

Test & Protect in Scotland

Falling at the First Hurdle

Our Scottish Future

11th January 2020



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Key Sources

- **Official Sources**
 - ONS Surveillance Survey Results (<https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/datasets/coronaviruscovid19infectionsurveydata>)
 - Public Health Scotland (<https://www.opendata.nhs.scot/dataset/weekly-covid-19-statistical-data-in-scotland>)
 - NHS Test & Trace England (<https://www.gov.uk/government/publications/nhs-test-and-trace-england-statistics-10-december-to-16-December>)
 - Public Health Wales (<https://gov.wales/test-trace-protect-contact-tracing-coronavirus-covid-19>)
 - Public Health NI (<https://www.publichealth.hscni.net/covid-19-coronavirus/testing-and-tracing-covid-19/contact-tracing-service-management-information>)
- **Academic Sources**
 - Comparison of molecular testing strategies for COVID-19 control: a mathematical modelling study (Grassly et al)

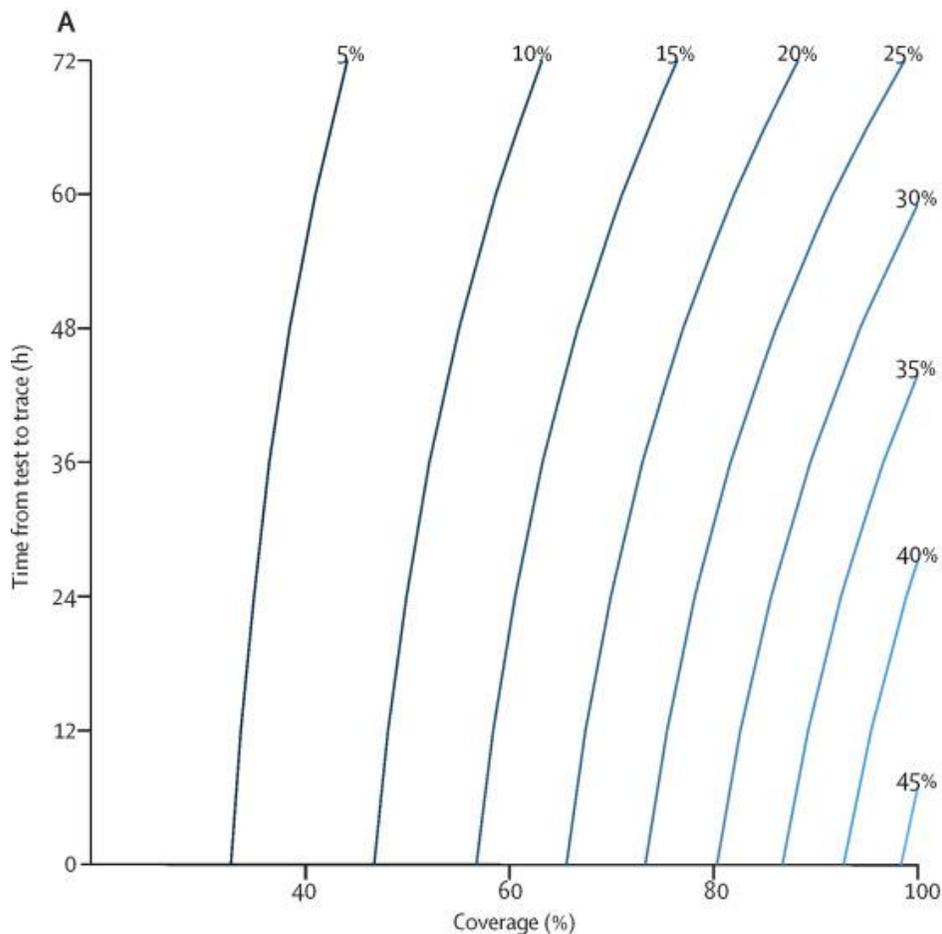
Scotland's Test & Protect programme is having virtually no impact on the fight against COVID: better management is urgently required

Executive Summary

- **Scotland's complex Test & Protect system can only work if it can operate at speed to identify and isolate a meaningful proportion of total cases, and harvest a high number of close contacts**
 - 'Test & Trace' programmes can impact R by c.20-30%, but only a high proportion of cases are identified in a timely manner – Imperial college modelling estimated that identifying 80% of cases with 24 hour turnaround time between sample collection and test notification could impact the reproduction rate ('R') by 23%
 - Responsibility for the Test & Protect operations – surveillance, testing, isolating/interviewing, and tracing - in Scotland is highly fragmented between UK bodies (ONS, UK Pillar 2), the Scottish Government, and Local Health Boards
 - The critical KPIs for understanding whole system performance sit across multiple data sets (ONS, Daily COVID Stats, Public Health Scotland)
- **The Scottish Test & Protect System is hamstrung by a low detection rate that misses 2/3 of positive cases and slow testing turnaround times; these factors both alone and together render an effective contact tracing operation effectively valueless (<5% impact on R)**
 - Comparing positive tests results to the infection rate estimated by the ONS surveillance survey implies that an average of 68% cases since November 22 have not been identified through testing – meaning that the vast majority of cases have not been contact-traced; Scotland is the worst performer in the UK on this metric
 - Furthermore, testing Turnaround Time (TAT) is slow – with only 56% of samples collected achieving a result within 24hrs meaning that the median time to contact tracing being effected is c.48 hrs
 - Scotland's good contact tracing machine (which generates c.1.5-2x more contacts per case than other UK nations, and has faster overall TAT) is therefore rendered meaningless by the low detection rate and slow testing TAT, with a total impact on R of <5%
- **Fixing the big issues with symptomatic testing and deploying Scotland's excess capacity on asymptomatic testing in schools could enable release of some of the most onerous lockdown restrictions while the vaccine is rolled out**
 - Scotland is currently only using around a third of its total testing capacity, with participation depressed by low levels of convenience and poor messaging across two separate testing systems (NHS Scotland and UK government)
 - Four simple fixes – better and more focussed messaging, more testing locations, better and faster at-home provision via lateral flow, and more active engagement with traced contacts - could dramatically increase symptomatic utilisation, but they must be made in co-ordination between the Scottish and UK testing operations
 - Furthermore, weekly prophylactic PCR testing should be offered to police officers and teachers so that critical public institutions can be kept safe

'Test & Trace' programmes can impact R by c.20-30%, but only a high proportion of cases are identified in a timely manner

Test & Protect In Theory



Theoretical Impact of Test & Trace

Academic modelling of the theoretical impact of Test & Trace on the R number focusses on 'Coverage' and 'Time'

- 'Coverage' = proportion of cases that are tested and contacts successfully traced and quarantined
 - Detection Rate (% of active COVID cases identified by testing)
 - Interview Rate (% of +ve cases interviewed to generate close contact list)
 - Contact Rate (% of identified close contacts contacted)
- 'Time' = Time between a positive sample and close contacts being shut down
 - Test Turnaround Time (TAT) between sample collection and positive result
 - Time between Positive Test & Interview(/Close Contact Discovery)
 - Time between Interview and Contacts

The chart on the left hand side (sourced from an Imperial college team – who assist the Scottish government with modelling the virus) details the impact on R of isolating contacts of positive tests based on Coverage and Time (incremental to positive/symptomatic cases self-isolating)

- Eg 20% reduction in R number can be achieved by c.70% coverage and 0 time from test to trace or 85% coverage, 72 hrs
- Isoquants (lines) demonstrate that 'coverage' is more critical than 'time'

Test & Protect has 4 core operational processes – each of which must be executed at speed across different organizations to have substantial impact

Test & Protect in Practice

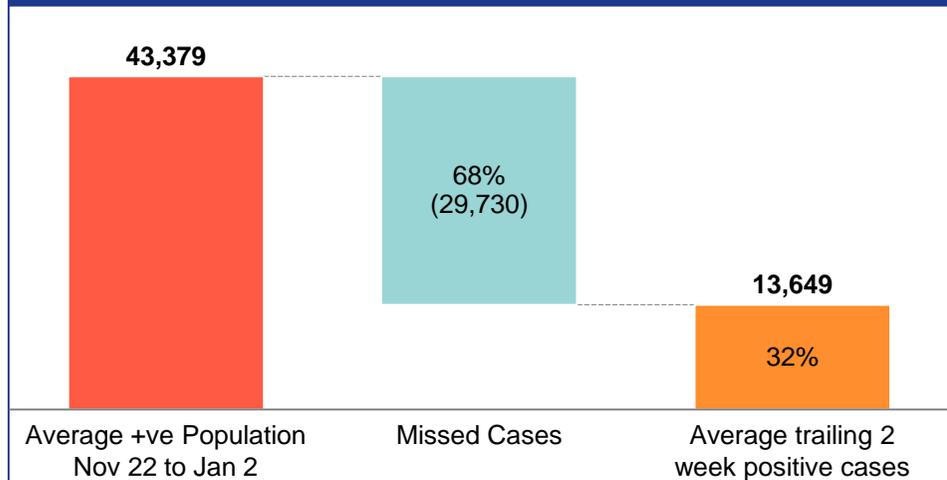


	Surveillance	Detection	Track	Trace
Purpose	<ul style="list-style-type: none"> Understanding with confidence the aggregate spread of the virus within a population Ideally modelled at as small a geographic level as possible 	<ul style="list-style-type: none"> Using testing to positively identify as many live COVID cases as possible 	<ul style="list-style-type: none"> Contacting those that have tested positive, and ensuring compliance with self-isolation period 	<ul style="list-style-type: none"> Harvesting contacts from those who have tested positive, and contacting and isolating those individuals
Scottish Solution	<ul style="list-style-type: none"> Initially, the Scottish government modelled the spread of the virus based on the Imperial Model of +ve tests and deaths Since October 2020, UK Office of National Statistics and Oxford University have run a surveillance-testing methodology 	<ul style="list-style-type: none"> NHS Scotland (in health boards) are responsible for Health & Social worker testing (c. 1/3 of all testing done, including most asymptomatic testing) The UK Government testing programme is responsible for all other tests 	<ul style="list-style-type: none"> National Contact Tracing Centre Supported by Local Enhanced Health Protection Teams 	<ul style="list-style-type: none"> Automated SMS-led approach for most cases, driven by NCTC
Key Performance Indicators	<ul style="list-style-type: none"> Infection Rate (% of population infected) Statistical Confidence Interval: (size of range of 95% confidence) 	<ul style="list-style-type: none"> Detection Rate: % of infected population testing positive Test Turnaround Time: Hours between initial request (or sample given) and result 	<ul style="list-style-type: none"> Interview Rate: % of positive test cases contacted Track Speed: Time to contact following test result 	<ul style="list-style-type: none"> Contact Ratio: Close Contacts identified per positive case Contact Rate: Close Contacts positively notified per individual identified

Scotland’s Test & Trace Regime objectively ‘falls at the first hurdle’ – with 2/3 of all cases not being identified

Detection Rate

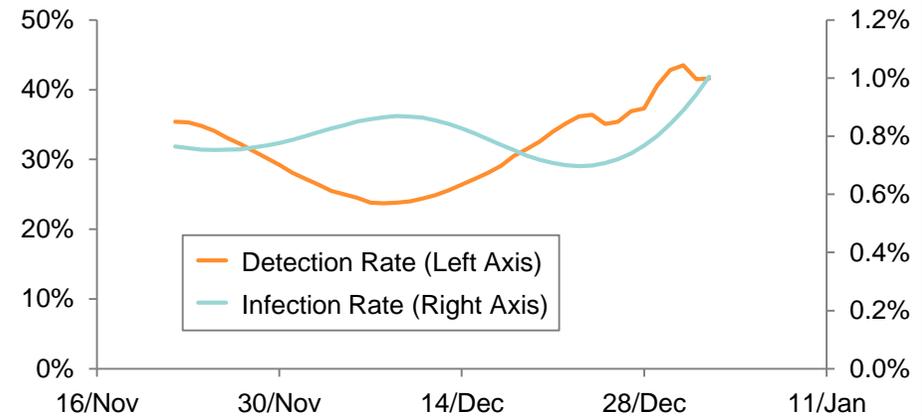
Since November, Scotland has missed >2/3 of all infections



• **Explanatory Methodology**

- ONS Surveillance data and modelling indicates that on the average day since daily modelling started c.43k people in Scotland would test positive for COVID in the community (excluding hospitals, care homes etc)
- Positive cases are on average infectious for c. 2 weeks, therefore the trailing 14 days of positive cases (reported based on sample collection) can be used to estimate a ‘detection rate’

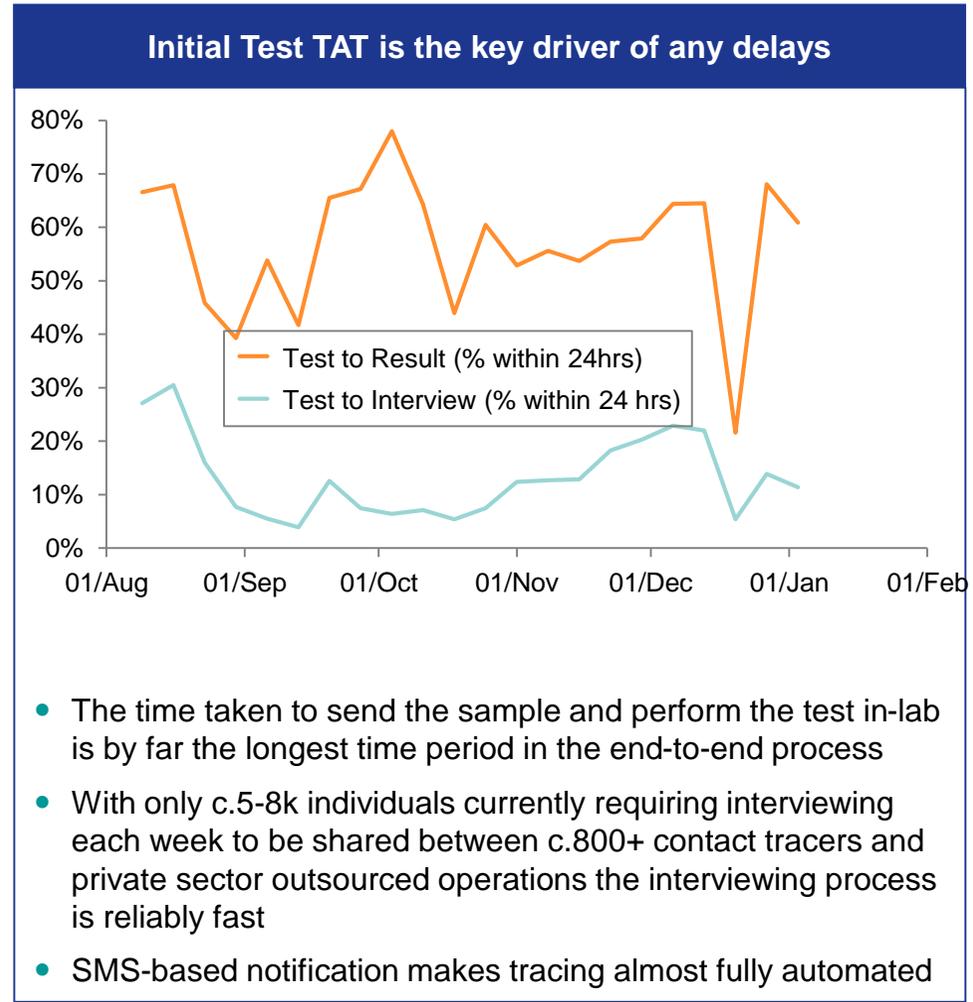
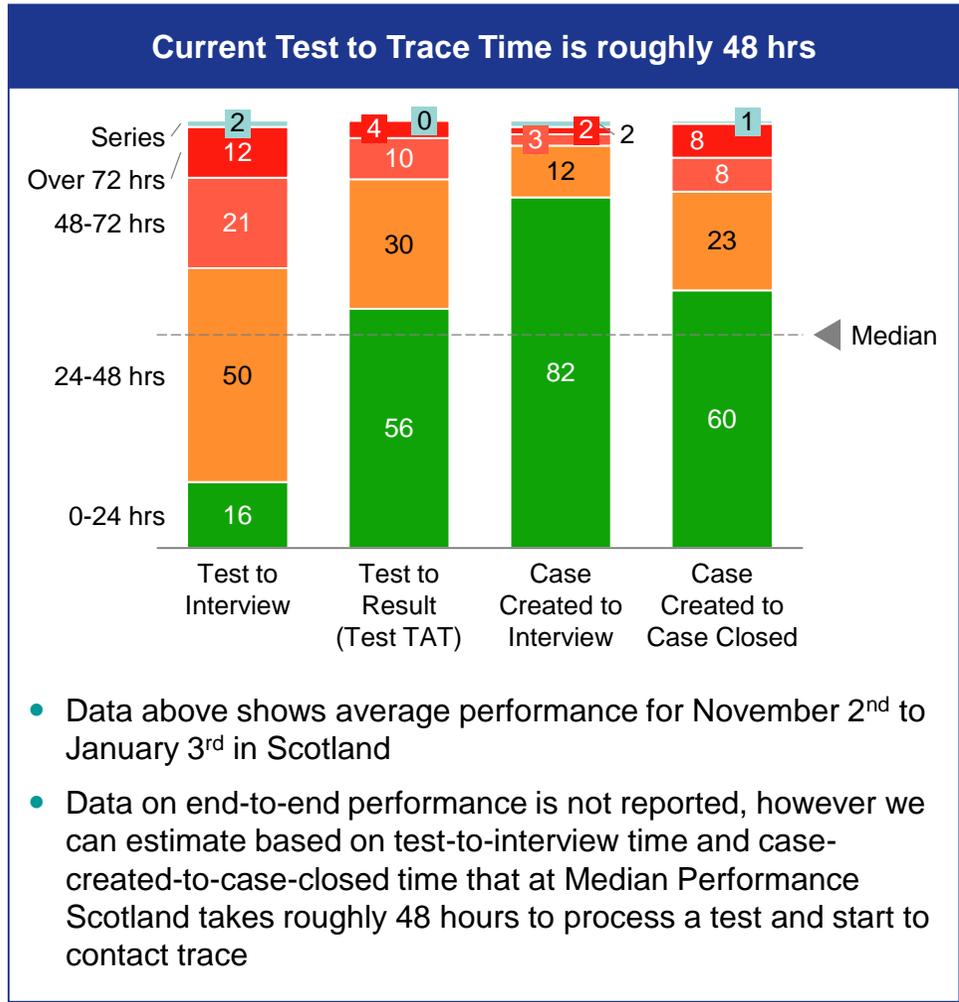
Detection Rate declines as Infection Rate rises, implying a rigid and ineffective overall programme



• **Implications**

- Imperial modelling suggests that Track & Trace operations at <35% detection rates are all but futile, reducing R by at most c. 5% even with perfect speed
- The inverse correlation between detection rate and infection rate observed in December (not repeated in other UK Nations) indicates a scheme that cannot adequately reach populations that become newly infected quickly

The systemic turnaround time is roughly 48 hrs – driven in particular by slow initial test turnaround time

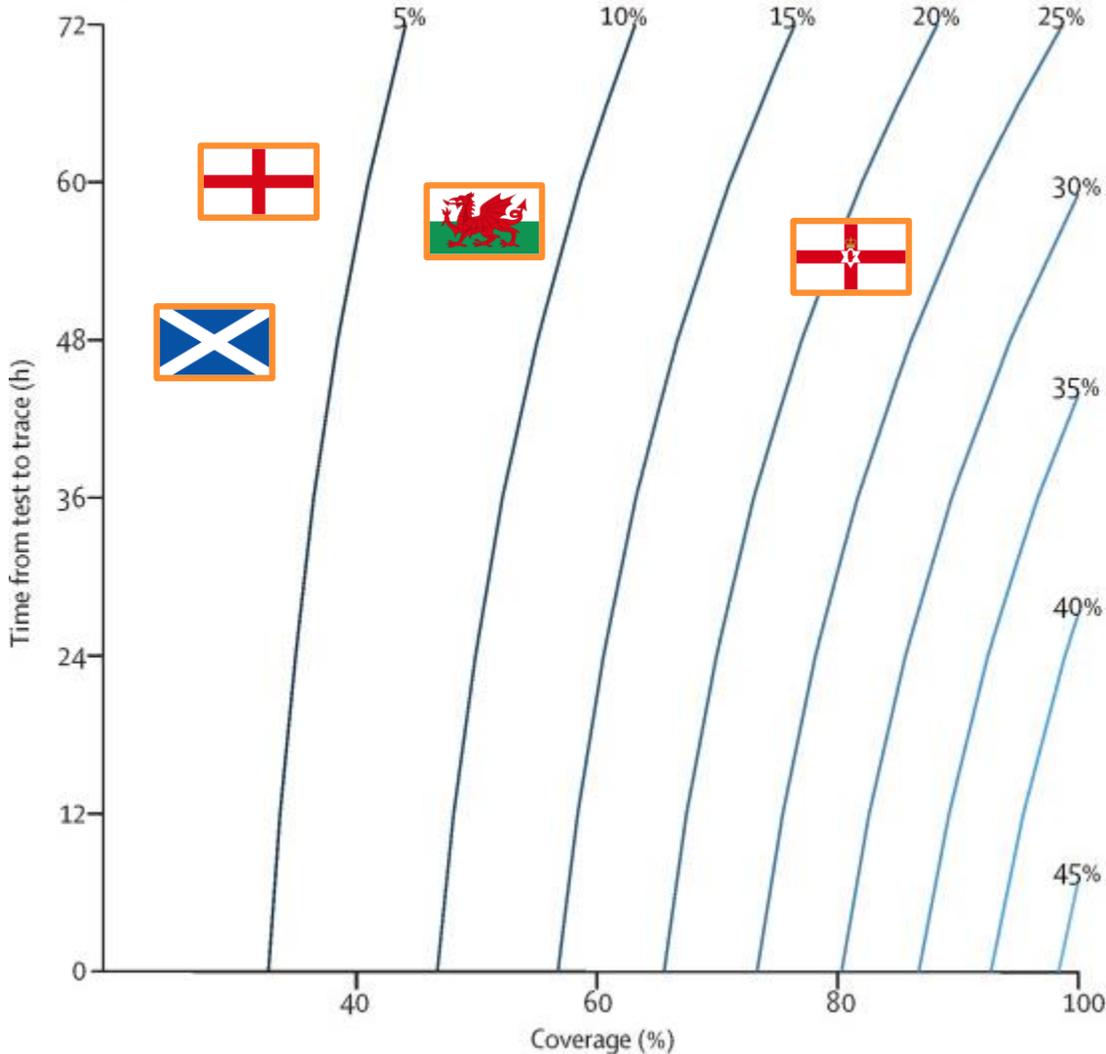


In aggregate, despite strong track & trace performance, Scotland's poor detection rate renders its overall programme worse than other UK nations

		Description	Scotland	England	Wales	Northern Ireland
Surveillance	Infection Rate	% of Population with the Virus (average 22 Nov to 2 nd Jan)	0.8%	1.3%	1.2%	0.5%
	Confidence Interval	%pt difference between 95% confidence lower/upper bounds of infection rate (same date range)	0.3%	0.1%	0.6%	0.4%
Detection	Detection Rate	Weighted Average Positive Cases for t-14 days as a % of Average Infections 3/11- 15/12)	32%	41%	70%	81%
	Turnaround Time	% of tests complete within 24 hrs of sample collection	56%	37%	60%	n.a.
Track	Interview Rate	% of Positive Cases Interviewed to harvest Contacts, last 6 weeks data	92%	87%	89%	c.95%
	Interview Speed	% of interviews held within 24 hrs of positive case notification, last 6 weeks data	82%	76%	51%	c.97%
Trace	Contact Ratio	Average Contacts Yielded per Interview, last 6 weeks data	4.1	2.4	2.7	2.1
	Contact Rate	% of Close Contacts successfully contacted, last 6 weeks data	97%	88%	83%	c.99%
	Contact Speed	% Contacts reached within 24 hours of interview, last 6 weeks data	n.a.	87%	74%	c.90%
Impact	Coverage Rate	Detection Rate x Interview Rate x Contact Rate	29%	31%	52%	76%
	Test to Trace Time	OSF Estimate based on indicators above (no end-to-end timing data available)	c.48 hrs	c.60hrs (+)	c.55 hrs	c.48-55hrs

Scotland's 'coverage' of 29% and test-to-trace time of c. 48 hrs means Test & Protect today has essentially zero impact on the fight against COVID

Coverage & Time impact on Test & Protect Success



Implications

Scotland's Test & Protect operation is having no impact on the fight against COVID

- Plotting Scotland's time from test to trace and coverage on the Imperial model implies a <5% impact of Test & protect on R
- Plotting Scotland's performance against other small UK nations, Scotland is clearly lagging

Improving 'Detection Rate' is the only way to meaningfully improve performance

- Detection rate puts a 'cap' on the effectiveness of the rest of the Test & Protect operation
- So long as detection rate is 30-40%, Scotland will be unable to meaningfully inhibit the spread of the virus through track & trace

Once coverage has improved, reducing time will have meaningful benefit

- If Scotland can achieve detection rates in line with NI, and then reduce TAT to 36 hrs, it could reduce R by c. 15%

Scotland is currently only using c. 1/3 of its available testing capacity – with low take-up likely driven by poor marketing and patient experience

PCR Testing Supply & Demand

		UK Government	NHS Scotland	Combined
October	Daily Testing Capacity	20,000	10,000	30,000
	Average Daily Tests	12,262 (68% of total)	5,836 (32%)	18,098
	Utilisation	61%	58%	60%
Going Forwards	Estimated Daily Capacity	40,000	32,000	72,000 <i>(60k Today – confirmed by FM)</i>
	Assumptions	<i>Continued share of UK capacity which has grown from 360k to 730k October to Jan</i>	<i>Impact of Glasgow, Aberdeen hubs (now open) and Edinburgh Hub (to Open)</i>	<i>Vs Scottish Government 65k plan for Winter</i>
	Average Tests/Day Nov 30-Dec 27	12,254 (63% of total)	7,144 (37%)	19,399
	Utilisation	31%	22%	33% <i>(of today's capacity)</i>

Of which 5,730 tests/day (c.30%) are asymptomatic care workers

Scotland's capacity is severely under-utilised

The Scottish System is poorly marketed and difficult to access for symptomatic cases

- The FACTS acronym relegates the importance of testing (part of Self-isolate) and only 40% of Scots know what it means in its entirety – 30% cannot identify a single feature.
- No Scottish government digital advertising has emphasised the need for symptomatic testing in the last 2 months (vs eg Students for Xmas) – this must be changed
- Currently 'two systems one country' across UK and Scottish capacity, with separate booking systems, criteria, channels/locations reduces convenience
- Currently there are only 24 permanent testing locations in Scotland, making getting tested highly inconvenient

Scotland's is therefore doing fewer tests per head than other UK nations

- Detection rate is driven in part by the proportion of the symptomatic population that decide to get tested
- For December 1-23, Scotland ran 8.4 tests per 100 population, vs 12.5 for England and Wales
- Pan-UK PCR capacity utilisation was 80% in October, and is 40% end of December

There is sufficient capacity to more than treble current testing volumes

4 simple fixes could drive up capacity utilization – each of which require more co-operation between UK and Scottish governments

1. Communicate The Need More Urgently

- The importance of getting tested – and the fact that it is convenient and free – should be communicated strongly and in its own right
- No Scottish government digital advertising has emphasised the need for symptomatic testing in the last 2 months (vs eg Students for Xmas) – this must be changed...
- ...And we should be clear with the public that we have substantial capacity available for anybody who is symptomatic

2. Improve Accessibility of UK Government Testing

- Convenience is the most critical enabler of testing regime compliance
- Currently there are only 24 permanent testing locations in Scotland – these must be at least doubled (with an emphasis on walk-thru) to enable shorter journey times
- The two separate online booking systems should be effectively consolidated into one
- The 5 day symptoms limit should be dropped and replaced with 8 days (in line with Eng)

3. Transform ‘At Home’ and Mobile Testing with Lateral Flow

- Only recently has ‘at home’ testing become available across all Scottish postcodes, and it is thought to represent a minority of Scottish test delivery today (10% in England)
- However, it is the most convenient channel, and in a world where coverage is for the moment more important than speed it must be prioritised
- Sending out lateral flow kits into the community for symptomatic cases (which they are better at diagnosing vs asymptomatic) could transform currently too-slow turnaround times and radically improve convenience

4. Call and Persuade Contact-Traced Individuals

- Traced contacts are more likely to develop symptoms than general population
- Currently almost all contact tracing is done through SMS for efficiency
- However, given current staffing levels there should be capacity in the system to deploy more staff to follow-up ‘check-in’ calls, where any report of mild symptoms can immediately lead to an on-the-phone booked test

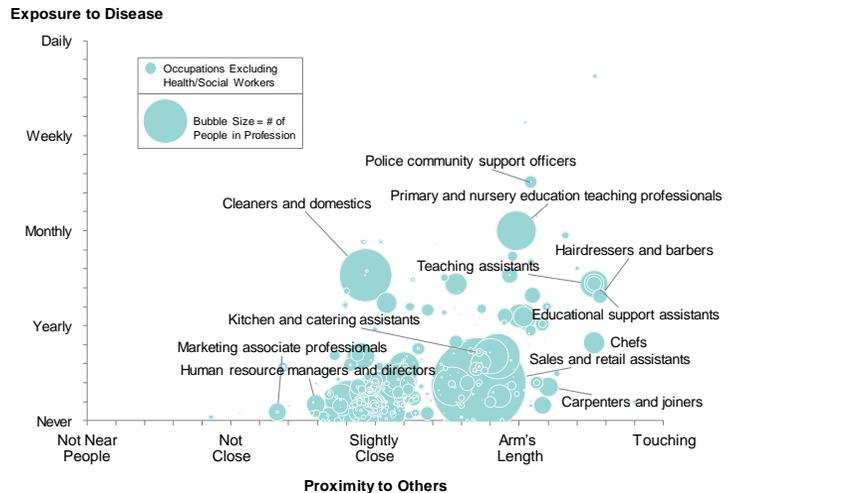
5. Improving UK-Scotland Co-Operation

- Develop and deploy common public health messaging and advertising between both nations when it comes to testing
- Develop inter-operable test booking platforms between Scotland and UK
- Local Health Boards should be encouraged to license more local sample collection capacity/locations that can plug into the UK Government Lighthouse Lab
- UK government should deplore more sophisticated mobile testing capacity (eg Lampore) in Scotland...
- ...And acquire and share more lateral flow devices from the global market
- Enable overflow capacity sharing between NHS England and Scotland operations to better load-balance and drive up call rate and utilization

In addition, asymptomatic testing should be offered to schools to help them re-open as planned February 1

Extending Asymptomatic Testing

- School teachers and police officers are among the most at-risk workers



- Re-opening schools safely from February 1 should be the priority – testing will be critical to this
 - Asymptomatic testing in care homes – previously advocated by Our Scottish Future – has worked, with c. 65-70% of the workforce being tested every week; even with more testing, we are still only seeing c.50% of the confirmed cases vs 1st peak now
 - Weekly asymptomatic testing for teachers can help ensure their safety and allow them to work with confidence
 - School pupils in areas with high infection rates could also get screening

