



A survey of imaging services for children in England, Wales and Scotland

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ABSTRACT

Purpose: Children are major users of imaging services but little is known about the provision made for them. The objectives of this survey were to: determine the extent to which children are imaged in primarily adult departments and the nature of procedures performed; establish the availability of child friendly environments and investigate the extent to which children are involved in service development. **Methods:** An 18 item questionnaire was sent to all hospitals with imaging facilities in the UK. Two versions were produced, one for adult departments and another for children's hospitals. Quantitative data were entered into SPSS-PC.

Results: Three hundred and fifty two questionnaires were returned including 17 from the 20 children's hospitals, representing a 70% response rate. Children were imaged in 84% of adult hospitals from which responses were obtained and estimates provided by respondents indicated that more children were imaged in adult than children's hospitals. In 89% of adult hospitals responses indicated that infants were imaged and in two thirds of English hospitals advanced procedures, such as MRI, were available for children. In 47%, 32% and 30% of adult hospitals in England, Wales and Scotland children's requirements were said to be considered when purchasing equipment. In 34%, 11% and 8% of English, Welsh and Scottish adult hospitals some separate provision for children (for example waiting rooms or toilets) was indicated. Overall 32% of adult hospitals (92 of the 95 were in England) reported having a lead radiographer, who specialised in a paediatric imaging. Responses indicated that in 60% of adult hospitals staff attended paediatric training courses. Children's views on hospital services were seldom sought in either the adult or children's hospitals.

Conclusions: The survey indicates that the recommendations of the Children's National Service Framework and the Health Care Commission have not been implemented fully in many imaging departments.

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Introduction

Children are major users of health services. The Department of Health (England) has estimated in a typical year up to half of all infants and one quarter of children over 12 months will attend an accident and emergency (A&E) department.¹ In addition, one in 15 children is likely to be admitted to hospital.² Therefore, significant numbers of children are likely to be referred to imaging departments.

The Platt report³ over 50 years ago recommended that children should not be treated as 'small adults'. A view endorsed by the Children's National Service Framework (NSF) in 2003.² This advocated that all areas of child health care should be child-centred, and all should have access to such services no matter where they live.⁴ Progress towards the NSF's targets was assessed by the Health Care

Commission (HCC) in 2007.⁵ The main findings were that health trusts had made some progress towards meeting children's general needs, and creating more child – friendly environments. The Commission concluded that children's needs were best met in a children's only service and recommended that 'all staff treating or caring for children or young people should have appropriate training, and should undergo regular updating and refreshment of skills'. Despite the comprehensiveness of the Commission's work there was no specific reference to imaging departments or recommendations made regarding them.

Imaging services were, however, specifically considered by the Commission in the report *An Improving picture? Imaging services in Acute and Specialist Trusts*⁶ but only one page of the 40 page document related to a 'child-centred service'. One of the main concerns expressed was the lack of separate areas for adults and children, resulting in children being in 'close proximity to adults with potentially distressing conditions' in an environment which is 'unfamiliar and sometimes a frightening place for a child'. It was recommended that an 'appropriate environment' should be provided. Currently we do not know the type of provision made

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across the United Kingdom (UK) as there is a lack of research on imaging services for children, as revealed by the authors' search [Medline (1996–2008) and Cinahl (1982–2008)]. The majority of literature relating to children and radiology concerns: the development of new technologies^{7–11} imaging procedures (including radiation dose) for specific medical conditions^{12–18}; imaging of non-accidental injury^{19–21} and safe immobilisation practice.^{22,23}

The aim of our survey, therefore, was to establish the provision of imaging services for children in adult and children's hospitals in England, Wales and Scotland. The objectives were to: i) determine the nature and extent of imaging for children carried out in X-ray departments; ii) establish types of procedures performed; iii) ascertain the availability of child-centred environments and iv) investigate the extent to which children were involved in service development.

Method

A quantitative methodology was adopted given the nature of the questions posed. A questionnaire survey was undertaken throughout Scotland in 2007, and subsequently repeated in England and Wales in 2008. Northern Ireland was not included because a major reorganisation of health services was in progress.

Ethical approval

The National Research Ethics Service (NRES) considered a full application was not required because a service evaluation was being undertaken.

Questionnaire development

A questionnaire was developed and two versions of the 18 item questionnaire were produced. One for completion in hospitals primarily designed to care and treat adults and the other for completion in dedicated children's hospitals. The questions for inclusion in the questionnaire were developed from topics and issues identified amongst the co-authors, two of whom are members of the Association of Paediatric Radiographers. Five sections were included relating to: i) the demographics of the participating hospital; ii) imaging services in the hospital; iii) the departmental environment; iv) staff and training; and v) procedures and policies relating to children. Space was provided at the end of the questionnaire for general comments. Prior to the commencement of the study the questionnaire was piloted in Northern Ireland ($n = 5$) and minor amendments made.

Distribution of questionnaires

Hospitals with imaging facilities were identified through the NHS Trusts and Strategic Health Authorities (SHA) in England website²⁴ and the NHS Wales website,²⁵ while in Scotland they were accessed through the Scottish Health on the Web.²⁶ The relevant hospital was contacted if the situation was unclear. Children's hospitals were identified through the Association of Paediatric Radiographers.²⁷

The questionnaires with unique identifiers (to ensure confidentiality and enable follow-up of non-respondents) together with pre-paid envelopes were mailed to superintendent radiographers or radiography managers in all hospitals with imaging departments. Reminders with an additional copy of the questionnaire attached were sent at approximately three and six weeks after the first mailing. An electronic version of the questionnaire had been available during the data collection period in Scotland but it was thought unnecessary to continue this for England and Wales as there had been a poor uptake in Scotland ($n = 3$).

Table 1

The response rate from hospitals, and adult hospitals who reported imaging children.

	England		Wales		Scotland		AI	
Adult hospitals								
Sample	365		46		95		506	
Returned	254	70	28	79	70	74	352	70
Respondents who image children	213	84	22	79	61	87	296	84
Children's hospitals								
Sample	16		1		3		20	
Returned	13	81	1	100	3	100	17	85

Data analysis

All quantitative data from the questionnaires was entered into SPSS-PC. Responses to the open-ended questions were read and organised into themes by a member of the research team. Quotations are included in the text in italics. The results from the Scotland-wide survey were not placed in the public domain so as to avoid influencing responses to the English and Welsh surveys, which took place later.

Adult hospital data are presented by country, but have been aggregated for children's hospitals in England and Wales to ensure confidentiality for the sole children's hospital in Wales. If results from the three countries are similar one aggregated percentage has been given in the results. When the results from the three countries show a variation, these have been included to allow comparison.

Statistical advice was sought with regards to the differences in services reported by the respondents across the three countries. Due to the high number of variables such as differing health policies, and health budget spending, the application of a test of statistical significance would not be appropriate.

Results

Response rate

A 70% response rate was obtained with 352 questionnaires returned from adult imaging facilities (Table 1). Responses were received from 102 NHS Acute/Teaching, 67 Foundation and 39 Primary Care Trusts in England and Wales, and 11 Acute/Acute Teaching hospitals, and 47 community/district general hospitals in Scotland.

Seventeen of the 20 children's hospitals responded; 3 English children's hospitals did not return questionnaires (Table 1).

Denominators fluctuate in the sections below as not all questionnaire respondents in adult hospitals answered all of the questions.

Numbers of children imaged

Estimates made by respondents indicate that at least two million children are imaged in the United Kingdom; approximately 1.5 million in adult hospitals (over 1.3 million in England, 50,500 in Wales, and 97,000 in Scotland), with nearly half a million in children's hospitals (approximately 380,000 in England and Wales, and 90,000 in Scotland).

In 84% of adult hospitals respondents reported that services were provided for children (Table 1) but 32% ($n = 94/296$) of departments did not indicate the numbers of children who were annually imaged. Table 2 indicates that for the majority of those who replied to the question, children accounted for less than 10% of their workload.

Table 2

Estimated percentage of child related workload in adult hospitals (as reported by respondents^a).

% workload	All		England		Wales		Scotland	
	n	%	n	%	n	%	n	%
30% & over	4	2	3	2	—	—	1	2
20–29%	15	8	10	7	1	7	4	9
10–19%	39	20	25	18	5	33	9	20
<10%	140	70	101	73	9	60	30	68
All workloads	198	100	139	100	15	100	44	99

^a Question not answered by 76, 7 and 17 respondents in England, Wales and Scotland.

Access to imaging services

A 24 hour/seven days a week service was provided for children in 54% (165/293) of adult hospitals. All but one of the children's hospitals provided such a service. An additional 24% (71/293) described a plethora of part-time services reflecting the working hours of the individual hospitals.

Ages of children imaged

Responses from adult hospitals indicated a total of 89% (248/280) imaged infants under a year old (91% [186/205]; 95% [19/20] and 78% [43/55] for England, Wales and Scotland respectively). In 29 adult hospitals imaging services commenced from 12 months onwards and in three from 10 years of age.

Services in children's hospitals in all three countries were described as available from the beginning of life to teenage years (range of 13–19 years).

Imaging provided

A range of imaging services was provided for children in adult (Table 3) and children's hospitals. The availability of advanced procedures for children in adult hospital such as CT and MRI varied across the three countries. Such procedures were available in all children's hospitals with the exception of one in Scotland where the children attended the adjacent adult hospital.

Child appropriate equipment

The requirements for children were considered by 45% [95/213]; 32% [6/32] and 30% [18/61] of English, Welsh and Scottish adult hospitals when purchasing imaging equipment. The main factors (as given in Table 4) which were taken into account by both adult and children's hospitals were radiation dose rates for children, and the ease of movement of the equipment around a child, as described by one respondent as follows;

Table 3

Imaging modalities provided for children in adult hospitals (as reported by respondents).

Modality	England n = 212		Wales n = 22		Scotland n = 61	
	n ^a	%	n ^a	%	n ^a	%
Plain film	212	100	22	100	60 ^b	98
Ultrasound	168	79	13	59	33	54
Fluoroscopy	141	67	10	46	17	28
CT	138	65	8	36	18	30
MRI	123	58	8	36	9	15
Other e.g. nuclear medicine	53	25	5	22	7	11

^a Does not sum to 100 as respondents described more than one procedure.

^b 1 Missing case.

Table 4

Factors taken into consideration in selecting equipment in adult hospitals (as reported by respondents^a).

Factor	England n = 95 ^a		Wales n = 6 ^a		Scotland n = 18 ^a	
	n ^b	%	n ^b	%	n ^b	%
Radiation dose to children	37	39	4	67	3	17
Ease of movement around a child	31	33	1	17	15	83
Accessory equipment e.g. immobilisation aids	23	24	1	17	7	39
Associated with type of imaging e.g. ultrasound probes, MRI coils	16	17	—	—	2	11

^a 120, 16, and 43 respondents from England, Wales and Scotland stated that children's needs were not taken into consideration when selecting equipment.

^b does not sum to 100 as respondents indicated more than one factor.

'Ease of use of equipment to reduce examination time. Flexibility of equipment to enable non-standard projections to be performed. Ceiling to floor range to allow erect exposures to be made on children. (Adult hospital, Scotland)

Respondents from two hospitals in Wales stated that as equipment was procured centrally they had little say in its selection.

Child friendly environments

Waiting and X-ray rooms

Eighty percent (238/297) of respondents from adult hospitals indicated that children's needs were taken into account in waiting rooms, through for example the provision of books, toys and play mats (Table 5). In 45 hospitals child friendly information was described as available (Table 5). Provision was variable across the three countries. Children's hospitals tended to provide a wider range of activities (Table 5) and in nine cases radiographers wore child friendly uniforms, for example incorporating fabric with cartoon characters (Table 5).

Three-quarters of respondents who reported activities for children were available in waiting areas also said there was special provision in X-ray rooms through, for instance, child friendly decoration (Table 5). Of the five children's hospitals which provided description of different features, four described the presence and use of distraction projectors and lights.

Separate facilities for adults and children

In 34%, 11% and 8% of English, Welsh and Scottish adult hospitals some separate provision for children was indicated, such as separate waiting rooms and toilets, but these were only available during the working day (Table 6).

Use of a play specialist

One hundred and one respondents from adult hospitals indicated they had access to a play specialist, but they were only used to prepare children for imaging procedures in 81 (68 English, 6 Welsh, and 7 Scottish) hospitals. In both adult and children's hospitals this was mostly prior to MRI (n = 44), CT scanning (n = 44) and fluoroscopy (n = 41). This was described as involving:

'Playing with a toy CT scanner, explaining to a child what will happen, and a visit to [the] CT scanner.' (Adult hospital, England)

'Sound preparation, photographic preparation, (and) visits to departments to enable patients to become familiar with equipment used for examinations.' (Children's hospital, Scotland)

Lead radiographer for children in adult hospitals

Overall 32% (95/296) of adult hospitals (92 of the 95 were in England) reported having a lead radiographer, who specialised in

Table 5Provision made for children in waiting and X-ray rooms in adult and children's hospital^a (as reported by respondents).

Provision	Adult hospitals n = 284						Children's hospitals n = 17	
	England n = 201 ^b		Wales n = 22 ^b		Scotland n = 61 ^b		All n = 17 ^b	
	Waiting	X-ray	Waiting	X-ray	Waiting	X-ray	Waiting	X-ray
Toys and play-mats	67	50	57	36	51	26	100	94
Books	63	33	61	15	44	20	100	94
Decoration and art	41	45	48	36	23	28	94	94
TV	22	7	4	1	8	3	71	41
Children friendly info	17	10	–	1	11	11	82	71
Music	14	12	17	1	7	10	29	82
Lower furniture fitments	14	5	4	1	5	2	59	57
DVDs/videos	11	12	–	1	2	5	65	59
Electronic games	4	1	4	1	–	–	65	18

^a 32, 2, and 37 respondents in England, Wales and Scotland stated that there was no provision for children in their department.^b does not sum to 100 as respondents indicated more than one provision.

paediatric imaging. The main duties were given as: training and the provision of continuing professional development of radiographers on child related issues ($n = 31$); the development of departmental policies and guidelines ($n = 24$); undertaking the imaging of children in the case of suspected non-accidental injury ($n = 12$) and liaising with other paediatric staff ($n = 9$), as reflected in the following:

'... responsible for child protection issues, updating policies and procedures, and educating new staff to feel confident with X-raying children.' (Adult hospital, England)

In 79% (75/95) of departments with a lead radiographer a 24/7 service for children was available, and 65% reported that the needs of children were taken into consideration when purchasing equipment.

Contact with children's hospitals

Twenty-one percent (59/271) of respondents from adult hospitals stated they had criteria in place for referring children onwards to the nearest children's hospital if specialist care was required. Twenty percent (59/296) of adult hospitals indicated they had a contact radiographer in a children's hospital if they required advice on any issues related to imaging children.

Staff and training

In 71% (152/213), 50% (11/22) and 26% (16/60) of adult hospitals in England, Wales and Scotland respectively staff were reported as attending paediatric training courses. Approximately 50% and 25% attended in-house and external courses respectively. The main topics were child protection, resuscitation and paediatric imaging techniques.

Table 6Separate facilities for children in adult hospitals (reported by respondents^a).

	England n = 54 ^b	Wales n = 3 ^b	Scotland n = 5 ^b
Separate waiting room (9.00am–5.00pm)	48	2	5
Separate waiting room (Out of hours)	22	1	1
Separate changing room (9.00–5.00pm)	14	–	1
Separate toilets (9.00am–5.00pm)	11	–	5
Separate changing room (Out of hours)	6	–	1
Separate toilets (Out of hours)	6	–	1

^a 161, 19, and 56 respondents in England, Wales and Scotland stated that there was no separate facilities available.^b Does not sum to 100 as respondents indicated more than one provision.

Respondents in children's hospitals reported staff attending in-house ($n = 9$) and external ($n = 7$) training courses. In all 17 children's hospitals resuscitation courses were in-house and 16 cases stated this also applied to courses in child protection. In four children's hospitals radiographers were described as attending university post-graduate courses as part of a Masters qualification for instance on imaging paediatrics. One respondent said it was *'difficult to find external courses as often cancelled due to low uptake'* (Children's hospital, England).

Policies

Approximately 80% of adult hospitals were described as having policies in place addressing the non-accidental injury of a child, and over 60% regarding possible pregnancy of a minor. Policies regarding restraint and immobilisation and consent were less common (Table 7). A similar trend was evident in the case of the children's hospitals. The three Scottish hospitals had policies covering all four areas.

Protocols

Thirteen percent (37/285) of adult hospitals and six of the children's hospitals respondents reported that specific protocols were in place regarding the care of children with physical, learning, or emotional and behavioural disabilities. Three respondents described using 'Trust protocols', and a further 50 said they had informal 'plans'. These included calling on other health care professionals for assistance ($n = 9$), scheduling the appointment for a specific time ($n = 6$) and having carer present with the patient ($n = 4$) as illustrated below;

'...patients with these known disabilities are given appointment times when the department is quiet and fully staffed to enable X-ray procedure in timely fashion and causing least distress to patient.' (Adult hospital, Scotland)

'Disability awareness card to fast track patient which goes into each area with the patient' (Adult hospital, England.)

'Many of our dental nurses are trained in certain aspects of radiography and accompany these patients- this continuity we find helpful to the patients' (Adult hospital, England)

Four children's hospitals in England and Wales and two in Scotland reported having protocols in place addressing the needs of children with special needs.

Table 7
Policies in place in adult and children's hospitals (as reported by respondents).

Policy	UK adult hospital						Children's hospitals	
	England n = 215 ^a		Wales n = 22 ^a		Scotland n = 61 ^a		All n = 17 ^a	
	n	%	n	%	n	%	n	%
Non-accidental injury	178	83	19	86	46	75	16	94
Possible pregnancy	121	56	19	77	44	72	14	82
Restraint and immobilisation	88	41	9	41	22	36	10	59
Consent	78	36	8	36	27	44	9	53

^a Does not sum to 100 as respondents indicated more than one policy.

Involving children in service development

Four adult and five children's hospitals were said to seek routinely the views of children on service provision, but for most it was said to occur on an ad hoc basis [76% (165/210), 91% (20/22), and 92% (56/61) in England, Wales and Scotland].

When views were sought they were described as helping;

'Provide a service that fits with family needs, e.g. extended opening hours etc. Information leaflets – what should be included' (Children's hospital, England).

Reflections by respondents on the study

Six respondents (England = 5; Scotland = 1) stated the questionnaire had made them aware that the service they provided was inadequate:

'Thank you for this survey it has brought to my attention how little we consider the needs of children visiting the department' (Adult hospital, England).

'The questionnaire has highlighted some areas where we are lacking, particularly in the written policies' (Adult hospital, Scotland).

Discussion

For far too long imaging services for children have been neglected by policy makers and commentators. This is despite significant numbers of children being referred to imaging departments for diagnosis and investigation of trauma, disease and illness. The respondents to our survey stated approximately two million children use their imaging services annually. This number must be regarded as an under estimate because: 1) over a third of participants failed to provide these statistics; 2) some double counting may have arisen through attendance figures being supplied and 3) 30% of questionnaires were not returned, including some from hospitals known to us to make provision for children. Our data indicates that currently more children are imaged in adult departments than in children's hospitals.

Variations in the provision of imaging services

Hospitals providing an imaging service to only children mainly provide a 24 hour/seven days a week service, but only half of adult hospitals provide such a service. This may have major implications if a parent is trying to access emergency care for their child out of hours, especially if there is no local children's hospital. Results also indicate the provision of advanced imaging for children in adult hospitals varies across the three countries. This is particularly true in Wales and Scotland and could result in children being transferred to other hospitals perhaps some distance from home if there

was need for such imaging procedures. Such differences have major implications for access to services and thus equity of provision.

Our survey also revealed differences in the provision of imaging services for children children's in adult and children's hospitals. This applies to many different aspects of care, including patient safety.

Patient safety

Consideration of children's needs when purchasing equipment:

Worryingly approximately two thirds of our respondents did not indicate on the questionnaire that children's requirements were taken into account in the purchase of imaging equipment. This is despite the recommendation of the National Framework for Children² which states 'equipment used for children must be the correct size for a child, and its design tailored to different needs at different stages of their development'. As only a third of respondents indicated they considered radiation dose to children when purchasing equipment, this could possibly result in harm to a child resulting from the radiation dose given. This is potentially problematic whilst using computed radiography (CR) and direct radiography (DR).²⁸ Compared to adults, children are more sensitive to radiation and this is true of conventional imaging²⁹ as well as interventional³⁰ and computed tomography (CT).³¹ As 60% of the sample of adult hospitals carried out CT this issue needs to be awarded a higher priority. This risk of over radiation is highlighted for example by the *Image Gently*³² campaign in the United States of America which is supported by the Society of Radiographers in the UK.

Non-accidental injury:

A further area of serious concern relating to patient safety is the lack of hospital policies in some key areas, such as concerning Non-Accidental Injury (NAI) to a child. This is despite both the Royal College of Radiologists and the Society of Radiographers having recommended the development of NAI policies at hospital level. Documents are available that give guidance not only in the development of these policies^{33–36} but also in the use of standardised imaging techniques and documentation required to provide evidence which is of value if the case should proceed to court.³⁵ Recent cases of child abuse have highlighted that all health professionals, including radiologists and radiographers, need to be vigilant in identifying children who may be at risk. It has been pointed out that radiographers, in particular, are on the front line to spot early signs of this.³⁷

Imaging of infants less than 12 months:

Our findings indicate the widespread practice of imaging infants less than 12 months of age (reported by 89% of respondents in adult hospitals) which gives rise to serious concerns. High levels of specialist clinical skills are required for imaging this group, who have been described as 'notoriously difficult to image'.³⁸ These may include the initial communication with the child, the positioning and immobilisation during the procedure and the interpretation of

images. These are not likely to be well developed in staff working in adult rather than children's hospitals, given the relatively low volume of children attending in some adult departments. In such circumstances patient care and treatment may be compromised. Chances to build up a wide repertoire of experiences are, therefore, restricted and paediatric training may not be awarded a high priority (as discussed below). In addition there seems to be few formal links between children's and adult hospitals. These could be established to share documents and policies and more importantly provide an opportunity for continuing professional development in order to share best practice.

Separate facilities for children and adults: In the light of the recommendations of the Health Care Commission⁵ we were surprised to discover that only a small number of adult hospitals were providing separate facilities, such as waiting rooms and toilets for children. This was particularly the case in Wales and Scotland. Children may be at risk through emotional distress as highlighted in the report *An Improving Picture?*⁶ children could be disturbed through contact with adults with distressing conditions and become anxious in an unfamiliar environment. Although the emotional well being of patients has tended to be neglected within the context of patient safety, it clearly needs to have a higher priority in the case of children, especially as it may impact on a lifetime's use of health services.

The provision of a child friendly service

The survey also revealed major differences between children's hospitals and departments in adult hospitals regarding the provision of a child friendly service.

Provision of play materials: Whereas all the children's hospitals were reported as providing a wide range of activities for children attending for imaging (Table 5), this was far rarer in adult departments. For example approximately half of Welsh and Scottish hospitals provided toys and play mats in waiting rooms compared to nearly three-quarters of English hospitals. Only a small number provided DVDs and videos. Given the popularity of electronic games with older children it was surprising their lack of availability in both adult and children's hospitals, despite opportunities being available to fund such a purchase.³⁹ In comparison to children's hospitals very few adult hospitals provide child friendly facilities within the X-ray rooms except toys and books, and decoration. For example the installation of music and distraction devices were more prevalent in children's hospitals even although these would be relatively easy to provide in any hospital. Lower furniture and fittings were uncommon in departments across England and Scotland and were reported by only one Welsh hospital but these were not universal in children's hospitals.

Play specialist: Play specialists were under utilised in adult hospitals that imaged children. This was despite the recognition that play specialists have an important role not only in the preparation for advanced technological procedures such as MRI^{40–42} but also in reducing children's fears regarding routine procedures,⁴³ thus contributing to the creation of more child friendly departments.

Child friendly information: Research to date indicates children desire information on health related matters when receiving care and treatment.^{44,45} Older children in particular are likely to use information to inform decision making and the giving of consent. Research by the authors,⁴⁶ however, highlighted informational needs require to be tailored to individual requirements and that 'one size will not fit all'. Although not all children's hospitals provided information material designed specifically for children, the provision of such material was poor in adult hospitals. Downloadable information has been developed and is readily available from web sites^{47,48} and it is also important that child friendly web

sites are signposted. It is also worthy of consideration that a child friendly site be set up, providing reliable information on imaging.

The picture that emerges, therefore, is of significant differences between hospitals, and across countries in the extent to which child friendly environments have been created. It is likely that for too many children imaging departments are 'a frightening place' to be⁶ that some hospitals are far from implementing the recommendations of the NSF. The development of policies and strategies may be needed at the departmental level to ensure this is addressed and children's experience of imaging is enhanced. In particular, it is important that the requirements of children with special needs are identified and appropriate provision made. It also must not be overlooked that staff have a crucial role to play in creating child friendly environments, as recognized by the HCC.⁵

Staff training

Many of the staff working in adult departments will not have undergone specialist paediatric training and may have had little previous experience of imaging children. As the HCC has advocated they may need to develop the 'technical clinical skills and the personal communication skills' necessary for treating children.⁵ However, it may still be a common assumption that while specialist radiographers are needed for CT scanning and ultrasound, for example, no particular training is required by those working with children³⁸ although it is recommended particularly with regard to communication.⁴⁹ The results of our survey indicate that paediatric training is far from widespread, although more prevalent in England than in Wales and Scotland respectively. Responses also indicated a high reliance on internal courses on a limited range of specific topics, such as on child protection and resuscitation. In the adult departments little reference was made to fundamental areas of practice, such as communicating with children, parents or carers, which was, however, highlighted by two thirds of respondents from children's hospitals with regard to course attendance.

It would appear from the information provided on the questionnaire that in the majority of adult hospitals paediatric training is ad hoc and reactive and consists largely of one off training or study days rather than being part of a structured programme of staff development which seeks to 'update and refresh skills'.⁵

Involving children in service development

It is increasingly expected that health practitioners will engage with patients in the planning of health services as well as establishing consumer satisfaction.^{50–52} However, the survey revealed that few departments either in adult or children's hospitals routinely sought the views of children on services. Yet this has been advocated for some time now by professional bodies such as the Royal College of Paediatrics and Child Health.⁵³ They recommended that 'the College should promote and support college members in involving children and young people (CYP) in their own individual practice, with particular emphasis on encouraging positive and effective communication with CYP'. In addition, the case for involving children and young people in clinical audit has been made.^{54,55} There is also mounting evidence of a growing demand from the younger generation to be heard.^{53,54,56–59} Health professionals, including radiologists and radiographers, need, therefore to develop systematic and child appropriate methods of engaging with children⁶⁰ and these will have to be integrated within routine practice. This will not be easy to achieve, as indicated by the results of our survey, reflecting the fact that there is little history of engaging with children in imaging services.⁶¹

Conclusion

From the above it is apparent significant numbers of children imaged in adult hospitals are receiving a service which fails to reflect best practice. Hospitals which provide a child only service are better placed to meet the needs of children,⁵ so children and their parents who cannot access these services due to where they live are being disadvantaged. Given the number of children being imaged in adult hospitals, action is urgently needed. A key aim should be to ensure that recommendations previously made by the HCC⁵ and in the report *An Improving picture?*⁶ are implemented.

We acknowledge that there are challenges in providing services for children in busy adult departments, especially where children represent only a small percentage of total workload. Indeed, it is only too easy for children's needs to be overlooked. Therefore, there would seem merit in having a lead radiographer for children in adult hospitals: in time the post holder might become a children's champion or advocate. Key aspects of the role would include: ensuring a child friendly department; developing policies and procedures for children and young persons; supervising staff training and professional development and liaising with staff in children's hospitals. These evidently are a reservoir of knowledge and skills and offer considerable opportunities for staff training and the sharing of best practice.

Where children comprise a low volume of work in a hospital (less than 10%) we consider on the basis of this study it is imperative that policy makers consider such options as 'children's centres for imaging'. These could be based for instance in one facility or one site and have specific functions for example the imaging of infants less than one year or providing advanced technological procedures. In addition, since we found such a wide variation of practice, we believe there could be major benefits from closer liaison between radiographers in adult hospitals and those in children's hospitals. This could help in the standardisation of service delivery.

Recommendations

This work has provided data on a wide range of aspects of imaging provision for children in adult and children's hospitals in England, Wales and Scotland and to the best of our knowledge it is the first time a comprehensive picture of services has been available, thus enabling recommendations to be made.

It is recommended:

- 1) the recommendations of key documents such as the Children's National Service Framework,² the HCC's Report *Improving Services for Children*⁵ and the Society and College of Radiographers' *Practice Standards for the Imaging of Children and Young People*⁶² to be implemented by all who provide imaging services for children. Radiography managers should ensure all staffs are aware of the above recommendations and their own individual responsibility for putting them into operation.
- 2) all involved in the procurement of equipment should recognise the needs of children and young people, such as the necessity of reduced radiation dose, are considered when choosing imaging equipment if a service for children is provided.
- 3) departments in adult hospitals where imaging services for children are available establish formal links with departments in children's hospitals and other hospitals to establish and share best practice.
- 4) policy makers explore the feasibility of setting up child centres for imaging, where for example specialist services, such as the imaging of infants and provision of MRI and CT, are offered.

- 5) all departments where the imaging of children occurs should have a lead radiographer who can champion⁶³ children's service provision.
- 6) separate waiting, changing areas and toilets be provided for children where imaging services for them are offered.
- 7) child friendly materials for children, such as books, play materials and games be provided by imaging departments which image children and consideration be given to the provision of music in waiting and X-ray rooms.
- 8) child friendly information on imaging be provided in all departments, including reference to child friendly web sites describing imaging procedures. This could be initiated by the Association of Paediatric Radiographers in association with the Society of Radiographers.
- 9) all departments should ensure that the views of children and their parents on service delivery are routinely established and that they are used to inform practice.
- 10) all staff who image children develop individualised plans for professional development (including a range of development activities) which address their needs concerning the imaging of children. This should be implemented and reviewed regularly.
- 11) professional bodies should review regularly imaging services for children and make recommendations which are evidence based and monitor the implementation of them.
- 12) universities throughout the UK should provide appropriate post-graduate education⁶⁴ for staff imaging children. They ought to consider the initiation of research programmes into aspects of paediatric imaging such optimisation of radiation doses during all types of imaging procedures, in order to provide evidence to underpin best practice.

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End note

Since the completion of this study The Society and College of Radiographers (UK) in conjunction with the Association of Paediatric Radiographers have issued new guidelines for the practice standards for imaging of children.⁶² A number of these recommendations are echoed in a recent report issued by the National Imaging Board.⁶⁵

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