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National Specialised Commissioning Team

Testing assumptions for future patient flows and manageable clinical networks

Workstream 2

Final report
October 2011

Workstream 2: Clinical – clinician interviews, referrer survey & focus groups

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Executive summary:
Clinician interviews, referrer survey & focus groups

Evidence base:

- Interviews with two nominated clinicians (mix of cardiac surgeons, cardiologists and cardiac intensivists) from each of the 11 surgical centres which were the focus of S&S.

- 153 responses to a postal survey (37% - 40+% response rate range) of referring paediatricians.

- Three clinician focus groups to 'sense check' Workstream 2 findings and agree and discuss issues. These involved 42 individuals representing clinicians from the 11 centres, including liaison nurses, as well as referring paediatricians and network clinical leads, where in place.

Clinician feedback - Referrals/patient flows

- The clinicians interviewed from the 11 cardiac surgical centres were nominated by their Chief Executive and they were a mix of cardiac surgeons, cardiologists and cardiac intensivists. Although on the whole they identified patient volumes would increase under S&S options, they considered some patient flows may not be as per S&S assumptions on the basis of a number of specific postcode areas.
- In particular there were some postcode areas identified by clinicians and also parents and the public (via the parallel workstreams being undertaken) where the indication would be that the S&S assumed surgical centre would not be the preferred choice.
- If patient flows for these postcode areas were factored into assumptions and projected levels of activity, they may have implications in particular for the Newcastle centre under Options A, B and C – ***see table overleaf.***
- Centres all indicated having plans to accommodate the increased patient flows under S&S options. However, clinicians expressed concern that the projected flows were worked out on children's procedures only, but practically grown up children's (GUCH) services would also be undertaken and these could stretch units beyond their capacity.
- Alongside clinician interviews at the centres, referring paediatricians were contacted and requested to partake in a postal survey on the S&S options.
- The referring clinician survey found that 83% of referrers indicated having the same referral behaviour as other paediatricians in their Trust. Also the key factors they identified as determining their referral preference were: *Existing joint working relationships; Proximity of surgical cardiac centre; and Clinical outcomes.*
- When asked about their referral patterns under the four options identified by S&S, referring paediatricians indicated that on the whole they would refer to the cardiac surgical centres assumed – ***see table overleaf.***
- For example, 94% of referrers indicated complying with S&S assumptions under Option A and 44% suggested this would require a change in their referral pattern, while 97% of referrer under Option C would refer to the assumed centres and 59% of them would require a change in their referral pattern to do so for this option.
- When some of these findings were discussed at the three clinician focus groups which were held to 'sense check' the clinical workstream findings, there were helpful comments from participants in particular around the referrer survey results and factors to consider in interpreting the findings.

Overview of clinician feedback

Referral behaviours/patient flows

- Clinicians at the 11 centres identified in S&S highlighted a number of postcode areas where they considered that patients may not flow to centres assumed. When cross referenced to the postcode areas where parents of service users and the general public suggested S&S assumed centres were not their preferred centre of choice (8 postcodes identified by them), there were certain postcode areas consistently identified with potential implications for three of the four S&S options as follows:
  - **Option A** – patients *preferring to flow to Liverpool than Newcastle*
  - **Option B** – patients *preferring to flow to Birmingham or Liverpool than Newcastle*
  - **Option C** – as above, patients *preferring to flow to Birmingham or Liverpool than Newcastle*

- 153 referring clinicians responded to a survey; of these 105 out of 122 (86%) who reported their role identified that they were *not* a paediatrician with expertise in cardiology.
- Key factors identified by the referring clinicians as determining their referral preference were:
  - Existing joint working relationships;
  - Proximity of centre; and
  - Clinical outcomes.

Referral behaviours under S&S options

	% of Referring clinicians who would refer to surgical centre assumed by S&S	% of Referring clinicians who indicated their referral pattern would need to change to align with Options A-D
Option A	118 (94%)	Yes (44%)
Option B	114 (96%)	Yes (50%)
Option C	114 (97%)	Yes (59%)
Option D	112 (93%)	Yes (49%)

Less disruptive — **More disruptive**

Managed Clinical Networks

Under each of Options A - D, referring paediatricians indicated the most well developed network feature and the least well developed feature

	Option A	Option B	Option C	Option D
Most developed network feature	Development of the role of PECs (60%)	Development of the role of PECs (61%)	The delivery of non-interventional care in local care settings (51%)	The delivery of non-interventional care in local care settings (67%)
Least developed network feature	Formal protocols agreed by the surgical centre and local services (39%)	Formal protocols agreed by the surgical centre and local services (40%)	Formal protocols agreed by the surgical centre and local services (32%) and strengthened cardiac liaison teams (32%)	Strengthened cardiac liaison teams (39%)

Challenges for Future Networks

- Lack of alignment with other networks e.g. PICU, maternity and neonatal
- Reliance on paediatricians with expertise in cardiology (PECs) and funding required to have them in place
- IT channels/mechanisms to support networks, notes transfer and video imaging
- Referral guidance and clinical protocols in place to support consistency and quality

Source: PwC survey of referrers, clinician interviews and focus groups with clinicians

Clinical feedback

Referrals/patient flows cont'd

- There were comments relating to the response rate for the survey which was 37% to 40% and placing too much emphasis on this. In our experience this is positive for a postal survey with no reminders having been sent; and provided a good 'snap shot' of referral behaviours.
- The focus on referring paediatricians for this survey was also discussed; and whilst it was understood, there was a view that input from referring obstetricians would have been helpful, as increasingly cardiac problems are being detected at the antenatal stage.
- It was also indicated that referral behaviours may vary dependent on the type of referrer and the nature of case presenting e.g. co-morbidities.
- That said, overall the findings on referrals/patient flows generated good discussion and led onto specific dialogue around managed clinical networks, the role of outreach clinics, cardiology centres, retrieval and impact of S&S options on other services. In summary, there was acknowledgement and discussion of the patient flows in the focus groups and then an emphasis on discussing if S&S were implemented, what were some of the areas which would benefit from further planning and input.

Managed clinical networks

- Clinicians at the centres mainly stated that currently 'informal' networks were in existence or elements of networks as envisaged by S&S. Clinicians agreed with the S&S identified features of regional paediatric cardiac networks and had suggestions for ways of supporting/strengthening these, such as:
  - Robust network funding.
  - Communication assisted by telemedicine with real time video imaging.
  - National guideline/template for a network to promote consistency.

They also indicated challenges to networks such as:

  - Lack of alignment with other networks e.g. PICU, foetal and neonatal.
  - Reliance on paediatricians with expertise in cardiology (PECs).

- Referrers, as well as clinicians at the cardiac centres were supportive of the concept of clinical networks. They however identified varying levels of existing network development - ***see table on previous page.***
- Generally the feedback suggested that the most well developed current networks were those related to centres that were less likely to continue to be cardiac surgical units under S&S options.

Clinical feedback

Managed clinical networks cont'd

- Participants at the focus groups were likewise supportive of networks. However, they suggested that clarity was needed on how networks would be set up, and how they would function. Specifically they discussed the following, which overlaps with some of the feedback from the clinician interviews:
  - The need for transition plans to be developed and quickly operationalised once a preferred S&S option has been chosen. It was also highlighted that these should cover a range of factors including training at paediatrician and nursing level as well as 'step down' care.
  - Aligning the cardiac networks to other existing networks, such as those for foetal/obstetric services, neonatal services and grown up children in order that a holistic, child centred approach is taken to ensure that children with co-morbidities receive all services in a single centre or a small number of hospitals working together.
  - Clarity on how the network models would deal with cross-over between, for example London and the Midlands and specific postcode areas where clinicians indicated that there were issues or uncertainties.
  - The need for IT systems to support network functioning, particularly to promote good communication within and between centres and also to allow the confidential sharing of patient notes by professionals working across each network.
  - Clear guidance for referrers on how the system should operate in their area, supported by robust commissioning arrangements. Also clinical protocols developed by networks to reduce variation.
  - Funding arrangements for patient care to incentivise network functioning by being attractive to both the centres and peripheral units.
- Overall, the clinical workstream brought together a range of viewpoints from across surgical centres and referring clinicians. It captured a strong desire to promote high quality services for children's heart surgery as well as feedback on patients flows/referrals and managed clinical networks.
- Other themes that were highlighted by clinicians as needing further consideration in the spirit of supporting the principles of S&S were: *The role of the cardiology centre; Retrieval; Promoting positive clinical outcomes; Impact of S&S options on other services and Consistency in outreach clinics as well as support for community paediatricians and nursing staff.*

Executive summary:
Clinician interviews (Workstream 2)

Evidence base:

- Interviews with two nominated clinicians from each of the 11 surgical centres which were the focus of S&S.

- The clinicians were nominated by their Trust Chief Executive and were most commonly cardiac surgeons, cardiologists and cardiac intensivists.

- The interview format was designed to explore the S&S review options around patient flows and clinical networks.

Options A – D: Clinician's views on impact on patient volumes and patient flows

Option A	• Under this option, clinicians indicated that patient volumes would increase for six of the seven centres as anticipated. However, the Birmingham centre indicated that there would be a decrease, potentially below the 400 threshold and that it was due to the exclusion of 'out of area' referrals in the activity figures. • Clinicians also suggested some patient flows may not be as per S&S assumptions, such as for patients from Coventry, Northampton, Leeds, Sheffield and Hull.
Option B	• All centres under this option identified an increase in patient volumes. However, the Bristol centre highlighted as per S&S, the risk that the number of procedures per year would be below the 400 threshold and GOSH that it would be a 'net loser'. • Clinicians also suggested some patient flows may not be as per S&S assumptions, such as for patients from Hemel Hempstead, Guildford, Leeds, Sheffield, Doncaster, Northampton, Hereford, Worcester, Oxford and Reading.
Option C	• The six centres under this option identified an increase in patient volumes. • However, clinicians suggested some patient flows may not be as per S&S assumptions, such as for patients from Northampton, Leeds, Sheffield and Doncaster.
Option D	• The six centres under this option identified an increase in patient volumes. • Clinicians also suggested some patient flows may not be as per S&S assumptions, such as for patients from Northampton, Doncaster, Lincoln, Nottingham and Peterborough.

Clinical networks: Clinician's views on managed clinical networks

Current network arrangements	• Clinicians at the centres mainly stated that currently 'informal' networks were in existence or elements of networks as envisaged by S&S were in place.
Views on managed clinical networks as per S&S	• Clinicians agreed with the S&S features of regional paediatric cardiac networks and had suggestions for ways of supporting/strengthening these.
Challenges for clinical networks as per S&S	**Clinicians indicated challenges to networks such as:** • Lack of alignment with other networks e.g. PICU, maternity and neonatal. • Reliance on paediatricians with expertise in cardiology (PECs).
Factors to help support networks	**Factors to support network development identified by clinicians included:** • Robust network funding. • Communication assisted by telemedicine with real time video imaging. • National guideline/template for a network to assist with consistency.
General comments	• Clinicians participating in the interviews, appeared well informed and had been working with their Trusts to explore the implications of the different S&S options. • From their experience, clinicians recognised where clinical flows would be different from S&S, however indicated that these variations could generally be managed and altered over time. • There was strong engagement with robust managed clinical networks. • There was a general desire to see S&S finally concluded such that services could be developed accordingly.

Executive summary:
Referrer survey (Workstream 2)

Evidence base:

- 410 surveys were sent via 82 Clinical Directors of paediatrics (or their equivalent) in Trusts referring to one of the 11 centres. They were requested to self complete a survey, if appropriate and to circulate the survey to up to another 4 referring colleagues.

- The 153 responses received represents a response rate in the range of 37% to 40+% - dependent on whether all 82 Directors forwarded surveys to their colleagues.

Options A – D: where referrers would send patients and referrers priorities in determining referral preference……

Option A	• 94% of referrers indicated that they would refer to surgical centre assumed by S&S under this option. • Referrers indicated that proximity to centre (67%) was the first priority under this option, with existing joint working relationships (55%) the second priority. • Patient choice (11%) was the lowest priority in determining preference under Option A.
Option B	• 96% of referrers indicated that they would refer to surgical centre assumed by S&S under this option. • Proximity to centre (62%) was the first priority for referrers, but under this option clinical outcomes (53%) was the second priority, followed by existing joint working relationships as the third priority (50%). • Historical (9%) was the lowest priority under this option.
Option C	• 97% of referrers indicated that they would refer to surgical centre assumed by S&S under this option. • Proximity to centre (68%) was once again the first priority under this option, with existing joint working relationships (48%) the second priority. • Historical (13%) and patient choice (12%) were the lowest priorities in determining referral preference.
Option D	• 93% of referrers indicated that they would refer to surgical centre assumed by S&S under this option. • Proximity to centre (69%) and existing joint working relationships (54%) were again the first and second priority under this option. • Historical (12%) and patient choice (12%) remained the lowest priorities in determining referral preference.

Clinical networks: would referrers be supportive of these ?

Views of clinical networks	• The survey results indicated that in terms of the key features of networks as identified by S&S, Birmingham and Newcastle had the least well developed networks. • Formal protocols and cardiac liaison teams were features of proposed Safe and Sustainable networks that showed the scope for most future development being required. • The majority (90%) of paediatricians indicated that they would agree or strongly agree with the principle of sending most referrals to the same centre in order to build relationships in local networks.
Factors to consider to help support networks	• Referring paediatricians most commonly identified five potential challenges associated with networks: 1) Transport and proximity 2) Capacity to handle increased workload 3) Need to increase level of outreach 4) Developing and agreeing shared pathways and protocols 5) Developing the role of local paediatricians

Executive summary:
Clinician focus groups (Workstream 2)

Evidence base:

- Three clinician focus groups to 'sense check' Workstream 2 findings and agree and discuss issues.

- A mix of 42 professionals attended these groups including clinicians from the 11 centres, referring paediatricians, clinical network leads and cardiac liaison nurses.

Summary of clinical focus group feedback

Overview of focus group discussions

- Three focus groups were undertaken on completion of analysis of a referring paediatrician survey, interviews at the 11 centres (that were the focus of S&S) and contact with parents and the public (via parallel workstreams). The purpose of the focus groups were to 'sense check' findings and discuss agreed areas for debate/of issue.
- The focus groups involved input from relevant stakeholders (42 individuals who were a mix of clinicians from the 11 centres, referring paediatricians, clinical network leads and cardiac liaison nurses) and on hearing feedback from the referrer survey and parent and public contact, there were a range of questions around methodology and points flagged for consideration such as:
  - How referral behaviours may vary dependent on the type of referrer and nature of the case presenting e.g. obstetric referrals, children with co-morbidities.
  - Variation in experience across outreach clinics could influence responses.
  - The impact of patient choice and clinical outcomes on referral behaviour and commissioning behaviours.
  - Experiences/feedback can vary by what stage of the patient journey individuals/families are at.
- Overall feedback from participants recognised that there were constraints around the scale and level of the work undertaken in the timeline and information available. However, the findings presented and answers provided to questions were found to be helpful and there was a general view that focus now needed to be given to how would the actual operation of a chosen S&S option be supported.
- As a result, the format of the groups was to then explore further areas of particular interest and/or concern to participants and to have an opportunity for their views to be heard and fed into the clinical workstream findings.
- The key areas that were repeatedly discussed across the groups were:
  - ***The role of the cardiology centre*** – would they add another layer but no value? Were referral routes via them clear?

    Participants did suggest that lessons could be learnt from Cardiff and Manchester where there are similar configurations. Shared appointments (staff from cardiology centres and surgical centres undertaking joint appointments) were also proposed as a helpful link for cardiology and surgical centres.

Summary of clinical focus group feedback

- *Functionality of networks* - the need to align the cardiac networks to other existing networks, such as those for foetal/obstetric services, neonatal services and GUCH was highlighted, in order that a holistic, child centred approach is taken.

  Also the need for IT systems to support network functioning, particularly to promote good communication within and between centres and to facilitate the sharing of patient notes by professionals working across each network .

- *Audit of staff skills* - to support the operation of networks and staff , it was felt that an audit across proposed surgical centres, cardiology centres and outreach clinics should be undertaken in order to identify any gaps in knowledge, skills or experience, so that training could be planned and put in place to address these gaps.

- *Retrieval protocols* - it was indicated that consideration needed to be given to the development of protocols covering whether patients are retrieved to a cardiology centre or a surgical centre, and recognising the challenge of retrieving patients within existing networks and beds availability.

- *Commissioning processes* - to support the provision of high quality care there was a call for robust commissioning and a review of funding arrangements to remove disincentives to operating managed clinical networking. This was particularly highlighted in relation to outreach clinics, which also was an area where it was felt greater consistency needed to be promoted.

- Overall, the clinical focus groups brought together a range of viewpoints from across surgical centres and referring clinicians. They captured a strong desire to highlight areas for further consideration and associated planning with regard to S&S options and all on the basis of promoting high quality services for children's heart surgery

Introduction and approach

Introduction to the study

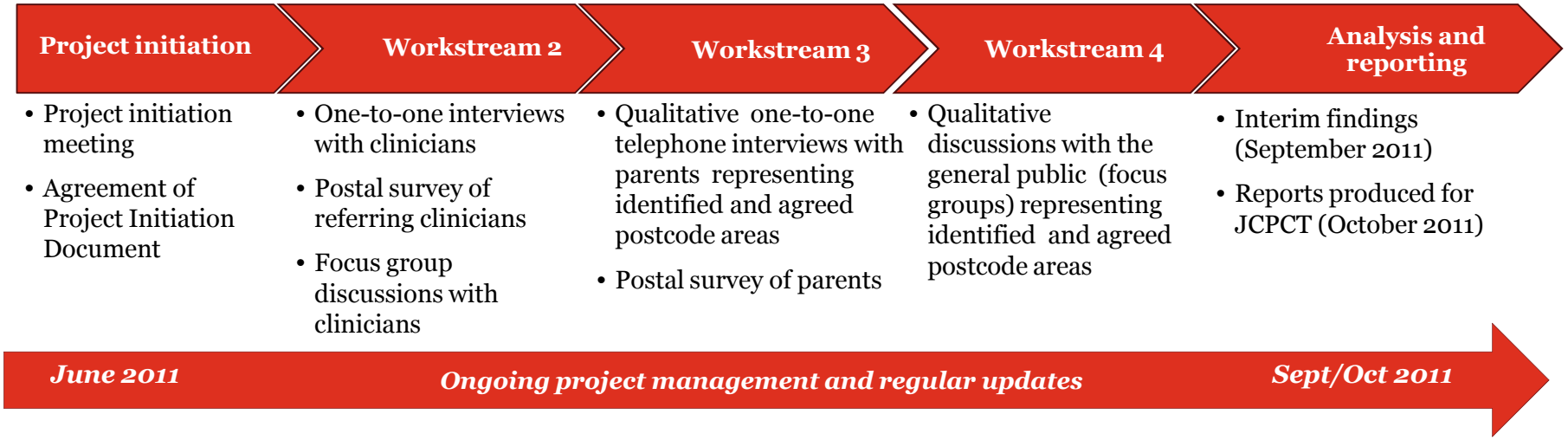
- PricewaterhouseCoopers LLP (PwC) was appointed by the National Specialised Commissioning Team (NSCT) to undertake a study on future patient flows and manageable clinical networks, as part of the *Safe and Sustainable* (S&S) review of children's congenital cardiac surgery in England.

- The study sought to examine the assumptions on patient flows that have been made across 22 postcode areas (diagram opposite) in England, under the four service reconfiguration options (Options A – D) which have been identified as part of this review (see Appendix). These assumptions have been informed by analysis of travel times (patients travelling to their nearest centre) and a consideration of current clinical networks.

- Key stakeholders involved in the project have been clinicians (Workstream 2), parents of services users (Workstream 3) and members of the general public (Workstream 4).

Methodology across Workstreams

- This final report presents the findings from Workstream 2 (clinical) and has three sections:
  - Feedback from clinician interviews at the 11 centres.
  - Findings from the referring clinician survey.
  - Clinician focus groups.
- The sections of the report relating to the clinician interviews and the referrer survey are broadly structured around the following themes:
  - Options A – D and centres where patients may flow/be referred to i.e. patient flows/referrals
  - Views on managed clinical networks.
- ***For note:*** in discussing options with parents and the public, the surgical centres referred to were as per those specific centres named for Options A – D in S&S (see Appendix).



Findings: Surgical Centre Clinician Interviews

- Approach to interviews

- Findings by interview theme:

  Patient patterns and impact on patient volumes;
  Managed clinical networks;
  Capacity & capability to deliver by the units under each option;
  Patient quality; and
  Summary of other issues raised.

Approach : Surgical Centre Clinician Interviews

- Most commonly two clinicians (Paediatric Intensive Care specialist and either a Paediatric Cardiac Surgeon or a Paediatric Cardiologist) at each centre were interviewed.
- These clinicians were nominated for interview after initial requests to their Trust Chief Executive.
- The interview format was designed to explore the S&S review options around patient flows and clinical networks. Interview themes explored the areas detailed in the following figure.
- The responses/findings recorded in the following slides are from the discussions with the clinicians in the centres. Validation checks have not been undertaken on these findings, they have been collated and presented in terms of the four options (A – D) identified by S&S.

Findings:
Surgical Centre Clinician Interviews

Patient patterns and impact on patient volumes

Feedback on the surgical procedure number assumptions

The table describes the change in numbers of procedures for each centre per option as reported by the clinicians interviewed at the eleven centres. Clinicians at Birmingham Hospital identified that under Option A there would be a decrease, they indicated that S&S was based on data that included 'out of area' referrals which would not occur in this option. For the Bristol centre and Option B, the clinicians agreed with the concern in S&S that this would be below the 400 threshold. Also GOSH, identified a 'net loss' in activity terms under Option B.

	Option A	Option B	Option C	Option D
Birmingham Hospital	Down , below 400 threshold	Increase	Increase	Increase
Bristol Royal Hospital	Increase	Increase, but below 400 threshold	Increase	Increase
Great Ormond Street Hospital	Increase	Increase, but overall a 'net loss'	Increase	Increase
Evelina Hospital, London	Increase	Slight / marginal increase	Increase	Increase
Glenfield Hospital, Leicester	Increase	Surgical unit close		
Alder Hey Hospital, Liverpool	Increase	Increase	Increase	Increase
Freeman Hospital, Newcastle	Increase	Increase	Increase	Surgical unit close
Southampton General Hospital	Surgical unit close	Increase	Surgical unit close	
Oxford Radcliffe Hospital	Surgical unit close			
Royal Brompton Hospital, London	Surgical unit close			
Leeds General Infirmary	Surgical unit close			Increase

Feedback on patient flows for each Option

On the basis of their experience, the surgical centre clinicians provided feedback on patient flow patterns under the four options. These are summarised below, with variance from S&S assumptions shown in red font.

	Option A	Option B	Option C	Option D
Birmingham Hospital	Fewer out of area referrals			
Bristol Royal Hospital	Oxford, Reading and Southampton likely to go to London Yeovil, Dorchester and Bournemouth may not come to Bristol	Parts of Plymouth may continue to go to Southampton Dorchester may not come to Bristol	Oxford, Reading and Southampton likely to go to London Yeovil and Dorchester may not come to Bristol	
Great Ormond Street Hospital	Northampton lost from GOSH in all options			
		Doubt that current patients from Hemel Hempstead would go to Southampton. Guildford patients may not go to Southampton.		
Evelina Hospital, London	Currently see some Brighton and Hove patients	Overlaps and existing patient flows between Southampton, Evelina & Brompton		
Glenfield Hospital, Leicester	Gain Sheffield and Doncaster Coventry and Warwick patients may still choose Birmingham	Surgical unit would close •Patients would go to Birmingham or London •Northampton patients likely to go to London •North Peterborough and South Lincolnshire will be a problem especially around retrieval		
Alder Hey Hospital, Liverpool	If Leeds closes, Liverpool will receive patients from Leeds/Sheffield			
		Doubt Doncaster and Sheffield would go to Newcastle		

Continued - Feedback on patient flows for each Option

	Option A	Option B	Option C	Option D
Freeman Hospital, Newcastle	Calculating numbers on assumption of taking circa 1/3 of Leeds patients	Calculating numbers on assumption of taking circa 2/3 of Leeds patients		Surgical unit would close
Southampton General Hospital	Surgical unit would close Patients to Bristol or more likely to go to Evelina Reading and Oxford likely to go to Bristol	Hereford & Worcester likely to go to Bristol, while Brompton cases to Southampton Patients are expected to go to Bristol but query if this would happen, Dorchester patients likely still to come to Southampton.	Surgical unit would close Patients to Bristol or more likely to go Evelina Reading and Oxford likely to go to Bristol	
Oxford Radcliffe Hospital	Surgical unit would close North of Oxford would go to Leicester	Surgical unit would close South of Oxford in particular, and Reading likely not to go to Bristol unless it is the only unit with capacity. It is more probable that they will go to London or some to Southampton	Surgical unit would close	
Royal Brompton Hospital, London	Surgical unit would close Oxford patients and those displaced from other centres are likely to come to London	Surgical unit would close As Option 'A', but with Southampton, there may be fewer patients coming to London and without Leeds/Leicester, there may be more for London	Surgical unit would close As Option 'A' without Southampton/Leeds/ Leicester may be more patients for London	Surgical unit would close As Option 'A' without Southampton/Leicester there may be more patients for London
Leeds General Infirmary	Surgical unit would close Bradford patients to Liverpool Leeds and Hull patients more likely to go to Liverpool, or even London, rather than Newcastle	Surgical unit would close Sheffield and Doncaster patients more likely to go to Birmingham (or Liverpool) than Newcastle		Some Newcastle patients would go to Glasgow. Cumbria patients to Liverpool or a few to Glasgow Leicester patients would go to Leeds, Birmingham or even Southampton

Other issues raised around patient volumes and flows

During the interviews, clinicians reported other issues for consideration around patient volumes and flows, as summarised below.

	Option A	Option B	Option C	Option D
Birmingham Hospital	Similar footprint to existing	Would have to absorb Leicester's catheter work circa extra 250 per year. Increase to circa 750 surgical cases per year - still manageable as a single team Relative reduction in complexity of cases as doing more "routine" work, though absolute numbers of complicated cases remains as at present		
Bristol Royal Hospital	Who will mandate the patient flows? It is possible that referral behaviour may not shift? Ultimate referral decision will depend upon bed availability Where complex patients have co existing non cardiac condition they will go to where both conditions can be treated			
		Will be the smallest unit in the country in this option and not appealing		
Great Ormond Street Hospital	Likely to be a "net" gain Business plan to have 3-5% gain on current 650 cases	GOSH likely to be a net "loser" of patients Reduction in numbers would limit development potential and impact upon GOSH ambition to be amongst the best in the world as the only UK hospital capable of achieving this	Likely to be a "net" gain Business plan to have 3-5% gain on current 650 cases	
Evelina Hospital, London		Leicester and ECMO is removed – other centres would have to do respiratory ECMO		
Glenfield Hospital, Leicester	Would need to expand PICU, at capacity already	Surgical unit would close Gap in ECMO capability and capacity – take minimum of five years to develop ECMO service		
Alder Hey Hospital, Liverpool	As it is likely that Leeds and Sheffield (and possibly Doncaster) patients would come to Liverpool rather than Newcastle, numbers would increase to c irca 550/600 cases in each of these options			

Continued - Other issues raised around patient volumes and flows

	Option A	Option B	Option C	Option D
Freeman Hospital, Newcastle	Volume of procedures increase by circa 100 per year Would have to absorb circa 70 extra catheter studies per year	Volume of procedures increase by circa 200 per year Would have to absorb circa 140 extra catheter studies per year		Surgical unit would close
	Relative reduction in complexity of cases as doing more "routine" work as Leeds do not do the same level of complex work			
Southampton General Hospital	Surgical unit would close	Changing existing referral patterns would be very difficult	Surgical unit would close	
Oxford Radcliffe Hospital	Surgical unit would close			
Royal Brompton Hospital, London	Surgical unit would close 85% of PICU cases are cardiac (not all surgical), this is circa 400 annually that would be displaced, hence PICU would become unsustainable. 400 catheters per year would also stop.			
Leeds General Infirmary	Surgical unit would close Leeds has 14 million population within two hours drive, Newcastle has just 2 million Leeds could be part of three or four networks, difficult to know where to send a sick baby especially in the middle of the night			Infrastructure would need to grow, Trust board in support of this

Findings:
Surgical Centre Clinician Interviews

Managed Clinical Networks

Existing relationships, challenges and enablers to S&S network options

Clinicians were asked to indicate their current networking arrangements and how these would be impacted by the four options.
All clinicians agreed with the principals/features of a managed clinical network as identified by S&S.

	Option A	Option B	Option C	Option D
Birmingham Hospital	• Informal learning network exists but needs better management and more strategically operated • Have good working relationships with existing referring hospitals			
	• Would lose existing cardiology outreach service in Burton, Derby and Coventry	• Willing and able to extend network across these options • Leicester would become children's cardiology centre and use their existing network across the East Midlands		
Bristol Royal Hospital	Elements of the network exist			
		Will be smallest unit in country under this option which could affect networking ability		
Great Ormond Street Hospital	• Currently a model exists and is working very well and an intermediate layer between GOSH and the local centre is not therefore welcomed • Network areas currently patchy, S&S would help to define geographical areas • Current good links with Oxford including telemedicine link			
		• The reduction of numbers in this option is a block to effective networking		

Continued - Existing relationships, challenges and enablers to S&S network options

	Option A	Option B	Option C	Option D
Evelina Hospital, London	Currently networks are haphazard			
	Stronger links need to be developed in the absence of Brompton and Southampton. Challenges around Southampton doing things differently to Evelina	Need to reduce any ambiguity between Southampton and Evelina pathways, as they overlap	Paediatricians would abide by managed clinical networks especially for Option C	Risky option as loss of transplant centre in Newcastle
Glenfield Hospital, Leicester	Current network is gearing to look like Option A	Surgical unit would close This would affect current outreach service in Derby, Nottingham, Mansfield, Lincoln, Boston, Grantham, Peterborough,Kettering and new service in Nuneaton Could use these outreach services in new networks Question the value of a cardiac centre if left with non-interventional work		
		London going to South Lincolnshire would be difficult, would need air ambulance retrieval		Nottingham may not wish to alter its network to look North
Alder Hey Hospital, Liverpool	• Current networks exist but are informal. A formal network will need to be created and managed as well as being backed by the surgical centre • Formalising the network will be a challenge • Cardiac surgeons from Evelina come to Liverpool a few times a year. Also have relationships with Manchester and GOSH but no managed clinical networks exist here			
		Manchester and Leeds could act as surgical recovery centres		

Continued - Existing relationships, challenges and enablers to S&S network options

	Option A	Option B	Option C	Option D
Freeman Hospital, Newcastle	• Would need to take on a further 14 outreach sites, though Leeds could serve these • Currently have informal networks within the region • Willing to build new network, however forming functional relationships could be an issue • Need to develop protocols, standards and scale outreach			Unit would close Risk of reduced transplant expertise, links and protocols
Southampton General Hospital	Surgical unit would close • Blue babies would not go to Southampton as it will not be a cardiac surgical centre	• Existing clinical networks with West Sussex and Dorchester but would need to build relationships with Guildford, Redhill and Brighton	Surgical unit would close • Blue babies would not go to Southampton as it would not be a cardiac surgical centre	
Oxford Radcliffe Hospital	Surgical unit would close Networking is possible but who would be working in Oxford? Difficult to work on split sites Neonatal units will have to be centralised also			
Royal Brompton Hospital, London	Unit would close • Elements of a network in place with Cardiac Liaison Nurses, and a partnership model with 30 years of relationship history, which will be difficult to replace/reconfigure • All London hospitals need to work together			
Leeds General Infirmary	• Clinical risk from confusion caused by dealing with multiple networks • Ill feeling has developed by the S&S process which could hinder network development			
	• Unit would close			Leeds has a good existing network

Cross cutting network themes

Interviewees discussed a range of issues in the interview process and the following are the key themes relevant to networking that were highlighted.

Alignment:

- Other networks such as PICU, maternity and neonatal are not aligned with the proposed S&S options

Co-location:

- Co-location of other services, general surgery, maternity etc. should have more importance
- Cardiologist and Surgeon are best co-located in the same unit

Referrers and referral processes:

- Over reliance upon Paediatricians with Expertise in Cardiology (PECs) which may be neither possible nor reliable
- Must not have too many referring layers within the network

Communication is Key:

- Telemedicine with real time video imaging is essential

Robust and adequate network funding is required:

- This requires local investment in equipment, which has not been forthcoming

A national guideline/template for a network needed for consistency:

- Currently 'informal' networks in existence or elements of networks as envisaged by S&S were in place, a national guideline would help support consistency

Over emphasis of surgical rather than medical care:

- The Safe and Sustainable review focussed on the surgical side of things and not the same consideration give to the medical aspect

Findings:
Surgical Centre Clinician Interviews

Capacity and capability to deliver by the units under each option

Capacity and capability

Clinicians reported the impact of the options on their unit's capacity and capability to deliver , as summarised below.

	Option A	Option B	Option C	Option D
Birmingham Hospital	This is more or less "as is" current service delivery	• Capability and capacity to deliver the service especially with new theatre and ICU beds • Relative drop in complexity of cases, however already scaled to cope with large increase in numbers • ICU is a potential issue but this has been considered and scaled • Ward capacity would be stretched but there are plans to build an extra ward to meet demand • Increased catheter numbers but can absorb these. • Loss of ECMO service from Leicester which should be diffused to other centres and Birmingham have capacity also		
Bristol Royal Hospital	Capacity to increase work across all options			
		Total numbers may not reach 400 threshold Do not need two units in South in the same option that makes Birmingham too big	Prefer six centre options as per 'C' & 'D'	
Great Ormond Street Hospital	• Not likely to be much impact, but not as sustainable (clinically or financially) as 'C' or 'D'. • Aiming for 740 cases p.a. (increase of 90) and moving to a new building		Six unit options are more sustainable financially and clinically	
Evelina Hospital, London	• Can cope with demand but would have implications for MRI, cath lab and patient accommodation	• Can cope with demand but would have implications for MRI, cath lab and patient accommodation • Can do respiratory ECMO and develop this service		

Continued - Capacity and capability

	Option A	Option B	Option C	Option D
Glenfield Hospital, Leicester	• Have capacity and the Trust has a funded business plan to develop the cardiac services over the next few years if the option is chosen • Very little capital cost involved due to good facilities on site and capacity for expansion	Surgical unit would close • This would make Leicester an out-patient only service and it would become increasingly difficult to recruit and retain cardiology and ICU expertise • If Leicester closes there is a big gap in ECMO capability and capacity rendering it unsafe for children who require ECMO • 100 trained ECMO nurses would not move from one centre to another therefore there would be a loss in capability • Leicester has training, capability and capacity which would have to be developed elsewhere • It would not just be cardiac surgery that moves but intensive care and ECMO also. Birmingham can take additional load of paediatric cardiac surgery but would not be able to take up the additional load of intensive care patients		
Alder Hey Hospital, Liverpool	• An addition of 100 patients means two extra beds and two extra surgeries a week which is possible • Medical centres would not have great skills and would have to focus on taking medical cardiology to a new level • Training and accreditation would be an issue in the new cardiology centres • Better planning of in-patient cases and better step down bed management and co-ordination with new cardiology centres in Leeds and Manchester. • There would be no impact on capacity to deliver			

Continued - Capacity and capability

	Option A	Option B	Option C	Option D
Freeman Hospital, Newcastle	• Considering children only there is capacity to cope but in reality there is a need to consider GUCH (grown up children heart services) which would require a new build and plans have been drawn up which estimate a required investment of £6m • Biggest staff issue is a national one of not enough Echo technicians or perfusionists. • For PICU there is a threshold that will be crossed requiring increased staff for option A which would be able to manage B and C. The need for space is a linear relationship with increased numbers			Surgical Unit would close
Southampton General Hospital	Surgical unit would close *(See further explanation as per Options C and D)*	• Plans to build another block (PICU) to add another 150 patients • Confident that would be able to handle additional workload	Surgical unit would close • Capacity would have to be reduced and cardiac surgeons relocate or move to adult cardiac surgery • Since the capacity and capability would get affected, level in clinics would diminish • There would be no / less liaison service / nurses • Possibility of destabilising PICU and due to it being downgraded recruitment and retention of paediatric anaesthetists would be difficult. • Retrieval service would have to move to London or Bristol	
Oxford Radcliffe Hospital	Surgical unit would close Issue with ability to deliver cardiac medical service and PICU			

Continued - Capacity and capability

	Option A	Option B	Option C	Option D
Royal Brompton Hospital, London	Surgical unit would close • If paediatric cardiac goes, adult congenital services would be adversely effected too, due to loss of a natural source of new patients. This would be a loss of about 10% of Trust turnover. ENT, dental and other services to those with heart and lung problems would be lost. • Adverse impact on quality in the remaining services, due to loss of co-location/adjacency of (back up and support) services • Sessional/ad hoc staff could be engaged, but they would not be 24/7, and the bringing in of extra problems: e.g. decreased quality, increased travel times, and decreased safety. • All potential mitigation, e.g. for respiratory bronchoscopy support, would be a negative compromise compared with the status quo – cardiac might be made a little better at the expense of making respiratory services worse			
Leeds General Infirmary	Surgical unit would close • Investment would be required in transport, and cardiology services. • Would become an outpatient department and all other paediatric surgical services would stop • The reconfiguration would be a move backwards to fragmented services • Loose Leeds as a fully integrated service , general surgery, maternity etc all on same site. Other units are stand alone cardiac centres			• More cardiologists required • No slack in current system, an increase of 10% workload would destabilise • There would be an increase to 600 cases per year which would mean change in infrastructure would be required

Findings:
Surgical Centre Clinician Interviews

Patient Quality

Key patient quality GAINS

Clinicians reported the following potential gains to patient quality, in terms of safety, experience and clinical outcomes, under each option

	Option A	Option B	Option C	Option D
Birmingham Hospital	"As Is"	• Move towards "one stop" outpatient system of ECGs and Echos to avoid multiple visits. Can fit 24 hour ECG for return next day • Patient experience in terms of delays and cancellations mitigated by doubling theatre space and increasing ICU capacity		
Bristol Royal Hospital	Quality depends upon resources, increasing activity would increase quality – important to have a number of patients annually to maintain staff resource level and for adequate training and development			
Great Ormond Street Hospital	• With GOSH's 650 (or more) cases, the volume of activity to support good patient experience, outcomes and the volume of activity for academic work			
Evelina Hospital, London	• Key gain is to have a minimum number of surgeons in each centre. • Neuro, ENT, etc in the same location which is important for safe delivery			
Glenfield Hospital, Leicester	• Retains nationally recognised respiratory ECMO centre that would not easily transfer to another site • Travel times reduced as 11m population of Midlands compared with 7m in London, makes sense to have two Midlands centres re travel aspect	Surgical unit would close		
Alder Hey Hospital, Liverpool	• If well planned, patient safety would not be affected – managed clinical networks would be crucial to supporting patient safety			

Continued - Key patient quality GAINS

	Option A	Option B	Option C	Option D
Freeman Hospital, Newcastle	• Increased numbers allows for more skilled staff and more procedures to take place therefore improving outcomes			Surgical unit would close • Population density is greater around Leeds so travelling times reduced in this option
Southampton General Hospital	Surgical unit would close	• Correcting findings in S&S regarding travelling times would promote this option in terms of access and support patient experience in that regard	Surgical unit would close	
Oxford Radcliffe Hospital	Surgical unit would close			
Royal Brompton Hospital, London	Surgical unit would close			
Leeds General Infirmary	Surgical unit would close			• All services are located in one place in Leeds with the interdependencies, this is not the same for other centres, therefore there is likely to be gain from this option in that patient experience of 'one stop' shop for services

Key patient quality RISKS

As well as reporting on patient quality gains, clinicians also fed back views on quality risks in terms of safety, experience and clinical outcomes for each option.

	Option A	Option B	Option C	Option D
Birmingham Hospital	• Reduced numbers, possibly below 400 hence skills would be reduced	• Transport from Lincoln would be an issue • If numbers increase above 800 the evidence suggests that it would have to fragment to function and this could be counter effective		
		• Closing ECMO in Leicester and thus this function would have to be dispersed		
Bristol Royal Hospital	In the absence of a 'driver' of patient flows, would centres like Bristol get the patient flows – activity may not be as projected and could have impact on quality			
Great Ormond Street Hospital	Little impact	• As a 'net loser' reduced numbers would lead to reduced quality • Possible that reduced numbers could also reduce charitable donations	Little impact	
Evelina Hospital, London	• Over emphasis on time to travel - ICU starts when patient first seen not when they arrive at centre • However, still need to mitigate risk, retrieval service on Isle of Wight (IoW), mitigated by Southampton continuing to do this, directing to either Southampton (medical) or Evelina (surgical)			
Glenfield Hospital, Leicester		Surgical unit would close • It will take five years to develop an ECMO service therefore this will lead to unsafe ECMO provision in make shift arrangements. There are 150 respiratory cases in one year, these cases may get treated by ventilators and could lead to a higher mortality rate making these options unsafe. • Have other centres the appropriate configuration i.e. space for parking, air ambulance or expansion.		

Continued - Key patient quality RISKS

	Option A	Option B	Option C	Option D
Alder Hey Hospital, Liverpool	• Managed clinical safety is crucial to ensure patient safety, formalising it will be difficult and is a key risk. • It is not completely safe for medical cardiac centres to do diagnostic catheterisation.			
Freeman Hospital, Newcastle		Too large a scale could risk quality, continuity and team working		Surgical centre would close • National Transplant Centre would have to move to Birmingham
Southampton General Hospital	Surgical centre would close *(See further explanation as per Options C and D)*		Surgical centre would close • From IoW would take more time to go to Bristol or London • Southampton is one of the quality centres across the country, removing it would affect clinical outcomes negatively • Fragmentation of a good team is not good for outcomes and there would be lower staff calibre due to issues with recruitment and retention - affecting clinical service quality	
Oxford Radcliffe Hospital	Surgical centre would close • Potential for pre op mortality to increase with increasing travelling times			

Continued - Key patient quality RISKS

	Option A	Option B	Option C	Option D
Royal Brompton Hospital, London	Surgical centre would close • Disruption to existing team therefore performance would not be at the same level and things would get worse before improvements are realised. Mitigated by having a phased change with clinical ownership • Staff may not comply with the changes			
Leeds General Infirmary	Surgical unit would close			• East Coast patients would be particularly at risk because of travel, even under this configuration, but with Option 'D' the service should be better than other options
	• Model is reliant on PECs which are new posts and hundred's would be required. They are not paediatric cardiologists, and they have limited skills and would need support • Increased risk to a large numbers of patients who would have to travel • Finite numbers of ambulances, they could be in use when required by the next patient			

Summary of other key issues raised during the centre interviews

Centre specific comments

Other centre specific comments

	Other centre specific comments comments
Birmingham Hospital	• Future capacity would have to cope with increased antenatal detection which has not been well developed in the Midlands
Bristol Royal Hospital	• Not enough importance given by S&S to co-location • Clarity of the role of cardiology centres and nature of cases they will treat especially in relation to individuals with co-morbidities
Great Ormond Street Hospital	• 400 cases a year, a modest number, with a greater number (650 or more) patient experience and outcomes supported
Evelina Hospital, London	• Managed clinical networks and no ambiguity – referral networks and pathways
Glenfield Hospital, Leicester	• Need to ensure units do not become too big. London could serve just inside M25 so patient flows from elsewhere are more local • "We cannot transplant Leicester ECMO service to another place, we would have to start it all over again"
Alder Hey Hospital, Liverpool	• Availability of beds in the lead centre would impact on referrals – effective capacity planning very important
Freeman Hospital, Newcastle	• GUCH is a significant issue and it is highly likely that GUCH would follow paediatrics and it is the Leeds GUCH that would require the biggest reconfiguration at Newcastle as it provides both services • Managing the transition is critical; this must be at a national level and by an external body
Southampton General Hospital	• No meaningful analysis of patient journey times for the IoW was made in the analysis. Inclusion of ferry times could mean that option A, C and D could impact the 90 minute patient travel times
Oxford Radcliffe Hospital	• Assess what is going to happen to the medical cardiology centres - become office based cardiology units with depleting skills. They may initially do diagnostic interventions but that in the long term retaining this is questionable. An impact on overall neonatology service in those centres , as a number of neonates have problems related to the heart

Other centre specific comments

	Other centre specific comments comments
Royal Brompton Hospital, London	• S & S did not really look at 'quality' e.g. for RBH it was research based, and was it properly assessed? • Do Evelina and GOSH actually have the capacity (particularly the estate) to cope with increased numbers? • Services could be rationalised around London as a whole. Distribution is unlikely to be based on the Thames (i.e. North/South), as that is not how transport works
Leeds General Infirmary	• Surgical mortality is maybe 3-4% (in many cases 1%); the reconfiguration might improve this a little, but there is evidence that the pre and post surgery care (including transport) can influence the overall mortality by 2.5 times .Therefore the reconfiguration may have implications regarding mortality overall

General issues raised by clinicians in the interview process

Managing the transition is key to success:

- This would be best done centrally and with an emphasis on people factors being critical and clinical ownership of the transition essential

Future for the decommissioned units:

- Downgrading to a cardiology centre impacts upon many other surgically dependant services including PICU expertise. There was an apprehension that these units would not manage medically sick cardiac patients. These are children with complex needs and hence other specialist services may also decline. Units would find recruitment and retention difficult, further compounding the problem

London dynamic:

- It remains unclear how London would divide up its patients. North of the river/South of the river has been assumed but has this been worked through especially in terms of transport links

Travel times:

- There are mixed messages, some say that it is the time that the patient is first seen that matters (i.e. before travel) others say that the longer the travel time the higher the surgical mortality. Concerns exist around the calculation of journey times in the S&S consultation document

ECMO services:

- There is broad interest in providing these but a recognition that they would take years to become fully effective when building from an inexperienced unit

GUCH (grown up children's heart services):

- Concern that in reality the location of these services would have a significant impact upon capacity of children's services that has not been adequately addressed

Retrieval services:

- National consideration for retrieval services required - perhaps delivered through networks

Service funding:

- Appropriateness of the current tariff system for this long term condition - tariff payments to referral centres acting as a disincentive to networks

Findings: referring clinician survey

- Approach to referrer survey
- Findings from referrer survey

Overview of questionnaire used for surveying referring paediatricians

- Based on national HES referral data from the 11 paediatric cardiac surgical centres that were a feature of S&S, the PCTs and corresponding hospital Trusts which refer/have referred to these centres were identified and a sample of 82 Trusts referring less than 85% of patients to the centres were determined – this was on the basis that their referral patterns were not clear cut and therefore could influence the success or otherwise of the future service configuration and network arrangements proposed by S&S.
- An internet search and telephone calls were undertaken to identify the Clinical Director for Paediatrics or an equivalent at these 82 Trusts. This Director was then sent a survey, along with four additional surveys for distribution to referring colleagues in that Trust. A four week response period was given and this was extended where requested for people who had been on leave/out of the office.
- The table below provides a summary of the key questions which were covered in the survey.

Section	Description
Current referral patterns	Clinicians were asked to indicate the centre to which they currently refer most of their patients, whether their referral patterns were in line with other colleagues in their Trust and the factors which influence their current referral decisions. Data was also gathered on the average number of referrals made per year.
Exploring the four options	Each of the options were explored in turn by asking clinicians where they would refer patients in terms of cardiac surgical centres under each of the options and the main factors which influenced their decision. This section also explored whether this would require a change from current referral patterns, and how many patients they would refer to each of the centres under the four options per year.
New network arrangements	Clinicians were asked whether the six features of the proposed managed clinical networks under S&S were currently in existence for the centre which they had selected under each of the options. They were also asked to identify the challenges which exist with taking part in such a network, and what might need to be developed to make it viable.
Other comments	Clinicians were also asked to note any other comments specific to this work around testing patient flows as part of the S&S review.

Source: PwC survey of referring paediatricians

Overall 153 responses to the survey were received, with paediatricians currently referring to all eleven surgical centres…

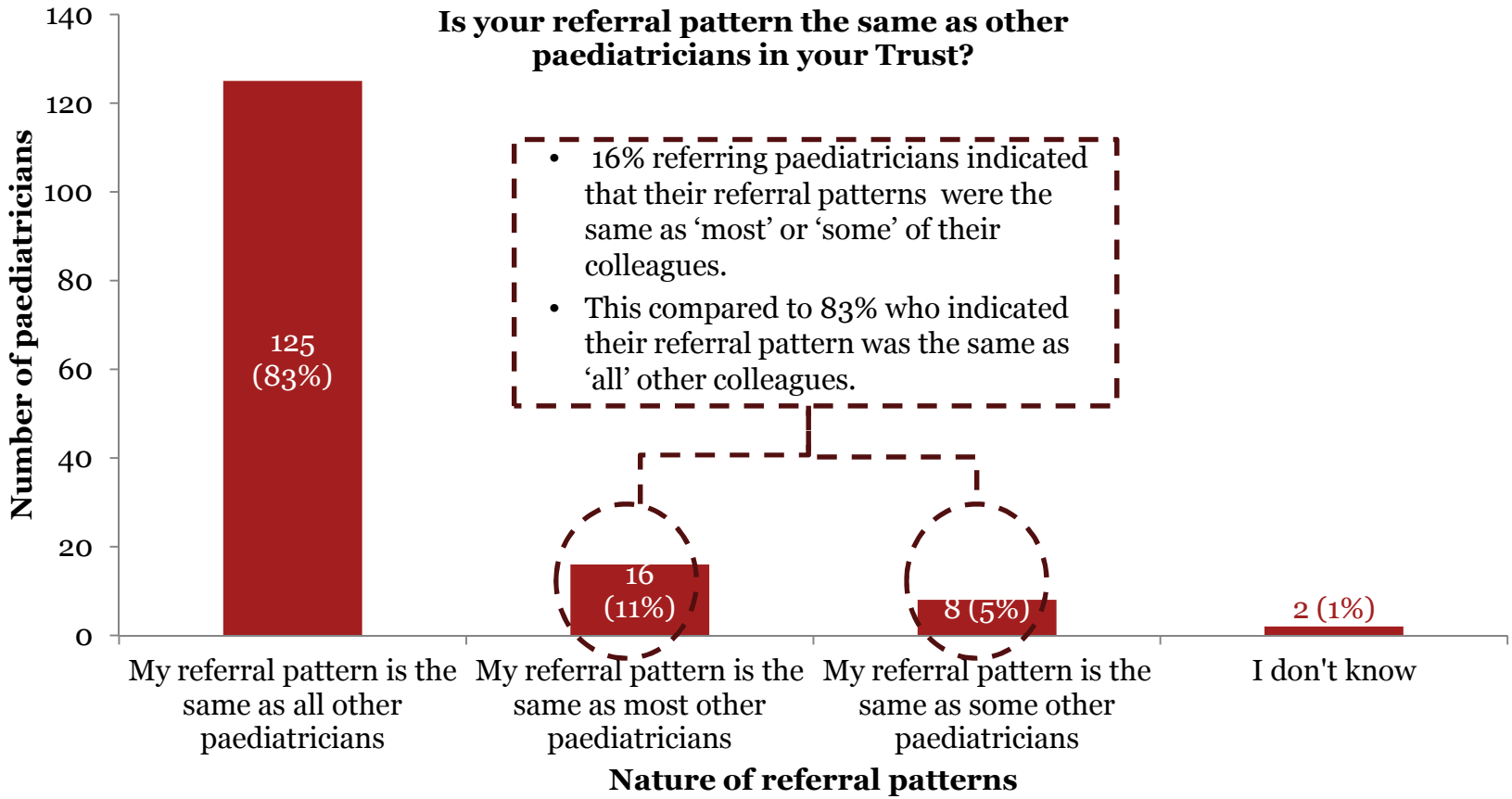
- Some 410 surveys were sent via 82 Clinical Directors of paediatrics (or their equivalent) in Trusts (for self completion, if appropriate and forwarding on to up to 4 referrer colleagues). The 153 responses received represents a response rate in the range of 37% to 40+% (dependent on whether all 82 Directors forwarded all surveys to their colleagues).
- Most responses were received from paediatricians who currently refer to Royal Brompton Hospital, London (17%) and Glenfield Hospital, Leicester (14%). Fewer responses were received from those currently referring to Freeman Hospital, Newcastle (3%), Birmingham Hospital (3%) and Oxford Radcliffe Hospital (4%).
- It should be noted that not all 153 paediatricians who responded to this survey answered all of the questions within the survey. Therefore the value of 'n' varies throughout the report.

Centre to which majority of patients are referred	% of respondents who refer to this centre	Centre to which majority of patients are referred	% of respondents who refer to this centre
Alder Hey Hospital, Liverpool	15 (10%)	Oxford Radcliffe Hospital	6 (4%)
Birmingham Hospital	4 (3%)	Royal Brompton Hospital, London	25 (17%)
Great Ormond Street Hospital	19 (13%)	Southampton General Hospital	14 (9%)
Evelina Hospital, London	8 (5%)	Bristol Royal Hospital	17 (11%)
Leeds General Infirmary	18 (12%)	Glenfield Hospital, Leicester	21 (14%)
Freeman Hospital, Newcastle	4 (3%)		

Source: PwC survey of referring paediatricians *n = 151*

Referring clinician survey – key findings

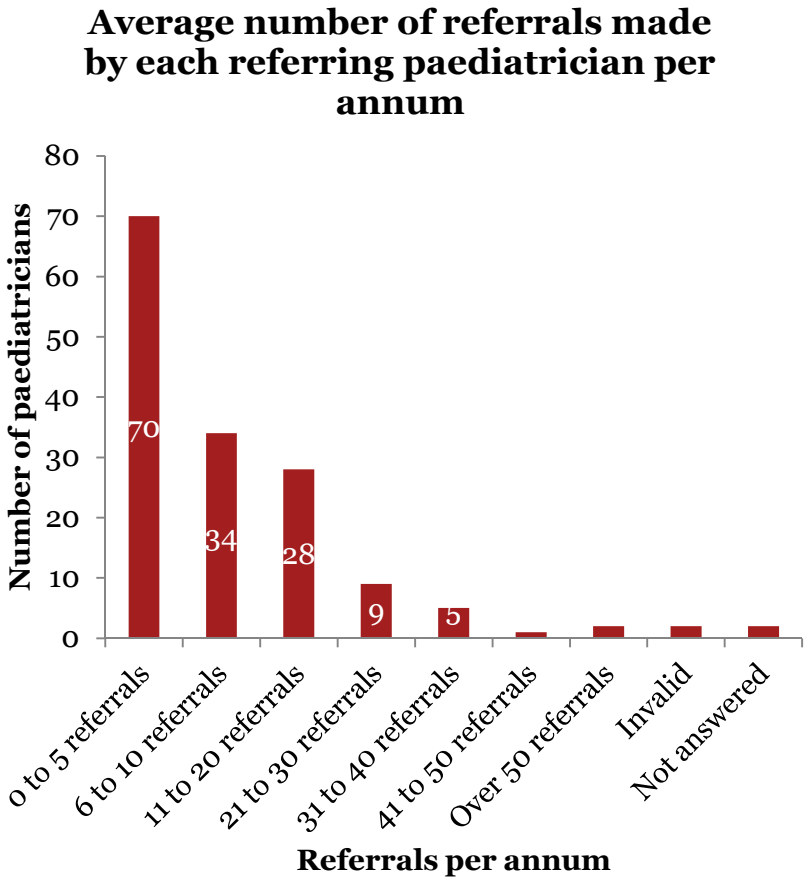
The majority (83%) of referring paediatricians indicated that their referral pattern was the same as all other paediatricians in their Trust…



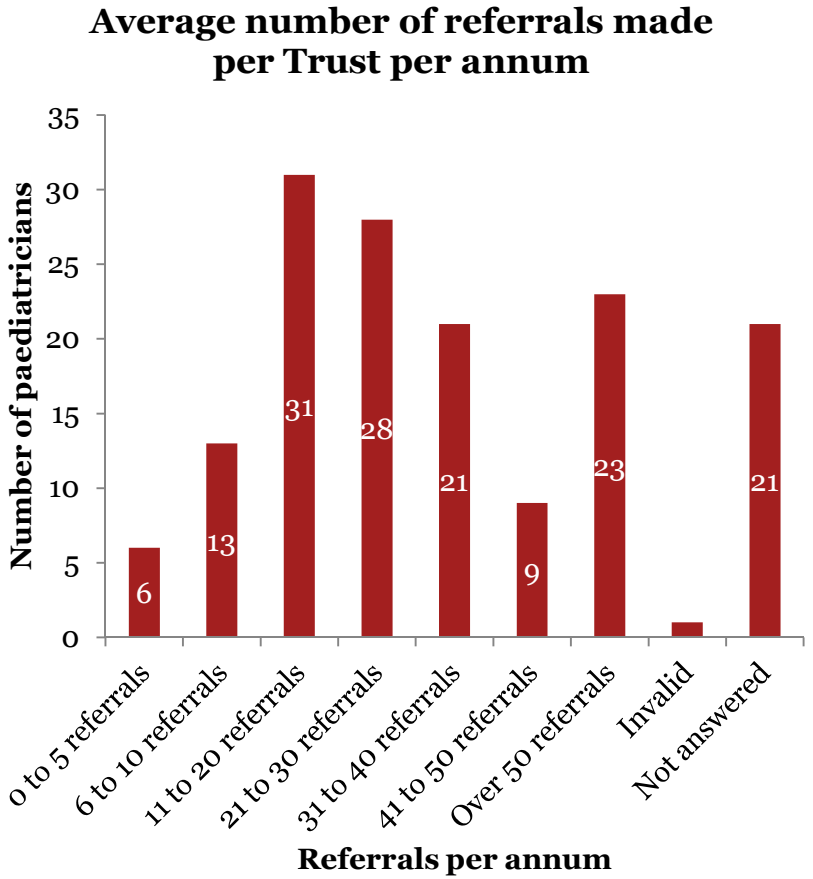
Source: PwC survey of referring paediatricians

n=151

Most paediatricians indicated that they refer five or less children for paediatric cardiac surgery per year, although the number of referrals per Trust varied…



Source: PwC survey of referring paediatricians *n=153*



Source: PwC survey of referring paediatricians *n=153*

Over a quarter of paediatricians indicated that existing joint working arrangements was the key factor in determining their referral preference…

Existing joint working arrangements	• This was identified as the 1st priority of 42 referring clinicians
Proximity of centre	• This was identified as the 1st priority of 33 referring clinicians
Clinical outcomes	• This was identified as the 1st priority of 19 referring clinicians
Personal professional relationship with the centre	• This was identified as the 1st priority of 17 referring clinicians
Historical	• This was identified as the 1st priority of 9 referring clinicians
Patient choice	• This was identified as the 1st priority of 1 referring clinician

Source: PwC survey of referring paediatricians *n = 123*

- Two paediatricians stated that other factors are key in determining preference, citing cot availability and the number of joint clinics held at a centre as the rationale for this.
- Thirty paediatricians gave invalid answers.

Note: *The list above orders the referral preferences based on the frequency at which referring clinicians ranked each of the preferences as their first choice. Adopting an approach of weighting each preference (so that the first choice gets multiplied by a factor of 7, the second choice gets multiplied by a factor of 6, and so on) results in a similar outcome in that the first, second, fifth and sixth preferences indicated in the list above remain the same. However, adopting a weighting approach results in personal professional relationship with the centre being prioritised third and clinical outcomes being prioritised fourth.*

Under each of the options, research showed that most paediatricians would refer to the centres which would be expected based on their current referral patterns…

- In each instance, over 90% of referring clinicians were in agreement with sending their patients to the centre which would be expected (based on the centre to which they currently refer) under the S&S review assumptions.
- Most referring paediatricians (97%) indicated that they would refer patients to the centre which had been assumed by the S&S review under Option C, whilst fewest paediatricians indicated that this would be the case under Option D (93%).

Option	% of referring paediatricians who would refer to centre assumed under S&S
Option A *(n=125)*	118 (94%)
Option B *(n=119)*	114 (96%)
Option C *(n=117)*	114 (97%)
Option D *(n=121)*	112 (93%)

Source: PwC survey of referring paediatricians

n varies by option – see table above

Existing joint relationships the most common factor in referral decisions under the current configuration, whilst proximity most common under each of the proposed options…

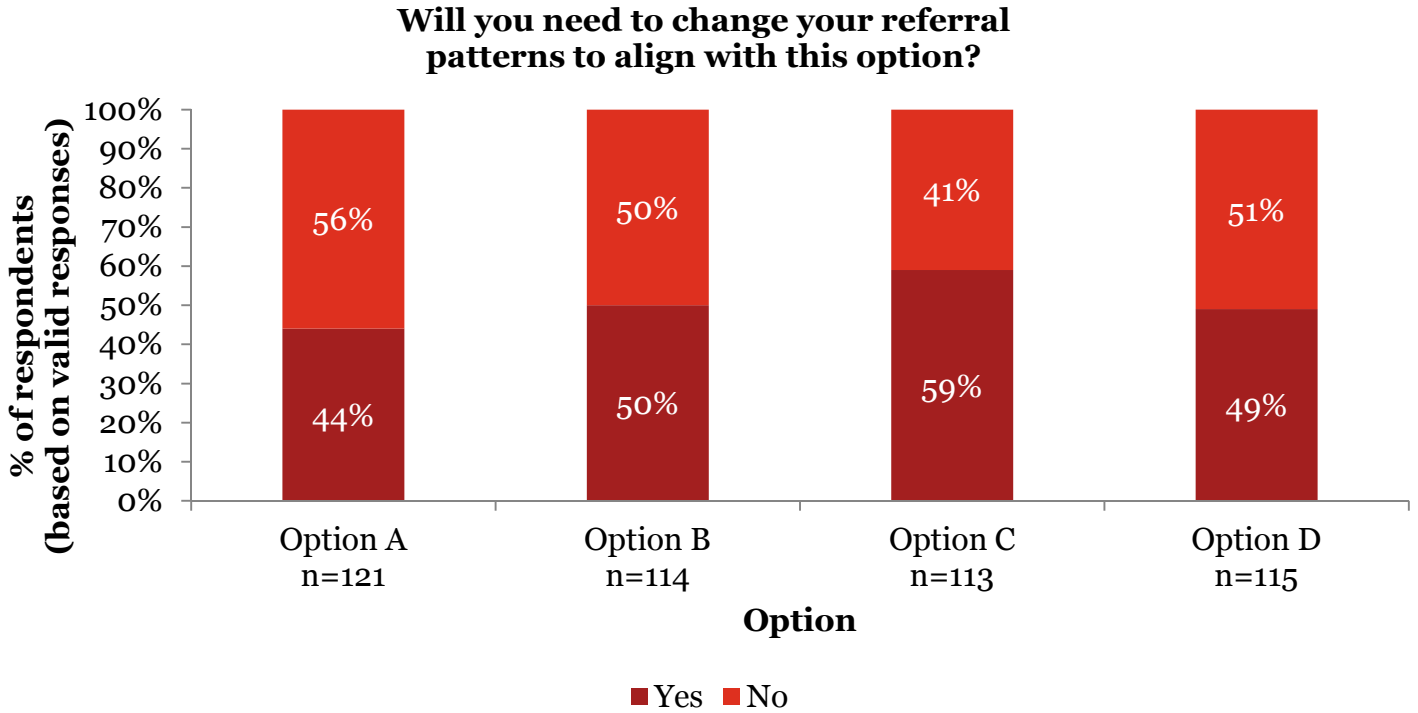
- Paediatricians were asked to state their "top three" factors which would influence their referral decisions under the four proposed options. The table below shows the percentage of paediatricians who selected each factor within their "top three".
- In Options A, C and D, existing joint working relationships was the second most commonly cited factor in influencing referral decisions, in line with views on referrals under the current service configuration. However in Option B, more paediatricians (53%) indicated that clinical outcomes would influence their referral decision than existing joint working relationships (50%).

	Option A n = 125	Option B n = 119	Option C n = 117	Option D n = 121
Proximity	84 (67%)	74 (62%)	79 (68%)	84 (69%)
Existing joint working relationships	69 (55%)	59 (50%)	56 (48%)	65 (54%)
Clinical outcomes	53 (42%)	63 (53%)	52 (44%)	55 (46%)
Personal professional relationship	45 (36%)	46 (39%)	43 (37%)	49 (41%)
Historical	20 (16%)	11 (9%)	15 (13%)	15 (12%)
Patient choice	14 (11%)	16 (13%)	14 (12%)	14 (12%)
Other	2 (2%)	2 (2%)	2 (2%)	2 (2%)

Source: PwC survey of referring paediatricians *n varies by option – see table above*

Referring paediatricians indicated that most change to referral patterns would be required under Option C…

- 59% indicated under Option C that they would need to change their referral pattern to align with this option. For Option B as many referring paediatricians (50%) indicated that they would have to alter referral patterns as those who indicated that referral patterns would stay the same.
- In contrast, 44% of referring paediatricians indicated that they would be required to alter existing referral patterns under Option A and 49% indicated that this would be the case under Option D.



Source: PwC survey of referring paediatricians

n varies by option – see graph above

Under Options A and B, referring paediatricians indicated that the development of the role of paediatricians with expertise in cardiology was the most well developed network feature…

	Centre	Formal pathways	Formal protocols	Local care settings	Paediatricians role	Liaison teams	Average
Option A	Freeman Hospital, Newcastle (8)	43% [1]	14%[1]	0%[1]	14%[1]	29%[1]	20%
	Alder Hey Hospital, Liverpool(13)	64%[2]	45%[2]	73%[2]	64%[2]	18%[2]	53%
	Glenfield Hospital, Leicester (22)	81%[1]	50%[2]	86%[1]	81%[1]	75%[2]	75%
	Birmingham Hospital (9)	38%[1]	25%[1]	50%[1]	50%[1]	38%[1]	40%
	Bristol Royal Hospital (23)	68%[4]	45%[3]	90%[3]	85%[3]	45%[3]	67%
	Evelina Hospital, London (21)	42%[2]	44%[1]	55%[1]	67%[3]	32%[2]	48%
	Great Ormond Street Hospital(31)	33%[1]	46%[3]	57%[1]	60%[1]	43%[1]	48%
	Average	53%	39%	59%	60%	40%	
Option B	Freeman Hospital, Newcastle (8)	43%[1]	14%[1]	0%[1]	14%[1]	29%[1]	20%
	Alder Hey Hospital, Liverpool (13)	70%[3]	50%[3]	70%[3]	70%[3]	20%[3]	56%
	Birmingham Hospital (21)	25%[5]	7%[6]	25%[5]	25%[5]	25%[5]	21%
	Bristol Royal Hospital (17)	80%[2]	50%[1]	94%[1]	88%[1]	50%[1]	72%
	Southampton General Hospital (16)	50%	63%	88%	94%	75%	74%
	Evelina Hospital, London(15)	43%[1]	50%[1]	67%	73%	43%[1]	55%
	Great Ormond Street Hospital (29)	42%[3]	48%[6]	69%[3]	65%[3]	42%[3]	53%
	Average	50%	40%	59%	61%	41%	

Note: [1] *– One less valid answer than from Q8,* [2] *- Two less valid answers than from Q8, and so on.* *n varies by option – see table above*
Source: PwC survey of referring paediatricians

Under Options C and D, referring paediatricians indicated that non-interventional care delivered in local settings was the most well developed network feature…

	Centre	Formal pathways	Formal protocols	Local care settings	Paediatricians role	Liaison teams	Average
Option C	Freeman Hospital, Newcastle (8)	43%[1]	14%[1]	0%[1]	14%[1]	29%[1]	20%
	Alder Hey Hospital, Liverpool (13)	70%[3]	50%[3]	80%[3]	60%[3]	30%[3]	58%
	Birmingham Hospital (23)	24%[6]	6%[7]	24%[6]	24%[6]	24%[6]	20%
	Bristol Royal Hospital (21)	63%[2]	40%[1]	85%[1]	80%[1]	40%[1]	62%
	Evelina Hospital, London (20)	44%[2]	41%[3]	56%[2]	61%[2]	33%[2]	47%
	Great Ormond Street Hospital (32)	33%[2]	41%[5]	60%[2]	57%[2]	37%[2]	45%
	Average	46%	32%	51%	49%	32%	
Option D	Leeds General Infirmary (20)	85%	68%[1]	85%	75%	70%	77%
	Alder Hey Hospital, Liverpool (11)	78%[2]	56%[2]	78%[2]	78%[2]	22%[2]	62%
	Birmingham Hospital (17)	31%[4]	8%[5]	31%[4]	31%[4]	31%[4]	26%
	Bristol Royal Hospital (21)	63%[2]	42%[2]	85%[1]	80%[1]	40%[1]	62%
	Evelina Hospital, London (20)	41%[3]	41%[3]	56%[2]	61%[2]	33%[2]	46%
	Great Ormond Street Hospital (31)	34%[2]	42%[5]	66%[2]	62%[2]	38%[2]	48%
	Average	55%	43%	67%	64%	39%	

Note: [1] *– One less valid answer than from Q8,* [2] *- Two less valid answers than from Q8, and so on.*
Source: PwC survey of referring paediatricians

n varies by option – see table above

Referring paediatrician views on the proposed S&S network features and how developed they currently are at centre level…

Option	Most developed network feature	Least developed network feature	Centre with most well developed network features	Centre with least well developed network features
Option A n= 127	Development of the role of paediatricians with expertise in cardiology (60%)	Formal protocols agreed by the surgical centre and local services (39%)	Glenfield Hospital, Leicester (75%)	Freeman Hospital, Newcastle (20%)
Option B n= 119	Development of the role of paediatricians with expertise in cardiology (61%)	Formal protocols agreed by the surgical centre and local services (40%)	Southampton General Hospital (74%)	Freeman Hospital, Newcastle (20%)
Option C n= 117	The delivery of non-interventional care in local care settings (51%)	Formal protocols agreed by the surgical centre and local services (32%) and strengthened cardiac liaison teams (32%)	Bristol Royal Hospital (62%)	Freeman Hospital, Newcastle (20%) and Birmingham Hospital (20%)
Option D n= 120	The delivery of non-interventional care in local care settings (67%)	Strengthened cardiac liaison teams (39%)	Leeds General Infirmary (77%)	Birmingham Hospital (26%)

Source: PwC survey of referring paediatricians

n varies by option – see table above

Referring paediatricians identified a number of key challenges and enabling factors associated with networks…

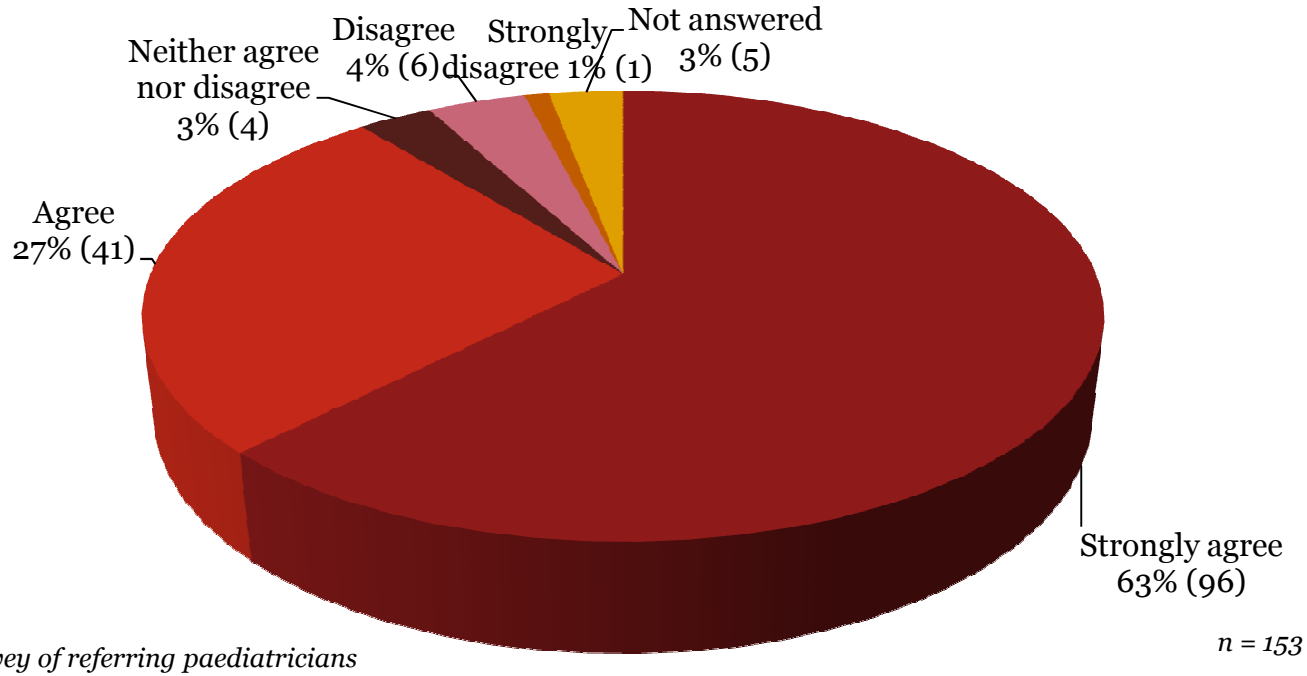
- Referring paediatricians most commonly cited the following challenges (grouped under themes) associated with taking part in a network with the features proposed by Safe and Sustainable and their view on enabling factors to assist in overcoming these challenges. These are highlighted in the following table.

Key challenges	Enabling factors
1) Links to other services	• Closer links between ante-natal, child and adult cardiac services. • Improve transport arrangements through development/use of a critical care transport service.
2) Capacity to handle increased workload	• Increased capacity and space at future centres under selected option for medical and surgical cases and critical care. • Enhanced capacity at outreach clinics in support of the above. • Formal service level agreements in place .
3) Need to increase level of outreach	• Ensure continuation of existing outreach clinics. • Increased capacity at outreach clinics. • Greater number of clinics.
4) Developing and agreeing shared protocols and pathways	• Shared cardiac protocols. • Cross-network protocols/working arrangements.
5) Developing the role of local paediatricians	• Increasing the number of paediatricians with expertise/interest in cardiology in local hospitals.

Source: PwC survey of referring paediatricians

The vast majority (90%) of paediatricians indicated that they strongly agreed or agreed with the principle of sending the majority of referrals to the same centre, in order to build good relationships in local networks…

Do you agree with the principle of sending all referrals to the same centre in order to build relationships in networks?

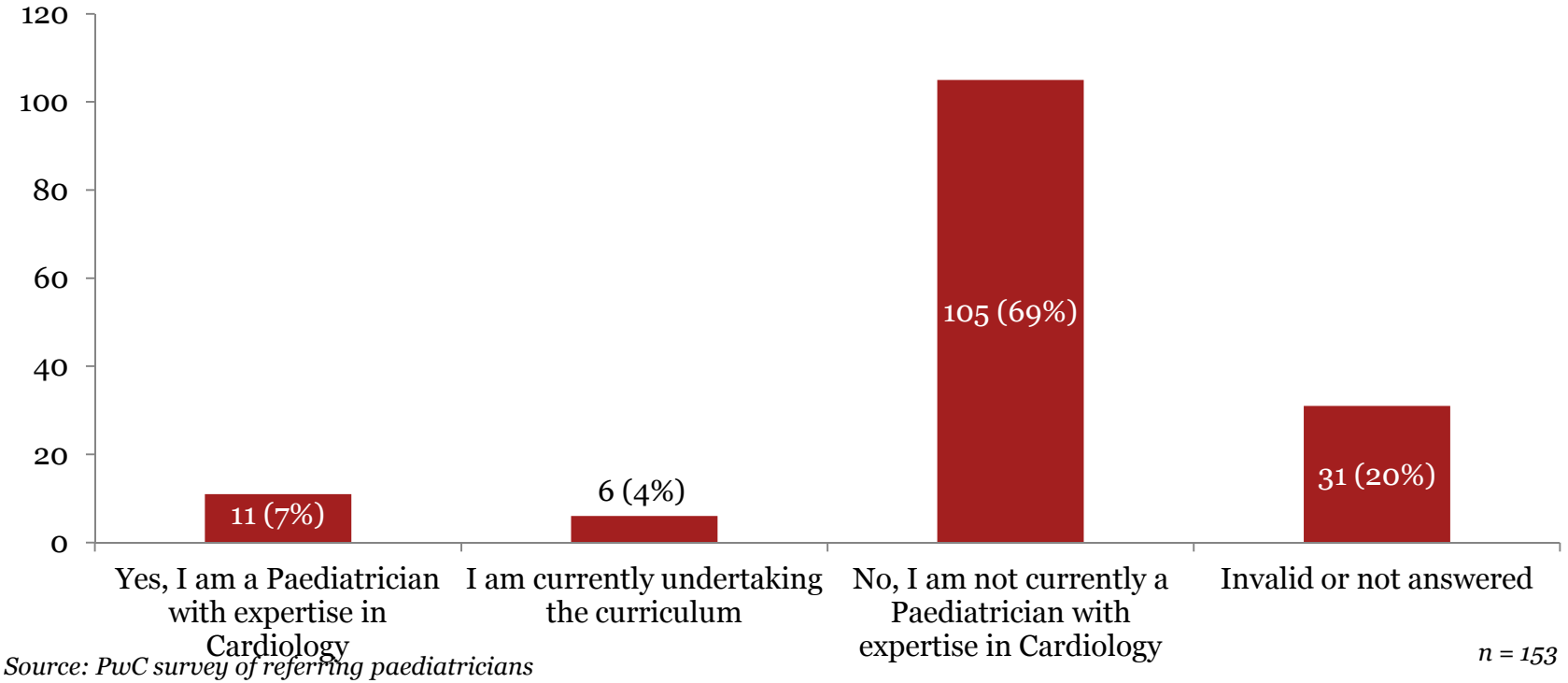


n = 153

Source: PwC survey of referring paediatricians

Most respondents to the survey were general paediatricians without expertise in cardiology…

Are you a paediatrician with expertise in cardiology who has undertaken the joint curriculum of the Royal College of Physicians and the Royal College of Paediatrics and holds the relevant certificate?



n = 153

Source: PwC survey of referring paediatricians

Completed questionnaires were received from a number of referrers across Strategic Health Authorities in England……

Strategic Health Authority (SHA):	Number (and %) of referring paediatricians who returned surveys:
East Midlands SHA	22 (14%)
East of England SHA	14 (9%)
London SHA	22 (14%)
North East SHA	0 (0%)
North West SHA	17 (11%)
South Central SHA	9 (6%)
South East Coast SHA	7 (5%)
South West SHA	23 (15%)
West Midlands SHA	2 (1%)
Yorkshire and The Humber SHA	15 (10%)
Other or SHA/hospital not specified	22 (14%)
Total:	**153 (100%)**

Source: PwC survey of referring paediatricians *n = 153*

Findings: clinician focus groups

- Approach to focus groups

- Key themes emerging from discussion:
  - *Network set-up, alignment and geography;*
  - *The role and function of outreach clinics and cardiology centres;*
  - *Potential for destabilisation of other services;*
  - *Retrieval; and*
  - *Supporting positive clinical outcomes.*

Approach to clinician focus groups

Introduction

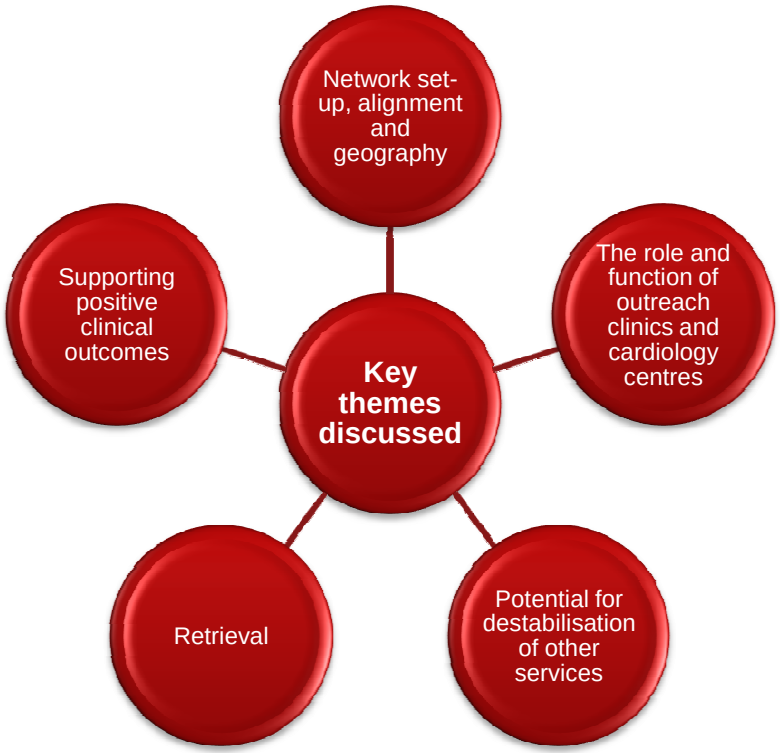
This report summarises the discussion, ideas and suggestions captured at the three focus groups held across England in September 2011 in relation to Workstream 2 (Clinical). The focus groups were designed and facilitated by PwC as part of their work for the National Specialised Commissioning Team to test assumptions for future patient flows and manageable clinical networks.

Objectives of focus groups

The purpose of the groups were to share and "sense check" findings gathered through the survey of referring paediatricians and interviews with clinicians (supported by data from the survey of parents and focus groups with members of the general public). The format of each focus group was as follows:

- Initial session on key findings on referral behaviours and clinical networks from referring clinician survey and feedback from parents and the public; and
- Subsequent discussion session on agreed themes emerging from the presentations of key findings.

The remainder of this report provides an overview of the comments received from across focus group participants and also sets out the key themes which were discussed (see diagram below).



Approach to composition of Workstream 2 clinician focus groups

Three focus groups were organised as follows:

- Midlands group (M) on 20 September 2011.
- South group (S) on 21 September 2011.
- North group (N) on 22 September 2011.

A mix of professionals attended these groups as shown in the table below, along with details as to how each group of professionals were identified and invited to attend. Each of the 11 centres referred to in S&S were represented by participants from one or more of these professional groups within each focus group.

Professional group	Method of identifying participants
Clinicians from the 11 centres	• The two clinicians who were interviewed as part of the centre interviews within Workstream 2 were re-contacted and invited to attend, or to nominate an alternative clinical colleague, to participate in the focus group.
Referring paediatricians	• HES data on referring hospitals was used to identify a number of referrers and a number of respondents to the referrer survey (where they indicated interest in being involved in further aspects of the project) were contacted and invited to the focus groups.
Clinical network leads	• Clinical network leads (where they are in place) were identified via the centre interviews or through discussions with the NSCT. These individuals were then contacted via email to invite them to the group.
Cardiac liaison nurses	• Liaison nurses were identified via contact with the Royal College of Nursing (RCN) and from discussions as part of the centre interviews. Each nurse identified was contacted, inviting them to attend the group or nominate an alternative in their area.

Summary of discussion and points raised – referral behaviours and manageable clinical networks

Each focus group commenced with a summary presentation of findings from the survey of referring paediatricians and interviews with clinicians, supported by data from the survey of parents and focus groups with members of the general public where relevant. The table below summarises the findings which were discussed and the key elements of feedback received and which group raised the question, for example, the Midlands group (M) asked for clarification around the postcode areas.

Topic area	Summary of areas/findings presented to groups	Questions raised and feedback from participants
Project methodology	• High level overview of the three workstreams, qualitative and quantitative approaches used and the 22 postcode areas being examined.	• Clarification on postcode areas considered, and areas within these (M) • Clarification on specific questions asked of referrers and parents, and on how each option was examined (M) • Approach to recruiting parents and members of the public from a range of backgrounds and socio-economic groups (M)
Referral behaviours	• Referrer and parent views on key factors determining referral preferences. • Changes required to referral patterns under each option. • Level of agreement /compliance with assumptions made within the S&S options i.e. feedback from referrers and parents and public as to whether they would refer to /or attend surgical centres as assumed by S&S.	• Surprise that cost and car parking was not more of an issue for parents, and queries over how parents judge reputation (M, N, S) • How referral behaviours may vary dependent on the type of referral and the nature of case presenting e.g. co-morbidities (M, S) • Criteria for identifying referring clinicians and parents and the public – comments on referrer survey response rate (M, S) • Impact of patient choice and clinical outcomes on referral behaviour and commissioning behaviours (S, N)
Clinical networks	• Current level of development of network features on the basis of referring clinician survey. • Challenges and enabling factors associated with networks. • Views on the principle of networks and model of care involving outreach clinics.	• Variation in experience across outreach clinics and could influence responses (M, N) • Why some referrers and parents are not supportive of networks and cardiology centres (N) • Experiences/feedback can vary by what stage of the patient journey individuals/families are at (M)

Summary of responses to question raised – referral behaviours and manageable clinical networks

A number of the questions detailed in the previous table related to the methodological approach adopted to contacting referrer, parents and the public – a summary of responses to these questions are detailed below.

Questions raised from participants	Response to questions/queries on methodology applied

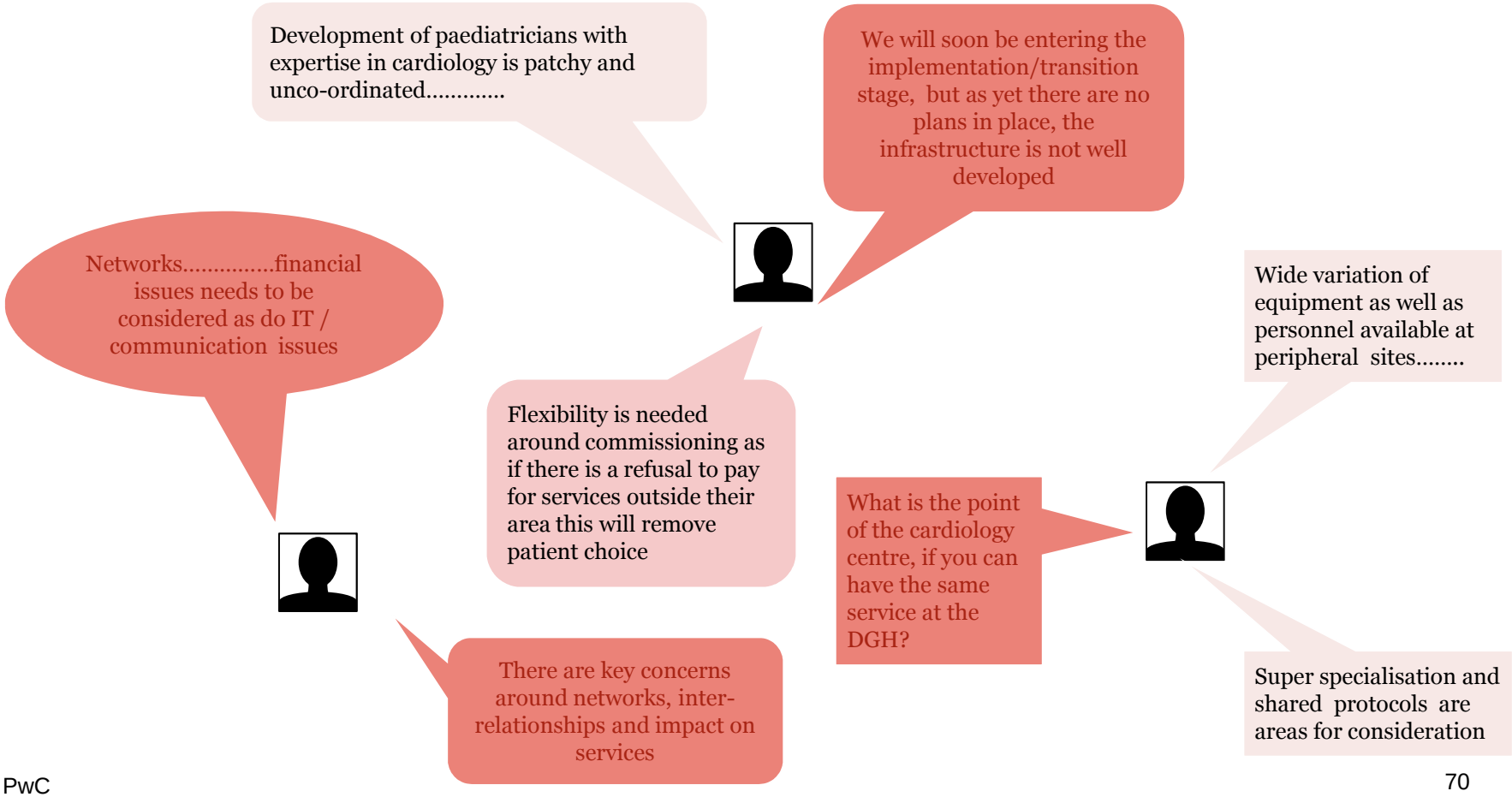
Clarification on postcode areas considered, and areas within these	• The 22 postcodes that were the focus of the parent and public workstreams were identified by the National Specialised Commissioning Team (NSCT) and Specialised Commissioning Group (SCG) Directors. They were chosen on the basis that they were:
	  • Postcodes where an assumption had been made to travel to a particular surgical centre but where another surgical centre is closer or roughly equal in distance to them such that it is reasonable to question alternative locations
	  • Where local intelligence has suggested that new referral patterns / patient flows are already emerging as a result of a collaborative approach across current centres and which may have the effect of replacing the 'closest to home' principle
	• In addition in recruiting parents and the public for involvement in this work, we sought to get coverage of postcode districts within each of the 22 postcode areas.

Clarification on specific questions asked of referrers & parents & how each option was examined	• In the slides in the clinical and parent and public reports where we present the findings of the research, we have documented the exact questions that were asked.
Approach to recruiting parents and members of the public from a range of backgrounds and socio-economic groups	• In recruiting the general public, we worked to get involvement from a spectrum of the public in terms of age, gender, socio-economic background and postcode area. Our ability to be as prescriptive for parent recruitment was lessened due to confidentiality issues – our key focus was to recruit parents across the 22 postcode areas and who had children that were both relatively new and longer term users of services.
Criteria for identifying referring clinicians and parents and the public – comments on referral survey response rate	• In the absence of a comprehensive and robust list of referring clinicians to the 11 centres, HES data was reviewed to identify referring Trusts. A sample of 82 Trusts which currently refer less than 85% of patients to one of the existing centres was identified – this was on the basis that their referral patterns were not clear cut and therefore could influence the success or otherwise of the future service configuration and network arrangements under S&S. • An internet search was undertaken to identify the clinical director for Paediatrics at these Trusts or their equivalent. This director was then sent a survey, along with four additional surveys for distribution to referring paediatricians colleagues in that Trust.

Summary of discussion and points raised – examples of recurring comments from focus group attendees

A number of recurring comments and themes were highlighted by participants at the focus groups, some examples of these are provided below.

The rest of this report provides further detail on the themes which most commonly were discussed across the groups and the views and ideas that were generated.



Key themes from clinician focus groups

Theme 1: Network set-up, alignment and geography

Three groups all agreed that clarity was needed on how networks would be set up, and how they would function. There were a number of areas in which participants requested such clarity, or put forward suggestions as to how networks could operate more effectively – these are shown in the diagram below.

Transition plans	• The need for transition plans to be developed and quickly operationalised once the preferred option is chosen. These need to cover a range of factors including training at paediatrician and nursing level as well as 'step down' care.
Alignment to other networks	• Aligning the cardiac networks to other existing networks, such as those for foetal/obstetric services, neonatal services and GUCH in order that a holistic, child centred approach is taken to ensure that children with co-morbidities receive all services in a single centre or a small number of hospitals working together.
Cross-over and postcode issues	• Clarity on how any of the network models would deal with cross-over between for example London and the Midlands and specific postcode areas where clinicians indicated that there were issues or uncertainties.
IT systems and communication	• The need for IT systems to support network functioning, particularly to promote good communication within and between centres and also to allow the sharing of patient notes by professionals working across each network (recognising that patient confidentiality must be upheld).
Referral guidance and robust commissioning	• Clear guidance for referrers on how the system should operate in their area, supported by robust commissioning arrangements. Also clinical protocols developed by networks to reduce variation.

Theme 2: The role and function of outreach clinics and cardiology centres

Participants discussed promoting consistency in outreach clinics and debated whether the role of cardiology centres would work within the proposed network models under S&S, although they indicated that the S&S process had tended to focus on the surgical aspects of care so far. An overarching concern for both of these concepts was that both outreach services and cardiology centres would require the support of *Paediatricians with Expertise in Cardiology (PECs)*, however their availability was considered to be patchy, and this could be costly and time-consuming to overcome. Participants identified a range of areas in which further clarity was required, or suggestions as to how these concepts could operate more effectively – these are shown in the table below.

Outreach clinics – how to support these?	Cardiology centres - areas to be considered/clarified
• ***Inequity in provision –*** availability of the equipment and cardiac liaison nursing support within each clinic on a consistent basis, however, commissioning arrangements can be a disincentive.	• ***Co-location with surgical centres –*** there was discussion that this was thought to be advantageous particularly for urgent patients where referrers may be reluctant to refer to a stand-alone cardiology centre. However the definition of co-location was debated. In general there was also a view that there needed to be more clarity around the referral route for cardiac patients between referrer, cardiology centre and cardiac surgical centre.
• ***Service standards –*** clinics should be supported by agreed standards to ensure that patients receive a consistently high level of service regardless of location.	• ***Staffing and skills –*** there were views that these centres should be staffed by cardiologists and the availability and capacity of PECs was questioned . Participants also highlighted the need for ECHO expertise. Overall there was a view that likely to be difficulties in recruiting skilled staff to these centres.
• ***Children with co-morbidities –*** often children and parents in this group are keen to receive all care at a specialist centre to promote continuity of care and prevent duplication.	• ***Impact on other services –*** other specialties were often thought to be dependent on the existence of in-house cardiology expertise, although there was concern that paediatric anaesthetists with skills in cardiac care would only be based in surgical centres.
• ***Operating model -*** a preferred , cost-effective operating model would need to be identified in terms of who is responsible for the clinics (i.e. the surgical centre or the host Trust), supported by technology for sharing patient notes and to promote efficient use of staff time.	• ***Sustainability –*** these centres were viewed as less attractive places to work and would need careful consideration in terms of job planning and training. Shared appointments between cardiology centres and surgical centres was put forward as a potential solution where this would be geographically viable (i.e. relatively short distances between the two types of centre).

Theme 3: Potential for destabilisation of other services

In each of the groups, a number of participants indicated concerns that the implementation of any one of the four options under S&S could potentially destabilise services beyond those in the surgical centres during the transition period and the longer term. Broadly these destabilising effects could be grouped into two core areas – effect on service provision and effects on staff – as shown below.

Effects on services

- Changes implemented as a result of S&S were thought to most likely impact upon **PICU, cardiac wards, retrieval, outreach and other tertiary services**, with some further concerns over the ability to provide more general surgical and respiratory services in the absence of access to cardiology surgical support. Such assumptions could be tested using data from existing sources.
- Learning from the **experience of previous reconfigurations** of paediatric cardiac surgery (e.g. In Cardiff, Glasgow/ Edinburgh and the North West) should be considered.
- A mechanism for **supporting decommissioned units in the transition period** was desired. It was thought that patients may be reluctant to use these units.

Effects on staff

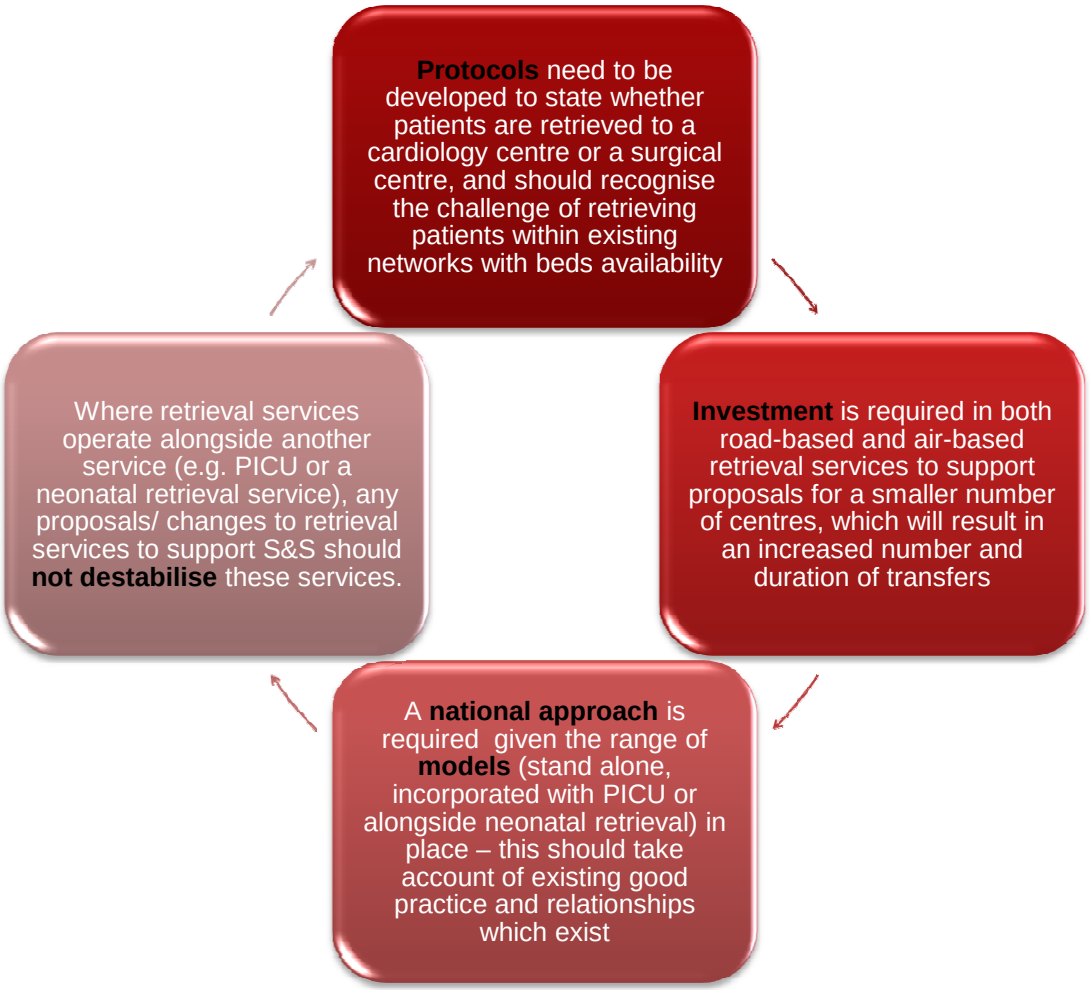
- The people aspects of the transition process need to be considered, particularly as any **staff moves** (planned or unplanned) could decrease levels of experience and skills in decommissioned units, and thus impact upon the quality of service provided.
- However this could also impact on centres within the chosen option, if **experienced staff** from the decommissioned units are not willing to work elsewhere, and new staff with the requisite skills cannot be found.
- Therefore there is a need to thoroughly **test** the extent to which staff in units to be decommissioned would be willing to move to other centres across **each of the options** and across **each of the professional groups** (clinical, nursing and more widely).

Theme 4: Retrieval

Two of the three groups specifically discussed issues around retrieval services, and how they would function to support the provision of paediatric cardiac surgery.

Concerns as to how well supported current retrieval services could operate in the future network model were expressed.

There were a number of linked areas in which participants requested clarity, or put forward suggestions as to how retrieval services could operate more effectively – these are shown in the diagram opposite.



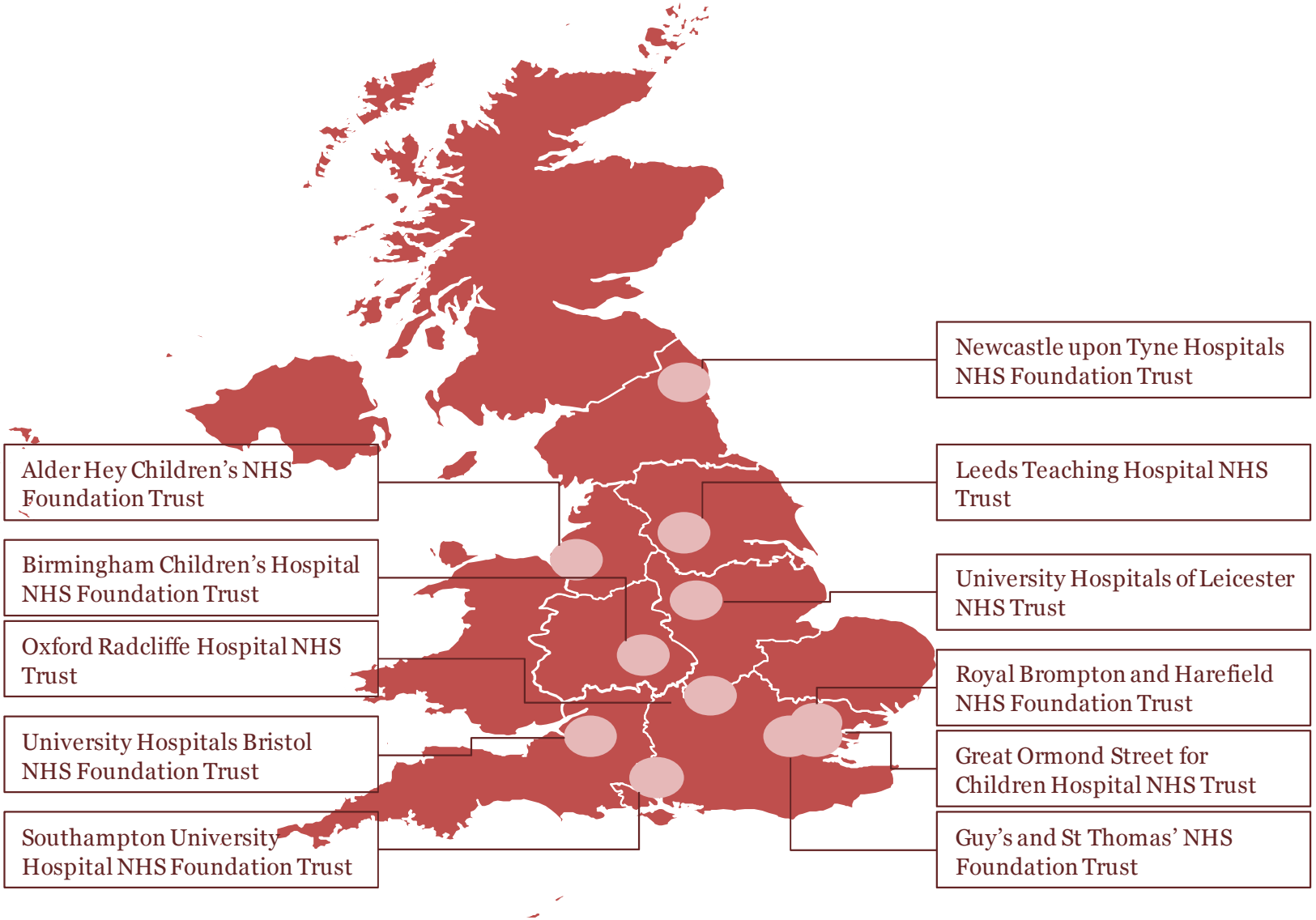
Theme 5: Supporting positive clinical outcomes

During the discussion, each of the three groups highlighted the need to promote that any changes optimise the quality of clinical outcomes achieved by paediatric cardiac surgical services, and agreed that as a core principle, the experience of good quality care should be the same whether in a surgical centre or outreach clinic. Suggestions on how these positive outcomes could be promoted were put forward as follows:

- The need to ensure that **commissioning processes** support the provision of high quality care, recognising that all centres cannot and do not currently provide the full range of cardiac surgical procedures, or to the same standard. There are datasets (such as CCAD and PICA.net) which can be used to compare procedures undertaken and outcomes achieved between the different centres, and there was a view that this needs to be understood and shared more widely.
- **Funding arrangements** to remove disincentives to networking. For example, where tariff payment is paid to an outreach hospital, the surgical centre clinician time is funded at cost, creating a disincentive for the surgical centre to provide expertise to outreach clinics. In addition, there is variation in the funding arrangements to support the provision of liaison nurses across different networks, potentially resulting in differential experiences of care.
- Shared **clinical protocols** should be developed within and across the cardiac networks in order to reduce variation in care standards and outcomes. Variation currently exists in terms of personnel available, equipment and prescribing habits, and this needs to be addressed for the future.
- An **audit of skills** across proposed surgical centres, cardiology centres and outreach clinics should be undertaken in order to identify any gaps in knowledge, skills or experience, so that **training** can be put in place to address these gaps.
- Participants questioned the **three-tier model** proposed by S&S but suggested that it may be workable as long as the system **eradicates any undue delays** in terms of referral of patients between the different tiers and there is clarity and appropriate support for the role of individual clinicians and NHS organisations.

Appendix

Safe and Sustainable Review - 11 centres focused upon...



Safe and Sustainable Review - Options A, B, C & D and associated centres…

Option A:	Option C:
Seven surgical centres at:	***Six surgical centres at:***
1. Freeman Hospital, Newcastle (NUTH) 2. Alder Hey Children's Hospital, Liverpool (AH) 3. Glenfield Hospital, Leicester (UHL) 4. Birmingham Children's Hospital (BCH) 5. Bristol Royal Hospital for Children (UHB) 6. Evelina Children's Hospital, London (GSTT) 7. Great Ormond Street Hospital for Children, London (GOSH)	1. Freeman Hospital, Newcastle (NUTH) 2. Alder Hey Children's Hospital, Liverpool (AH) 3. Birmingham Children's Hospital (BCH) 4. Bristol Royal Hospital for Children (UHB) 5. Evelina Children's Hospital, London (GSTT) 6. Great Ormond Street Hospital for Children, London (GOSH)
Option B:	**Option D:**
Seven surgical centres at:	***Six surgical centres at:***
1. Freeman Hospital, Newcastle (NUTH) 2. Alder Hey Children's Hospital, Liverpool (AH) 3. Birmingham Children's Hospital (BCH) 4. Bristol Royal Hospital for Children (UHB) 5. Southampton General Hospital (SUH) 6. Evelina Children's Hospital, London (GSTT) 7. Great Ormond Street Hospital for Children, London (GOSH)	1. Leeds General Infirmary (LTH) 2. Alder Hey Children's Hospital, Liverpool (AH) 3. Birmingham Children's Hospital (BCH) 4. Bristol Royal Hospital for Children (UHB) 5. Evelina Children's Hospital, London (GSTT) 6. Great Ormond Street Hospital for Children, London (GOSH)