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Glossary

24/7  Continuous
A&E  An outdated term for Emergency Departments/Services
AHP  Allied Health Profession
CHI  Community Health Index
CiRiS  Continuous improvement in Radiology and imaging Services. A system developed in association with the Royal College of Radiologists to support imaging department governance and continuous audit
CPD  Continuous Professional Development
CT  Computed Tomography
DoH  Department of Health
DGH  District General Hospital
ECG  Elecro-cardiograph
ICT  Information and Communication Technology
IRMER  Ionising Radiation (Medical Exposure) Regulations
MCN  Managed Clinical Networks
MDN  Managed Diagnostic Networks
MEN  Managed Educational Network
MRI  Magnetic Resonance Imaging
NES  NHS Education for Scotland
NTN  National Training Number
NWC  National Workforce Committee
NWU  National Workforce Unit
PACS  Picture Archiving and Communication System
PAF  Performance Assessment Framework
PDSA  Plan, Do, Study, Act - a system of rapid cycle change
POCT  Point of Care Testing
RIS  Radiology Information System
SEHD  Scottish Executive Health Department
US  Ultrasound
WoNuG  Workforce Numbers Group
1. Introduction

1.1 A number of factors are impacting on NHS Scotland which will necessitate change in the way health care services are delivered in Scotland. These include demographic profile pressures, changing expectation of patients, improvement in healthcare technology, and extensive workforce changes.

1.2 It became evident in Spring 2004 that co-ordinated work would be required to provide a national policy context for detailed planning and service redesign at regional and local levels.

1.3 Accordingly the then Scottish Executive Minister for Health and Community Care established a national review led by Professor David Kerr with a remit to:

- Explore and advise on strategies to secure a sustainable configuration of health services in Scotland;
- Recommend how sustainability might be supported and enhanced through improved integration of care;
- Report to ministers in the Spring of 2005

1.4 The National Framework Advisory Group Chaired by Prof David Kerr, was established to lead the review. The group drew its membership from a broad cross-section of stakeholders.

1.5 A number of action teams were established to consider the key issues for service delivery, as shown in Box 1:
1.6 This paper summarises the work of the Diagnostic Services Action Team. The group met formally 4 times between October 2004 and January 2005 and was chaired by Gillian Needham, Post-Graduate Dean, NHS Education North Deanery.

Remit of the Diagnostic Services Action Team

1.7 The Diagnostic Services Action team was remitted to report on:

- the future configuration of diagnostic services;
- the implications of redesign of diagnostic services and of changes in the skill mix of diagnostic teams;
- the alternatives to traditional diagnosis in a hospital setting and the implications of those alternatives for patient pathways and the future role and structure of Scottish hospitals;
- the extent services provided need to be planned at a regional or Board level;
- implications for remote and rural areas;

with a particular focus on diagnostic imaging and laboratory services.
1.8 The imperative to focus on these services was a result of the acknowledgement that imaging and laboratory services are essential adjuncts to effective diagnosis. Some 60-70% of diagnoses are based on imaging and laboratory findings; and timely access to such services is crucial in the efficient diagnosis, management and discharge of the vast majority of patients. Techniques such as MRI and CT scanning are now more widely relied upon and as health services reconfigure it will be essential that these services are available in a manner that supports, rather than inhibits, patient throughput.

1.9 While the Action Team’s focus has been on imaging and laboratory services, its attention has extended beyond these areas where dictated by evolving demand.

1.10 This work has been undertaken in conjunction with and informed by the diagnostics scoping exercise undertaken by the SEHD National Waiting Times Unit.
2. **Background**

2.1 Diagnosis is a multifaceted process. The patient’s history and findings on examination are distilled by the health care professionals to focal problems which require attention. That leads to a decision as to which investigations will inform further the diagnostic process, and where necessary dictate the development of an action plan of treatment, further investigation or reassurance.

2.2 The concept of “working diagnosis” emerges from the initial assessment and “final” or “confirmed diagnosis” as a result of investigation. Further, it may be possible to reassure the patient with the early investigation and negate the need for subsequent episodes of care or investigations. Laboratory services and imaging may be involved at each stage of the pathway and appropriate use will be of benefit to the patient, the health care professional and the service. The overall aim must be the best use of the diagnostic services and therefore the greatest benefit to the whole health care system in terms of minimisation of inappropriate and wasteful investigation and unnecessary exposure to radiation.
Diagnostic services have been characterised as a “bottleneck” in the patient’s journey of care. They are services that respond to multiple demands from primary care (in cases of direct and open access), screening services, outpatient clinics, A&E and inpatient services. They are subject to rapid changes in technology and struggle to keep pace with changing patterns of care. In the past these services have been unsuccessful in influencing demand in a significant and sustainable way despite effort – they have been reactive. As in many areas of the NHS there has been insufficient emphasis on measuring demand, activity and capacity or in understanding queuing theory, the importance of flow or tackling the variation in demand. Accordingly there has been a mismatch between activity levels and demand leading to a general
perception that diagnostic services lack capacity. Few examples exist of managed health care systems in Scotland matching clinical developments in referrer services to their impact on the demand for diagnostic services.

2.4 Three distinct drivers are coming to bear which will impact on demand for diagnostic services and the way they are organised and provided:

I. Reducing patient waiting times,
   - including for A&E treatment and initiation of treatment following a primary care referral,
   - by 2005, the maximum wait from urgent referral to treatment for all cancers will be two months; and
   - the “Fair to All, Personal to Each” commitment to develop waiting time standards for key diagnostic services.

II. The desire to provide as much care as possible locally, including diagnostic services. This has implications for where and how diagnostic services are delivered and is qualified by the need to maximise efficient use of available capacity nationally. Whilst diagnostic test availability should be as local to the patient as possible, it is crucial that there is understanding by planners that this does not necessarily require that processing and analysis of images or specimens is co-located. Indeed, separation may lead to real efficiencies in the system. However, the benefits of clinical contact between referrer and diagnostic service should not be undervalued, indeed diagnostic service specialists have become integrally involved in some clinical teams.

III. The changing nature of demand for diagnostic services:
   - The inevitable growth in demand for certain services as a result of the changing age profile of the population and concomitant epidemiological changes – such as the rise in age-related illnesses, e.g. cancers, Type 2 diabetes
   - The growth in one stop clinics (multiple tests available at one visit) – not always the most efficient use of the diagnostic workforce, but seen as crucial to the development of patient centred service design in some settings. It is estimated there are now around 400 such clinics in Scotland.
   - The service imperative to roll-out new technologies and procedures quickly as they become available. For example critical shifts are evident in the diminishing proportion of plain x-rays compared to ‘complex’ imaging
including CT, MRI and US. A significant role shift in who actually performs US is well underway –this currently involves training sonographers who are traditionally from a radiography background, but with an urgent need to move towards a more inclusive AHP model for sonographer role development as education programmes evolve. Enabling regulatory changes are underway in this area and must be encouraged. In pathology and laboratory medicine continuing rapid advances in automation mean that consideration should be given to rationalisation of some non-acute routine and screening functions.

- Benefits realisation of ‘new’ technologies and investigative modalities. The imperative is to have these not only more widely available but more accessible to patients.

- The concept of increased utility of imaging and laboratory tests in accurate diagnosis. This adds pressure to services as testing is refined and, with improved user knowledge, skill and experience, becomes more diagnostically focussed and therefore useful. As technology advances there is not only an opportunity to provide diagnostic services more effectively in traditional settings but also to develop new investigation pathways that add value in additional areas of clinical practice.
3. Executive summary

3.1 Capacity, demand and redesign
- Balance activity with and demand. Maximising capacity by using redesign to eliminate rate limiting steps and manage demand using decision support and referral protocols wherever possible.
- Use waiting list initiatives to remove backlogs only in support of re-design and in the context of a balance between activity and demand.
- Benchmark and monitor performance utilising robust electronic data collection ideally linked to departmental information systems to minimise duplicate and manual entry.
- Agree data definitions and enforce nationally.
- Disengage emergency/unscheduled from elective work wherever possible.
- Promote local availability of tests wherever possible as determined by overall service capacity and efficiency.
- Utilising technology, disengage interpretation from point of image capture/testing to improve local access and overall quality of care.
- Regionalise highly specialised services to improve overall access on a 24/7 basis.
- Reduce interfaces between primary, secondary and tertiary care.

3.2 Workforce
- Optimise recruitment and retention by encouraging flexibility in the workforce, by enhancing the roles of non-medical professionals and by introducing new roles as needed.
- Plan to backfill for staff upskilling.
- Increase recruitment into undergraduate programmes and improve careers management.

3.3 Technology
- Accelerate the national use of CHI as the unique identifier.
- Develop a national strategy and central control of Electronic Care Record development and implementation supported by adequate resource and project management.
- Develop electronic systems for decision support embedded in referral protocols.
- Accelerate the national PACS roll out/ telemedicine network, voice recognition implementation and coordinate with equipment replacement.
- Make use of CiRiS mandatory (Radiology) for all imaging departments, until such time as a fully integrated continuous audit system has been implemented.

3.4 Organisation
• Develop a regional and national overview of diagnostic services aligned to the framework of the Regional Planning Groups.

• Develop Managed Diagnostic Networks (MDNs) along the lines of the existing Scottish Pathology Network, linked to the Managed Clinical Networks and other clinical networks.

• Develop and support clinical leadership and project management capacity for change.
4. Recommendations

4.1 Capacity, demand and redesign

4.1.1 Underpinning Principles

- Systematic application of basic redesign tools is essential. This will require central dissemination and coordination of agreed methodologies for:
  - measurement of activity, capacity and demand (CDA analysis)
  - understanding queuing, variation and flow
  - process mapping

(The expertise is available to rapidly select preferred tools. Investment in training and capacity building at local level will be required for successful implementation. This recommendation is dependent on rapid all-system CiRiS implementation)

- Waiting list initiatives only to be carried out in support of redesign, not in place of it.

- Unscheduled and elective diagnostic services should be disengaged wherever possible.

- To maximise capacity, activity during the working day should be optimised and the working day extended before acquiring additional equipment. (CDA analysis dependent)

- It is recommended that either the Regional Planning Groups or MDNs take on the role of gathering and communicating good practice information on service redesign and new ways of working in Scotland. Advice on education and training and workforce development, including new role development needs, should be undertaken with NES support.

4.1.2 The Modernisation Agency’s report, 10 High Impact Changes for Service Improvement and Delivery is a valuable introduction to some of the main redesign concepts:

“We tend to think that diagnostic bottlenecks are caused by a lack of capacity. In fact they are often caused by the mismatch in the variation in demand and the variation in
supply. Systematic application of some basic redesign tools to match capacity and demand can have a dramatic effect on the “flow” of patients through the system.2

4.1.3 Using this approach prior to investment in additional capacity or implementation of new technologies will ensure that existing capacity is optimised and understood and that any necessary future investment is focused and evidence based.

<table>
<thead>
<tr>
<th>What do you need to do?</th>
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<tbody>
<tr>
<td>✓ High level leadership support, including clinical leadership</td>
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<tr>
<td>✓ Co-develop changes with service users</td>
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<tr>
<td>✓ Map the existing flows of patient referrals to the service</td>
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<td>✓ Map the existing patient process and identify bottlenecks in the service</td>
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<tr>
<td>✓ Measure potential and actual capacity</td>
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<td>✓ Measure and understand the true nature of demand for the service</td>
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<tr>
<td>✓ Match demand and capacity</td>
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<tr>
<td>✓ Identify the time and resources required for the service (High Impact Change No 9: optimise patient flow using process templates)</td>
</tr>
<tr>
<td>✓ Redesign and simplify the process, including role redesign3</td>
</tr>
<tr>
<td>✓ Clinical buy in through involvement and understanding of the process, therefore appropriate communication and education/training in the methodology and ethos</td>
</tr>
<tr>
<td>✓ Education and training to match service requirements</td>
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</tbody>
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4.1.4 The development of process templates to represent the time and resources required for patients in the existing system allows bottlenecks to be identified and reduces the impact of the variation in demand and capacity at the bottleneck. NHS teams may be able to free up around 30% additional capacity within existing resources. In George Elliot Hospital NHS Trust endoscopy and radiology units have been able to improve productivity by 40% through the use of process templates4. It should be noted that while productivity can be increased from within existing resources there are real capacity constraints in Scotland both in terms of staff and equipment.

4.1.5 A proactively planned and managed system of matching capacity to demand and better understanding the key constraints on local capacity (human and technological) is an imperative for the future. Demand management needs to be clearly rested with MDNs or CHPs, in partnership with referral services, but with control of demand determined by clear and accessible written (electronically embedded) guidance and

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3 Ten High Impact Changes for Service Improvement and Delivery, MA.
4 Ibid
decision support. An example of such guidance would be the RCR/EU Referral guidelines for prescribers of ionising radiation. This would be most effective if available electronically at the time of request.

4.1.6 There is evidence that the demand for a diagnostic service can be significantly improved (inappropriate demand reduced, appropriate demand increased) by targeting referrers with a variety of techniques. Whilst there are no “magic bullets”, audit and feedback combined with condition specific prompts are effective.

4.1.7 Diagnostic services will move to becoming a uniformly “enabling” aspect of the service when all demands are understood and, where appropriate, managed.

4.1.8 Capacity is defined by the key constraint in a given diagnostic service. That might be the availability of equipment or the availability of a key professional. Activity is not the same as capacity; it measures what is done not what is theoretically capable of happening when set to the key constraint. Redesign has an important role to play identifying bottlenecks in processes, and duplication or secondary constraints which fail to achieve best use of capacity.

4.1.9 Historically, some activity data and waiting list data have been captured but this may not reflect true demand and tells us nothing about capacity. Long waiting times brought about by failing to match activity to demand may stifle demand or lead to presentation in A&E to short circuit waiting times for routine investigations. Some current data are simply a measure of saturated activity and unhelpful in forward planning.

4.1.10 The use of process templates allows us to:

- Find the actual bottlenecks in the system
- Reducing the demand on the bottleneck by shifting work upstream or downstream and changing roles
- Increasing capacity based on robust evidence
- Calculate the return on the investment at the bottleneck
- Schedule patients to improve flow through the resources in the whole system
- Scenario plan – what is the impact if a member of the team goes on holiday?
- Schedule planned events e.g. holidays
4.1.11 These methodologies are not an answer which can be given to the service. They constitute a process which must be carried out locally. CCI will provide a central approach to applying the methodology in order that transferable lessons and benchmarking are possible.

4.1.12 The Centre for Change and Innovation is assessing a national collaborative on diagnostics commencing in 2005/2006 to drive the uptake of redesign supported by measurement and improvement theories and building on good practice. A collaborative is an evidence based change method specifically created and trialled in over 200 occasions internationally to date. The collaborative model is proven to be effective at spreading good practice and “chunks” complex change into simple Plan, Do, Study, Act (PDSA) cycles for rapid improvement.

4.1.13 Specifically a collaborative would promote the uptake of patient focussed booking, measurement of demand, activity and capacity; understanding variation and flow; eliminating unnecessary carve out; process mapping; using PDSA cycles to test change rapidly; and sharing best practice across Scotland.

4.1.14 Experience of re-designing services in Scotland provides some general principles to guide future diagnostic service re-design efforts.

- Waiting list initiatives are useful means by which to remove historical backlogs, but this must be in support of re-design rather than in place of it. Without redesign, backlogs will quickly build back up. Waiting list initiatives should be seen as short term fixes not addressing the underlying problem which should be analysed. Waiting List Initiatives should be co-ordinated with performance management so that poor performance is not “rewarded” with additional resources.

- Unscheduled and elective work should be disengaged wherever possible to protect capacity in both.

- If at all possible extend the working day before acquiring additional equipment. Work smarter, e.g. stagger lunch hours, start times and finish times to maximise throughput. Rigorous forward planning of leave and other predictable absence is essential.

- Audit and performance management driven by effective data collection using agreed definitions.
• Use of clinical leaders, with sufficient time, vision and focus to drive reform. Short term loss of capacity can result in potentially huge long-term gains.

• Reduce the interfaces between patient, primary care, secondary care and managed clinical networks. James Paget Hospital in Norfolk reduced treatment time for lung cancer by allowing direct referral from radiologist to physician rather than radiologist to GP to physician. The break down of these types of artificial barriers is central to providing patient centred care.

<table>
<thead>
<tr>
<th>6 pointers for redesign success for diagnostic services</th>
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<tbody>
<tr>
<td>1. Managed waits NOT Waiting list initiatives</td>
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<tr>
<td>2. Stream unscheduled from elective work NOT Carve out slots</td>
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<tr>
<td>3. Work smart, re-profile, extend the working day NOT Get more kit</td>
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<tr>
<td>4. Manage demand – decision support, audit, feedback NOT allow demand to manage the service</td>
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<tr>
<td>5. Invest in clinical leadership – find the time NOT over-managed clinical workforce</td>
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<tr>
<td>6. Develop managed diagnostic networks aligned to patient journeys NOT multiple artificial boundaries for patients to cross</td>
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</tbody>
</table>
4.2 Workforce

The workforce goals are robust (full and expanded) recruitment into existing programmes of undergraduate (radiographer/ biomedical scientist) and specialist (medical) training, and development and implementation of the practitioner framework. Urgent action is needed on assistant practitioner development and other new role development for 'backfill' as we move towards up-skilling the current workforce. We need to re-profile the workforce as well as train more people.

4.2.1 Recruitment and retention

- There is an urgent need to increase the number of specialist registrars in Scottish radiology training programmes, informed by collaborative modelling between the speciality and the Workforce Numbers Group (WoNuG) of the NWC. Regular intelligence gathering of trainees' career intentions to enable targeted careers advice and optimise retention of trainees in Scotland is needed as soon as possible.

- Expansion of undergraduate student training places in radiography and bio-medical science is needed as soon as possible.

- Provision for accelerated pre-registration masters level programmes in diagnostic radiography allowing fast-track entry into the Scottish workforce is needed as soon as possible.

- Development of innovative methods to achieve increased supply and retention in radiology, including international recruitment should be pursued.

- Consideration should be given to an incentivisation scheme to retain and recruit trained diagnostic staff in Scotland.

- Further work is needed on the concept of regional consultant posts especially in the context of MDN development. More regional appointments (under the direction of the Regional Workforce Groups) will ensure flexibility of workforce deployment as determined by regional CDA and other data. (Some detailed work has already been carried out and urgent action to implementation is required as the need for this kind of appointment is pressing)

4.2.2 Re-profiling the workforce
• An overall and future-proofed view of service design with a review of workforce profile is now required. The process in train for accumulating local plans into regional plans to inform the National Workforce Plan is to be commended. Regional Workforce Groups will have good quality information around which to support MDN and other re-profiling needs. This is not a one off re-profiling, but must become a continuous process against continuous adjustments in service design. Diagnostic services may benefit from performance management against their ability to keep aligned to service users’ needs and matched clinical change analysis must become integral to planning at regional and local levels.

• Provision of a competency based educational framework encompassing common multi-professional competencies and standards is needed.

• Career pathways which seek to retain skilled and experienced clinical practitioners within frontline diagnostic services are needed.

• Development of an ultrasound education programme accessible to non-radiographers, including other AHPs and assistant practitioners is necessary.
4.3 Technology

4.3.1 Radiology Information Systems

- Evidence based decision support at the front end of electronic requesting systems are needed to help inform and improve requesting practice. This should be a requirement for all electronic request systems under development. Full implementation within five years.

- Mandatory use of CiRiS with agreed definitions across NHS Scotland, until such time as a full electronic care record incorporating radiology data capture has been implemented (full implementation within a year).

- A national review of current information and communication systems and a move to national procurement of a nationally consistent radiology information system that is integrated into a Scottish CHI based Electronic Care Record (full implementation within five years).

4.3.2 Picture Archiving and Communication Systems (PACS)

- Rapid PACS and roll out to all parts of NHS Scotland (full implementation within two years).

- PACS roll-out must be linked to a planned process of equipment replacement and digitisation. This will require well-resourced, nationally supported regional project teams. There is an urgent requirement to build project management, change leadership and management capacity.

- It is essential that NHS Scotland prioritises the early adoption of a nationally operational Information and Communication system with integrated voice recognition capability.

- Tele-radiology and tele-conferencing links with local, regional and national components.
4.4 **Organisation**

4.4.1 Planning locus

- NHS Scotland should establish Managed Diagnostic Networks. These should form links to MCNs and better align with clinical services, including support of the introduction of new clinical services. It is likely that these networks will be best designed across regional planning scales. The MDNs will also be a key source of evidence-based advice inputting into strategic planning.

- The planning matrix contained in this section could serve as a guide to the location of future planning decisions.

4.4.2 Matched clinical change

- It is recommended that the importance of “matched clinical change” for diagnostic services is recognised by Health Boards and regional planners who are performance managed against their ability to gain best fit, in order to sustain high quality diagnostic services in the face of rising clinical demand. Criteria for measuring performance towards matched clinical change to be identified and incorporated into the PAF within the year.

4.4.3 Equipment

- Where most appropriate it is recommended that diagnostic services be planned regionally. (Regional Planning Groups to scope regional diagnostic services within the year). Boards will need to undertake a review of the equipment status and requirements of all imaging, pathology and laboratory medicine services. This should be co-ordinated regionally and an appropriate rolling capital budget for laboratory and imaging equipment purchase and renewal needs to be identified and managed. (Rolling capital investment and regionally managed replacement system to be scoped within the year).

- The further provision of cross-sectional imaging equipment (especially CT and MR) in remote and rural areas may be justified in terms of access. Further work is required to assess the limits of this policy, balancing access against the need to optimise use of all available capacity. Consideration should be given to allowing patients from other areas to travel to use that equipment to maximise the investment. This may
ultimately lead to a need to develop regional (in some cases national) test allocation systems (booking). (Linked to the recommendation for regional asset registers and capital investment and replacement programmes, this scoping should be achievable in two years)

4.4.4 Separation of image acquisition/testing and reporting

- The separation of image acquisition/testing and reporting should be explored by NHS Scotland as a means to:
  - maintain, extend and develop imaging services particularly in remote and rural areas (including mobile services),
  - facilitate the development of a regionally or centrally co-ordinated radiologist out of hours service; and
  - improve the efficiency and accuracy of reporting by avoiding interruptions and hence concentration-breaks and distractions, whilst pooling expertise and affording the opportunity to develop purpose-designed reporting facilities for the modern technological needs of the reporter. (This is dependent upon PACS roll out. Both regional and national services will emerge and these should be defined within two years)

4.4.5 Smaller hospital and rural communities

- There is a need to engineer a radical reform – point of care testing and moving diagnostics to primary care to make services closer and quicker for the patient where this does not adversely affect capacity in the system.

- The Pathology section of this paper covers developments in point of care testing and suggests a framework within which that can be taken forward on a Scottish basis.

- The dissociation of image acquisition from reporting will in many cases improve the patient’s experience of the health service – he or she might not need to travel to a hospital or distant facility.

- Further work needs to be commissioned around capacity, demand, activity analysis and deployment of kit and staff. Detailed business case production is required, balancing sustainability against economics and rural-proofing to identify the opportunities for the development of diagnostics in community settings.

- NHS Scotland should formally recognise and encourage tele-radiology services and regional service planners should ensure tele-radiology develops in a way that is
integral to all service developments and equitable to each end user. (This is dependent on PACS roll out but should be achievable in some areas now, and everywhere within two years).

- Tele-radiology should be regionally co-ordinated and systematically extended to encompass MDN developments in other clinical services including oncology and surgery and in support of unscheduled care services. It should be incorporated within existing regional networks/ service planning mechanisms, e.g. cancer. (Every region and MDN should have a plan for tele-radiology support and development within 2 years)

### 4.4.6 Laboratory services

- In order to maximise the effectiveness of laboratory service expertise in Scotland it is recommended that the concept of Managed Diagnostic Networks (MDNs) is built on the current example of the pathology MDN and should be extended to other laboratory disciplines and when possible to all diagnostic services. The exact configuration and linkage of the laboratory services MDNs will be subject to further consultation but should be fully implemented within two years.

- It is recommended that in future all laboratory departments should participate in the UK national benchmarking scheme. This information should be collated by the appropriate MDN or regionally within a year.

- It is recommended that a strategic overview of the development and implementation of molecular diagnostic services be undertaken and a national coordinating mechanism be established, in line with the recommendations in the Review of Genetics in Scotland. The model used by the Scottish Molecular Genetics Consortium maybe the means to achieve this within two years.

- It is recommended that at a regional and national level the MDNs should have a role in providing a quality framework for the roll out of POCT in Scotland and for communicating examples of good practice. (Framework for implementation available within two years)

### 4.4.7 Unscheduled care
• NHS Scotland should encourage the move towards the provision of 24/7 diagnostics services wherever possible. For this to improve patient care, this move should be matched by improved availability of senior clinicians to act upon results generated by diagnostic services. (Workforce modelling will be required to plan for this key shift in the delivery of diagnostic services. The NWC needs to lead on responsive modelling for significant service re-design, prior to regional and local planning cascade. (Workforce model available within the year)

• Further work is required to determine how diagnostics services should be reconfigured to support the framework set out by the National Framework’s Unscheduled Care group. This will include identifying the diagnostic services required at each level of care.

• The recently announced Accident and Emergency waiting time target will drive efficiencies in all aspects of the unscheduled care system, including diagnostic tests. A&E computer systems will help here, recording that which needs to be documented and driving the waiting time target.

• Emergency patients may require a range of diagnostic tests including blood tests, x-ray, ultrasound, CT and MRI scanning, ECG and echo cardiology and endoscopy. Waiting times in A&E departments are heavily reliant on other parts of the healthcare system. Transfer times when patients are admitted are a case in point.

• The absence of diagnostic tests out of hours can mean that patients wait in A&E, effectively queuing for the next available bed. While hospitals have a 24/7 x-ray service in or near A&E, most hospitals provide no, or limited, testing in A&E or 24/7 laboratory services, meaning that a significant number of patients with chest pain (for example), who might otherwise have been discharged stay in bed over the weekend. This is unacceptable from the perspective of the patient or the service. Reforming Emergency Care (DoH) suggested that this should be addressed by:

  o providing 24/7 diagnostic services. This is currently hampered by difficulties recruiting radiologists or radiographers required to staff a 24/7 service; and

  o Extending the working day

• 24/7 working must be supported by a change in culture of the organisation, including recognition of the need to provide facilities for those being asked to work at night including adequate catering, nursing and A/C support. Nursing support is
particularly important in the context of out of hours vascular/interventional cover and must be adequately resourced.

- Point of care testing and the use of protocols to allow Allied Health Professionals to refer patients for diagnostic services at the most appropriate time have led to some improvements in waiting times for diagnostics services.

- The Emergency Services collaborative being managed by the Centre for Change and Innovation in support of the four hour A&E target will almost certainly see some of these solutions, or local variations of them, developed and implemented across Scotland.

- The National Framework’s Unscheduled Care Group has developed a model for the provision of unscheduled care which re-profiles these services to better meet the demands. This will mean more local care, often provided in practitioner led “community casualty” units with tele-medical linkages to tertiary centres. Work is now required to develop guidance on which diagnostic tests and facilities should be available at each of the identified unscheduled levels of care. This should be a priority for future efforts. The Unscheduled Care Group’s “pyramid of care” is reproduced at Annex C.
## Who Does What in NHS Scotland?

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<th>Education and Training Planning</th>
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<td><strong>National</strong></td>
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<tr>
<td>National Service Framework</td>
<td>National Workforce Committee</td>
<td>NHS Education for Scotland</td>
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<tr>
<td>- all Scotland service planning framework</td>
<td>- National Workforce Unit</td>
<td>- developing</td>
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<tr>
<td>- National ICT strategy</td>
<td>- WoNuG</td>
<td>- commissioning</td>
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<tr>
<td>- Consistent tools for intelligence and planning (e.g. CDA; “collaboratives” approach to sharing good practice)</td>
<td>- Careers, Recruitment, Retention Group</td>
<td>- assuring educational frameworks and programmes; skills infrastructure etc</td>
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<tr>
<td>- Centre for Change and Innovation – service redesign</td>
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<td><strong>Regional</strong></td>
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<td>- service redesign interpreting national frameworks</td>
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<td>adding value to Boards’ individual plans</td>
<td>- (Managed Diagnostic Service Networks</td>
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<td>- Co-ordinated re-profiling for Hospital at Night and other Out of Hour re-designs</td>
<td>- Championing development of the learning organisation e.g. with CHPs</td>
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<td>Health Boards</td>
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<td>- Community Health Partnerships</td>
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<td><strong>Data gathering – standardised</strong></td>
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<td>- local process mapping (Centre for Change &amp; Innovation programme)</td>
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SPECIALTY SPECIFIC RECOMMENDATIONS

IMAGING

5.1 Diagnostic imaging services are widely viewed as a bottleneck to patient flow. This is often attributed to a significant radiographer and radiologist workforce shortfall or a perceived lack of equipment but has also been due to unprecedented demand. The increase in demand for imaging services is a consequence of technological development and maturity, the changing nature of clinical case management (particularly the greater expanded role of cross-sectional imaging in patients with suspected or proven cancer) and patient expectation. The greater public awareness of, and interest in health has generated a better informed populace who know what could and should be available.

Workforce

5.2 The growing demand for diagnostic services will necessitate careful planning for future needs. However it is recognised that there are significant challenges to be met in providing a sustainable workforce for existing service capacity. Shortages of key imaging professionals including radiologists, radiographers, sonographers, clinical physicists and radiopharmacists is widely recognised as a limiting factor for expansion of services in Scotland, the UK as a whole, and the wider radiological community.

5.3 A survey of the vacant consultant radiologist posts in Scotland in January 2005 undertaken by the Standing Scottish Committee of the Royal College of Radiologists put the vacancy rate at 49.4 posts, or 17.7% of all established posts (279). These figures are given in full at Annex A. It is particularly noticeable that the vacancy rate in district general hospitals is much higher than in teaching hospitals. It is critical that official workforce vacancy rates are reliable and accessible. Credible, robust, and timeous workforce data are necessary.

5.4 There is a clear differentiation between the situation of recruitment and retention of trained radiologists, compared to trainee radiologists (all specialist registrars). The numbers of SpRs in Scotland has risen from 79 in 1999 to 112 by August 2005 (30% increase). The problem is in large part one of recruiting SpRs into consultant posts in Scotland. There is recognition of the lack of appropriately skilled staff to match the clinical expansion driven by referrers.
5.5 A significant increase in radiography recruitment has seen the overall number of radiographers in NHS Scotland increase from 1197 in 2001 to 1409 in 2003, a 17.7% rise. However, ISD statistics suggest that recruitment of radiographers has failed to keep pace with the demand for staff, highlighting a vacancy rate increasing from 2% in 1998 to 9.7% in 2003.

5.6 There has been increased recruitment into undergraduate student training places for radiography but limited availability of clinical placements has restricted further much needed expansion. Following NHS Education for Scotland’s recent investigation of clinical placement availability for all AHPs, data are now available to identify optimal use of available placements.

5.7 It is clear that more radiologists and radiographers are required. Accordingly we need:

- a planned further increase of Scottish Radiology NTNs, informed by collaborative modelling between the specialty and NWU (under the auspices of WoNuG) and including continuous intelligence gathering of trainees’ career intentions (to assist strategies for optimising retention).

- a planned expansion of undergraduate student training places in radiography is needed, informed by NHS Education for Scotland clinical placement data.

- provision for accelerated pre-registration Masters level programmes in diagnostic radiography allowing fast-track entry into the Scottish workforce.

- development of innovative methods to achieve increased retention in radiography, including expansion of advanced and clinical specialist roles.

- consideration needs to be given to an incentivisation scheme or other effective means to retain trained radiologists and radiographers in Scotland. Training has a negative effect on efficiency of a department and is therefore only truly valuable if trainees stay in new roles in NHS Scotland long enough to justify the investment in that training.

- consideration needs to be given to the concept of regional teams including regional consultants. Consultants to be recruited to a regional post with flexibility to be deployed as needed within the region.
5.8 This can be summarised as robust recruitment into existing placements and programmes at pre-registration/ higher specialist training level, development of/ implementation of the practitioner framework, new role development for ‘backfill’ as we move towards up-skilling the current workforce. We need to re-profile the workforce profile as well as train more people.

5.9 NHS Scotland must move towards providing imaging services when they are needed. This will mean greater flexibility in the way the workforce is deployed, including promoting the extended working day. While the move to flexible or less than full time working is to some extent inevitable this should be underpinned by a recognition of the needs of patients and the service. It is recognised that flexible working at certain points in the career of healthcare professionals is necessary if staff are to be retained in NHS Scotland.

5.10 An overall view of service design with a review of workforce profile is now required. Individual areas will need to do this, in the context of the national framework and informed by Board plans.

5.11 We must also make much better use of the staff we have. This means moving away from the out-dated demarcations between the professions and reprofiling the workforce profile around those skill sets that are genuinely unique.

5.12 Extensive work has already been undertaken in re-profiling and reconfiguration of the diagnostic imaging workforce, including national projects to establish occupational standards for clinical imaging and to support rapid development of multi-professional team working. A series of skill mix initiatives have been tested across imaging and breast screening services in England between 1999 and 2003, led by the Modernisation Agency, followed by establishment of a programme of role development in Scotland during 2004/2005 led by NHS Education for Scotland (NES). These initiatives have demonstrated significant efficacy and cost effectiveness in the expansion of radiographer roles to undertake duties and responsibilities previously in the domain of radiologists. However, it is recognised that sustained investments in radiography post-registration education and new role development is required to ensure these devolved roles continue to provide a safe and quality service.

5.13 Scoping of the radiology services across Scotland has demonstrated a range of local skill mix developments involving radiologists, radiographers and nurses. In addition
to introduction of nurse referral protocols for investigative procedures, radiographer reporting of images is now widespread within breast screening and Accident and Emergency departments and is beginning to gain acceptance in cranial CT, gastrointestinal (barium enema) investigations and discrete aspects of MRI and nuclear medicine. Radiographer led US is one of the most frequently reported skill mix developments, contributing to US in all teaching and district general hospitals across Scotland. There is potential to extend such services closer to the patient, into rural general hospitals an intermediate/primary care setting as US imaging capacity increases with more trained sonographers. The provision of US in primary care should only happen when various quality issues are assured, including provision of appropriate premises, ongoing audit/ supervision and a cost-benefit analysis which ensures that investment in equipment and staff goes to those areas where throughput will be maximised. This should be a framework of support, protocol and audit to ensure patient safety and quality at all times, and as such requires to be integral to Boards’ clinical governance systems.

5.14 A feature of the future profile of the diagnostic imaging workforce will be assistant practitioners. Evidence from the UK suggests that such roles provide much needed extra capacity. Currently this initiative has only been taken up in Scotland by some radiotherapy services and some breast screening services. The aim is to release highly skilled personnel to focus on their core activities but also to extend the role of the assistant practitioner to the mutual benefit of the patient and service. These are evolving roles requiring mutual respect and trust for successful local development. National accreditation of these new roles will be necessary to ensure transferability and more comprehensive understanding and acceptance of them. Regional planners must give consideration to the allocation of funding for the development of this component of the modern workforce.

5.15 The considerable efforts of NHS Scotland to introduce consultant roles for non-medical staff should be recognised and extended. Several examples now exist in England of consultant radiographer roles, providing expert practice in breast screening, barium enema investigations, neuroradiology, axial and appendicular skeleton reporting, trauma reporting and palliative radiotherapy. National coordination of all AHP consultant posts including those within radiography is being led by the Scottish Executive Health Department and NES. In this way consistency of approach to selection, appointment and the educational basis of these roles is being maintained.

5.16 Local service planners need to be aware of these developments and flexible in their implementation where the workforce profile can be enhanced by their introduction.
5.17 The following steps should be taken to support the re-profiling of the diagnostic imaging workforce to match the needs of the service:

- Provision of an education framework sharing common multi-professional competency standards
- Assistant practitioner standards which meet anticipated 2007 national registration standards
- National definition of new roles within diagnostic services
- Individual and multi-professional skill sets are mapped to patient needs through accurate service and training needs analyses
- Career pathways are developed which seek to retain skilled and experienced clinical practitioners within frontline diagnostic services
- Functions are performed by member of the team skilled and competent to do so, supported by appropriate training and clinical governance.

5.18 As systems are modernised and voice recognition software spreads there is the potential to migrate existing, imaging department knowledgeable office staff to new front desk roles such as schedulers, clinical co-ordinators and other new roles.

5.20 Sonography education programmes are now being developed in Scotland. This is welcomed in terms of the opportunities this affords to develop new skills in the radiography workforce. It is critical that trainees can be released to take part in these training programmes if the sonographer model is to succeed. *It is recommended that the ultrasound education programme is opened to non-radiographers, including other AHPs and assistant practitioners.* This may require enabling legislation.

**Radiology Information Systems**

5.21 Radiology departments across Scotland use a variety of legacy Radiology Information Systems. Departments do not collect data in the same way or by the same definition. Accordingly there is no valid national data set gathered in Scotland. NHS Scotland’s Information Services Division collected a “snap-shot” of data annually until 1994. Since this was abandoned various attempts have been made to agree definitions and a data set but this has not been achieved nationally.

5.22 An adequate Radiology Information System with nation-wide coverage and agreed definitions and application should be a priority.
5.23 This system could serve as a clinical governance tool but if comprehensively and rigorously populated would also be a sound basis for service management, delivery, planning and modernisation. In other words the data, if carefully constructed, could be and should be multi-potent. One single agreed data set which allowed all the above to happen both at local, regional and national levels would be enormously useful. It would be useful to have the data set agreed in such a way that there was a contract between interested parties, i.e. the Scottish Executive, Regional Planning Groups and the Boards that only data of the agreed set be requested. This would obviate requests for data in multiple formats currently being requested and which necessitate manual collections which are time consuming. Definitions will be a fundamental part of this agreement to allow benchmarking and transferability of information.

5.24 NHS Scotland has been providing pump priming funds for one particular radiology data collection system, CiRiS, with funds running until September 2005; from which point individual Health Boards will decide whether to continue funding on an individual basis. CiRiS was designed in conjunction with the Royal College of Radiologists primarily as a clinical governance tool but recognising that the information would have other capabilities for use.

5.25 Loading data into CiRiS necessitates double entry as it does not link electronically with legacy RIS systems. This has resulted in incomplete usage of the system, and where there has been some ownership of the system varying degrees of population of fields has resulted in a poor benchmarking opportunity.

5.26 The ability to opt in and out of CiRiS has meant that there is incomplete coverage across NHS Scotland, with at least one large area opting out (until recently), making the data set incomplete. This reduces the benefit to the service in terms of comparable data, benchmarking, and transferable lessons.

5.27 Although feedback from the CiRiS system to the service has been slow in coming the information which has recently become available provides a valuable insight into the staff and service. For example, approximately 47% of plain radiography is outwith “normal” working hours (depending on the definition of “normal”), supporting the desire for a 24/7 service. Waiting Information is also available, suggesting a maximum wait for MRI of 360 days (average of a 100 day wait). Whilst the precise detail may remain elusive the trends are obviously helpful and the attraction of more robust data is irresistible.
5.28 Decision support at the front end of electronic requesting systems will help inform requesting practice and enable appropriate best use of services. In an environment where services are under pressure and clinician negotiation around the request is time consuming the default may be to perform the investigation. Electronic intervention in this process would eliminate the need for this and allow robust policing of good practice and compliance to standards and legislation.

5.29 Electronic transfer of information has much to offer in terms of expediting results transmission, arranging appointments and image transmission. These technologies can be exploited to patient benefit in terms of speed of delivery but also in terms of choice through booking systems.

5.30 There is a clear long-term benefit for Boards and the developing corporate NHS Scotland in having a standard nationally agreed and implemented dataset together with explicit definitions and comprehensive universal system for the collection of that data.

5.31 Currently the options are:

i. Abandon CiRiS and start again. A great deal of intellectual effort and funding has gone into the project, this is the least favoured option.

ii. Electronic link from legacy RIS systems to CiRiS. This would be an attractive but probably unobtainable solution in the short term. This would be a huge programme nationally, but could potentially begin with a pilot to interface a new RIS to CiRiS for data collection/ performance management.

iii. Make CiRiS mandatory (with or without modifications). This is the preferred option but there is a workforce consequence for use of CiRiS which must be recognised and acknowledged appropriately.

iv. Other comprehensive clinical information systems could be considered. Agreed data sets and definitions will be necessary whatever the solution

5.32Nation-wide radiology data collection needs to be in place if we are to move away from the current problems of incomplete or incomparable data from one NHS area to the next. Service planning should be based on robust service data.

5.33 Mandatory use of CiRiS appears to be the best option available to NHS Scotland in the short term. In the longer terms a single, national clinical information for all specialities, as is in place in some health care providers in the USA, should be the goal for the service.
Picture Archiving and Communication Systems (PACS)

5.34 Digital imaging will be at the heart of imaging services in future. PACS captures, stores and displays digital images such as digital radiology images, (x-rays or scans), removing the need to print film and store manually. MRI or CT scans create large data sets where there can be 1000 images for a routine chest, abdominal multi-slice study. Not only is PACS an efficient tool to acquire and store images it allows flexibility in display adding to the diagnostic ease and value to clinicians.

The benefits

For patients
- More effective care as clinicians and care teams work together across one or more locations extending the availability of the expert opinion to the patient closer to home.
- Faster access to medical imaging services and results
- Reduced re-testing due to loss of film and, therefore, a reduction in radiation burden to individuals and the population.
- Faster discharge from hospital and better care planning resulting from easier access to images and test results
- Fewer appointments and operations postponed because of non-availability of images
- More focused diagnostic capability as a result of timeous availability of imaging
- Improved patient experience with diminished unnecessary tests and over investigation by ‘next best’ tests due to waiting times for the ideal investigation.

For Clinicians
- Improved image quality and viewing capability
- Reduction in time searching for lost images
- Images available 24/7
- Simultaneous image viewing across multiple sites and locations (rapid second opinion)
- Quality images for teaching and presentation
- More timeous diagnostic capability for treatment planning
- Facilitation of high-quality multidisciplinary team (MDT) meetings.

For the NHS
- More efficient use of facilities and staff
Reduced expenditure on films, chemicals, transport and storage

5.35 The National Scottish PACS procurement is now at an advanced stage. An exercise is to be undertaken with Boards to establish their sign up to the national PACS project as this is fundamental to the costing of the project.

5.36 It is essential that PACS is rolled out quickly to all parts of Scotland. Individual Boards should be made aware of the priority placed on this by NHS Scotland. All divisions are at a different stage of preparedness for this with some PACS and mini PACS systems in place ahead of the national procurement.

5.37 The Minister for Health and Community Care’s recent confirmation that the Community Health Index is to be the unique patient identifier for NHS Scotland is to be welcomed from the perspective of moving towards a national data collection RIS and PACS.

5.38 The real clinical benefits will come when PACS is linked to a single patient record, a radiology information system and robust mature voice recognition software for the reporting clinician. It is critical that PACS roll-out is linked to equipment replacement and digitisation. This will require a well resourced, centrally supported project management team. Under resourced project management could entail a huge additional cost burden in terms of wasted investment or delayed realisation of potential efficiencies.

5.39 The Wanless report identified a pattern of chronic underinvestment in Information and Communication Technologies in the NHS across the UK. It is essential that these technologies are now rapidly adopted and that thereafter early adoption of new information and communication technologies remains a priority for NHS Scotland. This pursuit of efficiency and improved care through ICT and up to date medical technologies makes sense in every health care environment but particularly one in which skilled staff are in high demand and their output must be maximised, such as NHS Scotland.

Separation of image acquisition and reporting

5.40 There is great scope in NHS Scotland, facilitated by the application of the technologies described above, to separate image acquisition (e.g. “taking an x-ray”/scanning a patient) and analysis/reporting. Accordingly the patient and reporter...
(usually but not necessarily a radiologist) do not need to be in the same place, with the patient avoiding travel to a specialist centre for some tests, determined by the disposition of equipment rather than of reporters. As such there is the potential to provide even more diagnostics in local settings. That is a shift which should be encouraged.

5.41 It is a universal experience that there are significant interruptions during reporting which must create discontinuity of thought process and impact on clinical governance and patient safety (the potential for more mistakes). There are occasions when clinicians find added value in discussing cases with the reporting radiologist and there is no reason why this could not be facilitated if robust systems are put in place.

5.42 This development could help maintain or develop services in remote and rural areas. Tele-technologies must be developed to enhance the image acquisition/reporting split. Tele-assessment underpins much of the desired objective in unscheduled care of providing care locally, and avoiding unnecessary referral to tertiary centres.

5.43 This opens up the possibility of a centrally co-ordinated out of hours on-call service for imaging (perhaps initially out of hours cranial only CT). This suggestion deserves further consideration but is predicated on the existence of a single patient record incorporating all of the patient’s previous imaging, national PACS, and clarity on the relevant medico-legal issues. A&E reporting could also potentially be performed in and out of normal working hours by this method.

Imaging service in smaller hospital and rural communities

5.44 Scotland’s dispersed population presents specific challenges for the provision of fair and equitable access to diagnostic services. In addressing these issues the aim should be to provide safe patient focussed care while acknowledging the important operational issues linked to economies of scale, logistics and clinical governance.

5.45 The level of imaging required to support a general clinical service has moved on greatly in the last two decades. It is no longer acceptable to provide imaging services to a district general hospital without ready access to ultrasound, CT and increasingly MRI, in addition to plain radiography. At the last national survey, the majority of district general hospitals in Scotland have up to date ultrasound equipment, CT scanners and most have access to nuclear medicine and MRI. Some DGHs provide excellent vascular and interventional services but this should be dictated by local expertise, the volume of local clinical activity and be subject to clinical governance.
As a general principle however, low volume, highly specialised equipment and techniques should be sited within specialist centres. Medical Defence Societies dictate this as well as College recommendations with strictures about maintaining expertise.

5.46 Most DGHs provide emergency neuro-imaging and most have some form of tele-radiology link with tertiary neurosurgical centres. These links, however, are often far from robust and have mostly been forged by the enthusiasm of the local clinical team with little managerial or financial support. As a result they are poorly integrated into receiver systems.

5.47 In a country such as Scotland with a dispersed population it makes sense that there is formal recognition of tele-radiology services. Quality assurance systems must be developed and maintained around working practice and skills maintenance.

5.48 Tele-radiology should not just be seen as a necessity for neuro-imaging, it should be systematically extended to encompass all other clinical services.

5.49 It is generally accepted that separating emergency from elective procedures improves through-put (Reforming Emergency Care, Dept of Health 2001). However, this is not always possible in smaller units where economies of scale are difficult to realise with a limited equipment and a small workforce. Smaller hospitals have already encountered serious difficulties in covering on-call arrangements for even basic surgical and medical services let alone diagnostic imaging. Whilst “carve out” of protected slots is proven to be inefficient in the urban context there is proven merit in more rural settings for slot-differentiation (urgent versus routine). What is of proven effectiveness in a large District General Hospital setting doesn’t necessarily work in a rural or small hospital setting.

5.50 The crucial role radiology now plays in acute care and in outpatient services such as oncology has led to unsupported and unplanned increases in demand from frontline clinical services. If diagnostics are not to be a bottleneck in the patient’s pathway through the system it is important for senior imaging staff to be involved from the outset in the local planning of imaging services to design patient flows that best suit local needs. If properly involved, smaller imaging departments will often find unique, innovative and low-cost ways of facilitating diagnostic pathways.

5.51 The shortage of consultant radiologists and radiographers, particularly affecting district general hospitals, requires recognition and national workforce planning. In order to maintain local services, it may be necessary to take a regional view of
provision of some services with the development of managed clinical and diagnostic networks (regional, sub and supra-regional). Wherever possible there should be a robust core of ‘general’ expertise supplemented by specialist interests influenced by the needs of the health care system and other services. In remote communities of insufficient size to warrant full-time radiological support, an attempt should be made to attract “role-extended” radiographic staff wherever possible with appropriate safeguards around protocols and support from a radiologist/ team in a larger centre to protect staff and patients. The small number of very remote units should be supported by robust tele-radiology.

5.52 Tele-radiology links require to be strengthened not just for neuro-imaging but for all services. There is a need to make tele-radiology linkage an obligatory part of health care provision by the tertiary centres. Currently the responsibility for the tele-radiology link falls on the district general hospital as the referring centre and there is little incentive for the receiving tertiary centre to facilitate, support or fund it. This obstacle will not be resolved until provision of tele-radiology is a mandatory requirement for both district general hospitals and tertiary centres. Regional planning mechanisms should ensure adequate bi-/multi-partite support for such services through the development of networks. There should be integration of tele-radiology links with other tele-medicine initiatives including the facility to offer education by broadcast and other innovative media. Managed clinical networks will be a helpful vehicle for this and must be integrated with managed diagnostic networks.

5.53 See Annex B for details of current imaging services in Scotland’s remote and rural hospitals.
REFERENCES

1. See “Drivers for Change”, 2005, *Building a Health Service Fit for the Future*


4. Ibid


8. Forsyth L, and Robertson E.M, “Can we trust each other?” presented at European Congress of Radiology, 8 March 2005

6. SPECIALTY SPECIFIC RECOMMENDATIONS

PATHOLOGY AND LABORATORY MEDICINE

Introduction to pathology and laboratory medicine

6.1 Pathology and laboratory medicine include the following main specialties:

- Clinical biochemistry
- Cytopathology
- Genetics
- Haematology
- Histopathology
- Immunology
- Medical microbiology
- Transfusion medicine
- Virology

Many of these specialties include one or more sub-specialties. Pathology and laboratory medicine departments are based in every acute hospital in Scotland, although not every specialty is represented in each hospital.

6.2 In England the collective term ‘Pathology’ is commonly used to describe all the specialties listed in paragraph. However, in Scotland use of the term ‘Pathology’ is restricted to Histopathology and Cytopathology whereas ‘Laboratory Medicine’ is the collective term for all the other specialties. The Scottish convention will be used in this document.

6.3 The provision of Pathology and Laboratory Medicine diagnostic services may conveniently be divided into three phases:

- The pre-examination phase which involves selection of the correct investigation together with the collection, delivery and reception of the appropriate specimens
- The examination phase which involves examination or analysis of the specimen to produce a finding or result of defined quality
- The post-examination phase which involves interpretation and reporting of the finding or result together with the provision of clinical advice, which may lead to therapy and/or additional investigations

6.4 There is a requirement in Scotland for mandatory enrolment of clinical laboratories with a recognized laboratory accreditation scheme. Virtually all Scottish laboratories are enrolled with Clinical Pathology Accreditation (UK) Ltd (CPA), which accredits the
pre-examination, examination, and post-examination phases as well as the quality management system, staffing, equipment and facilities.  

6.5 Clinical laboratories contain the following grades of staff working in teams:

- Medical consultant pathologists and trainees (registered with the General Medical Council)
- Clinical scientists and trainees (registered with the Health Professions Council (HPC))
- Biomedical scientists (BMS), Advanced Practitioners, and BMS trainees (registered with HPC)
- Support grades (Medical Laboratory Assistants (MLA), Medical Technical Officers (MTO), Cytoscreeners, Administrative & Clerical (A&C)) who are not currently registered

It is a requirement of CPA accreditation that all registered staff working in clinical laboratories undertake continuous professional development (CPD) and the large majority participate in the CPD schemes run by the Royal College of Pathologists (RCPPath) (medical consultants and clinical scientists) or the Institute of Biomedical Science (IBMS) (BMS)

Current status of pathology and laboratory medicine in Scotland

6.6 It is generally accepted that 60-70% of diagnoses rely on output from Pathology and Laboratory Medicine services.

6.7 The organisational responsibility for Pathology and Laboratory Medicine services in Scotland is largely based at Health Board and divisional level with little national oversight. The most obvious exception is the Scottish Molecular Genetics Consortium, which provides national oversight for the delivery and coordinated development of molecular genetic services.

6.8 Pathology and Laboratory Medicine services in Scotland have functioned without adequate investment for many years. As a result there are shortages of staff and an ageing workforce in most specialties, coupled with inadequate workforce planning. There is a lack of modern equipment, and the fabric of many laboratories leaves much to be desired. These findings were documented in the report of the Scottish Pathology Action Group (SPAG). There is general recognition of the need for modernisation of Pathology and Laboratory Medicine and remodelling of services. The challenge is to achieve this whilst managing the rising workload, addressing staff shortages and breaking down historic inter-professional barriers.
6.9 Pathology services are largely qualitative, relatively labour intensive and require direct medical input into the interpretation of most diagnostic examinations. The development of sub-specialisation in Pathology has been implemented to varying degrees across Scotland. True specialisation is not a trivial commitment for it requires exposure to large numbers of specialist specimens which therefore will be reported in a single department, participation in specialist external quality assurance (EQA) schemes and close integration of the consultant pathologist into multidisciplinary clinical teams. There is a medical staff shortage which limits the potential for specialisation in some smaller departments and in some Pathology sub-specialties (notably Neuropathology, Paediatric & Perinatal Pathology) which is impacting on the quality of service delivery.

6.10 Laboratory Medicine services are largely quantitative and utilise technically advanced equipment where appropriate. Clinical Biochemistry and Haematology both include high volume core sections that are delivered using automated platforms for the examination phase of service delivery. Similar trends are developing in some areas of Immunology, Medical Microbiology and Virology. All Laboratory Medicine specialties include relatively low volume, specialist tests that require expert clinical interpretation in the post-examination phase by staff (medical and clinical scientist) trained to MRCPath level. The development of consultant sub-specialization is growing and there is a shortage of medical staff in Haematology, in Haemostatsis and Thrombosis, and there is no consultant allergist in Scotland.

6.11 As with all diagnostic specialties modern information technology and management is crucial to Pathology and Laboratory Medicine. Many laboratory information and management systems contain very large databases of patient information that need to be interrogated, updated and communicated on a 24/7 basis. Lack of investment means there is often a lack of compatibility between laboratory systems in the same hospital and serious deficiencies in connectivity between laboratory, hospital and community information and management systems.

6.12 Pathology and Laboratory Medicine services vary in the urgency with which results are required and this influences the need for locally available services at the point of contact. Core Clinical Biochemistry, Haematology and blood transfusion services are required to deliver a turnaround time of less than one hour for urgent requests (e.g. Accident & Emergency (A&E), Intensive Therapy Unit (ITU), acute medical receiving, obstetric services); less than four hours for standard requests (e.g. inpatients) and less than twenty four hours for other non-specialist requests (e.g. outpatients, primary care) and this means that 24/7 on-site services are essential in each acute hospital. Blood transfusion services are required in each acute hospital on a 24/7 basis. An
urgent frozen tissue Pathology service is also required to support surgery. However, most other Pathology and Laboratory Medicine services are less urgent and so do not necessitate on-site provision provided that transport and information management systems will enable clinically acceptable turnaround times to be achieved.

6.13 Point of care testing (POCT) has an established role in Laboratory Medicine service provision, which is likely to expand considerably in the future. Currently, POCT services are provided by healthcare professionals from wards, operating theatres, ITU, clinics, primary care centres, community pharmacies, the workplace and the home. Compliance with the Medicine and Healthcare Products Regulatory Agency (MHRA) guidelines is required for the delivery of POCT in the hospital and primary care setting and this involves Laboratory Medicine staff in service commissioning, oversight, quality assessment and operator training.

6.14 The Pathology and Laboratory Medicine workload is rising in all specialties. For example in Clinical Biochemistry the national workload has doubled in less than ten years, with the highest annual increase occurring in 2004, due in large measure to a rise of almost 20% from the primary care sector. There are several drivers for this increased workload including:

- Greater clinical activity
- Changing clinical practice, including a shift from secondary to primary care
- An ageing population
- Greater public awareness of health issues
- Public health issues including hospital acquired infection
- Evidence-based clinical guidelines (Scottish Intercollegiate Guidelines Network (SIGN), National Institute for Clinical Excellence (NICE) etc)
- Expansion of cancer screening programmes
- The new consultant and General Medical Services (GMS) contracts
- Government targets
- The availability of new services (especially molecular diagnostics)

The rise in laboratory workload has not been matched by a rise in resources because laboratories have commonly been viewed as a cost centre. Staffing budgets have remained largely static in real terms during this rapid growth phase and consumables budgets have failed to take full account of increased demands. As a result there has been pressure to reduce staffing levels despite the rapid increase in workload, in order to meet overall financial targets. Many laboratories have become caught in a long-term cycle of demand to increase output with diminishing resources. This has caused a negative impact on service quality and results turnaround, at the very time when the clinical importance of rapid diagnostic services has grown. The concept of ‘matched clinical change’ is crucial to service planning if Pathology and Laboratory
Medicine services are to cope with the expansion of any developments in the provision of patient care.

6.15 Scientific and technological change is an essential feature of Pathology and Laboratory Medicine services. In general financial constraints have limited the rate at which scientific and technological advances have been introduced into Scottish laboratory services. Examples of the successful introduction of new scientific and technological services include:

- Liquid based Cytology
- Electronic issue of blood in Transfusion Medicine
- Automated cross-matching in Blood Transfusion
- Molecular testing in Virology, Haematology and Histopathology
- Automated polymerase chain reaction equipment in Genetics
- Tandem mass spectrometry in Clinical Biochemistry
- Automated antibiotic sensitivity testing in Microbiology
- Automated allergy testing in Immunology
- Digital imaging in Histopathology

Additional resource is required to enable the introduction of these new scientific and technological services to improve the quality and efficiency of laboratory services in Scotland.

6.16 The following strategy for the modernisation of Pathology and Laboratory Medicine services in Scotland has been informed by publications from the Department of Health in England and by a review of current issues that was undertaken by the Scottish Council of the Royal College of Pathologists. The strategy is divided into sections for ease of comprehension.

**Strategy for the Modernisation of Pathology and Laboratory Medicine**

**Developments in the rest of the United Kingdom**

6.17 The Department of Health in England has published a comprehensive strategy entitled ‘Modernising Pathology Services’ and this strategy is in the process of being implemented. The key feature of this strategy is the introduction of managed pathology and laboratory medicine networks with the lead being taken at Strategic Health Authority level. To facilitate this development there is a National Pathology Advisor, a National Pathology Framework and incentive funding. Well publicised pathology networks function in Lincolnshire (Pathlinks) and Teesside (TeesPath) and many others are being developed. In the light of ‘Modernising Pathology Services’ the Heath Departments in both Wales and Northern Ireland have conducted independent
reviews, of Pathology and Laboratory Medicine services, which will be implemented during 2005.

Clinical and Laboratory Service Configuration

6.18 It is logical and highly desirable that laboratory services should be aligned with the clinical services that they support. This will facilitate relevant and efficient laboratory services and the inclusion of the laboratory specialist as a member of the multidisciplinary team. Therefore, the future configuration of Pathology and Laboratory Medicine services will depend on changes to and developments in clinical services. Interaction of disease-specific and laboratory MCNs will be crucial in managing this process. Different models will apply according to the clinical service and other factors, including population demographics and geography. For example:

- On site core Clinical Biochemistry, Haematology and Transfusion Services will be required in all acute medical hospital settings, with the availability of 24/7 results with a clinically acceptable turnaround time
- Locally available services will be required for Pathology, Immunology, Microbiology and Virology but these services need not necessarily be located on every acute site
- Specialist Pathology and Laboratory Medicine services should be tailored to meet the needs of regional and national managed clinical networks in areas such as cancer, cardiovascular disease and transplantation.
- Highly specialist Pathology and Laboratory Medicine services are best provided through managed national provision from one or more centres. The Scottish Molecular Genetics Consortium is the best current example

6.19 The introduction of Diagnostic and Treatment Centres to Scotland will provide new opportunities to match diagnostic services to clinical services. On-site Pathology and Laboratory Medicine services will be required, to include support for frozen sections and diabetes centres. Agreement on the extent of on-site laboratory services should be reached at the planning stage for Diagnostic and Treatment Centres. There is a requirement to develop national and regional guidance to inform local planning.

6.20 The interface between clinical and laboratory services is especially important in academic centres. Considerable laboratory service support is required for clinical research and the discovery and development of new, improved laboratory diagnostic services requires active collaboration with clinical units that have defined patient populations. An active collaborative research programme is an important factor in
recruiting high quality trainees and research staff to both clinical and laboratory specialties.

6.21 Currently, the configuration of Pathology and Laboratory Medicine services in Scotland is very variable and owes much to history. For example, some Health Boards have sizeable district general hospitals without an on-site Pathology department whereas other Health Boards provide a more dispersed Pathology service across all district general hospital sites. It is recognised that there is not a single model of laboratory service configuration which will suit all areas of Scotland.

Health Boards, regional planning groups and NHS Scotland should consider opportunities to configure laboratory services to optimise use of resources and better align with clinical services in order to offer high quality, cost effective core and specialist services. Such matching is especially important to ensure that laboratory services are available and resourced to support the introduction of new clinical services.

Managed Clinical Network in Pathology

6.22 A managed clinical network (MCN) in Histopathology/Cytopathology is being implemented. This MCN has been set up through the regional planning groups and the Scottish Cancer Group and should be viewed as the start of a more extensive programme of modernisation. The MCN will function as a model for other potential managed diagnostic networks.

6.23 The strategy for the future development of Pathology should be through investment in the MCN, encouraging full participation of individual departments and recognition of the central importance of the MCN by other agencies in NHS Scotland. It is crucial that the recognised requirement for development is balanced with local needs and sensitivities. Professional body (e.g. RCPath, IBMS) contribution to the Pathology MCN will be essential for strategic development.

6.24 Once developed the MCN will enable the development and provision of authoritative, unbiased information to regional planning groups, NHS Scotland and SEHD. The MCN will also develop a framework for the introduction of new technologies and the development of new ways of working, including augmented roles for BMS.

6.25 The advantages of the Pathology MCN in this context are:

- A focal contact point for all stakeholders (departments, NHS Boards, planning groups, SEHD, professional bodies)
• Availability of a full time manager whose remit is to develop services across the country
• Compatibility with developments in Pathology and Laboratory Medicine in England
• Ownership by the professionals delivering the service

As this is the start of a change process, more ambitious redesign will be required to align these services with service redesign more broadly.

6.26 A working model of the potential of networking in Pathology and Laboratory Medicine is the North East Scotland Pathology Area Network (NESPAN), which has reviewed all new diagnoses of lymphoma in Grampian, Tayside, Highland and Fife since April 2004. Benefits include reassured diagnosis, timely review and a forum for the continuing development of specialists and trainees as well of consistency of management of this complex condition which can involve expensive treatment. A corresponding West of Scotland Pathology Area Network (WOSPAN) is also being developed. There are already and is potential for more disease-centred networks at regional or national level across Scotland in several areas of Pathology and these would be within the remit of the Pathology MCN.

It is recommended that the strategic development of Pathology Services in Scotland should be through the pathology MCN and that it should involve input from stakeholders, including individual departments, relevant regional MCN, NHS Boards, planning groups, professional bodies, partnership representatives and users.

Laboratory Medicine Forum

6.27 Laboratory Medicine specialists currently play a leading role in many local multi-disciplinary teams and increasingly they are providing expertise and support to developing MCN in Scotland. For example, consultants from Clinical Biochemistry are active members of the West of Scotland MCNs for cardiovascular disease, diabetes and prostate cancer and the Scottish MCN for parenteral nutrition. Consultant Haematologists are active members of the West of Scotland Haematoncology MCN and of the Scottish and Northern Irish Haemophilia Centres Organisation.

6.28 It seems likely that there will be an expansion of regional and national MCN in Scotland. It is also possible that managed diagnostic networks could develop to support some areas of clinical practice. The active involvement of Laboratory Medicine specialists as team members of multidisciplinary MCN, and future MDN is to be commended as good practice in order to ensure:
In order to maximise the effectiveness of Laboratory Medicine expertise in Scotland it is recommended that the concept of Managed Diagnostic Networks (MDN) built on the example of the Pathology MDN be extended to other laboratory disciplines. The exact configuration and linkages of the MDNs will be subject to further consultation.

Specialist Services

6.29 The National Services Division (NSD) currently funds and oversees the provision of a range of highly specialist laboratory services for the benefit of NHS Scotland. Examples of such services occur in Genetics (Scottish Molecular Genetics Consortium), Medical Microbiology (specialist services in Bacteriology and Parasitology) and Clinical Biochemistry (trace elements and micronutrients). This model of specialist service commissioning and oversight allows for the managed introduction and monitoring of new services for the benefit of services and patients across Scotland.

6.30 The Calman Review of Genetic Services in Scotland has recently been completed, which provides for further expansion of this growing area of health care with central oversight, direction and funding. As part of this review recognition was given to the rapid expansion of molecular diagnostic services in all areas of Pathology and Laboratory Medicine and it is recommended that a national advisory group be established to manage the wider introduction of molecular diagnostics, including issues of repertoire, technology, training and quality assurance. This national advisory group should work closely with the Pathology MCN and with the Laboratory Specialties Forum.

6.31 In Pathology, service developments and specifications are leading to a need for a greater degree of sub-specialisation amongst pathologists. This requirement puts particular stresses on services that are otherwise coping – e.g. one of the neurosurgical centres is serviced by a Pathology department that does not have a recognized Neuropathologist. The NHS in Scotland will have to become increasingly
sensitive to this issue and the Pathology MCN should be given the task of facilitating the exchange of resources between departments to cover critical gaps in the service.

6.32 In Laboratory Medicine most specialist services are provided on an ad hoc basis. Such specialist services are usually based in teaching centre laboratories in Glasgow, Edinburgh, Dundee and Aberdeen. The combination of pressures on laboratory budgets and a lack of clarity in the area of reimbursement and cross-charging is putting some of these specialist services under threat.

*It is recommended that a review of non-NSD funded specialist services in Laboratory Medicine should be undertaken.*

**Benchmarking Performance for Pathology and Laboratory Medicine**

6.33 There is no longer a comprehensive national laboratory data collection scheme within Scotland and so quantitative information on workload and staffing is not available. Therefore, there is scant information to allow for benchmarking of the efficiency and effectiveness of the Pathology and Laboratory Medicine services in Scotland. Some laboratory centres participate on a voluntary basis in the UK national benchmarking scheme that is organised by the University of Keele. With changing service configuration and the increasing contribution of MCN and MDN it will be important to benchmark laboratory services in Scotland against each other and with corresponding services from the rest of the UK.

*It is recommended that in future all laboratory departments should participate in the UK national benchmarking scheme. The Pathology MCN, through the network manager, will be responsible for collating Pathology data across Scotland.*

6.34 Despite the absence of comprehensive Scottish data on workload trends there is plenty of evidence that the workload in Pathology and Laboratory Medicine continues to rise in all specialties. For example, the Clinical Biochemistry workload has been rising at an annual rate of 5-10% for many years with the rate of increase accelerating in 2004, due in large part to a 20% rise in work from the primary care sector as a result of the introduction of the new GMS contract. The Haematology workload has continued to rise steadily by 5-6% per annum, and there have been greater percentage rises in Genetics and Virology. With the reorganisation of healthcare management in Scotland, including the introduction of Community Health Partnerships (CHP) it will be important to establish a robust mechanism for contracting Pathology and Laboratory Medicine.
It is recommended that the importance of “matched clinical change” for Pathology and Laboratory Medicine services is recognised by regional planners, who are performance managed against their ability to gain best fit, in order to sustain high quality laboratory services in the face of rising clinical demand.

6.35 Workload management and requesting behaviour can be influenced through the provision of evidence-based support material and this can help to ensure realistic use of available resources. For example, a project in Grampian and Moray demonstrated that the combination of test report reminders and enhanced educational feedback reduced requesting from the primary care sector by 16.8% resulting in a reduction in consumable budget of £130Kpa. This approach is being further developed in England through the Good Practice in Primary Care project that has the support of all relevant stakeholders. However, successful workload management requires considerable investment into ICT and of the time of consultant laboratory specialists if it is to be maintained.

6.36 The development of new or expanded laboratory services should be evidence-based and data from benchmarking will be crucial for overall national planning. It is important that laboratory specialists are involved at an early stage of discussions on the introduction of new or improved clinical services since this will enable the optimal laboratory support to be defined and resourced. It is not uncommon for the effectiveness of new clinical services to be impaired because of a failure to identify and resource the laboratory support required for that service. At national level networks will provide a forum for strategic planning and this should enable the rational introduction of common service, including information technology and management.

The Pathology and Laboratory Medicine MDNs should have a key role in workforce development (in partnership with NES).

Quality Matters

6.37 The main quality measure for Pathology and Laboratory Medicine lies in the requirement for laboratory accreditation, usually with CPA. Central to laboratory accreditation is the development and implementation of a quality management system and the growing role of the designated quality manager. There would be considerable benefit to the service and to the patient in shared experience of quality management, perhaps leading to a common clinical governance platform with uniform Scottish quality standards. For example a uniform blood tracking system in Scotland
would have obvious benefits to quality standards. The Pathology and laboratory medicine MDNs can facilitate such shared experience.

6.38 NHS Quality Improvement Scotland (QIS) has less of a direct role in maintaining standards in Pathology and Laboratory Medicine than it does in clinical services but it has reported specifically on autopsy standards, cervical cytology standards and commented on specialization in the existing cancer standards. The Scottish Intercollegiate Guidelines Network (SIGN) and the Royal College of Pathologists will continue to have a role in producing standard minimum datasets for reporting in particular clinical areas and the use of these datasets should be mandatory in all Pathology departments.

New Technology

6.39 It is recognized that many laboratory departments across Scotland are significantly under equipped. Inadequate investment over many years has meant that it has proved difficult to replace basic items of laboratory equipment that are time expired (e.g. centrifuges, autoclaves) let alone introduce new technology that can improve quality and laboratory service efficiency.

*It is recommended that regions or Boards undertake a review of the equipment status and requirements of all departments of Pathology and Laboratory Medicine and that an appropriate rolling capital budget for laboratory equipment purchase and renewal be identified and managed.*

6.40 The introduction of the European Union In-Vitro Diagnostics Directive brings a requirement for the increased use of commercially available CE marked products with financial consequences for laboratory budgets.

6.41 In Laboratory Medicine there are new developments in automation that can assist with managing the pre-examination and examination phases of service provision. With economies of scale through network formation and purchase it is possible that these new platforms may be introduced at no additional cost.

6.42 The introduction of reliable, modern mass spectrometry techniques has opened up the possibility of increased use in routine service provision to provide greater specificity and quality. The high capital investment in such technology has to be offset against the large reductions in consumable costs from the techniques currently in use. Such technology is especially useful in Clinical Biochemistry for the
measurement of drugs, hormones, vitamins and a wide range of metabolites associated with paediatric pathology.

6.43 The use of flow cytometry is becoming of increasing importance in the delivery of specialist Haematology services in oncology as accurate subtyping guides therapy, and in non-malignant conditions where the technique helps to enumerate foetal cells in investigation of haemolytic disease of the newborn.

6.44 The greatest expansion in the use of new technology will come with increased use of molecular diagnostics in all specialties of Pathology and Laboratory Medicine. Molecular Genetics relies on the technology for its expanding service delivery and development. Routine Virology testing now employs molecular diagnostics as a first line test and the technology has also been introduced into routine service in specialized areas of Haematology, Microbiology, Immunology and Clinical Biochemistry. The use of the technology in Laboratory Medicine may expand considerably with the introduction of new and/or improved tests and the development of new areas such as pharmacogenetics. In Pathology the expansion of molecular diagnostic testing is essential to development of improved cancer services. A range of new techniques and equipment is now available to support the expansion of molecular diagnostic testing. The increasing importance of molecular diagnostics has been highlighted in the Calman Review of Genetic Services and through the Scottish Molecular Pathology initiative.

It is recommended that a strategic overview of the development and implementation of molecular diagnostic services be undertaken and the model used by the Scottish Molecular Genetics Consortium may be the means to achieve this.

6.45 Immunocytochemistry is being used increasingly in Pathology both for diagnosis and for targeting patients for specific therapy. For example, the technique is used to guide the use of Imatinib in gastrointestinal stromal tumours and Herceptin in the treatment of breast cancer. Further developments in this technology will need to be linked with molecular pathology in a national strategy for cancer investigation.

6.46 Digital imaging will have a variety of different applications in Pathology and Laboratory Medicine. At a basic level the technology may be used to aid accurate input of patient data into laboratory computer systems, so aiding data retrieval during reporting. At a more advanced level the technology may be used to communicate and/or store the results of investigations such as blood films. The most sophisticated use of digital imaging is in Pathology where it will allow instant transmission of
complex images from point to point so facilitating telemedicine, multidisciplinary team meetings, reporting, quality assurance and research. The PATHALBA initiative has recognized the value of digital imaging and it is anticipated that with the help of the Pathology MCN manager it will be extended across Scotland by the end of 2005.

6.47 Information technology (IT) and information management are central to the accurate and effective use of Pathology and Laboratory Information services and have much to contribute to improved turnaround time, a reduction in waiting times and a reduction in the transmission of infections. The state of IT in Scottish laboratories is variable but is generally well below that required for a modern, efficient service. There is an urgent need for IT and information management systems that will allow for seamless connectivity across laboratory specialties, with other diagnostic services, with hospital and community based information systems. The introduction of the unique patient identifier (CHI) will facilitate this process. Increased use of voice recognition technology will aid the speed of production of Pathology reports and so facilitate the on-line authorisation that is already widely used in Laboratory Medicine.

6.48 Developments in IT and information management at a wider level within the health care community will also provide opportunities for Pathology and Laboratory Medicine. It is likely that doctors in frontline care will rely increasingly on personal digital assistant (PDA) palm top computers. Such PDA should contain laboratory handbooks and reference ranges and with wireless technology should allow for messaging from the laboratory and the direct transmission of key results and reports.

6.49 The use of POCT will increase considerably in the future. This will enable the rapid production of an increasing repertoire of laboratory test results in more clinical settings and so facilitate timely clinical decision making and treatment. For example, the following POCT applications will become increasingly used:

- Wards  
  - urinalysis, blood glucose
- ITU  
  - blood gases, blood glucose
- A&E  
  - blood gases, blood glucose, electrolytes, troponin
- Theatres  
  - parathyroid hormone
- Outpatients  
  - diabetes assessment, anticoagulant monitoring
- Primary care  
  - urinalysis, diabetes assessment, cholesterol
- Self testing  
  - diabetes monitoring, anticoagulant monitoring

However, there are major quality concerns arising out of the inaccurate or inappropriate use of POCT, which can be minimised by adherence to MHRA guidelines, and by involving Laboratory Medicine staff in service commissioning, oversight, quality assessment and operator training\(^3\). This additional role for laboratory staff will need to be resourced.
It is recommended that at a national level the Laboratory Medicine MDN should have a role in providing a quality framework for the roll out of POCT in Scotland and for communicating examples of good practice.

**Service Redesign and New Ways of Working**

6.50 Laboratory Medicine is not normally regarded as a serious bottleneck to speedy patient diagnosis. However, even short delays in the turnaround time for core results can introduce delays in diagnosis in A&E, and contribute to delays in treatment and patient discharge in the hospital setting. Delays in the return of specialist test results can contribute to significant delays to diagnosis and treatment. The return of Pathology reports is often essential in making the diagnosis, especially in cancer. Therefore, service redesign and new ways of working should have as their focus delivering high quality results more quickly. Clinical audit is often the starting point when considering service redesign and new ways of working.

6.51 Boards working with regional planning groups and in consultation with the relevant MCNs will be responsible for determining the optimal configuration of Pathology and Laboratory Medicine services in order to meet the clinical needs of the hospital and community sectors. In reaching these decision Health Boards should have in mind the need to:

- Agree the level of quality required for the service
- Align clinical and laboratory services
- Provide a suitable repertoire of 24/7 services with turnaround times to match acute service needs, and provide a 24/7 consultant led advisory service
- Enable the timely production of results to assist in meeting national waiting time targets (e.g. the four hour A&E target)
- Take advantage of the economies of scale that can emerge from the use of laboratory networks, especially in relation to the purchase of analytical platforms, the rationalisation of specialist services, and the utilisation of staff
- Optimise transport services for specimens and reports
- Introduce common IT and information management systems

6.52 As part of service redesign there is a responsibility at regional planning group and SEHD level to ensure the integrity and financing of specialist laboratory services that transcend Health Board boundaries. The Pathology MCN and the Laboratory Medicine Forum can assist this process.
Pathology and Laboratory Medicine departments should consider ways of better using available resources. For example, the introduction of an extended working day in appropriate laboratory settings will enable better use of expensive equipment and make the best use of automated analytical platforms. Extended working will also enable work from primary care to be processed so that the availability of results can be arranged to coincide with primary care centre opening times.

Greater collaboration between laboratory specialties should be considered. For example, the introduction of shared specimen reception, data input and analytical platforms in Clinical Biochemistry and Haematology offers greater efficiency within the laboratory and improved access and simpler procedures for the clinical user.

Increasing partnership with the independent sector should be considered as a means of providing cost-effective quality services. For example, partnership with a commercial company may enable the introduction of a managed service provision with a shift of risk management and possible savings in value added tax.

Greater use of POCT should be encouraged with the responsibility for governance and quality vested in the Laboratory Medicine service. This will result in outreach roles for laboratory staff who will monitor, co-ordinate, develop and direct POCT services.

The roles of many medical consultants in Laboratory Medicine are becoming more clinical, with increased responsibility for direct clinical care. This development is consistent with the new consultant contract. Examples of this trend include:

- Infection control and antimicrobial therapy in Medical Microbiology
- Haematological malignancy in Haematology
- Venous thromboembolism in Haematology
- Metabolic medicine in Clinical Biochemistry
- Disorders of the immune system in Immunology

Increasing numbers of clinical scientists are obtaining MRCPath by examination so enabling them to fill consultant level posts within laboratories with responsibility for specialist service oversight, wide-ranging clinical interpretation and liaison and laboratory management. The MRCPath by examination is now available to clinical scientists in all specialties of Laboratory Medicine and an MRCPath in specialized areas of Pathology (known as Cellular Science) is being developed.

Extended roles for BMS have been developed in Pathology in the areas of cervical cytology and surgical cut-up. With additional prescribed training these Advanced
Practitioners can acquire competencies to enable them to prepare, perform and report examinations that were previously undertaken by medical practitioners. The development of new Advanced Practitioner roles is anticipated in ophthalmic pathology, neuropathology and colorectal screening and the RCPath and IBMS are collaborating to produce the quality standards to enable this to happen. It is likely that Advanced Practitioner roles for BMS will also develop in Laboratory Medicine. It should be noted that these are additional roles for BMS and there will need to be an increase in BMS establishment to enable such role development.

6.60 An increased role for non-graduate assistant grades is envisaged in laboratories. Such individuals will work under supervision to perform roles that include reagent preparation, simple manual analysis, loading automated equipment and basic quality control. Workplace training and competence assessment will be required to underpin these roles.

6.61 It is recommended that the Pathology and the Laboratory Medicine MDNs take on the role of gathering and communicating good practice information on service redesign and new ways of working in laboratory services in Scotland. Advising the workforce development and planning aspects of new ways of working should be part of this role.

Workforce Strategy

6.62 Inadequate medical, clinical scientist and BMS staffing of Pathology and Laboratory Medicine departments has been and remains a major problem. Staff numbers have been broadly static over many years during which time the volume, repertoire and complexity of work have increased dramatically as the importance of diagnostic services has grown. Automation and IT have had some impact on mitigating the effects of the increased workload but there remains an urgent need to address the staffing shortfall.

6.63 The shortage of staff in Pathology and Laboratory Medicine departments is further compounded by several factors:

- An ageing workforce, especially in the more established specialties
- Implementation of the Working Time Regulations, which are having a major impact on the availability of staff in those specialties that provide 24/7 working
- Agenda for Change, which has increased the holiday entitlement for most staff
- New and extended roles, which have not been matched by backfilling
6.64 The introduction of the new consultant contract and Agenda for Change both provide the opportunity for process change and matching of staff competencies to service needs.

6.65 Workforce planning with linked training commissions has existed for many years for medical consultants and clinical scientists. However, the inexact nature of this process has not prevented shortages and unfilled posts, especially in Histopathology. Formal workforce planning has not existed for BMS and this has contributed to an ageing workforce and a shortage of trainees. There is an urgent need for a review of workforce planning and development for all graduate staff working in Pathology and Laboratory Medicine.

6.66 Two reports from the Scottish Medical and Scientific Advisory Committee (SMASAC) have highlighted problems with the recruitment, training and retention of BMS. As a result SEHD has established a Biomedical Scientist Modernisation Board, which is supported by NHS Education Scotland (NES). This Board is developing training for BMS that includes workplace placement and enables graduation to coincide with the requirements of HPC registration. A mechanism needs to be created to match the production of BMS graduates to services needs.

6.67 An important recent development in Pathology and Laboratory Medicine is the introduction of the Healthcare Scientist staff grouping. This broad staff grouping includes clinical scientists, BMS and assistant grades. A nine-stage career pathway for Healthcare Scientists has been developed, which is underpinned by National Occupational Standards and which facilitates flexibility in training and career development. This career pathway has been benchmarked against Agenda for Change and will be launched in England in the middle of 2005. The career pathway allows the definition of new roles at Associate Practitioner and Advanced Practitioner level. The Scottish Forum for Healthcare Science (SFHS) has been formed by the professional bodies to support the introduction of Healthcare Scientists and the career pathway into Scotland. The SFHS has submitted a strategy document entitled ‘Developing Healthcare Science’ to SEHD, which includes a major focus on mapping the workforce and identifying the workforce planning and training needs. The SFHS could play a role in facilitating workforce planning and development for Healthcare Scientists working in Pathology and Laboratory Medicine.
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    Department
### ANNEX A

**Consultant Radiologist Staffing in Scotland – 2005**

<table>
<thead>
<tr>
<th>HEALTH BOARD</th>
<th>ESTABLISHED POSTS</th>
<th>VACANCIES</th>
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<tr>
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<td>Dec-01</td>
<td>Dec-02</td>
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<tr>
<td>AYRSHIRE</td>
<td>13.0</td>
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<td>BORDERS</td>
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<tr>
<td>DUMFRIES &amp; GALLOWAY</td>
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<td>5.3</td>
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<td>TOTAL</td>
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<tr>
<td>PERCENTAGE</td>
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<td>18.2</td>
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<td>Location</td>
<td>Staff WTE</td>
<td>Vacancies</td>
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<td>--------------</td>
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<td>INVERCLYDE</td>
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<tr>
<td>PAISLEY</td>
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<tr>
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<td>2wte</td>
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**AYRSHIRE**

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**BORDERS**

BORDERS GENERAL  5wte  No vacancies  
HOSPITAL  
  No change  

**DUMFRIES AND GALLOWAY**

DUMFRIES ROYAL  5.6wte  2.6 long term vacancies.  

INFIRMARY  
  Previous occupant continues to do own locum 4 days a week but due to his age (over 70 )this will reduce significantly in March.  Long term Swedish locum has left.  

**FIFE**
QUEEN MARGARET HOSPITAL  6.8wte  
2.5 vacancies – all long term.
1 post filled by South African Radiologists in rotation – now in third year. New appointment in October.

VICTORIA HOSPITAL  7.2wte  
4.6 long term vacancies. 
New appointment January
South African rotation in place – just starting third year.
Long-term Australian locum – 8 sessions.
Recent retiral of long term 0.4wte locum
Part time 0.6wte retiring shortly.

11 sessions provided across Fife by
Consultants employed by other Health Boards

FORTH VALLEY

FALKIRK DG HOSPITAL  9.0wte  
1 vacancy – unsuccessfully advertised.
STIRLING ROYAL INFIRMARY

GRAMPIAN

ABERDEEN HOSPITALS 19.3wte 1 vacancy. Two Consultants still on long term leave.

DR GRAY’S HOSPITAL 3.3wte 1 long-term vacancy.
No change

GREATER GLASGOW

NORTH GLASGOW
Royal Infirmary 10.0wte 1 long term vacancy. No change.

Stobhill 6.2wte No vacancies. No change
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<tr>
<td>Victoria</td>
<td>1.0wte</td>
<td>1.0wte taking up post in April – moving from</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hairmyres.</td>
</tr>
<tr>
<td>Institute</td>
<td>8wte</td>
<td>1 vacancy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Potential of new post in April.</td>
</tr>
<tr>
<td><strong>YORKHILL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RHSC</td>
<td>6.0wte</td>
<td>1 vacancy.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Appointment made in autumn</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Transfer of 0.2wte from Royal Infirmary to cover Neonatal work</td>
</tr>
<tr>
<td><strong>BREAST SCREENING</strong></td>
<td>8.9wte</td>
<td>0.5 vacancies.</td>
</tr>
</tbody>
</table>

**HIGHLAND**
RAIGMORE  10wte  2 vacancies – no change.

LANARKSHIRE

HAIRMYRES  9.5wte  1 vacancy – new appointment starting February.
Consultant moving to South Glasgow in April.

MONKLANDS  8.7wte  2.7wte vacancies.
South African rotation in place.
Retired Consultant does sessions.

WISHAW  9wte  3.6 vacancies – 1 South African locum in post. Second locum terminated at short
notice due to financial constraints.

LOTHIAN

UNIVERSITY HOSPITALS
RHSC  4wte  No vacancies.
<table>
<thead>
<tr>
<th>Location</th>
<th>WTE</th>
<th>Description</th>
</tr>
</thead>
</table>
| Royal Infirmary       | 14.6wte | Retiral occurring in May  
|                       |      | No vacancies.                                                               |
|                       |      | Consultant dropping 5 sessions in May.                                      |
| Western General       | 17.6wte | 1 vacancy in Neuroradiology.                                                |
|                       | 1wte  | Allocation not yet determined                                               |
| PRIMARY CARE          | 3wte | 1 vacancy. No change.                                                       |
| WEST LOTHIAN          |      |                                                                            |
| St John’s             | 6wte | 1.1 long term vacancies.                                                   |
|                       |      | Retirement likely in near future                                           |
| Sixth post agreed following |      | negotiations over new consultant contract. Not advertised.                |
| BREAST SCREENING      | 4.6wte | 0.1 vacancy.                                                               |

**TAYSIDE**
NINEWELLS  
PERTH  
STRACATHRO  26.8wte  4 vacancies. 3 about to be advertised  
Will shortly interview new post of Professor of Radiology.  
Drop of 1.9wte posts due to funding shortfall.

BREAST SCREENING  1wte  No vacancies. No change

WESTERN ISLES  

WESTERN ISLES  1wte  1 vacancy as before.  
HOSPITAL  Former occupant doing own locum.  
Finishing in March. Discussions in place re future
### Imaging details of remote and rural hospitals

<table>
<thead>
<tr>
<th>Hospital/Location</th>
<th>Contact Person</th>
<th>Phone Number</th>
<th>Screening</th>
<th>u/s</th>
<th>plain film</th>
<th>CT</th>
<th>MR</th>
<th>Full Image link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Isles Hospital</td>
<td>Malcolm McNinch</td>
<td>01851 704704</td>
<td>☒ ☒</td>
<td>☒</td>
<td>☒</td>
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<td>☒</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Electronic link for CT Images To SGH neuro</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Setting up electronic link to Stobhill – not in action as yet</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Gilbert Bain</td>
<td>Ann Smith acting for David Wagstaff</td>
<td>01595 695678</td>
<td>☒ ☒</td>
<td>☒</td>
<td>☒</td>
<td>☒</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>CT and MR cases travel to Aberdeen.</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>½ pacs system electronic link for u/s images to be viewed in Aberdeen</td>
<td></td>
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</tr>
<tr>
<td>Balfour Hospital</td>
<td>Carole Hartman</td>
<td>01856 888278</td>
<td>☒ ☒</td>
<td>☒</td>
<td>☒</td>
<td>☒</td>
<td>☒</td>
<td>☒ ☒</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CT/MR patients travel to Inverness/Aberdeen.</td>
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<td></td>
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<td></td>
<td>Concern that CT would not be cost effective if installed but cannot currently meet guidelines for Stroke management.</td>
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<td></td>
<td></td>
<td></td>
<td>Electronic link to ARI after teleradiology link broke down</td>
<td></td>
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<tr>
<td>Lorne and Islands DGH</td>
<td>Moira Haywood</td>
<td>01631 567500</td>
<td>☒ ☒</td>
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<td>☒</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Part time u/s – when radiologist available</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>CT electronic link to Paisley</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Teleradiology link from Island hospitals to Oban</td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Hospital</td>
<td>Location</td>
<td>Phone Number</td>
<td>Screen</td>
<td>u/s</td>
<td>Plain Film</td>
<td>CT</td>
<td>MR</td>
<td>Full Image Link</td>
</tr>
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</tr>
<tr>
<td>Vale of Leven</td>
<td>Lomond/Argyle/Clyde</td>
<td>01389 754121</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
</tr>
<tr>
<td>(Betty McVean)</td>
<td></td>
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<td>☑️</td>
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<td>☑️</td>
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</tr>
<tr>
<td>Teleradiology links throughout Lomond and Argyle divided up into chunks sent to Oban, Vale of Leven and Inverclyde. MR patients travel to Paisley. Superintendent will e-mail with lists of facilities at all peripheral units.</td>
<td></td>
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<tr>
<td>Belford Hospital</td>
<td>Fort William</td>
<td>01397 702481</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
</tr>
<tr>
<td>(Kevin Hickman)</td>
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<td>☑️</td>
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<td>☑️</td>
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<tr>
<td>MR patients travel to Inverness. Links to Inverness- plain film teleradiology, CT electronic link. Skye has screening, plain film and u/s facilities all image linked to Raigmore.</td>
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<tr>
<td>Dr Gray’s</td>
<td>Elgin</td>
<td>013435 43131</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
</tr>
<tr>
<td>(George Simpson)</td>
<td></td>
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<td>☑️</td>
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<td></td>
<td>☑️</td>
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</tr>
<tr>
<td>MR patients travel to Aberdeen. CT images linked to Neuro Aberdeen. As from this weekend link set up to Aberdeen. Images will then be sent to Radiology, Radiotherapy, CCU, ITU and CT at Aberdeen. Plans for 6 community hospitals in Murray, Banff and Huntley to have CR systems installed so that images can centrally archived.</td>
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</tbody>
</table>
Volume

Level 1
Community-provided services such as primary care unscheduled, Scottish Ambulance Service and NHS24 services.

Level 2
Locally provided assessment and treatment services, such as minor injuries, illness assessment, with some diagnostic facilities

Level 3a
Providing core admitting services – general surgery, ortho, medicine

Level 3b
Providing sub-specialised services – Vascular surgery, Urology, Burns and Plastic surgery, interventional cardiology

Level 4
Limited number of facilities - providing highly specialised services, eg neuro.

ANNEX C
Unscheduled Care – tiered provision of services
ANNEX D

Group Membership

Gillian Needham (Chair)  Regional Development Director and Postgraduate Dean, NHS Education for Scotland/North Region
Elizabeth Robertson  Consultant Radiologist NHS Grampian. CMO adviser in radiology.
Michael Fuller  Scottish Partnership Forum
Paul Duffy  Consultant Radiologist and Clinical Director, NHS Glasgow Diagnostic Imaging Modernisation Programme
Jocelyn Imrie
Frank Carey  Clinical Leader in Pathology, Tayside University Hospitals
John Reid  NHS Scottish Partnership Forum
Peter Johnstone  Consultant Pathologist
Lesley Forsyth  Senior Lecturer, School of Health Sciences, The Robert Gordon University
Pauline Ferguson  Programme Manager, Centre for Change and Innovation
Carmen McAteer  Programme Manager, Centre for Change and Innovation
Graham Beastall  Consultant Clinical Scientist and Clinical Lead for the Department of Clinical Biochemistry, NHS Greater Glasgow. Vice President of the Royal College of Pathologists in the UK
Mike Lyon  National Waiting Times Unit, SEHD
Mike Cornebleet  Senior Medical Officer
Elizabeth Porterfield  Head, Clinical Strategies: Cancer, SEHD
Brian Dornan  National Planning Team, SEHD