Working smarter to meet demand – South Western Ambulance Service NHS Foundation Trust

ALL public services are under pressure to make financial savings, with NHS trusts having to deliver between £15 billion and £20 billion in efficiency savings over three years from 2011 to 2014. The steep cuts are equivalent to up to six per cent of the current NHS budget and Health trusts which fail to deliver the required savings could face tough new penalties. The scale of the savings drive far exceeds what was forecast due to "extremely challenging" conditions caused by the economic downturn.

South West Ambulance Service began working with Process Evolution in 2008 to ensure that resources were utilised as efficiently as possible whilst meeting demand and challenging performance targets. This working partnership has enabled SWAST to get ahead by developing an in-house capacity to utilise 21st century technology to identify key areas of its A&E business for improvement.

The toolset detailed in this article has been used to underpin the Trust's 5-year business plan created as part of its successful application to become and NHS Foundation Trust and is seen as an integral part of the Trust's strategy of continuous improvement.

Key ingredients to the success included the provision of affordable software which is practical to use in house, thereby removing a reliance on consultants every time a new initiative needed to be evaluated.

Demographics

South Western Ambulance Service NHS FOUNDATION Trust (SWAST) provides three core services to the NHS South West Strategic Health Authority. Those core services are Emergency Ambulance Service (A&E), Urgent Care Service (UCS – Out of Hours Medical Care) and Patient Transport Service (PTS). It is one of 12 NHS Ambulance Trusts in England.

The Trust serves a total estimated population of over 2.9 million, receives an influx of holidaymakers and visitors of around 17.5 million each year and covers 17,094 square kilometres including 32,000 kilometres of road and 1,331 kilometres of coastline. The operational area is predominantly rural across the four counties of Cornwall and the Isles of Scilly, Devon, Dorset and Somerset but there are a number of major urban centres such as Bournemouth, Poole and Plymouth.

The Trust employs a workforce of 2,220 whole time equivalents, has access to 112 student paramedics, 209 bank staff and 432 sessional General Practitioners who support delivery of the Urgent Care Service.

Ambulances are dispatched in response to public 999 emergency calls and calls from Healthcare Professionals based on the clinical need of the patient. The calls are prioritised according to the seriousness of the patient's condition; until recently categorised as A,B or C incidents but now known as red or green: Red:- patients with immediate life threatening conditions and should receive a response within 8 minutes for 75% of all cases. When presenting conditions indicate that a transport capability is required, arrival of the transporting vehicle must be within 19 minutes of the request in 95% of cases.

These response standards were formerly known as A8 and A19. Green: Serious but not life threatening conditions, with locally determined response standards usually between 20 and 60 minutes. Formerly response standards known as B19 fell into this group along with Category C incidents.

A key factor is that all performance times are taken from the moment the call is placed with the Trust as opposed to the moment when the call was answered.

The challenge for SWAST has always been to find new methods and tools to help them to improve performance and effectiveness in what is by the nature of the business a random demand scenario, i.e. it is impossible to state with certainty when and where the next incident will occur and have a resource placed strategically to deal with the incident. This is where Process Evolution has provided valuable consultancy and tools to SWAST.

SWAST first commissioned Process Evolution to apply its Evidence Based Decision Making (EBDM) approach in 2008. EBDM involves applying a suite of advanced analytical tools that provide a compelling rationale for change.

The initial focus was on supporting a piece of on-going work in Dorset in relation to implementation of unpaid breaks to bring the county into line with the other counties covered by SWAST. The project was also used to explore the wider capability of EBDM to support all SWAST Operations. The initial findings produced by Process Evolution were of great value to Dorset and Bill Brace, the Information Manager said: "Process Evolution successfully demonstrated that the use of

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EBDM had a much wider potential to improve performance and efficiency across the Service".

Following this successful piece of work in Dorset SWAST decided to set up their own in-house capability and purchased a set of sophisticated software tools and consultancy from Process Evolution. The aim was to model the impact of a whole range of scenarios on the original performance indicators A8, A19, and B19. Examples of some of the scenarios included changing the number/type and shift start/end time of resources at Ambulance Stations, changing the deployment patterns of vehicles, changing the timings at various stages of the job cycle, e.g. quicker mobilisation times, less time waiting at Hospital, and changing conveyance/non-conveyance rates.

Phil Jones, the Information Analyst said, "Process Evolution were extremely helpful in assisting us to set-up and utilise the software in-house. They are a very professional Company and their Team are always on hand to assist with any problems or to answer any queries we have in respect of our on-going development of the tools."

The toolset

The software tools purchased included the Response Profiler which is a computer simulation model of emergency medical services (EMS). Powered by the industry standard software Simul8™, it accurately mimics the behaviours of resources, shifts, ambulance stations and status plans in response to historical or predicted incident demand.

One of the key outputs from using Response Profiler is the optimal profile of resources required to satisfy demand, i.e. how many resources, where and when. This information is the input to the second key piece of software purchased, XIMES. The XIMES software enables shift patterns and rosters to be designed in support of any proposed core vehicle rota.

In addition to the software purchases from Process Evolution, SWAST has developed its own in-house tools to support their work. These tools include the 'Data Import Assistant' to pre-process information for the Response Profiler and an 'Activity Analyser' to support model calibration. A 'Scenario Manager' has also been developed which allows batch processing of multiple scenarios.

Bill Brace said, "The software tools that we now have available to us enables us to clearly demonstrate the impact any proposed changes will have on performance prior to us making them. It has improved the quality of the information available at a time when it is critical to manage our resources as efficiently as possible."

How the Tools Work and Complement Each Other

The in-house product, the "Data Import Assistant" is used to analyse data for a specified area and period (normally a full year for a County). This analysis provides the processed data for the "Response Profiler" and all the travel times between dispatch points, wards and acute trusts. The "Response Profiler" is updated with the vehicle core rota and status plan for the county. "Response Profiler" then runs a simulation and calculates the A8, A19 and B19 performance.

The Response Profiler enables SWAST to vary the parameters around activity, number and location of ambulance stations, and to see the impact on response oriented performance metrics (A8, A19 and B19). It can include activity in any ward, district, local authority, PCT and county, the number and location of ambulance stations, type and number of vehicles at each ambulance station and their shift start/end and rest break times.

Other areas of activity include the number, location and priority of dispatch points, time at scene, conveyance rates, number and location of hospitals, hospital handover and handover to clear time at distributions.

This information is held in an Excel based interface which is used to drive the Simul8™ model. SIMUL8 is a general purpose discrete simulation tool used across most sectors of industry, commerce and service. It is used to test the performance of processes whilst taking into account real life constraints and other factors affecting the total performance and efficiency. In particular, it takes into account the randomness of real life processes, which in EMS terms includes fluctuations in demand volumes, time at scene, number of resources deployed etc. Through this model it is possible to test scenarios in a virtual environment to understand how changes would work if implemented for real.

Process Evolution has built an EMS process model in Simul8 which is driven by inputs from the Response Profiler and calculates A8, A19 and B19 performance for any configured scenario. The model outputs are fed back into the Excel interface for ease of viewing and presentation.

The calculated A8, A19 and B19 performance data are then compared against the actual values for the County and timeframe in question. The model was calibrated to reduce any difference between calculated and actual performance until recommended tolerance levels were achieved.

Calibration involved comparing actual and calculated performance at the Ward level, working with Operations Managers to understand the differences and then calibrating the model to "narrow the gap", e.g.:- "The North Devon link road effect". It was found that Wards near the North Devon link road

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had higher actual performance than calculated. This was caused by vehicles regularly using this road to return to North Devon following conveying a patient to the Acute Trust at Taunton and being allocated to calls whilst in transit and the model was therefore adjusted accordingly. As an indication of model accuracy, the variance against actual for the Dorset model was 0.7% (A8), 0.3% (A19) and 0.4% (B19).

The XIMES software comprises two modules. Firstly, the Operating Hours Assistant (OPA), where the main input is the core staffing requirement (a matrix of hourly or half-hourly staff numbers) defined by the Response Profiler. OPA is used to optimize the start time and duration of shifts. The second module is the Shift Planning Assistant (SPA) which takes the output from OPA and designs rosters that provide the desired number of staff on each shift, meeting working time directives and Trust policies, whilst also seeking to take into account staff views and preferences.

Running Scenarios

Once a model has been calibrated and approved by the appropriate Head of Operations, it is possible to run scenarios to predict the impact on performance of changes. Bill Brace said, "There is no magic wand that will answer the question "what would be the cost of improving the response performance in a rural PCT up to national targets, but working with Process Evolution has certainly given us the tools to move to a much more informed position."

Bill added, "We work with our Head of Operations to run multiple scenarios using different vehicle mixes and different shift start and end times at ambulance stations until the desired performance outputs are achieved. We use XIMES to determine how many staff are required to fulfil the proposed rota and then work with our Finance Department to identify the financial impact of the proposed scenario. Process Evolution's help and software have enabled us to identify the best balanced scenarios to meet the business objectives."

Progress and Benefits so Far

SWAST have worked closely with Process Evolution to enhance the capabilities of the software to meet their needs, particularly in respect of Geographic Analysis. They have developed fully calibrated and approved models for each County in the Trust and have so far run well over 200 scenarios in support of business improvement programmes. Additionally, forecasts from the models are an integral part of the 5 year Business Plan that is required to achieve Foundation Trust status.

The results produced for SWAST senior managers have achieved a high credibility rating with them. One of the reasons for this is that staff can associate with the way that the model simulates what really happens in practice. There is a high level of engagement with senior operational staff during the calibration phase and calculated performance aligns very closely with actual historic performance (within1% for A8, A19 and B19). Calculated scenario results also align with what experienced members of Operations staff would have expected.

Phil Jones said, "By using our senior officers' understanding of what really happens we have been able to build more realistic models."

With regard to the benefits achieved so far, modelling is embedded as an integral and trusted part of SWAST's A&E Improvement Programmes, it is seen as a key input to Evidence Based Decision Making that will enable the Trust to maintain its high performance in a landscape of increasing demand and increasing financial constraints. Evidence from modelling is used as a key input to discussions with staff when negotiating changes and articulating the impact of proposed changes. It is helpful also that the results produced by the Information Management and Technology Team (IM&T) are seen as "independent". The process is quick and efficient with scenarios being tested and results available normally within a few days.

An important achievement is the fact that the technology has removed the burden of forecasting the results using manual techniques and anecdotal evidence that Heads of Operations had to rely on. The in-house availability of the tools and IM&T resources is far more efficient and cost effective than calling in consultants each time scenarios needed to be tested.

Bill Brace said, "Process Evolution provided excellent value for money in respect of consultancy and the cost of software, and are extremely professional and experienced in their field. I would have no hesitation in recommending them to other users."

What the Future Holds for SWAST

SWAST hope to continue to make technological progress to deliver cashable efficiency savings. They are currently in discussion with Process Evolution to develop a model that can also calculate the vehicle mileage used during each scenario. This will help assess cost profiles for different scenarios/status plans as the increasing cost of fuel is a major challenge to SWAST in the current financial environment.

Bill Brace's final words were, "We live in a world of continuous change and increasing demand. The use of tools detailed in this article is now an integral part of running our business. The tools provide independent evidence to support necessary change."

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