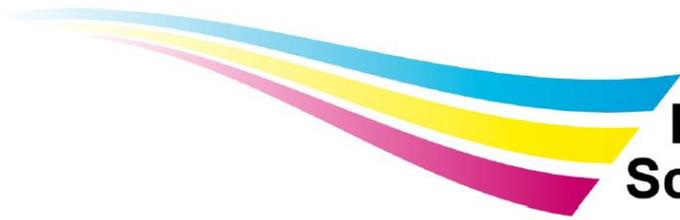


National Demand Optimisation Group (NDOG)

**Demand Optimisation in
Laboratory Medicine
Phase IV Report**



Healthcare Science



**Scottish Clinical
Biochemistry
Network**
National Managed Diagnostic Network



**Genetics / Molecular
Pathology Consortia**

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1 Foreword

Our health and care system is under significant pressure. We know that demand for health and care services is increasing and the COVID-19 pandemic has accelerated the need to make optimal use of the resources we have to provide better value care, for patients and our system.

There are many factors which affect the sustainability of our NHS. The NHS in the UK has experienced growth in demand for healthcare services of around 4.5% per annum and almost two thirds of it is generated by increases in the volume of activity, or innovation. Less than 10% of the growth is due to the healthcare needs of our ageing population. A significant portion of the increase in volume in clinical practice is clinician determined, and we need to support clinicians to understand and tackle the unwarranted variation within healthcare systems that leads to overuse of tests and interventions.

The Organisation for Economic Co-operation and Development (OECD) estimate that across OECD member countries between 10 – 34% of this increase in clinical activity is likely to be low value treatment and care, or waste. Low value and futile tests and treatments often lead to more patient regret. We know too, that all healthcare has potential to cause harm - exposure to radiation from imaging, risks from procedures, and side effects from medication. Over-investigation and overtreatment can lead to unwarranted variation in health, treatments and outcomes and is likely to be causing harm, while also wasting our precious healthcare resources that could be better used elsewhere.

There is also an underuse of some tests and interventions which are very high value, and that is often linked to inequality of access to services. Disinvestment in low value tests and interventions allows resources to be redeployed to meet this unmet need and improve outcomes more equally for our population.

All of this suggests we are going beyond the 'point of optimality' - the point of delivering the best balance of benefit to harm to a population. As we recover and reform services, we must build towards a more sustainable healthcare system that delivers better value care.

The Scottish National Demand Optimisation Group (NDOG) continues to produce invaluable reports and recommendations that highlight the proactive and collaborative measures to reduce unwarranted variation in the delivery of healthcare in NHS Scotland.

This report highlights the main outcomes of the Phase IV programme of work, including the publication of the interactive recovery monitoring dashboards. Phase IV has built on the existing principles of the first three phases, demonstrating the successful modification of well-established data collection and display methods to focus on more relevant testing trends occurring during the COVID-19 pandemic and into the recovery phase.

As Scotland moves into the next phase of recovery, laboratory testing will continue to play a hugely important role in healthcare delivery and improved outcomes in patient care. Existing unwarranted variation and inappropriate diagnostic test requesting was significantly impacted by the COVID-19 pandemic across all NHS Boards in Scotland and the dashboards demonstrate the value of the data in measuring the impact of the pandemic, and allows for well-informed and targeted decision-making.

We fully support the continued work of the NDOG and look forward to the anticipated outputs of Phase V over 2021-2022.

Catherine Ross

Chief Healthcare Science Officer
Scottish Government

Dr Gregor Smith

Chief Medical Officer
Scottish Government

2 Executive summary

Demand Optimisation is defined as the process by which diagnostic test use is optimised to maximise clinical utility, which in turn optimises clinical care and drives more efficient use of associated scarce NHS resources.

The Scottish Government has funded the National Demand Optimisation Group (NDOG) since its establishment in 2016, under the auspices of the Healthcare Science National Delivery Plan (NDP). The programme continues to deliver successfully against ambitious objectives in line with the ethos of Realistic Medicine. A prototype of the Atlas of Variation was developed, published and launched in Phase III and successfully demonstrated potential in identifying unwarranted variation that could facilitate interventions to drive more optimal testing across NHS Scotland and was well received in early 2020 at its launch in NHS Lothian.

As with all aspects of healthcare, the impact of the COVID-19 pandemic on the Demand Optimisation programme has been significant and work was temporarily paused in early 2020. The programme of work has been refreshed to reflect and meet the dynamic requirements of the new pandemic healthcare landscape.

This report highlights the many achievements in Phase IV of the programme, including:

- Publication of interactive recovery monitoring dashboards for Pathology and Blood Sciences. The dashboards demonstrate substantial reductions in diagnostic testing across participating NHS Boards throughout the COVID-19 pandemic and allow Boards to identify, prioritise and address gaps in healthcare provision and allow scarce resources to be more efficiently directed to where they are needed the most.
- Formation of new strong links with Scottish Government Policy Teams, Primary Care colleagues and other key stakeholders.
- Development of feedback reports for tests included in the recovery monitoring dashboards.
- Awarded Royal College of Pathologists 2020 Award for 'Innovation in Pathology Practice.'
- Finalists at Advancing Healthcare Awards 2021 in Scottish Government's category for 'Driving Improvement, Delivering Results.'

The NDOG has identified the following areas where the recovery monitoring dashboards may be utilised:

- Phlebotomy capacity: monitoring and directing resource.
- Cancer: identifying gaps in the screening, diagnosis and monitoring of specific malignancies.
- Chronic disease pathways: focusing on specific disease pathways to identify healthcare gaps.
- Targeted prioritisation: identifying healthcare gaps to be assessed and prioritised as Scotland recovers from the COVID-19 pandemic.
- Targeting and reducing unwarranted variation: ensuring appropriate laboratory test use is tracked. This is especially important during post-pandemic recovery.
- Laboratory resource allocation – varying demand and pressure on laboratory services will occur as healthcare recovery brings heavier use of lab tests. This will be mostly felt across pathology where a predictable overshoot above normal pre-pandemic workloads will require urgent additional resource.

It is vital that National Demand Optimisation work continues, for both the emerging pandemic and recovery-monitoring work and to ensure delivery against the initial aims. Appropriate laboratory testing, reduction in unwarranted variation and the associated laboratory intelligence data will continue to be pivotal in informing decisions around priorities and driving COVID-19 recovery and renewal.

3 Introduction

3.1 Background

It has been widely accepted and demonstrated that there is considerable variation in the use of diagnostic tests across the NHS.¹ While some of this variation may be attributed to clinical and demographic differences, the degree of variation suggests an element of over-requesting and under-requesting, or unnecessary repeat testing. This is amplified by lack of availability or awareness of certain tests within some NHS Boards.

Demand optimisation (DO) is defined as the process by which diagnostic test use is optimised to maximise clinical utility, which in turn optimises clinical care and drives more efficient use of scarce NHS resources.

The key areas to consider in targeting DO 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 the healthcare system.
- Standardisation of test naming and 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 monitored and adhered to.

In addition to more efficient use of resources within diagnostics, optimisation of diagnostic testing is associated with more effective patient care pathways, driving appropriate and timely patient diagnoses and impacting patient flow and treatment.

The work of the National Demand Optimisation Group (NDOG) aligns with the ethos of the Realistic Medicine approach²; strengthening the relationships between those who provide and receive care, and ensuring that people receive appropriate and beneficial care that is evidence-based and in line with their preferences. Using evidence intelligently to continuously improve and challenge existing healthcare models, the approach taken by the NDOG is aligned with the principles of the National Performance Framework³, in particular contributing to the associated health outcomes as it aims to ensure appropriate diagnostic testing for the Scottish population.

It is also vital to acknowledge that diagnostics and patient pathways interact in complex ways that may not be immediately evident. There may be occasions where sub-optimal tests are used to triage patients to different treatment pathways. It is imperative therefore that national demand optimisation takes a whole systems approach, with open

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

² <https://www.realisticmedicine.scot/>

³ [Health | National Performance Framework](#)

communication and collaboration between laboratories and referring clinicians, to ensure the end to end management of patients using diagnostics is appropriate and optimises NHS resource and patient outcomes.

3.2 Phase I-III Summary

Demand optimisation was determined a focus within the Scottish Government's 2015 Healthcare Science National Delivery Plan (NDP).⁴ The National Demand Optimisation Group (NDOG) was established to review and progress work against the third deliverable of the NDP.

“Demand Optimisation: Support healthcare science leads, managers and heads of service to work with the national healthcare science leads and diagnostic networks in collectively progressing this improvement work”

Under the auspices of NDOG, three distinct phases of work have been completed to date, as outlined below. All reports are published on the Scottish Government website and detail the key achievements realised in each phase as well as recommendations for future work.^{5,6,7}



Due to the emerging COVID-19 pandemic, much non-essential work was paused, including work on the final stages of Phase III in early 2020. The NDOG resumed work for Phase IV in summer 2020 and the Phase III report was published in early 2021. This report contained an addendum highlighting initial progress made in Phase IV of the programme; collection of blood science and pathology data and initial development of interactive dashboards allowing interrogation of laboratory activity at NHS Board level.

3.3 Membership and Governance

The NDOG is commissioned by Scottish Government, with laboratories teams providing expertise, and National Service Scotland (NSS) providing programme management resource and support. See Annex A for the governance structure employed throughout Phase IV.

⁴ <https://www.gov.scot/publications/driving-improvement-delivering-results-scottish-healthcare-science-national-delivery-plan-20152020/>

⁵ <https://www.gov.scot/publications/demand-optimisation-diagnostics>

⁶ <https://www.gov.scot/publications/demand-optimisation-laboratory-medicine-phase-ii-report>

⁷ <https://www.gov.scot/publications/national-demand-optimisation-group-ndog-phase-3-report>

Since its establishment, NDOG membership has evolved to reflect the particular focus of each phase. However, there has always been consistent representation from:

- Scottish Government
- Biochemistry, Microbiology/Virology, Pathology, Haematology, Clinical Immunology
- Genetics/Molecular Pathology consortia

Full details of the Phase IV group membership can be found in Annex B. NDOG members continue to ensure that work is cascaded effectively through established formal and informal networks to laboratory users and other stakeholders.

4 Phase IV

4.1 Aims

An NDOG Phase IV Programme Initiation Document (PID) was developed in early 2020, expanding upon work undertaken in Phase III of the programme and was approved through agreed governance channels (see Annex C for original Phase IV PID).

As with all aspects of healthcare, the impact of the COVID-19 pandemic on the Demand Optimisation programme was significant. In response to the emerging pandemic, the suitability of the initial scope and objectives of the Phase IV Demand Optimisation programme were reconsidered by the Scottish Government and the NDOG and it was agreed that the Phase IV objectives and scope should be revised accordingly (see Annex D). This paper and the revised Phase IV Proposal document were supported and fully endorsed by the appropriate governance groups.

The new objectives resulted in a re-focused and dynamic programme of work responsive to the COVID-19 pandemic and changing landscape. It should be noted that work against many of the initial objectives of Phase IV were effectively paused.

The revised Phase IV objectives were as follows:

- Source data and observations from all boards and networks on the changes in healthcare infrastructure and provision as a result of the COVID-19 pandemic.
- Collect discipline specific laboratory activity data for the main sources where available – primary care, secondary care and outpatients.
- Estimate the “gap” in testing for different areas and disciplines especially in relation to the response to the COVID-19 pandemic.
- Histopathology – focus on identifying specific specimen workload reductions and the burden of workload in expected recovery phase.
- Development of educational guidance, mainly via the networks, to roll out across healthcare settings with a focus on avoiding unnecessary samples as well as individual tests.
- Atlas of Variation – re-focus of the Atlas to acknowledge and track the new post COVID-19 metrics, but also to allow peer comparison across boards, regions, clusters and nations. Such comparisons are likely to be pandemic focused rather than looking chronologically at what came before COVID-19. A post-COVID-19 dashboard will need developing that merges with prior Atlas aims and objectives around appropriate testing.
- Focus on key areas such as cancer and diabetes where normal testing activity will likely have been impacted by the response to the COVID-19 pandemic.

4.2 Meeting Schedule

The NDOG Steering Group formally met five times throughout Phase IV. In addition, the NDOG core team led a data workshop in September 2020 to define the Phase IV blood science data request. A full list of Phase IV NDOG meetings is listed in Annex E.

5 Phase IV Output

A primary focus of Phase IV was the establishment of a defined data set to feed into a monitoring tool, tracking diagnostic activity across Scotland during the pandemic and into recovery. This data acts as a direct surrogate metric for associated clinical activity, to be used to identify healthcare gaps, monitor recovery, and enable evidence-informed prioritisation of decisions regarding the resumption of tests and pathways across NHS Boards.

The Phase IV data collection focused on histopathology and blood sciences data sets and required a complete revision of the pre-established Atlas of Variation data set. Monthly data from January 2019 onwards was requested. The monthly 2019 data allowed for a baseline 'non-pandemic' year to be established for individual Boards. The 2020 and 2021 monthly data was mapped against the 2019 monthly averages to help identify possible gaps in healthcare provision during the pandemic and into recovery.

The Phase III Atlas of Variation data collection and associated activity was largely paused throughout Phase IV of the programme due to the refocused objectives, although some NHS Boards continued to provide this data through automatic data collection processes previously set up.

5.1 Histopathology Data Set

The pathology data set was finalised in early October in discussion with the SPAN Steering Group, Core Team and NDOG representatives. The histopathology data request was disseminated to agreed contacts at all 10 Scotland pathology laboratories on 12 October 2020. The agreed histopathology data fields requested are listed in Annex F.

It should be noted that immunohistochemistry (IHC) slide data was not included as part of the initial data collection, but was retrospectively requested from Boards in March 2021. IHC is considered to be a reliable surrogate marker for cancer diagnoses, given it is usually only requested to assist in staging/typing of cancers.

There has been continual engagement with the pathology community and data has been submitted by all 10 pathology laboratories. One of the laboratories has submitted partial data due to IT limitations.

5.2 Blood Science Data Set

The NDOG core team led a blood science data workshop in September 2020 to define the Phase IV blood science data set, attended by NDOG Steering Group members, IT laboratory staff and blood science discipline representatives. The finalised and agreed data request template (see Annex G) was disseminated to agreed contacts in all NHS Boards on 4 December 2020.

As with the pathology community, there has been extremely positive engagement and collaboration with colleagues regarding the blood sciences data collection. As of 31 May 2021, varying complexity levels of data have been submitted by 12 NHS Boards.

5.3 Data Governance and Data Publication

A Data Protection Impact Assessment (DPIA) screening was completed and there was no information governance risk above that already noted as part of Phase III of the programme. The same data collection principles utilised in earlier phases of the programme have continued throughout Phase IV. To date, two Boards have been able to set up automatic monthly data pulls from their Laboratory Information Management (LIMS) system.

The NDOG Core Team presented the Phase IV data publication proposal to Scottish Government Policy Lead Colleagues in March 2021 and it was approved. All dashboards were published on Tableau Public on 30 March 2021 and have been widely promoted and utilised throughout the clinical community in Scotland.

The NDOG has also liaised extensively with the diagnostic community, mainly through the National Managed Diagnostic Networks (NMDNs) and other networks, around the development of the dashboards, to ensure clear, appropriate and informative data presentation.

5.4 Recovery Monitoring Dashboard Views

A short paper outlining initial findings from the dashboard data was published as an addendum in the Phase III Report and is attached as Annex H.

Figures 1-6 in this report are screenshot examples of the published dashboard views and Figure 4 outlines the number of views of each of the dashboards since publication (NHS Board names have been redacted in this report, but are published on all dashboards).

Histopathology

Figure 1 shows % change in monthly overall laboratory pathology requests per NHS Board from January 2019 – April 2021. Consistent across all Boards is the significant reduction in laboratory request numbers in April 2020 (~60-80% reduction from the 2019 monthly average) at the start of the first wave of the COVID-19 pandemic. The dashboard view shows varying levels of recovery across the Boards throughout 2020 into 2021, with a second smaller reduction in pathology requests during the second wave of the pandemic in winter 2020/21. Overall, request levels remain well below pre-pandemic levels.

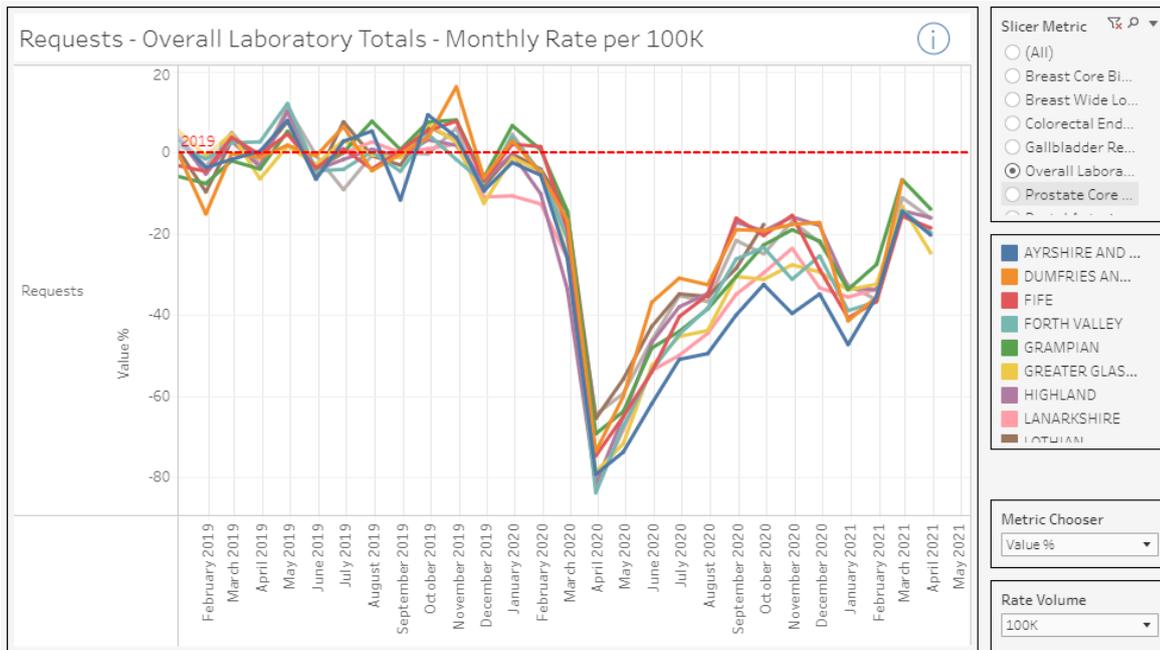


Figure 1: Pathology – Overall Laboratory Requests by NHS Board - % change against 2019 monthly average

The data shown in Table 1 supports these trends: Table 1 shows the total pathology specimens for the data received from NHS Boards in Scotland. It is clear that for all the pathology specimens, there has been a significant decline in levels during the COVID-19 pandemic, with a total reduction of 183,721 specimens compared to pre-pandemic levels.

Pathology Scottish Totals					
	Specimens	Pre-COVID	COVID	Difference	% Change
Breast Core Biopsy		13,336	10,866	-2,470	-18.52%
Breast Wide Local Excision		9,667	6,499	-3,168	-32.77%
Colorectal Endoscopy Biopsy		98,048	53,132	-44,916	-45.81%
Gallbladder Resection		7,309	4,266	-3,043	-41.63%
Prostate Core Biopsy		21,946	15,709	-6,237	-28.42%
Rectal Anterior Resection		1,639	1,017	-622	-37.79%
Grand Total		151,945	91,489	-60,456	-39.79%
Neuro	Workload	1,455	1,195	-260.0	-17.87%
Overall Laboratory Totals	Specimens	490,586	306,865	-183,721	-37.45%
*SPAN Notes					
Pre-COVID April 19 to Mar 20 inclusive and COVID April 20 to Mar 21 inclusive					
Lothian Denominator – April 19 to Oct 19 and Apr 20 to Oct 20					
Lanarkshire denominator – 11 months May 19 to Mar 20 and May 20 to Mar 21					

Table 1: Pathology NHS Scotland Specimen Totals of data received⁸

⁸ “Pre-COVID19” includes data from 1 April 2019 – 31 March 2020 inclusive and “COVID-19” data includes data from 1 April 2020 – 31 March 2021 inclusive, unless specified in the SPAN Notes at the bottom of the table.

Cancer data

Public Health Scotland (PHS) has published weekly data on the number of individuals from whom a pathology sample detected cancer.⁹ Overall, the commonest cancers in Scotland are of the lung, breast (females), prostate (males) and colorectal. By the week ending 27th December 2020, compared to the same week in 2019, there were 761 fewer lung cancers (a total fall of 21.2%); 1591 fewer breast cancers (a total fall of 19.1%); 831 fewer prostate cancers (a total fall of 18.7%); and 1,111 fewer colorectal cancers (a total fall of 21.1%). This Scotland total cancer data can be mapped against corresponding Pathology Demand Optimisation monthly (Scotland total) data for colorectal endoscopy biopsy, prostate core biopsy and breast core request numbers. Figure 2 shows this comparison for Colorectal biopsy/colorectal cancer diagnosis). The light blue lines in the graph are 2019 figures and darker blue lines are 2020 figures. Mapping of these two data sources allows for comparative assessment of changes in colorectal biopsy with colorectal cancer diagnosis. In summary, there was a 45.8% overall reduction in colorectal biopsy but levels of colorectal cancer diagnosis only fell by 21.2%. While this nevertheless presents as very concerning reductions in cancer diagnosis, the magnitude would appear to be less than the impact on colorectal biopsy levels. This suggests that while cancer referral pathways were not as affected as endoscopy services, there were still significant reductions in colorectal cancer diagnoses observed.

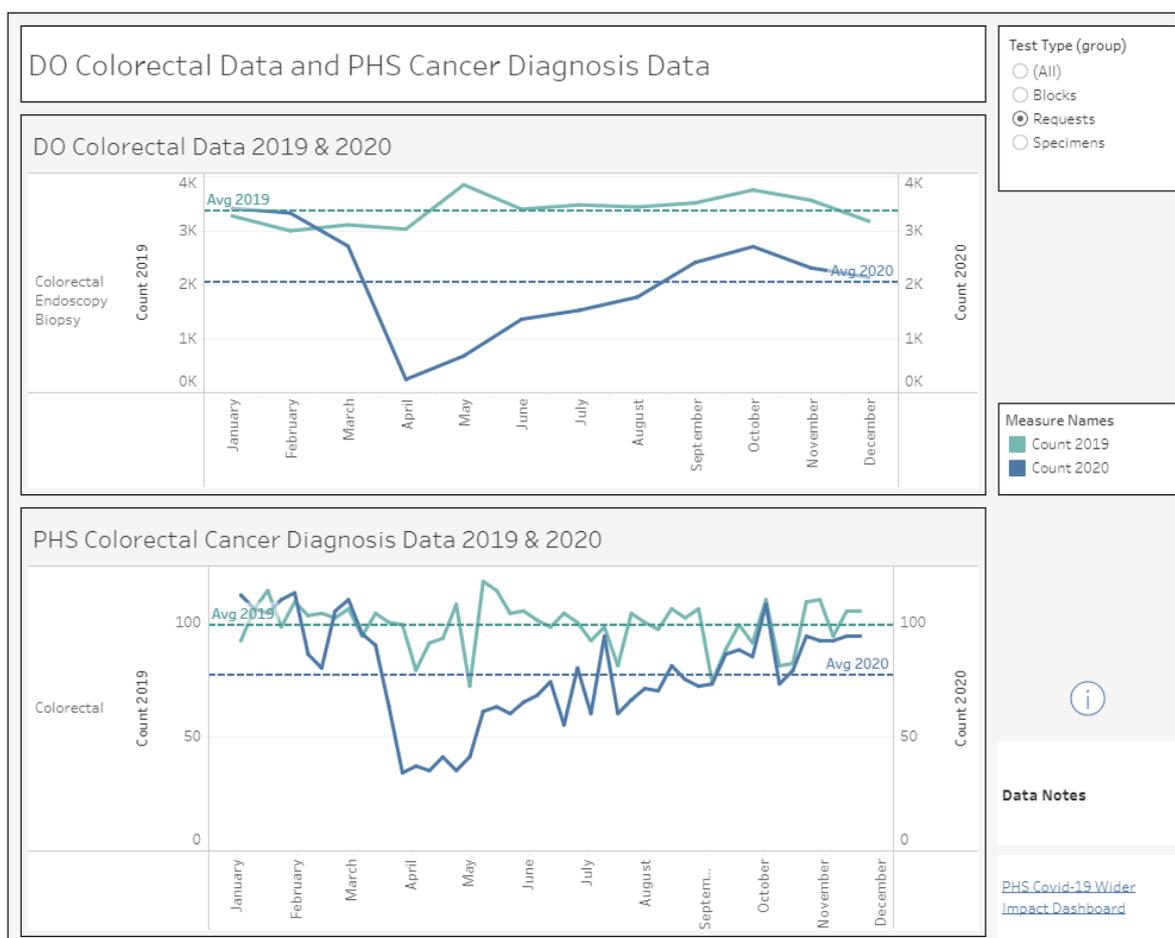


Figure 2: All Scotland Colorectal Endoscopy Biopsy Requests (top) and Colorectal Cancer Diagnoses (bottom) – PHS data¹⁰

⁹ <https://scotland.shinyapps.io/phs-covid-wider-impact/>).

¹⁰ Data caveats: NHS A&A DO data only includes specimen data; no data has been provided for blocks or requests. NHS D&G DO Prostate Core blocks data only includes Jan 2019 – Sep 2019 inclusive. NHS Lanarkshire DO data only includes May 2019 – Dec 2020 inclusive. NHS Lothian DO data only includes

Blood Sciences

Figures 3 and 4 show monthly blood science workload by discipline data for an example Board. Figure 4 displays the raw monthly values against the 2019 monthly average and Figure 5 shows % change from the 2019 monthly average. As with the pathology data, these dashboard views clearly demonstrate a substantial and sudden decrease in monthly workload beginning in April 2020, with gradual, albeit partial, recovery throughout the rest of the year. These two figures also demonstrate the usability of the dashboards, as users are able to easily toggle between ‘Metric Choosers’ of raw request values, value % and also requests rate (weighted for Board population).

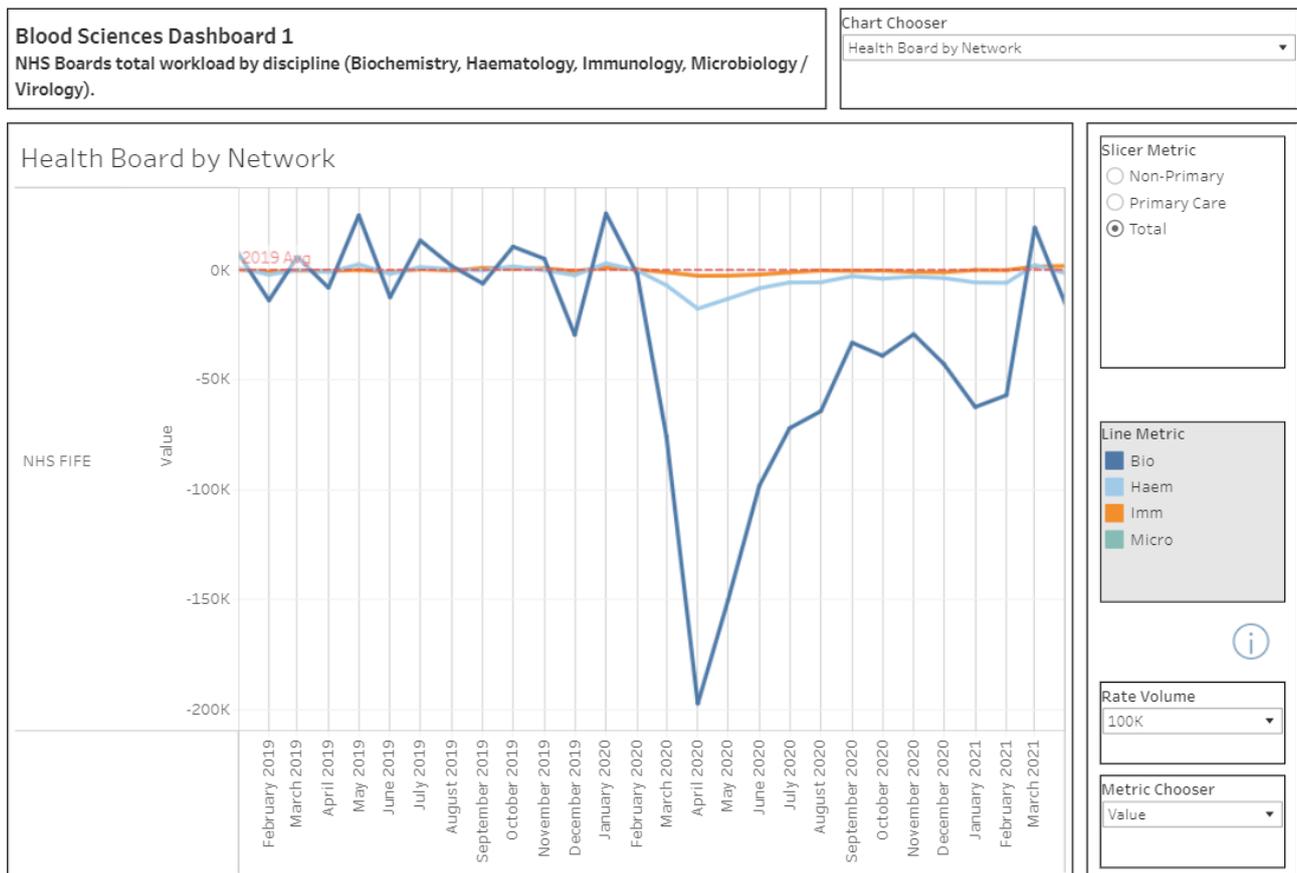


Figure 3: Blood Science – NHS Board example of workload by discipline – raw monthly values against 2019 monthly average

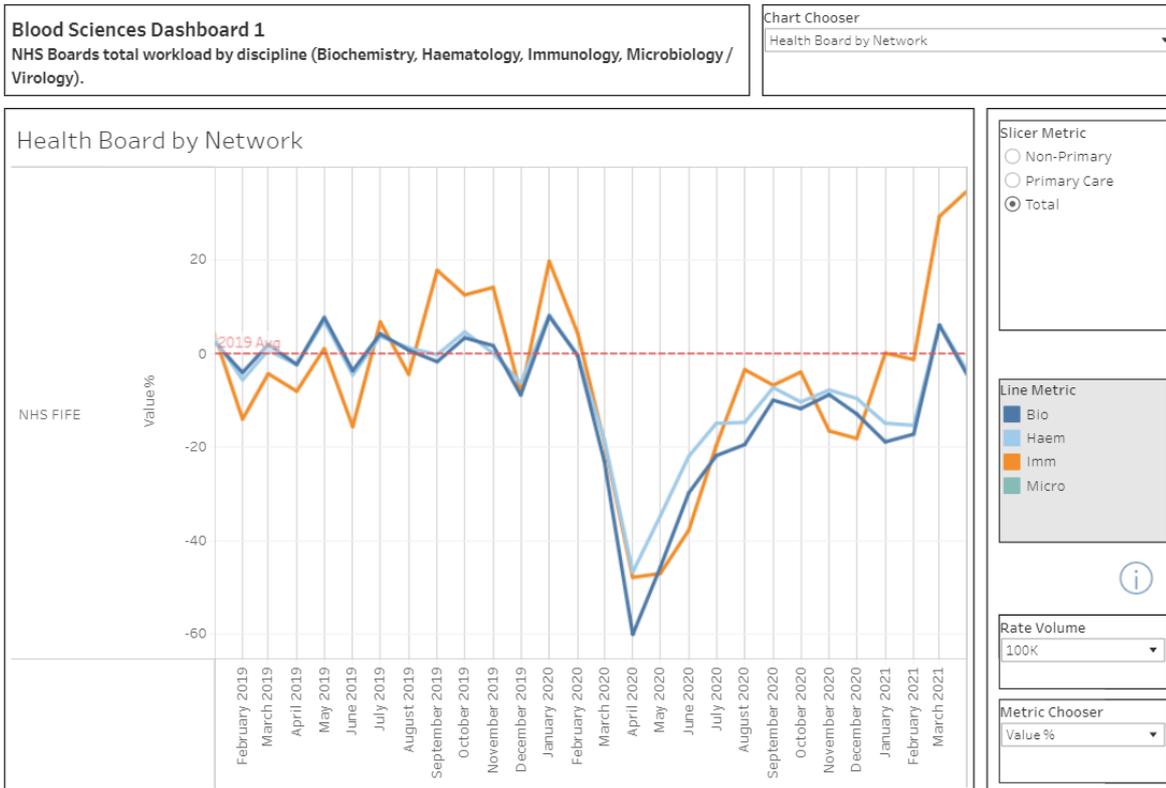


Figure 4: Blood Science – NHS Board example of workload by discipline – % change against 2019 monthly average

Table 2 below highlights the significant decline in discipline testing levels during the COVID-19 pandemic in comparison to the equivalent months the year before, with over 18 million fewer biochemistry tests being performed across Scotland and between 21%-31% decrease in testing levels across all disciplines.

Blood Sciences Level 1 Data Total				
	Pre-COVID	COVID	Difference	% Change
Bio	66,955,626	48,921,513	-18,034,113	-22.68%
Haem	34,412,630	22,050,512	-12,362,118	-31.88%
Imm	427,911	275,346	-152,565	-30.61%
Micro	7,123,379	5,567,371	-1,556,008	-21.84%
Blood Science Notes				
Greater Glasgow and Clyde only Micro data				
Ayrshire and Arran denominator April 19 to November 19				
Forth Valley denominator April 19 to December 19				
Highland denominator April 19 to January 20				
Orkney denominator April 19 to January 20				
Lanarkshire denominator May 19 to March 20				

Table 2: Blood Science – NHS Scotland totals of data received by discipline: Biochemistry, Haematology, Immunology, Microbiology and Virology¹¹

Table 3 below provides an overview of total NHS Scotland test data received for the 25 tests as outlined in Level 2 of Annex G. Reflective of the trends displayed on the dashboards, it is clear that there has been a substantial decline across the majority of the suite of tests during the pandemic year, with some tests seeing up to an 80% drop in testing in comparison to the previous year – 8 million fewer tests overall. This highlights both the ability to track individual test use but also demonstrates the variable impact on specific tests, with a few tests even showing over recovery and increased use during the pandemic.

¹¹ “Pre-COVID” includes data from 1 April 2019 – 31 March 2020 inclusive and “COVID” data includes data from 1 April 2020 – 31 March 2021 inclusive, unless specified in the Blood Science Notes at the bottom of the table. Where other denominators are used for 2019-2020 “Pre-COVID19” months, the corresponding 2020-2021 “COVID” months are also used.

Blood Sciences Level 1 Data Total				
	Pre-COVID	COVID	Difference	% Change
B12	440,075	330,197	-109,878	-24.97%
Blood Film	169,155	132,831	-36,324	-21.47%
BNP/ ntpro-BNP	15,133	16,515	1,382	9.13%
Bone Marrow	2,128	1,765	-363	-17.06%
CA125	36,966	33,888	-3,078	-8.33%
Calprotectin	78,817	53,493	-25,324	-32.13%
CEA	32,376	28,522	-3,854	-11.90%
Chlamydia/ Gonorrhoea	296,986	135,916	-161,070	-54.23
Cholesterol	1,118,224	601,057	-517,167	-46.25%
Coeliac (tTG Antibody)	58,224	40,779	-17,445	-29.96%
D-Dimer	44,879	49,639	4,760	10.61%
Drugs of Abuse	81,026	16,178	-64,848	-80.03%
Ferritin	541,905	415,804	-126,101	-23.27%
Full Blood Count	17,112,516	11,695,980	-5,416,536	-31.65%
HbA1C	702,563	512,200	-190,363	-27.10%
Immunophenotyping	4,740	4,619	-121	-2.55%
INR (not including POCT)	261,149	182,600	-78,549	-30.08%
Intrinsic Factor	8,738	8,099	-639	-7.31%
PSA	211,841	179,689	-32,152	-15.18%
QFIT	62,416	92,648	30,232	48.44%
Serum Electrophoresis	48,350	39,099	-9,251	-19.13%
SFLCs	12,421	12,566	145	1.17%
Sodium	4,867,718	3,717,448	-1,150,270	-23.63%
Urine Culture	468,825	359,777	-109,048	-23.26%
Blood Science Notes				
Greater Glasgow and Clyde only Micro data				
Ayrshire and Arran denominator April 19 to November 19				
Forth Valley denominator April 19 to December 19				
Highland denominator April 19 to January 20				
Orkney denominator April 19 to January 20				
Lanarkshire denominator May 19 to March 20				

Table 3: Blood Science – NHS Scotland totals of data received by test¹²

¹² “Pre-COVID” includes data from 1 April 2019 – 31 March 2020 inclusive and “COVID” data includes data from 1 April 2020 – 31 March 2021 inclusive, unless specified in the Blood Science Notes at the bottom of the table. Where other denominators are used for 2019-2020 “Pre-COVID19” months, the corresponding 2020-2021 “COVID” months are also used.

Figure 5 is a dashboard example of NHS Board level monthly data for the diabetes blood test, HbA1c. In April 2020, all Boards saw a notable decrease in HbA1c testing, dropping between ~80-85% at the height of the first wave of the pandemic. Since then there has been variable recovery in testing activity, with some boards showing both recovery and overshoot from previous activity, while for other boards the recovery remains challenging. This marked reduction in overall testing is likely to have impacted both the diagnosis rate of new diabetics and the optimal monitoring of existing diabetes patients. Clearly, Health Boards and Diabetes services could use the dashboard to monitor such trends for their own local services.

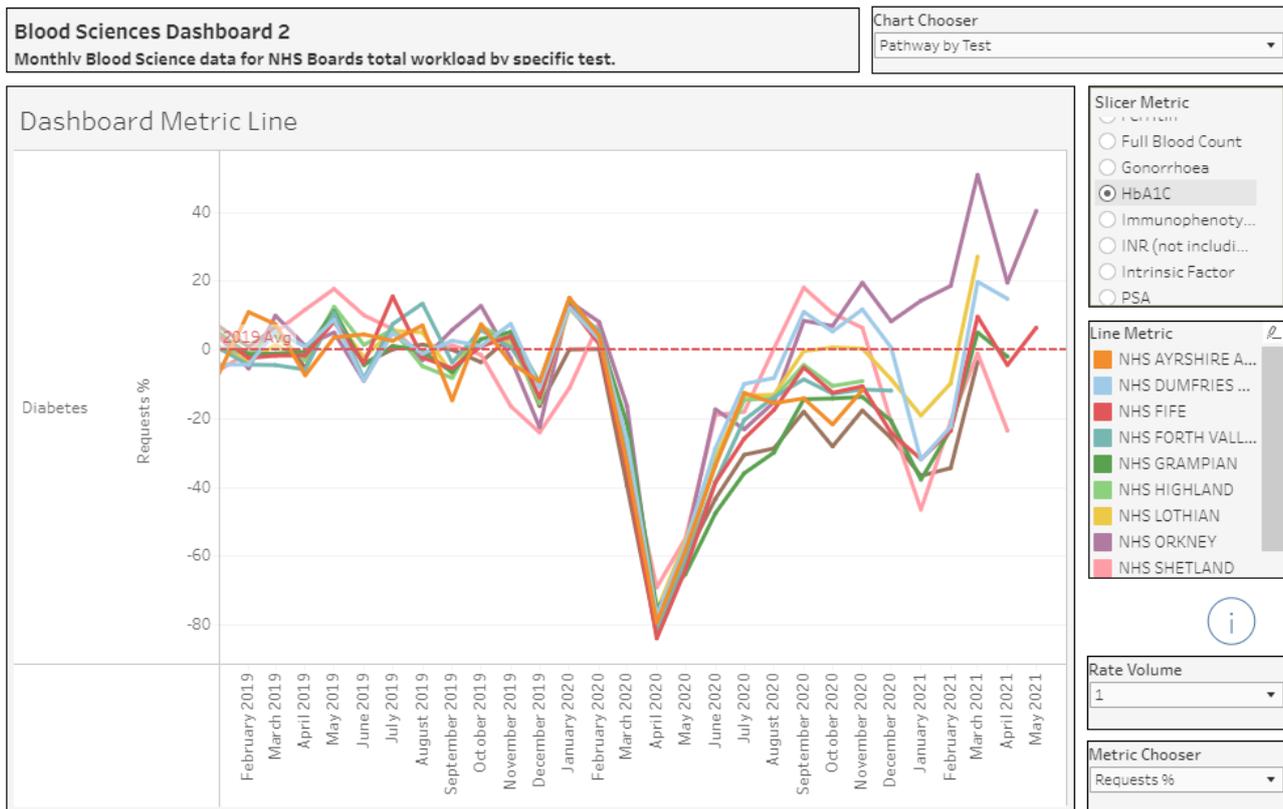


Figure 5: Blood Science – Total HbA1C tests by NHS Board – % change against 2019 monthly average

Figure 6 shows the dashboard view for total cholesterol Primary Care request figures by NHS Board (raw monthly values against 2019 monthly average). A familiar trend in test requesting is evident here, with a sharp decline in cholesterol requesting numbers in April 2020 and gradual increase across the second half of 2020 and into 2021. Overall test number remain lower than previous pre-pandemic levels and recovery of previous testing rates is variable.

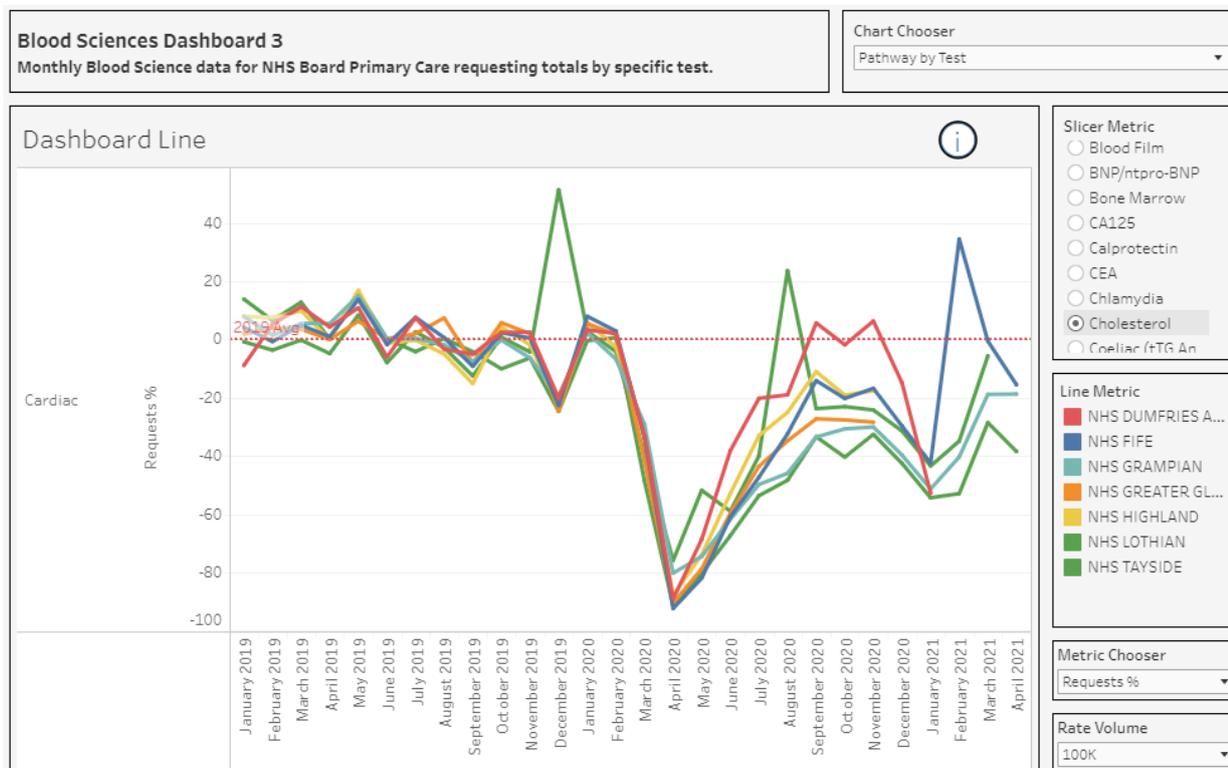


Figure 6: Blood Science – Total Cholesterol Primary Care request figures by NHS Board – raw monthly values against 2019 monthly average

The interactive recovery monitoring dashboards and tabulated data clearly demonstrate substantial reductions in diagnostic testing across NHS Boards throughout the COVID-19 pandemic. The dashboards have been developed in such a way as to allow Boards to identify, prioritise and address possible related gaps in healthcare provision as NHS Scotland moves further into recovery.

The dashboard has already been widely utilised, and the view counts as of 31 May 2021 can be seen below in Table 4. Through further targeted promotion of the dashboards and engagement with specific NHS and Scottish Government groups, the NDOG anticipate these dashboard viewing figures will continue to increase.

	Pathology Dashboard	Blood Science Level 1 Dashboard	Blood Science Level 2 Dashboard	Blood Science Level 3 Dashboard
Number of views as of 31 st May 2021	169	220	166	170

Table 4: List of dashboard viewing figures 30 March – 31 May 2021

The NDOG have identified work in the following areas where the recovery monitoring dashboards should be utilised within NHS Scotland, including:

- Phlebotomy capacity: monitoring and directing resource.

- Cancer: identifying gaps in the screening, diagnosis and monitoring of specific malignancies.
- Chronic disease pathways: focusing on specific disease pathways to identify healthcare gaps.
- Targeted prioritisation: identifying healthcare gaps to be assessed and prioritised as Scotland recovers from the COVID-19 pandemic.
- Targeting and reducing unwarranted variation: ensuring appropriate laboratory test use is tracked. This is especially important during post-pandemic recovery.
- Laboratory resource allocation – varying demand and pressure on laboratory services will occur as healthcare recovery brings heavier use of lab tests. This will be mostly felt across pathology where a predictable overshoot above normal pre-pandemic workloads will require urgent additional resource.

5.5 Links – Scottish Government and Recovery

Where the data presented in the recovery monitoring dashboards indicate that there is variation in remobilisation across NHS Boards, the NDOG have ensured that relevant networks and Scottish Government policy teams including diabetes, heart disease and cancer are involved, to allow the NDOG to contribute effectively to work progressing on improving patient outcomes across Scotland.

5.6 Quality Improvement projects and educational Guidance

The Atlas of Variation and recovery monitoring dashboards provide powerful Quality Improvement (QI) tools with ‘at a glance’ information on variation of diagnostic test use at a variety of levels. In order to make a difference and generate positive outcomes, the Atlas of Variation and recovery monitoring dashboards should be utilised in all NHS Boards and QI teams.

In previous phases of the programme, the NDOG and wider stakeholders in NHS Boards have undertaken some QI projects with teams at a local level. There has also been some appetite from Primary Care colleagues to lead QI projects within their practice or cluster groups. During Phase IV, progressing QI work was obviously challenging due to COVID-19 pandemic. However, NDOG are aware that QI work has previously taken place in NHS Fife (targeted QI work with local GPs around optimising Vitamin D primary care test requesting) and NHS Ayrshire and Arran (targeted QI on coagulation and glucose test requesting patterns) and these are initiatives that the programme will revisit and support throughout future phases.

A detailed Frequently Asked Questions (FAQs) document has been published on the NDOG website that clearly outlines the functionality and details the interactive features of the recovery monitoring dashboards (Annex I).¹³ A link to this document is published on each dashboard for information and the document is included as part of the NDOG toolkit.

Test feedback templates have been developed for the diagnostic tests included in the recovery monitoring dashboards (see Annex J for an example). The templates include a screenshot of the relevant dashboard test view and a data table with pre-pandemic and pandemic totals by NHS Board to enable the quick identification of gaps in testing and rates of recovery. A link to the dashboard is also included to encourage further interrogation of data and questions are listed at the bottom of the form, the responses to which will help provide deeper clinical context to the dashboard views where appropriate.

¹³ <https://www.demandoptimisation.scot.nhs.uk/wp-content/uploads/2021/04/Phase-IV-FAQs-v1.pdf>

6 Engagement

Throughout Phase IV, the NDOG engaged extensively with clinical colleagues throughout Scotland, mainly through the established NMDNs and the Genetics / Molecular Pathology consortia. A list of stakeholder engagement and all relevant meetings detailed in Annex E.

The NDOG were Royal College of Pathologists 2020 Awards winners in the 'Innovation in Pathology Practice' section and core team members attended an online awards ceremony on 19 November 2020. The NDOG also submitted an application for the 2021 Advancing Healthcare Awards, where they were finalists in the Scottish Government's award for 'Driving Improvement, Delivering Results' category. This recognition of the work and achievements of the programme has helped to raise the profile of the group at a national level. The NDOG is looking forward to be presenting posters and showcasing work at future events, including at the June 2021 UKMedLab event, 2022 IBMS Congress, and future NMDN education events.

In April 2021 it was agreed with Genetics NDOG representatives and the leads of the four Genetics laboratories in Scotland to define a genetics data set with the view to collecting and publishing as part of the anticipated Phase V programme of work.

The group continues to maintain and regularly update its website with pertinent programme information and links (www.demandoptimisation.scot.nhs.uk) and interacts with colleagues regularly via the NMDN Twitter account (@NMDNScot).

6.1 COVID-19 Impact

Due to the COVID-19 pandemic, all face-to-face meetings were replaced with online meetings from mid-March 2020 onwards. As a result, there were no NMDN education days, large conferences or wider Primary Care meetings at which to present work and network.

However, as highlighted in section 4.3 and Annex E, the NDOG has continued to engage extensively with the diagnostic networks, clinical colleagues and other key stakeholders throughout Phase IV.

Holding all Phase IV associated meetings remotely has in fact enabled the NDOG to engage with individuals and groups with whom it might otherwise have been difficult to meet with and strengthen existing working relationships. It has allowed for strong working relationships to develop with new groups and programmes of work, including Scottish Government Policy Teams and engagement with clinical colleagues from remote and rural Boards.

7 Conclusion and Recommendations

Conclusions

The Scottish Demand Optimisation Programme has demonstrated the huge value in collecting laboratory activity data and presenting it in an interactive Atlas of Variation, thus allowing observations and comparisons to be made Nationally, between Health Boards and across individual General Practices. Phase IV of the programme has also demonstrated that this data collection/display system can be modified to focus on more relevant testing trends occurring during the COVID-19 pandemic and into the recovery phase.

The trends observed clearly show dramatic reductions in pathology specimens and blood testing across all health Boards at the onset of the pandemic – much of which could be linked to reductions in related clinical activity, such as cancer diagnosis and monitoring, and chronic disease management. Recovery towards pre-pandemic levels of testing has been slow, incomplete and variable across the health Boards. The interactive atlas provides a useful tool to drill down and examine such comparative trends in detail. GP Practice level requesting data, when available, will also allow comparisons to be made at individual practice level.

Continual monitoring of activity going forwards remains important not just as a metric for clinical services recovery, but also to identify emerging pressures on laboratory services. Pathology services across the UK are very much limited by an insufficient number of histopathologists, whose work is generally capped at RCPATH levels of activity. Inability therefore to deal with post pandemic increases in workload above normal levels is highly likely to lead to significant bottlenecks in healthcare pathways, notably for cancer diagnosis and management. Ongoing dashboard monitoring should be able to pick this up at health board level.

Recommendations

The Demand Optimisation programme is now at a turning point. The NDOG have developed a comprehensive Atlas of Variation and suite of recovery dashboards that are now widely promoted as a QI tool.

The next phase of work will see a programme of QI work informed by the data dashboards beginning to emerge and complementing work on care pathways including diabetes, heart disease, cancer and respiratory. It is vital that patient pathways are efficiently used and so correct use of laboratory tests where these are pivotal in directing patients is so important to ensure cost effective healthcare and allow savings to be recycled from unnecessary pathway utilisation.

A formal roll out of the test feedback documents to all NHS Boards via the NMDNs and other established networks has been planned as part of Phase V. This will allow for regular interrogation of up to date Board-level diagnostic testing data as the NHS moves through into a recovery period following the COVID-19 pandemic.

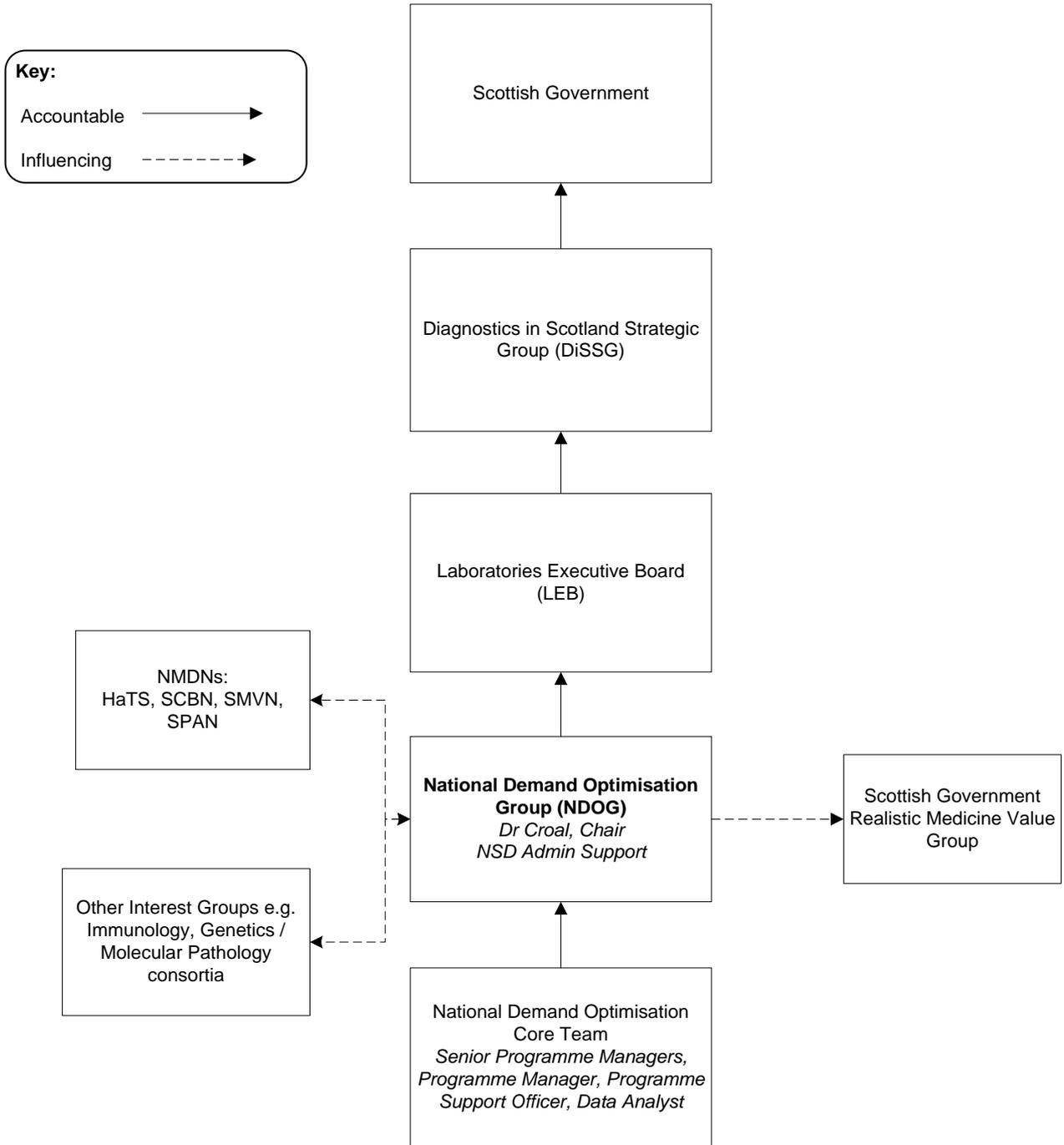
It is vital that National Demand Optimisation work continues, for both the emerging pandemic and recovery-monitoring work and to ensure delivery against the initial aims. Appropriate laboratory testing, reduction in unwarranted variation and the associated laboratory intelligence data will continue to be pivotal in informing decisions around priorities and driving COVID-19 recovery and renewal.

The following recommendations are made:

- A national oversight for Demand Optimisation of Laboratory testing is retained, further promoted, and supported in all NHS Boards.
- All Health Boards to submit required data for the Atlas of Variation and recovery monitoring dashboards. Consideration needs to be given to enhancing IT support locally to allow this to be achieved.
- Inclusion of Genetics data set in the recovery monitoring dashboards.
- Formal national rollout of the Atlas of Variation and recovery monitoring dashboards.
- Embedding of Demand Optimisation dashboards and QI toolkits in all NHS Board QI projects and teams.
- Strengthen links with Realistic Medicine leads and Demand Optimisation teams in NHS Boards across Scotland.
- Re-engage with Local Improvement Support Teams (LIST) to develop plans for tackling and responding to variation.
- Identify relevant clinical pathways to target for streamlining processes, tackling variation across all Health Boards and driving better use of resources where appropriate.

8 Annex

Annex A: National Demand Optimisation Group Governance



Annex B: National Demand Optimisation Group Membership

Chair of the Group	Dr Bernie Croal, Consultant Chemical Pathologist, NHS Grampian
Scottish Government	Catherine Ross, Chief Healthcare Science Officer Karen Stewart, Healthcare Science Officer Raveena Sajjan, Strategy and Policy, CNOD
NHS National Services Scotland	Dr David Stirling, Director of Healthcare Science
Specialty Covered	Membership
Biochemistry	Dr Janet Horner, Consultant Biochemist Dr Rebecca Pattenden, Consultant Biochemist Dr Heather Holmes, Consultant Clinical Biochemist Dr Sara Jenks, Consultant Clinical Scientist Dr Chris Pitt, Principal Biochemist
Microbiology/Virology	Mike Gray, Laboratory Manager Linda Mulhern, Operational Service Manager, Microbiology
Pathology	Dr Fiona Payne, Consultant Pathologist David Topping, Clinical Lab Manager/Lead BMS
Haematology	Sonja Wright, Clinical Scientist Sarah Dack, BMS Manager
Clinical Immunology	Dr Charu Chopra, Consultant Immunologist Dr Liz Furrie, Clinical Scientist
Genetics/Molecular Pathology Consortia	Dr David Baty, Consultant Clinical Scientist Caroline Clark, Consultant Clinical Scientist
NSS Programme Management / Programme Support	Liz Blackman, Senior Programme Manager, NSD Philli Cottam, Programme Manager, NSD Claire Lawrie, Senior Programme Manager, IMS Gavin Hallford, Data Analyst, IMS Dr Karl Hope, Programme Support Officer, NSD Bina Collins, Programme Support Officer, NSD

1. Background

Scottish Government have funded three phases of national demand optimisation. The first explored ongoing work in NHS Scotland and published a report which proposed a national approach to the work. The second phase began to develop an atlas of variation and launched a number of QI projects. The third further developed the atlas to the point where it is in pilot with primary care colleagues.

The longer term vision is an automated Atlas, fed from the National Laboratories Information and Intelligence Platform, and a range of QI initiatives tackling over and under requesting. Significant further work is required to enable this. Meantime, there is benefit in continuing to develop the atlas and work with stakeholders to tackle variation.

2. Aims

The aims of Phase IV include:-

- Learning from the pilot phases of the Atlas
- Further roll out to primary care
- Ongoing quarterly data collection
- Development of educational toolkit
- Work with Local Improvement Support Teams (LIST) to develop plans for tackling variation
- Work with National Managed Diagnostic Networks (NMDNs) and labs to develop flash reports
- Exploration of embedding Primary Care QI portal into existing HIS platform
- Engagement with relevant stakeholders to promote and refine the programme

REDO Laboratory Testing (*Re-Engineered Demand Optimisation*) A Post COVID-19 Approach to Appropriate Laboratory Test Use.

Background

It has been widely accepted and demonstrated that there is considerable variation in the use of diagnostic tests across the NHS. While some of this variation may be attributed to clinical and demographic differences, the degree of variation suggests an element of over/under-requesting, or unnecessary repeat testing. In addition, the lack of availability or awareness of certain tests within some NHS Boards will also limit their optimal use and thus further amplify any variation in such use. Demand Optimisation is defined as the process by which diagnostic test use is optimised to maximise clinical utility, which in turn optimises clinical care and drives more efficient use of associated scarce NHS resources.

Demand Optimisation 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. This group has subsequently delivered through three phases and is about to commence Phase Four. The programme has identified areas of good practice across the disciplines, coordinated collection of laboratory test use data, compiled an Atlas of Variation, developed online Atlas tools and interactive elements and had just begun formulating flash reports on appropriate test use for GP pilot work. The onset of the COVID-19 pandemic understandably paused the programme's work in March 2020.

COVID-19

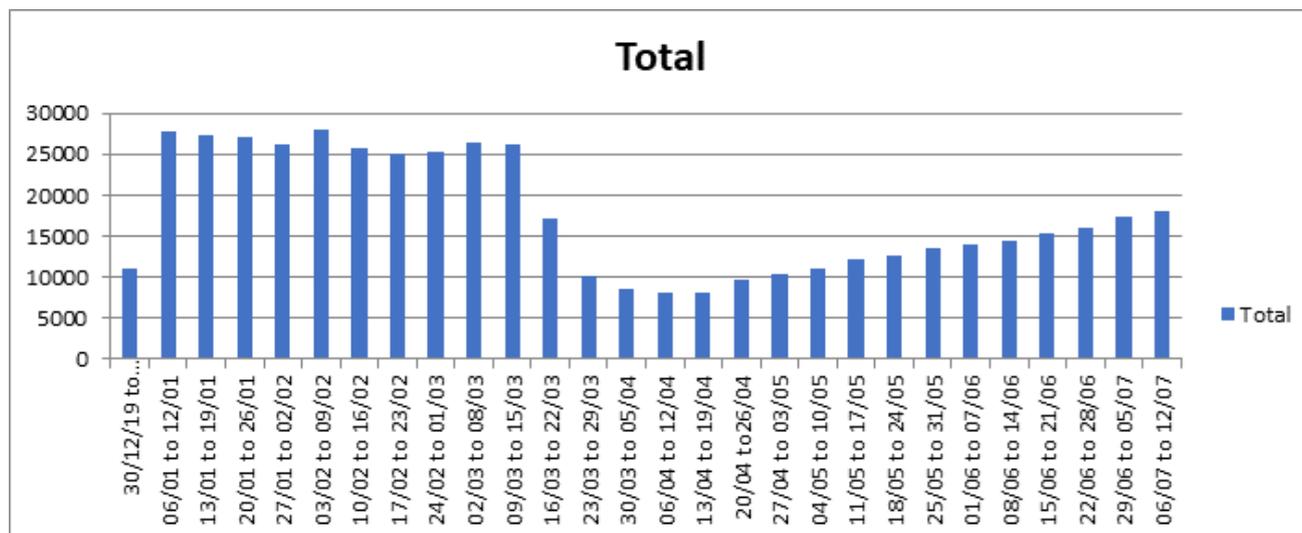
The impact of the COVID-19 pandemic on the delivery of healthcare has been dramatic. Non-essential work was set aside with resources focused on preparing for and dealing with the impact of the virus. Lockdown and social distancing also had a major effect on the types of services offered and the capacity for such work. Significant changes in how laboratory tests are used, both during the lockdown phase and the recovery period, would seem to be continuing, with the new ways of working and the reduced capacity for patient facing interaction, including phlebotomy, being major factors affecting laboratory test use. The need for appropriate, targeted use of diagnostic tests will likely be even more important in the changed, scarred and finance limited NHS of the future, especially during any attempted "catch up" or recovery phase.

Changed ways of working within the NHS, along with the limitations of delivery in a socially distanced setting, will clearly have major effects on how test use activity can be recorded, assessed and compared. The Demand Optimisation programme has an even more important role than before to ensure that such limited capacity and resource can be best used to ensure optimal use of laboratory tests and ultimately patient care.

Impact of the COVID-19 Pandemic on Laboratory Testing

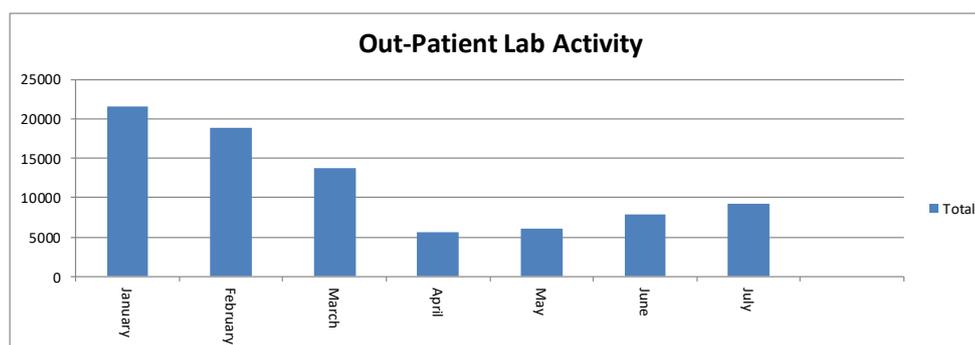
During Lockdown and with the refocus of NHS care towards dealing with the pandemic, many services within both primary and secondary care were significantly reduced or paused. In addition, patient numbers presenting to NHS facilities also reduced significantly. This had a dramatic effect on phlebotomy and subsequent laboratory test use. An example of this is seen in the graph below from NHS Grampian, which

demonstrated reductions in early lockdown of around 70%. This has slowly begun to rise again as lockdown has eased and some services have returned, however levels remain around 30% less than before.



Weekly laboratory test requests – NHS Grampian 2020.

In addition, out-patient activity has significantly reduced and is very slowly returning:



Impact on Secondary Care

Huge backlogs in elective activity have inevitably built up – this will include expansion of waiting lists for out-patient referral, investigations, surgery, other procedures, and treatment. Social distancing has reduced capacity in all these areas, with many services still on pause. Out-patient follow up and new referrals continue to see a significant expansion in remote ways of working, such as Near-Me, Microsoft teams and telephone consultation use. Blood samples usually taken in a secondary care clinic setting are now more appropriately being targeted towards a community solution – however there are limitations with that - see below. In addition, while there have been significant reductions in pathology workload, the likely backlog that has been created clinically will inevitably impact cellular pathology departments in the near future as activity resumes and “catch up” is attempted. Complexity of specimens is also likely to increase as a result of more advanced presentations.

Impact on Primary Care

Similar backlogs have also developed in Primary Care; however capacity is also limited due to continued staff absence and social distancing restrictions leading to reduced

throughput of things like blood testing within practices. While overall testing remains well below pre-COVID-19 levels, “new” capacity levels for phlebotomy would appear to have been exhausted. Expansion of community-based phlebotomy focused around General Practice would seem unlikely given these limitations, which would severely impact the overall effectiveness of remote secondary care clinics, given their now increased dependency on remote phlebotomy delivered in the community. Some Boards are now actively looking to develop new community-based phlebotomy centres which could deliver such services without placing additional demand on GP practices.

Impact on the Demand Optimisation Programme

Clearly the need for appropriate lab testing remains and is arguably much more important given the capacity limitations and clinical backlogs that have developed. It is also evident that new ways of working, including shifting focus on location and delivery will make both time and peer-based comparisons of test use difficult. The Atlas of Variation approach modelled previously within the programme will need a complete re-focus to fit this changing landscape. The challenge therefore for the programme going forward will be to re-engineer itself post COVID-19 and develop appropriate monitoring metrics and associated interventions to help ensure laboratory test use is optimised.

A Re-Engineered Demand Optimisation Programme

Healthcare provision is re-engineering itself to fit the new “normal”. The Demand Optimisation programme also needs to re-engineer itself to focus on issues facing the Scottish NHS as it emerges from lockdown. A backlog in appropriate investigations is likely to have developed, however clinical capacity to deal with such a backlog will be limited. The need to identify laboratory testing trends and provide appropriate testing guidance as services return will be important, however this will be a new normal comprising some of what happened before, some new ways of working and a “catch-up” element.

New Demand Optimisation Programme objectives:

- 1) Source data and observations from all boards/networks on the changes in healthcare infrastructure and provision as a result of the COVID-19 pandemic.
- 2) Collect discipline specific laboratory activity data for the main sources – Primary care, Secondary care and out-patients.
- 3) Estimate the “gap” in testing for different areas/disciplines – this is likely to relate to healthcare provision that was missed, delayed or postponed.
- 4) Histopathology – expected that workload will increase as catch up is attempted – needs monitoring and prioritized given the fixed capacity of services. Specimen type, volume of work and complexity needs tracking to assist prioritisation decisions.
- 5) Development of educational guidance as a matter of urgency, mainly via the networks, to roll out across healthcare settings – this needs to focus on avoiding samples as well as tests – the limitations are largely with patient interaction/phlebotomy, not with laboratory capacity (for blood sciences).
- 6) Atlas of Variation – needs a re-think – both to acknowledge and track the new post COVID-19 metrics, but also to allow peer comparison across boards, regions, clusters and nations. Such comparisons are likely to be single use rather than looking chronologically at what came before COVID-19. A Post-COVID-19 dashboard needs developing.

- 7) Focus on key areas such as cancer and diabetes where reduced testing during the pandemic is likely to have had a negative effect on individuals. Identification of specific requesting patterns that have failed to catch up.

A new era for Demand Optimisation

The COVID-19 pandemic has had a dramatic impact on the delivery of healthcare across the UK and will continue to do so as new ways of working are embedded long term. Clearly there has been a significant gap in provision as a result of delayed investigations and treatment, however the ability of the already stretched system to “catch up” will be limited – especially if social distancing limitations on clinical interface capacity remain.

Laboratory testing remains an especially important part of healthcare delivery and given limitations of the overall NHS system combined with the likely increased demand, it is vital that capacity and resource use are optimised. Demand optimisation of such processes affecting the whole “vein to brain” pathway is even more important than it was before but needs to be re-engineered to interface with the new challenges now being presented. This should now be seen as a priority for Laboratory Medicine and the wider NHS.

Annex E: NDOG Meetings Phase IV

2020

23 rd June:	NDOG Steering Group meeting
16 th July:	Update at Laboratories Executive Board (LEB)
21 st August:	Presentation at Scottish Clinical Biochemistry Network (SCBN) Steering Group
26 th August:	Presentation at Haematology and Transfusion Scotland Network (HaTS) Steering Group
27 th August:	Update at LEB
2 nd September:	NDOG Steering Group meeting
3 rd September:	Update at Diagnostics in Scotland Strategic Group (DiSSG)
17 th September:	Update at Scottish Microbiology and Virology Network (SMVN) Steering Group
23 rd September:	Presentation and initial data discussion at Scottish Pathology Network (SPAN) Steering Group
24 th September:	NDOG Phase IV Blood Science Data Workshop
30 th September:	Meeting with Scottish Government Long Term Conditions (LTC) Team
22 nd October:	Update at LEB
2 nd November:	Update at DiSSG
19 th November:	Meeting with Scottish Government Long Term Conditions (LTC) Team
19 th November:	RCPATH Achievement Awards Ceremony – NDOG a winner in ‘Innovation in Pathology Practice’ section
3 rd December:	NDOG Steering Group meeting
14 th December:	Update at LEB

2021

25 th January:	Presentation at SPAN Data Workshop
3 rd February:	Presentation at Academy of Medical Royal Colleges (AMRC)
18 th February:	Update at LEB
23 rd February:	Presentation at SPAN Steering Group
24 th February:	Engagement at SCBN Data Workshop
3 rd March:	NDOG Steering Group meeting
10 th March:	Engagement at HaTS Data Workshop

11 th March:	Update at DiSSG
16 th March:	Presentation at SCBN Steering Group
23 rd March:	Scottish Government session - Atlas of Variation QI presentation and publication discussion
31 st March:	Presentation at HaTS Steering Group
6 th April:	Meeting with Heart Disease policy colleague in Scottish Government
12 th April:	Meeting with Neuro Pathology colleague in Scottish Government
22 nd April:	Meeting with Diabetes policy colleague in Scottish Government
22 nd April:	Update at LEB
4 th April:	Presentation at Genetics laboratories meeting
11 th May:	NDOG Steering Group meeting
12 th May:	Meeting with Scottish Government Long Term Conditions (LTC) Team
21 st May:	Advancing Healthcare Awards– NDOG a finalist in Scottish Government's category for 'Driving Improvement, Delivering Results'
25 th May:	Meeting with Diabetes policy colleagues in Scottish Government
27 th May:	Meeting with Scottish Government LTC Team Primary Care members

Annex F: Phase IV Histopathology Data Collection (monthly, January 2019 onwards)

Overall Laboratory Totals	Total Requests
	Total Blocks
	Total Specimens
Breast Core Biopsy	Total Breast Core biopsy Requests
	Total Breast Core biopsy Blocks
	Total Breast Core biopsy Specimens
Colorectal Endoscopy Biopsy	Total Colorectal Endoscopy biopsy Requests
	Total Colorectal Endoscopy biopsy Blocks
	Total Colorectal Endoscopy biopsy Specimens
Prostate Core Biopsy	Total Prostate core biopsy Requests
	Total Prostate core biopsy Blocks
	Total Prostate core biopsy Specimens
Gallbladder Resection	Total Gallbladder resection Requests
	Total Gallbladder resection Blocks
	Total Gallbladder resection Specimens
Rectal Anterior Resection	Total Rectal Anterior Resection Requests
	Total Rectal Anterior Resection Blocks
	Total Rectal Anterior Resection Specimens
Breast Wide Local Excision	Total Breast Wide Local Excision Requests
	Total Breast Wide Local Excision Blocks
	Total Breast Wide Local Excision Specimens
Neuro	Total Neuro Workload
Immunohistochemistry	Total slides

Annex G: Phase IV Blood Sciences Data Collection (monthly, January 2019 onwards)

Level 1 data (NHS Board Totals)

Total Biochemistry Tests	Primary Care
	Non-Primary
	Out-Patients
	Total
Total Haematology Tests	Primary Care
	Non-Primary
	Out-Patients
	Total
Total Immunology Tests	Primary Care
	Non-Primary
	Out-Patients
	Total
Total Microbiology / Virology Tests	Primary Care
	Non-Primary
	Out-Patients
	Total

Level 2 data (NHS Board Totals)

General - Total tests	Full Blood Count
	Blood Film
	Coeliac (tTG Antibody)
	B12
	Ferritin
	Intrinsic Factor
	Immunophenotyping
	Drugs of abuse (oral and urine combined total)
	Chlamydia
	Gonorrhoea
	Sodium
	Urine culture
	INR (not including POCT)
	Cancer - Total tests
QFIT	
SFLCs	
Serum Electrophoresis	
CA125	
CEA	
Bone Marrow	
Calprotectin	
Diabetes - Total tests	HbA1C
Cardiac - Total tests	BNP/ntpro-BNP
	D-Dimer
	Cholesterol

Level 3 data (Request figures by GP Practice Code)

General - Total tests	Full Blood Count
	Blood Film
	Coeliac (tTG Antibody)
	B12
	Ferritin
	Intrinsic Factor
	Immunophenotyping
	Drugs of abuse (oral and urine combined total)
	Chlamydia
	Gonorrhoea
	Sodium
	Urine culture
	INR (not including POCT)
	Cancer - Total tests
QFIT	
SFLCs	
Serum Electrophoresis	
CA125	
CEA	
Bone Marrow	
Calprotectin	
Diabetes - Total tests	HbA1C
Cardiac - Total tests	BNP/ntpro-BNP
	D-Dimer
	Cholesterol

Annex H: Lab Activity as a Metric for Pandemic Healthcare Trends (February 2021)

The National Demand Optimisation Group (NDOG) for Laboratory Medicine has developed a monitoring tool that tracks diagnostic activity during the pandemic and into recovery. This information is a direct surrogate metric for associated clinical activity and can be used to identify healthcare gaps, monitor recovery, and enable better informed prioritisation decisions.

Background

The NDOG was established in 2016 as a collaborative initiative aimed at developing a programme of work to optimise the use of laboratory testing to reduce unwarranted variation in the delivery of healthcare. The group has developed an interactive Atlas of Variation (AoV) for laboratory tests that tracks lab test use at regional, board, cluster, and GP practice levels. This allows unwarranted variation to be identified and targeted via peer comparison and educational interventions.

During the COVID-19 pandemic, emphasis has shifted towards using the same data collection and AoV structure to develop dashboard intelligence on lab test trends. Given the integral importance of lab testing throughout healthcare, these trends are an indirect marker for diagnosis, monitoring and treatment modalities throughout the pandemic period and into the recovery phase. Such information may be vital at identifying reductions in diagnoses and treatment of specific malignancies and other disease pathways such as diabetes, heart disease and chronic conditions.

Pathology and Cancer

Pathology specimens serve as a robust marker of healthcare activity associated with the diagnosis and treatment of various malignancies and other serious diseases. Figure 1 shows the total number of pathology requests, received by Scottish labs during the pandemic, adjusted to the 2019 average for each health board. Similar trends are seen when specific specimen types are looked at in isolation.

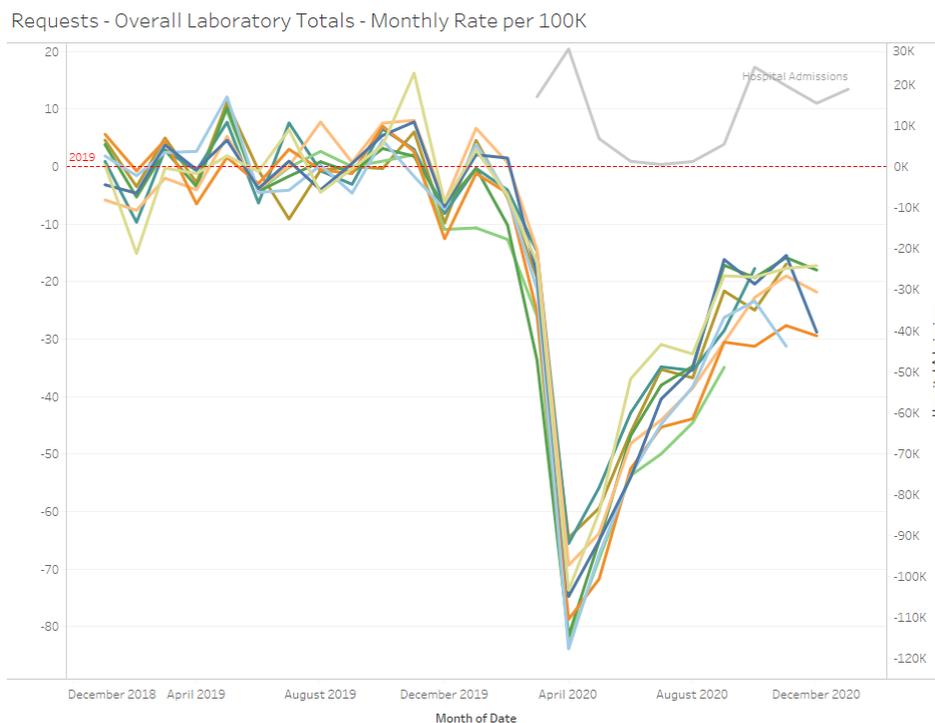


Figure 1. Total pathology requests per health board adjusted to 2019 average and COVID-19 hospital admissions – monthly data points

Interactive Dashboard Development

An AoV style Tableau dashboard (Figure 2) has been created that allows interrogation of the data to focus on specific health boards, specimen types and even complexity of specimen requests by virtue of the number of blocks and slides generated.



Figure 2. Interactive tableau dashboard

Blood Sciences and Diabetes

Blood tests are a good measure of healthcare activity within both Primary and Secondary care. Significant reductions in blood test requesting have been observed throughout the pandemic because of reduced activity (out-patients, GP led clinics) and significant phlebotomy capacity issues in the community due to social distancing measures and staff pressures.

The diagnosis and monitoring of diabetes is crucially dependent upon blood testing for HbA1c. Figure 3 shows Primary Care HbA1c requesting trends during the pandemic period adjusted to the average 2019 activity. The significant reductions observed in HbA1c testing are likely to have significant clinical consequences for both new diagnoses and the adequate monitoring of existing diabetic patients.

Interactive dashboards are being created for HbA1c and other key blood markers, including those related to cancer diagnosis and monitoring. These will allow trend interrogation by health board down to GP practice level.

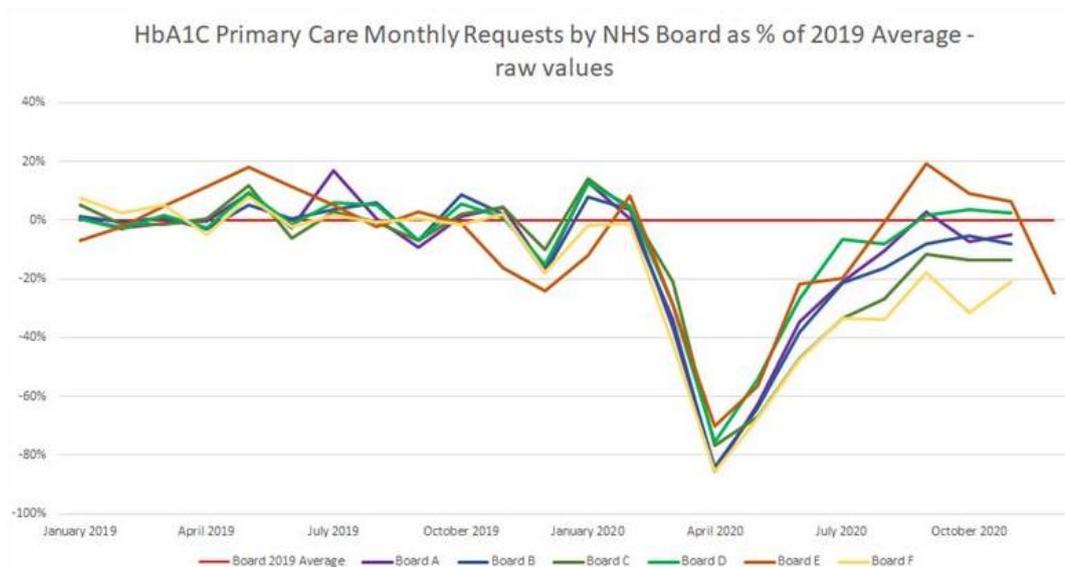


Figure 3. Primary Care HbA1c requesting trends per health board adjusted to 2019 levels

Data Collection and IT Limitations

Data collection of laboratory test use on a national basis is difficult because of outdated lab IT systems, inconsistent coding systems and a lack of interoperability between health boards. Automated collection on a national basis is therefore not possible but must rely on manual downloads from individual health boards. Data collection is therefore patchy and will depend upon IT resource availability within the boards, which is under intense pressure due to the pandemic. If lab test trend analysis is important then consideration should be given to provide additional resource allocation to assist data collection by local IT personnel.

Potential Uses of the NDOG Lab Activity Dashboard

As a result of the pandemic, established metrics of healthcare activity/demand have become unreliable due to the huge shift away from traditional modes of care, referral, waiting list accumulation and reluctance of patients to seek direct medical input. The Lab Activity dashboard can therefore serve as a useful surrogate metric for healthcare activity across cancer and other chronic conditions. Specific uses could include:

1. **Phlebotomy Capacity** – using blood sciences data to identify demand and shortfall in phlebotomy provision across Primary/Secondary care and monitor the impact of developing Community Phlebotomy Hubs.
2. **Cancer** – using pathology and blood sciences data to identify gaps in the screening, diagnosis and monitoring of specific malignancies.
3. **Chronic Disease Pathways** – Similarly, focus in on specific disease pathways to identify healthcare gaps from health board down to individual GP practice level.
4. **Recovery Targeted Prioritisation** – identified healthcare gaps can be assessed and prioritised at health board level during recovery programmes.
5. **Targeting and Reducing Unwarranted Variation** – Ensuring appropriate lab test use is tracked and optimised – especially important during post pandemic recovery period.
6. **Laboratory Resource Allocation** – Much of the gap lab activity will likely return, and with the inevitable enhanced recovery initiatives to enable catch up, this will

likely put huge pressures on lab services – especially within pathology, given the predicted consultant shortfall.

Recommendations

The Scottish NHS has faced a huge crisis associated with the COVID-19 pandemic. As we hopefully emerge from the second wave, another healthcare crisis associated with the missed diagnoses, delayed treatments, and the continuing impact of COVID-19 long term, will require focus – both to identify the gaps and to prioritise scarce resource. The NDOG Lab Activity dashboard will be an important tool going forwards and the following should be considered:

- **Awareness** – Scottish Government, Health Boards, Chief Executives, Remobilisation Groups and Lab Services should be aware of this potentially valuable resource in identifying pandemic driven healthcare gaps and enabling targeted prioritisation of resource moving into the post-pandemic recovery period.
- **Collaboration** – Clinical groups should consider working alongside the NDOG to develop specific lab metric bundles linked to their patient pathways.
- **Resource** – Additional resource input should be considered to allow the NDOG/ISD and local lab IT provision to deliver this initiative.
- **Lab Services** – Careful resource planning to enable lab services to cope with likely enhanced activity they will face as services recover and overshoot normal capacity - especially given the existing shortfall in Consultant pathologist capacity across the UK.

Dr Bernie Croal on behalf of the NDOG
August 2021

Demand Optimisation Pandemic Monitoring Dashboards FAQs

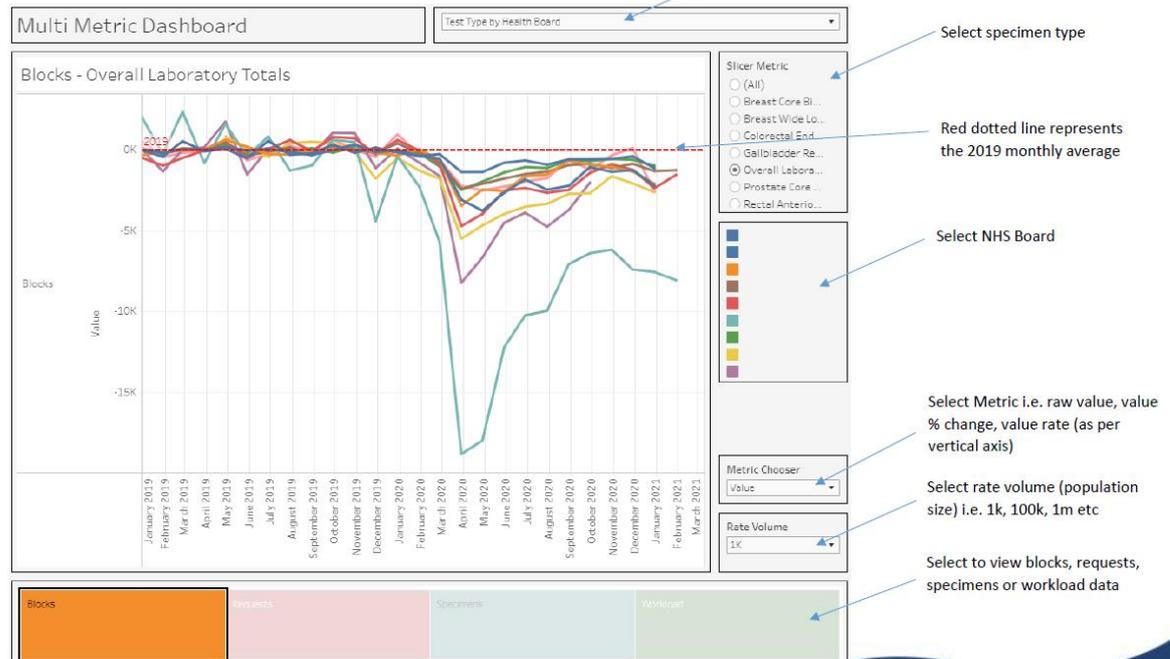
The [Pandemic Monitoring Dashboards](#) were developed in collaboration with the DO Steering Group and other key stakeholders. The dashboards demonstrate potential in identifying emerging healthcare gaps in diagnosis and treatment for areas such as cancer and chronic disease as a result of the COVID-19 pandemic. This could be useful during recovery to help identify priority areas and allow focus on these at national, regional and board level.

FAQs:

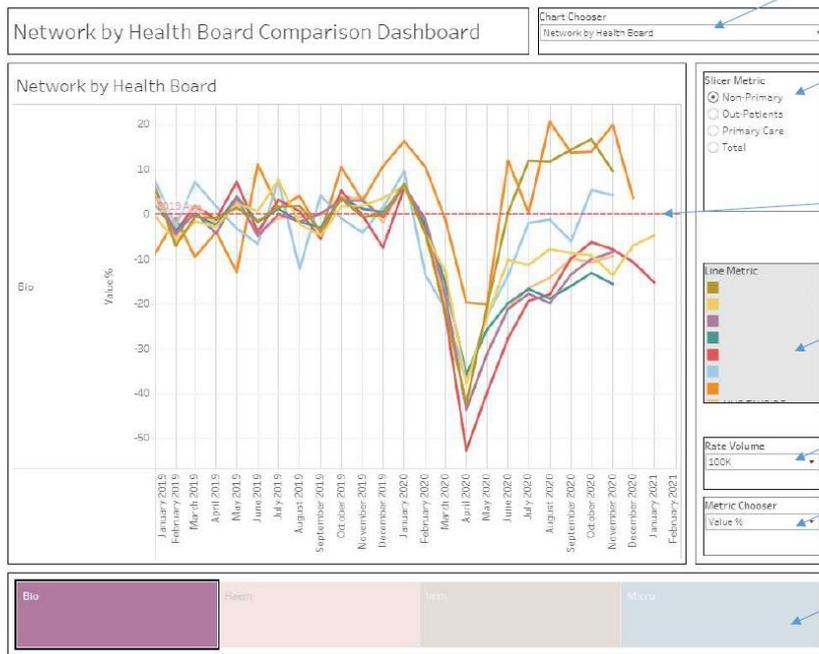
1. **What do I do if the data looks wrong?**
 - a. Email nss.nationaldemand@nhs.scot to report it with as much information as possible (i.e. GP Practice name, test name etc)
2. **Can I share the links to the dashboards with other NHS Scotland Staff?**
 - a. Yes – please do
3. **How often are the dashboards updated?**
 - a. We request monthly data from NHS Boards to undertake regular dashboard updates
4. **Can I suggest changes to the dashboards?**
 - a. Yes, please email nss.nationaldemand@nhs.scot. Information provided will be discussed by the Demand Optimisation Core Team and raised at relevant National Diagnostic Network Steering Groups where relevant
5. **Is there a change control process?**
 - a. Yes, the Demand Optimisation Core Team record all changes made to the dashboards
6. **How do I find out more about the Demand Optimisation Group?**
 - a. Please visit our website <https://www.demandoptimisation.scot.nhs.uk/>
7. **Which Internet browser should I use to access the Atlas of Variation?**
 - a. Please use Chrome or Firefox. Do not use Internet Explorer
8. **If I have local / national guidelines relating to tests on the dashboards, can I send them in?**
 - a. Yes – please send in to the Demand Optimisation mailbox nss.nationaldemand@nhs.scot
9. **Where do I go if I have any other questions?**
 - a. Please email us using the Demand Optimisation mailbox nss.nationaldemand@nhs.scot

In the annotated dashboard views below, NHS Board names are redacted.

Histopathology view



Blood Sciences Level 1 view – NHS Board total workload by discipline



Select dashboard view

Select source of diagnostic test

Red dotted line represents the 2019 monthly average

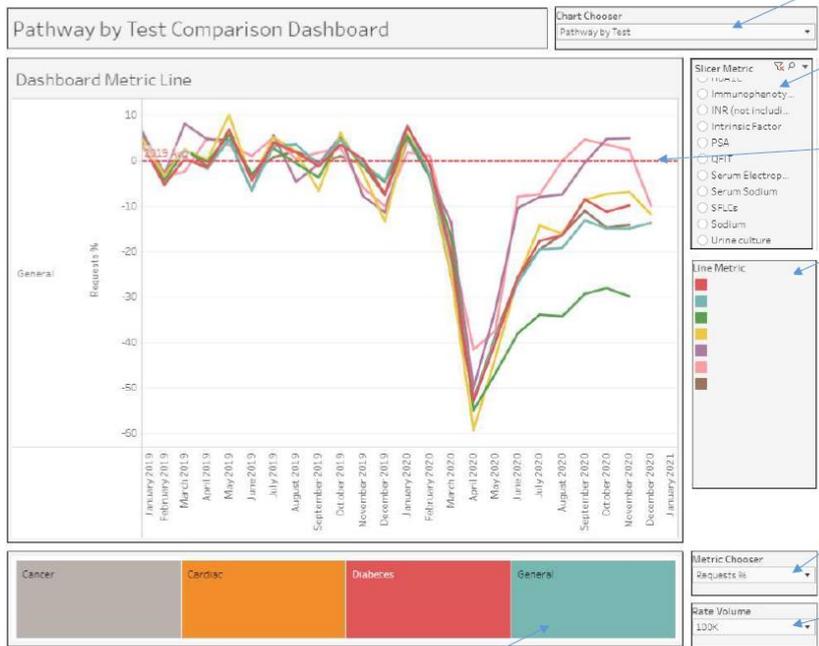
Select NHS Board

Select rate volume (population size) i.e. 1k, 100k, 1m etc

Select Metric i.e. raw value, value % change, value rate (as per vertical axis)

Select discipline i.e. Biochemistry, Haematology, Immunology, Microbiology&Virology

Blood Sciences Level 2 view – NHS Board totals by test



Select dashboard view

Select test from list

Red dotted line represents the 2019 monthly average

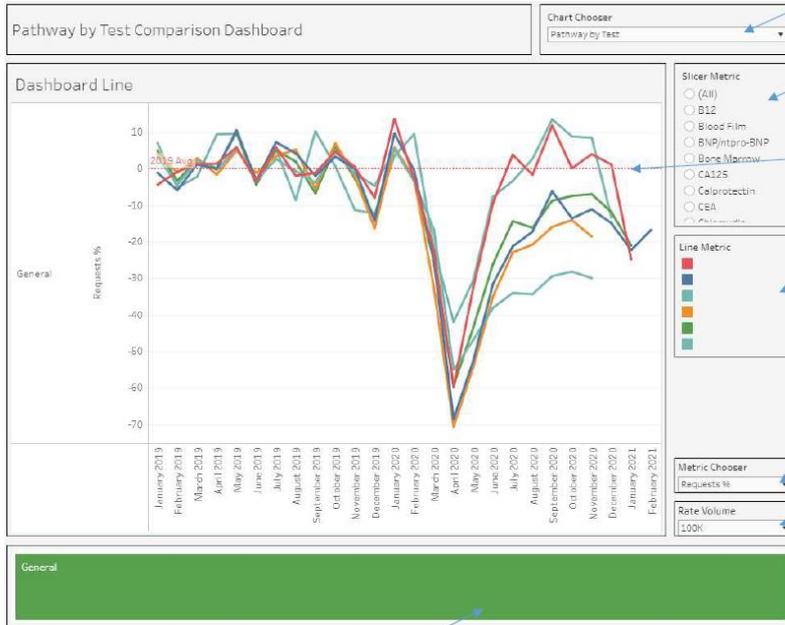
Select NHS Board

Select Metric i.e. raw value, value % change, value rate (as per vertical axis)

Select rate volume (population size) i.e. 1k, 100k, 1m etc

Indicates the pathway category that the test fits into i.e. Cancer, Cardiac, Diabetes or General Population Health

Blood Sciences Level 3 view – total Primary Care test requests by NHS Board



Select dashboard view

Select test from list

Red dotted line represents the 2019 monthly average

Select NHS Board

Select Metric i.e. raw value, value % change, value rate (as per vertical axis)

Select rate volume (population size) i.e. 1k, 100k, 1m etc

Indicates the pathway category that the test fits into i.e. Cancer, Cardiac, Diabetes or General Population Health

Annex J: Test feedback template example

Demand Optimisation Blood Science Test Information Template

Test Name:	B12	Report Refresh Date:	24/06/2021	NHS Boards included: NHS Ayrshire and Arran NHS Dumfries and Galloway NHS Fife NHS Grampian NHS Highland NHS Lothian NHS Shetland NHS Tayside																																													
Report Views:	Board total test figures - % change from 2019 monthly average																																																
View A: Board total test figures - % changes from 2019 monthly average		Table A: Board total test figures - raw data																																															
		<table border="1"> <thead> <tr> <th>NHS BOARD</th> <th>Pre-Pandemic</th> <th>Pandemic</th> <th>Difference</th> <th>% Change</th> </tr> </thead> <tbody> <tr> <td>NHS Ayrshire and Arran</td> <td>20978</td> <td>24034</td> <td>3,056</td> <td>14.57%</td> </tr> <tr> <td>NHS Dumfries and Galloway</td> <td>10806</td> <td>9821</td> <td>-985</td> <td>-9.12%</td> </tr> <tr> <td>NHS Fife</td> <td>20236</td> <td>17292</td> <td>-2,944</td> <td>-14.55%</td> </tr> <tr> <td>NHS Grampian</td> <td>48731</td> <td>41316</td> <td>-7,415</td> <td>-15.22%</td> </tr> <tr> <td>NHS Highland</td> <td>18104</td> <td>14703</td> <td>-3,401</td> <td>-18.79%</td> </tr> <tr> <td>NHS Lothian</td> <td>143656</td> <td>114044</td> <td>-29,612</td> <td>-20.61%</td> </tr> <tr> <td>NHS Shetland</td> <td>1966</td> <td>2167</td> <td>201</td> <td>10.22%</td> </tr> <tr> <td>NHS Tayside</td> <td>19979</td> <td>15948</td> <td>-4,031</td> <td>-20.18%</td> </tr> </tbody> </table>			NHS BOARD	Pre-Pandemic	Pandemic	Difference	% Change	NHS Ayrshire and Arran	20978	24034	3,056	14.57%	NHS Dumfries and Galloway	10806	9821	-985	-9.12%	NHS Fife	20236	17292	-2,944	-14.55%	NHS Grampian	48731	41316	-7,415	-15.22%	NHS Highland	18104	14703	-3,401	-18.79%	NHS Lothian	143656	114044	-29,612	-20.61%	NHS Shetland	1966	2167	201	10.22%	NHS Tayside	19979	15948	-4,031	-20.18%
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Dashboard: https://public.tableau.com/app/profile/ims.requests.team/viz/AoVPhase4LVL2/ComparisonDashboard																																																	
Information Required																																																	
Your Board:																																																	
Comment on Scottish trend and clinical significance – also specific Boards of concern if applicable:																																																	
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