in the NHS, Royal Devon & Exeter will consider how to apply these newly acquired simulation modelling skills to find solutions to other complex problems. For example the excessively high levels of Bed Occupancy across the hospital and to examine how we will consistently achieve the national 18-week target in all of our directorates.