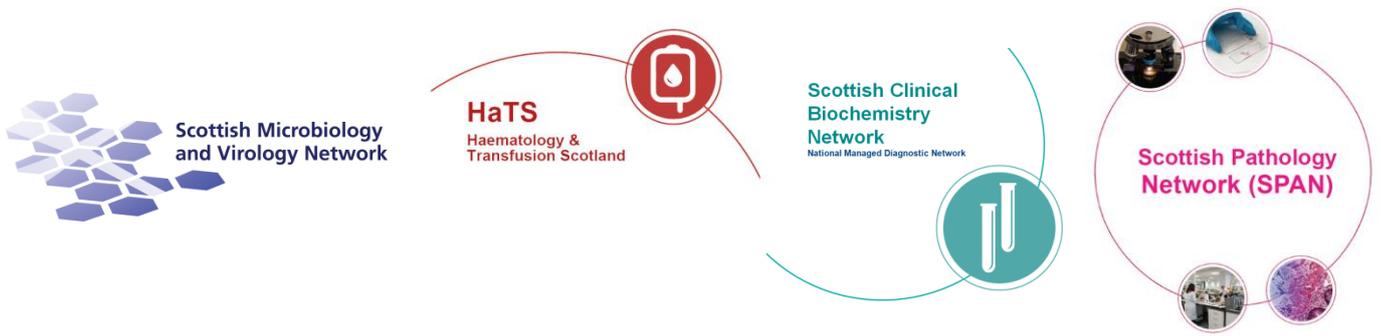


Demand Optimisation in Laboratory Medicine

Phase II Report



Demand Optimisation in Laboratory Medicine Phase II Report - the full development of an Atlas of Variation (AoV) for laboratory test requesting covering multiple disciplines from the whole of Scotland. this report is the second phase of a previously issued report, which can be found at <https://www.gov.scot/publications/demand-optimisation-diagnostics/> and is an associated document to the Healthcare Science National Delivery Plan which can be found at <https://www.gov.scot/publications/driving-improvement-delivering-results-scottish-healthcare-science-national-delivery-plan-20152020/>



Genetics/Molecular Pathology consortia

Contents

1	Foreword.....	5
2	Executive Summary.....	6
3	Introduction.....	8
3.1	Background.....	8
3.2	Group Membership.....	9
3.3	Governance of the NDOG.....	9
4	Aims.....	11
5	NDOG Output.....	12
5.1	Atlas of Variation for Diagnostic Laboratories.....	12
5.1.1	Diagnostic Laboratories Atlas of Variation – Static Observations.....	14
5.1.2	Interactive Atlas.....	19
6	Quality Improvement.....	27
6.1	Background.....	27
6.1.1	NHS Tayside- The intelligent Liver Function Testing pathway (iLFT).....	28
	Pathology.....	29
6.1.2	NHS Lanarkshire - Audit of sampling appendectomy specimens for histopathological assessment.....	29
6.1.3	NHS Forth Valley- Reduction of histology specimen turnaround times.....	30
6.1.4	Scotland - Reduction in Vitamin D testing.....	31
6.1.5	NHS Fife - Reduction of urine samples sent to Microbiology laboratories for analysis.....	32
6.1.6	NHS Ayrshire & Arran and NHS Dumfries & Galloway - Reduction of High Vaginal Swabs (HVS) sent to Microbiology laboratories for analysis.....	33
6.1.7	NHS Lothian - Reduction of leg ulcer swabs sent to Microbiology laboratories for analysis.....	33
6.1.8	Scotland - Agreed B12 Standardised Diagnostic Testing Pathway.....	34
6.1.9	NHS Grampian- Rationalisation of rheumatoid arthritis serology CCP vs RF.....	34
6.1.10	Scotland - Development of an online eligibility calculator for access to Familial Hypercholesterolaemia (FH) genetic testing.....	35
6.1.11	Laboratory Genetics, Queen Elizabeth University Hospital, Glasgow - Review of Chimerism Service Strategy.....	35
6.1.12	Scottish Genetics Consortium Laboratories (Aberdeen, Dundee, Edinburgh, Glasgow) - <i>DPYD</i> Genotyping Pilot.....	35
7	Conclusions.....	36
8	Recommendations.....	37
9	Appendices.....	38
9.1	Appendix A NDOG Membership.....	38
9.2	Appendix B Stakeholder engagement.....	39

Figure 1 NDOG Governance structure	10
Figure 2 Atlas dashboard at national level.....	21
Figure 3 National dashboard demonstrating requesting variation of a specific test at practice level.....	21
Figure 4 National dashboard demonstrating requesting variation of a specific test at board level (a) and cluster level (b).....	22
Figure 5 Atlas dashboard at NHS Board level	22
Figure 6 Practice sizes with differing request rates	23
Figure 7 Atlas dashboard at GP level	24
Figure 8 Histogram demonstrating two practices from one cluster group with differing request rates (blue) over a 12 month period.....	25
Figure 9 Atlas dashboard for practice request comparison	26
Figure 10: Number of appendix cases and ratio of blocks used per NHS Board during financial year 2017-2018.....	29
Figure 11 Practice requests of Vitamin D per NHS Board	32
Table 1 Tests identified by the networks for data collection	13
Table 2 NHS Forth Valley histology reporting turnaround times in 2017	30
Table 3 NHS Forth Valley histology reporting turnaround times in 2018	31

1 Foreword

The aim of Realistic Medicine is to strengthen the relationships between those who provide and receive care, ensuring that people receive appropriate and beneficial care that is evidence-based and in line with their preferences. Variation in healthcare exists for all sorts of legitimate reasons, but identifying and tackling unwarranted variation is essential to improving outcomes derived from healthcare across Scotland.

This report looks to tackle unwarranted variation across laboratory diagnostic testing. While some of this variation can be explained by clinical circumstances and demographic differences, some of the variation is suggestive of considerable levels of inappropriate demand as a result of over-requesting, under-requesting and unnecessary repeat testing.

Laboratory testing plays a very important role in healthcare from before birth to after death – this includes screening, diagnosis, treatment decisions and monitoring. Considerable unwarranted variation exists across Scotland with regards to laboratory test provision and use. This potentially impacts both laboratory and the general NHS provision of service.

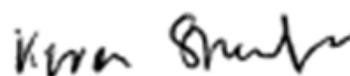
NHS Scotland is unique within the UK, having developed since 2015 a national approach to promote more appropriate laboratory testing by forming a National Demand Optimisation Group. The Scottish National Demand Optimisation Group (NDOG) had its inception from the Healthcare Science National Delivery Plan (2015) and in 2017 released its first phase of work that focused around defining recommendations for future demand optimisation structures and implementation strategies.

The work of phase II has developed a Diagnostic Atlas of Variation (AoV). The identification of good practice for potential roll out along with the inception of a National Atlas of Variation for laboratory testing will allow the development of future approaches that inform more rational testing while ensuring equal access to new and novel testing.

I fully endorse closer collaborative working with the wider healthcare family across patient pathways as being the key for the success of interventions aimed at driving more appropriate testing and look forward to the outcomes that phase III of the programme aims to deliver.



Dr Gregor Smith
Deputy Chief Medical Officer for Scotland
Scottish Government



Karen Stewart
Healthcare Science Officer
Scottish Government

2 Executive Summary

Demand optimisation ensures optimal use of laboratory tests. This has a positive impact on patient experience, on healthcare outcomes and on laboratory budgets. Given the scope of these benefits, demand optimisation is a key priority in ensuring an effective healthcare system, in line with the aims of Realistic Medicine and the Healthcare Science National Delivery Plan.

However, looking at laboratory tests in isolation will not have the desired long term effect in ensuring a cultural change. Diagnostics is an integral part of the overall complex care pathway and as such a 'whole systems' approach will ensure that efficient and clinically effective pathways are designed; resulting in patients having the correct investigations, reducing waste and adding value.

In developing a strategy for demand optimisation, the key areas to consider are:

- Minimising over-requesting and under-requesting, both of which can be damaging to patient care
- Reducing unnecessary repeat requesting
- Ensuring appropriate and useful test repertoires are universally available across all healthcare outlets
- Standardisation of nomenclature/test coding to reduce unnecessary variation and allow automated data monitoring systems to extract laboratory test usage information in an efficient, consistent and timely manner
- Internal standardisation of laboratory practice – to ensure the optimal processes, procedures and testing protocols are adhered to.

The Scottish National Demand Optimisation Group (NDOG) was formed in 2015. During phase I, NDOG identified already existing demand optimisation work as well as undertaking a number of feasibility pilots to identify unwarranted variation, with a view to designing targeted interventions.

This report outlines phase II activity, which continues to develop the themes from phase I. This includes the full development of an Atlas of Variation (AoV) for laboratory test requesting covering multiple disciplines from the whole of Scotland.

Targeted static observations of marked variation from the AoV provides a starting point from which to develop interventions aimed at reducing unwarranted variation. An interactive, web based version of the AoV has also been developed which would allow a range of healthcare professionals to interact in a variety of ways that could identify and promote more appropriate test use. Work to develop a range of dashboards that focus on relevant requesting information for specific groups has also begun.

Within this report, significant examples of good demand optimisation practices, for potential wider roll out, have also been included.

There is a need to maintain the momentum from the initial successful phases of the national Demand Optimisation programme and implement improvement strategies locally and nationally, embedding the values and tools of demand optimisation into operational practice.

To enable this, NDOG has made the following recommendations: -

1. Pilot the Atlas with referring clinicians: -
 - to obtain feedback on the utility and identify improvements
 - to widely promote its capabilities in highlighting variation for demand management at individual, group and board level
 - to provide full access to all to enable new and sustained improvements
2. Focus on sustaining the current quality improvement initiatives, as well as delivering and monitoring new quality improvement (QI) proposals and progressing implementation of the ongoing proposals. This should be supported by the production of a QI package to instigate interventions in specific areas of unwarranted test requesting.
3. Ensure alignment with the values of the Realistic Medicine and contribution to the Scottish Government's vision for the future of primary care services.

Phase III of the NDOG programme will begin in Autumn 2019 and will be focused on developing specific test ordering interventions aimed at promoting more appropriate testing and reducing unwarranted variation. Closer working with colleagues outside of laboratory services will also be developed, with a particular focus on developing partnerships with laboratory service users.

The following objectives have been agreed for Phase III: -

- Engaging with referring clinicians to continue to improve the Atlas of Variation and promoting its capabilities within the GP community
- Data collection for the calendar year of 2018 to build upon the existing data collected in phase II
- Exploring alternative options to streamline data collection for populating the Atlas
- Where applicable, undertaking internal demand optimisation within laboratories to review and standardise methodologies
- Monitoring and reporting on QI programmes being delivered
- Expanding stakeholder engagement by coordinating quality improvement champions at a local level to support change
- Engaging with referring clinicians and laboratory managers to promote a cultural shift in managing requesting patterns
- Implementing interventions where unwarranted variation can be identified
- Continuation of clinical networks engagement at a national, regional and local level around specific conditions to develop and implement requesting guidelines which could be referenced at a board level
- Promoting demand optimisation and the realistic medicine agenda at conferences, in reports to professional bodies and in newsletters

The support of Scottish Government for the third phase is welcomed. This will enable the continued progression of NDOG aims through a partnership between laboratory diagnostics and service users.

3 Introduction

3.1 Background

It has been widely accepted that there is considerable variation in the use of diagnostic tests across the NHS¹. While some of this variation can be explained by clinical circumstances and demographic differences, some of the variation may be attributed to inappropriate test requesting by clinicians as a result of over/under-requesting and unnecessary repeat testing. In addition, lack of availability or awareness 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 associated scarce NHS resources.

In order to target demand optimisation, the key areas to consider are:

- Minimising over-requesting and under-requesting, both of which can be damaging to patient care
- Reducing unnecessary repeat requesting
- Ensuring appropriate and useful test repertoires are universally available across all healthcare outlets
- Standardisation of nomenclature/test coding to reduce unnecessary variation and allow automated data monitoring systems to extract laboratory test usage information in an efficient, consistent and timely manner
- Internal standardisation of laboratory practice – to ensure the optimal processes, procedures and testing protocols are adhered to.

It is important to acknowledge that the optimisation of rational diagnostic testing may not only bring about more efficient use of resources within diagnostics but it is the knock-on effect for patient care pathways that will ultimately be more valuable. However, it is also vital to recognise that diagnostics and pathways interact in complex ways which may not be immediately evident to laboratories. There may be examples that certain, seemingly inappropriate, diagnostic tests are requested, to ensure the patient is admitted to the correct pathway and receive the appropriate care.

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 (NDP). In 2015, the Scottish Government requested that a National Demand Optimisation Group (NDOG) be established to review the third deliverable of the NDP, which states:

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.

The first phase of Demand Optimisation began in 2015 in order to review existing demand optimisation work, to deliver an improvement plan to optimise diagnostic

¹ <https://www2.gov.scot/Resource/0047/00476785.pdf>

testing for patients and to support the implementation of the National Clinical Strategy and Scottish Government's Healthcare Science National Delivery Plan.

In January 2017, the group produced an extensive report, detailing a comprehensive overview of demand optimisation and demand management activity and structures across NHS Scotland².

Following publication, diagnostic networks reformed their demand optimisation subgroups or directed their Steering Groups to progress implementation of the report and local arrangements were put in place in some NHS Board areas. However, there was no over-arching, cohesive national plan to progress the recommendations of the report.

The Diagnostic Steering Group identified the need to support implementation of the report recommendations and the second phase of Demand Optimisation began in February 2018.

3.2 Group Membership

The multidisciplinary National Demand Optimisation Group (NDOG) was formed in 2015, with minor representation changes for phase II, and has been developing a number of aims and workstreams around demand optimisation. The group had representation from Scottish Government, National Services Scotland and the National Managed Diagnostic Networks, as well as representation from laboratories including Biochemistry, Microbiology / Virology, Pathology, Haematology and Clinical Immunology. There was also representation from the Genetics / Molecular Pathology consortia and the Scottish National Blood Transfusion Service. Full details of the group membership can be found in Appendix A.

The group representatives cascaded work through established formal and informal networks to lab users. In addition, engagement with service users was sought throughout the development of the Atlas of Variation. This provided the opportunity for reciprocal interaction to drive forward improvement and ensure a whole systems focus.

3.3 Governance of the NDOG

The Scottish Government Healthcare Science Officer commissioned the work, Scottish labs teams provided the expertise and NSS provided the resource and methodology to ensure improvements could be replicated and sustained.

The governance structure employed in the work was: -

² <https://www.gov.scot/binaries/content/documents/govscot/publications/guidance/2017/02/demand-optimisation-diagnostics/documents/00514237-pdf/00514237-pdf/govscot:document/>

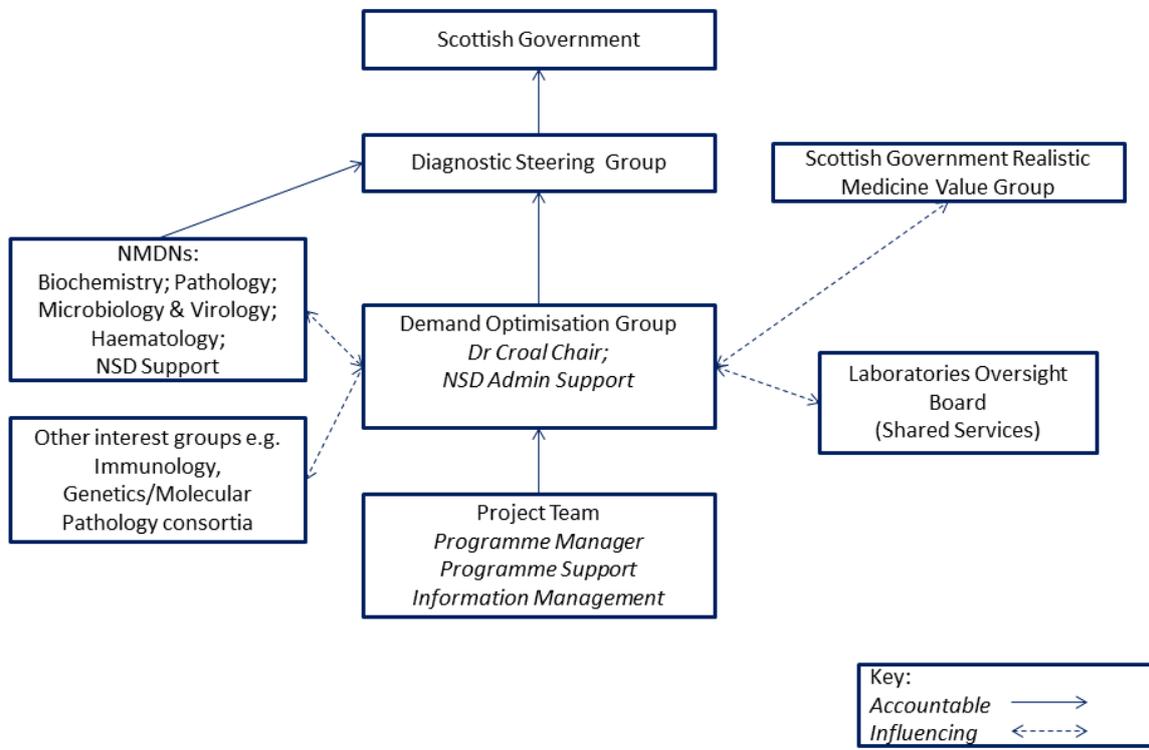


Figure 1 NDOG Governance structure

A website provided additional information and regular bulletins were issued to highlight the work of the NDOG.

4 Aims

The NDOG was funded and scheduled to meet four times across 2018/2019.

The main aims of the group are summarised below: -

Oversight and Governance -

- Undertake a high-level scoping exercise to ascertain the sticking points to implementation of the NDOG recommendations and develop an over-arching plan in response to this.
- Undertake bridge work between the end of phase I and commencement of phase II and make links across new and emerging structures.

Develop and deliver an Atlas of Variation -

- Collect information across lab disciplines to provide a way to identify and target unwarranted variation in test requesting.

Quality improvement -

- Identify and coordinate quality improvement champions at a local level who could support a series of tests of change to spread learning.
- Establish a mechanism for ongoing best practice sharing.
- Engage with clinical networks at a national, regional and local level around specific conditions to develop and implement requesting guidelines which could be referenced at a board level.

Service User engagement -

- Promote a cultural shift amongst referring clinicians and laboratories to ensure a closer working relationship with shared decision making on current and proposed changes to ensure best value.

5 NDOG Output

This section details the overall activity and output of the NDOG in relation to the aims stated above. The NDOG met on 4 occasions through 2018/19. During this time, concepts around the identified activities and pilot work from phase I were taken further, in particular around the collection of data and development of an Atlas of Variation.

5.1 Atlas of Variation for Diagnostic Laboratories Background

The NHS England Diagnostic Atlas of Variation was first published in November 2013 and focused primarily on diagnostic tests from Laboratory Medicine. The Atlas demonstrated significant variation in some diagnostic requesting patterns. Although some of the variability may be attributed to differences in patient populations, disease incidence/prevalence or regional differences in information recording, these reasons cannot wholly explain the differences observed in the Atlas. Some of the variations in test requesting can only be attributed to variable requesting patterns, which may reflect an inconsistent approach to patient management across practices.

This variation observed in the English Atlas of Variation is likely to be replicated across the United Kingdom and similar unwarranted variations in diagnostic test use would exist across NHS Scotland. As such, the collection of laboratory testing data from across Scotland was seen as being vital to determine and identify potential unwarranted variation both in Primary and Secondary Care. This data was not just for observational purposes but to identify and enable interventions to be put in place to improve and reduce under/over-requesting and equity of access to new tests.

Development

During phase I of the Demand Optimisation programme, a prototype Atlas had begun; using data on laboratory tests collected from NHS Grampian and Tayside in order to test proof of concept. There was significant development of this initial prototype in Phase II. A number of tests were targeted for data collection and incorporated into the Atlas. Using Tableau software, data was presented in dashboards that provided snapshots of laboratory requesting activity and allowed comparisons between the two NHS Boards and the GP practices within.

The clear demonstration of requesting variability provided the basis for the key recommendation from the Demand Optimisation report that data collection is a key enabler for all future work and that the Atlas should be expanded to include data from all disciplines from all NHS Boards for an overall Scotland view. The Atlas developed significantly throughout Phase II and, whilst there will always be scope for ongoing development, the initial version of the Atlas has been completed and is fully operational.

Methodology

NMDNs are specialty focused networks, comprised of specialty specific health professionals, that support diagnostic services to continuously improve service delivery, and contribute to equitable provision of high-quality, clinically effective services. In collaboration with these key health professionals, a list of tests identified to be most likely to show variation within and across boards from each discipline was

produced. The test data identified was collated from primary and/or secondary care and may not necessarily have been the most common tests carried out by each discipline, but the ones where unwarranted variation in requesting was suspected or was deemed important. The tests that were included can be seen in table 1.

Biochemistry tests	Haematology tests	Immunology tests	Microbiology & Virology tests
Alb:Creatinine Ratio Bone Calprotectin C-Reactive Protein CA 125 CEA Cholesterol FSH Free T3 Free T4 Glucose (incl. fasting) HbA1C HDL Cholesterol Liver Function Tests Protein PSA Testosterone TPO Antibodies Triglyceride TSH Urea & Electrolytes Vitamin D	B12 Coagulation Screens CRP D-Dimer DRVVT ESR FBC Ferritin Folate Plasma Viscosity Protein Rheumatoid Factor Serum Free Light Thrombophilia Screen Urine Bence Jones	AGPCA ANA ANCA APL-anti-cardiolipin APL-beta 2 glycoprotein C3/C4 CCP CTDS/ENAS Ds DNA Ab Electrophoresis IF IgA TTG IgE – Aspergillus IgE - Birch IgE - Cat IgE - Dog IgE - Egg IgE - Grass IgE - HDM IgE - Milk IgE - Peanut IgE - Total IgE - Wheat IgG/ IgA / IgM IgM RF Liver autoantibody - AMA Liver autoantibody - ASM Liver autoantibody - LKM PR3/MPO TPO	High Vaginal Swab Urine – Catheter Urine - Mid stream Urine – other

Table 1 Tests identified by the networks for data collection

Data on individual GP practice and non-GP requesting rates for laboratory tests were collected for an entire year from the Laboratory Information Management Systems (LIMS) of all NHS boards. Having this data at practice level meant it could be combined with information including GP practice list size, cluster groups, SIMD

deciles and population demographics e.g. practice patient age distribution, to enable meaningful analysis and comparisons to be made.

The data was extracted from the LIMS by executing a standard query and populating an Excel spreadsheet for further analysis. The data was visualised in Tableau visualisation software to enable a variety of analyses and comparisons to be made.

There has been the opportunity over phase II of the programme to demonstrate the interactive Atlas to a number of stakeholders including clinicians, laboratory managers, referring clinicians and Scottish Government (see Appendix B for a full list of engagement). This has helped to shape the content and views of the Atlas ensuring it meets stakeholders' needs and is developed into a useful tool both for service users and laboratories.

Results

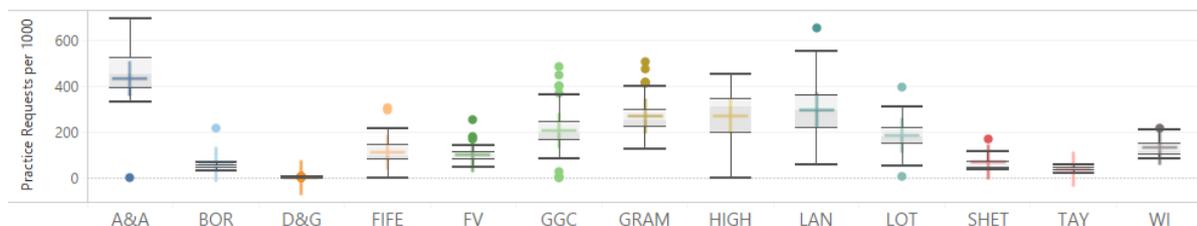
5.1.1 Diagnostic Laboratories Atlas of Variation – Static Observations

Given the large number of tests identified to be of interest (Table 1), and the potential for many observations and correlations to be made between NHS Boards, GP clusters and individual GP practices, the following represent only some examples. All figures represent comparisons between NHS Boards (Box and Whisker style) at the top with a bar chart showing the spread across all GP practices.

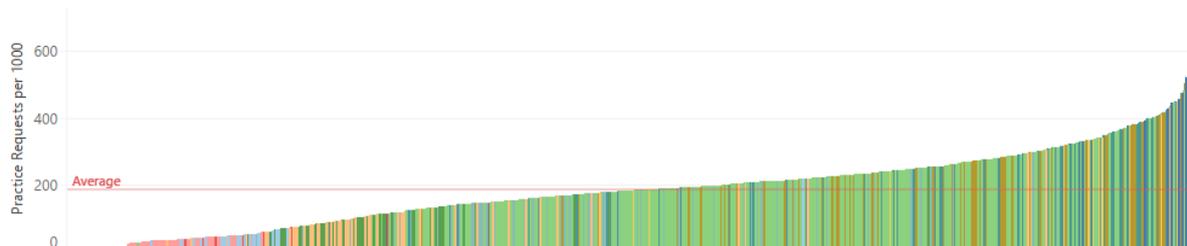
5.1.1.1 Free T4 and Thyroid Stimulating Hormone (TSH)

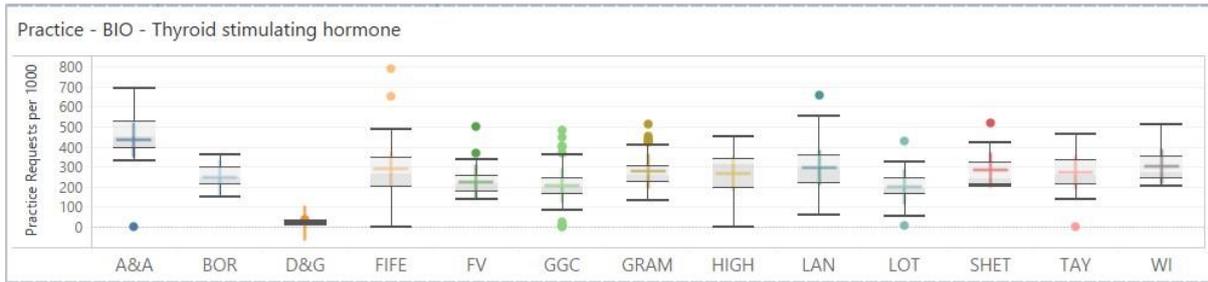
The thyroid derived hormone Free T4 (fT4) is used for screening, diagnosis and monitoring of thyroid disease. The pituitary derived hormone TSH is used for screening, diagnosis and monitoring of thyroid disease.

Practice - BIO - Free T4

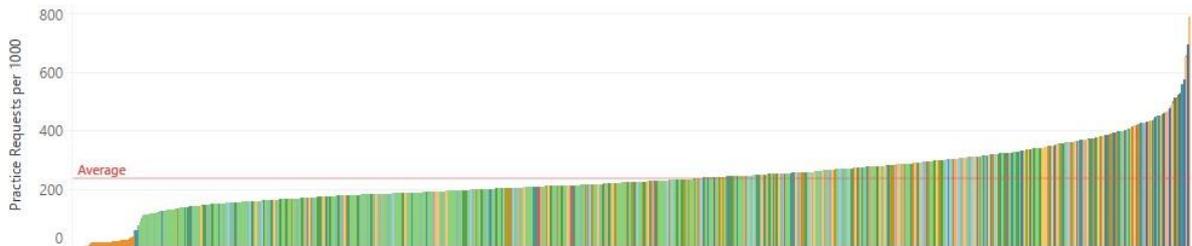


Practice - BIO - Free T4





Practice - BIO - Thyroid stimulating hormone



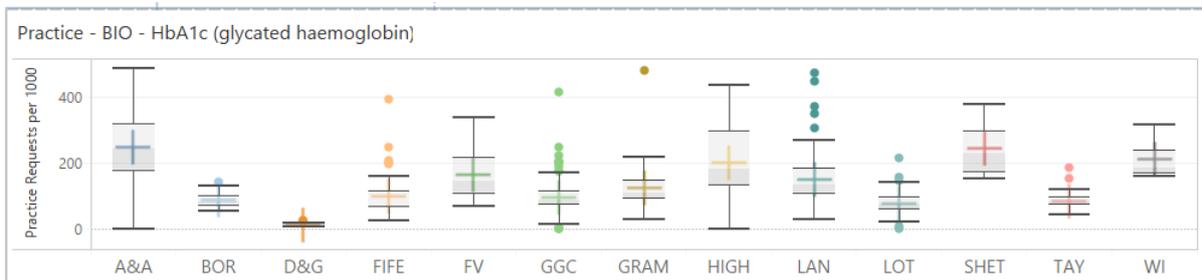
Commentary

Large variation exists between the NHS Boards. This likely reflects the existence of different Thyroid requesting profiles offered by the different laboratories, with some offering both TSH and FT4, and others only TSH as first line. This difference does not appear to be present with TSH testing (see below). This remains clinically controversial but effort could be made to allow a consistent Thyroid requesting protocol across all Boards to be implemented.

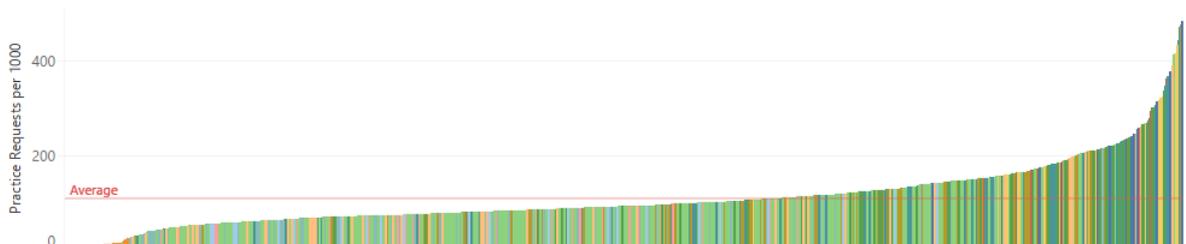
Much variation also exists between GP practices as seen in the lower figure. This is also present for TSH requesting. This variation is likely to represent differences in requesting by individual GPs. Much of this may be due to unwarranted requesting, both under and over requesting. The Specialty networks could be directed to engage with and support clinicians to develop guidance that could be targeted to identified practices to promote optimal requesting.

5.1.1.2 Haemoglobin A1c (HbA1c)

HbA1c is used in the screening, diagnosis and management of diabetes.



Practice - BIO - HbA1c (glycated haemoglobin)



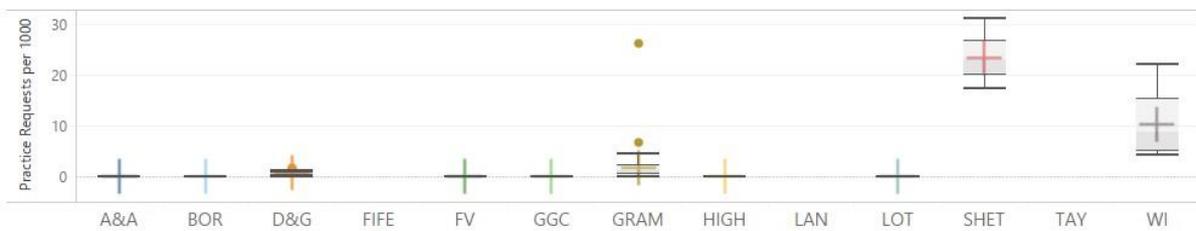
Minimal variation exists between the NHS Boards, except for higher requesting evident for Ayrshire and Arran. There is however significant variation between GP practices within some of the NHS Boards as is evident by the Box and Whisker vertical height. This may reflect differences in test use guidance made available to GPs or the varying adoption of HbA1c for diagnostic purposes.

Much variation also exists between GP practices as seen in the lower figure. This variation is likely to represent differences in requesting by individual GPs. This may be due to unwarranted requesting, both under and over requesting. Evidence would suggest that both under and over monitoring of diabetes using HbA1c can lead to sub-optimal outcomes for the patient. The Specialty networks could be directed to engage with and support clinicians to develop guidance that could be targeted towards identified practices to promote optimal requesting. A consistent approach to the use of HbA1c for diagnostic purposes could also be developed.

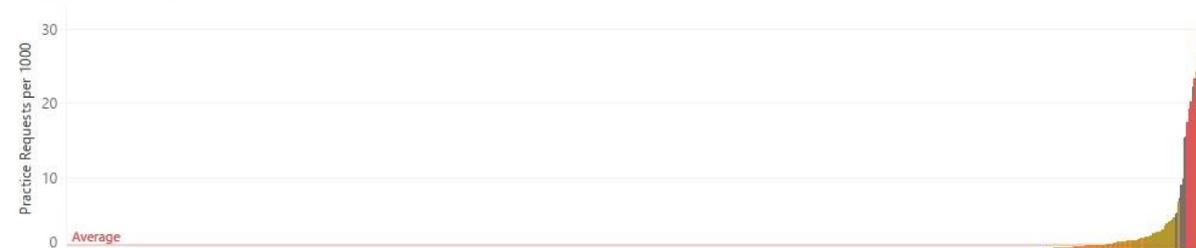
5.1.1.3 B-Type Natriuretic Peptides (BNP or ntProBNP)

Natriuretic Peptide measurements are used in the diagnosis and management of Heart Failure.

Practice - BIO - BNP



Practice - BIO - BNP



Commentary

Natriuretic peptides are relatively new tests to NHS Scotland. Their main use is in the triage of patients presenting with symptoms of possible heart failure. Their implementation has been obstructed due to the lack of suitable funding mechanisms to enable laboratory budgets to pay for the tests when the benefit is felt across the wider NHS, notably for echocardiography referral patterns.

Clearly many NHS Boards are still registering little use, which may reflect lack of availability, awareness or the test being offered as a Point of Care testing version within GP practices. This data therefore allows the monitoring of the uptake and availability of such tests.

It is notable that for the NHS Boards that do register that this test is available, there is both considerable differences in requesting rates between the boards and between the individual practices. This likely reflects differences in mechanisms for

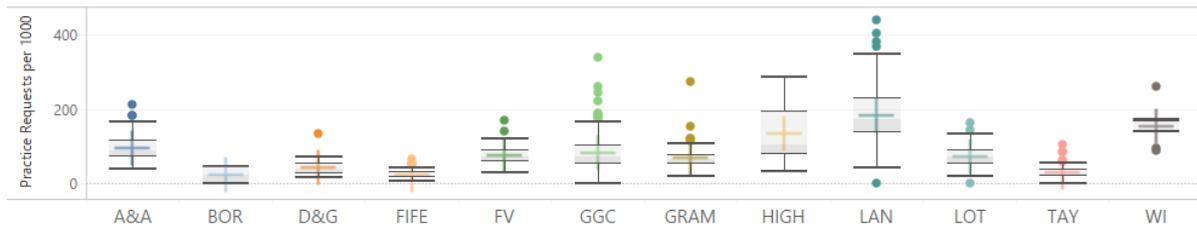
test request gatekeeping, clinical awareness of the test and potential unwarranted variation due to cross-systems reasons.

Specialty networks could be tasked with developing consistency of testing pathways and guidance across the boards and also attempt to improve future data accuracy by capturing any point of care testing activity.

5.1.1.4 Serum Vit B12 and Folate

Vit B12 and Folate are used in the investigation of anaemia.

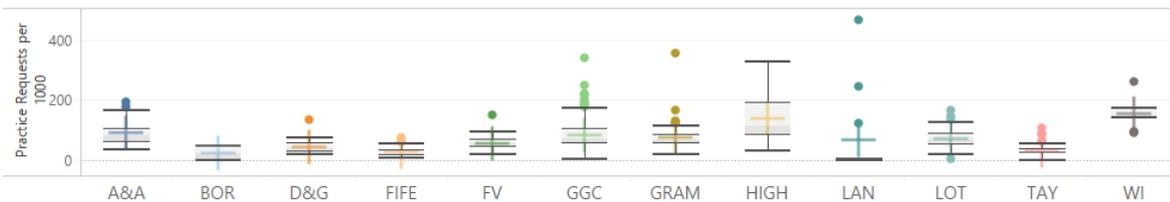
Practice - HAEM - B12



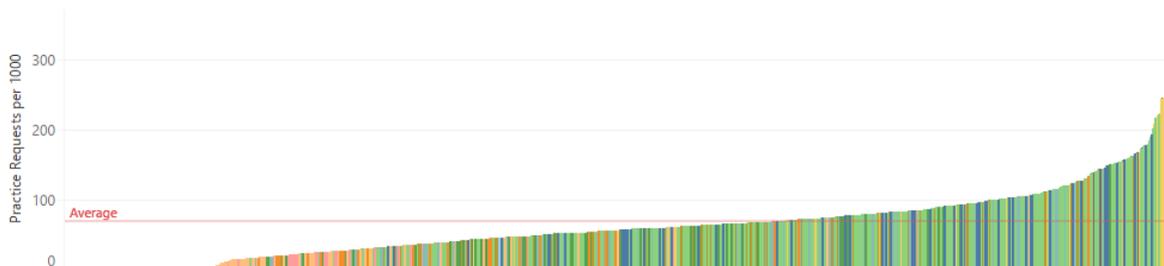
Practice - HAEM - B12



Practice - HAEM - Folate



Practice - HAEM - Folate



Commentary

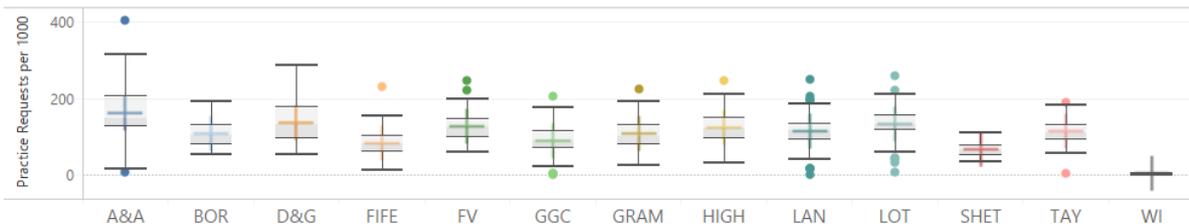
Significant variation exists in the requesting of both B12 and folate. This is evident both between and within NHS Boards. Much of this variation may be due to unwarranted under and over requesting of these tests.

Overall, the variation between all GP practices is large, as seen in the lower figure. The Haematology network could be tasked with engaging with and supporting clinicians to develop testing strategies for GP practices exhibiting outlier requesting behaviour.

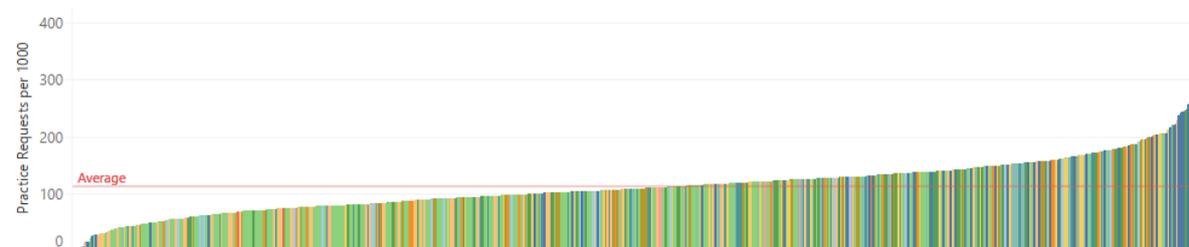
5.1.1.5 Mid-Stream Specimen of Urine (MSSU)

The MSSU test is used in the diagnosis of urinary tract infections.

Practice - SMVN - Mid-stream sample of urine (MSSU)



Practice - SMVN - Mid-stream sample of urine (MSSU)



Commentary

Reasonable consistency is demonstrated between the NHS Boards in terms of requesting rates per 1000 patients, however large variation is evidenced in rates between GP practices both within each Board but also across the entire country.

The Microbiology and Virology Network could be tasked with developing requesting guidance that could be made available generally but also for those practices at either extremes of the requesting rate graph.

Overall points

It is clear that the availability of this kind of static data is very useful in identifying potential unwarranted variation in the requesting of laboratory tests related to over requesting, under requesting and lack of availability or awareness of specific tests. Matching this with a range of demographic data further supports analysis. It remains important that such observations are considered to assess their importance and to allow development of specific interventions aimed at reducing such variation. It would be the intention of the NDOG to work with the national Specialty networks within phase III of the programme to develop and implement such interventions.

It also needs to be emphasised that the data is not perfectly clean. Significant barriers remain in place that inhibit efficient, accurate data collection:

- Dysfunctional Laboratory Information Management Systems (LIMS).
- Lack of standardisation of nomenclature between NHS Boards and even within.

- Lack of standardisation of laboratory processes.
- Inconsistency in specific discipline location for certain tests.
- Lack of time for staff to manually collect data, especially given the competing pressures of the National Laboratories Programme.

Within Phase III of the NDOG programme, work is underway to further refine this process with collection of 2018 data. As an aside, there are moves to develop a national procurement process for a common LIMS with a linked standardisation workstream. While these are unlikely to deliver for many years, it is clear that the goal should be to move from manual extraction of data to electronic automated real time extraction directly from LIMS.

5.1.2 Interactive Atlas

In order to enable healthcare professionals (including those within primary care) to have access to the data within the Atlas of Variation and be able to interact with the different views of data; an interactive portal has been developed. The level of information contained within the Atlas allows comparator data be used such as cluster, board and national analysis. Going forward into phase III there has been some interest in including test cost information which allows calculated financial comparator for GP practices per list size be made. In order to take this forward, there would be some standardisation work required to ensure that there is consistency in cost calculation across NHS Boards.

Following stakeholder engagement (see appendix B for a full list of meetings) it was agreed that the end product was not to be overly complicated, was accessible and had the capability to deliver interventional change following observed unwarranted variation. As such, the decision was made to create a series of different views which would be linked to roles. Much has been achieved in terms of stakeholder engagement but it is envisaged that during phase III of the NDOG programme, this will be refined by collaboration of the NDOG with both specialty lab group and specific laboratory user groups and patient representatives.

The developed interactive Atlas demonstrated the requesting patterns of laboratory tests at individual GP practice, cluster, region, NHS Board and Scotland wide. In addition, demographic data including SIMD deciles and population size were included to enable more appropriate analysis and comparisons to be made.

The Atlas developed included four main dashboards, tailored to the specific user to view the most relevant information.

The dashboards generated were: -

- National Scotland wide overarching view
- NHS Board primary care view per discipline
- GP and cluster view per NHS Board
- Scotland wide and NHS Board practice requests

In total, test request data from 94% of all practices in Scotland have been collated and added to the Atlas. Data was adjusted per 1000 population unless otherwise stated and variation in practice requests from the median were presented using box and whiskers plots. All the data are driven by the specific test chosen and available

filters allow the dashboards to be tailored to the specific need. Filter options include viewing data by:

- Scotland-wide
- NHS region (South East, West, North)
- NHS board
- cluster group
- practice

The data may be colour coded by:

- age
- deprivation index
- outliers

5.1.2.1 Atlas of Variation- National Scotland wide overarching view

Upon entering the Atlas, the first dashboard comprises of two figures (

Figure 2);

- a map of Scotland fragmented by NHS Boards
- a funnel plot demonstrating the selected test coloured by request incidence to highlight outliers.

The figures are driven by the specific test chosen ('test name') and filters will allow for delving either by region (north, west or south east) or by NHS Board. The funnel plots can be colour coded to identify the outliers or to colour code all the practices according to the deprivation index or by age profile ('colour overlay').

As per every dashboard, if a guideline for the specific test is available, a direct link is provided. In addition, further information for each section can be accessed using the 'show info' button.

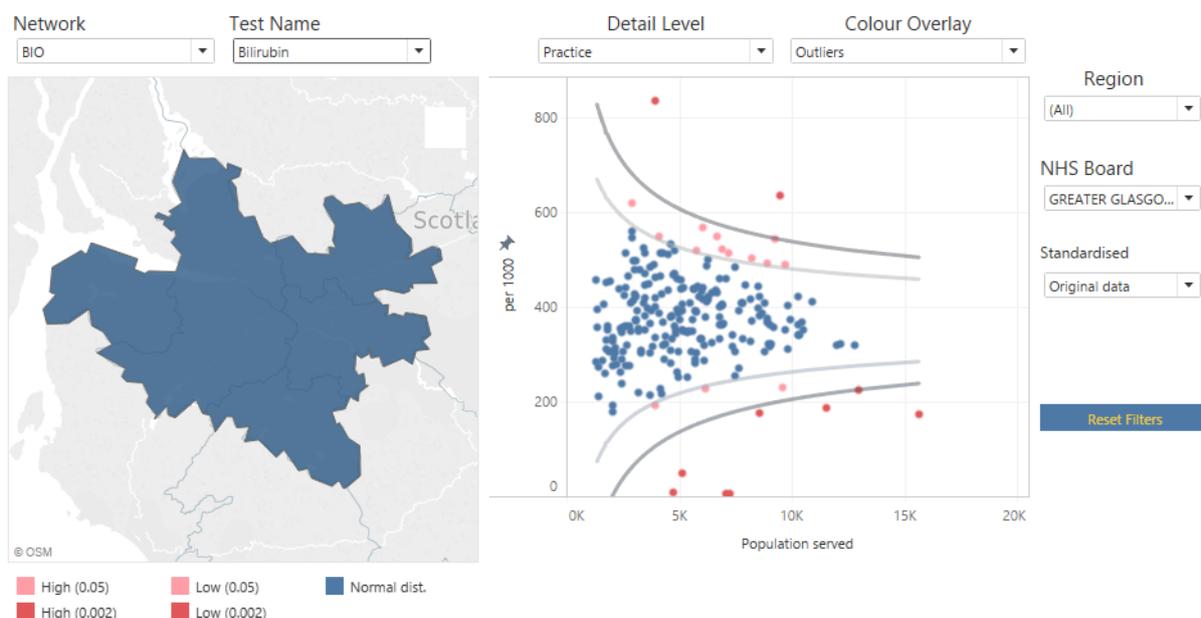


Figure 2 Atlas dashboard at national level

This dashboard allows for an overarching Scotland wide view and provides a snapshot of the selected test requests across Scotland. Hovering over a specific NHS Board on the map of Scotland will show the requesting pattern of all the GP practices in the funnel plot. Similarly, hovering over a specific dot on the funnel plot, which represents a single practice, will highlight the practice information and the location on the map of Scotland. Using this dashboard may demonstrate tests where variation may not be prevalent (fig 3a), where variation may require further investigation (fig 3b) or provide at a glance the individual practices that are obvious outliers (fig 3c)

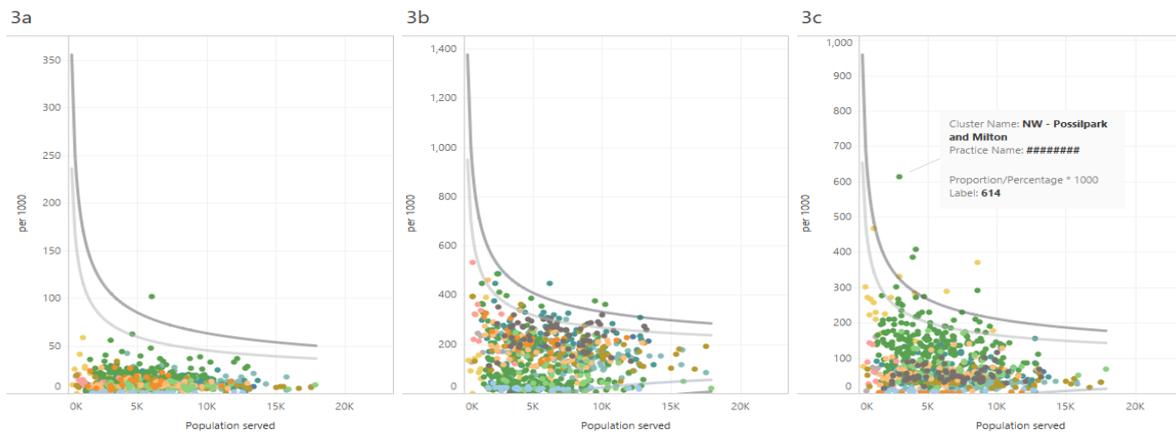


Figure 3 National dashboard demonstrating requesting variation of a specific test at practice level

Similar information can be viewed by changing the detail level to cluster or to board (Figure 4)

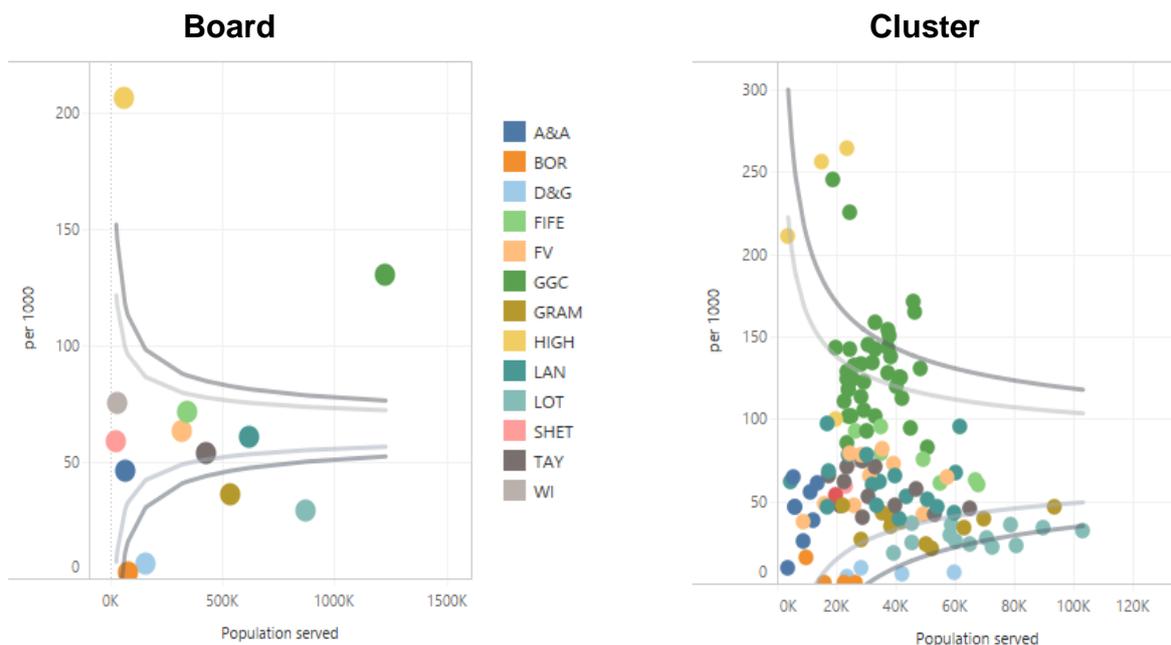


Figure 4 National dashboard demonstrating requesting variation of a specific test at board level (a) and cluster level (b)

5.1.2.2 Atlas of Variation- NHS Board primary care view per discipline

Highlighting a board on the national level map or the Board/cluster view tab will direct the user to a dashboard providing greater detail of the selected test (Figure 5). The Board view includes three elements;

- a coloured cluster map that highlights the cluster areas in the selected board
- a funnel plot that shows the selected test
- a practice table detailing all the practices in the selected board.

As in other dashboards, the funnel plot may be tailored to compare the selected test to either the other practices in the board or to the other practices within its cluster.

The practice table includes additional information, including the practice list size, total practice requests and practice requests per 1000 population.

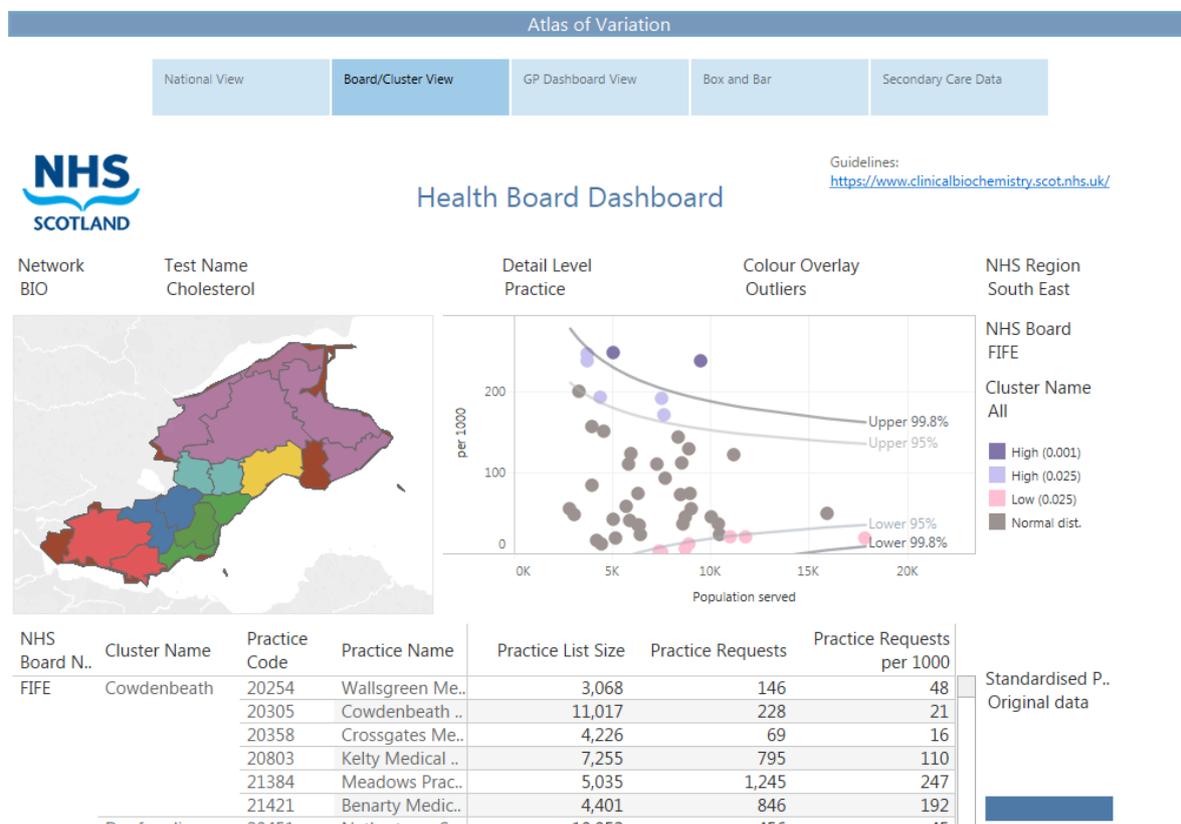


Figure 5 Atlas dashboard at NHS Board level

Delving deeper into the NHS Board dashboard funnel plot, the user, at a glance, can compare practice requests and compare this to the practice list size (Figure 6). An example below highlights the test request of 3 practices that are of a similar size (~12,500) in one board, yet the requesting rates differ in excess of 25x fold. This may highlight to the user that practice across this board may require further investigation.

Board funnel

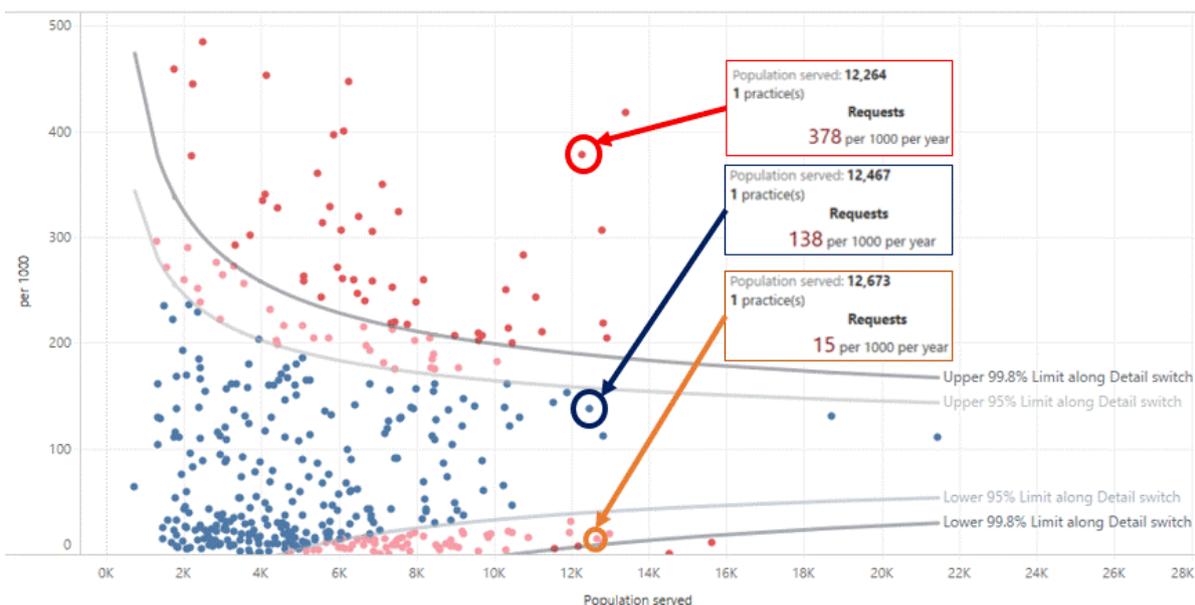


Figure 6 Practice sizes with differing request rates

5.1.2.3 Atlas of Variation- GP and cluster view per NHS Board

Opening the GP dashboard will open the GP view, which includes the most pertinent figures most useful to a GP (Figure 7). The dashboard includes:

- A GP practice histogram Presenting the age distribution of the selected group
- A box and whiskers plot Presenting the selected cluster spread of variation
- A GP practice line chart Plotting the selected practice (blue) in relation to the average requests of its associated cluster (lilac), board (green) and national figures (pink).

In addition, the information box (blue fill) includes the GP practice the list size, the yearly requests and SIMD16 decile score. A useful slide bar chart below the information box represents the selected practice average request rate compared to the average request of its affiliated cluster.

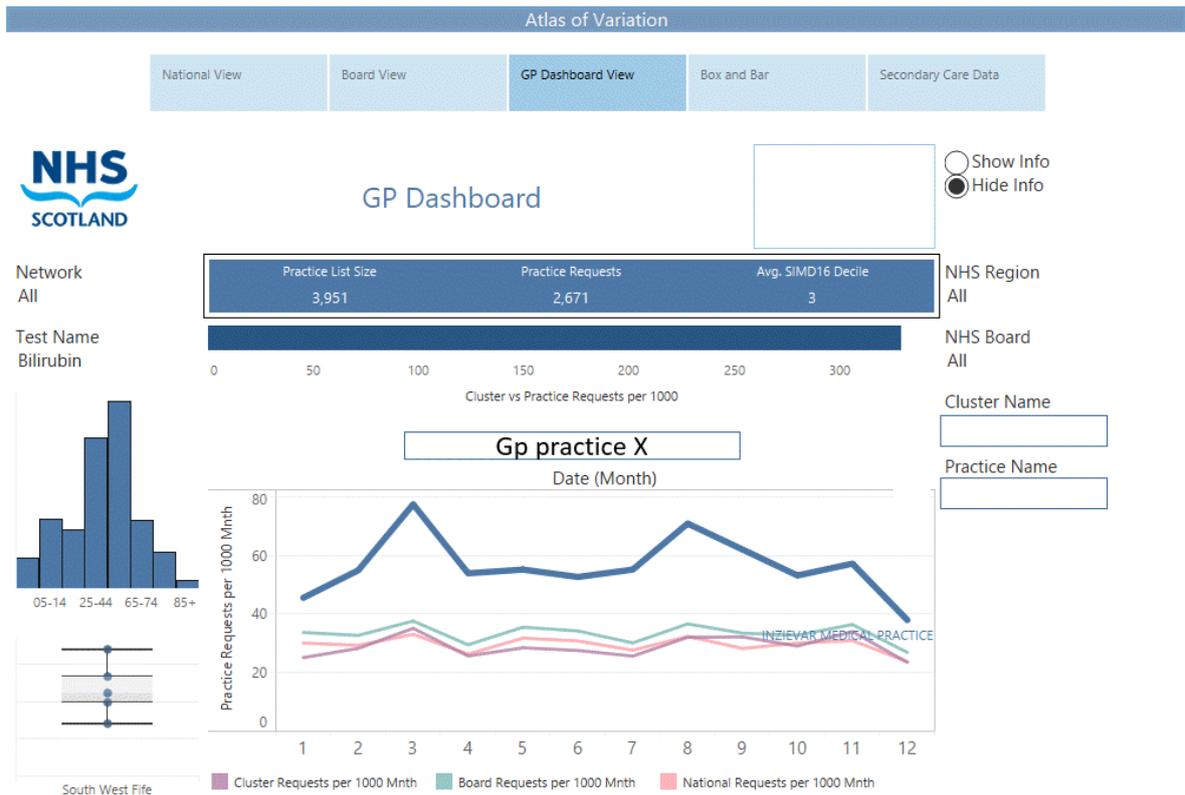


Figure 7 Atlas dashboard at GP level

The GP dashboard can effortlessly demonstrate the test requesting patterns of a GP practice in comparison to its own cluster, board or National average. For example, concentrating on the histogram alone, Figure 8 shows the requesting patterns of two practices within the same cluster. The GP requesting pattern (blue) of figure 8a is consistently higher than its own cluster average (lilac), where as in the figure 8b the requesting is consistently lower. As a standalone, this suggests that there may be inconsistencies in the test requesting. However, when addressing the additional information, the population distribution age is overall 'younger' in the practice with the fewer test requests which may be a contributing factor. Additional information relating to the population group including SIMD 16 decile scale may further provide a more rounded picture. Overall however, the reasoning underlying the differences in test requesting cannot be wholly explained by the Atlas alone, it may only be used as a tool to highlight the differences and provide any additional information that will aid the user to reach an informed conclusion.

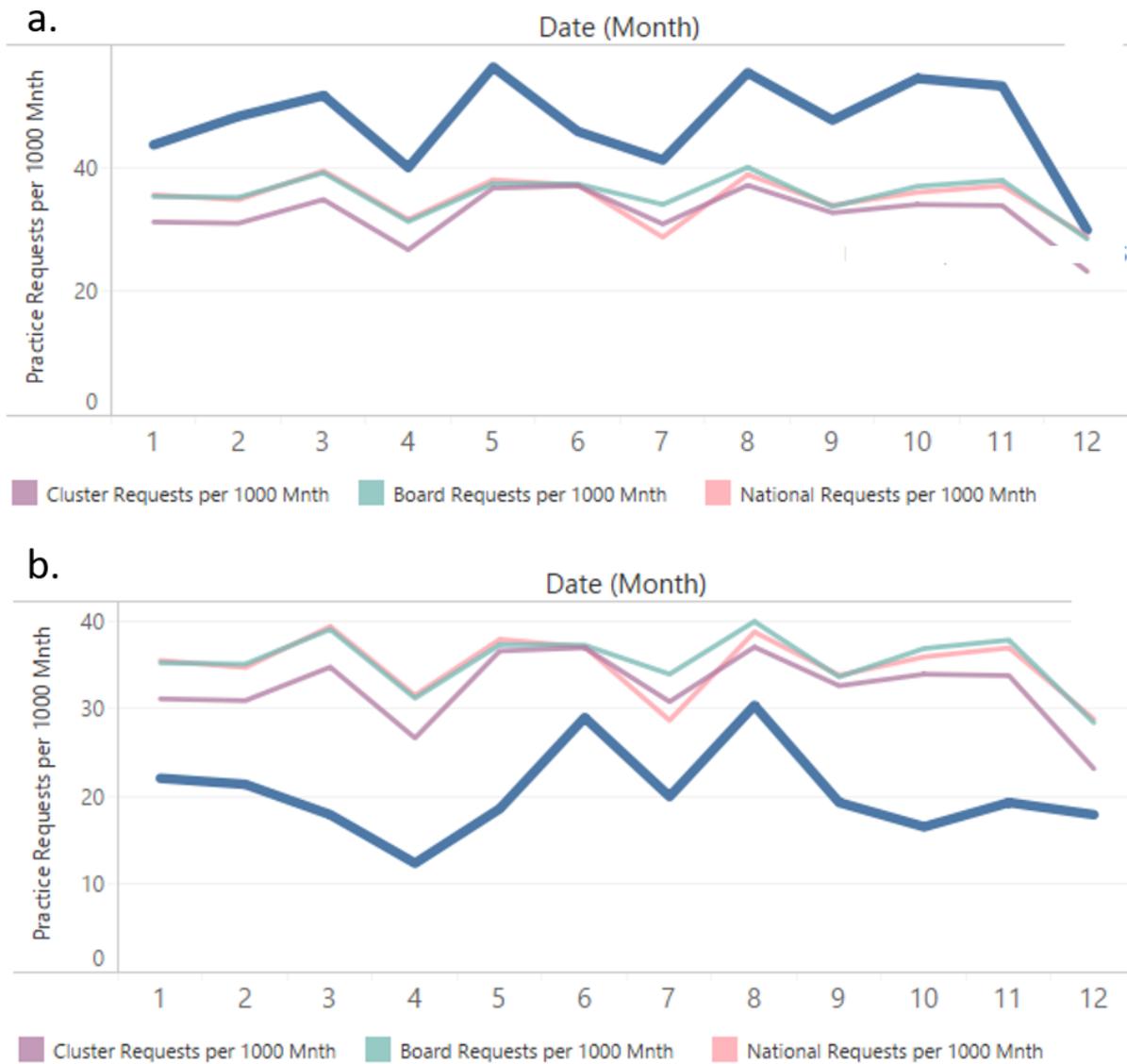


Figure 8 Histogram demonstrating two practices from one cluster group with differing request rates (blue) over a 12 month period

5.1.2.4 Atlas of Variation- Scotland wide and NHS Board practice requests

This dashboard presents two elements (Figure 9):

- test request per practice within its own board and in comparison to other boards in a box and whiskers format. This demonstrates Board variation.
- all the practices in Scotland by request, highlighting national variation.

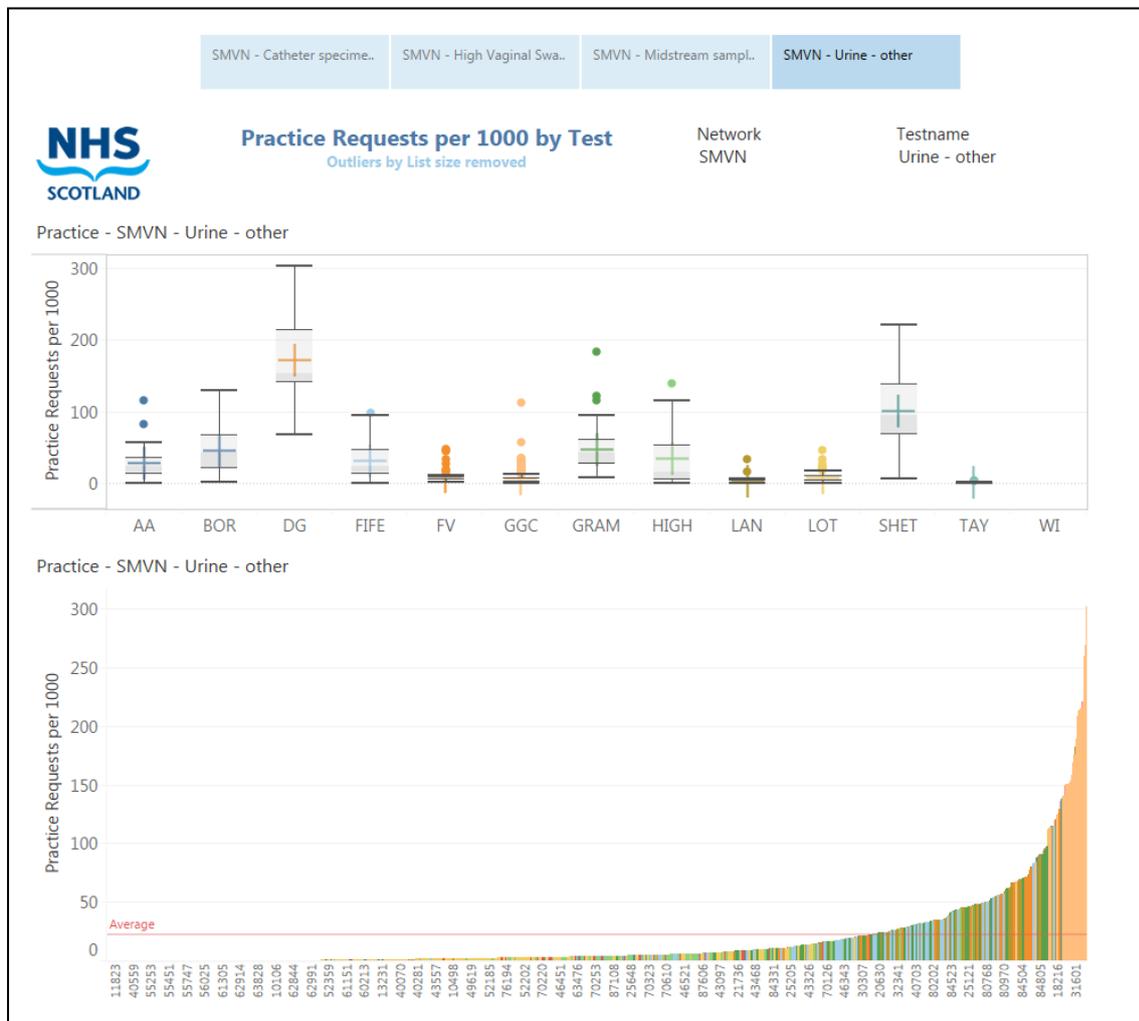


Figure 9 Atlas dashboard for practice request comparison

As per the discussion in the static observation section above (section 3.1.1), this dashboard represents comparisons between NHS Boards in a box and whisker style plot and the spread of all GP practices in the lower bar graph. This provides a quick snapshot to determine the fold difference in variation at NHS Board level and at GP Scotland wide.

Minimal or no variation across the NHS Boards will portray the boxes aligned horizontally. The greater deviation from the horizontal ideal will demonstrate greater variation of the selected test across Scotland while the dots outwith the whiskers represent the outliers within each NHS Board.

The practice histogram provides instant visualisation to the spread of the practice test request and an instant visualisation for highlighting unwarranted variation.

Future Development

A great deal has been achieved with the development of the Atlas, however in order to realise its full potential, the Atlas must be in regular use by referring clinicians and lab staff.

Atlas development has been limited by individual laboratories' capacity to provide data; consistency of data definitions, meaning that the accuracy of comparisons cannot be guaranteed; and lack of engagement with referring clinicians and capacity to engage.

Over the course of the next phase, there is a clear need for the delivery of an Atlas of Variation with data from the subsequent year, collecting information across all lab disciplines. This will demonstrate the outcome of changes implemented from QI programmes in requestors' behaviour, which will in turn lead to waste reduction and tackling unwarranted variation in line with the principles of values-based healthcare.

Specific objectives for the future phase include: -

- Data collection for the calendar year of 2018 to build upon the existing data collected in phase II
- Engaging with referring clinicians to continue to improve the Atlas of Variation and promote its capabilities within the GP community, including a supportive education programme to enable use of the Atlas
- Direct access to the Atlas for laboratory professionals, allowing them to interrogate their own data and develop their own QI strategies in response to this
- Exploring alternative options to streamline data collection for populating the Atlas in the longer-term.

6 Quality Improvement

6.1 Background

Quality Improvement initiatives remain an important mechanism for improving laboratory services across NHS Scotland. Many such initiatives begin their development within individual NHS Boards and are then showcased as examples for others to also implement. Initiatives increasingly involve collaboration or interaction directly with clinical services. It is the latter clinical end of the patient pathway where benefits in terms of better outcomes, increased efficiency or financial savings can be realised as a result of changes in laboratory function or test use.

Historically, laboratories have struggled to implement change due to silo budgeting. Flexibility around this is very important to allow laboratories to implement the initial changes around test use or availability that can then have much wider knock on benefits across the clinical interface.

The examples below of Quality Improvement initiatives provide the opportunity for other Laboratory Services to consider implementation of similar concepts. This is not always straightforward due to local differences in NHS Board structure, clinical interfaces and IT functionality. The existence of the National Managed Diagnostic

Networks allows such initiatives to be presented, discussed and considered for further roll out.

Multidisciplinary Initiatives

6.1.1 NHS Tayside- The intelligent Liver Function Testing pathway (iLFT)

Liver disease is now the fifth most common cause of death overall in the UK, and the third most common cause of death in people under 65 years of age.

Although liver function tests (LFT) alone may indicate liver disease, the results are commonly abnormal, as detailed by the Abnormal Liver Function Investigations Evaluation (ALFIE), performed in NHS Tayside between 1989 and 2003. Around 1.3% of patients with abnormal LFT results go on to develop significant liver disease. Additional investigations of abnormal test results on initial samples provide an opportunity to diagnose and manage liver disease earlier and ultimately significantly impact mortality by reducing the number presenting with late or end-stage liver disease.

The object of the iLFT pathway study was to reduce the morbidity, mortality and costs associated with late-presenting liver disease. To achieve this, iLFT aimed: -

- to increase the diagnosis of liver disease, especially at an earlier stage
- to improve the appropriateness of referral to secondary care
- to ensure that all patients with significant disease, or those where significant liver disease cannot be excluded, are appropriately referred to the liver clinic for assessment.
- to remain cost-effective

The pilot study used an automated, algorithm-based system that further investigated abnormal LFTs on initial blood samples received from primary care. It was designed using a multi-disciplinary approach incorporating hepatology, biochemistry, immunology, virology, haematology and laboratory IT services.

To date, iLFT became fully operational across NHS Tayside's primary care service in August 2018 and has identified that 70% of patients are suitable for ongoing investigation and management in primary care, helping to improve the appropriateness of referral to hepatology services.

Due to the increase in diagnosis and follow-up there is also likely to be an increase in referral to liver services, at least in the short-term. However, these referrals are all necessary, and patients are receiving appropriate and relevant prior investigations, resulting in earlier intervention and improved patient and hospital outcomes.

An additional unforeseen positive outcome has been that the multi-disciplinary iLFT aetiology screen has identified other clinical diagnoses alongside the common alcohol-related liver disease and non-alcoholic fatty liver disease, including hepatitis infections which now have a higher pick-up rate through iLFT than the current screening program.

The success of iLFT has led to the Scottish Government identifying the pathway as eligible for adoption across the whole of NHS Scotland as part of its Modern Outpatient Programme. The Tayside iLFT group are currently collaborating with

other NHS Scotland NHS Boards to assist with the implementation of iLFT within their laboratories and primary care services. Additionally, several Clinical Commissioning Groups (CCGs) from NHS England have expressed keen interest in setting up iLFT in their own areas. Furthermore, negotiation is underway with a multinational diagnostics company to consider the addition of iLFT to their global portfolio of services.

Specialty Specific Quality Initiatives

Pathology

6.1.2 NHS Lanarkshire - Audit of sampling appendectomy specimens for histopathological assessment

Appendices are usually removed due to appendicitis or accompanying other operations. Appropriate sections depend on the indication for appendectomy, however, there is no specific advice given by the Royal College of Pathologists (RCPATH) on the minimum number of blocks that should be taken.

Following data submission by SPAN on the number of blocks taken per appendiceal case, there was variation in number of blocks taken across the labs in Scotland (Figure 10). The object of this study was to analyse if appropriate numbers of tissue blocks were taken at NHS Lanarkshire in relation to the RCPATH recommendations.

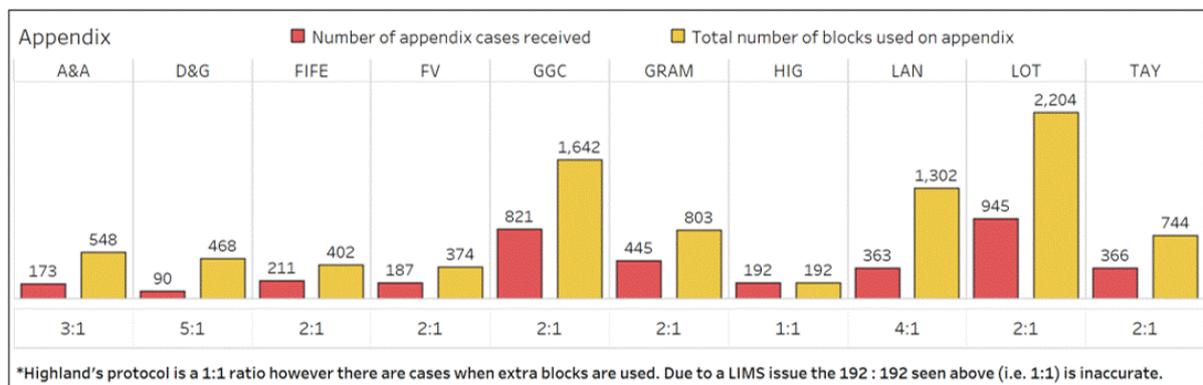


Figure 10: Number of appendix cases and ratio of blocks used per NHS Board during financial year 2017-2018

A review audit was carried out collecting the demographic and pathological data of all patients who underwent appendectomy at NHS Lanarkshire between 1st January and 30th June 2017. The data revealed that the number of blocks taken depended upon the indication of appendectomy and the block number taken was commensurate with the adequate diagnosis of the cases submitted.

Following the audit, NHS Lanarkshire will move to a new LIMS in 2019 and there is a plan to provide two cassettes for standard sampling of the appendix. Further cassettes could be added if required by the dissectors.

6.1.3 NHS Forth Valley- Reduction of histology specimen turnaround times

There is currently a National shortage of Consultant Pathologists as highlighted by the Royal College of Pathologists and Cancer Research UK^{3,4}. The issues highlighted in the papers clearly demonstrated that local turnaround times for Histopathology for NHS FV did not meet local turnaround time targets.

2017	J	F	M	A	M	J	J	A	S	O	N	D	Annual Ave	Target	Difference
Breast Needle Biopsies	5	3	4	4	4	3	4	5	3	4	4	3	4	3	-1
Colonic Biopsies	6	6	7	7	8	6	7	7	6	6	6	6	6	4	-2
Prostatic Needle Biopsies	8	6	6	7	8	7	6	6	5	6	5	6	6	5	-1
Colorectal Resection	9	9	8	9	8	9	9	7	7	8	8	9	8	7	-1
Mastectomy	14	10	9	10	9	10	10	11	8	9	10	9	10	7	-3

Table 2 NHS Forth Valley histology reporting turnaround times in 2017

In order to improve turnaround times and improve compliance to cancer wait targets, NHS Forth Valley embarked on 2 separate projects. This included training of BMS to carry out specimen dissection and the implementation of a voice recognition system for diagnostic reporting. This was due to the largest bottlenecks in complying with turnaround times being attributed to the reporting process.

The first change that NHS FV embarked on was an initiative to train BMS staff to become proficient in performing dissections for category B, C, and D specimens whilst completing the IBMS Diploma of Expert Practice in Specimen Dissection. This would release consultant histopathologists to tackle reducing histology specimen turnaround times.

To date, there has been an improvement in turnaround times for breast needle biopsies (Table 3). However, this project is ongoing and the true impact will not be fully realised until all 3 trainee BMS staff can perform specimen dissection independently.

³ Meeting Pathology Demand-Histopathology workforce consensus. Royal College of Pathologists; August 2018. <https://www.rcpath.org/uploads/assets/uploaded/aff26c51-8b62-463f-98625b1d3f6174b6.pdf> Testing Ti

⁴ An Evaluation of Pathology Capacity across the UK. Cancer Research UK; November 2016. https://www.cancerresearchuk.org/sites/default/files/testing_times_to_come_nov_16_cruk.pdf

2018	J	F	M	A	M	J	J	A	S	O	N	D	Annual Ave	Target	Difference
Breast Needle Biopsies	3	3	3	3	5	3	3	4	4	3	3	3	3	3	0
Colonic Biopsies	6	8	6	6	7	7	6	6	7	7	8	8	7	4	-3
Prostatic Needle Biopsies	7	6	7	5	7	5	8	8	6	7	7	5	7	5	-2
Colorectal Resection	8	8	11	8	8	9	10	8	8	9	11	9	9	7	-2
Mastectomy	9	12	10	9	10	11	10	9	7	10	10	10	10	7	-3

Table 3 NHS Forth Valley histology reporting turnaround times in 2018

The second initiative included the implementation of a voice recognition system for diagnostic reporting in order to release administrative capacity and improve quality by reducing transcription errors. It is anticipated this would also improve turnaround times and cancer waiting times by replacing dictation software to voice recognition software for diagnostic reporting.

This project is still in its infancy with no results to date as voice recognition has not been fully implemented yet due to delays in training.

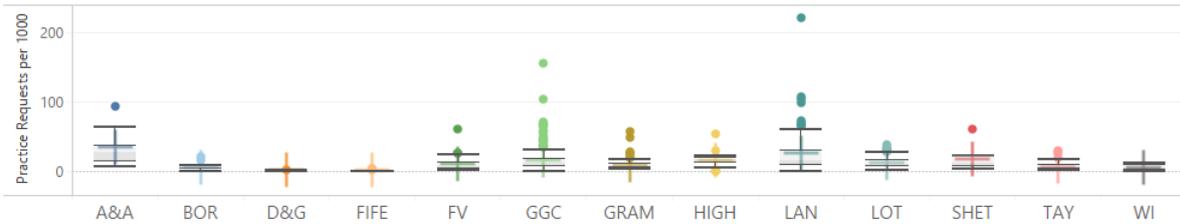
Biochemistry

6.1.4 Scotland - Reduction in Vitamin D testing

The number of test requests for Vitamin D is continually increasing with significant variation in testing across geographical areas and between practices. If not addressed the increasing numbers will impact on the efficiency and sustainability of biochemistry laboratory services within Scotland. The initiative aims to promote standardisation of practise across Scotland, through promotion and adoption of the Vitamin D guideline developed and ratified by the network.

Data collected from the Atlas of Variation from 2017 demonstrated that GG & C and Lanarkshire have the greatest variation in test requesting of Vitamin D across their GP practices, with Lanarkshire requesting almost double the average across Scotland (Mean- 13.2, Lanarkshire 24.7)

Practice - BIO - Vitamin D



Practice - BIO - Vitamin D



Figure 11 Practice requests of Vitamin D per NHS Board

To tackle the variation, SCBN have produced and endorsed guidance on Vitamin D testing and the practices with the highest variability have been approached to discuss change ideas and utilise the practise to trial the initial PDSA cycles.

To date, the Vitamin D guidance has been issued in Lothian and changes have been made to some of the GP order comms systems to reinforce when it is appropriate to request Vitamin D. There are no formal results reported as yet.

Microbiology and Virology

6.1.5 NHS Fife - Reduction of urine samples sent to Microbiology laboratories for analysis

In general, as a first step, patients with a UTI are given empirical antibiotics which are sufficient for treatment in most cases. In some practices, a urine sample is also sent to the laboratory. This is unnecessary as treatment has already begun in the form of antibiotics. Therefore, many samples are unnecessarily analysed, causing excessive workload that could otherwise be alleviated.

This study aims to reduce the number of unnecessary urine samples and reduce the burden on the laboratories that process and report these samples by 10%. This will also reduce the number of patients prescribed antibiotics unnecessarily and reduce the associated paperwork.

Information stating the new guidelines for urine samples was distributed to all GP practices in NHS Fife and a rejection procedure complying with the current guidelines set up in the laboratories. Short reports were produced stating the reason for the rejection, and sent to the requestor.

Baseline data collected 3 months prior to onset of the project showed that 12,319 samples were processed between 1/6/18-31/08/18. Of these: -

Negative	69.3%
Positive	28.1%
Rejected	2.6%

To date, a final report has not been completed however there was an estimated 15% reduction in numbers of samples. This achieved its target reduction and has resulted in reduced staff time and consumable costs.

6.1.6 NHS Ayrshire & Arran and NHS Dumfries & Galloway - Reduction of High Vaginal Swabs (HVS) sent to Microbiology laboratories for analysis

The number of HVS samples received from the community is unfeasibly high (In 2017, NHS Ayrshire & Arran - 12,333 samples, Dumfries & Galloway- 6,135) and it is felt that there is actually no requirement for some of these samples to be sent to the laboratories. It is anticipated that simple tests performed within the GP practice will help to triage samples and treatment for some of these samples can be given without sending the samples to Microbiology.

This study aims to reduce the number of swabs by 10% by the end of the year. This will be done by ensuring only appropriate swabs are taken and sent to labs, thereby reducing the burden to process and report these samples. In addition, it aims to reduce the number of patients who may be receiving unnecessary antibiotics, further reducing the overall burden on NHS services.

A protocol has been made available with a flow chart for users in measuring vaginal pH. Depending on the pH level a decision can be made about a probable diagnosis and the guidance will help to determine whether swabs are required to be sent to Microbiology. This protocol has been implemented in NHS Fife where they have seen a significant drop in the number of samples received; this reduction has been sustained over a number of years.

In order to measure the outcome, the number of HVS samples coming into the department will be monitored over a period of six months. In addition, monthly checks will be made and recorded and frequent engagement with involved practices will help to ensure compliance.

This project is expected to commence in 2020.

6.1.7 NHS Lothian - Reduction of leg ulcer swabs sent to Microbiology laboratories for analysis

In general, leg ulcer care is mainly provided in the community by nurses. As part of routine care, community nurses will swab the ulcers and send these to labs for analysis. In 2017, NHS Lothian received 23,142 samples, yet the majority did not grow significant bacteria but may have still been prescribed antibiotics unnecessarily. This indicates that, in some cases, there is actually no requirement for these samples to be sent to the laboratories. Instead many may be managed effectively by community nurses.

This study aims to reduce the number of swabs by 10% by the end of the year. This will be done by ensuring only appropriate swabs are taken and sent to labs, thereby reducing the burden to process and report these samples. In addition, it aims to reduce the number of patients who may be receiving unnecessary antibiotics, further reducing the overall burden on NHS services.

A protocol has been made available to provide guidance in the management of leg ulcers. This protocol allows for staging the infection and detailing when swabs should be sent to the laboratory.

This project is expected to commence in 2020.

Haematology

6.1.8 Scotland - Agreed B12 Standardised Diagnostic Testing Pathway

Previous work by the short life Haematology working group (SLHWG) identified a wide variance in the testing of B12, Folate and Ferritin across Scotland covering issues including terms of test availability, variable retesting intervals and further reflex. This led to a petition submitted to the Scottish Parliament by the Pernicious Anaemia Society to raise the issues associated with B12.

Forming consensus testing guidelines would standardise anaemia investigations, especially B12 investigations, as there are already British Society of Haematology (BSH) investigation guidelines available. It was expected a standardised anaemia pathway with emphasis on the B12 diagnostic pathway would result in reduced variation across Scotland for patients and appropriate access for patients to reflex test investigations that follow the BSH guidelines.

The SLHWG collected data from across Scotland on the availability of anaemia testing, minimal retesting intervals, reportable units and further reflex tests that are available. Through a consensus approach, the SLHWG then analysed the data and developed guidelines for users with recommended reporting unit and minimal retesting intervals.

Following approval, these guidelines will be made available widely to referrers with online access via the newly launched HaTS network website and linked to the Atlas of Variation.

Immunology

6.1.9 NHS Grampian- Rationalisation of rheumatoid arthritis serology CCP vs RF

Although joint pain is a common clinical detail in requests to immunology labs from both primary and secondary care, rheumatoid arthritis (RA) is a relatively rare condition with a specific set of presenting features.

In order to assess the likelihood of a patient having rheumatoid arthritis, IgM Rheumatoid factor (Rf) has been used as the serological test. However, it has limited value with moderate clinical specificity (70-75%). The alternative serological test, anti-cyclic citrullinated peptide (CCP) antibodies, is a more clinically specific test (96%) and should minimise false positive RA serology currently found with Rf, particularly in primary care.

The new requesting protocol has been running in NHS Tayside since 2007, limiting CCP requests to approximately 1000 per annum. This protocol has identified the expected number of new RA patients per annum in Tayside given clinical sensitivity of the assay and incidence of disease. However, the Tayside project only has anecdotal evidence from Rheumatology that it has reduced the numbers of inappropriate referrals to out-patient clinics.

To date NHS Grampian has implemented the same protocols as the NHS Tayside process and has rolled it out to a limited number of primary care practices as a pilot before full implementation.

This trial is ongoing and there is no formal data as yet.

Genetics/Molecular Pathology consortia

6.1.10 Scotland - Development of an online eligibility calculator for access to Familial Hypercholesterolaemia (FH) genetic testing

Referral numbers for genetic testing in Familial Hypercholesterolaemia (FH) continue to grow each year with a concomitant decrease in mutation detection rate. This is considered due to the increase in awareness of FH combined with the low specificity of the current eligibility criteria. In house data demonstrated an increase in numbers of referred samples and a decreasing detection rate, resulting in a doubling of cost/mutation positive cases detected.

An online eligibility calculator was predicted to help combat the observed decreasing mutation detection rates in patients referred for genetic testing by increasing the likelihood that those patients selected have FH. It was also predicted this will result in an increase in cost effectiveness.

This project is still in its infancy, with the eligibility calculator currently in development in consultation with IT team.

6.1.11 Laboratory Genetics, Queen Elizabeth University Hospital, Glasgow- Review of Chimerism Service Strategy

In recent years, the service for allogenic bone marrow transplants was transferred to GG&C without consultation of the Genetics laboratory that carry out the chimerism testing. The transfer led to such a large increase in the workload that the laboratory struggled to cope and, in turn led to a failure rate of ~25%. The workload was then further compounded by the introduction of new guidelines for monitoring post-transplant.

An audit reviewing the existing strategy, including the failure rate and the reasons for failures was undertaken and an automated methodology for chimerism testing was developed. This allowed the laboratory to cope with the increase in demand for the test, while also reducing the failure rate.

The change from a manual to an automated protocol following robust validation resulted in an improved test success rate, a reduction in staff processing time of ~50% and the ability to absorb the increased workload with no additional reagent costs.

The new automated test is now fully implemented in GG&C.

6.1.12 Scottish Genetics Consortium Laboratories (Aberdeen, Dundee, Edinburgh, Glasgow) - DPYD Genotyping Pilot

5-Fluorouracil (5-FU) and capecitabine (CAP) are among the most frequently prescribed anticancer drugs used in the treatment of a range of cancer types. Although these treatments are generally well tolerated, ~5-10% of patients treated will suffer severe adverse drug reactions, which can result in hospitalisation (including intensive care unit (ICU) stays) and may even be lethal⁵. These drugs are inactivated in the liver by the enzyme dihydropyrimidine dehydrogenase (DPD).

⁵ Lunenburg C et al: Prospective *DPYD* genotyping to reduce the risk of fluoropyrimidine-induced severe toxicity: Ready for prime time. *European Journal of Cancer* 54 (2016) 40-48

However, specific variants in the *DPYD* gene can lead to decreased DPD activity which can result in an increased risk of severe side effects and potentially lethal toxicity in patients treated with regular drug doses.

In order to identify patients with DPD deficiency, a pilot study performing *DPYD* Genotyping on patients prior to commencing treatment is in progress. Data collection is ongoing and will be collated at the end of the pilot period but it is expected to demonstrate a decrease in the number of patients with severe adverse drug reaction including lethal toxicity.

7 Conclusions

Demand Optimisation is crucial in maximising lab test use that in turn drives efficiencies, makes best use of scarce resource and benefits patient care and outcomes.

National oversight and drive from the NDOG has been important in facilitating cross Board and discipline work in this area. This has been recognised nationally with the funding of phase III.

The Atlas of Variation has been welcomed universally and displays huge potential for identifying unwarranted variation that will facilitate interventions to drive optimal testing across NHS Scotland.

Many Quality Improvement activities continue to be evident across NHS Scotland related to good laboratory practice and integration with clinical pathways. These are well suited for national consideration and roll out. Many limitations however, especially around IT functionality and standardisation issues, continue to affect optimal implementation of demand optimisation activity. It remains important that the NDOG continues to engage fully with development taking place in these areas.

8 Recommendations

There is a need to maintain the momentum from the initial successful phases of the national Demand Optimisation programme and implement improvement strategies locally and nationally, embedding the values and tools of DO into operational practice.

To enable this, the following recommendations are made: -

1. Pilot the Atlas with referring clinicians: -
 - to obtain feedback on the utility and identify improvements
 - to widely promote its capabilities in highlighting variation for demand management at individual, group and board level
 - to provide full access to all to enable new and sustained improvements
2. Focus on sustaining the current quality improvement initiatives, as well as delivering and monitoring new QI proposals and progressing implementation of the ongoing proposals. This should be supported by the production of a quality improvement package to instigate interventions in specific areas of unwarranted test requesting.
3. Ensure alignment with the values of the Realistic Medicine and contribution to the Scottish Government's vision for the future of primary care services.

In order to enable the progression of these recommendations, the following objectives have been agreed for Phase III: -

- Engaging with referring clinicians to continue to improve the Atlas of Variation and promoting its capabilities within the GP community
- Data collection for the calendar year of 2018 to build upon the existing data collected in phase II
- Exploring alternative options to streamline data collection for populating the Atlas
- Where applicable, undertaking internal demand optimisation within laboratories to review and standardise methodologies
- Monitoring and reporting on QI programmes being delivered
- Expanding stakeholder engagement by coordinating quality improvement champions at a local level to support change
- Engaging with referring clinicians to promote a cultural shift in managing requesting patterns
- Implementing interventions where unwarranted variation can be identified
- Continuation of clinical networks engagement at a national, regional and local level around specific conditions to develop and implement requesting guidelines which could be referenced at a board level
- Promoting the demand optimisation and the realistic medicine agenda at conferences, in reports to professional bodies and in newsletters

9 Appendices

9.1 Appendix A NDOG Membership

Chair of the Group	Dr Bernie Croal, Consultant Chemical Pathologist, NHS Grampian.
Scottish Government Sponsor	Karen Stewart, Healthcare Science Officer
Scottish Government Lead	Mike Gray, Health Care Science National Lead Life Sciences
NHS National Services Scotland	David Stirling, Director of Healthcare Science
NSS Programme Management / Programme Support	Liz Blackman, Senior Programme Manager, NSD Dr Niove Jordanides, Programme Manager, NSD Claire Lawrie, Programme Manager, IMS Grace Cervantes, Programme Support Officer, NSD Shelley Heatlie, Programme Support Officer, NSD
National Laboratories Programme	Charlotte Syme, Clinical Scientist (Biochemistry)/ Deputy Clinical Lead for the National Laboratories Programme
Specialism Covered	Membership
Biochemistry	Dr Janet Horner, Consultant Biochemist Dr Rebecca Pattenden, Consultant Biochemist
Microbiology/Virology	Linda Mulhern, Operational Science Manager, Microbiology
Pathology	David Topping, Clinical Lab Manager/Lead BMS Dr Fiona Payne, Consultant Pathologist
Haematology	Dr Alastair Hart, Consultant Haematologist
Clinical Immunology	Dr Liz Furrie, Clinical Scientist
Genetics/Molecular Pathology Consortia	Caroline Clark, Consultant Clinical Scientist Dr David Baty, Consultant Clinical Scientist
Scottish National Blood Transfusion – to cover national Blood Banking (to sit within Haematology & Transfusion Scotland (HaTS))	Dr Alastair Hart, Consultant Haematologist

9.2 Appendix B Stakeholder engagement

Steering Groups	<ul style="list-style-type: none"> • Diagnostic Steering Group • Demand Optimisation Group • Scottish Microbiology and Virology Network (SMVN) • Scottish Pathology Network (SPAN), • Scottish Clinical Biochemistry Network (SCBN) • Haematology and Transfusion Scotland network (HaTS)
Other interest groups	<ul style="list-style-type: none"> • Clinical Immunology • Genetics / Molecular Pathology consortia • Scottish National Blood Transfusion Service
Scottish Government Realistic Medicine team	<ul style="list-style-type: none"> • Realistic Medicine Atlas Development Subgroup • Realistic Medicine Atlas of Variation Design Group
Scottish Government Primary Care Team	
NSS Primary Care leads	
Primary care cluster groups	<ul style="list-style-type: none"> • Lothian Primary Care Laboratory Interface Group • Dumfries and Galloway Clinical Optimisation Group
ISD Local Intelligence Support Team (LIST)	
Roadshow events	<ul style="list-style-type: none"> • NHS Ayrshire and Arran • NHS Lanarkshire • NHS GG&C • NHS Grampian • NHS Dumfries and Galloway • NHS Western Isles
NHS Scotland Events	<ul style="list-style-type: none"> • Healthcare Science event • NHS Scotland Event
Association for Clinical Biochemistry (ACB) focus	



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