Demand Optimisation in Diagnostics

Best Test, Best Care

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Healthcare
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Scottish Microbiology
and Virology Network

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SCIN

Scottish Clinical
Imaging Network

Contents

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Executive Summary

It has been recognised for many years that there is considerable variation in the use of diagnostic tests across the NHS. While some of this variation can be explained by clinical circumstances and demographic differences, there still exists considerable levels of inappropriate requesting by clinicians, practises of over-requesting, under-requesting etc. In addition, lack of availability of certain tests across the NHS Boards may also limit their optimal universal utility.

Demand Optimisation is defined as the process by which diagnostic test use is optimised to maximise appropriate testing which in turn optimises clinical care and drives more efficient use of scarce resource. The process needs to consider:

- Minimising over-requesting and under-requesting, both of which can be damaging to optimal patient care.

- Reducing unnecessary repeat requesting.

- Ensuring appropriate and useful test repertoires are universally available across all healthcare outlets.

- Standardisation to reduce unnecessary variation – especially around IT definitions and clinical pathways that utilise diagnostic tests.

In 2016, Scottish Government set up the National Demand Optimisation Group (NDOG). This multidisciplinary group brought together individuals from the main diagnostic disciplines within Laboratory Services and Radiology, along with support from Scottish Government, NHS National Services Scotland (NSS) and the National Managed Diagnostic Networks (NMDNs).

The NDOG met four times across 2016 and formulated a number of aims which covered information gathering on current good practice and Demand Optimisation activity in NHS Boards, production of guidance documents on strategy and support for some pilot work streams for potential national roll out. While reviewing existing practice and information, the group also explored links with local and national initiatives so that the demand optimisation agenda could be set in the context of major strategic initiatives already taking place. The concept of demand optimisation can be applied to many diagnostic services, however the main focus of the conclusions and recommendations of this group relate to laboratory medicine.

The NDOG made the following conclusions with related recommendations:-

Conclusions

- Demand Optimisation activity already has a high profile and good momentum within many NHS Boards driven by the current financial climate. This would benefit from a wider whole systems review, sharing of practice and central oversight.

- Collection of data that captures diagnostic test requesting activity is vital and underpins any Demand Optimisation Programme.

- Data can be obtained manually relatively easily from individual NHS Boards. The incorporation of such data into a comprehensive, accessible system across NHS Scotland would however need expertise and resource allocation.

- General Demand Optimisation Guidance produced by the NDOG, if implemented across all NHS Boards, would allow a coordinated, consistent approach to Demand Optimisation.

- Educational Feedback Programmes similar to the one being piloted across NHS Grampian Primary Care could be replicated across other NHS Boards. This consistent approach could lead to more rational use of laboratory and other diagnostic tests and reduce variation in practice.

- Information technology is fundamentally important to the delivery of many Demand Optimisation strategies. It is vital that systems supporting such activities are fit for purpose and that there is a degree of consistency across all NHS Boards.

- A programme of Effective Diagnostic Pathways, linked in with emerging work on Effective Care Pathways, could help promote rational, consistent pathways of care and unblock bottlenecks that limit the introduction of new tests and technologies as a result of silo budget inflexibility.

- Governance – in order to support and facilitate the roll out of a consistent, "Once for Scotland" approach to Demand Optimisation, it is vital that the appropriate governance and support structures are in place both centrally and locally within each NHS Board so as to enable definition of strategy, dissemination and implementation. Initial provider based strategy should make way for the longer term aims of developing a "whole systems approach".

Recommendations

1. **Guidance** - NHS Boards should adopt the recommendations within the General Demand Optimisation Guidance and IT Guidance documents produced by the NDOG (Appendices C and F).

2. **NDOG Related Workstreams** - The NDOG (revised as an implementation group) should continue to function into 2017, and beyond, to allow coordination and support for Demand Optimisation work streams and strategy implementation. The following work streams should be taken forward in collaboration with local Health Board leads, the Diagnostic Networks and the NHS Scotland Shared Services Health Portfolio:

    2.1. Data Management. Data collection and reporting is a key enabler for all future work and will underpin all the work streams. This should be taken forward within existing work in the NHS Scotland Shared Services Laboratories project to meet the requirements set out for Demand Optimisation. The necessary resource allocation to allow local data collection with national level collation, analysis and presentation needs to be considered

2.2. Service Variation. This workstream needs to identify variation across NHS Boards both in terms of scope of available services and the actual use both in primary and secondary care. Regular collection/collation of data would allow an Atlas of both service and variation to be generated which would not only provide a snapshot but act as a rolling baseline to gauge progress.

2.3. Requestor Feedback. A common, consistent approach to providing requestors with information around their own activity should be considered. This information could be accompanied with peer comparison data, best practice guidance and related test cost data.

2.4. Minimum Retesting Intervals (MRIs). Existing guidance on MRIs in lab tests should be consistently implemented across all NHS Boards to reduce unnecessary repeat testing. Addressing related IT bottlenecks needs to be prioritised.

2.5. Introduction of New Tests/Pathways. A more focused and collaborative workstream aimed at facilitating the introduction of new tests within definitive clinical pathways should be initiated. This effective diagnostic pathway approach could also be applied to existing tests.

2.6. Realistic Radiology. The Scottish Clinical Imaging Network will establish a subgroup to engage with the recommendations made by the NDOG with regard to imaging. This will include evaluating various clinical decision software options, with a view to piloting a preferred option in the near future

3. **Information Technology (IT).** Shortcomings in IT functionality and lack of interoperability between systems limit the scope for successful demand optimisation strategy implementation. The Scottish Government, the shared services portfolio group, existing diagnostic networks and NHS eHealth leads should collaborate to explore solutions that would allow:

- Regular, consistent and automated data collection around diagnostic test activity.

- Improved standardisation across information systems, read codes and data repositories.

- True interoperability across systems.

- Optimum functionality for implementation of minimum retesting intervals including "live blocking" of inappropriate requesting

Fast tracking developments to support demand optimisation, with an initial focus on minimum retesting intervals, should be explored as part of this

4. **Oversight, Collaboration and Governance**. The success of any demand optimisation programme relies heavily on clear collaborative governance structures existing both centrally and locally within the NHS Boards. Much of this already exists in some areas but requires re-defining and prioritising. The following recommendations are made:

4.1. NHS Boards and Diagnostic Networks should continue to provide support to healthcare science leads, managers and diagnostics staff to work with the national healthcare science leads and diagnostic networks in collectively progressing Demand Optimisation work.

4.2. The national Diagnostic Steering Group (DSG) should consider establishing an authorising subgroup made up of Board diagnostic services managerial and clinical leads to decide on, prioritise and approve NDOG/NMDN recommendations including those related to demand optimisation.

4.3. NHS Boards should implement structures (where not already in place) that will enable Demand Optimisation strategies to be considered and implemented. This will require:

- Involvement of not just the diagnostic services but also ensuring that clinicians from Primary and Secondary Care, managers and finance are fully engaged as integrated teams to ensure delivery of optimal diagnostic services.

- Where not already in place, identification of a Demand Optimisation Lead (Board-level executive lead for Healthcare Sciences) to oversee the development of local infrastructure and enable linkage of local diagnostics demand optimisation activities

4.4. Diagnostics service providers and users should be supported by Boards to continue to

- Develop an embedded focus on diagnostics demand optimisation within their management and operational delivery structures.

- Engage in national and local data collection activity to identify overt variation in user practice and gaps in repertoire.

- Monitor demand optimisation strategy effect on local improvement in clinical outcome and/or efficiency of the service

- Feed back good practice examples into the existing test case library (appendix B) – this will be managed by the existing NMDNs.

4.5. The relevant National Diagnostics Managed Network should provide national oversight and consistent quality, with operational leads for each discipline from each providing NHS Boards. Where national networks do not exist for a particular discipline, a community of practice should be established and supported, linked to Scottish Government's Healthcare Science Lead

4.6. Biannual reports from all disciplines should be provided to the Diagnostic Steering Group via the national networks or via the Scottish Government's Healthcare Science Lead, where no relevant network exists.

Section 1: Introduction

1.1 Background

Demand Optimisation in Diagnostic Services

It has been recognised for many years that there is considerable variation in the use of diagnostic tests across the NHS. While some of this variation can be explained by clinical circumstances and demographic differences, much of the variation is suggestive of considerable levels of inappropriate requesting by clinicians as a result of over-requesting, under-requesting and unnecessary repeat testing. In addition, lack of availability of certain tests across the NHS Boards may also limit their optimal use.

Demand Optimisation is defined as the process by which diagnostic test use is optimised to maximise appropriate testing which in turn optimises clinical care and drives more efficient use of scarce resource. The process needs to consider:

- Minimising over-requesting and under-requesting, both of which can be damaging to optimal patient care.

- Reducing unnecessary repeat requesting.

- Ensuring appropriate and useful test repertoires are universally available across all healthcare outlets.

- Standardisation to reduce unnecessary variation – especially around IT definitions and clinical pathways that utilise diagnostic tests.

It remains vital to acknowledge that the optimisation of rational diagnostic testing may bring about more efficient use of resources within diagnostics, however it is the knock-on effect for patient care pathways and the associated clinical impact that are much more important. The concept that investing more financial resource within diagnostics can in fact result in cost savings to the wider NHS way in excess of the original investment needs to be considered, explored and implemented – this invest to save approach has been used in particular to justify the implementation of newer, more costly diagnostic tests in recent years.

Demand Optimisation interest has been rising for many years and it has become a focus programme within the Scottish Government's Healthcare Science National Delivery Plan. In 2015, the Scottish Government requested that a National Demand Optimisation Group (NDOG) be established. This multidisciplinary group was formed in 2016 and has been developing a number of aims and workstreams around demand optimisation.

It is within the interests of healthcare provision across NHS Scotland that a joined up, focused, patient centred programme around Demand Optimisation be developed and adopted so that diagnostic testing can be made more appropriate, consistent and cost effective – ensuring that for every patient, the right test, at the right time is available and is carried out without unnecessary waste or potential harmful knock-on effects. Using appropriately delivered diagnostic testing to drive efficient healthcare pathways across the NHS remains the ultimate goal.

1.2 Group Membership

The multidisciplinary National Demand Optimisation Group (NDOG) was formed in 2016 and has been developing a number of aims and workstreams around demand optimisation. The group has representation from Scottish Government, National Services Scotland, the National Managed Diagnostic Networks, as well as representation from laboratories including Biochemistry, Microbiology / Virology, Pathology, Haematology and Clinical Immunology. There is also representation from Clinical Imaging, Genetics/Molecular Consortia and the Scottish National Blood Transfusion Service. There are Demand Optimisation subgroups currently operating within the Clinical Imaging and Biochemistry networks. Full details of the group membership can be found in Appendix A.

1.3 Governance of NDOG

Scottish Government's Healthcare Science Lead resourced NHS National Services Scotland to provide administrative support to the NDOG for an initial 12 month period, to deliver an improvement plan to optimise diagnostic testing for patients and to support the implementation of the National Clinical Strategy and Scottish Government's Healthcare Science National Delivery Plan. An initial scoping exercise was undertaken to identify stakeholders and agree the scope of the work. The governance structure employed in the work was –
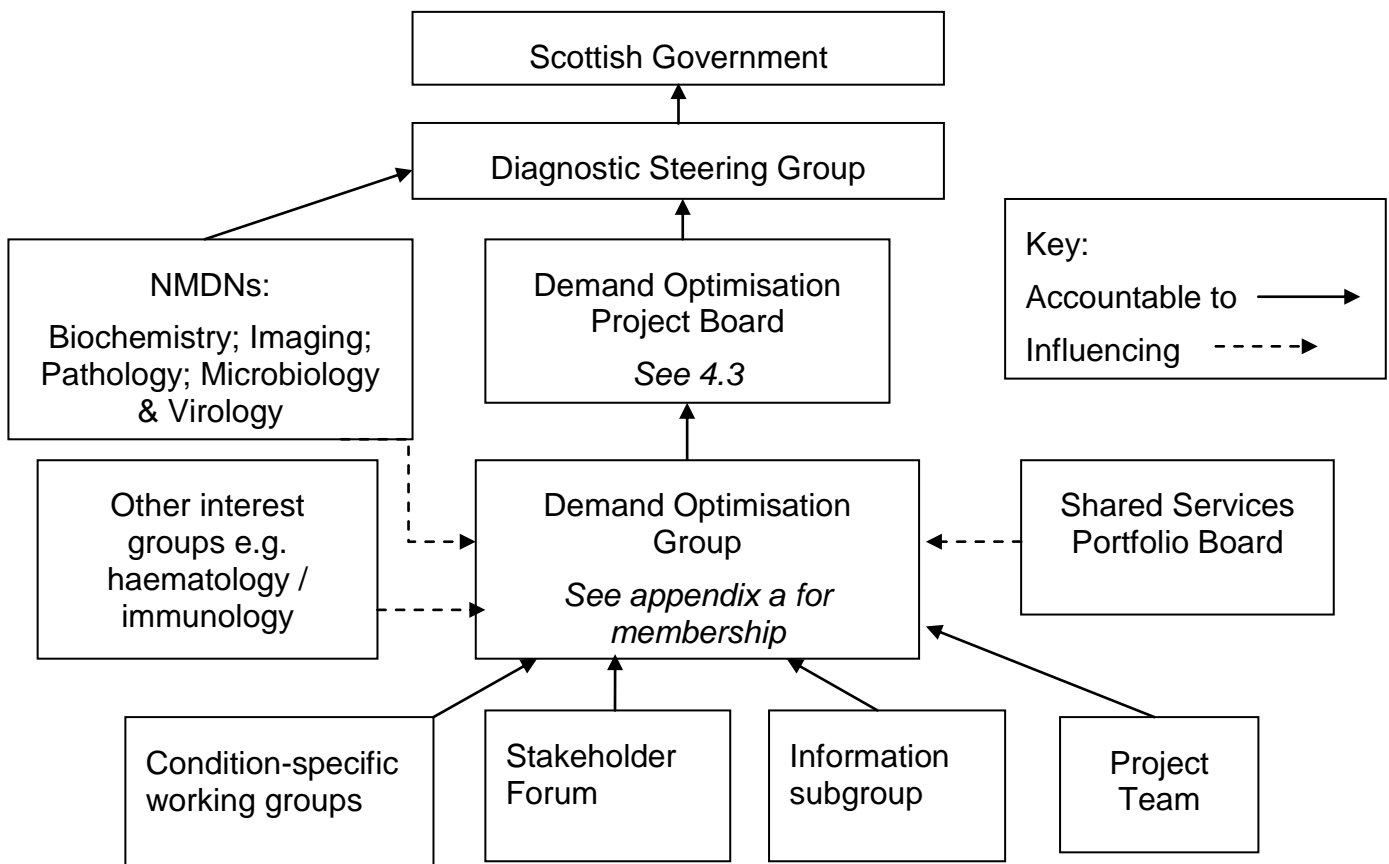

Figure 1: NDOG Governance arrangement.

A website was established and regular bulletins issued to highlight the work of the NDOG. Members also linked with relevant activity at a local and national level, to capture a true Scotland-wide picture of demand optimisation activity.

Section 2: Aims

The NDOG was funded and scheduled to meet four times across 2016. This timescale meant that the scope and deliverables would be limited and focused around defining recommendations for future demand optimisation structures and implementation strategies. The main aims of the group are summarised below:

a) Information Gathering – Aim to understand what is already happening within NHS Scotland through carrying out a survey of Demand Optimisation activity as well as collecting examples of good practice from NDOG members and beyond.

b) Demand Optimisation Data – Aim to discuss how best to collect data on diagnostic activity. In addition, to establish the importance of using this data both to identify areas of variation in practice and to establish a baseline from which future implementation strategies could be assessed. A proof of concept for a potential Scottish "Atlas of Variation" was also an aim.

c) General Demand Optimisation Guidance – Aim to construct via the NDOG, a "Top Ten" Demand Optimisation set of guidance detailing strategy for implementation across all NHS Boards.

d) Educational Feedback in Primary Care – Aim to explore and provide proof of concept for an educational feedback program to Primary Care that would both highlight comparative laboratory test use along with guidance on appropriate test use.

e) Information Technology Guidance – Given the importance of IT in delivering demand optimisation interventions, the NDOG would aim to develop general guidance regarding the likely areas of interest.

f) National and Local Governance Structures – The NDOG would aim to provide a recommendation on how national and local governance structures could be established to enable demand optimisation strategy to be developed and implemented in a standard, consistent way that drove cost-effectiveness and promoted appropriate diagnostic test use.

g) Effective Diagnostic Pathways – The concept of defining standard pathways of care that utilise new and existing diagnostic tests in order to promote consistent availability and use across NHS Scotland would aim to be explored. A link would also be made to the parallel work emerging through Health Improvement Scotland on Effective Care Pathways.

Section 3: NDOG Output

This section details the overall activity and output of the NDOG in relation to the aims stated above.

3.1 Information Gathering

On establishment, the national Demand Optimisation Group (DOG) sought to identify relevant work taking place at a local level to address demand optimisation / demand management issues.

Demand Optimisation Survey - Summary Findings

The Demand Optimisation survey was circulated to all NHS boards delivering diagnostic services (Laboratory and Radiology). The main aim was to understand how demand optimisation governance and work streams were managed and delivered across Scotland.

The survey highlights an appetite across the NHS Boards to delivery around the overall ambitions of demand optimisation, in providing the 'right test, at the right time, for the right patient' in order to provide appropriate clinical testing and treatment. There is significant variation across Scotland in terms of the existence of a co-ordinated delivery and associated governance, along with limitations in IT systems and a lack of tools to measure baseline activity and overall clinical impact.

The key points highlight:

- The majority of boards do not have a formal demand optimisation group or committee operating at NHS board level; there are different governance models in operation across the boards

- There is variation across the boards with adoption of national guidelines and minimum retesting intervals.

- There is variation across the boards in the provision of activity feedback to clinical users.

- The survey highlighted some good areas of demand optimisation practice.

- The survey highlighted that currently demand optimisation initiatives in general have not been linked to patient care quality or outcomes.

- There is no national IT platform, with limited local ability to control the ordering of tests

Overall Findings

Evidence from the survey and case studies highlighted that Demand Optimisation was high on the agenda for Scottish NHS Boards given the current financial climate; however, there was a lack of consistency and coordination with much variation apparent. The known limitations of the "silo budget" effect and IT systems that were not fit for purpose/interoperable across boards also came to light.

Demand Optimisation Test Case Library

Where the diagnostic exercise identified innovation, greater detail was sought to allow the development of a library of Demand Optimisation test cases.

The aim of such work was to allow cross-fertilisation of knowledge in this area and to act as a catalyst for change for a variety of clinical and management teams working within Health and Social Care.

Examples of work include:

- Collaborative working between laboratory services, Sexual Health and Primary Care to optimise the diagnosis of female genital infection.
- Optimisation of the use of urinary culture in asymptomatic patients to ensure that it was not used where results were unlikely to alter clinical management.
- Evidence based alteration to the protocol for serological testing for rheumatoid arthritis.
- The use of a dashboard tool within Primary Care to provide feedback on the use of diagnostic tests and optimise their appropriate use within this setting.
- A review of the clinical appropriateness of the need to refer samples for the assessment of markers CA19-9 and CA153 to laboratories.
- Reviewing the constituents of the Liver Function Test Panel.

Examples of work from the library can be found at appendix B.

3.2 Demand Optimisation Data

The ability to identify and measure diagnostic test use activity is fundamental to any Demand Optimisation programme. The existence of such data brings with it many opportunities:

a) Benchmarking of diagnostic test use – allowing comparisons between GP practices, hospital wards or even NHS Boards.

b) Identification of variation in practice enabling interventions to be formulated and targeted towards known problems.

c) Specific identification of under and over requesting areas allowing targeted outreach interventions to be made with minimal resource implications.

d) Pulling of "Big Data" to allow clinical observations to be made and linkage with other benchmarking data to assess public health issues, impact and uptake of guidelines and clinical strategy effect assessment.

e) Longitudinal data allowing assessment of Demand Optimisation strategies and trends in specific test requesting.

f) Financial planning and identification of resource intense practice areas.

Keele benchmarking – it was acknowledged that all laboratories participate in Keele benchmarking which includes data collection on diagnostic test utilisation. This data

is not however suitable for the kind of interrogation required to allow specific identification of sub-optimal requesting behaviour – such as GP practice level data.

Information Services Division (ISD) Role – Discussion also took place between members of the NDOG and ISD regarding any utility of data that they currently collect. It was once again acknowledged that the source, availability and level of data collection was not suitable currently for full demand optimisation purposes. Furthermore, the lack of standardisation of diagnostic test coding and the lack of interoperability between the Health Board systems meant that such data could not feasibly be collected on an automatic basis and would require manual download/extraction at Health Board level followed by compilation in order to allow pan-Scotland comparisons to be made.

3.3   Atlas of Variation Pilot

It was decided early on that the NDOG, given their remit and time limitations, would not be in a position to deliver a comprehensive Atlas of Variation for Scotland. It was instead proposed that a proof of concept pilot would be developed to assess the ease and feasibility of data collection and the potential opportunities that such data would bring.

Background

The NHS England Diagnostic Atlas of Variation was published in November 2013. The focus in this publication was on diagnostic tests and incorporated data from not just Laboratory Medicine, but also some limited data on radiology, endoscopy and other physiological diagnostic services. In summary, the Atlas showed the variation in the requesting of diagnostic tests across the then 151 Primary Care Trusts (PCTs) adjusted per 1,000 population. The large variations exhibited require further discussion as to their validity, significance and potential for corrective action.

Across the range of diagnostic testing examined, there are of course valid reasons to explain some of the variation observed: different PCT populations/case-mix, deprivation, disease incidence/prevalence, local policy decisions on specific services and availability of relatively new diagnostic services. Despite that, some of the variations in test requesting seen remain so significant that the only conclusion is that they represent the individual requesting patterns by doctors collectively within each PCT. As examples, even when outliers are trimmed off, the variation in the requesting of ALT, rheumatoid factor, CA125, vitamin D and urine protein-creatinine tests showed 56, 170, 9, 392 and 334-fold differences respectively across the PCTs. The significance of such variation in requesting, whatever the reason, needs further consideration.

Such variation in the use of diagnostic tests can be said to have significant impact not only on the utilisation of scarce resources within the NHS but also can have real impact on patient care and subsequent morbidity and mortality. It should also be emphasised that while these differences between PCTs are large enough in themselves, when the data is drilled down further to individual practices or indeed individual GPs, then the variations are multiplied even further.

These differences do of course matter and do reflect different approaches being used to manage patients by individual practitioners, between practices and even across different PCTs. Much of this variation may reflect inappropriate use of resources but more importantly may signal sub-optimal and even damaging patient care as a result of inappropriate diagnostic choice.

While this data originates from English PCTs, it is likely that very similar variations in requesting would be observed across other regions of the United Kingdom including Scotland. Benchmarking of requesting rates is not a new concept, nor is the observation of large variations in such requesting patterns. Explanations for the potential variation in diagnostic testing observed are many. The variation in diagnostic test use demonstrated within the NHS England Atlas could not be explained by differences in patient numbers or health demographics. It is likely that similar unwarranted variations in diagnostic test use exist across NHS Scotland.

Methodology

Laboratory Services within NHS Grampian and Tayside volunteered to formulate and collect data relating to GP practice utilisation of laboratory tests in order to test proof of concept that the relevant data could be easily collected, combined and made use of to highlight variation and inform demand optimisation strategies.

Data on individual GP practice requesting rates for laboratory tests were collected for an entire year (Sept 1st 2015 to August 31st 2016) from the Laboratory Information Management Systems (LIMS) of NHS Grampian and NHS Tayside. This data was combined with information including GP practice list size so that requesting patterns could be adjusted for this confounder and allow more appropriate analysis and comparisons to be made.

The following tests were targeted for data collection:

- General – Sodium, Creatinine, Bilirubin
- Bone – Calcium, Vitamin D, PTH
- Endocrine – TSH, fT4, fT3, Glucose, HbA1c
- Cancer – CA125, CEA, PSA
- Cardiac – Cholesterol, TGS, HDL
- Therapeutic Drugs – Lithium, Phenytoin, Carbamazepine
- Immunology – Thyroid Peroxisomal Abs, Rh Factor, IgE (RAST)
- Haematology – FBC, B12, Folate (serum + red cell), Ferritin
- Urine – Protein/Creat ratio, albumin/creat ratio

A data download was extracted from the Laboratory Information Management System (LIMS) operating within Laboratory Services of NHS Grampian and Tayside using a standard query based extraction tool – this enabled the relevant fields to be populated on an Excel spreadsheet for further analysis. While LIMS will differ across the NHS Boards, the process of data extraction relating to requesting rates attributed to specific geographical locations is straightforward and usually carried out on a regular basis – such as for data collection for Keele Benchmarking returns and for turnaround time evaluations. Despite the lack of interoperability, there should therefore be no barriers to the NHS Boards contributing a common format excel based data extraction with the requesting rate data required for this process.

Results

Firstly, the data was relatively easily extracted from the LIMS systems of both NHS Boards. Secondly, it became clear that the data would be able to provide a snapshot of laboratory requesting activity and allow comparisons between the two NHS Boards and the GP practices contained within.

As expected, significant variation in requesting was demonstrated across the GP practices. Figure 2 shows the variation between both NHS Grampian and Tayside for requesting rates for Rheumatoid Factor, a blood test. Clearly, this test is rarely used across NHS Tayside, whereas across NHS Grampian Practices there is a 70-fold variation in requesting rates for this test, which remains around 7-fold when outliers are stripped off.
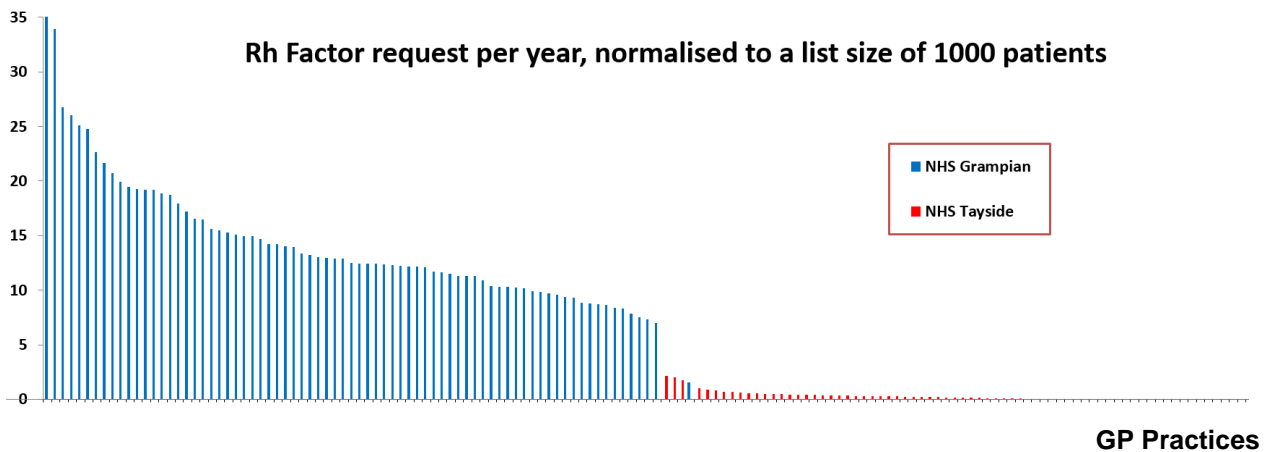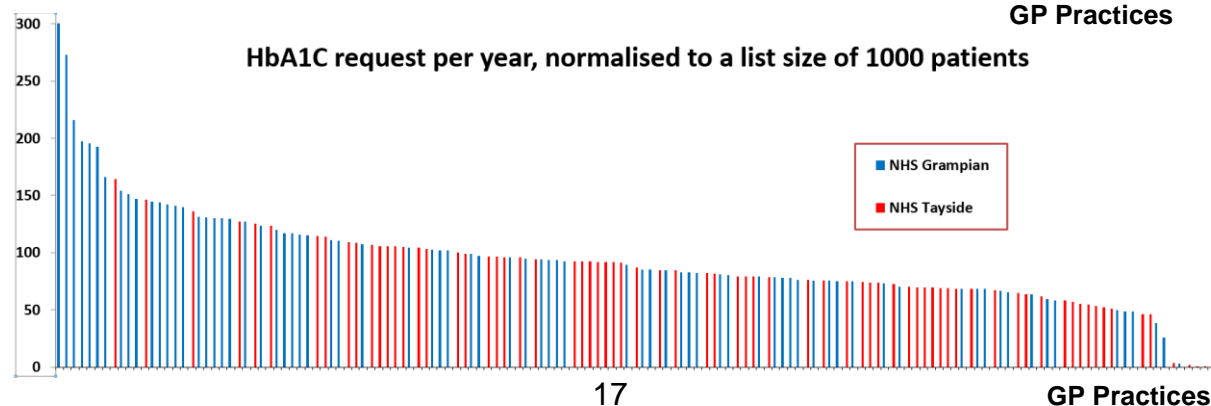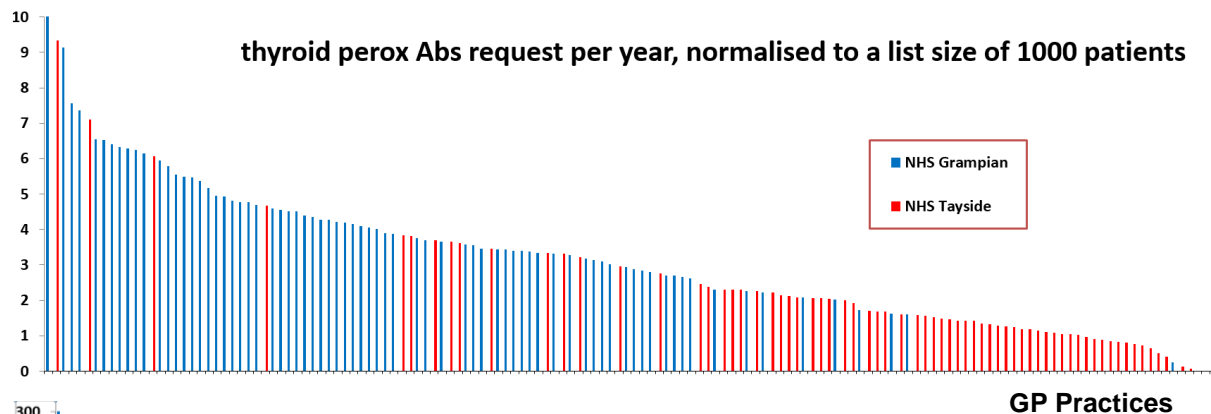

Figure 2. Rheumatoid Factor requesting rates across GP Practices within NHS Grampian and Tayside.

Similarly, tests for Thyroid Peroxidase Antibodies (figure 3) show a 10-fold variation in adjusted requesting rates across practices, whereas that variation is 5-fold for HbA1c – a test for diabetes diagnosis and monitoring (figure 4).

Conclusions

This pilot demonstrated proof of concept that laboratory services within NHS Grampian and Tayside were able to extract the relevant data that could be used to populate a Scottish Atlas of Variation. It is likely that other NHS Boards would also be able to provide this data on a rolling basis.

The pilot also demonstrated that there exists across the GP practices assessed, significant variation in requesting that pointed towards sub-optimal utilisation or availability of diagnostic tests. This observation is likely to be replicated across the rest of Scotland.

Clearly existence of this data on a Scotland wide basis would allow the focus and targeting of specific demand optimisation strategy to be implemented.

3.4 General Demand Optimisation Guidance.

A guidance document highlighting the main, "Top Ten", implementation strategies for demand optimisation that could be introduced across all NHS Boards was formulated by the group – this is available as Appendix C. A particular focus within the guidance on Minimum Retesting Intervals has also given rise to more specific guidance on this with priority MRIs documented as Appendix D.

The aim of this document was to illustrate clearly the main strategies that all NHS Boards should be implementing and to drive consistency across Scotland. The actual uptake and implementation of the strategies contained within the guidance relies heavily on sufficient governance structures and mechanisms within the NHS Boards to allow this to happen.

3.5 Educational Feedback in Primary Care

This workstream stemmed from activity already happening across NHS Grampian in 2016. It was agreed that its development was relevant and would serve as a proof of concept/pilot for potential roll out across other NHS Boards.

As well as the planned ongoing pilot within NHS Grampian, there was also discussion within the NDOG around the potential for such requesting rate activity to be made available on a rolling basis for GPs – an example system made available to GPs across NHS Grampian is in development that provides such data via a Sharepoint Web access login. It is worth noting that the data collection for this is the same data set/source as is used for the enhanced educational feedback service and indeed for a proposed Atlas of Variation. In addition, it would also be feasible to enhance this dataset further by adding in the relevant costs of specific laboratory tests and providing clinical areas with a comparative measure of their diagnostic financial burden to the NHS.

Enhanced Educational Feedback in Primary Care Pilot

Background: The feedback of laboratory test requesting rates to GP practices along with educational guidance on appropriate test use is not a new concept, having been trialled elsewhere – notably within NHS Grampian as part of a randomised controlled trial reported in the Lancet in 2006 (Thomas et al. The Lancet 2006; 367: 1990-1996). This labour intensive paper-based intervention carried out ten years ago has now been replaced by an automated electronic system that involves the generation of PDF feedback tailored to specific GP practices.

Methods: Tailored feedback documents detailing requesting rates (adjusted for practice list size and in comparison to NHS Grampian averages) for general and specific laboratory tests were generated for all 78 practices (578 GPs) across NHS Grampian and reported electronically to the practice managers/GPs. Educational messages were also appended for the focused tests. This process was repeated on a two monthly basis commencing August 2016.

The targeted tests were selected on the basis of tests that a perceived variation in requesting was suspected or were thought to be of particular clinical importance. An example of the enhanced educational feedback report can be seen in Appendix E.

Results: The first observation being that the extraction of the data was straightforward and the incorporation into a spreadsheet with automated report generation macros built in was feasible and achievable. Secondly, it was clear that significant variation in requesting existed across the tests being assessed – similar to that observed from the Atlas of Variation pilot work given the common origin of the data.

At time of writing, the project has just delivered its second of two monthly individualised feedback reports to GP practices. As educational interventions are likely to take some time to demonstrate effect, it is probably still too early to see the expected changes in requesting rates – these changes may not necessarily equate to overall reduction in requesting but may simple be reflected as a reduction in variation (reflecting a reduction in both under and over-requesting). For example, two month changes in overall requesting rates for the Tumour Marker CarcinoEmbryonic Antigen (CEA) has shown a reduction in requests from 1.49 to 1.11 (average requests per 1,000 population), with a contraction in overall variation ($p = 0.05$). While small at this stage, these changes would signal a potential reduction in inappropriate use of this test which would not only save laboratory resource but also other unnecessary healthcare knock-on effects.
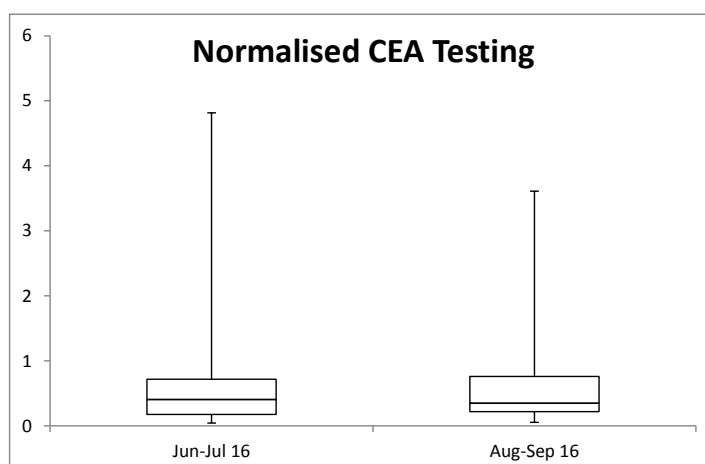
Figure 5. Initial change in Requesting rates for CEA across NHS Grampian.

Conclusions: This piece of work demonstrated proof of concept that the relevant data could be easily extracted and incorporated into electronic, automated feedback reports for Primary Care that provided them with comparative requesting rate activity and educational support to promote appropriate test use. It is likely that this tool could be populated with data by other NHS Boards and rolled out in a similar fashion. Similar applications for Secondary Care could also be developed.

3.6 Information Technology (IT) Guidance

The importance of fit for purpose IT systems to allow interrogation of diagnostic test use and to ease the implementation of specific strategies cannot be under-estimated. The NDOG has formulated a set of guidance aimed at directing NHS Boards along a consistent path that takes into consideration the issues and challenges that provide both opportunities and barriers to demand optimisation strategy implementation. The guidance can be found in Appendix F.

Ideally, the whole approach to demand optimisation and the move to promote more rational use of diagnostic tests would be enhanced if common IT systems could be adopted across NHS Scotland. Within laboratory services, the concept of a common LIMS and a national laboratory medicine catalogue with standardised test name, units of measurement, reference intervals and IT coding remains a huge challenge but one which should remain as a high priority in the longer term.

3.7 Effective Diagnostic Pathways (EDPs).

It is clear that variation exists between NHS Boards regarding the availability or the way in which specific tests are used within patient pathways. This exploratory piece of work looked to scope out ways in which standardised diagnostic pathways (patient pathways that are particularly heavy on diagnostic test incorporation) can be defined from a national level under a "Once for Scotland" approach. This may then make it easier for local Health Board funding and implementation to be realised. This approach could be potentially used not just for new or emerging diagnostic tests but also for established ones where there is noticeable variation in the way the test is being offered, used or interpreted across the NHS Boards.

Examples of potential EDPs can be focused around specific diagnostic tests, disease pathways or be symptom based. The use of B-Type Natriuretic peptide (BNP) for example, could be focused at all three levels – use of the test within a primary BNP test pathway, a cardiac failure pathway or a breathlessness pathway. A possible schematic for the use of BNP is illustrated below (figure 6), with the main reasoning being that its use can triage breathless patients for echocardiography thereby saving resource and allowing more critical/severe cases to be dealt with quicker. Following recommendation of best practice there would be the need locally to determine the operational requirements and relevant contribution of Primary Care, relevant specialties and clinical professionals in delivery of the pathway

Figure 6. EDP for B-Type Natriuretic Peptide use in patients with suspected heart failure.

Another example would be the use of the Faecal Calprotectin test, whereby similar triage of patients to colonoscopy could be rationalised by the use of this test. The pathway is outlined below (figure 7) but with commentary required again to define where in the healthcare system this should be carried out.

Figure 7. EDP for Calprotectin use in patients with symptoms of possible inflammatory bowel disease (IBD) or irritable bowel syndrome (IBS).

Governance and Implementation

A major barrier to the implementation of new diagnostic tests is the typical silo budget arrangement that generally applies to services across the NHS Boards. Therefore even when there are potential savings for the NHS, and more importantly, improvements in patient care, from the introduction of new tests it is difficult to get that investment into laboratories to enable such provision. Flexibility within laboratory budgets to enable delivery of new 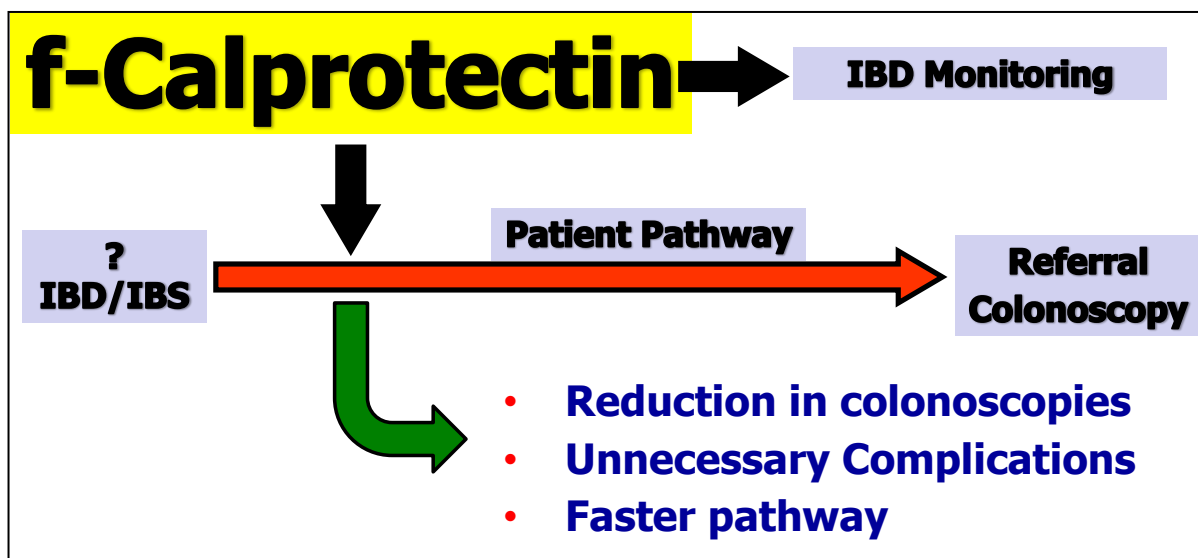tests is further constrained by the need to balance laboratory budgets subject to cost improvement programmes. Conflicting priorities placed on Boards for resource combined with a siloed rather than a whole system focus on return on investment delivers barriers to improvement. This is why we see significant variability across NHS Scotland in terms of availability of newer test such as BNP and Calprotectin – effectively, post code diagnostics.

It is essential therefore that NHS Boards formulate mechanisms and governance arrangements to help ensure that EDP recommendations can be explored from an entire patient pathway perspective and to create enough fluidity with budgets to allow savings made in one part of the NHS to flow back to other parts that are taking a financial hit to stimulate the pathway.

Section 4: Synergies

There are clearly many other work streams running across NHS Scotland which the NDOG work aligns closely with – these are discussed below:

4.1 The Scottish Healthcare Science National Delivery Plan 2015-20

The National Delivery Plan for Healthcare Science published in April 2015 (http://www.gov.scot/Resource/0047/00476785.pdf) states "Demand optimisation is defined as the application of processes and tools to maximise the "return" of effectiveness of healthcare science interventions, consequently freeing-up capacity, particularly in the life sciences stream". Basically, it is about providing the right test at the right time to the right person in the right way, reducing or eliminating unnecessary testing and enhancing decision-making in patient care."

Set within the plan is deliverable No.3 which states "To achieve our ambitions, NHS board healthcare science leads will work with stakeholders to develop local improvement plans to reduce unnecessary testing across primary and secondary care. This will free-up capacity to address rising demand and deliver testing that positively affects the patient pathway, supports primary care preventive measures and reduces hospital referrals and admissions. This will be achieved by the end of 2017, with full implementation by the end of 2019."

The work of the NDOG was initiated as a result of the publication of the National Delivery Plan as a means to enable National Healthcare science leads, NHS board healthcare science leads, managers and heads of services to work with NHS boards and diagnostic networks to reduce unnecessary testing and measure overall impacts on patient outcome.

4.2 Shared Services

A Senior Leaders Forum, comprising Board Chairs and Chief Executive Officers, was established to consider the key strategic challenges facing health in Scotland whilst addressing pressing current and emerging demands on the system. In January 2015 agreement was achieved to create a Shared Services portfolio approach for a number of support functions. One of the three portfolios is Health which includes Laboratories, Medical Physics, Pharmacy Aseptic Dispensing, Public Health and Radiology.

A Health Portfolio Board has been established, consisting of key stakeholders who have an interest in the delivery of the Health Portfolio. A Position Paper was discussed with the Chief Executives Group at the beginning of January 2016 where it was agreed that the first Health Portfolio programmes to be taken forward will be Pharmacy Aseptic Dispensing and Radiology.

Since the inception of the Radiology Programme within the Health Portfolio, work has been carried out with all NHS Boards to identify those individuals they believed to have the appropriate expertise within the service to help the work towards a "Once for Scotland" diagnostic imaging service. Engagement work had been started and information had been gathered about the current landscape of diagnostic imaging in Scotland. Dr Hamish McRitchie, Consultant Radiologist, NHS Borders has been

appointed to the position of Radiology Programme Subject Matter Expert for the Health Portfolio.

The Laboratory Programme has been established more recently but is now gaining momentum. Dr Bill Bartlett (NDOG member) has been appointed to the position of Laboratories Programme Subject Matter Expert for the Health Portfolio. Drawing on visioning documents prepared by the NMDNs, an initial stakeholder workshop has been held, identifying risks, issues, synergies and potential models to provide a once for Scotland approach to labs services going forward.

4.3 Healthcare Improvement Scotland

The Healthcare Improvement Scotland Effective Care Pathways programme aims to provide support to local NHS Boards to undertake optimisation of clinical pathways that have been identified as a priority at that local level. Examples of such pathways may include optimisation of care for inpatients who are diabetic or optimisation in reaching a diagnosis and then treating pneumonia. The benefits of such being to reach a diagnosis in a timely manner, reduce the risk of harm and ensure that patients are able to return to their home or a homely setting in as an efficient manner as is possible.

At the time of writing this report HIS were working to identify the data set required at the local level on which to determine the needs of those participating in the programme. They felt that there would be the need to work closely to understand the successful work undertaken as well as the enablers and barriers to success of the contributions submitted to the work of the NDOG and develop a simple and not overtly bureaucratic mechanism for boards to learn from process rather than the detail of specific solutions.

4.4 The National Clinical Strategy

The National Clinical Strategy published by Scottish Government in February 2016 aligns very well with the demand optimisation programme given the former's focus on reducing waste, harm and unnecessary variation.

In addition, the push for healthcare to be delivered more in the community will add pressure to the arrangement for diagnostic services provision – it is vital that a demand optimisation approach is adopted so that variation is limited and only proven, cost effective diagnostic strategies are implemented.

4.5 Choosing Wisely

This programme of work began in the USA and fits well with their healthcare system. A similar attempt to explore and develop its principles for use across the UK has been slowly developing through the Academy of Medical Royal Colleges (UK), with specific input from the Royal College of Pathologists. The initial report has been published in October 2016 and it contains 5 Pathology specific examples. It remains uncertain just how useful, relevant or indeed what sort of impact this may make on overall appropriate test use across the NHS given its very limited scope and lack of implementation plan. Its vision of potentially giving patients more insight and say in

how diagnostic tests are offered and chosen should be supported, however this is unlikely to make a significant impact on overall test ordering and should be looked at a parallel adjunct to the NDOG programme.

4.6   National Roadmap for Clinical Decision Support

NHS Education Scotland (NES) are exploring the integration of clinical decision support into existing clinical software, with the potential to support demand optimisation. NDOG members have engaged with the NES team, who have been piloting a range of initiatives, including: a successful outcome of a pilot of patient-specific decision support integrated into SCI-Diabetes, the successful introduction of hyperlinks to evidence embedded within TRAKCare, the launch of an antimicrobial prescribing app and enabling electronic versions of handbooks.

This work will be ongoing and has been funded by the Digital Health and Care Institute for a Scottish Government eHealth/University of Glasgow-Industry project to:

- Scope the range of content and structures which would form the shared, national knowledge base underpinning clinical decision support solutions.

- Produce a specification for the publication and content management toolset which would deliver this knowledge base.

Any ongoing demand optimisation implementation could potentially link with this work.

Section 5: Organisational Approaches to Demand Optimisation Implementation

5.1   Background

Diagnostic services (Diagnostics) underpin the delivery of modern healthcare systems. In order to provide clinically meaningful information while reducing waste there needs to be a clear data set to identify outliers in terms of under or over requesting of specific diagnostics. Such waste decreases the value of investment in existing and new diagnostic investigations, modalities and service delivery models. Inequity also has the potential to impact on patient safety.

Realisation of the Triple Aim

Optimising demand of diagnostics across the wider NHS will have a positive impact on efficiency, effectiveness, and affordability of healthcare. If "demand optimisation" is achieved then desired outcomes from investment in Diagnostic Services are resultant and enable the delivery of Triple Aim[1,2].

The Need for Co-production

An approach to laboratory diagnostics demand management has been proposed by Fryer and Smellie[3]. They present a "demand management" tool kit with some principles presented that equally apply to other diagnostics (e.g. clinical imaging). Their publication correctly identifies the need for co-production of demand management strategies with users and describes a number of approaches that may be used to not only manage demand, but also to optimise demand on diagnostic testing (diagnostics). This approach is delivered from the perspective that existing and future workloads need to be optimised, that demand is the issue to be focussed upon and that the legitimacy of that demand requires to be established and controlled.

This "provider driven" approach delivers a degree of complexity in optimising demand for diagnostics within any health care system. It reveals a requirement for a much greater understanding of the whole system impacts and benefits of investment in diagnostics to be shared by users and providers to enable user buy in and co-production of demand optimisation. It is critical that clinical users see the value of demand optimisation initiatives translated as mutual benefit rather than of one sided benefit to the provider (e.g. reduced workload, reduced spends in the diagnostics budget silo).

In the provider driven approach it is therefore the diagnostics providers that are currently in the difficult and complex position of driving forward demand optimisation programmes to users that may not be engaged. This delivers difficulty in obtaining traction for such initiatives and resistance to change and results in comparatively small returns on invested effort.

The practical challenge therefore is to deliver an environment to develop an approach to demand optimisation that:-
- Encourages co-production
- Permeates through the wider health care system

- Ensures that investment in diagnostics delivers maximum potential benefit to patients and exemplifies good value.

An NHS Scotland Whole-Systems Approach

To date, demand optimisation has taken place in Scotland in isolated pockets of innovation, going back several years with limited shared learning. Local governance approaches have varied; as has national interest.

With the building momentum of several major initiatives including the Healthcare Science Delivery Plan, it is clear that NHS Scotland needs to implement the recommendations of the National Demand Optimisation Group; however the right conditions will have to be created for this to prove successful.

Demand optimisation from a provider perspective has a starting point of looking at the usage of a particular test as an end point to drive change, however solely this approach is likely to have limited success in changing the behaviours and culture of clinicians requesting tests. An alternative is to use a "whole systems approach" that is focussed on pathways rather than diagnostics. This correctly views the diagnostics as an integral part of a complex system of care.

Here the proposition is that if efficient and clinically effective pathways are designed well and consistently followed, then the use and demand of associated diagnostics should be *de facto* optimal. An advantage of this approach is that it necessarily results in a transfer of ownership and responsibility for optimisation of demand away from the diagnostics provider to the clinical users and embeds delivery of optimised demand into good clinical care processes.

This might be seen as a point of contention by some, but arguably the user has the ethical responsibility to ensure that patients have the correct investigations ordered on their behalf and that waste is avoided. The Academy of Royal Colleges have highlighted the role of Doctors promoting value and protecting resources[4].

The whole system approach does deliver whole system benefits and opportunities for co-production by users and providers bringing together their knowledge, skills and expertise to enable best value to be obtained from investment of current and future resources into patient care. The functionality of the service requested by the users will define the form of the services delivered by service providers.

Optimising demand of diagnostics therefore delivers a degree of complexity for the NHS as a consequence of need to consider the whole delivery system impacts and benefits. Users and providers of diagnostic services need to co-produce an environment, systems and processes, within Boards and across the NHS, that enables constructive challenge of current and proposed practice involving use of diagnostics and enables sharing of best practice, which delivers opportunities to optimise demand on services as a whole, that maximises the value from investment in diagnostics and is able to demonstrate that value. The challenge for the Boards and NHS Scotland is to deliver the infrastructure to achieve these aims.

5.2   Appropriate Governance

The way forward will require a combination of the "provider driven approach" and a "whole systems approach". Ultimately it will be the whole systems approach that delivers the benefit outlined earlier. That approach will require cultural changes within the NHS and the emergence of clinical leadership to deliver it. The NHS Scotland National Clinical Strategy and the Chief Medical Officer's report 2016 are promoting the discussions which will define the environment within which this should be achieved. In the context of optimised demand of diagnostics, Boards should ensure that clinical users and diagnostics providers are fully engaged as integrated teams within the emerging health care delivery model and working towards delivery of clinical services that ensure optimal use of diagnostics.

Operational Leads

Boards should have mechanisms in place to enable development and adoption of optimised demand on clinical services, employing evidence based pathways in the context of a realistic medicine approach and the national clinical strategy. On a practical level this might mean that all new clinical pathways and guidance involving use of diagnostics should have input from diagnostics teams.

The whole systems approach as identified above requires that users and providers need to co-produce optimisation of demand on diagnostics through the development of safe and effective evidenced based clinical pathways. This is a big agenda that requires both local and national focus with mechanisms in place to enable sharing of best practice across organisations. This delivers a requirement for an organisational structure that enables a Board and NHS wide focus.

Without a strong combination of local ownership and national oversight, Demand Optimisation Leads at an NHS Board level would be isolated and less likely to succeed. It is therefore crucial to ensure they can link in through a variety of existing structures.

Executive Leads

The "provider driven" approach to demand optimisation will afford shorter term gains in reduction of variation, waste and harm associated with the use of diagnostics. The return will depend on organisational buy in to the approach, however this will require authority and support from NHS Boards to drive change in culture and behaviours.

Patient facing staff place the demand on diagnostic services in the main. Their requesting behaviours deliver the variation in demand. The underlying reasons for this source of variation are many and need to be addressed. Service providers are also responsible for variation in demand as a consequence of the way in which they make test repertoires available to users in different locations. These issues need also to be addressed and executive-level support and scrutiny will be required to deliver sustainable whole-systems change.

Continuous Quality Improvement

Diagnostics service providers are best placed to identify sources of variation in demand for testing and to critically assess and address the impact of service configuration on demand. Variation in requesting can be presented to users in order to constructively challenge demand. The providers are also in a position to enable implementation of best practice around frequency of testing and to share demand optimisation initiatives from other centres made available by the Demand Optimisation Leads. This places a requirement on Diagnostics teams to have a focus on demand optimisation with a structure that enables them as providers to identify variation, waste and harm arising from user practice. A further focus should include ongoing critical appraisal of the value of existing service repertoires and configuration to enable optimal service delivery and development of ways of working with users to enable them to use services to best effect. The Fryer and Smellie toolkit for managing demand provides a useful reference guide for initial focus by diagnostics providers, as does the NDOG guidance in appendix C.

Boards are currently attempting to deliver the demand optimisation focus in different ways and the approaches are evolving. Delivery of optimised demand will remain challenging without a whole systems focus, but much can be delivered from a provider driven approach with appropriate positive support from the Boards. Ability of any Board to deliver the necessary focus on demand optimisation will vary according to availability of resource and organisational structures, but it is clear that there is a requirement for this focus as part of a standalone provider driven initiative or as an integrated part of a whole systems approach within the currently evolving health care delivery system. Some key characteristics of an organisational structure /infrastructure for delivery of demand optimisation are attached in Appendix G. These may be used to help define the Boards response to the required focus on demand optimisation and to inform discussion within the wider health care system.

Members of the national DOG have built a library of test cases, to promote quality improvement activity at a local level, where innovation is taking place or evidence is being built to determine best practice. The library contains a range of examples of innovation across all disciplines and will provide access to expertise to validate and promote initiatives.

This multi disciplinary, multi-professional library will continue to be built and will contribute to challenging variation in practice across Boards, providing a shop window for demand optimisation. As evidence is built for a change in practice, this can be used to engage with stakeholders at all levels to continue to build a culture focused on the optimisation of demand. The national networks, the Diagnostic Steering Group and the local leads should all contribute to ensuring spread, via annual workplans.

5.3 The Way Forward

Diagnostics demand optimisation delivers a challenging but necessary focus for Boards. Optimised demand is a requirement for good clinical care and outcomes. Under and over-production of diagnostics both carry patient safety issues and deliver impacts on the effectiveness of clinical pathways.

A patient pathway or "whole systems driven" approach will ultimately deliver optimal demand by default. This should be aspired to and measures should be taken to ensure involvement of Diagnostics specialist in their development. Organisations should begin to work towards this. In the interim a "provider driven" approach will address some of the issue.

An organisational infrastructure with an embedded focus on demand optimisation will be required, ensuring leadership at an executive and operational level. Recognised senior leads will then enable development of an organisationally embedded approach top down, bottom up and across local health care systems, ensuring interaction with both provider and user at each point in the journey.

Existing governance structures should be harnessed wherever possible to promote ownership and oversight. The role of the national managed diagnostic networks in brokering the provider/user interface should also be optimised.

Through promoting local ownership, whilst at the same time retaining national oversight and leadership, it will be possible to develop a culture of continuous quality improvement; focused on demand optimisation in diagnostics.

1. Stiefel M and Nolan K. A Guide to Measuring the Triple Aim: Population Health, Experience of Care, and Per Capita Cost. Institute for Healthcare Improvement, 2012.

2. http://www.qihub.scot.nhs.uk/media/581636/nhsscotland%20qi%20hub%20-%20triple%20aim%20final.pdf

3. Fryer A, Smellie W. Managing demand for laboratory tests: a laboratory toolkit. J Clin Path 2013; 66: 62-72

4. Promoting resources, promoting value: a doctor's guide to cutting waste in clinical care. Academy of Medical Royal Colleges 2014. http://www.aomrc.org.uk/wp-content/uploads/2016/05/Protecting_Resources_Promoting_Value_1114.pdf

Section 6: Conclusions

The NDOG through its meetings and work streams have been able to gather much information regarding Demand Optimisation activity, produced several pieces of guidance for consideration and implementation across all NHS Boards and developed proof of concept/pilot information for several key associated strategies. The following conclusions can be made:

a) Demand Optimisation activity already has a high profile within many NHS Boards driven by the current financial climate. This would benefit from a wider whole systems review, sharing of practice and central oversight.

b) Collection of data that captures diagnostic test requesting activity is vital and underpins any Demand Optimisation Programme.

c) Data can be obtained manually relatively easily from individual NHS Boards. The incorporation of such data into a comprehensive, accessible system across NHS Scotland would however need expertise and resource allocation.

d) General Demand Optimisation Guidance produced by the NDOG, if implemented across all NHS Boards, would allow a coordinated, consistent approach to Demand Optimisation.

e) Educational Feedback Programmes similar to the one being piloted across NHS Grampian Primary Care could be replicated across other NHS Boards. This consistent approach could lead to more rational use of laboratory and other diagnostic tests and reduce variation in practice.

f) Information technology is fundamentally important to the delivery of many Demand Optimisation strategies. It is vital that systems supporting such activities are fit for purpose and that there is a degree of consistency across all NHS Boards.

g) A programme of Effective Diagnostic Pathways, linked in with emerging work on Effective Care Pathways, could help promote rational, consistent pathways of care and unblock bottlenecks that limit the introduction of new tests and technologies as a result of silo budget inflexibility.

h) Governance – in order to support and facilitate the roll out of a consistent, "Once for Scotland" approach to Demand Optimisation, it is vital that the appropriate governance and support structures are in place both centrally and locally within each Health Board so as to enable definition of strategy, dissemination and implementation. Initial provider based strategy should make way for the longer term aims of developing a "whole systems approach".

Section 7: Recommendations

The NDOG recommends the following:

1. **Guidance** - NHS Boards should adopt the recommendations within the General Demand Optimisation Guidance and IT Guidance documents produced by the NDOG (Appendices C and F).

2. **NDOG Related Workstreams** - The NDOG (revised as an implementation group) should continue to function into 2017, and beyond, to allow coordination and support for Demand Optimisation work streams and strategy implementation. The following work streams should be taken forward in collaboration with local Health Board leads, the Diagnostic Networks and the NHS Scotland Shared Services Health Portfolio:

   2.1. Data Management. Data collection and reporting is a key enabler for all future work and will underpin all the work streams. This should be taken forward within existing work in the NHS Scotland Shared Services Laboratories project to meet the requirements set out for Demand Optimisation. The necessary resource allocation to allow local data collection with national level collation, analysis and presentation needs to be considered.

   2.2. Service Variation. This workstream needs to identify variation across NHS Boards both in terms of scope of available services and the actual use both in primary and secondary care. Regular collection/collation of data would allow an Atlas of both service and variation to be generated which would not only provide a snapshot but act as a rolling baseline to gauge progress.

   2.3. Requestor Feedback. A common, consistent approach to providing requestors with information around their own activity should be considered. This information could be accompanied with peer comparison data, best practice guidance and related test cost data.

   2.4. Minimum Retesting Intervals (MRIs). Existing guidance on MRIs in lab tests should be consistently implemented across all NHS Boards to reduce unnecessary repeat testing. Addressing related IT bottlenecks needs to be prioritised.

   2.5. Introduction of New Tests/Pathways. A more focused and collaborative workstream aimed at facilitating the introduction of new tests within definitive clinical pathways should be initiated. This effective diagnostic pathway approach could also be applied to existing tests.

   2.6. Realistic Radiology. The Scottish Clinical Imaging Network will establish a Short Life Working Group to engage with the recommendations made by the NDOG with regard to imaging. This will include evaluating various clinical decision software options, with a view to piloting a preferred option in the near future

3. **Information Technology (IT).** Shortcomings in IT functionality and lack of interoperability between systems limit the scope for successful demand optimisation strategy implementation. The Scottish Government, the shared services portfolio group, existing diagnostic networks and NHS eHealth leads should collaborate to explore solutions that would allow:

- Regular, consistent and automated data collection around diagnostic test activity.

- Improved standardisation across information systems, read codes and data repositories.

- True interoperability across systems.

- Optimum functionality for implementation of minimum retesting intervals including "live blocking" of inappropriate requesting.

Fast tracking developments to support demand optimisation, with an initial focus on minimum retesting intervals, should be explored as part of this.

4. **Oversight, Collaboration and Governance**. The success of any demand optimisation programme relies heavily on clear collaborative governance structures existing both centrally and locally within the NHS Boards. Much of this already exists but requires re-defining and prioritising. The following recommendations are made:

4.1. NHS Boards and Diagnostic Networks should continue to provide support to healthcare science leads, managers and diagnostics staff to work with the national healthcare science leads and diagnostic networks in collectively progressing Demand Optimisation work.

4.2. The national Diagnostic Steering Group (DSG) should consider establishing an authorising subgroup made up of Board diagnostic services managerial and clinical leads to decide on, prioritise and approve NDOG/NMDN recommendations including those related to demand optimisation.

4.3. NHS Boards should put in place structures that will enable Demand Optimisation strategies to be considered and implemented. This will require:

- Involvement of not just the diagnostic services but also that clinicians from Primary and Secondary Care, managers and finance are fully engaged as integrated teams to ensure delivery of optimal diagnostic services.

- Identification of a Demand Optimisation Lead (Board-level executive lead for Healthcare Sciences) to oversee the development of local infrastructure and enable linkage of local diagnostics demand optimisation activities

4.4. Diagnostics service providers and users should be mandated by Boards to:

- Develop an embedded focus on diagnostics demand optimisation within their management and operational delivery structures.

- Engage in national and local data collection activity to identify overt variation in user practice and gaps in repertoire.

- Monitor demand optimisation strategy effect on local improvement in clinical outcome and/or efficiency of the service.

- Feed back good practice examples into the existing test case library (appendix B) – this will be managed by the existing NMDNs.

4.5. The relevant National Diagnostics Managed Network should provide national oversight and consistent quality, with operational leads for each discipline from each providing NHS Boards. Where national networks do not exist for a particular discipline, a community of practice should be established and supported, linked to Scottish Government's Healthcare Science Lead

4.6. Biannual reports from all disciplines should be provided to the Diagnostic Steering Group via the national networks or via the Scottish Government's Healthcare Science Lead, where no relevant network exists.

Appendices

Appendix A – National Demand Optimisation Group membership

Chair	Dr Bernie Croal, Consultant, NHS Grampian
Scottish Government Sponsor	Karen Stewart, Healthcare Science Officer
NSD Sponsor	Fiona Murphy, Director, National Specialist and Screening Services Directorate (NSD)
Scottish Government Lead	Mike Gray, Health Care Science National Lead Life Sciences
NSS Programme Management / Programme Support	Liz Blackman, Senior Programme Manager Jimmy Paul/ Alexandria Speirs, Programme Manager Susan Fairley, Programme Support Officer
Specialism Covered	Membership
Scottish Clinical Biochemistry Managed Diagnostic Network	Dr Bill Bartlett, Consultant Clinical Scientist, NHS Tayside With shared rotation between: Dr Janet Horner, Consultant Biochemist, NHS GG&C Dr John O'Donnell, Consultant Biochemist, NHS Borders
Scottish Microbiology and Virology Network	Dr Ewan Olson, Consultant Microbiologist, NHS Lothian Ms Linda Mulhern, Operational Science Manager, Microbiology, NHS Lothian
Scottish Pathology Network	Mr David Topping, Clinical Lab Manager/Lead BMS for NHS Tayside Deputy: Mr Andy Munro, Quality Manager for NHS Tayside Pathology
Scottish Clinical Imaging Network	Dr Fiona Hawke, Scottish Clinical Imaging Network (SCIN) Imaging manager, NHS Borders
Haematology	Dr Steve Rogers, Consultant Haematologist, NHS Fife Chris Hind, Clinical Laboratory Manager, NHS Tayside
Clinical Immunology	Dr Sai Murng, Consultant Immunologist, NHS GG&C Dr Liz Furrie, Lead Clinical Scientist, Clinical Immunology, NHS Tayside

Genetic Consortia	Caroline Clark, Consultant Clinical Scientist, Honorary Research Fellow, Deputy Head Molecular Genetics, NHS Grampian Dr Anne Katrin Lampe, PhD, FRCPEd, Consultant in Clinical Genetics, NHS Lothian
Scottish National Blood Transfusion Service	Dr Lynn Manson Consultant Haematologist (representing Blood Banking)

Demand Optimisation Project Board	
Project Executive	Karen Stewart, Healthcare Science Officer
Senior User	Dr Bernie Croal, Consultant, NHS Grampian
Senior Supplier	Fiona Murphy, Director, National Specialist and Screening Services Directorate (NSD)
NSS Programme Management / Programme Support	Liz Blackman, Senior Programme Manager Jimmy Paul, Programme Manager Susan Fairley, Programme Support Officer

Appendix B – Demand Optimisation Test Case Library

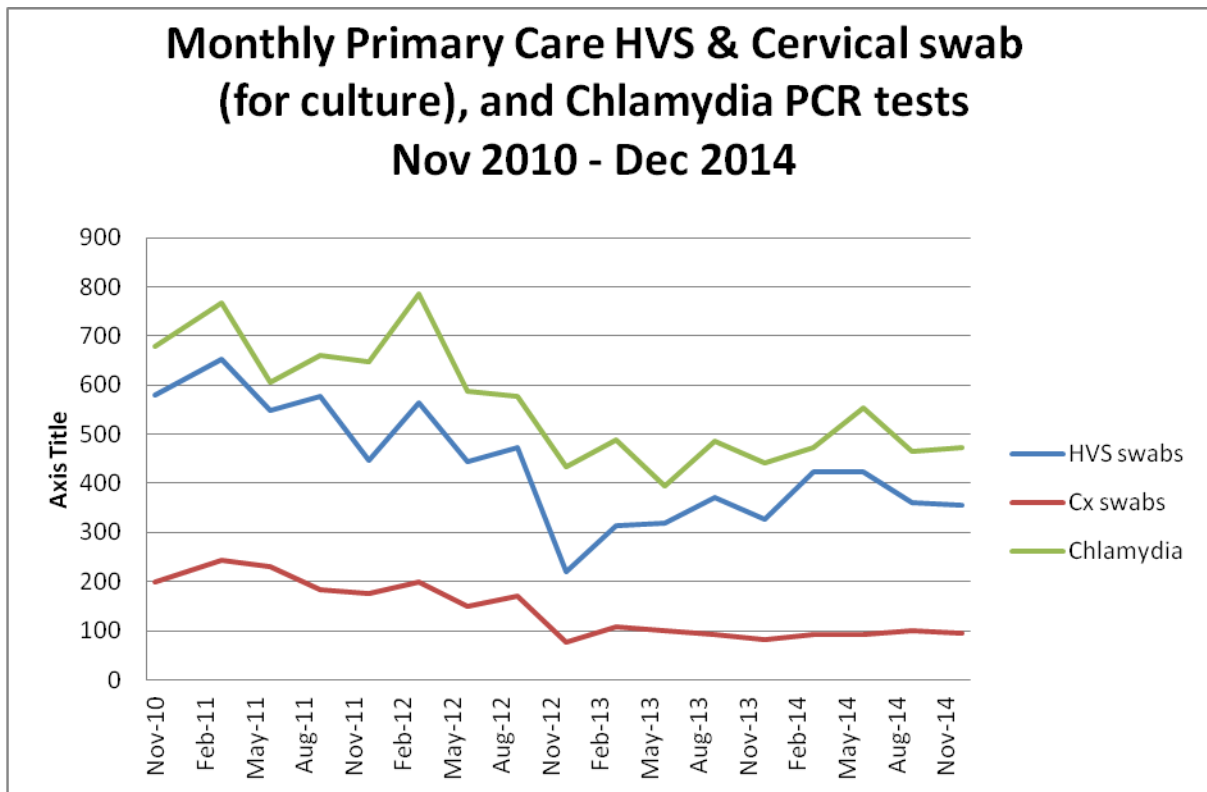The library will continue to build as the DOG work progresses its implementation phase. It can be found at http://www.mcns.scot.nhs.uk/dog/resoures/test-cases/

NHS Forth Valley
Collaborative working between laboratory services, Sexual Health and Primary Care to optimise the diagnosis of female genital infection

Collaborative working between the laboratory, Sexual Health services and Primary Care was undertaken in NHS Forth Valley with the aim of optimising the diagnosis of female genital infection. Traditionally clinicians had taken two swabs when undertaking vaginal examinations to look for bacterial infection in the vagina and cervix as well as a third swab of the cervix to screen for infection with Chlamydia. These swabs were then sent for formal processing within the laboratory. By testing the acidity of the vagina within Primary Care it was possible to reduce the requirement for testing by laboratory services for a number of these patients. The basis of such change being guidance provided by Sandyford Sexual Health Services in Glasgow and the local Sexual Health Services within the Board.

The benefit of such a change in diagnostic practice allows more timely prescription of treatment to those whom will benefit while ensuring that where specific diagnostics are required that these targeted to maximise diagnostic yield while minimising waste. In turn this reduces workload at all stages of patient journey and has potential to result in cost savings.

As illustrated in the chart below there was clear evidence that the number of samples received in the lab before and after the alteration of the diagnostic pathway fell. More recently it has become common place to undertake urinary testing for Chlamydia in those defined at risk and although the numbers of endocervical tests has fallen this has been offset by the less invasive and more patient centred modality of testing.
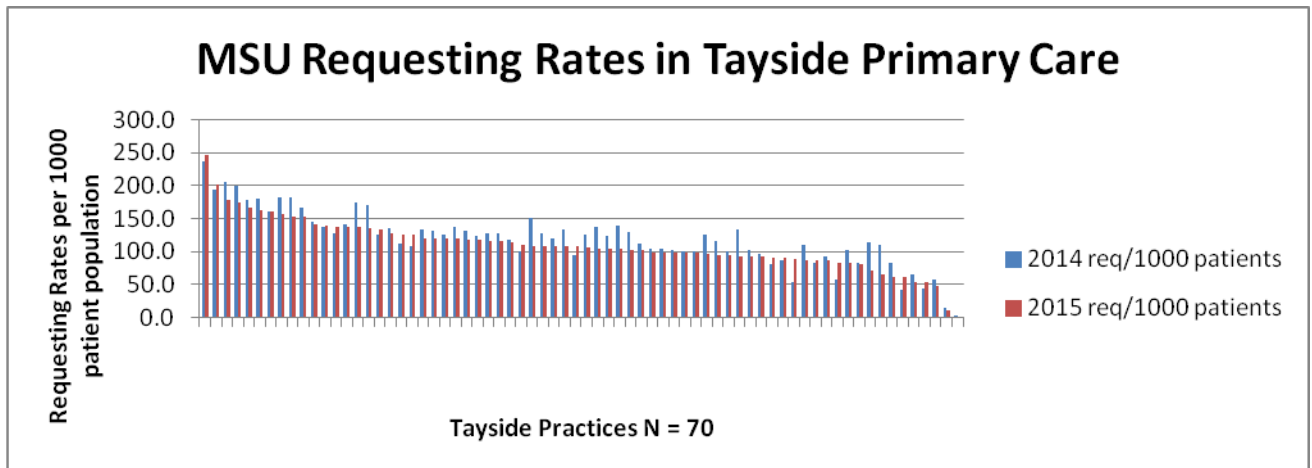
Monthly Primary Care HVS & Cervical swab (for culture), and Chlamydia PCR tests Nov 2010 - Dec 2014

NHS Tayside
Optimisation of the use of urinary culture in asymptomatic patients to ensure that it was not used where results were unlikely to alter clinical management.

The introduction of a laboratory testing algorithm by NHS Tayside was undertaken to deliver demand optimisation in the diagnosis of urinary tract infection. Using their unique laboratory requesting interface, clinicians were required to confirm that the patient was symptomatic for infection (eg abdominal pain, fever, burning on urination, need to pass urine frequently, offensive smell or colour to urine or acute confusion) at the time of the test request. Where patient was asymptomatic they were required to confirm whether there was an another appropriate indication for the test to take place. Examples being pregnancy, acute confusion, sepsis, post renal transplantation or the need to screen for organisms showing antibiotic resistance.

The system was also configured to provide evidence of best practice in the diagnosis of urinary tract infection. The basis for this process of demand optimisation was evidence that many asymptomatic patients were having samples submitted for culture at the time of routine urinalysis (e.g. diabetic review or hypertension check). Clinicians had assumed that where there was evidence of protein, leucocytes, blood or nitrites that the sample should be submitted for culture and that in many cases patients were prescribed antibiotics that were not indicated and had potential to cause side effects or result in bacterial resistance.

The effectiveness of this intervention was measured and the graph below shows evidence of a change in clinical practice in the requesting of urine cultures and a reduction in variability by individual practice. The algorithm is in place across NHS Tayside and where outliers are identified it is planned that support will be provided to discuss reasons for this variation with the practice. It will only work if the algorithm can be implemented on the Board's laboratory test requesting system (Tayside use ICE).

Headlines
51 (73%) practices showed an overall fall in the rate of requesting, though 2 surgeries showed no discernible change
28 (40%) of 70 practices showed a greater than 10% reduction in requesting
rates
17 (24%) of 70 practices showed an increase in rate of
testing
Biggest fall in requesting was 39.3% in one
surgery
Biggest rise in requesting was 46.1% in one
surgery
2014 median fell from 124 to 107 per 1000 practice patients overall

The efficiency gains through the implementation of guided decision making for the clinical service user: 16865 MSU investigations avoided, £3,373 costs avoided.

The limitations of such change is the requirement that IT system in place locally has to be configured in a manner to allow decision aided requesting and at the present time this is not universally available across Scotland with variation by Boards in the systems used to support laboratory services.

NHS Tayside
Evidence-based alteration to the protocol for serological testing for rheumatoid arthritis

Partnership working between the Immunology Laboratory and Clinical Rheumatology Service in NHS Tayside identified that patient referrals for rheumatoid arthritis were disproportionately high in comparison to the expected epidemiology.

To address such a discrepancy the clinical decision was taken to alter the primary serological screening pathway for rheumatoid arthritis. The change from IgM rheumatoid factor (RF) to IgG anti-cyclic citrullinated peptide (CCP) antibodies was undertaken in 2005.

CCP is a more clinically specific test (Clinical specificity CCP >96% versus 86% for RF) and provides a more useful serological tool to triage patients with high likelihood of RA to secondary services, thus reducing inappropriate referrals.

Full demand management protocols were introduced in the laboratory resulting in increased scrutiny of CCP and RF requests. Processing of samples was undertaken being cognisant of clinical presentation for Rheumatoid Arthritis and relevant prognostic criteria. This protocol has continued for the last 10 years.

To this end it rationalised the requesting of rheumatoid serology by:
1. Removing the large scale (7500 per annum; 1.6% of total population of Tayside each year) inappropriate requesting of rheumatoid factor by users for general joint pain.

2. Use the funding saved by removing 95% of requesting for RF, to introduce CCP as the front line test for RA. NHS Tayside also undertook management of that change by clinical evidence based demand management, with a target to maintain testing of CCP to 1000 test per year (0.2% of total population of Tayside). Readers of this paper should note that Rheumatoid Arthritis is a rare disease, epidemiological evidence shows that the frequency of new presentations in the UK is 1:5000-10000 patient years (This would result in an estimate of 90-180 new patients each year in NHS Tayside.)

3. The process also allowed the diagnostic and clinical service to work together to minimise the inappropriate referral for patients with positive RF and no clinical evidence of RA, to secondary care rheumatology services.

This work has been shared with other diagnostic immunology providers in Scotland and as a result is being considered by other Boards with a view to introduction within a number of other laboratories. The process has also resulted in the consideration of whether similar work could be undertaken in the diagnosis of Connective Tissue Disease.

NHS Forth Valley
Primary Care Whole System Working

Laboratory managers participated in a Primary Care Whole System Working project in 2011/12 within NHS Forth Valley. The aim of such work being to use a dashboard to provide targeted feedback and identify variation by clinicians requesting diagnostic investigations.

One of four priority areas for this project was laboratory and radiology services. This included a review of biochemistry requesting of cholesterol tests.

The aim was to encourage adherence to the NHS Forth Valley Lipid Lowering Guideline which recommends that for primary prevention of cardiovascular disease there is no need to recheck cholesterol levels. The project ran between May 2011 and March 2012 with the GPs providing feedback on the workstreams in September 2011.

The laboratory worked with Forth Valley Information Services department to provide data to GPs on their requesting of laboratory tests and allow comparison with other practices in Forth Valley.

The project encouraged best practice and resulted in a sustained reduction in primary care cholesterol requests, with the clear benefit to patients and laboratories of reduced unnecessary testing.

The project also provided an opportunity for GPs to reflect on clinical behaviour through the use of comparative data which demonstrated variation. The project subsequently promoted and provided best practice guidelines and an evidence base.

The inclusion of laboratory tests was encouraged through the Community Diagnostic Users Group – a group established in 2009 to improve communications between diagnostic and primary care and to help inform primary care of new developments and best practice. Laboratories, radiology, cardiology and endoscopy are represented along with service managers and GPs. This highlights the need for appropriate governance to support service change and improvement.

Areas chosen to prioritise were those where guidance exists or was being developed:

- The use of Lumbar Spine X rays in Lower Back Pain

- The use of Abdominal Ultrasound

- The use of B12/Folate assays

- The use of MSSU in non-pregnant women with simple UTI

- The 'Treat and Forget' strategy in Primary Prevention of Cardiovascular Disease

The NHS Forth Valley Lipid Lowering Guideline v4 (2010) was used to inform the Treat and Forget part of the workstream and cholesterol requesting was reviewed.

GPs were asked to reflect upon their own activity levels compared to that of other practices in NHS Forth Valley. Practices were also asked to undertake sample audits of their own clinical practice to inform their reflective learning. Information on requesting rates for cholesterol were provided. The Treat and Forget strategy augmented significant levels of work already undertaken by the Forth Valley prescribing team.

The majority of GPs were happy to now adopt the Treat and Forget strategy although some remained concerned as the change is hard to explain to patients who have undergone many changes in their lipid management.

Data collected by the laboratory show a reduction in the use of cholesterol following the project. The Whole System Working project 2011/12 report contained chart 1 below:
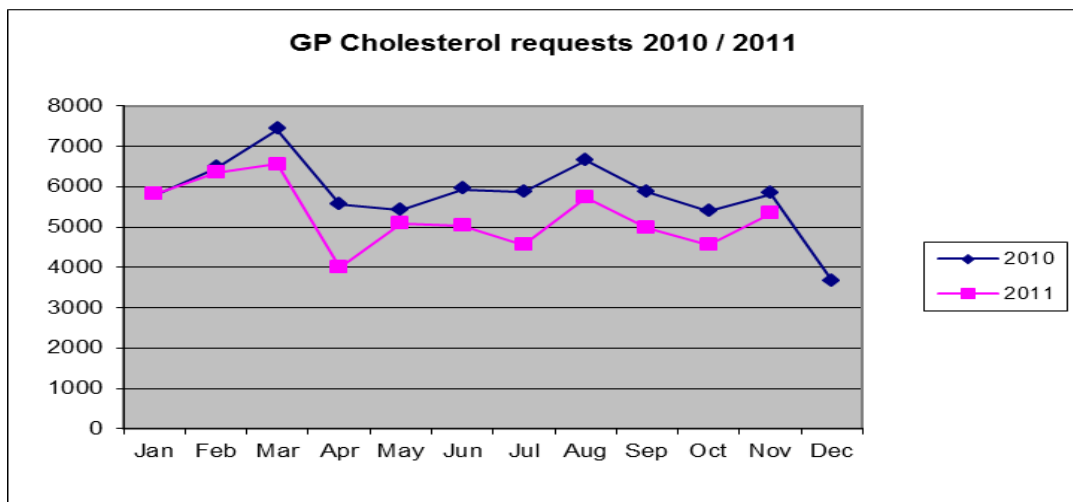

Chart 1. Cholesterol activity 2010/2011 taken from the Whole System Working 2011/12 Output Report. .

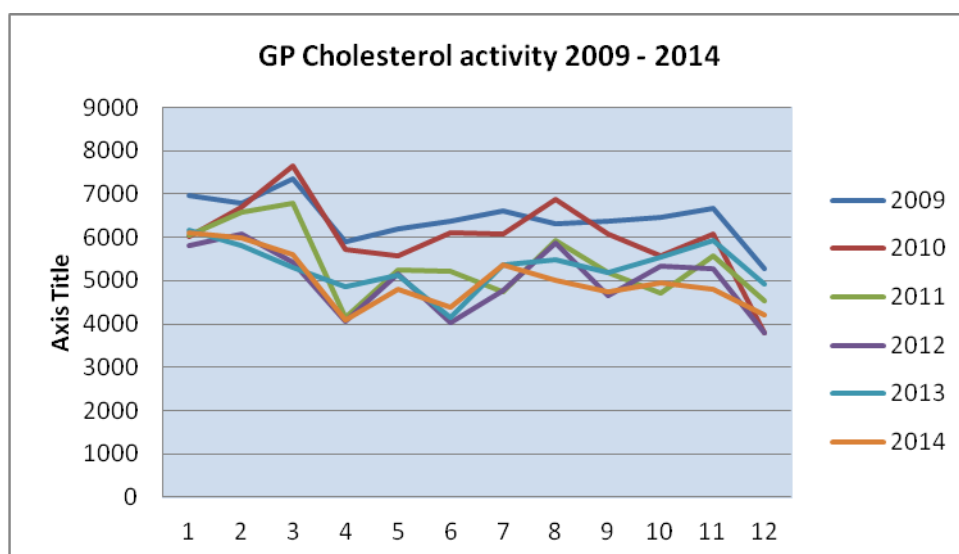Updated data on GP cholesterol requests is shown in chart 2 below:

Chart 2. GP cholesterol activity 2009 – 2014.

The percentage reduction in annual GP cholesterol activity in 2014 compared to 2010 is 16.8%, just over 12,000 tests a year. The project has been completed and the change to requesting cholesterol has been sustained.

Laboratory testing was included again in the 2012/13 Whole Systems Working project but not since then.

The Community Diagnostic Users Group continues to meet regularly and provides an invaluable communication link to primary care including discussion about requesting in relation to patient pathways. The introduction of a direct ordering system in Forth Valley over the past 12 months has involved this group in agreeing test groups for primary care and approving any changes.

Unfortunately no such group currently exists for secondary care diagnostics users due in part to the variety of specialities and the difficulty of providing an agenda that would be of interest to all.

Access to up to date laboratory test data is very important when reviewing the effect of changes on demand e.g. when new guidelines are issued. A dashboard is being developed by the Forth Valley Information Services department which currently holds primary care requesting information. A similar dashboard for secondary care will be the next development, which will be a key enabler in the identification of waste and variation.

NHS Highland
A review of the clinical appropriateness of the need to refer samples for the assessment of markers CA19-9 and CA153 to laboratories outside local lab.

NHS Highland carried out a review of CA19-9 and CA153 referrals to outside laboratories.

The aim was to reduce the numbers of samples sent away for testing, also to ensure that the tests were being performed on appropriate patients e.g. patients with KNOWN pancreas cancer and KNOWN metastatic breast cancer.

This review was undertaken because a previous review of samples revealed that a number of CA19-9 tests were being done as part of 'tumour marker screen' which was not an appropriate indication for testing

Despite reporting no reduction in the number of tests; there has been benefit to patients as tests are now being done on the correct patients e.g. for appropriate indication.

This work is now being carried out in the board and there is currently a vetting of tumour markers as part of the duties of the Duty Biochemist.

NHS Fife
Transforming Liver Function Testing

Colleagues in NHS Fife improved services by transforming the liver function test (LFT) profile by withdrawing gamma-glutamyltransferase (GGT) and total protein. Both tests are still available should they be required through requesting on a case-by-case basis; however they are no longer automatically done as part of the LFT.

GGT is considered the least specific of the LFTs and continually causes GP colleagues problems when they receive a result that is slightly abnormal and "do not know what to do with it". A few years ago it was removed from the LFT profile in the Acute Hospital. That resulted in a dramatic fall in GGT workload at that time, which has continued. It was therefore hoped that this finding would be repeated with GGT requesting in Primary Care. At the same time it was decided to review the LFT profile further and explore the impact of removing total protein.

Following the introduction of the change in May 2016, GGT requests have fallen by 90% and total protein by 98%. Both tests are still available and workload will be continually monitored.
Projected savings are about £8000 per year

Following on from the success of this exercise this is now standard practice in NHS Fife. It was highlighted that getting the full support of the Medical Directors, together with dialogue with service users was an essential part of the process. The NHS has made cost savings with no change in the availability of tests.
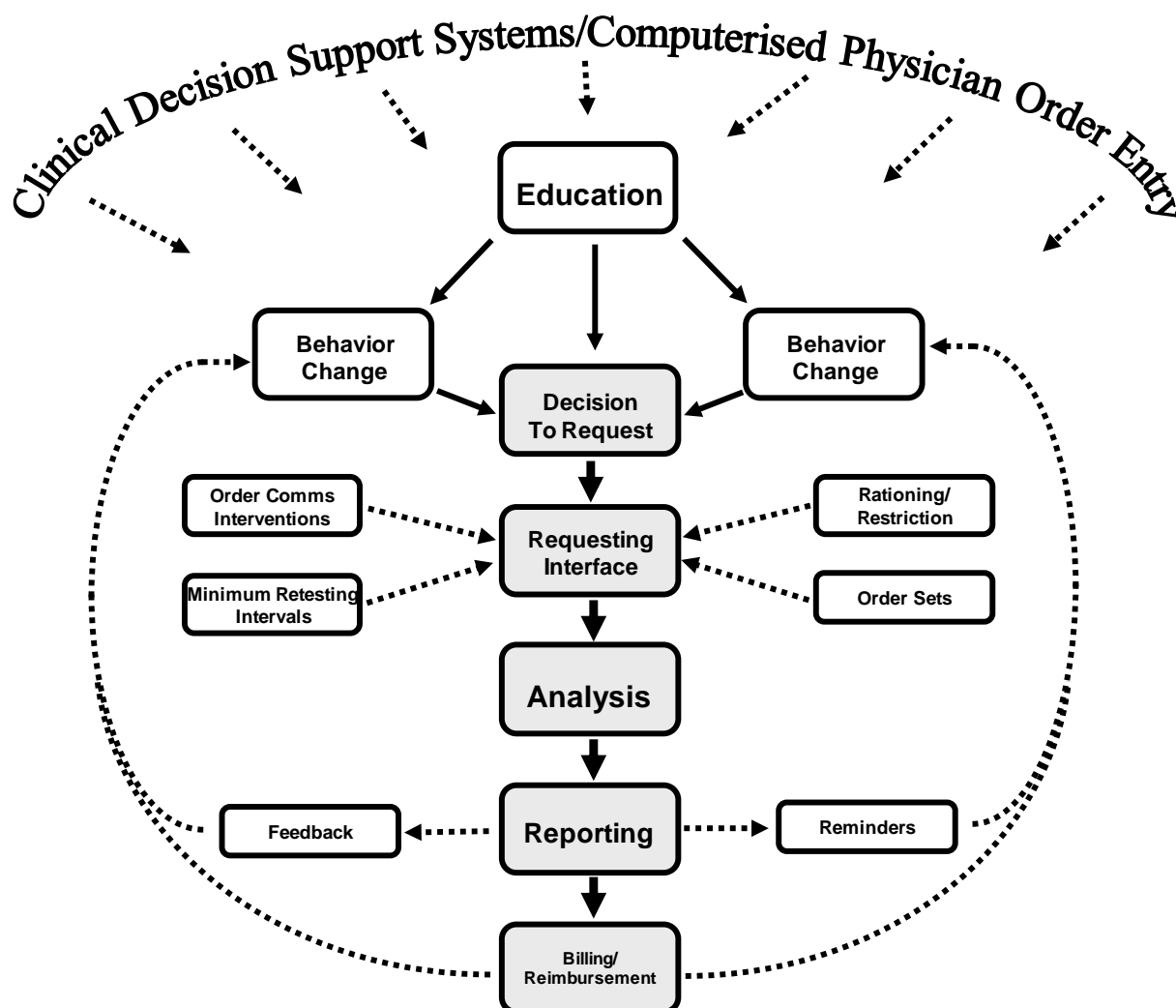
Appendix C – General Demand Optimisation Guidance

THE SCOTTISH NATIONAL DEMAND OPTIMISATION GROUP

Demand Optimisation in Diagnostic Services – Guidance for Implementation

Background

Demand optimisation is defined as the process by which diagnostic test use is optimised by maximising appropriate test requesting which, in turn, optimises clinical care and drives more efficient and effective use of scarce resource. Interventions need to be focussed on not just minimising over-requesting, but also under-requesting and reducing unnecessary repeat requesting. The concepts defined and the aims formulated within the National Clinical Strategy[1], Realistic Medicine[2] and the Shared Services[3] agenda align directly with the objectives of demand optimisation given its focus on reducing waste, minimising variation and the promotion of appropriate testing within a patient centred healthcare system. This guidance outlines strategy that should be considered for implementation across all diagnostic interfaces within NHS Scotland.

There are many areas across the diagnostic test end to end pathway whereby demand optimisation interventions can be implemented:

* adapted from Croal BL[4] – Opportunities for Demand Optimisation strategy implementation across the diagnostic test end to end pathway.

It will be in the best interests of NHS Scotland and patient care if an organised and consistent approach towards the implementation of demand optimisation strategy can be realised. The NHS Scotland National Demand Optimisation Group for Diagnostic Services would therefore outline the following key interventions and processes as being essential for implementation across all Scottish NHS Boards.

1 Diagnostic Workload Data Collection

The fundamental key component for any demand optimisation programme has to be the ability to measure and compare diagnostic test demand and use. This is vital to not only highlight unwarranted variation (over and under requesting) but also to allow gaps in test availability to be identified (both new and existing tests). In addition, such measures of workload can serve as a baseline from which to assess the effectiveness of particular demand optimisation strategies.

The NHS England Diagnostic Atlas of Variation[5] published in 2013 used test requesting data from 151 Primary Care Trusts to demonstrate large variation in test use across many key diagnostic services. Such variation could not be explained by differences in patient numbers or health demographics. It is likely that similar unwarranted variations in diagnostic test use exist across NHS Scotland.

For many years, laboratory services have submitted workload data to the Keele Benchmarking Service. It will be important that a refreshed look at the value of this exercise is made with a focus on collecting data that will be more aligned with the demand optimisation objectives. The potential for a Scottish Atlas of Variation for Diagnostic Services needs to be considered.

Principle 1: All NHS Boards to collect local data relating to diagnostic test utilisation and actively engage with national programmes of diagnostic workload data collection including a potential future Atlas of Variation.

2 Workload Feedback to Users

The value of feedback of diagnostic requesting data to clinical services has been well documented within the Scottish NHS[6,7]. Such requesting data can help diagnostic services identify areas of potential over and under requesting and allows the user groups to ascertain their own requesting behaviour patterns in comparison with their peers. The addition of other data such as financial costs or educational commentary on best practice can further enhance the positive effect on driving more appropriate test use.

A pilot of an enhanced educational diagnostic test use feedback in Primary Care is currently being assessed within some of the Scottish NHS Boards. The possibility of a live SharePoint database that will allow users to see their own live requesting patterns in comparison to local, regional and national data is also being explored. Similar but different strategies for secondary care requesting feedback will also need to be developed.

3   Minimum Retesting Intervals Implementation

Unnecessary repeat testing represents wastage within scarce healthcare budgets. The concept of defining, where possible, time intervals whereby repeat testing would be unjustified, is one that could be useful for demand optimisation purposes. The Royal College of Pathologists have recently published guidance on Minimum Retesting Intervals in Pathology[8] (2015). This guidance serves as a baseline for laboratory services to define, in conjunction with their users, a strategy for limiting unnecessary repeat testing within their domain.

While some requesting interval blocking can be made at the laboratory/radiology department level, focus should be paid to the point of request, usually at the available requesting interface – such as the order communications module, in order that unnecessary test requests can be avoided at this stage before an order is made or a specimen taken. The early adoption of automated IT systems, as they are developed, should be encouraged.

The National Demand Optimisation Group will issue separate guidance on Minimum Retesting Intervals that focus on key priority areas to implement.

4   Diagnostic Request Vetting

Diagnostic test request vetting is of much value – especially for high cost or potentially harmful procedures such as is found in Radiology. Vetting strategies vary but may only be practical when the necessary clinical information is provided or when the volume of requests is low enough to practically enable this process to be efficiently performed. Low volume/high cost diagnostic tests should be prioritised.

Vetting can also be carried out using IT functionality if available – currently such requesting interface functionality is early in development. Vetting at this level can of course be carried out more simply on the basis of location of request, via an additional added question at the order comms level or via a minimum retesting intervals strategy.

5   Terminology Standardisation

Significant variation exists across Scottish diagnostic services with regard to how diagnostic tests are named, requested and reported. Additional variation exists within laboratory medicine at the level of units of measurement, reference intervals and the

components of composite test panels – such as U&Es, LFTs, etc. There would be significant advantages to the Scottish NHS, clinical research, patient safety and the economy, if standardisation could be developed that would allow true interoperability between NHS Boards to exist. Such standardisation within radiology largely exists, however this is not the case within laboratory medicine. This will limit the big data approach, composite research databases, direct to patient results and many of the demand optimisation strategies identified in this document.

Developments such as the National Laboratory Medicine Catalogue (NLMC) should be supported along with piecemeal harmonisation exercises emanating from Colleges, Societies and the Scottish Managed Diagnostic Network system. In the interim, adoption of diagnostic test request translation services such as the National Pathology Exchange (NPEX) should be encouraged for all send away testing from Scottish laboratories to facilitate safe and efficient data transfer across Health Board boundaries.

It is also vital that any send away tests and point of care testing activity is also incorporated within the electronic diagnostic test domain and ultimately is recorded within the electronic patient record.

Principle 5: All NHS Boards should seek to adopt national consensus harmonisation/standardisation recommendations and make plans to implement NPEX and NLMC coding when available.

6   Information Technology Solutions

It has become clear that many of the recommended interventions to promote rational and appropriate diagnostic test use are dependent on IT solutions with the necessary functionality to align with such strategy. Such functionality to support test vetting, minimum retesting intervals, decision support and indeed test requesting data collection/feedback is very much in its infancy. It is therefore vital that diagnostic services play close attention to the availability/early adoption opportunities of such functionality and ensure any procurement processes across Order Comms, Laboratory Information Management Systems (LIMS) and linked clinical databases contain the demands of such functionality within the relevant service specifications.

The National Demand Optimisation Group will issue separate guidance on this topic.

Principle 6: All NHS Boards to actively implement IT solutions that support and facilitate demand optimisation strategies and ensure future IT procurement for diagnostic services incorporates the likely functionality required.

7   Local Health Board Governance Structures

Implementation of a national, consistent approach to demand optimisation across all Health Board areas requires considerable buy-in and collaboration. It is vital that any recommendations on national demand optimisation strategy are supported by local health board governance that allows implementation and control of such activity. It is vital that such governance structures incorporate not just diagnostic service involvement but also embrace representation and collaboration from clinical services, primary care, management and financial sectors within the boards – a whole systems approach.

8   Effective Diagnostic Pathways Implementation

Health Improvement Scotland (HIS) have recently developed plans for a programme of work focussing on Effective Care Pathways (ECPs)[9]. This work is likely to focus on pathways of care that encourage best practice and a consistent value driven delivery of healthcare. Given that diagnostic tests are involved in the vast majority of all clinical decisions made across healthcare, it has been recognised that many of these ECPs will incorporate or be heavily influenced by diagnostic test use. The National Demand Optimisation Group has been developing a parallel strategy of Effective Diagnostic Pathways (EDPs) as standalone recommendations on diagnostic test use. These will initially be focussed on areas where variation in test use is perceived but will also be useful in promoting the adoption of new tests across all NHS Boards, thereby minimising the diagnostic postcode lottery that currently exists.

Initial EDPs will focus on breathlessness (natriuretic peptides), Bowel disease (calprotectin/NFIT) and tests for DVT (D-Dimer) as examples.

9   Specialist Services Consolidation

The shared services agenda for diagnostic services promotes the concept of 'Once for Scotland'. While this approach is not suitable for the vast majority of diagnostic test services, there will be some areas identified whereby duplication of high cost or highly specialised services could be deemed as sub-optimal use of healthcare resource. This may include specific radiology examinations, some specialised histopathology services and some metabolic/genomic based testing within blood sciences. The shared services programme is likely to address some of these options in the near future.

10   Educational Support

Education relating to appropriate diagnostic test use has been challenging in recent years as formal diagnostic teaching has decreased within medical schools in favour of a 'systems' approach. As a result, many feel that the general knowledge around appropriate diagnostic test use has significantly diminished.

All NHS Boards should be encouraged to re-engage with their medical, nursing and AHP staff to facilitate learning around rational diagnostic test use. The advent of e-

learning, on-line CPD, eKSF and personal proficiency testing provide the potential opportunity to incorporate such educational input. Additional educational guidance should also be implemented via any diagnostic test requesting feedback strategy and as a component of any developing diagnostic electronic decision support modules within IT systems.

The adoption of the Medical Undergraduate Curriculum[11] by RCPath should also be promoted through all NHS Boards incorporating Medical School involvement. In addition, there should be a national approach from the National Demand Optimisation Group and the Managed Diagnostic Networks to develop common learning material on appropriate diagnostic test use for widespread dissemination.

Principle 10: All NHS Boards should actively provide educational support to facilitate better understanding of appropriate diagnostic test use amongst all staff. Use of nationally produced material should be encouraged.

Conclusions

The implementation of activity to support demand optimisation is vital for modern, efficient diagnostic services. Diagnostic services must be equipped to work with and enable users to optimise requests for examinations within a patient centred context and be able to deliver effective knowledge rich reports to the point of care that deliver the maximum positive impact to a patient pathway.

This document provides basic guidance to all NHS Boards to assist the facilitation and implementation of interventions to promote appropriate diagnostic test use. It remains vital that such strategy is supported by not only national guidance and inter-board collaboration via the diagnostic networks, but also by the development of specific and explicit governance arrangements within NHS Boards that incorporate diagnostic services, clinical users, management and financial elements. In this way a true culture of demand optimisation can be realised at all levels of healthcare interface across NHS Scotland.

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Appendix D – Minimum Retesting Intervals Focus

Background

Unnecessary repeat testing represents wastage within scarce healthcare budgets. The concept of defining, where possible, time intervals whereby repeat testing would be unjustified, is one that could be useful for demand optimisation purposes. The Royal College of Pathologists have recently published guidance on Minimum Retesting Intervals in Pathology[1] (2015). This guidance serves as a baseline for laboratory services to define, in conjunction with their users, a strategy for limiting unnecessary repeat testing within their domain.

While some requesting interval blocking can be made at the laboratory/radiology department level, the most appropriate focus for improvement work would be the point of request, usually the clinical user's requesting interface – such as the order communications module – to ensure unnecessary test requests can be avoided before an order is made or a specimen taken. The early adoption of automated IT systems, as they are developed, should be encouraged. The actual mode of interaction will depend on the test in question, especially with regards to the volume of samples being received, the cost of the test and the clinical risks involved in actually blocking requests.

The National Demand Optimisation Group has recommended a workstream to explore and agree national minimum retesting intervals. The following information represents areas of key focus for each discipline, demonstrating existing variation in some cases. Note that some of these MRIs represent pragmatic compromises to ensure that important though rare indications for more frequent testing are not inadvertently blocked:

1. **Clinical Biochemistry – MRI Times**

Test	NHS Grampian	NHS Fife	Comments
Vitamin D	1 Year *	**	* only extremely rarely, a more frequent service may be required
			** Not available routinely in primary care. Only available when requested by key locations/consultants Any other circumstances contact duty clinical biochemist. Developing guidance
HbA1c	1 week *	60 Days	* MRI can be extended if diagnostic and monitoring based testing can be distinguished – if so then the latter MRI could be 1 month
Cholesterol	1 month	All lipids MRI 60 days	
Thyroid Function	1 week *	28 days	* MRI could be extended much further

Test			if clinical reason for request could be effectively interrogated via the order comms interface
CRP	20 hours *	48 hours	* Essentially a one day MRI in practice. Note some boards have implemented a 3 day MRI.
Liver Function Test	20 hours *	No MRI for LFT's	* Essentially a one day MRI in practice
Transferrin		28 days	

2. Haematology – MRI Times

Test	NHS Grampian	NHS Fife	Comments
FBC	20 hours *		* Essentially a one day MRI in practice
INR	20 hours *		* Essentially a one day MRI in practice

3.Immunology – MRI Times

In NHS Tayside, all requests that fall inside the minimum retest interval are electronically held on LIMS system and scrutinised by a senior member of staff (Band 7 and above) before rejection or acceptance. This protocol allows clinical context to inform decision.

Test	Current Retest interval	Comments
Anti-TPO Abs	12 months	Repeats not routinely required
Anti- TRAB	12 months	Dependant on clinical context
Anti Gastric Parietal antibodies **Intrinsic Factor antibodies**	12 months	Repeats not routinely required
Anti-adrenal antibodies	12 months	Repeat testing of limited clinical value –frequency to be determined by clinical context
Anti-Smooth muscle antibodies **Anti-mitochondrial antibodies** **Anti-M2 antibodies** **Anti Liver Kidney Microsome antibodies**	6 months	Repeat testing of limited clinical value –frequency to be determined by clinical context
Anti-Neuronal antibodies	12 months	Repeats not routinely required

Anti glomerular basement membrane antibodies	4 weeks	Case by case basis for patients on therapy
Circulating skin antibodies	6 months	With discretion for patient on therapy for bullous pemphigoid
Anti tissue transglutaminase antibodies	6 months	frequency to be determined by clinical context
IgG endomysial	None	Only measured in patients with IgA deficiency
Anti nuclear antibodies (ANA)	6 months	6 months
Anti-neutrophil cytoplasmic antibodies (ANCA)	4 weeks	Case by case basis for patients on therapy
MPO/PR3	42 days	Case by case basis for patients on therapy
Anti ds DNA antibodies	3 months	Case by case basis for patients on therapy
Anti-Extractable nuclear antigens (ENA)	12 months	Repeat testing of limited clinical value –frequency to be determined by clinical context
Anti-cardiolipin antibodies	9 weeks	9-12 weeks retest to confirm positive results Previously negative determined by clinical context
IgM Rheumatoid factor	12 months	Not routinely required– frequency to be determined by clinical context
Anti- cyclic citrillullated peptide antibodies (CCP)	12 months	Not routinely required– frequency to be determined by clinical context
Complement C3 and C4	4 weeks	frequency to be determined by clinical context
lymphocyte subsets	1 week	All repeats must be discussed with consultant
Functional antibodies	2 years	Repeats to assess response to immunisation at 6-8 weeks on patients with previous levels below protective range.
Total IgE	6 months	For ABPA to assess efficacy of therapy
Allergen specific IgE	6 months	For ABPA to assess efficacy of therapy

IgG precipitins	6 months	For ABPA to assess efficacy of therapy
NMO Ab	12 months	Repeat testing guided by clinical context and only allowed if Oxford clinical questionnaire is completed
Basal ganglia Ab	24 months	Repeat testing of limited clinical value –frequency to be determined by clinical context
C3 nephritic factor	12 months	Not routinely required if positive, only allowed if C3 below normal range
GAD	12 months	Not routinely required
Ganglioside Ab	12 months	Not routinely required
Histone Ab	12 months	Not routinely required
IA2 Ab	12 months	Not routinely required
IgG subclasses	12 months	Not routinely required IgG4 - Repeat testing of limited clinical value –frequency to be determined by clinical context
Mast cell tryptase	28 days	frequency to be determined by clinical context re anaphylaxis versus mastocytosis monitoring
MAG Ab	12 months	Repeat testing of limited clinical value –frequency to be determined by clinical context
Myositis panel	12 months	Repeat testing of limited clinical value –frequency to be determined by clinical context
NMDA	3 months	Repeat testing of limited clinical value –frequency to be determined by clinical context
Ovarian Ab	12 months	Not routinely required
Parathyroid antibodies	12 months	Not routinely required
Voltage gated KC and CC Ab	6 months	Repeat testing of limited clinical value –frequency to be determined by clinical context
Anti-acetyl choline receptor antibodies	12 months	Frequency determined by clinical context – every 6 months on treatment
Anti-MUSK antibodies	12 months	Repeat testing of limited clinical

		value –frequency to be determined by clinical context
C1 inhibitor protein and activity	no limit	Once only to confirm, generally only performed if C4 is low or with compatible clinical information

NHS Grampian information-

ANA/ CTD Screen / ENA Screen	6 months	
Liver Autoantibodies	6 months	
IgA anti-TTG antibodies	12 months	
Thyroid peroxidase antibodies	12 months	

4.Microbiology/Virology – MRI Times

In general minimum tests intervals have not been implemented for Microbiology and Virology. The RCPATH guidelines for Minimum Retesting are based on expert opinion and as they are not being widely used there is an opportunity to formally validate them before being implemented.

There are some tests where there is established guidance on when to repeat the tests and labs do police the guidelines. These tests are a tiny percentage of the workload e.g. Viral load testing in HIV and retesting patients who are known to be positive for clostridium difficile.

There are large volume tests where MRI would be useful to reduce duplicate samples. Urine culture is an example. This topic needs to be discussed by the SMVN.

Test	Current Retest interval	Comments
Viral load testing in HIV	Depends on indication see BHIVA guidelines http://www.bhiva.org/documents/Guidelines/Monitoring/2016-BHIVA-Monitoring-Guidelines.pdf	A small numbers expensive test where it is worthwhile enforcing guidelines
Clostridium Difficile testing	Some labs will not test a sample if there has been a previous positive in the last 10 days	

NHS Grampian information-

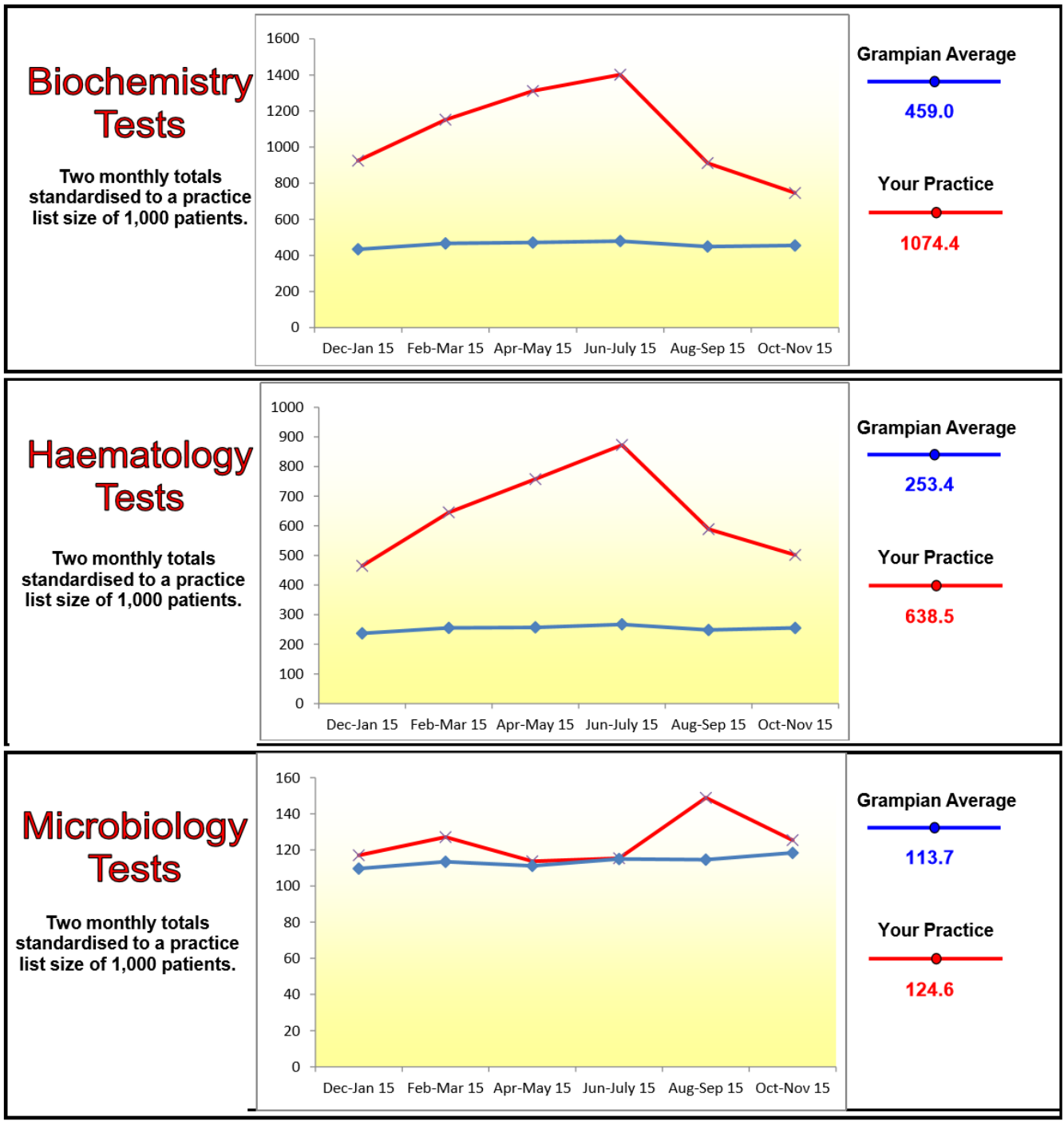| ASO Tite	14 days	
Helicobacter pylori serology	28 days if previously negative	Never repeat if previously positive
MRSA Screen	7 days	
Urine microscopy and culture	3 days	

5. Radiology – MRI Times

In imaging there is very little in the way of minimum retesting intervals. Repeat radiological investigations would be subject to IRMER regulations. Imaging benefits from global work lists, so investigations performed in other boards would be visible to all NHS Scotland staff so duplicate tests should not be performed unless clinically necessary and within guidelines.

The only exception highlighted to the NDOG is chest X-ray for improvement of appearances of infection for which the patient has been prescribed antibiotics. There is little point in re x-raying in less than 7 days as the antibiotic course will not have been completed. However the patient may need to have further chest X-Ray if the clinical condition worsens so a degree of clinical judgement will need to be applied in some cases.
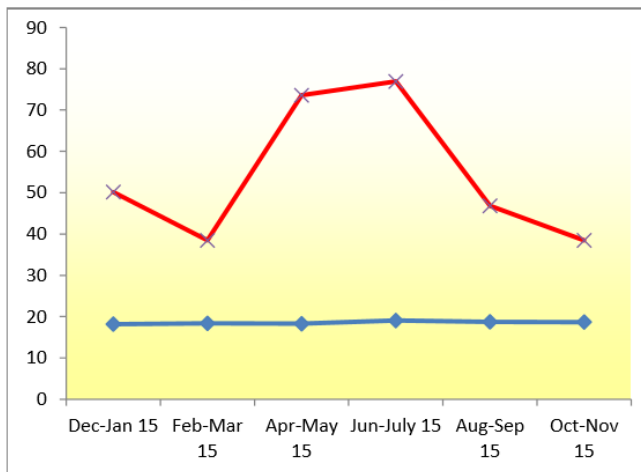
Appendix E – Enhanced Educational Feedback Report

The graphs display the 2 monthly requesting patterns for your practice compared to the Grampian average (all rates adjusted to a practice list size of 1,000 patients) for three of the main laboratory areas. The average displayed to the right of the graph is the average of the preceding 12 month period. The pages following highlight similar requesting trends for specific tests where it is thought that unwarranted variation may exist.

It must be stressed that these requesting trend comparisons are not an exact science, therefore a requesting level above or below the Grampian average does not necessarily imply appropriate or inappropriate test use. Instead, specific sources of potential inappropriate test use have been identified and commented on. We hope that this type of educational information is found to be helpful.

Biochemistry Tests

Two monthly totals standardised to a practice list size of 1,000 patients.

Grampian Average: 459.0

Your Practice: 1074.4

Haematology Tests

Two monthly totals standardised to a practice list size of 1,000 patients.

Grampian Average: 253.4

Your Practice: 638.5

Microbiology Tests

Two monthly totals standardised to a practice list size of 1,000 patients.

Grampian Average: 113.7

Your Practice: 124.6
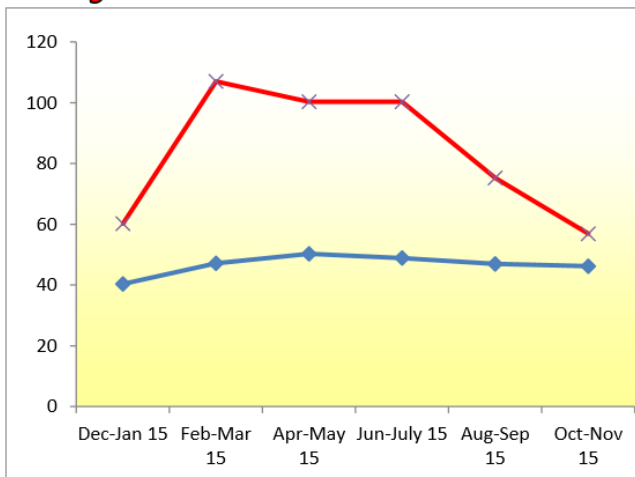
ZTEST

HbA1c

| Grampian Average | ●———— | 18.6 |
| Your Practice | ●———— | 54.1 |

Diagnosis of (Type II) Diabetes Mellitus:
Use of HbA1c for diagnostic purposes is not recommended by NHSG at present time.

Monitoring:
It is recommended that HbA1c testing is performed for monitoring of patients with type I or II diabetes mellitus at 2 to 6 monthly intervals (tailored to individual needs). Testing can be reduced to 6 monthly intervals in stable patients (whose therapy is unchanged).

Thyroid Function Test

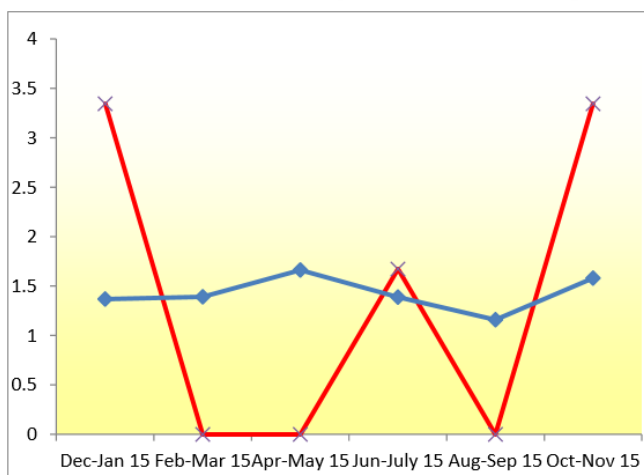| Grampian Average | ●———— | 46.6 |
| Your Practice | ●———— | 83.3 |

Screening:
Screening of the healthy population is not recommended, except in specific populations, such as patients receiving Amiodarone or Lithium.

Suggest checking TFTs in the following conditions (not exhaustive): atrial fibrillation, osteoporosis, subfertility, diabetes mellitus (type I), Down syndrome, Turner's syndrome, post neck irradiation, previous post partum thyroiditis.

Hypothyroidism (on thyroid replacement):
See GAFUR guidance for adjusting levothyroxine dosage on NHSG intranet.

Hyperthyroidism :
Frequency of monitoring of thyroid function as recommended by secondary care (Endocrinology Department).

Carcino-Embryonic Antigen

| Grampian Average | ●———— | 1.4 |
| Your Practice | ●———— | 1.4 |

Screening:
Given the lack of sensitivity and specificity for early disease, CEA should not be used for the screening or early diagnosis of GI malignancy, nor in the diagnostic evaluation of an undefined illness.

Diagnosis:
Not recommended for diagnostic purposes as a negative CEA does not exclude GI malignancy. Patients presenting with possible symptoms of GI malignancy and who meet urgent referral criteria should be referred for the relevant investigations.

Monitoring:
Should only be used in primary care to monitor known GI malignancy in coordination with secondary care.

Appendix F – Information Technology Guidance

THE SCOTTISH NATIONAL DEMAND OPTIMISATION GROUP

IT Guidance To Support Demand Optimisation Activity

Across Diagnostic Services

Background

It has been said that the practice of modern medicine is beyond the capability of the unaided mind. This delivers challenges to those wishing to deliver maximum benefit from investment in services that enable access to a readily available and rapidly growing repertoire of diagnostic tests. Triple Aim requires that the demand on such services is optimised. There is therefore a requirement to deliver systems and processes to help facilitate demand optimisation of diagnostic services.

Demand optimisation is defined as the process by which diagnostic test use is optimised to maximise appropriate test requesting which, in turn, optimises clinical care and drives more efficient and effective use of scarce resource and consequently delivers Triple Aim. There are significant impacts to be gained by optimising demand and many tools can be employed to enable delivery. Interventions need to be focussed on not just minimising over-requesting, but also under-requesting and reducing unnecessary repeat requesting. The ability to extract diagnostic requesting behaviour data and the functionality to deliver efficient, and in some cases automated, demand optimisation interventions is largely linked to information technology (IT) functionality that is resident within the diagnostic service environment and beyond. The following guidance focuses on defining some of the most desirable attributes that should be present or used within diagnostic IT systems to support demand optimisation activity in order to enable the collection of useful data, facilitate interoperability of diagnostic test results between systems within and between NHS Boards, and deliver demand optimisation interventions.

The guidance focuses largely on systems and concepts aligned to laboratory medicine, but the content is applicable to other diagnostic services. Separate sections on specific radiology applications are however included.

1 Diagnostic Services IT Systems

The following levels of IT operation need to be considered:

a)   Laboratory Information Management Systems (LIMS)

It is vital that each laboratory LIMS system has the necessary ability and functionality to deliver demand optimisation activity. Such functionality is rarely present as standard, however the majority of LIMS system providers are now beginning to develop specific demand optimisation modules that will assist in this process. It is therefore important that laboratory services are aware of such developments, seek to promote their use, and also try to ensure that such functionality is included within the specification of any new procurement exercise for a laboratory IT system.

b)   Order Communications Requesting Systems (Order Comms)

These systems are frequently being used across NHS Boards to enhance and automate requesting and reporting of laboratory test results. Examples are Trakcare order comms and Sunquest ICE. Once again the functionality of these systems is vital with regards to the collection of useful data and the delivery of demand optimisation interventions.

c)   Clinical Databases and Electronic Patient Records (EPRs)

Many systems are in operation across the NHS including GP systems, hospital EPRs and specific disease level databases (renal, diabetes). It is vital that such systems are not only interoperable within laboratory based systems (using a common language) but are also able to accept and display any demand optimisation intervention output in a seamless fashion.

d)   IT Translation Engines

Interoperability between IT systems is a challenging area within the NHS. The ability to transfer laboratory results between labs or NHS Boards remains difficult owing to the different systems being used and the different coding applied to test name, units, reference intervals and linked clinical terms. Systems have become available (bolt on software for LIMS), such as the National Pathology Exchange (NPEx), that do enable this communication functionality. Such systems can improve the efficiency associated with send away work, reduce turnaround times and minimise transcription errors - thus improving patient safety.

e)   Radiology IT systems

Radiology information flow mirrors that of labs with the Radiology Information System (RIS) replacing LIMS. The scheme is therefore Order Comms – RIS – EPR. Provision of demand optimisation modules in RIS is variable between vendors. However there has been much success in using external statistical packages to measure referral parameters. Furthermore, standardised RIS coding for examinations has been implemented across Scotland allowing direct comparison of hospitals and boards. As with laboratory specialties, Order Comms presents an opportunity to both analyse clinician referral behaviour and to deliver contextual decision support during requesting.

Images are stored in the Picture archiving and communication system (PACS) which is centralised to a Scottish national archive as well as peripheral board archives. It is hoped that access to national demand data directly from the Scottish National archive will be possible.

2 IT Systems Functionality

The following levels of IT functionality and activity need to be considered across all relevant IT platforms to enable demand optimisation programmes to function across diagnostics:

a) Data Collection Activity

It is vital that IT systems are put in place that will enable and enhance the ability to collect and extract data to inform, monitor and support demand optimisation activity. Functionality should be inherent within laboratory information systems (LIMS), radiology IT systems, order communications systems (order comms), and any other clinical database used for archiving, reporting or storage of diagnostic test results. Such requesting activity data should be easily extractable and examined at Health Board, Hospital, Ward, GP Practice, and individual clinician/general practitioner levels. The relevant IT systems should be able to provide such information on a regular basis and allow chronological examination of any trends. For any data collection, it is important to reference the need for interoperability and standardisation between systems (see below). This is especially important when such data is to be accumulated on a national basis and comparisons made. The additional ability to include analysis tools within the Diagnostic IT systems should also be considered, especially at the LIMS/Radiology system level. Such functionality should allow the clear and easy identification of potential over-requesting, under-requesting, unnecessary repeat testing, and gaps in available diagnostic test repertoire.

b) Test Request Blocking

It is important that LIMS/Radiology systems and order comms systems have in-built functionality to facilitate the automated blocking of potential inappropriate test requests. Automated blocking of such requests should be an in-built function and should occur automatically when the request is made within the relevant minimum retesting intervals time window or other appropriate clinical timeframe. The blocking decision should be made based on previous requests and/or the existence of a valid test result within such a time frame. This test result should be reported again back to the requester at this time. Such blocking of inappropriate requesting should ideally be made at the point whereby a request is being initiated and ideally before a blood sample/radiology request has been taken/made. Such functionality is therefore best implemented at the order comms requesting stage, thus allowing requesting behaviour modification so as to avoid unnecessary venepuncture/sample transportation to the laboratory or equivalent within radiology. It should be acknowledged that any minimum retesting intervals guidance is not completely fool proof and therefore decisions to block requests should be made based upon local circumstances and following discussions with users. All IT systems should be able to allow bypass mechanisms to be effected if necessary.

c) Requesting Audit and Feedback

IT systems, and especially LIMS/Radiology level, should have in-built functionality that enables the reporting of specific requesting behaviour back to individual clinicians, GPs, GP Practices or Wards. Such data presentation should allow chronological trends to be identified and reported back to users. The ability to incorporate financial costs associated with requesting behaviour and the ability to adjust any figures for known confounding variables (such as GP Practice list size) should also be possible.

d) Interoperability and Standardisation

No recognised standard for laboratory test names, units of measurement, reference intervals, or associated clinical coding is available or has been implemented uniformly across all Scottish NHS Boards. This severely limits both the ability to combine data extraction and for laboratories to communicate with each other. Attempts have been made, and are still underway, to develop standardised systems such as the National Laboratory Medicine Catalogue. The development of such systems is extremely challenging and is unlikely to be available for a number of years. As such systems do become available, it is important that laboratory/radiology IT systems, which include analysers, order comms, LIMS, clinical reporting databases, and electronic patient records, are all populated with such coding if available.

The delivery of standardised data sets and data archetypes is an important concept for the immediate and longer term. It does however deliver a degree of complexity and requirement for discipline around coding and taxonomy. A pragmatic approach will be required that will lead to a planned convergence of organisations towards the use of common coding systems. This will enable a transitional phase to deliver immediate benefits in some key areas. In the longer term the advantages of commonality of coding with a supporting taxonomy will enable big data approaches within diagnostics. Historical data requires that key characteristics of the data item are stored (data archetype, including investigation type, instrument, units, standardisation used, reference data etc) to enable benefits from archived data to be realised. The managed diagnostic networks should consider this as a cross network work stream. There are internationally recognised approaches for coding including NPU, SNOMED CT, etc.

e) Laboratory to Laboratory Communication

To a greater or lesser extent, all laboratories in Scotland currently outsource a number of samples/tests to other laboratories, both within Scotland and out with. This has generally been done on a manual basis, mainly due to the limitations in system interoperability as identified above. Until such interoperability can be resolved, many laboratories have begun using the National Pathology Exchange (NPEx) system to allow both the requesting and reporting of laboratory tests between laboratories. This effectively uses a translation engine that allows direct communication between the LIMS systems of different laboratories/NHS Boards. The implementation of NPEx or related

software applications should therefore be encouraged to allow more efficient and safer cross-boundary activity to take place.

3 Radiology Systems Functionality

It is envisaged that most radiology demand will come via ordercomms systems with the radiology information systems (RIS) containing demand and activity data. Within Scotland there are multiple instances of these systems provided by 4 ordercomms vendors and 3 RIS vendors. It is unlikely to be viewed as cost effective to ask existing vendors to alter the current nationally installed solutions. The preferred route is a national strategy utilising external solutions. As described elsewhere in this document, demand optimisation consists of 2 major components namely measurement of demand and modification of requestor behaviour.

a.   Measurement of Radiology Demand.

The Scottish Clinical Imaging Network (SCIN) are currently working closely with NSS to implement a central data warehouse driven solution to display aggregated demand and activity figures for all Scottish Radiology departments. NSS already perform this task for a number of other clinical areas. This will allow powerful linkage of radiology data to other hospital specialties. However, individual departments need to be encouraged to formulate their own local business intelligence strategies. Using 3rd party software, SCIN have demonstrated the ease in which demand, activity and queue data can be displayed both live and retrospectively and are offering this support via SCIN. The involvement of the local health board information services department is also to be encouraged for example in the creation of local dashboards. Some departments have chosen to engage with 3rd party companies to provide data analysis services. Modification of the current installed RIS systems is not seen as a viable solution at the current time. We strongly recommend that all future RIS acquisitions include business intelligence modules as well as back end SQL data access for 3rd party data analysis. Finally, as important as the software solutions, it is necessary to have parallel protocols and processes to interpret, monitor and act on the resultant data. In particular all departments should perform breach management monitoring and capacity planning. Feeding back total demand (and total xray dose) figures to clinicians is highly desirable. Automated dashboards will facilitate this.

b.   Requestor Behaviour Modification

i) Before Request – This primarily depends on clinicians adhering as closely to agreed local guidelines for the various clinical scenarios. It is strongly recommended that local clinical teams engage and agree on management pathways where possible. Radiology departments are often well placed to coordinate this activity. These guidelines need to be accessible and visible to clinicians. National Education Scotland are currently going to tender for systems to embed guidance into existing EPR applications. Whilst other forms of dissemination remain important, it is likely that this form of embedded contextual clinician decision support will prevail.

ii) During Requesting - The provision of pertinent data within order comms at the time of requesting is paramount to request quality. This includes recent results, possible duplicate request, clinical information and decision support material. The increased usage of Clinical portal and other EPR systems largely provides this information. SCIN are currently evaluating the European Society of Radiology (ESR) iGuide system that is designed to provide immediate advice to the requestor by displaying a clinical 'appropriateness score'. This system has shown to be useful in the US and is also in use in Some European countries. The system also generates an automated audit of requests for individual clinicians. A pilot of this software is currently planned in England and Scotland. This will be in collaboration with NES and will use a national guideline 'knowledgebase'.

iii) After Requesting – Many radiological investigations require 'vetting' prior to booking. All order comms systems must support the ability for the department to request more information or reject a request outright. Furthermore it is highly desirable for the system to support a dialogue between clinician and radiologist. Manual vetting of requests is time intensive but necessary for certain groups eg paediatrics.

4 Diagnostic Decision Support

Decision support software exists in the healthcare domain in a number of forms and integrates at various levels with order comms systems and clinical databases. Much of it is still in its infancy of development with true integration across the UK limited by the lack of standardisation and interoperability between systems. Whilst it may be difficult to demonstrate a close link between such decision support and positive outcomes in terms of demand optimisation, there is nevertheless a strong empirical notion that identifying best practice with regards to test choice and facilitating consistent requesting behaviour on that basis would be in the interests of patient care and efficient diagnostic practice. Local teams should therefore consider the implementation of such decision support software at an early stage and make use of guidance in referral information sites (such as www.**refhelp**.scot.nhs.uk*)*
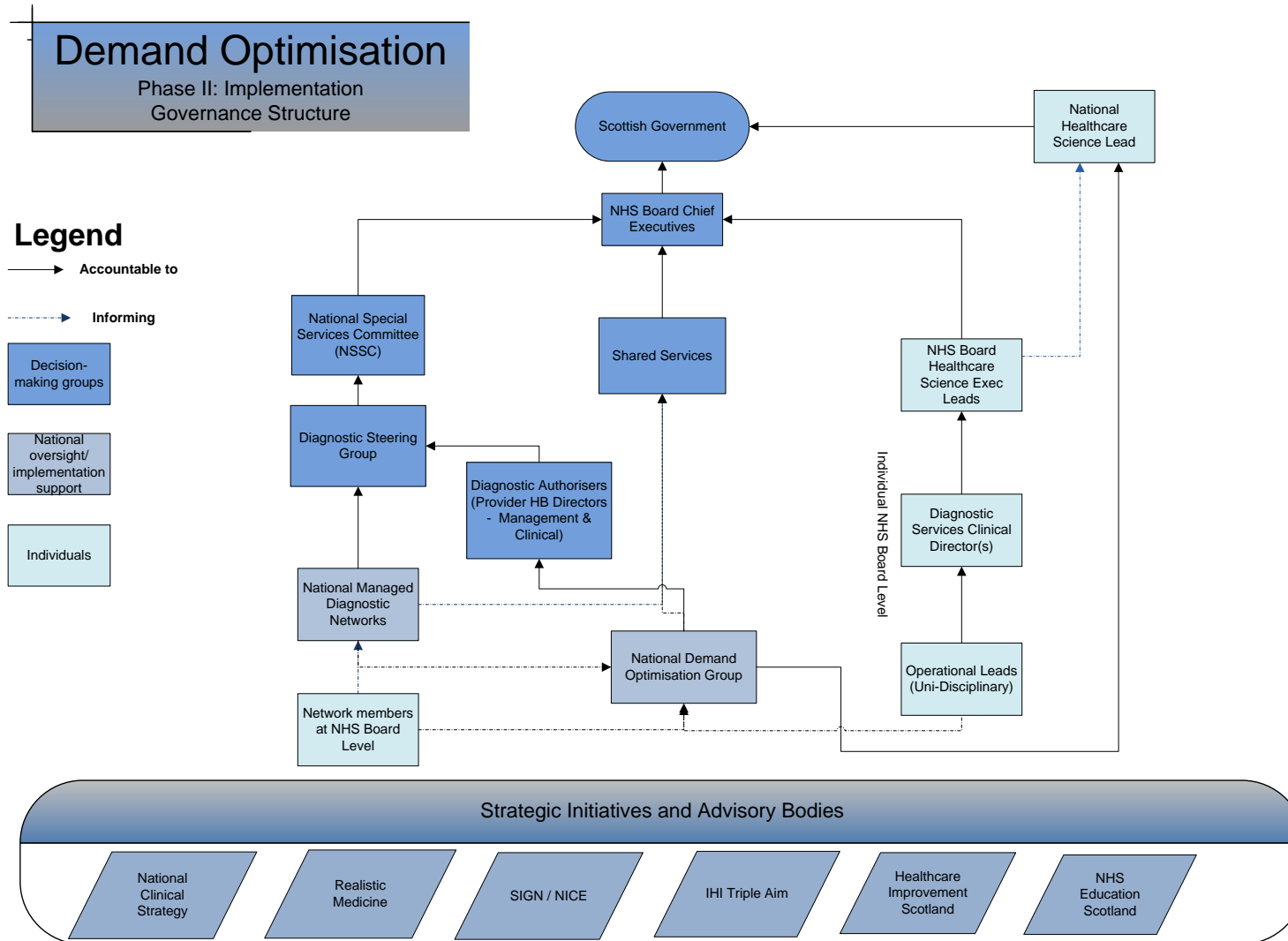
Conclusion

The implementation of activity to support demand optimisation is vital for modern, efficient diagnostic services. Diagnostic services must be equipped to work with and enable users to optimise requests for examinations within a patient centred context and be able to deliver effective knowledge rich reports to the point of care that deliver the maximum positive impact to a patient pathway.   Much of this activity is dependent on the availability of specific IT functionality allowing automated data collection and requesting behaviour modification activity.

It remains clear however, that attempts to develop such automated and functional IT systems to support diagnostic demand optimisation activity, interoperability and standardisation are in their infancy, but nevertheless need to be developed and matured with a degree of urgency. These limitations should not however stop or limit such demand optimisation work implementation, while diagnostic services should

look to incorporate such functionality described at the earliest opportunity as these systems/modules become available. Diagnostic service providers provide only part of the key to delivery of demand optimisation and the realisation of benefits from the approach. This means working across the diagnostic services in Scotland to reduce variation and working with users of the service to enable tailoring of demand and service provision with a view to delivering demonstrable outcomes that are consistent with Triple Aim.

Appendix G: Demand Optimisation Governance

Demand Optimisation
Phase II: Implementation
Governance Structure

Legend

→ Accountable to

⇢ Informing

Decision-making groups

National oversight/ implementation support

Individuals

Scottish Government

National Healthcare Science Lead

NHS Board Chief Executives

National Special Services Committee (NSSC)

Shared Services

NHS Board Healthcare Science Exec Leads

Diagnostic Steering Group

Diagnostic Authorisers (Provider HB Directors - Management & Clinical)

Diagnostic Services Clinical Director(s)

National Managed Diagnostic Networks

National Demand Optimisation Group

Operational Leads (Uni-Disciplinary)

Network members at NHS Board Level

Individual NHS Board Level

Strategic Initiatives and Advisory Bodies

National Clinical Strategy

Realistic Medicine

SIGN / NICE

IHI Triple Aim

Healthcare Improvement Scotland

NHS Education Scotland

Scottish Government
Riaghaltas na h-Alba
gov.scot

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