Case study: Norfolk and Norwich University Hospitals NHS Foundation Trust

Supporting the optimisation of imaging services at NNUH

Helping the trust respond to rising diagnostic imaging demand by driving efficiencies through data analysis and workflow optimisation

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Executive summary

The Norfolk and Norwich University Hospitals NHS Foundation Trust (NNUH) is supported by a Value Partnership with Siemens Healthineers to respond to growing patient demand for diagnostic imaging services. This Value Partnership has helped the trust to refresh and expand its Radiology and Nuclear Medicine services.

As a value driver within the Value Partnership, Siemens Healthineers Consulting has collaborated with the NNUH on multiple projects to increase imaging performance by driving efficiencies and optimising services.

These have included simulation-based operational testing of phased patient activity plan of the NNUH's Community Diagnostic Centre and the expansion of both the Nuclear Medicine and the Interventional Radiology Departments.

The following case study summarises the powerful support that Siemens Healthineers Consulting has provided as NNUH expands its imaging services and optimises its processes to address rising demand.

The Value Partnership has helped NNUH with:

- **Nuclear Medicine productivity: including +5% scanning utilisation and faster examinations**
- **Development of an IR demand & capacity model: identifying potential to achieve 80% utilisation**
- **CDC operational planning: identifying how to mitigate utilisation spikes and over-crowding**
- **Radiology booking optimisation: delivering a 10% reduction in vetting to attend time**

The customer

Norfolk and Norwich University Hospitals NHS Foundation Trust runs Cromer Hospital and Norfolk and Norwich University Hospital.

Through these Norfolk-based hospitals, the trust delivers a full range of acute clinical services, including more specialist services such as oncology, radiotherapy, interventional radiology and specialist cardiology. Overall, it provides care to a population of around one million people from Norfolk, neighbouring counties and further afield.

About NNUH:

- The trust carries out nearly one million outpatient appointments, day case procedures and inpatient admissions annually
- Many of its services are amongst the largest in the country, including the fifth busiest NHS cancer service in England
- It works closely with the University of East Anglia's (UEA) Faculty of Medicine and Health Sciences to train health professionals and conduct clinical research

The challenge

NNUH predominantly caters for the population of Norfolk and North Suffolk, with patients referred to the trust from around 100 local GP practices and other acute hospitals spread across the region. Some patients are also referred to the trust from further afield to access its specialist services.

The population of Norfolk is not only growing, but also ageing, with the highest proportion of over-65s in England and Wales[1]. As a result, there is a need for increased diagnostics capacity. In light of this growing demand, NNUH has sought to increase efficiency, space and capacity.

As part of its plans to expand its imaging fleet and facilities and respond to rising demand, the trust wanted to ensure it could understand the financial and operational implications of adding capacity in areas such as the Interventional Radiology Department, as well as better understand the limitations of existing patient pathways and establish solutions in modalities such as Nuclear Medicine.

In recent years the NNUH has also undertaken its biggest building programme since the Norfolk and Norwich University Hospital opened in 2001. This has included the Norfolk and Norwich University Hospital Community Diagnostic Centre (CDC), a greenfield site development that represents one of three new CDCs[2] in Norfolk.

Ahead of opening to patients, the CDC also required detailed planning to define and optimise operational processes. Priorities included defining ways of working that would achieve optimal patient flow, workforce and equipment utilisation, while also exploring different operational scenarios to identify parameters that would deliver agreed business case activity profiles.

The solution

NNUH's Value Partnership with Siemens Healthineers has supported the trust as it has expanded its Radiology and Nuclear Medicine services, increasing patient access to innovative imaging and treatment in Norfolk.

Value Partnerships are long-term, performance-oriented, collaborative engagements that provide a combination of clinical insight, medical technology innovation, strategic vision, implementation expertise and operational excellence to partners.

As a significant value driver within these partnerships, or as a standalone service, Siemens Healthineers Consulting combines in-depth knowledge of healthcare, clinical excellence and local know-how with expertise in digital transformation and operational efficiency, to enable the optimisation and enhancement of strategies and processes - from ideation to implementation.

The Siemens Healthineers Consulting team includes former medical doctors, radiographers, NHS managers, C-Suite and analytics specialists.

Possessing real-world experience of delivering complex, data-driven change in the NHS, across acute specialities, primary care and community, the consultants partner with clinical teams and senior management to improve operational efficiency, flow, staff engagement and patient experience.

Siemens Healthineers Consulting collaborated with NNUH on multiple projects to support its efforts to improve operational workflow, drive efficiencies and ultimately optimise services. These covered the launch of the CDC, and the expansion of the Nuclear Medicine and Interventional Radiology Departments.

The results

Ahead of the CDC's planned opening, NNUH was keen to stress test the deliverability of a phased patient activity plan for each of the CT, X-ray, MR and US modalities. This process would enable it to identify and mitigate potential bottlenecks and ensure optimal utilisation of imaging equipment and staffing.

To assist with this, Siemens Healthineers Consulting defined clinical pathways for the CDC, developing simulation models of each pathway and running multiple scenarios to identify optimal ways of working.

With a particular specialism in supporting improvement and transformation within clinical pathways, Siemens Healthineers Consulting was well positioned to help the NNUH CDC determine optimal scenarios for patient flow, workforce and equipment utilisation.

This involved collaborating with clinicians and stakeholders to map patient flow and supporting workflows, stress-testing these against planned activity trajectories for each of the modalities, and then co-designing mitigations for any bottlenecks, resource assumptions or operational processes that could constrain CDC imaging capacity.

To facilitate this, the Siemens Healthineers consulting team utilised:

- Input from key stakeholders and clinicians on patient flow and current ways of working
- Data on the planned CDC operating model, opening hours, equipment numbers, floor plans, staff roles and responsibilities and WTE figures
- Forecast activity trajectories and waiting list figures for each modality

Using this, Siemens Healthineers Consulting created a simulation model, establishing a digital twin of each CDC modality. The simulation enabled clinical leads to run multiple scenarios to test optimal ways of working that were used to consider patient flow, staffing model and scanner booking slots.

The simulation modelling enabled NNUH to:

- Identify potential patient, staff and equipment bottlenecks as CDC activity levels increase in line with an agreed trajectory
- Test the deliverability of business case assumptions - activity (patients per day) and productivity (scans per hour)
- Propose booking templates, patient arrival frequency and rules to optimise patient throughput
- Identify changes in the skill mix of the CDC workforce recruitment trajectory that would balance workload across roles and modalities, for example using Radiology Department assistants and volunteers to reduce radiographer workload

"The Siemens Healthineers team worked with our service and modality leads to stress test CDC patient flow, workforce and equipment assumptions and helped identify potential flow optimisation opportunities that we were then able to consider before and during go-live," says Seshni Mohammed, Radiology Service Operations Manager at Norfolk and Norwich University Hospitals NHS Foundation Trust.

"The simulation modelling approach provided a robust external assessment of our planning assumptions and gave us confidence we had made the right planning decisions and assumptions."

Seshni Mohammed
Radiology Service Operations Manager, Norfolk and Norwich University Hospitals NHS Foundation Trust

Analysis of assets, workflow and workforce

With Nuclear Medicine services experiencing growing demand for cancer treatment and scanning, as well as cardiology and neurology imaging, NNUH entered into a Value Partnership with Siemens Healthineers to assist with the growth and reconfiguration of the department.

This not only provided access to new Nuclear Medicine equipment, but also consulting support to optimise ways of working and ensure the department could get the most from the equipment.

To enable this, Siemens Healthineers Consulting conducted analysis on the existing assets, workflow and workforce to better understand and alleviate the increasing pressure being placed on this complex and specialised service.

This involved understanding the efficiency limitations of the current end-to-end patient pathways and understanding the true demand and capacity now and for the next five years including external referrals.

During an analysis week, the consulting team undertook on-site observation, interviews and shadowing alongside the acquisition of data insights across:

- People and culture
- Demand and capacity
- Productivity

A range of insights were surfaced through the analysis, identifying several mitigating factors for the increasing pressure. These insights were supplemented by a visit to a high performing peer site in East London, where best practice processes and ways of working were identified.

An opportunity to increase the throughput across the service was developed, including opportunities to improve the service through key areas of patient flow and room utilisation.

Summarised in a shared action plan, the analysis proposed how workflows could be streamlined, and what obstacles would need to be addressed, to enable the service to operate sustainably at 85% utilisation rate.

Ensuring imaging services are right-sized for the needs of patients

Elsewhere, Siemens Healthineers also supported NNUH with the creation of the new Norfolk Centre for Interventional Radiology (NCIR), an initiative that would ultimately quadruple the number of interventional suites at NNUH.

As part of the expansion process, NNUH wanted to understand the financial and operational implications of adding capacity. This meant obtaining a performance baseline to estimate throughput and efficiency gains.

To inform investment planning, there was also a need to have a better understanding of future demand and service capacity requirements.

Siemens Healthineers Consulting introduced interactive modelling to enable clinicians to project the demand and capacity requirements of various scenarios, while the provision of planning tools allowed users to estimate the implications of adding capacity.

The blueprint for operational planning and service optimisation developed by the consulting team included:

- **Performance benchmarking**: Current IR patient and procedure volumes were examined to benchmark utilisation and performance, leveraging existing intelligence, expertise and benchmarks
- **Capacity assessment:** A detailed review of existing IR resources was conducted to evaluate alignment with current and anticipated demand
- **Scenario planning**: Advanced data modelling was used to simulate future scenarios, identifying gaps and optimising resource allocation to meet evolving service needs

Rachael Forton, Radiology Operations Manager at NNUH, notes: "Siemens Healthineers Consulting provided invaluable insights to baseline current performance, ensuring our service is right-sized to meet the needs of our patients."

"Siemens Healthineers Consulting also provided a planning tool with the ability to quantify the impact of various scenarios, including the financial and operational implications of adding lab capacity."

Rachael Forton
Radiology Operations Manager, Norfolk and Norwich University Hospitals NHS Foundation Trust

The future

Siemens Healthineers Consulting has delivered data-driven analysis, insights and recommendations to NNUH that has enabled it to optimise its imaging services across multiple modalities. The Value Partnership therefore not only provides the trust with access to modern diagnostic and imaging equipment but also enables it to get the most from that equipment.

James Loughlin, Lead Radiographer at the Norfolk Centre for Interventional Radiology at NNUH, says: "It has been a massive benefit. It was really useful to get an external view on things, because when you're working in that environment you become used to the standard way of practice. They identify the small things that we can do to improve the way we work but also examine all the data in terms of patients treated, procedures, procedure times and the way we run our lists."

The Value Partnership has helped NNUH to:

- **Benchmark utilisation and performance**
- **Test business case assumptions**
- **Identify optimisation opportunities**
- **Highlight potential bottlenecks**
- **Project demand & capacity requirements**
- **Quantify impact of adding capacity**

"The work is ongoing and it is a real benefit to have the consulting team available to us to be able to keep on improving the service."

James Loughlin
Lead Radiographer, Norfolk Centre for Interventional Radiology, NNUH

[1] North Norfolk District Council, North Norfolk District Population Supplementary Statement
[2] Norfolk and Waveney Integrated Care System, £86m investment in three new diagnostic centres to be built at region's hospitals