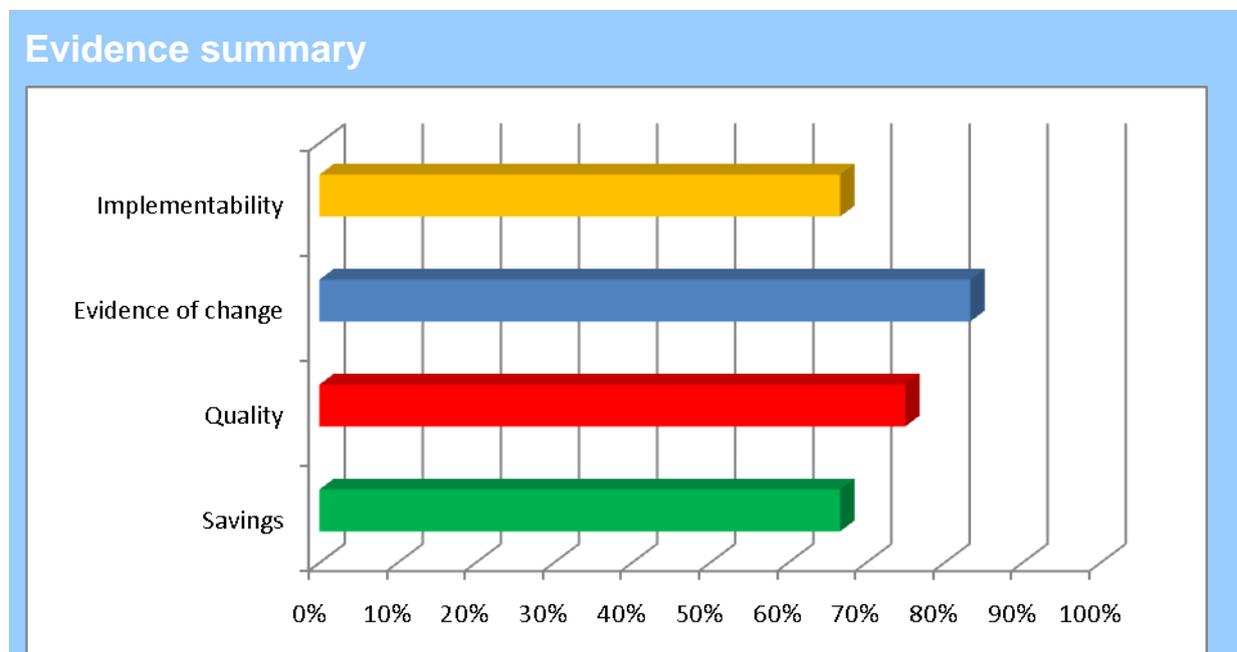


Centralised Nurse-led Vascular Access Team within Radiology: Reducing costs and complications of central venous access

Provided by: University Hospitals of Leicester NHS Trust
Publication type: Quality and productivity example

QIPP Evidence provides users with practical case studies that address the quality and productivity challenge in health and social care. All examples submitted are evaluated by NICE. This evaluation is based on the degree to which the initiative meets the QIPP criteria of savings, quality, evidence and implementability; each criterion is given a score which are then combined to give an overall score. The overall score is used to identify the best examples, which are then shown on NHS Evidence as 'recommended' or 'highly recommended'.

Our assessment of the degree to which this particular case study meets the criteria is represented in the evidence summary graphic below.



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Details of initiative

Purpose	To reduce delays, complications and costs around central venous access for patients across the Trust, using a team of specialist nurses employing image guidance as standard and centralising this work in Radiology.
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Description (including scope)	A centralised, nurse-led vascular access team has been funded and set up. Three nurses within the Radiology Department at Leicester Royal Infirmary have been trained to insert and remove all vascular access devices using ultrasound and fluoroscopy guidance as standard. Sessions in a dedicated room were reserved for them to carry out this work and the new service was heavily publicised across the Trust.
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In the past these procedures were mainly carried out in wards and clinics, by various grades of medical staff, often using anatomical landmarks rather than image guidance. Infection control practices were varied and could be sub-optimal, and more junior staff often lacked skills and experience. Patients could also be referred unnecessarily to the anaesthetist's emergency list, thus blocking a theatre. Complications such as device failure, pneumothorax, arterial puncture and infection could stem from poor insertion technique or care and maintenance issues.

The new service has helped to address these issues, improve device choice and increase cost savings due to reduced bed stays, reduced infection rates and reduced repetition of work.

This service is offered on weekdays from 8.30am to 5.00pm to all patients requiring central venous access at Leicester Royal Infirmary. Also a more limited advice, troubleshooting and insertion service is on offer to the other two Leicester hospitals. Giving advice and training is a vital part of the Team's remit.

The service is increasingly used by wards and clinics across the three Leicester hospitals. Currently the Vascular Access Team performs approximately 1000 of the 6000 central line insertions/removals per year across the Trust, a number that is expected to grow. They also provide an estimated 1000 episodes of device maintenance, which could mean assessing the device in situ, providing advice in person or over the phone. The Vascular Access Team does not perform all central line insertions, as this could compromise the skills of the medical staff and trainees across the Trust. However they do provide advice and training to such staff to help support the quality of the out-of-hours service.

The range of patients who currently benefit are:
Oncology and Haematology, particularly chemotherapy patients

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	(approx 70% of the work) Cardiology: Endocarditis patients Medical Unit: Cellulitis patients Trauma and Orthopaedics Infectious Diseases Unit Diabetes Respiratory Diseases
Topic	Planned care
Other information	Documents were provided as supporting evidence: 1. Business Case 2. Supporting information 3. Initial Review Paper

Gate 1: Savings delivered / anticipated

Amount of savings delivered / anticipated	This service is still developing but currently savings are a mixture of reduction in expenditure and productivity improvements. £25,000 of direct savings and approximately £730,000 indirect savings identified for a large hospital. Savings are £72,600 per 100,000 population based on Leicester, Leicestershire and Rutland areas covered. There are indications of a population outside these areas using this service.
Type of saving	Savings are mainly non cash.
Any costs required to achieve the savings	Capital investment was required to refurbish existing estate and purchase dedicated imaging equipment. Revenue costs of £225,000 and capital costs of £110,000 were required to implement this proposal.
Programme budget	Other

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Details supporting Gate 1

Type of saving - for every outpatient peripherally inserted central catheter (PICC) or Hickman insertion there is potential to save up to 4 bed days, with fewer repeat cannulations taking place, as staff are now taking time to consider long-term vascular access needs. Savings are due to fewer patient infections, pneumothorax or arterial punctures and associated care. Time savings are for medics and support staff who now perform fewer of these procedures on wards and in clinics. Introduction of needle free vascular access device across the trust contributes to cost savings associated with infections, reduction in drug spend and bed stay. Early indications estimated a saving of £14,500 per year if a single needle-free device is adopted across the Trust. Standardisation of procedural packs and consumables have led to cost savings. For example, University Hospitals of Leicester (UHL) cancer services saved £11,000 by changing to use the standard product pioneered by Imaging.

Cost of changes required - capital investment was required to refurbish existing estate and purchase dedicated imaging equipment.

The service is still developing, but as a snapshot:

- The unit costs for performing each line insertion or removal appear to be about the same as before.
- Reduced length of stay with central lines inserted earlier and removed earlier. For example, an orthopaedic patient with osteomyelitis would be on a ward having daily antibiotics peripherally. Five weeks of bed days could be saved because the patient is able to have antibiotic therapy at home via their central line. Saving 35 bed days x £245 typical cost per bed day = £8575. It is accepted there are associated costs with home care, but not of the same scale as the savings made.
- Reduced length of stay with treatments given at home. As a single example from a limited group of patients; in 12 months 195 oncology patients had 1351 episodes of 5-fluorouracil chemotherapy at home via their central line. Previously each would have been an inpatient for a minimum of two days. The associated saving was therefore at least £661,990 (1351 episodes x 2 days minimum x £245 typical cost per bed day).
- Reduced Emergency Theatre attendances with associated high costs. We estimate £38,400 (200 patients per year x 1hr each x approx £192 per hr staffing). The Vascular Access Team can deal with more complex patients who might otherwise have required a theatre slot.
- Reduced complications and less associated care due to fewer patient infections, pneumothorax or arterial punctures.

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- Fewer repeat line insertions - more catheter days per line as staff are now taking time to consider long-term vascular access needs. The equipment cost of a central line is, however, much more than the cost of repeated cannulae, but carries higher patient satisfaction.
 - Fewer peripheral lines inserted – ‘right access at the right time’.
 - Reduced drug spends – reduction in catheter borne infections.
 - Standardisation of peripheral lines –used across this Trust ,saving £37 per line. 300 lines placed in oncology in last year (potential savings to cancer services £11,100 per year)
 - Needle free vascular access device introduced across the Trust will contribute to cost savings associated with infections, reduction in drug spend and bed stay. Early indications estimated a saving of £14,500 per year if a single needle-free device is adopted across the Trust.
 - Time savings for medics and support staff who now perform fewer of these procedures on wards, clinics and theatres - an estimated 45mins per episode x 1000 episodes per year.
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Gate 2: Quality outcomes

Impact on clinical quality

Clinical quality should be improved due to access to the right device first time, inserted by appropriately trained professionals under image-guidance in a dedicated, safe & clean environment. Many admissions are also avoided and there is an improved flow of patients across all relevant specialities.

Best practice infection control procedures adhered to, leading to reduced infections and associated costs.

Education offered to nurses and medics on proper choice of device, leading to reduced multiple cannula insertions when a long-term device would be more appropriate.

Education for all staff and patients on the appropriate care and maintenance of devices, leading to reduced infections and costs.

Training and advice provided to all medical staff to support out-of-hours placement of lines.

A leading role in standardising procedures across the Trust.

Collaboration with Procurement Team to standardise and roll out

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	<p>the use of safety cannulae and needle-free devices, leading to reduced needle stick injuries and subsequent infection to patients and staff.</p> <p>Fewer patients referred to anaesthetics emergency list.</p>
Impact on patient safety	<p>Central venous access performed by trained and experienced staff, using image guidance as standard, leading to a significantly reduced rate of pneumothorax and arterial puncture incidents when compared to junior & middle grade medical trainees. When audited in 2007/8 the complication rate was 7% for Nurses compared with 13% for junior and 14% for middle grade medical trainees. The Vascular Access Nurses only experienced one failure to place during this 4 month study. See Attachment 5. Please note this is an early audit which included Nurses from outside the Vascular Access Team, performing non-image guided placement.</p>
Impact on patient and carer experience	<p>Improved patient experience is likely due to patients and carers now being more involved and supported in the care of their own devices. Patients are educated and actively encouraged to question the care they receive in wards and clinics post-insertion. When a long-term device is selected this allows the patient to be free from repeat cannula insertions every 2 days for the length of their treatment. Also IV therapy can more often be given at home when the correct device is in situ. In addition, patient experience must be improved by greatly reduced delays in obtaining vascular access, plus lower infection and complication rates. Previous ward based services are poor with higher infection rates.</p>
Supporting evidence	<p>No further information provided.</p>

Gate 3: Evidence of effectiveness

Evidence base for initiative	<p>Ultrasound technique for placing central venous catheters is outlined in published guidance for example NICE Technology Appraisal Guidance 49 (Sept 02).</p>
Evidence of deliverable from implementation	<p>Not yet replicated outside University Hospitals of Leicester NHS Trust.</p>
Where implemented	<p>Service open to all wards and clinics across Leicester Royal Infirmary plus limited support for Glenfield Hospital and Leicester General Hospital. All 3 hospitals are part of University Hospitals of Leicester NHS Trust</p>
Degree to which the actual benefits matched	<p>Same as expected</p>

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assumptions

If initiative has been replicated how frequently / widely has it been replicated

The initiative has not yet been replicated.

Supporting evidence for Gate 3

3.1 Evidence for Clinical Improvement - as implementing:
1) NICE Technology Appraisal Guidance No 49. Guidance on the use of ultrasound locating devices for placing central venous catheters. Sept-02.
2) epic2: National Evidence-Based Guidelines for preventing Healthcare-Associated Infections in NHS Hospitals in England. Pratt et al. Journal of Hospital Infection (2007) 65S, particularly S6-S8.
3) Saving Lives: reducing infection, delivering clean and safe care. Department of Health. 21 June 2007

We believe other such dedicated teams using image guidance do exist in Glasgow, Preston and Manchester, however we have no clear information about their methods or results.

Gate 4: Details of implementation

Implementation details

Dec 2007 - Baseline image-guided service of 1 radiologist plus 1 nurse session per week.
Jan 2008 - Pilot study of 3 months funded by SHA aiming to reduce infections related to central venous access.
Feb-2008 - Implementation of Vascular Access Team. A 2nd part time nurse, already competent to place PICC lines, started training to introduce other vascular access devices. Also education of ward and clinic staff started.
Apr-2008 Service established including standardisation of Vascular Access Policies and Procedures. Vascular Access Steering Group set up and led by consultant radiologist with cross-directorate representation including anaesthetists and Infection control. This was essential to ensure revised policies were implemented across the Trust.
Sep-2008 - 3rd full time nurse, also PICC trained, started training.
May-2009 - Hosted a county-wide conference to promote "Enhancing Best Practice in Vascular Access Device Care". Attended by 170 delegates from both Hospital and Community settings, including some from Nursing Homes.
Jun-2009 - Dedicated vascular access suite opened within Radiology following completion of refurbishment and procurement of capital imaging equipment.

The education of ward and clinic staff (started in Feb-2008) immediately prompted more referrals and additional capacity was opened up as demand grew.

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Benefits of improved care and quicker access were observed from the start. In 2010 urgent requests are now completed within 0 to 72 hours, with many done within the hour.

Time taken to implement

Nurse-led vascular access team can be set up within one year. Key milestones in the development of the service are provided. Benefits were seen within 3 months of employing our second nurse in Feb 08. The benefits of improved care and quicker access were observed from the start and referral rates increased rapidly.

Ease of implementation

Affects whole organisation across a range of teams and departments - especially oncology services, wards, imaging, anaesthetics, infection control, procurement.

Level of support and commitment

Buy in from users was easy to obtain. They had previously performed the majority of the procedures.

Risks

During ultrasound or fluoroscopy guidance training there was a slight risk of operator error causing pneumothorax or mis-identification of the appropriate vessel. This risk was felt to be less than that of not using image-guidance at all. Training was always carried out under direct, and later indirect supervision. Consultant back-up was always available as this was an 8:30am to 5:00pm service.

Supporting evidence for Gate 4

No further information provided.

Further evidence

Dependencies

We specified that nurses should already be competent and confident in placing PICC lines before starting their training to place other devices. We specified that nurses should undergo extended IR(ME)R training as an 'Operator' before they independently operated the Fluoroscopy equipment and provided the procedure report. They also had to be trained as 'Referrer' before they could refer for Chest X-rays to confirm correct device position.

Contacts and resources

Contacts and resources

If you require any further information please email: contactus@evidence.nhs.uk and we will forward your enquiry and

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contact details to the provider of this case study. Please quote QIPP reference 10/0032 in your email.

Publications and resources:

1) NICE Technology Appraisal Guidance No 49. Guidance on the use of ultrasound locating devices for placing central venous catheters. Sept-02.

<http://www.nice.org.uk/nicemedia/live/11474/32461/32461.pdf>

2) epic2: National Evidence-Based Guidelines for preventing Healthcare-Associated Infections in NHS Hospitals in England. Pratt et al. Journal of Hospital Infection (2007) 65S, particularly S6-S8.

3) Saving Lives: reducing infection, delivering clean and safe care. Department of Health Publication. 21 June 2007

4) Local Activity Information

5) Impact of the introduction of ultrasound locating devices for the placement of central venous catheters in a large teaching hospital NHS trust, a prospective observational study. J.L. Parker, A.D. Leonard, N.J. Flint, C.M. Allsager, A. Bromley, J.P. Thompson Department of Anaesthesia, Critical Care and Pain Management, University Hospitals of Leicester NHS Trust

6) RAID assessment: a training slide for Vascular Access Care Pathway adapted from Bradley, Addenbrookes 2008

7) Vascular Access Device What to Use: a training slide to aid correct device selection

8) Central Venous Access Device Trouble Shooting: a training poster

9) Agenda for Enhancing Best Practice in Vascular Access Device Care Study Day 28th May 2009

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