

Nottingham University Hospitals NHS Trust's Communications and Collaboration Strategy Transforms Healthcare Delivery

Executive Summary

CUSTOMER

Nottingham University Hospitals
NHS Trust

INDUSTRY

Healthcare

CHALLENGES

- Boost productivity, reduce patient wait times in the ED, and improve communications among after-hours care service staff

SOLUTIONS

- Cisco Medical-Grade Network with advanced wireless networking capabilities
- Workflow software to capture and assess requirements from H@N ward staff and match them to available clinical resources
- Cisco Cius™ tablets to enable the H@N nurse coordinator, from anywhere in the hospital, to assess requests from the wards and allocate tasks

RESULTS

- Wait times for ED patients with minor injuries or illnesses reduced by 23 percent for adults and 33 percent for children
- H@N nurse coordinators now spend only 39 percent of their time allocating tasks and 60 percent of their shift providing direct clinical care in the wards
- H@N solution put 8,000 hours into direct service delivery, worth roughly \$466,000 per annum

Background

In 2006, Queen's Medical Centre and Nottingham City Hospital merged into one organization called Nottingham University Hospitals NHS Trust,¹ or NUH. The Trust, one of the biggest and busiest in England, employs 13,000 and provides acute care services to more than 650,000 Nottingham residents and specialist services to nearly 2.5 million people from neighboring counties each year. It has 87 wards, approximately 1,700 beds, and an annual income of roughly US\$1.14 billion (approximately £725 million).

Upon its formation, NUH set a goal of becoming the best acute teaching Trust in England by 2016. To achieve this, it needed to improve productivity by making major changes to working practices. Due to the organization's size, the management team realized that information and communications technology (ICT) was key to achieving their goal. The Trust asked the Cisco® Internet Business Solutions Group (IBSG) to help define an ICT strategy.

Between 2007 and 2009, the Trust implemented elements of the new strategy and made a significant investment in a Cisco Medical-Grade Network with wireless networking capabilities. Since 2009, the Trust has been using its investments in wireless communications and mobile IP to support major improvements in quality, safety, and service levels in a number of critical areas of the hospital. Cisco IBSG, Cisco local health and sales teams, and partner organizations such as NextiraOne and Nervecentre Software helped support these initiatives, which would prove groundbreaking.

The Trust also rolled out important ICT initiatives to address challenges in the emergency department (ED) and in services offered outside normal office hours. In addition, the independent Association of Chartered Certified Accountants (ACCA) evaluated the initiatives in two reports sponsored by the European Commission and presented at the

¹ Public hospitals in the English National Health Service (NHS) are organized into Trusts, which are public-sector corporations run by a board of executive and non-executive directors.



Cisco Internet Business Solutions Group (IBSG)

European health ministers' eHealth High Level Conference in 2010 and 2011.

Challenges

Nottingham University Hospitals NHS Trust comprises three sites: Queen's Medical Centre, the main facility for emergency care; Nottingham City Hospital, where planned and long-term care is provided across eight medical specialties; and Ropewalk House, which provides a range of outpatient services. Each facility has a separate campus, making the Trust a complex entity to manage, with significant vehicle traffic around and among the sites.

In 2009, the Trust identified two issues that required immediate attention: patient wait times in Queen's Medical Centre's ED, and after-hours care at Nottingham City Hospital.

Emergency Department

In 2009, the ED at Queen's Medical Centre admitted more than 146,000 patients—a 6 percent increase over the previous year and a trend that the Trust, in its 2008/2009 annual report,² projected would continue at a rate of 5 percent per annum for the next five years. Due to financial constraints, hiring more nursing and clinical staff was not an option. New ways of working were required to sustainably meet the demands of a growing number of patients.

The annual report also highlighted that the ED suffered from severe communications problems caused by its size and complexity (it has six treatment areas, a store, and numerous offices). Locating staff members or medical equipment, managing patient throughput, or getting updated clinical information on patients was often difficult. Because of this, nursing staff spent up to 19 percent of their time searching for people or things, patients were kept waiting longer than necessary, and staff were under pressure to meet the U.K. government's target of seeing and treating all patients in less than four hours. It became clear that communication among staff and across departments was a core problem in addressing patient growth.

Hospital at Night

NUH faced another challenge in 2009 when the European Working Time Directive came into effect in England, reducing the maximum hours a doctor is permitted to work from an average of 56 per week to 48. The Directive also required that shifts of up to 12 hours be followed by at least 11 hours of continuous rest. These requirements created a dramatic reduction in the number of junior doctors working outside core hours (9 a.m. to 5 p.m., Monday to Friday), and prompted a national workflow management initiative known as Hospital at Night (H@N) to be applied in acute hospitals.

Despite its name, the H@N service covers weekends, holidays, and weeknights from 5 p.m. to 9 a.m., amounting to more than 75 percent of total hospital hours a year. During these times, Nottingham City Hospital is staffed by an H@N team

2. "Nottingham University Hospitals NHS Trust, Annual Report & Accounts, 2008/09," <http://www.nuh.nhs.uk/about/annualreports/2009/Full%20Annual%20Report.pdf>

comprised of a senior nurse (acting as coordinator), registrar (midgrade doctor), four junior doctors-in-training, and two clinical support workers per shift. This small team, working together with ward-based nursing staff and senior clinicians, who are on-call from home, is responsible for up to 450 patients across 39 wards. The team's work is orchestrated by the H@N coordinator, who prior to system changes sat in an office fielding calls from wards and locating clinical staff via a pager and landline communications system.

On a large site such as the Nottingham City Hospital campus, it is critical to know 1) where clinical staff are and what they are doing, and 2) have an overview of their availability so that they can respond to new demands from the wards. It became clear that the fixed-phone-line and pager system did not enable the H@N service to provide the level of responsiveness and quality of service required by NUH's management.

NUH and Cisco IBSG assessed the service and concluded that, as with the ED, communication was the main problem affecting quality and safety. Easy, traceable, and transparent communications were required to streamline collaboration among staff and improve the quality of care and governance of running the H@N service.

Solutions

The Trust's management invited Cisco IBSG to survey its existing ICT infrastructure and processes. IBSG found that the environment did not adequately support the Trust's strategic objectives to a) become a leading center of excellence in selected specialties and recognized nationally for research, teaching, and clinical care; and b) become a distinguished general hospital providing more integrated care in out-of-hospital settings such as home care. The resulting report:³

- Described slow and inaccurate information processes with incremental growth, leading to duplicate information systems containing inconsistent data
- Identified significant risk to clinical service delivery from a growing reliance on information provided through aging and increasingly unreliable technology
- Noted that staff were using outdated, stand-alone equipment that led to duplicate data entry
- Found that systems integration across departments and sites was rare, leading to multiple, disconnected data entries for the same patient and limited knowledge of bed status

Based on IBSG's report, the Trust invested in a Cisco Medical-Grade Network that includes:

3. "Internet Business Solutions Group Connected Hospital Study: Report of Findings on Nottingham University Hospitals Trust," April 2006.

- **Wireless telephony, unified communications, and presence technology** to provide real-time availability of staff and enable them to be contacted wherever they are in the hospital
- **Wireless data** to give staff access to information systems at the point of care
- **Cisco Unified Application Environment** messaging system to enable transfer of information from departmental systems (laboratory, pharmacy, X-ray, and more) to wireless telephony
- **Location-awareness** capability to find clinical staff resources using mobile devices and the wireless network
- **Radio frequency identification (RFID) and tracking** to enable geographic location of medical equipment

While these technologies addressed problems in both the ED and H@N service, the H@N network was complemented by:

- **Nervecentre workflow software** tailored to the H@N service. The software captures and assesses requirements from ward staff and matches them to available clinical resources by staff proximity, skills, and availability. Nervecentre real-time workforce management software takes advantage of NUH's investment in the Cisco Medical-Grade Network and provides a strategic platform that not only meets H@N's requirements, but also improves workforce and workflow processes in other areas of the hospital.
- **Cisco Cius tablet**, which enables the nurse coordinator from anywhere in the hospital to assess requests from the wards and allocate tasks to clinical staff based on their availability and clinical priority of the task.

Results

Building on its relationship with ACCA, Cisco IBSG introduced ACCA to NUH as a trusted and neutral third party to objectively assess the impact of ICT—first, on the ED between 2009 and 2010, and second, on the H@N service between 2010 and 2011.

Emergency Department

Results from ICT implementations in the ED were impressive. Use of IP-based telephony and messaging streamlined collaboration among clinical and care staff, creating considerable time savings. In July 2009, prior to the rollout of the Medical-Grade Network, nearly 400 patients with minor injuries or illnesses were admitted to the ED over a 10-day period (representing approximately one-tenth of all patients admitted during that period).

Staff recorded the arrival time of each minor-injury patient and the time it took for him/her to complete the journey through the ED. Findings showed that, on average, wait times (waiting for triage or test results; or waiting to be admitted to a ward, assigned a wheelchair or nurse/doctor, or to take blood tests or X-rays) as a proportion of total time spent in ED was about 75 percent for adults and 71 per-

cent for pediatric patients. Average patient journey—from arrival to being either discharged or admitted to a ward—was 99 minutes for an adult and 103 minutes for a child. Of that time, an adult spent 74 minutes waiting to be treated and 35 minutes receiving treatment; a child spent 73 minutes waiting for treatment and 30 minutes receiving treatment.

In November 2009, after the new technology was fully operational, project staff repeated the data-collection exercise. On average, the total time spent in the ED by each patient with a minor injury or illness was reduced by 23 percent (23 minutes) for adults and 33 percent (34 minutes) for children. For other patients, the time spent waiting but not receiving active treatment was reduced by 28 percent (21 minutes) for adults and 40 percent (29 minutes) for children.

Shortening the patient's journey is important not just for the patient, but also for capacity management. The ED admits approximately 150 patients with minor injuries or illnesses daily, representing roughly 35 percent of all ED admissions. The technology-enabled time savings for dealing with such patients equate to nearly seven hours per day for clinicians, or one full-time doctor per year. Increased efficiency generated by better communications will significantly help NUH contain costs while coping with the forecasted growth in patient numbers.

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Clare Walsh
H@N Coordinator

Hospital at Night

The H@N experience was equally positive in terms of impact on quality of care, staff productivity, and length of patient stay. These simultaneous impacts are significant because they address issues targeted in the NHS Quality, Innovation, Productivity, and Prevention Programme, to which approximately \$32 billion (£20 billion) of the NHS budget has been allocated over the next few years.

The ACCA observed and documented the way that the H@N team worked prior to the introduction of Nervecentre, and then assessed the impact of the new system in terms of quality of care, staff satisfaction, and financial return on investment. Data collected across all H@N shifts during a one-week period in March 2010 showed that, on average, H@N coordinators received 160 requests via pager from wards each shift. To handle them, the coordinators had to phone the ward, log the details of the request into a spreadsheet, page a doctor or clinical support worker, and wait for a callback before assigning the task. This process not only had the potential to compromise safe and effective patient care through delays and miscommunication, but also to create long wait times for patients and poor governance of task management.

The study showed that, on average, a coordinator spent 97 percent of his/her time per shift dealing with pages, phone calls, and spreadsheets, with minimal time devoted to working in the wards. More often than not, however, a coordinator's shift was entirely desk-based. “The system required you to be on the computer all the time,” commented Clare Walsh, H@N coordinator. “I didn't like that. I'm a hands-on clinical person, not a computer person.”

The ACCA then collected data over a comparable one-week period in March 2011, after the implementation of the new system based on Nervecentre and Cisco infrastructure, including Cisco Cius tablets. After clinical handover at the start of each shift, the H@N coordinators can now take the Cius onto the wards while they work, releasing them from working in a static location. Ward nurses input their requests for clinical support into Nervecentre via PCs at the nursing stations. The coordinator receives the requests on the Cius tablet. The system's intelligence provides visibility into the location of staff, tasks in which they are involved, and their skill set. Based on this information, the coordinator allocates a task to the appropriate team member based on his/her location and patient need, while also balancing workloads across the entire team.

"It [the new system] has given me my life back."

Tony Drakeford
H@N Coordinator
Nottingham University
Hospital

The data ACCA collected showed that while the number of requests from the wards remained the same, the nurse coordinator spent only 39 percent of his/her time in the H@N central office allocating tasks. Because of this, the coordinators were able to spend roughly 60 percent of their shift providing direct clinical care in the wards, putting about 8,000 hours back into direct service delivery, worth roughly \$466,000 (£296,000) per annum to the Trust. "It [the new system] has given me my life back," said Tony Drakeford, H@N coordinator, NUH.

ACCA showed that in addition to allowing the H@N coordinators to resume clinical work and thereby increase job satisfaction, the new system has given all after-hours staff the tools they need to communicate with one another, efficiently and effectively. Furthermore, rather than feeling isolated, they now work as a cohesive team. This has significantly improved patient safety, since the new technology enables the coordinators to know which junior doctor is working with which patient. When the patient is acutely sick or has a complex health history, the system automatically notifies a senior doctor, who receives the information on his/her mobile phone and contacts the junior physician to provide immediate advice.

The success of the new system was due in large part to close collaboration among clinical and nursing staff, hospital management, and IT staff on planning and deployment. "It's been a fantastic opportunity to be part of the ICT technical delivery team working collaboratively with the H@N team, who have embraced the Medical-Grade Network's latest ICT," said Lee Willerton, technical design consultant of ICT, NUH. "Clinicians have shaped the Nervecentre application to meet their needs rather than use an off-the-shelf product that satisfies only part of their requirements. This project has been led throughout by clinicians, with ICT working as an enabler to help them deliver service improvements that can be measured and quantified."

NUH realized additional benefits. Prior to the new system, the H@N team's workload was difficult to track throughout the night. The Nervecentre/Cius solution captures each request from the wards, and resulting demand can be analyzed. In the beginning of the implementation process, H@N management noticed that most of the demand was experienced in the early evening—yet, clinical sup-

port workers were contracted for 12-hour shifts to provide coverage throughout the night. By realigning shift patterns to cover peaks in demand, the hospital has seen nearly \$161,000 (£102,000) in savings.

Furthermore, the solution reduced the time it takes to find and allocate resources to meet patients' needs, thereby decreasing the average hospital stay. Based on data collected by the ACCA, Dr. Dominick Shaw, H@N clinical lead, estimated that 0.8 days of patient care can be avoided per H@N shift, and projected NUH cost savings are \$450,000 (£285,000) annually.

These combined benefits equate to a two-month payback, beyond the impact on patient safety and patient/staff satisfaction.

Next Steps

The infrastructure deployed in the ED at Queen's Medical Centre has been successfully implemented at Nottingham City Hospital to improve the quality and delivery of care, and governance of after-hours clinical care.

Results from this engagement highlight the significant and immediate impact of the Cisco Medical-Grade Network and software solutions. In the long term, NUH believes that the new system has huge potential, particularly if expanded across multiagency/multicare provider systems envisioned for the future. In such systems, where a range of organizations must collaborate to deliver care, lack of workflow communication and real-time information about available resources can result in delays of many days.

The infrastructure can also provide "federated presence" capability, allowing each organization to see the current availability of all staff skill sets—thereby improving resource management, ensuring that no skill or availability is invisible to those coordinating care, and maximizing use of appropriate resources across an entire patient pathway regardless of how many care provider organizations are involved.

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Lee Willerton,
Technical Design
Consultant , ICT
Nottingham University
Hospital

More Information

Cisco Internet Business Solutions Group (IBSG), the company's global consultancy, helps CXOs from the world's largest public and private organizations solve critical business challenges. By connecting strategy, process, and technology. Cisco IBSG industry experts enable customers to turn visionary ideas into value.

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