SIEMENS Healthineers

Case study: Norfolk and Norwich University Hospitals NHS Foundation Trust

Optimising patient flow and resource utilisation for a new CommunityDiagnostic Centre

Stress testing planning assumptions with simulation modelling to identify optimal ways of working

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Executive summary

Norfolk and Norwich University Hospitals NHS Foundation Trust (NNUH) 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

Ahead of the opening of its Community Diagnostic Centre (CDC), NNUH partnered with Siemens Healthineers to facilitate with pre-launch planning, to support the optimisation of patient flow and resource utilisation.

Through the use of simulation modelling, the Siemens Healthineers Value Advisory Services team assessed planning assumptions and optimal ways of working to help the CDC achieve its patient activity targets.

Siemens Healthineers Value Advisory Services helped NNUH to:

- Identify potential patient, staff and equipment bottlenecks as CDC activity levels increase
- Test business case assumptions - activity (patients per day) and productivity (scans per hour)
- Optimise patient throughput by informing booking templates, patient arrival frequency and rules



The context

Shifting more care out of hospital and into the community is one of the goals outlined in the NHS Long Term Plan. By providing a broad range of diagnostic services in a local setting, Community Diagnostic Centres are a crucial measure to achieving this and relieving pressure on overstretched hospitals.

Offering patients faster and easier access to testing, it is hoped that the UK's CDCs will deliver up to 9 million tests each year[1].

As of 2025, 165 sites were operational[2], with further CDC sites approved across England. One of these is the NNUH Community Diagnostic Centre.

A greenfield site development, the NNUH CDC represents one of three new CDCs[3] in Norfolk, an area with a growing, ageing population and the highest proportion of over-65s in England and Wales[4], that is experiencing rising demand for increased diagnostics capacity.

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.

NNUH was already working closely with Siemens Healthineers in the form of a pre-existing Value Partnership - a long-term, performance-oriented collaboration supporting its ambitious expansion plans, and enabling improved access to innovative cancer treatment and imaging.

Using existing advisory days allocated within the Value Partnership, the Siemens Healthineers Value Advisory Services team was able to design clinical pathways for the Community Diagnostic Centre, developing simulation models of each pathway and running multiple scenarios to identify optimal ways of working.

The challenge

Ahead of the Community Diagnostic Centre's opening, detailed planning was essential to ensure that operational processes were optimised. The priorities included exploring different operational scenarios to determine optimal patient flow, workforce and equipment utilisation.

At the same time, there was also an acknowledgement that the go-live planning process presented a valuable opportunity to explore new ways of working that could improve patient throughput and patient and staff experience, rather than simply defaulting to traditional acute hospital ways of working.

Certain elements of the CDC had already been decided, including the facility design, imaging equipment and workforce budget. However, some elements still required agreement, including patient flows through the CDC, workforce allocation across CDC areas, booking templates and rules.

The Siemens Healthineers Value Advisory Services team were engaged to gather insights about planned CDC patient flows, using their expertise and tools to identify potential bottlenecks and provide recommendations to ensure go-live and full ramp-up patient activity numbers could be achieved.



The solution

The Siemens Healthineers Value Advisory Services 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 advisors are adept at partnering with clinical teams and senior management to improve operational efficiency, flow, staff engagement and patient experience.

With a particular specialism in supporting improvement and transformation within clinical pathways, the Value Advisory Services team was well positioned to help NNUH determine optimal scenarios for patient flow, workforce and equipment utilisation.

This involved collaborating with clinicians and stakeholders to map patient flows 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 the CDC's imaging capacity.

To facilitate this, the advisory team utilised:

- Input from key stakeholders and clinicians on patient flows, 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 Value Advisory Services created a simulation model, establishing a digital twin of each CDC modality. The simulation enabled clinical leads to run multiple scenarios to identify optimal ways of working that were used to inform patient flow, staffing model and scanner booking slots.

Insights from the simulation modelling included:

- A definition of CDC maximum capacity for year 1, 2 & 3 aligned to a workforce recruitment trajectory
- A detailed report outlining the optimal operating model for each modality, including booking slots, and patient arrival frequencies, to meet business case assumptions
- The identification of potential bottlenecks, with mitigations through changes to workforce, patient flow and operational processes



The results

The development of simulation models allowed NNUH to stress test different operational scenarios with small investment, surfacing insights and recommendations to optimise the service model to help the new CDC meet target patient volumes and ensure optimal flow.

The simulation modelling provided NNUH with a patient-centric visualisation of clinical processes and workflows, and transparency on resource allocation, capacity and utilisation. By comparing baseline and simulated outcomes with metrics such as patient throughput, patient waiting time and resource utilisation, the project identified opportunities to improve patient flow and resource utilisation.

Insights and recommendations included:

- How to mitigate an image acquisition utilisation spike using Radiology Department Assistants (RDAs) roles and/or volunteers
- The variation of an RDA staffing model to cross-cover X-ray and ultrasound, where possible
- The definition of modality appointment and staggered arrival times to inform booking templates and avoid over-crowding
- Testing the skill mix of the CDC workforce recruitment trajectory to improve productivity and retention

Seshni Mohammed, Radiology Service Operations Manager at Norfolk and Norwich University Hospitals NHS Foundation Trust, says: "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."

"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

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

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