Future of Imaging

HEALTHAWARENESS.CO.UK

Transforming radiology with cooperation

Improving efficiency and patient care through new techniques

PHOTO: ViewRay Inc

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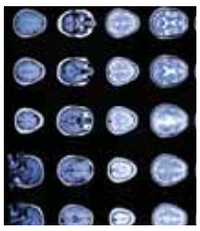

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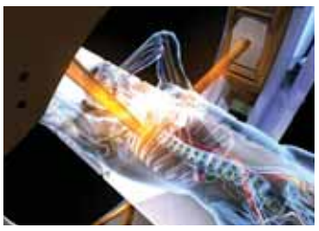

Transformation
How we can take a personalised approach to diagnosis and treatment

The future of imaging: an issue for us all

Since 1895 when Wilhelm Roentgen discovered X-rays, imaging has played an increasingly vital role in medicine. Imaging underpins almost every patient diagnosis and treatment, from the early diagnosis of cancer, to detecting abnormalities in the womb, identifying a bone fracture, or guiding modern radiotherapy treatments. **It has, quite simply, transformed healthcare.**

We now have the ability to diagnose disease earlier and with greater certainty and this leads to better outcomes. New approaches such as using optical radiation to image at the molecular level are being developed and personalised imaging is becoming a reality, so an individual's imaging features, combined with genomic or lifestyle data, leads to a personalised approach to diagnosis or treatment.

Challenges ahead

But as we live longer and medicine advances, the radiology workforce faces immense challenges. There are more requests for imaging and we struggle to keep pace with advancing scanner technology in a budget-pressured environment. With a shortage of radiologists, departments are outsourcing radiology services, depending heavily upon reporting radiographers coping with the reporting backlog or exploring "machine reading", controversial solutions which require sound governance.

Also, X-rays carry a small risk for patients and staff but through education and campaigns we aim to reduce unnecessary referrals and radiation dose for all.

Andy Rogers
President, The British Institute of Radiology

Driving change

This campaign aims to raise awareness, not only of the exciting future of radiology but the controversies and the challenges the imaging community faces as technology drives forward. I believe the future of imaging is a bright one and by working together we should spread the word about innovation, new ways of working and good practice to offer the very best diagnostic and therapeutic service to our patients. Their wellbeing couldn't be in better hands. ■

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COMMERCIAL FEATURE

The what and why of molecular imaging

By Linda Whitney

Molecular imaging – one of the newest ways to image the human body – will help doctors deliver increasingly personalised care for cancer patients.

Molecular imaging is a cutting-edge imaging technology, but what is it and what can it do?

Jonathan Allis, chief executive of Blue Earth Diagnostics, an Oxford-based company developing molecular imaging agents for cancer, explains: "Years ago, patients with suspected cancer would often be admitted to hospital for what was called an 'exploratory operation'. Today almost every stage of cancer care, from diagnosis, staging the cancer, planning radiation therapy through to monitoring treatment – involves imaging.

"Conventional technologies such as X-Rays, MRI and CT scans are used to examine the structure of the body – and in cancer care to pinpoint the location of a tumour or to observe its size before and after treatment. These technologies, however, have limitations – for example, they may not be able to distinguish between a tumour that is still active and one that's been successfully treated.

"Molecular imaging takes a different approach. By revealing the biology of cells, it allows doctors to investigate if the cells are using energy, are growing, or are in a low-oxygen environment and so less susceptible to radiation treatment. Molecular imaging can also reveal whether cancer cells are dying, enabling the progress of therapy to be evaluated more quickly so doctors can make more informed decisions about how to care for patients."

Jonathan Allis
Chief Executive,
Blue Earth Diagnostics

The patient is injected with a targeted radiopharmaceutical – a drug loaded with a tiny amount of radioactivity – which is taken up by cells and emits a signal picked up on a PET scan.

One agent used routinely in cancer care is FDG, a glucose-based molecule linked to radioactive fluorine. Many cancers are hungry for energy and absorb the FDG which lights up the tumours on the scan. Worldwide about five million FDG scans are carried out each year. However, FDG works poorly on some cancers. Allis says: "Prostate cancer cells, for instance, consume little glucose, so do not show up well."

To overcome this challenge, scientists are developing new agents to image cancer cells with much greater specificity. "Molecular imaging means more personalised medicine," says Allis. "By helping doctors to accurately spot the site of a tumour, it has potential to transform the management of cancer."

www.blueearthdiagnostics.com

BLUE EARTH DIAGNOSTICS

COMMERCIAL FEATURE

New technology could improve breast cancer detection

By Linda Whitney

A new imaging technology that could make breast cancer diagnosis and treatment easier will be available shortly.

The Micrima MARIA™ system employs high-frequency radio waves similar to those used by mobile phones to reveal internal features such as cysts, calcifications and tumours.

Consultant radiologist Professor Iain Lyburn, who has been involved in clinical evaluation of the system at Thirlestaine Breast Centre, Cheltenham, says: "We have been using it alongside mammograms and ultrasound scans for women who have shown breast cancer symptoms. Trials have shown that high-frequency radio wave scans have the potential to be better than mammograms at detecting tumours particularly in women with denser breast tissue, a characteristic of younger women."

It could also contribute to more individualised care and reduce the risk of unnecessary operations. "At present, anything that mammograms, ultrasound and core biopsies show could be malignant is frequently surgically removed," says Lyburn, "but by adding in the higher discrimination of high-frequency radio wave scanning results can be more specific, which means the risk of over-treatment could be reduced."

Professor Iain Lyburn
Consultant Radiologist,
Thirlestaine Breast Centre,
Cheltenham

Unlike mammograms, no radiation is involved, an important benefit for patients who need more frequent scanning, such as those with a family history of breast cancer. It can also be used in cases where chemotherapy is started prior to surgery, in order to check the effect of chemotherapy on the tumour, and help determine the need for any further treatment.

How does it work?

The five minutes-per-side scan involves no compression of the breast, so any patient discomfort is eliminated, reducing the risk of patients dropping out of screening programmes.

So far the system has been used on 500 patients. Lyburn says: "The next trial, in 2017, will focus on refining the system so it can discriminate between benign and malignant tumours.

"As initial trials are now concluding on MARIA™, it is becoming available for hospitals to use in patients who already have symptoms and trials of its use in general screening will begin shortly, initially for younger women, those with denser breasts and those with a family history of breast cancer."

www.micrima.com

Micrima

INSPIRATION

COLUMN

Dr Neelam Dugar
Consultant Radiologist,
Doncaster Royal Infirmary

Moving towards better image sharing

Radiologists are taking steps to achieve faster image and data sharing among UK hospitals.

Dr Neelam Dugar, consultant radiologist at Doncaster Royal Infirmary, says: "Most hospitals currently use the Image Exchange Portal (IEP) for sharing images. Different hospitals have Picture Archiving Communication Systems (PACS) bought from different vendors. These vendors use different access protocols, so one vendor's system may not allow access to another."

What's needed, says Dugar, is a standardised protocol that all vendors must use. The standard already exists, and the vendors are willing to carry out the necessary changes to implement the standard, but there is a cost.

Dugar, who has worked with the Royal College of Radiologists on 'Who Shares Wins', a document detailing the solution, says: "Patient centric instant access to the images and reports stored in neighbouring hospitals is essential to patient care.

"Trusts should lobby the NHS nationally to fund the work. The document sets out the recipe. Now we need someone to buy the ingredients and bake the cake." ■

By Linda Whitney

How to request the right test for each patient

Choosing the right imaging method is vital in improving patient care, reducing pressure on scarce radiology resources and saving the NHS money.

By Linda Whitney

When an X-ray or a scan is requested to help diagnose a condition, the patient assumes the right kind of imaging test has been chosen. But sometimes, medical professionals get it wrong.

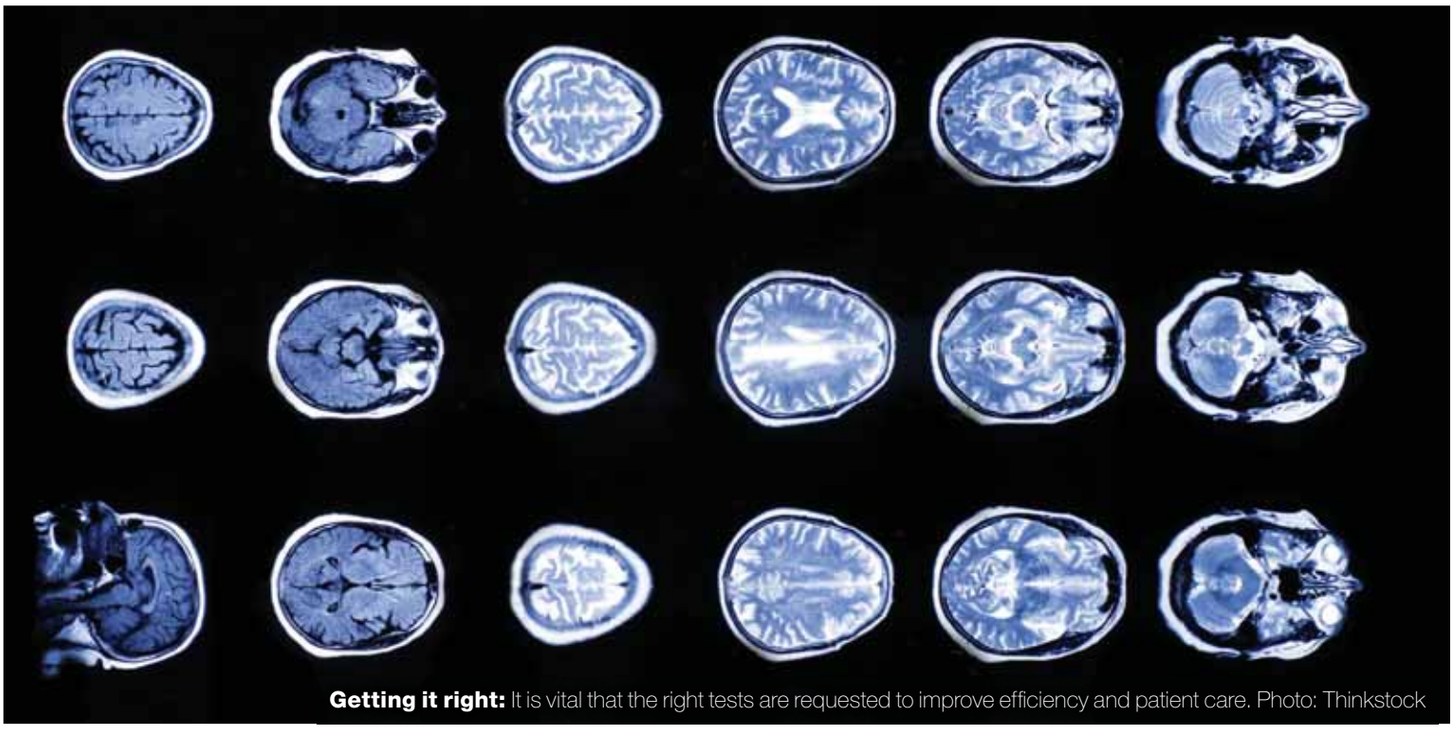
"People are sometimes sent for inappropriate imaging," says Dr Nicola Strickland, President of The Royal College of Radiologists (RCR) and Consultant Radiologist at Imperial College Healthcare NHS Trust in London. "We want patients to have the correct imaging to diagnose their condition, so they receive as little ionising radiation as possible and stand the greatest chance of getting an accurate diagnosis quickly."

Requesting the wrong kind of imaging test can mean incorrect or delayed diagnoses and waste time and money unnecessarily.

"For instance, requesting a lumbar spine X-ray for a patient with lower back pain is usually pointless unless a fracture is suspected," says Strickland. "A standard X-ray reveals nothing about soft-tissue problems.

"The majority of back pain is caused by obesity, poor posture, lack of exercise or weak abdominal muscles – all best treated by lifestyle changes. Plain X-rays of the lumbar spine usually show nothing relevant," says Strickland. "Sometimes an MR (magnetic resonance) scan of the lumbar spine is appropriate, but doctors should understand the specific indications for this test."

Poor imaging choice can also mean unnecessary patient risk. Strickland says:



Getting it right: It is vital that the right tests are requested to improve efficiency and patient care. Photo: Thinkstock

"A suspected pulmonary embolism requires a CT (computed tomography) scan. This is equivalent to around 200 chest X-rays – a significant radiation burden – so must be selected only when this is the most likely diagnosis."

Inconclusive X-rays and scans can lead to further tests, unnecessary radiation doses or other imaging tests.

Unnecessary tests also put more strain on stretched radiological resources: 9 per cent of UK Consultant Radiologist posts are currently unfilled, and 41 per cent of those have been vacant for over a year. In addition, radiographers (who 'take the pictures' for radiologist doctors to diagnose) are in even shorter supply: there is a 15 per cent shortage of radiographers in the UK.

Dr Nicola Strickland

President, The Royal College of Radiologists (RCR), Imperial College Healthcare NHS Trust, London

To decrease the risk of the wrong test being requested, the iRefer tool, a set of guidelines drawn up by radiologists to help doctors choose the right imaging test, is now being incorporated into electronic requesting systems in pilot sites in hospitals and GP practices. If the trial succeeds it will be adopted more widely.

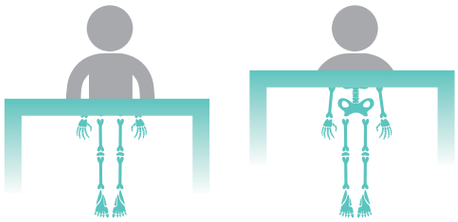
Strickland says: "Using iRefer will allow doctors to correctly explain to patients the reason they have requested a particular test, improving patient understanding. It also fits in with 'Choosing Wisely', an initiative to help doctors and patients make better treatment decisions together and helping achieve maximum efficiency in UK healthcare.

"Modern healthcare depends on the right imaging test done at the right time. Appropriate scanning can avoid unnecessary operations, deliver better overall patient care, avoid misusing radiological resources and save time and money." ■

Read more on **healthawareness.co.uk**

NEWS

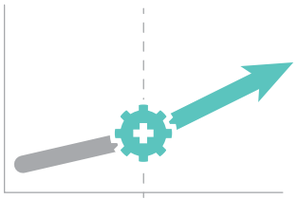
INFOGRAPHIC



CT/MR scanning has grown by

10-12%

per year for the last ten years



whereas the workforce has only grown by

3%

The English Cancer Strategy demands, a step change in delivery of diagnostics by the NHS by

2020

9%

of consultant posts are vacant

230,000

patients are waiting over a month for their imaging test results

Source: The Royal College of Radiologists

Transforming radiology with co-operation

By Linda Whitney

NHS Glasgow and Clyde is using partnership and co-operation to transform its radiology service with a teleradiology model tailored to its own needs.

At NHS Greater Glasgow and Clyde, Director of Diagnostics, Aileen MacLennan, firmly believes that teleradiology is one of the key tools tackling the pressure on NHS radiology services.

She says: "Teleradiology is a vital tool in delivering care. Done well, it enables expert opinions to be delivered by radiologists who do not need to be in the same location, or indeed the same country.

"Demand for radiology services is growing and often many different scans are requested in a short time frame. We need to make maximum use of technology, while ensuring clinical quality standards are maintained and appropriately-trained staff produce reports as swiftly as possible to ensure the best care of our patients".

NHS Greater Glasgow and Clyde now uses teleradiology throughout its Health Board area. The Imaging departments have introduced a series of initiatives to create a bespoke service, maximising the use of currently available technology to deliver inpatient acute imaging services in a short frame. The technology also helps the imaging departments on the non-acute patient access targets in Scotland.

Aileen MacLennan

Director of diagnostics, NHS Greater Glasgow and Clyde

MacLennan says: "We operate an enhanced radiology opinion/reporting service, based in hubs at the site of super-hospitals such as the Queen Elizabeth University Hospital in Glasgow, staffed by our own radiologists and trainees working in the evenings and at weekends.

Specialist support

The workload is shared across the city hospitals and in the evenings the hub at Glasgow Royal Infirmary acts as a central reporting room.

The consultant radiologists are rostered onto hub shifts as do the Radiology trainees. "It means that hospital speciality doctors can liaise with radiologists within the same specialty."

Faster diagnosis

The radiology service is now dependent on teleradiology, Maclennan continues: "We have standard protocols and parameters for imaging and reporting so everyone involved knows what is required from imaging for patients across the Health board area. Once images and reports are obtained through teleradiology we can, if required, use teleconferencing to allow all of the medical specialists involved with the patient to view the report and images at the same time and discuss the diagnosis.

The teleradiology systems combined with a dedicated radiology service results in faster diagnosis and treatment, and second and third opinions can also be obtained more quickly.

In the future, MacLennan expects more developments in the teleradiology service. She says: "We plan to start using virtual hubs, enabling radiologists to work from home, and software allowing reports to be voice to text by radiologists, making them faster to produce. Within the next few years we will be working in a different way than in the past." ■

Teleradiology and the NHS: a collaborative partnership

By Linda Whitney

Teleradiology services can improve patient care and save money - but quality assurance and continuous improvement are essential, says Dr Stephen Davies.

PHOTO: SHUTTERSTOCK

Teleradiology enables images such as CT and MRI scans to be sent electronically to teams of off-site radiologists for a fast, accurate diagnosis, offering huge benefits for patients and healthcare providers alike.

"Teleradiology provides the opportunity for hard pressed healthcare organisations to benefit from the expertise of experienced NHS radiologists when it is needed most. It removes the geographical constraint and allows the scan to be efficiently matched with the radiologist with the most appropriate experience. This reduces delays, provides access to expertise which may not be available locally or would otherwise be expensive to deliver in a timely manner." says Dr Stephen Davies, Medical Director and Responsible Officer at Medica Group.

Teleradiology is already in use in parts of the NHS and private sector – Medica works with around 100 hospitals, producing about 1.5 million reports a year.

Davies stresses the importance of collaboration in such relationships. He says: "Simon Stevens, CEO of NHS England, has urged the NHS to move on from transactional to transformational change. Collaborative partnerships with the NHS can – and are - enabling transformation of the radiology service delivery model."

Transformation is certainly overdue. Davies says: "The NHS has a radiology backlog. Currently around 230,000 NHS patients wait over a month for a report."

Increasing efficiency and productivity

There is a national shortage of radiologists. NHS Radiology departments are generally staffed to meet average workload demand at best and since radiologists specialise in a particular aspect of radiology some hospitals may also lack radiologists with experience in specific areas, such as paediatrics and neuroradiology.

Teleradiology does not replace onsite radiologists, it works best in partnership to provide a flexible, scalable radiology reporting service that dovetails with NHS in-house reporting. It can provide additional capacity at times of increased demand as well as access to subspecialist skills which may not be available locally."

Hospitals also face problems in providing night-time cover. An onsite radiologist may only report a handful of cases for their hospital overnight, but are usually not able to work the next day. 'NightHawk' services can deliver greater efficiency. "Over 50 trusts use our team of night-time radiologists who provide the reporting overnight. This allows the local radiologists to be more productive in the hospital in the daytime." says Davies.

Speedy turnaround for Emergency scans can significantly improve patient outcomes. For instance, says Davies: "The National Institute for Clinical Excellence (NICE) stipulates standards for the speed of brain imaging in diagnosing acute stroke. Our out-of-hours turnaround times for stroke cases are within 30 minutes. The faster the diagnosis, the faster medical teams can deliver clot-dispersing drugs that can limit stroke damage."

But can such services deliver the same – or better – quality than the existing NHS service?

Davies says: "Equivalence in terms of quality is essential. We use UK based, NHS-trained and experienced doctors who are experts in their area. Our radiologists can also access the entire radiology records of the patient, just as an in-house radiologist does, which is unique in the private teleradiology sector.

Dr Stephen Davies
Medical Director and Responsible Officer, Medica Group

"The faster the diagnosis, the faster medical teams can deliver clot-dispersing drugs that can limit stroke damage"

"We are also ahead of current NHS quality assurance and quality improvement models."

Benefits for many

Medica quality assurance processes are used to generate continuous quality improvement, using methods based on modern theory of learning. Davies says: "10 per cent of our CT and MRI scans are reviewed by a second radiologist to continuously monitor our quality. The radiologists are required to look at the feedback they receive and are encouraged to use it as learning opportunities to improve in their own practice. We also choose selected cases to share with all our radiologists in our monthly educational case reviews, which means they are all are able to benefit from the learning opportunity.

"This approach has enormous benefits for patients as there is a clear path for continuous improvement through learning. A supportive developmental quality improvement approach also appeals to radiologists, who appreciate the extra training, which leads to better staff retention."

Davies says, "innovative practices such as appraisal and performance review, originating in the independent teleradiology sector, could also benefit the NHS. A good example of this is an annual reflective review and consolidation of learning. Radiologists have commented that this approach has had a positive impact on their NHS practice."

Davies concludes: 'Now is the time for NHS radiology services run on traditional lines to review their model of service delivery and look for transformational opportunities that off-site teleradiology services can provide when working in partnership with local services."

www.medicagroup.co.uk

MEDICA GROUP

COLUMN

Taking precautions: *Protect and store safely*

When you have an X-ray you are exposed to a minimal amount of radiation but spare a thought for people who work in imaging departments who can be exposed to damaging radiation from X-ray equipment all day long. This isn't unduly hazardous as long as precautions are taken but it's easy for people working in a busy diagnostic X-ray department to forget to put on their protective clothing correctly or even to neglect to wear it at all.

Aprons, kilts, gloves, collars and protective glasses (known as Personal Protective Equipment or PPE) use special shielding materials and come in a range of sizes so the body is fully protected. Not only should it be worn, it should be fastened carefully to avoid unnecessary radiation exposure and the right size selected to prevent overload and discomfort – PPE can be heavy!

"It's vital that everyone is made aware of best practice"

Once removed it shouldn't be tossed on a radiator or thrown into a cupboard. Not everyone realises that this equipment is fragile and should be hung carefully to avoid damage and regularly screened to test for cracks and tears caused by over-stretching, burst seams and even scissors in pockets!

International, European and UK regulations require employers to restrict exposure of employees to radiation. It's vital that everyone is made aware of best practice, understands the health implications of a careless fastening or poor maintenance and be extra vigilant to protect the health of everyone in the X-ray room, patients and staff. ■

Peter Hiles
Chair, British Institute of Radiology Radiation Safety Special Interest Group

Medical imaging: balancing benefits against risks

By Linda Whitney

Medical imaging brings many benefits, but some techniques also involve using radiation. What are the real risks to patients, staff and the public?

The increasing use of medical imaging means better diagnosis – but how can it be used without adding to radiation risk?

The answer lies in the key principles of radiation protection. Jim Thurston, Head of Radiation Protection and Dosimetry at the Royal Marsden Hospital, and member of the IPEM Radiation Protection Special Interest Group, says: "Radiation protection of patients is about justification and optimisation: deciding whether the benefits of using radiation justify the risk, and calculating the minimum radiation dose required for each individual patient to create optimal images for accurate diagnosis.".

Minimising risk

For medical staff, the regulations set down annual occupational limits to their radiation dose. It is generally accepted that no worker should be exposed to an annual risk of death from their occupation of over 1 in 1,000, which translates to a maximum whole-body radiation dose of 20 milliSieverts (mSv) annually. (Sieverts are the measure of radiation absorption by the body, and a milliSievert is 1,000th of a Sievert). This is therefore the annual limit for the acceptable exposure of staff set down by regulation.

However, these dose limits do not apply to patients. If a medical exposure is deemed justified in terms of the benefits of diagnosis outweighing the risks, then the radiation dose that the patient may have received from previous exposures is irrelevant. But the patient must be informed of the benefits and risks so that they can give consent, says Thurston. "Where patients are unable to consent, their families or advocates must be asked. Where no-one else can be asked, only then doctors must make the decision, for example in treating an unconscious patient in Accident and Emergency."

Jim Thurston
Head of Radiation Protection and Dosimetry, Royal Marsden Hospital and member of IPEM

"There must be justification that the potential benefit to the patient outweighs these risks"

A few comparisons can put medical radiation risks into context. Thurston says: "Natural background radiation levels in the UK average 2 to 2.5mSv a year. A simple chest X-ray involves a dose of only 0.02mSv, equivalent to about 2-3 days of background radiation, and a one in a million risk of later getting a fatal cancer as a result."

Flying at high altitude means additional exposure to higher cosmic radiation levels so a flight from London to Spain approximates to one chest X-ray – increasing risk of death by one in a million.

Thurston cites examples of other activities that people choose to do with an approximate one in a million increased death risk: travelling 50 miles in a car, smoking one cigarette in the average lifetime, canoeing for six minutes or rock climbing for 90 seconds.

It should be noted that all medical interventions carry risk – and can be much more risky than imaging with radiation. Thurston says: "Some procedures carry a risk as high as a few percent that it might lead to serious complications or death, and some surgery carries an even higher risk – but always there must be justification that the potential benefit to the patient outweighs these risks."

Remaining vigilant

However there is no room for complacency. Thurston says: "In the USA the use of CT scanning in particular has soared in the last 30 years, partly driven by evolving imaging technology, but also by doctors' fears that a missed diagnosis could prompt a law suit. The average annual dose from medical exposure in the USA is now 3mSv per person, up from around 0.5mSv 30 years ago."

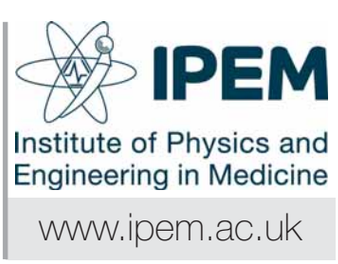
The average annual medical exposure per person in the UK has risen from around 0.4 to 0.5mSv in the same period.

Thurston says: "We must remain vigilant in the face of increased use of new medical imaging technology to ensure that the fundamental principles of justification and optimisation of medical exposures are maintained." ■

With thanks to The British Institute of Radiology, The Royal College of Radiologists, The Institute of Physics and Engineering in Medicine, The UK Radiological Congress and The UK Radiation Oncology Congress

for collaborating on the development of this campaign.

MEDIA PLANET



INSPIRATION

COLUMN

Better teamwork could mean faster imaging results

A fresh look at the way radiology teams work may speed up reporting. Nick Woznitza, reporting radiographer at Homerton University Hospital and Canterbury Christ Church University says: "Trained radiographers can interpret scans and X-rays as accurately as consultant radiologists."

A study of teamwork changes at Homerton, that included radiographer reporting, found that though radiology department activity increased by 35 per cent over six years, average waits for reports stayed constant.

More radiographer reporting is not enough, he says. A broader look at workloads is needed.

"Follow-up tests can be done while the patient is still in the department, saving time, money and patient worry"

"If the radiography assistant is trained to do some of the radiographer's basic work, the radiographer can be trained to report and take on routine work from the radiologist, freeing up the radiologist for more complex work."

Faster turnround enables same-day reporting, to be trialled this year. Woznitza says: "Follow-up tests can be done while the patient is still in the department, saving time, money and patient worry." ■

By Linda Whitney

Radiologist calls for more radiographer reporting

More radiographer reporting could help solve the long-established problems of increasing demand on radiology departments.

By Linda Whitney

Radiology departments failing to cope with demand is nothing new – it's been documented since the 1970s, says Professor Nigel Thomas, a Consultant Radiologist from the University of Salford. The solution, he says, is to train radiographers to take on more of radiologists' reporting work.

Thomas says: "Radiographers have been helping doctors with reporting for years. Even when radiography did not require a degree, junior doctors were informally asking radiographers for their opinions of X-rays."

Then this was formalised: radiographers stuck a red dot on images they felt raised questions. "This was by no means diagnosis, but some junior doctors realised that some radiographers were particularly skilled at recognising abnormal images and to some extent relied on them," says Thomas.

In the mid-1990s, postgraduate courses for radiographers (who by then needed a degree) were initiated to train them in reporting on plain film X-rays taken in A&E. "Radiologists were directly involved in setting up the courses and setting course contents, and within hospitals, radiologists advised and mentored the reporting radiographers," says Thomas.

Later the courses were expanded to include reporting on plain films outside of A&E, such as chest and abdomen X-rays, and there are now courses on reporting

Training and development It is important to use the team as efficiently and effectively as possible. Photo: Thinkstock

some types of CT and MRI scans.

"We now have 50-60 consultant radiographers in the UK. Those who specialise in breast imaging can carry out the mammogram, interpret it, if necessary do an ultrasound scan, interpret that, and if required do a biopsy, as well as providing counselling to the woman," says Thomas.

Safeguards are built in to radiographer reporting to ensure high standards are maintained.

Meeting standards

There is a prescribed scheme of work, signed off by the boards of NHS trusts, that sets out what kind of reports that reporting radiographers can do, how many reports they can produce and the time allowed.

Professor Nigel Thomas
Consultant Radiologist,
University of Salford

There is also an audit mechanism in place. Around 10 per cent of their reports are reviewed by consultant radiologists and their peers, and there are meetings to look at trends in the reporting of individual radiographers.

Thomas says: "It takes at least five years to train a consultant radiologist and whilst we should campaign for more trainees, in the meantime we need to use the resources we already have more efficiently."

He suggests more training for assistant radiographers, so they could reduce the work pressure on radiographers, and in turn reporting radiographers and radiologists. "This would mean reporting radiographers could help reduce the reporting backlog and the number of unreported images and auto-reported images – those which are informally reported by other medical staff," Thomas says.

"Many radiologists have been involved in training reporting radiographers and they know it works, but some have opposed radiographer reporting," says Thomas. "It is essential that everyone realises that radiographers and radiologists complement each other." ■

FACTS

1 **Since 2012**, **over £70m** of additional savings were achieved by undertaking commitment deals with the Department of Health Trading Fund.

2 **Since 2012**, **126 NHS Trusts** have procured CT, MRI and Radiotherapy Treatment systems through the Department of Health Trading Fund.

3 **Since 2012, over £24.5m** of additional savings have been delivered to the NHS by procuring CT, MRI and Radiotherapy Treatment systems in bulk through the Department of Health Trading Fund.

4 **Research carried out** by the York Health Economic Consortium demonstrated that according to healthcare professionals, the main risks associated with the use of older imaging equipment include **lower diagnostic capability**, inability to scan as wide and full a range of patient types, lower reliability and higher doses of radiation in the case of CT equipment.

5 **According to research** carried out by NHS Supply Chain, in 2014:

- **CT:** No. of Machines over seven years: 148. Investment required: **£71.3m**
- **MRI:** No. of Machines over seven years: 181. Investment required: **£144.4m**
- **Linear Accelerator:** No. of Machines over ten years: 46. Investment required: **£92m**

Sources - 1, 2, 3, 5: NHS Supply Chain, 4: York Health Economic Consortium

Read more on **healthawareness.co.uk**

Three ways the NHS can save on imaging equipment

By Linda Whitney

Longer-term thinking and clever buying policies can help NHS trusts acquire the latest imaging equipment while potentially reducing outlay.

The NHS spends more on imaging equipment than any other type of equipment. A new MRI scanner can cost anywhere from £750,000 to £2 million, while CT scanners average £1.5 million. Service contracts can add up to 25 per cent of the total life cycle cost.

With such high costs, the NHS procurement system for imaging technology must be as smart as possible.

Jason Lavery, VP for Capital Solutions at NHS Supply Chain, the division of DHL which procures 80 per cent to 90 per cent of NHS imaging equipment, says: "The NHS is doing the best it can but trusts tend only to replace imaging equipment when absolutely necessary, so the average age of the installed equipment is growing".

This can be a false economy. Lavery says: "Technology has improved over the last five years while costs have generally remained static. Newer equipment delivers better images faster, delivering better patient outcomes and fewer repeated tests, which increase costs."

Formerly, trusts generally paid for new imaging equipment out of their yearly budgets but more now use other options, such as loans, commercial leases or managed equipment services, where third party companies supply and maintain the equipment. Many of these longer term arrangements can cost more than capital purchases but the current constraints on the NHS Capital budget deem them a necessity in many areas.

Lavery suggests three ways that the NHS could save on imaging equipment.

1 Aggregation

Around 200 NHS trusts which formerly bought equipment separately are now using aggregated buying.

"Utilising a Department of Health Capital Equipment Trading Fund, we are aggregating trusts' demand and placing orders in bulk for, say, 20 CT scanners, instead of one at a time. We support radiologists and radiographers to pull equipment specifications together and try to co-ordinate procurement and finance across NHS regions. Since the Trading Fund started in April 2012 we have aggregated £0.7bn of medical equipment delivering average price reduction of circa 10 per cent.

> "Technology has improved over the last five years while costs have generally remained static"

2 Thinking longer-term

"Buying service agreements alongside equipment can save money, as can buying service agreements over several years," says Lavery.

"A £50m pilot scheme we conducted last year involved combining purchases of MRI and CT scanners with seven-year service contracts and leasing these to the NHS with seven-year low-cost interest deals. Savings averaged 16 per cent." The initial outlay to manufacturers was funded from the Capital Trading Fund. "Securing a longer term source of low cost finance to support equipment and maintenance aggregation and financing could extend this procurement model," says Lavery.

3 Strategic investment programmes

"Currently there may be demand for 40 NHS scanners one year but only 10 the next. Certainty about demand means better deals, so a rolling procurement system, where say, 20, are bought each year could save money," says Lavery. Pilots are running in a number of Trusts using decision support tools to help formulate longer term, more structured replacement plans based on optimum time to replace, we are hoping this will lead to a replacement blueprint that the NHS could adopt.

Lavery adds: "Faced with funding constraints, NHS trusts often face a complex juggling act when replacing aged imaging technology. The Capital system should provide for the NHS to buy service at the same time as equipment and find more low-cost finance routes. With a new approach and access to more flexible financing, trusts could spend less on buying better imaging equipment – saving money and improving patient care." ■

COMMERCIAL FEATURE

New solutions to today's imaging problems

By Linda Whitney

Medical imaging departments are producing more images with greater detail in shorter timeframes than ever before.

"To manage the workload, healthcare professionals rely on hardware and software that enables images to be quickly delivered and interpreted in appropriate locations," says Chris Whitton, UK Business Manager at Vital Images, a Toshiba Medical Group Company, which provides advanced software and services for medical imaging world-wide.

Lack of funding is leading hospitals to manage with outdated technology, impacting patient care, but often traditional solutions are expensive.

"Modern CT scanners produce around ten times the volume of data per scan than a decade ago," says Whitton. "This puts pressure on networking infrastructure between healthcare sites, slowing data transmission times and report delivery."

The increased data flow and shortages of specialist staff have led to the use of independent teleradiology companies and the formation of regional image-sharing networks.

One solution to slow transmission times lies in image streaming. Whitton says: "Here new technologies avoid transmitting large data volumes by utilizing streaming solutions. The data remains in a central location but large amounts of images can be viewed quickly using local and regional networks and wide-area networks which may include teleradiology providers."

Chris Whitton
UK Business Manager, Vital Images

Other trends include greater interest in 'deconstructed' medical imaging systems. Rather than buying the whole system from one vendor, the component parts may be sourced from several suppliers. "Greater competition between suppliers drives prices down," says Whitton.

Deconstructed solutions allow technologies to be selectively added to the hospital's existing technology as required. One example is vendor neutral archives (VNAs) – a storage system that can be accessed using any vendor's equipment. This avoids the need to purchase separate archives and improves patient care by providing healthcare professionals an easy way to access all patient documents, photographs and images. Connecting a universal viewer means they can be seen side by side.

Easy access to all patient and imaging-related information means healthcare providers can also run analytics, helping to optimize service, provide the best patient care and manage costs.

King Edward VII hospital in London is one of the first UK hospitals to deploy a deconstructed imaging solution, including a VNA, image-streaming and universal viewers from Vital Images.

www.vitalimages.com

VITAL

COMMERCIAL FEATURE

Tackling the radiology bottleneck

By Linda Whitney

A bolt-on software solution could tackle the radiology bottleneck – without replacement.

"Image and report sharing can be enabled across existing radiology information systems (RIS) without the expense or risk of total replacement," says Chris Yeowart, director of Healthcare Software Solutions (HSS), the UK's largest independent RIS provider and author of CRIS, the RIS used in the majority of England's radiology departments.

"CRIS supports 24.7m imaging events per annum and is used in over 120 NHS sites, forming an almost national network. It means we are in a position to help trusts form regional networks and set up teleradiology hubs for themselves," says Yeowart.

"This kind of in-sourcing means resources and revenue are retained within the NHS and ties in with the steps outlined by the Royal College of Radiologists aimed at solving the problems of increased demand that have led to 75 per cent of England's NHS trusts having a backlog of radiology studies."

Collaborative working

Connecting existing CRIS and other RIS systems by adding the new Network Teleradiology Platform (NTP) CRIS Central, allows hospitals to form networks to share workload, regionally and even nationally.

Chris Yeowart
Director of Healthcare Software Solutions (HSS)

"The new platform will help tackle the problem, improve patient care and save money"

"A hospital could send studies to other sites in the group where on-call radiologists can report on them, thus optimising capacity, saving time and money," says Yeowart. "Studies could also be sent to specialist radiologists, making fuller use of scarce resources, irrespective of where they are located."

The new NTP can transfer not only images and reports but also documents from digital medical records. HSS' document viewing software enables clinicians to see documents and images simultaneously, which will improve Multi-Disciplinary Team collaboration.

Hospitals' existing technologies can only cope with images. "CRIS Central will optimise workflow to support collaborative ways of working to suppress the issues faced within Radiology departments today." says Yeowart.

The new NTP is already being trialled by several NHS areas in the South of England. Yeowart says: "Radiology departments are already under strain and the number of radiology examinations is predicted to rise to 51 million by 2025. The new platform will help tackle the problem, improve patient care and save money."

www.hssnet.com/cris-central

CRIS Healthcare Software Solutions

NEWS

COLUMN

Professor Katrine Riklund

Chair, Board of Directors, European Society of Radiology (ESR)

Joined up thinking

The future of radiology training

Competence and technology is revolutionising radiology and more standardised cross-training is needed to keep pace and ensure that patients reap the benefits.

The scope and power of imaging equipment is changing all the time. With more powerful technology come new opportunities to use imaging to help diagnose conditions and treat patients on an individualised basis and evaluate therapy earlier and more accurately.

However, training needs to extend beyond the radiology community, argues Professor Katrine Riklund, Chair of the Board of Directors of the European Society of Radiology (ESR). Imaging could be harnessed to provide more personalised treatment for a wider range of conditions, but to do so will require more healthcare professionals to be trained appropriately.

"We are not proposing that everyone becomes a radiology specialist," says Riklund. "But there needs to be greater understanding from different specialties and more cross-training to make full use of the technology available."

Sharing knowledge

Through her work as Chair of the ESR Board, Riklund brings together a global body of nearly 70,000 radiologists, radiographers, physicists and other professionals in imaging to encourage research, continuous education and revision within the discipline. Each country has its own approach to training, but Riklund believes that sharing knowledge and adopting a more standard approach to professional development could help to provide patients with better care across the board.

The European Diploma in Radiology already exists to ensure that radiologists across Europe have the correct knowledge and competencies outlined by the ESR European Training Curriculum for Radiology. Within the next years, the diploma is set to become an internationally recognised certificate, raising the standard of radiology practice across the globe. ■

By Kate Sharma

Artificial intelligence could transform radiology

By Linda Whitney

Artificial intelligence and big data approaches could tackle imaging backlogs and aid personalised medicine by making science fiction a reality.

The increasing growth in demand for imaging services and the backlog in reporting cannot be tackled by simply recruiting more radiologists. Artificial intelligence (AI) and big data approaches could help, with technological solutions that are moving from science fiction into reality.

"It is time to take a different approach in radiology and AI is one approach that could be used to aid doctors in diagnosis," says Vicky Goh, Professor of Cancer Imaging at King's College London and Consultant Radiologist at Guy's and St Thomas' Hospitals.

It could be done – in fact it is on its way. Goh says: "Computers can be trained to recognise abnormal scans. By collecting data from a huge number of images which have already been reported, and feeding them into a computer, it can 'learn' to distinguish between the normal and the abnormal."

Computer-aided diagnosis

This is happening now. Giovanni Montana, Professor of Bioinformatics at Kings College London, is using a million Chest X-rays and reports, plus a sophisticated algorithm, to train a computer to differentiate normal and abnormal images. The work is ongoing so the technology is not in clinical use yet.

Vicky Goh

Professor of Cancer Imaging, Kings College London and Consultant Radiologist, Guy's and St Thomas' Hospitals

"Machines will never replace doctors but algorithms can be very good at detection, so they can be used in detecting cancers"

However computer-aided diagnosis is already possible in a limited way in screening programmes of breast cancer. "Machines will never replace doctors but algorithms can be very good at detection, so they can be used in detecting cancers," Goh says. "However, it is a big step from detection to fully automated accurate diagnosis." This would require far more sophisticated technology.

Goh says: "Imaging is so sophisticated now. In cancer we can already collect information about the size, shape, texture of cancers, its physiology, and its metabolic activity with molecular imaging. In the future, we can envisage an integrated system that could hold all of the medical information about a patient, including family history, test results including genetics, and radiology images and reports. By combining all of that information, we could train machines to predict the likely diagnosis and maybe even outcome."

Tech of science fiction is becoming a reality

This technology is not here yet, but it is possible – and it could potentially enable highly-personalised medicine. "It will be some time before the necessary technology is available - and affordable - but we are progressing towards it in incremental steps," says Goh.

It may not be long before the technology of science fiction becomes a reality. Dr 'Bones' McCoy, the doctor on the Star Ship Enterprise in Star Trek, used a handheld device which he swept across the patient's body to diagnose medical problems.

Goh says: "That kind of diagnostic scanning could be the future, perhaps not in my lifetime, but in the lifetime of my children." ■

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