NHS
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Clinical Senate

East of England Clinical Senate

Interventional Radiology in the East of England: the role of Networks

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Foreword from East of England Clinical Senate Chair

The East of England Clinical Senate provides independent, patient focussed clinical advice (both formal and informal) and also undertakes proactive projects with the aim of improving the health of the population of the East of England.

Interventional radiology is an important area of service provision required to enable a high quality service with good patient outcomes for many serious and emergency conditions, and it has an increasing role to play.

The East of England Clinical Senate was asked in August 2015 by the East of England Medical Directors Forum Chair, Dr Jag Ahluwalia, if it could assist in progressing the issue of Interventional Radiology service provision. This had been a topic of discussion at the Medical Directors Forum on several occasions as there were concerns regarding the equitable and reliable access to these interventions for patients, especially out of hours. Resolving these issues had proven difficult in view of the differing levels of provision in the Trusts across the region, workforce issues, the lack of reliable data and a range of ways in which these services were commissioned and funded.

The request was considered by Clinical Senate Council and it was agreed that a working group be established which was tasked in the first instance to determine the variation in provision across the region, how this compared with best practice and national guidance and to develop some high level recommendations.

The working group (see acknowledgements page 3) was assisted by the frank and prompt responses from each of the 18 acute trusts in the region with information provided by the interventional radiology leads, radiology leads and Medical Directors. This work was also assisted by the Eastern Region Interventional Radiology Network as well as the Medical Directors Forum. Public Health England has not only provided support to the overall project and data provision but has also contributed two members to the working group.

This project has involved a significant time commitment from all members of the working group and I would like to thank them all for the enthusiasm, determination and efforts, and especially to Dr Frank Carey who has undertaken the bulk of the work.

This piece of work has demonstrated that current interventional radiology service provision across the East of England is unacceptable and improvement in provision must be taken forward as soon as possible by commissioners as well as providers. The East of England must improve this service for the benefit of our population.

Dr Bernard Brett
East of England Clinical Senate Chair

Acknowledgements

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Introduction

Interventional Radiology (IR) refers to a range of techniques which rely on the use of radiological image guidance (X-ray fluoroscopy, ultrasound, computed tomography [CT] or magnetic resonance imaging [MRI]) to precisely target therapy. Most IR treatments are minimally invasive alternatives to open or laparoscopic (keyhole) surgery. As many IR procedures start with passing a needle through the skin to the target it is sometimes called pinhole surgery[1]. These minimally invasive techniques often prevent patients undergoing major surgery, allowing faster recovery and often better outcomes overall which is not only beneficial to the patient, but also to the hospital to which they are admitted and indeed the local health care system[2]. This review will explore the IR services currently available to the population of the East of England, determine the existing and predicted future demand and aims to present a series of high-level options for commissioners, providers and STPs to help shape the future direction for the provision of IR services.

SECTION 1

Standards for Interventional Radiology (IR) services

In 2008, the Royal College of Radiologists published 'Standards for providing a 24-hour interventional radiology service'[3]. The following conclusions and recommendations were made:

- The absence of IR services puts patients at risk.
- Clarity was needed for referring clinicians within the trust and service commissioners about what IR services were available and when they were available.
- Pathways should be in place for treating patients appropriately when the relevant IR service was not available locally.
- Out-of-hours service provision must be subject to a formal rota.
- The resource implication for supporting a 24-hour IR service in terms of manpower and diagnostic imaging should be recognised.
- Onward referral pathways should be formalised including formal contractual agreements between referring and accepting trusts, protocols for transfer and arrangements for appropriate remuneration for services provided.

It is recognised that some IR procedures are relatively low volume and many sites have insufficient elective cases to employ the required number of interventional radiologists to provide a safe and sustainable on-call rota (minimum 1 in 6). Similarly, a lack of specialist interventional radiology nurses, radiographers and interventional radiology facilities can adversely affect the ability to set up on-call services. This is more likely to be the case in smaller district general hospitals (DGH).

Current and future demand for IR and workforce.

In 2014, the Royal College of Radiologists (RCR) and the British Society of Interventional Radiologists (BSIR) published 'Investing in the interventional radiology workforce: the quality and efficiency case'[4]. This document emphasised the central role for IR in safe and effective patient care. In addition it identified some of the existing difficulties in delivering a comprehensive service to all patients, 24 hours a day, 7 days a week, highlighting increasing demand with a relative workforce shortfall.

The demand for IR services is increasing as a consequence of an aging population and an increasing number of pathologies potentially amenable to IR treatment. A good example of developing IR therapeutics is the evolution of the role of IR in the management of acute stroke[5]. Between 2010 and 2012, there was a 21% increase in the number of interventional radiology procedures across England. Impacting on this are the growing number of hospital admissions, the increasing number and complexity of patient's comorbidities and the requirement for 24/7 services. This growth will continue as technology improves and the sub-specialty grows. While demand for IR services in England grew by 21% between 2010 and 2012, there was only a 5% increase in the number of IR consultants (from 412 to 433). Also, IR was the radiology subspecialty predicted to be the worst affected by consultant workforce attrition in the years following 2014. While much of this was due to retirement, there were many cases of DGH consultants ceasing to provide IR services citing a lack of infrastructure or networked arrangements as contributing to their decision to stop.

Feedback to the RCR census indicated that Trusts were not able to recruit interventional radiologists in sufficient numbers to provide a robust 24/7 on-call IR rota. It estimated that a further 200 IR consultants were need to provide an adequate out of hours rota nationally. Currently the RCR and the British Society of Interventional Radiologists (BSIR) calculate that 25 additional IR trainees per year are required to bridge the gap between demand and currently anticipated workforce by 2023. It is recognised that significant service reconfiguration will also be required in order to sustain safe IR services across England.

Workforce issues are not confined to the interventional radiologists. Similar issues exist in the demand for, and the shortfall in, radiographers and radiology nurses which need to be addressed in conjunction with the increase in interventional radiologists.

The East of England (EoE) covers a large geographic area with a population of approximately 6.7 million people. As is seen across the country, the demand for IR services is growing in the region. The Centre for Workforce Intelligence in 2012[6] reported 46 interventional radiologists were in post in the region and estimated that a further 44 would be required (a total of 90) to provide a 1:5 on-call rota based on a single trust model of delivery. Based on our current survey there were 47 Interventional radiologists in the region in 2016 representing a shortfall of 43.

A networked solution to service delivery is likely to be required to bridge the gap between demand and workforce shortfalls.

Current provision of IR services in the East of England

Data on the provision of IR services in the East of England (EoE) was obtained from NHS England Operations and Information Directorate. The Hospital Episode Statistics (HES) database is a data warehouse containing details of all admissions, outpatient appointment and Accident and Emergency Department attendances at NHS hospitals in England[7]. The details of each patient's hospital attendance is collected and submitted to allow hospitals to be paid for the care they deliver. It is also used by local commissioning groups, provider organisations, commercial healthcare bodies and researchers as a tool to investigate trends in healthcare service provision to assess the delivery of care and to facilitate local service planning.

Healthcare Resource Group (HRG) codes for the most commonly performed IR procedures were submitted and the number of procedures performed in the five years to 31 August 2016 provided for each trust in the region.

The procedures included:

Nephrostomy (RC02Z)

Endovascular intervention (stent, lysis, embolisation) (RC14Z)

Endovascular aneurysm repair (EVAR) (RC41Z)

Due to changes in coding practice and data collection, data prior to April 2013 was not included.

The figures below illustrate the number of core IR procedures performed in the region on an annual basis since 2013.

Figure 1.

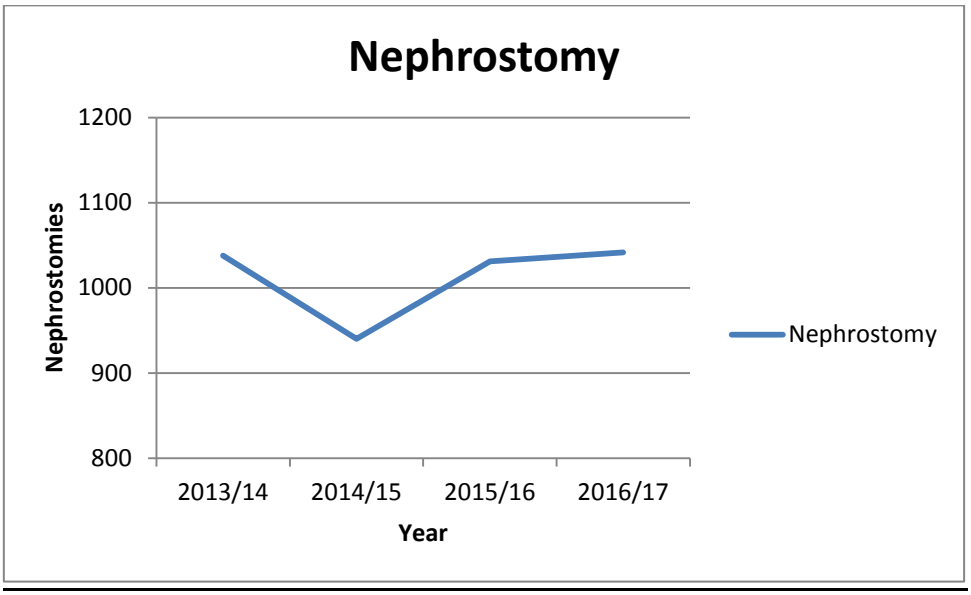


Figure 2.

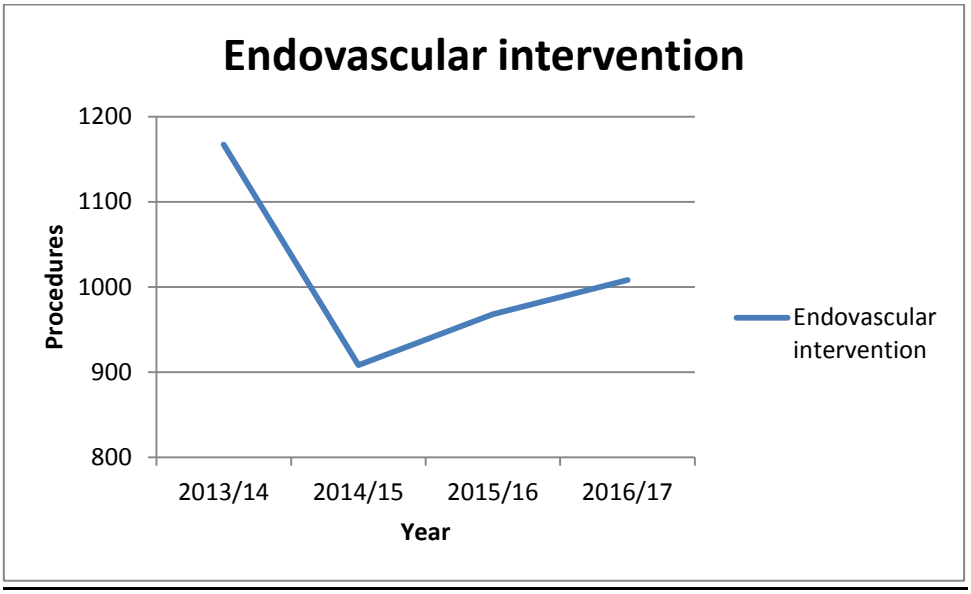
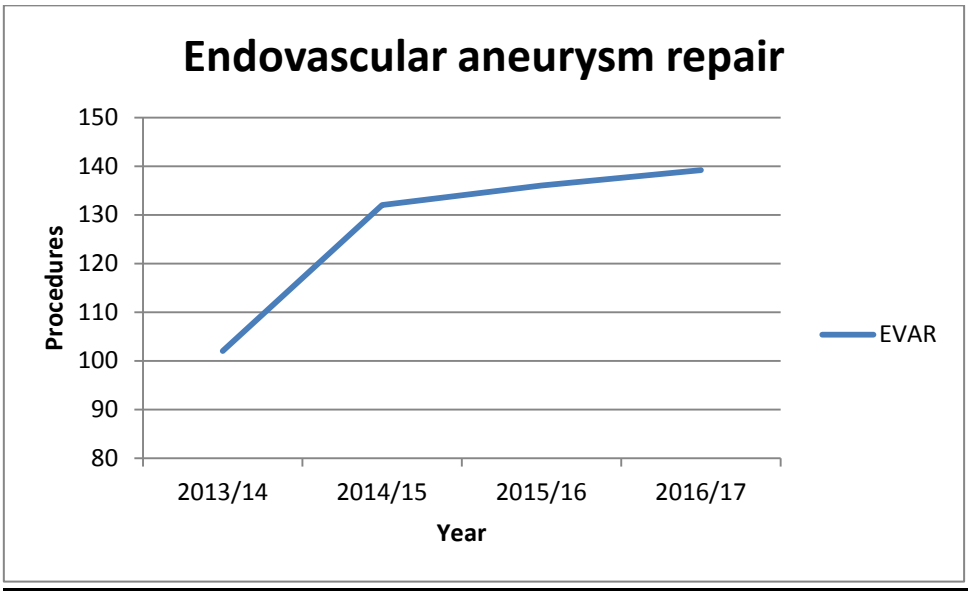


Figure 3.



*The figures for 2016/17 are projected based on the level of demand in the year to date

As can be seen from the number of procedures performed, there is a high demand for the core IR services currently delivered. In the case of nephrostomy and endovascular intervention the demand has been relatively constant. The number of EVARs has grown almost 40% between 2013/14 and 2016/17. The data is however limited by a number of factors; due to the differences in coding practice between trusts this HES data is likely to underestimate the actual IR activity across the region. In particular, endovascular intervention which includes angioplasty, stenting and lysis, encompassing a multitude of procedures and different body parts. Unfortunately, again due to the way these procedures are coded, it was not possible to separate these more specifically. It was also not possible to separate the procedures into 'in-hours' and 'out-of-hours'.

Despite these limitations, these data shows a high level of provision of the key IR procedures. With the possible addition of new IR procedures such as thrombectomy for acute stroke and pulmonary emboli, the overall demand for IR services, including out of hours (OOH) is predicted to increase.

The limitation of these data highlights the need for accurate, detailed, prospective data collection for IR procedures performed both 'in-hours' and 'out-of-hours'.

SECTION 2

Networks

A networked system, where multiple sites collaborate through the pooling of staff and/or facilities to form a safe on-call service, may facilitate the goal of providing 24-hour interventional radiology services.

The National Imaging Board published 'Interventional Radiology: Guidance for Service Delivery' in 2010[8]. This document built on the idea of networks and suggested that, where needed, NHS trusts delivering IR could be part of a network with agreed levels of service delivery which would provide IR expertise out of hours across a region. This would require formal, consultant led rotas, providing immediacy of care for emergencies within the unit or transfer of the patient or key staff within a structured network. Allied to this would be the need for 24-hour access for IR to co-dependent specialties (anaesthetics, vascular etc.) and the relevant staff (nurses and radiographers) and facilities. A network is likely to be based on a geographic framework and, where appropriate, existing referral pathways and practices. There needs to be evidence based guidelines and protocols for management of patients including timely transfer into, and repatriation back from, a providing trust. Where patients are not suitable for transfer, protocols should be in place for the IR team to move to the patient. In addition there should be regular review of patient outcomes to ensure that performance is optimised.

The Health Foundation report in 2014 'Effective Networks for Improvement'[9], considered the evidence for the general effectiveness of networks and the evidence for the key elements of successful networks based on a literature review and empirical evidence. The review found that published evidence for the effectiveness of networks was scarce, as it was difficult to identify a network's effect on clinical outcomes independently from other factors. However, the review did find that within the existing literature there was some evidence that networks can:

- Improve quality both directly and indirectly. For example, creating cohesive and collaborative professional networks helps coordinate care and creates social capital among employees (thus improving job satisfaction and reducing staff turnover).
- Have a symbolic impact through publications, events and images that foster network identity and legitimacy.

- Allow ‘bottom up’ views to contribute to solving complex planning, design and delivery problems – bridging gaps between professional groups and competing organisations.
- Provide a forum for addressing inconsistent practice and variations in outcomes. The Working-group in Interventional Radiology of the East forum is an excellent example of this in the East of England.

Networks in Interventional Radiology

With these considerations in mind, NHS Improvement and the BSIR have sought to develop networks to deliver 24-hour access to core interventional procedures. These are:

1. Nephrostomy
2. Embolisation for haemorrhage – traumatic, GI and post-partum
3. Endovascular intervention – angioplasty, intra-arterial stenting and lysis

In 2012 the BSIR and NHS Improvement published ‘Towards better practice in interventional radiology’[10] which illustrated the variability in both ‘in hour’ and ‘out-of-hour’ service provision across the UK for IR, particularly those for potentially lifesaving procedures. They found that networks were essential to improve access to IR and provided examples of effective networks already in operation. Further to this, it found significant contribution by IR not only to patient outcomes, but also to significant operational savings.

To date the BSIR and NHS Improving Quality /NHS Improvement have performed four annual surveys of IR services across NHS trusts in England. The results of these surveys demonstrated an increase in the out of hours provision of IR from 21% in 2011 to 68% in 2014. However, they also showed that not all patients had access to 24hr IR services with some trusts continuing to rely on informal or ad-hoc arrangements for their out of hours emergencies.

Examples of good practice in IR Networks

South Devon Healthcare NHS Foundation Trust and Royal Devon and Exeter NHS Foundation Trust[10].

The Royal Devon and Exeter trust serves a population of 370,000 and, 25 miles away, the South Devon Trust serves 280,000 patients with three interventional radiologists at each site, both historically providing out of hours cover on an ad-hoc basis. This system became unsustainable with increasing numbers and complexity of cases. There was an existing vascular surgical on-call network in existence across the two sites.

Discussion between radiologists, radiology department managers, medical directors and senior executives, interventional nurses and radiographers lead to the development of a local network solution.

Each site covered its own on-call from Monday to Friday, on a 1:3 rota. At weekends, one IR was on-call for both sites, making a 1:6 rota, with the radiologist travelling to the trust where the patient was located. Overnight and at weekends there was an IR nurse and radiographer on call at both sites. The agreed portfolio of work covered on both sites include: nephrostomy, abscess drainage, peripheral vascular intervention and embolisation for haemorrhage.

The service is currently running well and appears sustainable.

NHS Greater Glasgow & Clyde

Recognition of the importance of interventional radiology in the patient pathway and the existing variation in out of hours access with no formal on-call rota, prompted collaboration across several trusts to provide a 24/7 service to all patients.

Nine interventional radiologists and nurses provide 24/7 cross-site cover. This required additional staff and funding, development of a cross-site on-call nurse rota and consolidation of consumables (wires, catheters etc.), across sites.

This has resulted in a sustainable 24/7 rota achieving excellent results for patients and receiving excellent feedback from clinical colleagues.

Lessons learned from existing networks

1. Clinical leadership within each group was key in establishing networks.
2. Network solutions cannot be achieved without active managerial participation.
3. Resistance to significant changes in working practices may have been reduced by involving staff earlier in designing the service reconfiguration.
4. Requests for procedures outside of those covered by all interventional radiologists' contributing to a network will still arise, and formal referral pathways for these procedures must be in place.
5. Rationalisation of equipment across sites in the network facilitates safe and comfortable cross-site working.
6. Use of an IR discussion forum helped with the network day to day operation and with resolution of problems

Vascular surgery networks

In 2013, The Vascular Society of Great Britain and Ireland (VSGBI) and the National Confidential Enquiry into Patient Outcome and Death called for a reorganisation of vascular services for emergency and elective care to optimise outcomes for patients[12]. This included both elective and emergency procedures and was in response to reported higher than average mortality rates in the UK for elective Abdominal Aortic Aneurism repairs, when compared to other Western European countries (7.9% UK vs 3.5% Europe (Vascunet 2008[12]), longer hospital stays compared to the rest of Europe and the significant gaps in the provision of emergency vascular IR services. The NHS England 'NHS standard contract for specialised vascular services (adults)', provided some of the evidence and criteria for the use of networks for the reorganisation of vascular services. This document noted the importance of IR services in both the provision of diagnostic imaging, but also minimally invasive procedures in the emergency setting. Any proposed IR network should consider the existing vascular surgical support in order to foster a collaborative approach to vascular interventional procedures and the best patient outcomes. It is crucial however to recognise that vascular procedures are only part of the range of services provided by IR out of hours.

District General Hospital (DGH) Interventional Radiology

A network approach to IR services should aim to support the work that is provided at all sites. DGH IR is under increasing pressure for a number of reasons:

- Difficulty in recruiting interventional radiologists, leading to onerous on-call rotas (for example 1 in 3).
- The centralisation of vascular services has led to variable practices across the UK with some DGHs losing considerable IR services to larger centres. Loss of vascular work to larger centres means that there is not enough routine/elective work to support more than 1 or 2 interventional radiologists in smaller units if they continue to work on a single site.
- Commissioners have variable understanding of the scope of IR services provided in DGHs which results at least in part from the relatively low volumes for each CCG catchment area.

Failure to promote and invest in local interventional radiologists in the DGH setting can lead to the loss of local IR services such as angioplasty to visiting vascular teams and eventually the service being relocated to local vascular centres. The loss of local skill and experience may result in all but the most routine of non-vascular IR services requiring transfer to the local tertiary centre (or the need to transfer specialist staff out to the smaller unit). It may also result in patients being treated with endoscopic or open surgical procedures where IR was more appropriate.

Any network solution to IR should consider the role of the existing DGH service and how to optimise this.

SECTION 3

Funding

The national Payment by Results (PbR) system is the tariff method by which commissioners pay health care providers for patients seen or treated, taking into account the complexity of the patient's healthcare needs. It has been the most commonly used payment and funding system. The two key features are currencies and tariffs. The currency is the unit of healthcare provided and the tariff is the set price paid for each currency. It is essential that the tariff is an accurate representation of the cost of delivering a service. Where networks are concerned, tariffs and the agreement of appropriate funding streams will form an important part of any formal referral pathway or network agreement. In order for the correct tariff to be paid, the procedure coding needs to be accurate. This can be a challenge in radiology as the procedure performed often changes from the one originally planned as a result of the imaging findings and dynamic assessment whilst the patient is on the IR table, and as such the coding needs to reflect these changes. Current emergency tariffs do not cover all the costs of out of hours IR provision making these vital emergency procedures money losing services, and, despite their clinical value, potentially unattractive to Trusts and commissioners.

Clinical coding teams need to be kept up to date with all the relevant funding stream agreements made as part of any proposed network arrangement. Internal re-charging may also be necessary to ensure the IR is receiving the correct remuneration for services provided.

The National Vascular Registry

The National Vascular Registry (NVR) is a national prospective audit measuring the quality of care for patient undergoing a vascular procedure, commissioned by the Health Quality Improvement Partnership.[14] Engagement with this registry will allow IR to demonstrate the extent of its contribution to the provision of vascular procedures. This is extremely important as it will influence the future commissioning of services. In 2014, the submission rate to the registry for peripheral angioplasty, a common IR procedure, was less than 15%[15]. Failure to accurately represent the role that IR already plays in service provision will reduce the visibility of IR to commissioning groups and weaken further the ability to provide a 24/7 service. The low level of submission is in part a consequence of low levels of interventional radiologists and a lack of administrative support. Trusts may need to provide this support

and IR specialists will need to fully engage with the data collection process in order for IR activity to be accurately represented.

Allied to this is the need to audit and publish technical success and patient outcome measures thereby clarifying the impact IR has on patient pathways, allowing the benchmarking of services and helping to determine appropriate funding.

SECTION 4

Review of current IR provision in the East of England

Many, but not all, Trusts in the East of England (EoE) contributed to the national surveys undertaken previously by the BSIR. A new survey of all trusts was completed as part of this joint Clinical Senate and Public Health England project, to ensure that the information was specific to the region and up to date.

The Medical Director and interventional radiology or radiology clinical leads were contacted and invited to complete a survey which collated the information about their centre (number of interventional radiologists, number of interventional nurses / radiographers and facilities etc.). More specific information was requested regarding the provision in hours and out of hours for the following interventional radiology procedures (see Appendix 1.)

Core:

Nephrostomy
Embolisation (General and Post-Partum Haemorrhage)
Endovascular interventions (stent, angioplasty and lysis)

Non-core:
Endovascular aneurysm repair (EVAR)
Thoracic endovascular aneurysm repair (TEVAR)
Trans-arterial intrahepatic porto-systemic shunt (TIPSS)
Uterine fibroid embolisation (UFE)
Renal dialysis access intervention

Core IR services
For the core IR services further details were collected:

- Was the service provided at that site, if so was the cover 24/7?
- Was there a formal rota, if so what was the frequency?
- If the service was not provided at that centre, was there a plan to do so within the next 12 months?
- If the service was not being delivered, what would be required for the provision of that service (including interventional radiologist appointments, IR nurse rotas, facilities and access to and IR network).

Results

Responses were received from all 18 trusts. The number of interventional radiologists in the region currently is 47. Respondents comprised both teaching hospitals and district general hospitals. The Trusts included are detailed in the Table 1 below:

Table 1

Local areas	Population	Trusts	
Hertfordshire, Bedfordshire and Luton	1.33m	East and North Hertfordshire NHS Trust	Lister Hospital Queen Elizabeth II Hospital
		West Hertfordshire NHS Trust	St Albans City Hospital Watford General Hospital
		Bedford Hospital NHS Trust	
		Luton and Dunstable University Hospital NHS Foundation Trust	
East Anglia – Cambridge, Peterborough, West Suffolk	1.77m	Peterborough and Stamford Hospital NHS Foundation Trust	Peterborough City Hospital Stamford Hospital
		Hinchingbrooke Hospital	
		Papworth Hospital	
		West Suffolk Hospital NHS Foundation Trust	
		Addenbrooke's Hospital NHS Foundation Trust	
East Anglia – Norfolk, Suffolk, Great Yarmouth and Waveney	1.38m	James Paget University NHS Foundation Trust	
		Norfolk and Norwich University Hospital NHS Foundation Trust	
		Queen Elizabeth King's Lynn Hospital NHS Foundation Trust	
		Ipswich Hospital NHS Trust	
Essex	1.75m	The Princess Alexandra Hospital NHS Trust	
		Mid Essex Hospital NHS Trust	Broomfield Hospital St Michael's Hospital St Peters Hospital
		Colchester University Hospital NHS Foundation Trust	
		Basildon and Thurrock University Hospital NHS Foundation Trust	Basildon Hospital Orsett Hospital
		Southend University Hospital NHS Foundation Trust	

Table 2. The in hours provision of IR services (Sep 2016)

Procedure	Provided	FRP	Not provided/ NoFRP
Nephrostomy	16	2	0
Endovascular intervention	15	3	0
Embolisation	11	4	3
TIPPS	1	6	11
EVAR (rupture)	9	9	0
TEVAR	6	7	5

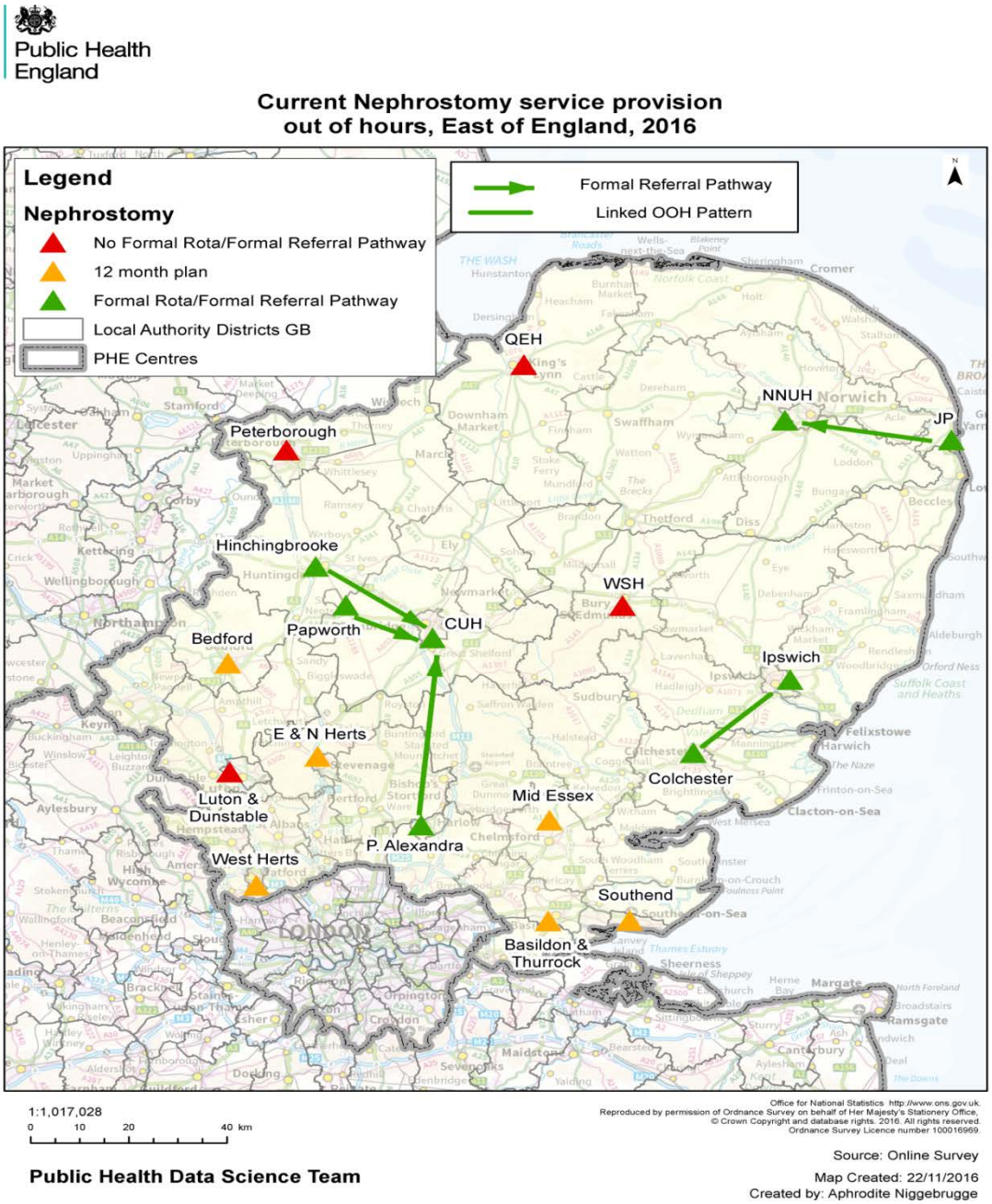
Table 3. The out of hours provision of IR services (Sep 2016)

Procedure	Formal rota	FRP	Not provided / No FRP
Nephrostomy	4	4	10
Endovascular intervention	4	4	10
Embolisation	4	4	10
TIPPS	1	5	11
EVAR (rupture)	5	8	5
TEVAR	2	6	9

FRP = Formal referral pathway

Nephrostomy

Figure 4: Nephrostomy out of hours



Nephrostomy out of hours

Four centres had a formal rota with an on-call frequency of either 1 in 5 or 1 in 6:

- Norfolk and Norwich University Hospital (NNUH)
- Cambridge University Hospital (CUH)

- Ipswich Hospital (IHT) and Colchester Hospital (CHT) combined rota

Four centres had formal referral pathways:

- The Princess Alexandra Hospital (to CUH)
- Papworth Hospital (to CUH)
- James Paget University Hospital (to NNUH)
- Hinchingbrooke Hospital (to CUH)

Of the ten centres with no current provision or no formal referral pathway six had plans for a network solution in varying stages of development:

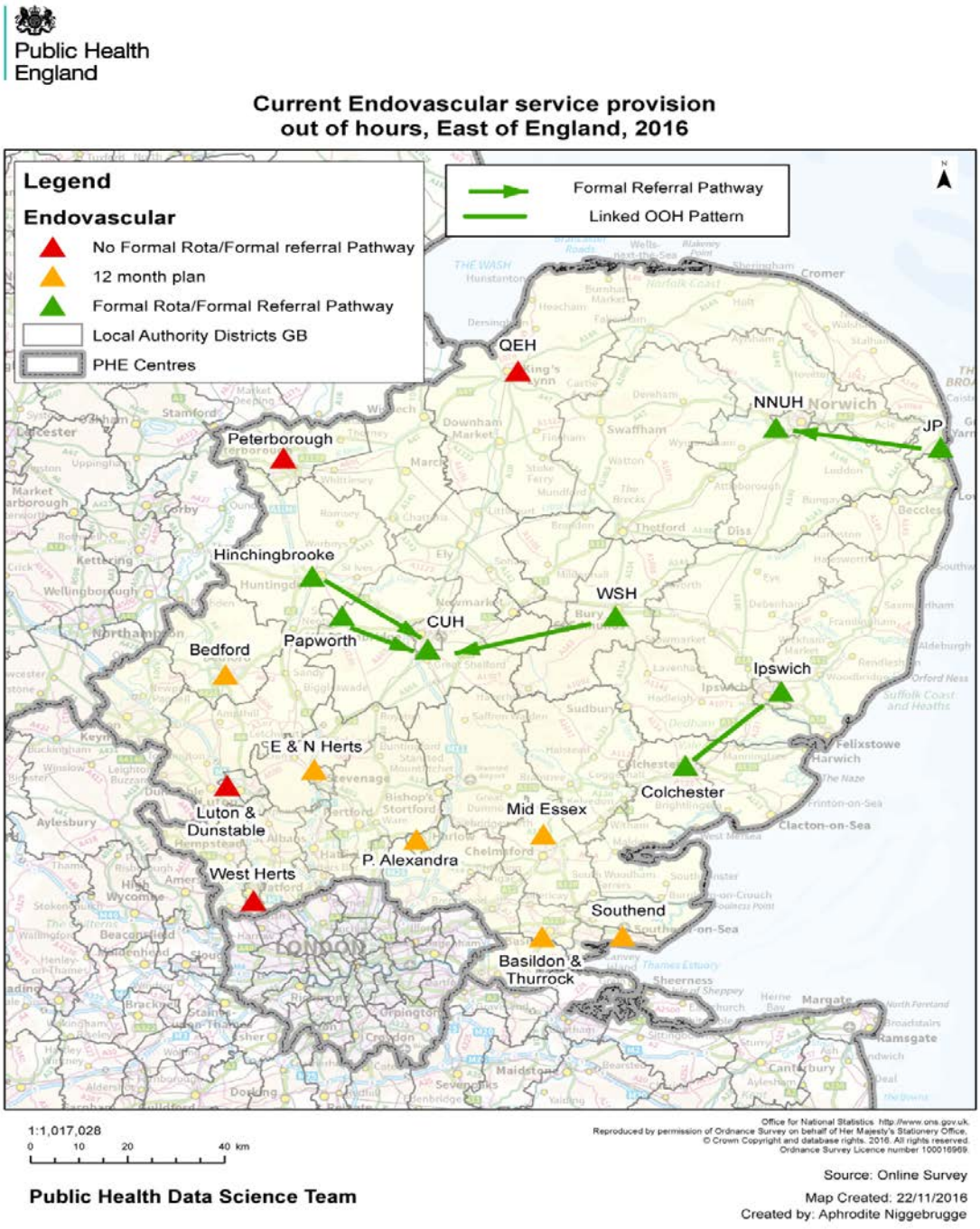
- The Mid and South Essex Success Regime, which has a much broader transformational remit, has an IR work stream that is developing a network to provide 24/7 IR services across:
    - Southend University NHS Foundation Trust
    - Basildon and Thurrock University Hospital NHS Foundation Trust
    - Mid Essex Hospitals
- Two further trusts had 'network plans in progress'
    - East and North Hertfordshire NHS Foundation Trust
    - Bedford NHS Trust
- One centre had a business case being developed
    - West Hertfordshire Hospital NHS Trust

Four had no agreed network solution for an on-call service in the next 12 months

- Peterborough and Stamford Hospital NHS Foundation Trust – provided an ad hoc on-call service which was less than 24/7
- West Suffolk NHS Foundation Trust – provided an ad hoc on-call service which was less than 24/7
- Luton and Dunstable Hospital NHS Foundation Trust
- Queen Elizabeth Hospital Kings Lynn NHS Foundation Trust

These centres sited the lack of an interventional radiologist appointment, nurses and radiographers and lack of a local network as the main obstacles to provision of 24/7 IR services. Some of these sites had approached multiple other centres but had been unsuccessful in arranging formal cover.

Figure 6: Endovascular intervention out of hours



Endovascular intervention

Four centres had a formal rota with an on-call frequency of either 1 in 5 or 1 in 6:

- Norfolk and Norwich University Hospital (NNUH)
- Cambridge University Hospital (CUH)
- Ipswich Hospital (IHT) and Colchester Hospital (CHT) combined rota

Four centres had formal referral pathways:

- The West Suffolk Hospital (to CUH)
- Papworth Hospital (to CUH)
- James Paget University Hospital (to NNUH)
- Hinchingbrooke Hospital (to CUH)

Of the ten centres with no current provision or no formal referral pathway:

Six had ongoing networks plans

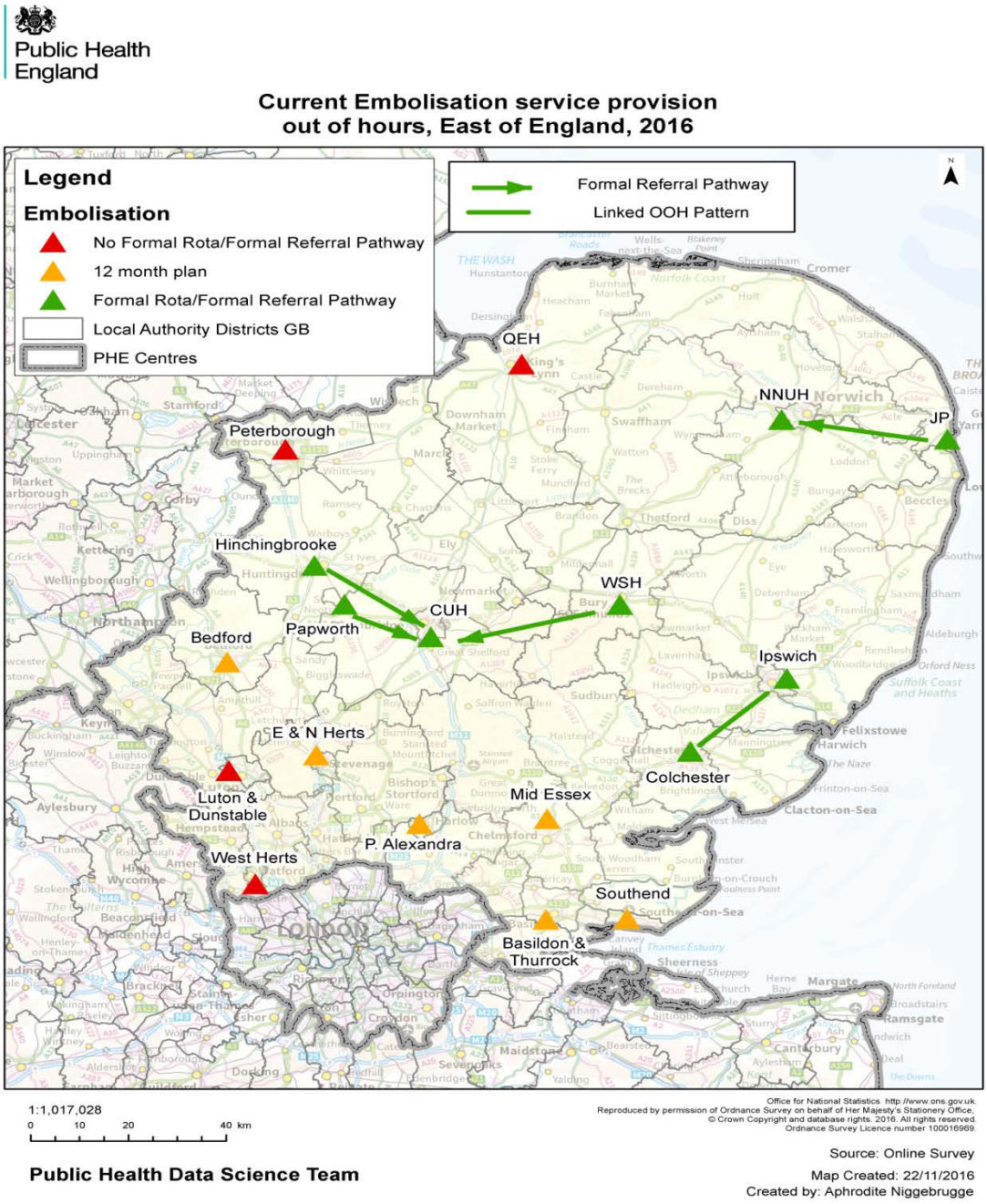
- The Mid and South Essex Success Regime, which has a much broader transformational remit, has an IR work stream that is developing a network to provide 24/7 IR services across:
    - Southend University NHS Foundation Trust
    - Basildon and Thurrock University Hospital NHS Foundation Trust
    - Mid Essex Hospitals.
- Three further trusts had 'network plans in progress'
    - East and North Hertfordshire NHS Foundation Trust
    - Bedford NHS Trust
    - Princess Alexandra Hospital NHS Foundation Trust.

Four had no agreed network solution for on-call service in the next 12 months

- Peterborough and Stamford Hospital NHS Foundation Trust
- Luton and Dunstable Hospital NHS Foundation Trust
- Queen Elizabeth Hospital Kings Lynn NHS Foundation Trust
- West Hertfordshire Hospital NHS Trust

These centres sited the lack of IR appointment, nurses and radiographers and lack of a local network as the main obstacles to provision of 24/7 IR services. Some of these sites had approached multiple other centres but had been unsuccessful in arranging formal cover.

Figure 8: Embolisation for Haemorrhage (General and PPH) out of hours



Embolisation for haemorrhage

Four centres had a formal rota with an on-call frequency of either 1 in 5 or 1 in 6:

- Norfolk and Norwich University Hospital (NNUH)
- Cambridge University Hospital (CUH)
- Ipswich Hospital (IHT) and Colchester Hospital (CHT) combined rota

Four centres had formal referral pathways:

- The West Suffolk Hospital (to CUH)
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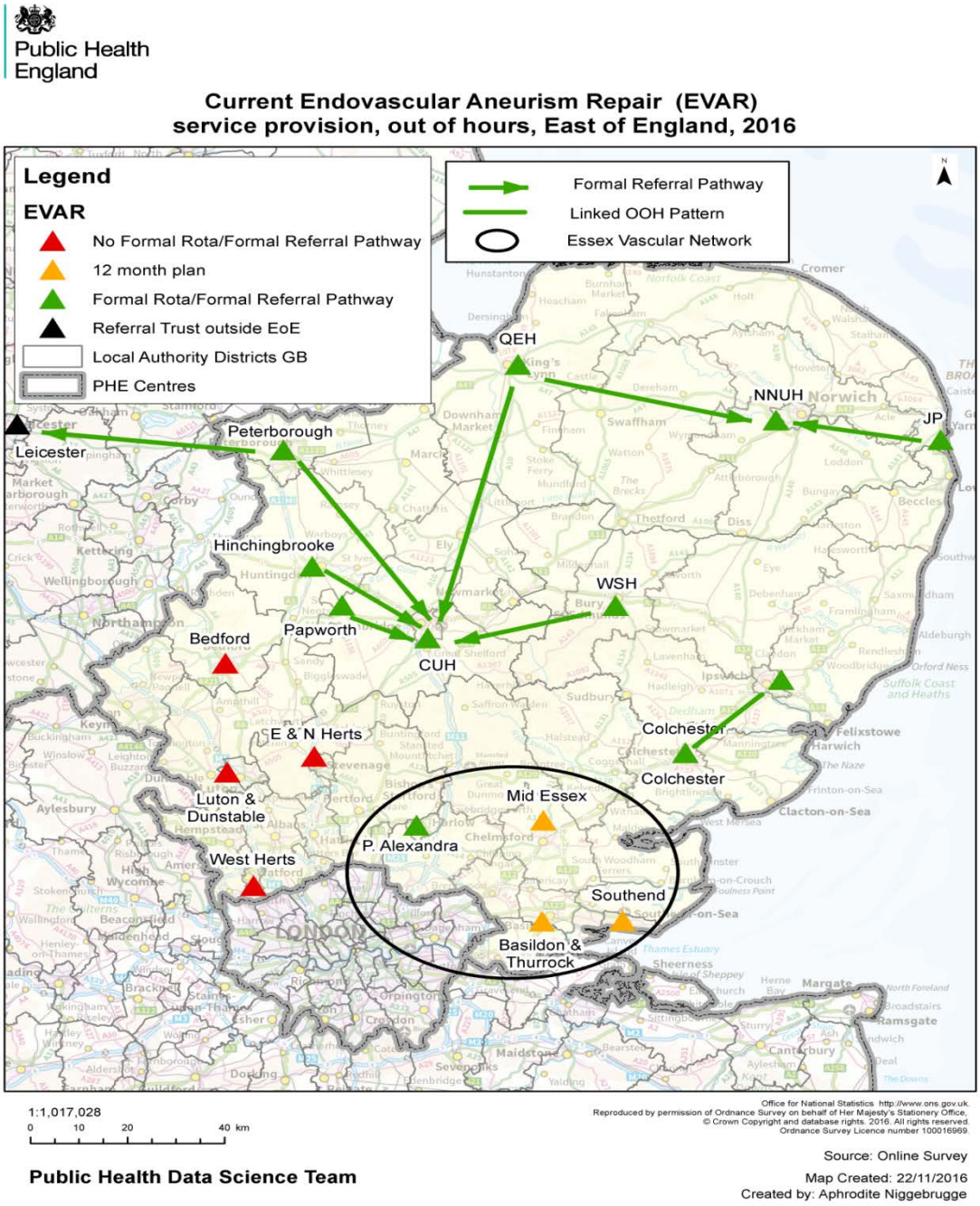
- Peterborough and Stamford Hospital NHS Foundation Trust
- Luton and Dunstable Hospital NHS Foundation Trust
- Queen Elizabeth Hospital Kings Lynn NHS Foundation Trust
- West Hertfordshire Hospital NHS Trust

These centres sited the lack of IR appointment, nurses and radiographers and lack of a local network as the main obstacles to provision of 24/7 IR services. Some of these sites had approached multiple other centres but had been unsuccessful in arranging formal cover.

Figure 6: Endovascular aneurysm repair (EVAR)



Endovascular aneurysm repair (EVAR)

Four centres had a formal rota with an on-call frequency either 1 in 5 or 1 in 6:

- Norfolk and Norwich University Hospital
- Cambridge University Hospital
- Bedford Hospital
- Ipswich Hospital and Colchester Hospital joint rota

Seven centres had formal referral pathways

- West Suffolk Hospital (to CUH)
- Princess Alexandra Hospital (via Essex Vascular Network)
- QEH King's Lynn (CUH and NNUH)
- Peterborough (CUH and Leicester)
- Papworth Hospital (CUH)
- James Paget University Hospital (NNUH)
- Hinchingbrooke Hospital (CUH)
- Luton and Dunstable (Bedford)

Three had ongoing networks plans

- The Mid and South Essex Success Regime, which has a much broader transformational remit, has an IR work stream that is developing a network to provide 24/7 IR services across:
    - Southend University NHS Foundation Trust
    - Basildon and Thurrock University Hospital NHS Foundation Trust
    - Mid Essex Hospitals.

Two remaining centres – No formal IR referral pathway.

- East and North Herts
- West Herts

EVAR at some of these sites are covered by local vascular networks involving both vascular surgeons and interventional radiologists. As previously mentioned and IR network needs to consider any existing vascular network.

Atlas of Variation

In January 2017 the '2nd Atlas of Variation in NHS Diagnostic Service in England'[16] was published by Public Health England and NHS Right Care. This document compared availability of evidence based NHS diagnostic and interventional services across CCGs with a focus on "unwarranted variation". This is variation that cannot be explained by variation in patient illness or patient preferences. This unwarranted variation is seen as a "hallmark of lower value health care". The purpose of the NHS Atlas is to:

- Explore the concept of variation
- Identify the causes of unwarranted variation
- Concentrate on reducing lower value activity, thereby allowing the applying of these released resources to higher value care for the same patient group or transfer to a group with higher need.

The Atlas included variation in availability of the core IR services in the Strategic Health Authorities (SHA) across England and Wales, which was based on the results of the annual survey of IR provision carried out by the NHSIQ and the BSIR in 2013. Although the results of the 2014 survey were known, the 2013 results were used for the Atlas of Variation as they provided the level of 24 hour service by trust across England, but also by strategic health authority. Although SHAs are no longer part of the NHS structure they provide a useful proxy measure for larger populations.

Figure 5: Atlas of Variation 2017. Percentage of NHS Hospital Trusts that had formal arrangements for 24-hour access to nephrostomy by strategic health authority

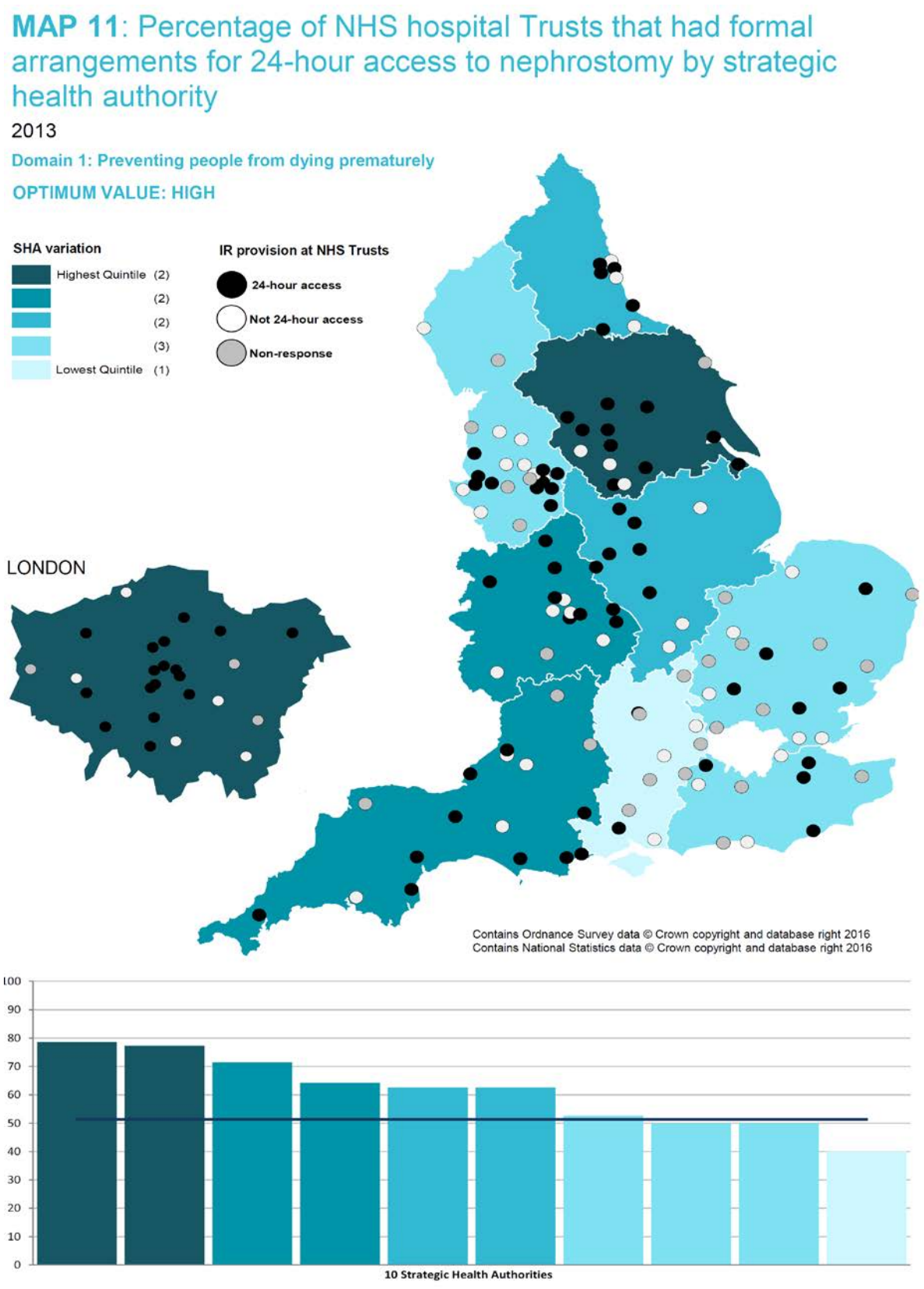


Figure 7: Atlas of Variation 2017. Percentage of NHS hospital Trusts that had formal arrangements for 24-hour access to endovascular intervention by strategic health authority

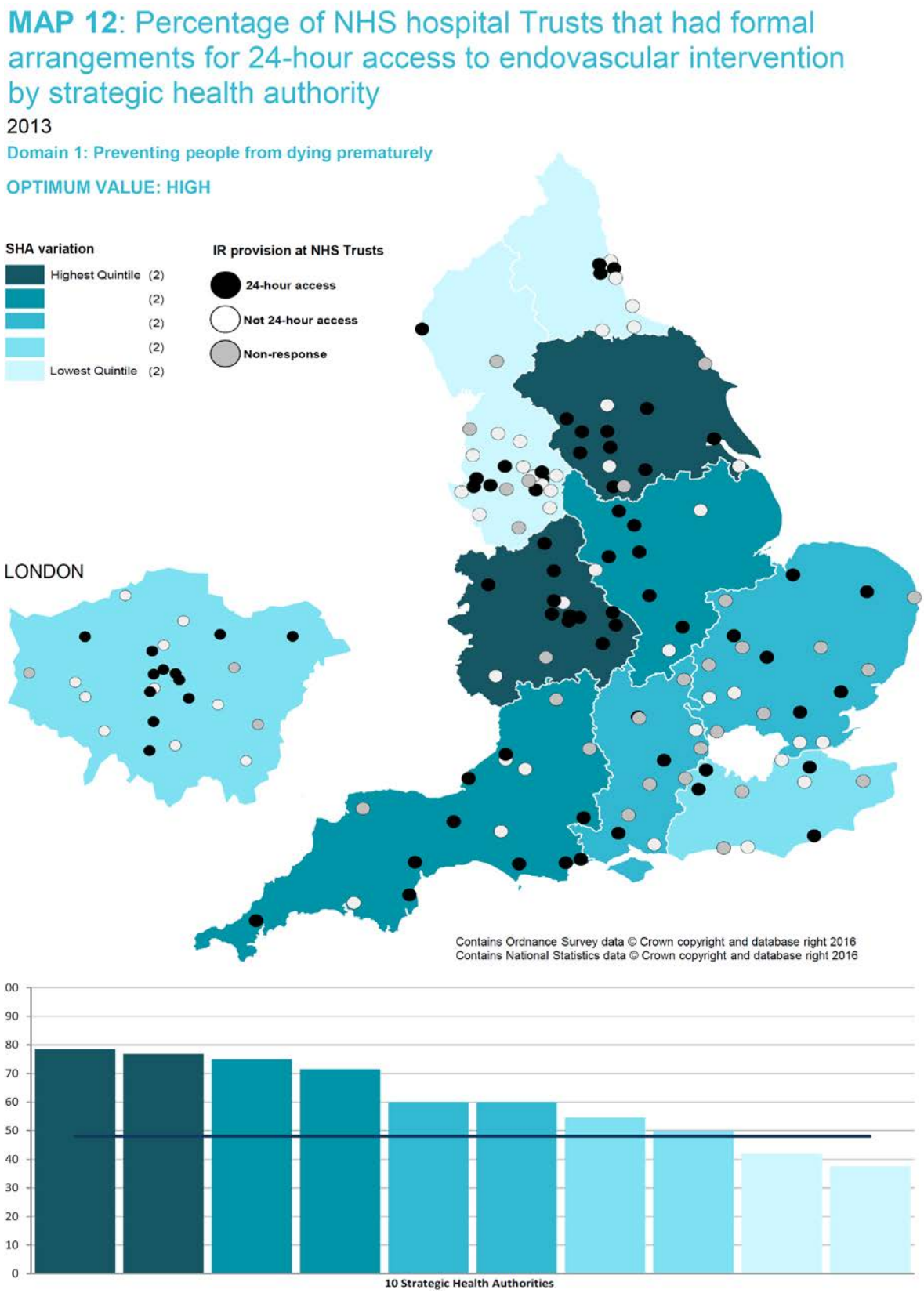


Figure 9. Atlas of Variation 2017. Percentage of NHS hospital Trusts that had formal arrangements for 24-hour access to embolisation for haemorrhage by strategic health authority

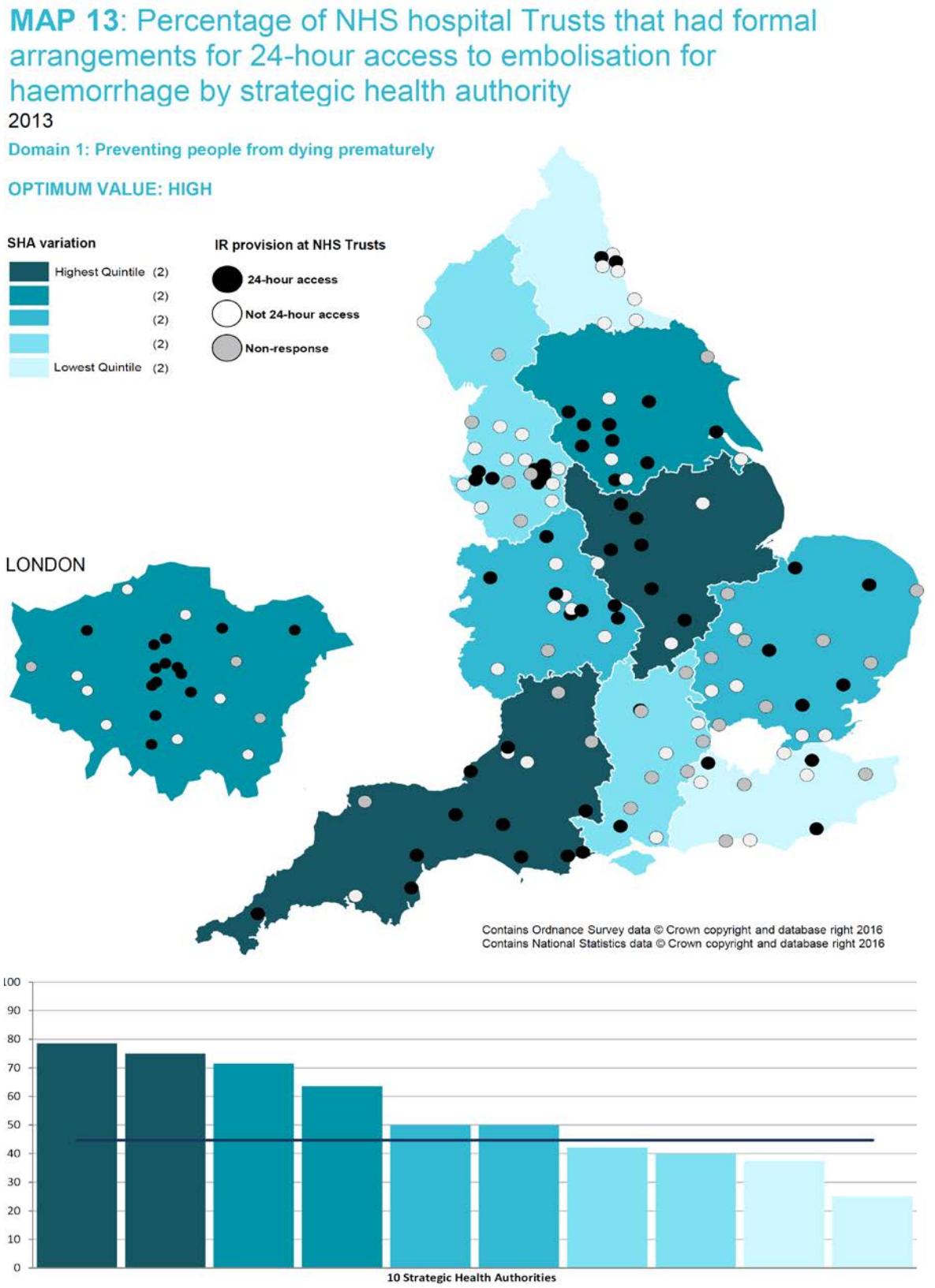
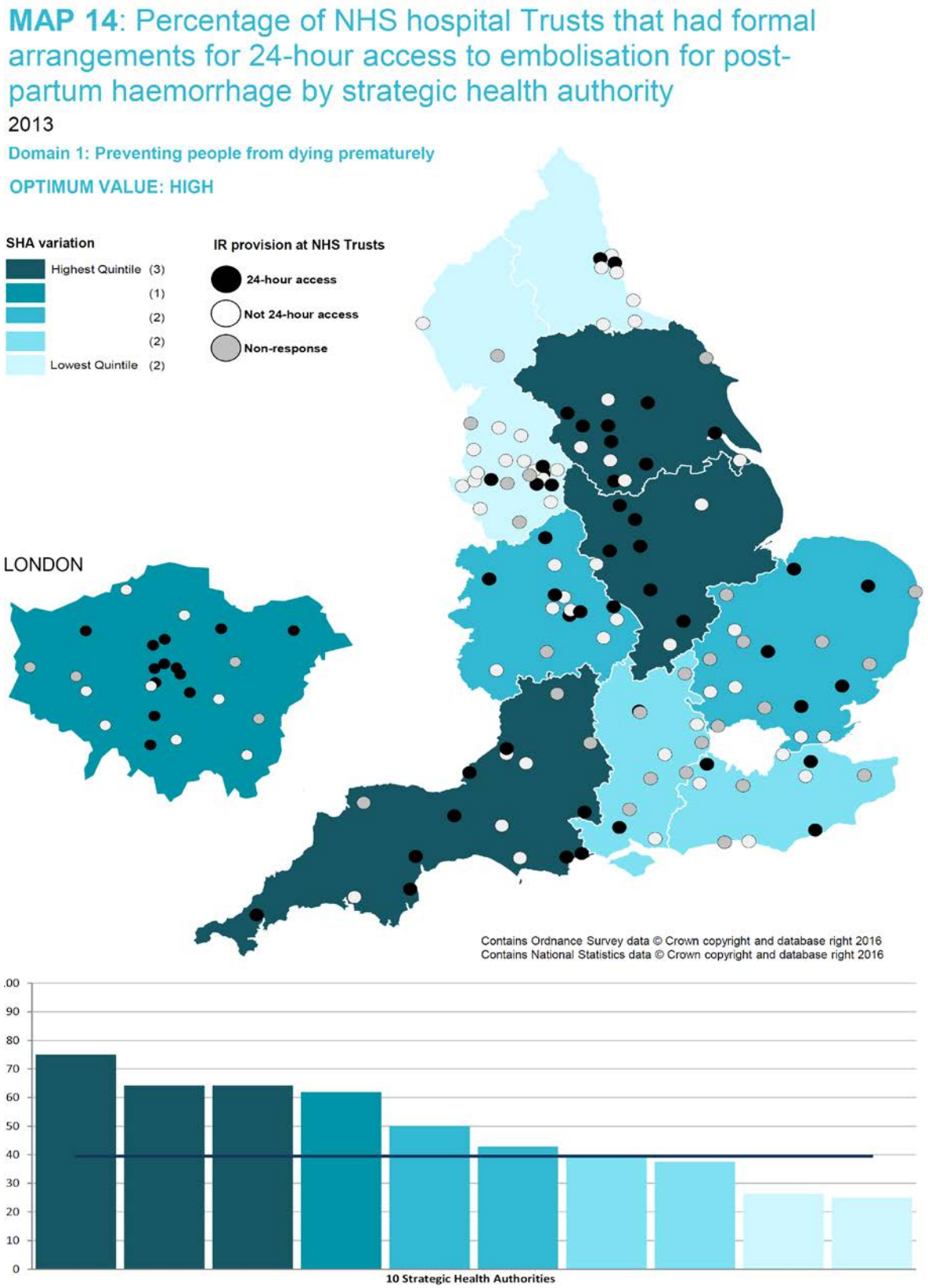


Figure 10. Atlas of Variation 2017. Percentage of NHS hospital Trusts that had formal arrangements for 24-hour access to embolisation for post partum haemorrhage by strategic health authority



Magnitude of variation

Nephrostomy:

For SHAs in England the percentage of NHS trusts that had formal arrangements for 24 hour access to nephrostomy ranged from 40.0% to 78.6%. In the East of England 10 of the 18 trusts responded and five of these (50%) reported 24 hour provision of nephrostomy.

Endovascular intervention:

For SHAs in England the percentage of NHS trusts that had formal arrangements for 24 hour access to endovascular intervention ranged from 37.5% to 78.6%. In the East of England 10 of the 18 trusts responded and six of these (60%) reported 24 hour provision of endovascular intervention.

Embolisation for haemorrhage – General and PPH:

For SHAs in England the percentage of NHS trusts that had formal arrangements for 24 hour access to embolisation for haemorrhage ranged from 28% to 78.6% (general) and 25% - 75% (PPH). In the East of England 10 of the 18 trusts responded and five of these (50%) reported 24 hour provision of embolisation for haemorrhage (general and PPH).

Table 4. Variation in the % of trusts providing 24 hour core IR services.

	Range* (%)	**EOE 2013 (%)****	**EOE 2016 (%)*****
Nephrostomy	40 – 78.6	50	44
Endovascular intervention	37.5 – 78.6	60	44
Embolisation – general	25 - 78.6	50	44
Embolisation - PPH	25 -75	50	44

* % of Trusts providing service for SHAs in England in 2013

** East of England, based on 10 respondents

*** East of England based on 18 respondents

It is evident from these figures that not only was the 24 hour provision for core IR procedures less in the East of England compared to the rest of the country, but also that this provision appears to have fallen between 2013 and 2016.

The reasons for the degree of variation in provision varied across the trusts, but the recurrent factors included:

- Interventional radiologist appointments
- Interventional nurse appointments
- Interventional nurse rotas
- Interventional radiology rota
- Network approach to service delivery
- New interventional radiology facility.

Networks in planning

Following the retirement of a number of staff, the out of hours IR cover across Ipswich and Colchester was becoming untenable owing to an increase in the on-call frequency from 1:6 to 1:3. Norwich are discussing some out of hours IR cover for Ipswich and Colchester on a 3:6 basis when they will not have cover by Ipswich and Colchester radiologists. There is still some debate about what cases they will send to Norwich and on-going discussions with the vascular surgeons to define pathways of care across the hospitals.

Also there are plans for a network with Cambridge University Hospital (Addenbrooke's) which defines formal referral pathways for patients from:

- Bedford Hospital NHS Trust
- Peterborough and Stamford Hospitals NHS Foundation Trust
- Queen Elizabeth Hospital King's Lynn NHS Trust
- West Suffolk NHS Foundation Trust
- Hinchingbrooke Hospital Healthcare NHS Trust

As previously mentioned the Mid and South Essex Success Regime which has a much broader transformational remit, has an IR work stream that is developing a network providing 24/7 IR services involving:

- Southend University NHS Foundation Trust
- Basildon and Thurrock University Hospital NHS Foundation Trust
- Mid Essex Hospitals.

SECTION 5

Feedback of findings and draft report – meeting with Medical Directors Forum East of England

The findings of our regional survey and draft recommendations were presented to the East of England Medical Directors Forum in October 2016. There were representatives from a number of trusts from across the East of England. The presentation was followed by discussion and debate which resulted in several areas where agreement was reached and, in addition, several identified potential barriers to reaching an optimal solution.

Key areas of agreement.

1. The current service provided across the East of England, especially out of hours is not satisfactory or acceptable.
2. Service provision needs to improve in order to ensure that radiological interventions are consistently available when needed.
3. The service should be easy to access with a clear pathway from both a patient and staff perspective.
4. It is highly preferable to maintain day-time services at smaller Acute Hospitals/ District General Hospitals (DGHs) to minimize the requirements for either patients or staff to move. Normal working day cover could be provided by a much small number of IR specialists than that required for full 24/7 cover.
5. Larger centres or 'Hubs' need to support DGH Trusts and DGH IR specialists with recruitment, retention, governance and training in order to maintain, daytime services, close to patients. Supporting and encouraging joint appointments may assist with recruitment and retention. In addition, enabling the exposure to the higher volume of cases at a major centre on a regular basis, perhaps weekly, would enable DGH IR specialists' skills to be maintained and developed.
6. Out of hours services and some more complex services (TIPSS etc.) would need to be delivered by either a network or a tertiary centre with a formal agreement with smaller centres (if general networks were preferred)
7. Patients would either need to travel to a centre or the clinicians/technicians (including IR specialists, IR radiographers and IR nursing staff as required) would need to travel to the patient. A different approach may be adopted in different parts of the region. If

an IR consultant is based at a vascular and/or trauma centre then it may not be clinically safe for them to travel a significant distance from their base hospital – this would potentially create the need for two IR specialists to be on-call at any one time. The possibility of air ambulance transfer for either patients or staff was raised. There was a preference for moving the patient in most cases.

Barriers and potential solutions

1. Transferring patients is currently a difficult process; difficulties include managing the transfer itself, bed capacity at receiving centres and the subsequent repatriation of patients.
2. Transferring IR clinicians is problematic because of the transport itself (which in some parts of the East of England can involve significant distances), the difficulties created by taking them away from their base hospitals (i.e. the lack of IR cover there) and potential lack of familiarity with equipment.
3. Region wide transfer teams were suggested as a possible solution – this could provide support for a wider range of patients across the whole eastern region– potentially each trust contributing staff to a region wide rota.
4. Funding has remained a significant barrier as standard tariff funding is not suitable at present for patients requiring these interventions. Funding could be made up with one or more of the following possible models:
    a. Block contract for the entire service for the whole region taking into account anticipated activity.
    b. Baseline funding to cover basic running costs.
    c. Funding per case either on its own or as a supplement to baseline costs.
    d. A combination of baseline costs and charges per case.
    e. Funding in kind (e.g. providing clinicians for the rota, or providing beds, radiology suites and treatments for part of the week – e.g. rotating the on-call centre).
    f. A combination of several of the above models.

Conclusion

Interventional radiology is a vital specialty, providing diagnosis and treatment in a range of routine and emergency settings. There should be equal access for all patients in the East of England 24 hours a day as clinically indicated. IR networks have been shown to provide a possible solution to the issue of out of hours IR service. Currently there are centres in the region where there is neither a formal rota nor a formal referral pathway for provision of some of the core interventional radiology procedures. The provision of services in the region currently falls short of that seen throughout the rest of England. There are planned networks in the region which will address some of the existing gaps in IR provision, but the timeline for these to be in operation is unclear. With the demand for IR services ever increasing and the scope for new emergency treatments coming under the IR remit, it is becoming increasingly important to address any remaining gaps in IR provision. Further work is required to assist those remaining sites to achieve formalised 24 hour IR service cover.

Recommendations

Commissioners and STPs

1. Current networks should be encouraged and supported.
2. Commissioners and STP leads should seek solutions to ensure funding streams support appropriate IR provision as part of optimal clinical care.
3. STP teams should be encouraged to seek resolutions to the service provision gaps currently identified and if necessary liaise with neighbouring STPs in order to provide equitable 24hr access.
4. IR plans within each STP footprint should take into account the endovascular procedures performed by vascular surgeons within the existing vascular networks, where applicable, to achieve a collaborative approach in accordance with local needs.
5. Network approaches should consider the role of the DGH interventional radiologist in terms of maintaining a local in hours service provision, and how they can contribute to the out of hours network.
6. Patient groups should be involved in the design of future services.

NHS England and Health Education England

7. An IR workforce strategy will need to be developed in conjunction with Health Education England - this will need to include the training, recruitment, and retention of consultants, nurses and radiographers and will need to include new ways of working and potentially new roles.

Interventional radiology departments and NHS Trusts

8. Prospective data collection on service provision out of hours is required to inform the level of service cover and additional training/recruitment required. This must include endpoint data such as surgery for upper gastrointestinal bleeds and hysterectomy for uterine bleeds as well as IR procedures for relevant emergency conditions etc.
9. IR departments need to engage with the National Vascular Registry and audit and publish their clinical outcomes. This will require administrative support from trusts.

Clinical Senate / Public Health England

10. Clinical Senate and Clinical Networks, Public Health England with the Eastern Academic Health Science Network should offer to facilitate developmental workshops.
11. The data collection exercise should be repeated in 12 months' time.
12. This report should be shared with Medical Directors, NHS Trusts, STP leads, CCG Chief Officers and NHS England Specialised Commissioning.

KEY

BSIR	British Society of Interventional Radiologists
CCG	Clinical Commissioning Group
DGH	District General Hospital
EVAR	Endovascular aortic aneurysm repair
FRP	Formal referral pathway
HES	Health episode statistics
HRG	Healthcare Resource Groups
IR	Interventional Radiology
NVR	National Vascular Registry
OOH	Out of hours
RCR	Royal College of Radiologists
SHA	Strategic Health Authority
TEVAR	Thoracic endovascular aortic aneurysm repair
TIPPS	Transjugular intrahepatic portosystemic shunt
VSGBI	Vascular Society of Great Britain and Ireland
24/7	24 hours 7 days a week

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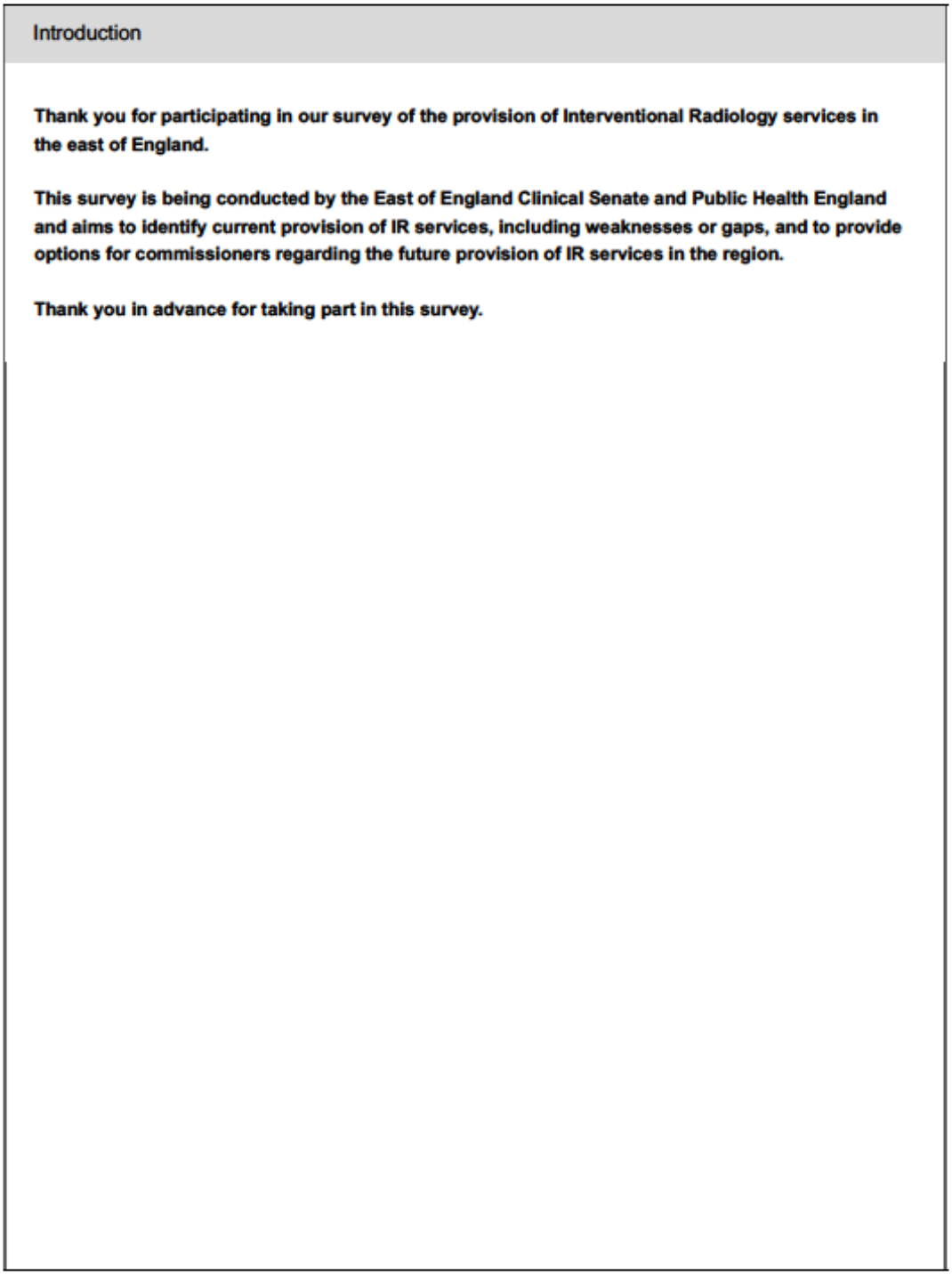
Appendix 1.

(Note: accessible only electronically – click on introduction below to open as Adobe file in new window)



Introduction

Thank you for participating in our survey of the provision of Interventional Radiology services in the east of England.

This survey is being conducted by the East of England Clinical Senate and Public Health England and aims to identify current provision of IR services, including weaknesses or gaps, and to provide options for commissioners regarding the future provision of IR services in the region.

Thank you in advance for taking part in this survey.