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Managed Care & Facilities

COVID-19 Daily Tracker: May 15, 2020; Introducing State Reopening Dashboards

Today we are excited to introduce two new state-level dashboards monitoring COVID-19 case growth and testing thresholds required for progressing through the three phases of reopening. Equally important, we have begun tracking two key metrics for monitoring signs of case growth rebounds in open states recognizing that many of the open states have yet to meet Phase 1 thresholds and that the outlined measures are lagging, not coincident, indicators of virus progression.

- Incorporating CDC guidance.** We have refined our initial threshold measures based on White House, National Governors Assoc. and other public health organizations to reflect the CDC guidelines that circulated last week but were not approved for distribution by the administration (with adjustments to reflect our view of important threshold metrics).
- Case growth thresholds: 39 states and DC have passed.** Examining the trajectory of case growth over the last 14-days, we find that 39 states and DC have demonstrated a sustained decline of which 26 have begun to loosen social distancing measures. **However, the daily case growth and five-day trend suggest 6 states may be seeing a rebound and caution is warranted in another 24.** We note that AR, SD, AL, ME, ND, NC and AZ have begun to open despite continuing to show an increase in case growth. (Case Dashboard on pg. 12)
- Testing thresholds: 44 states and D.C. have passed.** As testing has expanded (trailing 7-day average run rate of 2.25mn), **44 states and D.C. have demonstrated a 14-day decline in the trend in % positive, but no state has met the CDC draft guidance for 14 consecutive days and only five have achieved our less stringent measure of 10 of the last 14 days** (27 have met 8 of 14 days). The % positive remains above 10% in open states IA, AZ, NE and PA, suggesting more testing is needed. (Testing Dashboard on pg. 19)
- What next? We are watching the states that are evidencing potential signs of rebound closely, including both those that have already opened (TN, IA) are about to open soon (VA and LA) or appear to be opening of their own accord (MI).**

Figure: Nephron Research State Case Growth Threshold Dashboard: Indications of Rebound

State	Days Open	14-Day Trend (slope)	Avg Daily Cases (Prior 14-Days)	Case Threshold	Days Avg Daily Cases/100K > 10 Prior 14-Days	5-Day Trend (slope)	Sign of Rebound
Tennessee	18	-0.047		Pass/Phase 1	+2	+0.075	REBOUND
Iowa	14	-0.037		Pass/Phase 1	+12	+0.111	REBOUND
Louisiana	Opening Today	-0.018		Pass/Phase 1	+3	+0.124	REBOUND
Virginia	Opening Today	-0.001		Pass/Phase 1	+9	+0.015	REBOUND
Michigan	-	-0.042		Pass/Phase 1	+1	+0.064	REBOUND
Illinois	-	-0.010		Pass/Phase 1	+14	+0.081	REBOUND

Source: Nephron Research analysis of The COVID Tracking Project, CDC Reopening Guidance, State Reopening Data: <https://nyti.ms/2Ywoj1a>

U.S. CASE GROWTH UPDATE: Yesterday was another good example of increasing testing leading to higher case growth while cumulative % positive continues down (13.9%). U.S. cases totaled 1,407,507, an increase of 1.8% from the prior day, with the growth rate up 20bps. The data shows an uptick in new cases on an absolute basis, which corresponds to testing totals accelerating to the second highest daily level to date.

Please see important disclosures at the end of this report.

MAY 15, 2020

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COVID-19 Daily Tracker – Summary of Today's Update

U.S. case growth increased 1.8% yesterday up 20bp relative to the prior day

- **GLOBAL CASES:** Total global confirmed cases of COVID-19 reached 4.25 million on May 14th, representing an increase of 1.9% over the prior day. **The US has the most confirmed cases (1.41 million), followed by Russia (252.2K) and the UK (229.7K).**
- **GLOBAL HOT SPOTS:** We see increased activity in the mid-East, Africa and South America while second waves in Hong Kong and Singapore appear under control. We are watching India closely given implications for the pharmaceutical and medical supply chains.
- **U.S. CASE GROWTH:** Yesterday was another example of increased testing leading to higher case growth while % positive reaches new lows. There were 1,407,507 cases in the US, an increase of 1.8% from the prior day, with the growth rate up 20bps. The data also shows an uptick in new cases on an absolute basis, which corresponds to testing totals accelerating to the second highest daily level to date. We do note that **the daily % of positives ticked up 45bps to 6.9% but percentage of cumulative positive cases as a % of total testing ticked down 25bps to 13.6%** (the lowest level since March 21st).
- **NY STATE & CITY CASE GROWTH:** NY State reported 343.1K cases, up 0.7% from the prior day. Case growth increased to 2.4K d/d, compared to growth of 2.2K in the previous day. Despite the slight acceleration, **New York data continues to trend much more favorably, and has recorded eighteen consecutive days with growth below 5.0K** (and 9 of the past 10 days under 3K). Within New York City, case growth remained very low at 0.7%, which is one of the lowest growth rates recorded since the outbreak and the number of absolute new cases is the lowest since March 17th.
- **CASE GROWTH THRESHOLD:** Examining the trajectory of case growth over the last 14-days, we find that **39 states and DC** have demonstrated a sustained decline of which 26 have begun to loosen social distancing measures. However, the daily case growth and five-day trend suggest 6 may be seeing a rebound and caution is warranted in another 24. **We note that AR, SD, AL, ME, ND, NC and AZ have begun to open despite continuing to show an increase in case growth.**
- **TESTING THRESHOLD:** **44 states and D.C. have passed as testing has expanded (trailing 7-day average run rate of 2.25mn), but no state has met the CDC draft guidance for 14 consecutive days and only five have achieved our less stringent measure of 10 of the last 14 days (27 have met 8 of 14 days).** The % positive remains above 10% in open states IA, AZ, NE and PA suggesting more testing is needed.
- **HOSPITAL CAPACITY THRESHOLD:** State level hospital capacity and ICU utilization data is mixed at best making it hard to measure this threshold. We focus on ICU utilization in aggregate, which yesterday stood at ~10.9K beds, down 0.7% from the prior day. **The rate of ICU as a % of positive cases remained flat at 0.8%.** We are monitoring this closely as we would like to see fewer positive cases require the highest (and least supplied) level of care.
- **PUBLIC HEALTH SYSTEM CAPACITY THRESHOLD:** Testing will never be adequate, reliable and fast enough to identify all cases in real time, **requiring that state and local health agency tracing capability** alongside public health studies determining prevalence and mortality within communities and geographies. **We lack a data source for the number of public health workers focused on tracing by state but note estimates suggest an incremental 100k-300k are needed near-term.**
- **OPEN STATE MEASURES:** We are closely tracking case growth and % positive measures in open states (and key cities) that have not met the thresholds above. As of now the states of greatest concern include GA, TN, OK, SC and MS.

Breaking News Summary & Chart of the Day

[Chasing The Elusive Dream Of A COVID Cure](#) - Kaiser Health News

Although scientists and stock markets have celebrated the approval for emergency use of remdesivir to treat COVID-19, a cure for the disease that has killed nearly 260,000 people remains a long way off — and might never arrive. Hundreds of drugs are being studied around the world, but “I don’t see a lot of home runs right now,” said Dr. Carlos del Rio, a professor of infectious diseases at the Emory University Rollins School of Public Health. “I see a lot of strikeouts.”

[Will the U.S. corner the market on Covid-19 vaccine?](#) – STAT News

The United States is sprinting headlong toward the development and distribution of Covid-19 vaccines. But under an “America First” president, public health experts worry, the United States could seek to gobble up early supplies — and set the stage for prolonged devastation in the rest of the world.

[Extension of Certain Timeframes for Employee Benefit Plans, Participants, and Beneficiaries Affected by the COVID-19 Outbreak](#) – Federal Register

Instead of having to choose to enroll in COBRA within 60 days of notice, people now can enroll until 60 days after this coronavirus national emergency ends.

[Serological testing for SARS-CoV-2 antibodies](#) – AMA

The AMA cautions physicians and the general public about use of these tests to determine individual immunity and warns that public health decisions, such as discontinuation of physical distancing, should not be made on the basis of results.

[Abbott Will Change Coronavirus Test Instructions for Second Time](#) – Wall Street Journal

Abbott Laboratories said Thursday that it would change the instructions for using its fast coronavirus test for a second time, days after a preliminary study by a major medical center found the device frequently gave negative results for patients who were infected with the virus. The change will tell users that negative results produced by Abbott’s ID Now device are “presumptive” and should be verified with an alternative test for patients with signs of the virus. That means sacrificing the device’s quick turnaround time for some patients as tests are repeated using methods that can take much longer.

[Factbox: The race to deploy COVID-19 contact tracing apps](#) – Reuters

Technologists and health officials around the world are racing to develop smartphone apps to trace who has been in contact with carriers of the novel coronavirus. Contact-tracing, a disease control tactic that traditionally relies on patients’ memories of their movements, identifies people they might have infected so they too can be isolated.

[Hospitals Knew How to Make Money. Then Coronavirus Happened](#) - New York Times

When the top-ranked Mayo Clinic stopped all nonemergency medical care in late March, it began to lose millions of dollars a day. The clinic, a Minnesota-based hospital system accustomed to treating American presidents and foreign dignitaries, saw revenue plummet as it postponed lucrative surgeries to make way for coronavirus victims. The hospital network produced \$1 billion in net operating revenue last year, but now expects to lose \$900 million in 2020 even after furloughing workers, cutting doctors’ pay and halting new construction projects.

[Talking Can Generate Coronavirus Droplets That Linger Up to 14 Minutes](#) - New York Times

Coughs or sneezes may not be the only way people transmit infectious pathogens like the novel coronavirus to one another. Talking can also launch thousands of droplets so small they can remain suspended in the air for eight to 14 minutes, according to a new study. The research could help explain how people with mild or no symptoms may infect others in close quarters such as offices, nursing homes, cruise ships and other confined spaces.

[In Reversal, Kansas Will Count All Positive COVID Cases, Even Asymptomatic Ones](#) – Kaiser Health

Kansas leaders will include asymptomatic COVID-19 cases in their assessments of virus trends as they evaluate when to take further steps to ease stay-at-home orders and other social distancing measures. The move represents a reversal after NPR reported last week that the state was omitting these cases from its data, painting an overly optimistic picture of the outbreak.

[C.D.C. Issues Reopening Checklists for Schools and Businesses](#) – New York Times

The CDC on Thursday released six flow charts meant to help schools, restaurants, transit systems and other businesses decide when to reopen during the coronavirus pandemic, the agency's first release of such guidance after a more comprehensive draft was rejected by the White House. The decision trees are mostly composed of basic tips that can serve as a checklist for businesses before they reopen.

[Here's How Wuhan Plans to Test All 11 Million of Its People for Coronavirus](#) – New York Times

Wuhan, the Chinese city where the coronavirus pandemic began, has announced an ambitious plan to test all of its 11 million residents for the virus **in the coming days**, a campaign that will be closely watched by governments elsewhere.

[McConnell: 'High likelihood' that Congress will need to pass fifth coronavirus bill](#) – The Hill

Senate Majority Leader Mitch McConnell (R-Ky.) said Thursday that Congress would likely need to pass a fifth coronavirus relief bill, but declined to give a timeline for additional legislation. McConnell, during a Fox News interview, said he did "anticipate" that Congress will need to "act again at some point" but that Republicans first wanted to review the roughly \$2.8 trillion already appropriated by Congress.

[U.S. issues first coronavirus workplace guidance to nursing homes](#) – Reuters

The U.S. Department of Labor issued its first workplace guidance to nursing homes on Thursday since the COVID-19 pandemic swept the country and ravaged care facilities, saying residents, staff and visitors should keep 6 feet (1.83 meters) apart.

[One-Quarter of American Restaurants Won't Reopen, OpenTable Says](#) - Bloomberg

One in every four U.S. restaurants will go out of business due to the coronavirus quarantines that have battered the food-service industry, according to a forecast by OpenTable. Total reservations and walk-in customers from OpenTable's network were down 95% on May 13 from the same day a year ago.

COVID-19 Daily Tracker: Key Thresholds

Publication of the White House Coronavirus Task Forces' *Guidelines for Opening Up America Again* on April 16th was followed by the National Governors Association's publication of *Roadmap to Recovery, A Public Health Guide for Governors* on April 21st. **As such, we have organized the tracker around the goals and measures put forth by the White House, National Governors Assoc. and other public health organizations with an eye toward identifying those states that have met the thresholds for reopening the U.S. economy. Given that not all states are waiting until they achieve the suggested measures, we have also begun to more closely track cases in key cities within those states that have relaxed social distancing measures.**

Fig. 1: Within this report we track available readiness and reopening measures

White House Threshold	NGA State Metric to Consider	Available Measure
Case Identification Trend Goals: <i>Decreasing rate of COVID-19 positive cases, influenza like illness (ILI) and COVID-19 syndromic cases</i>	<ul style="list-style-type: none"> • 14-day trend for # of positive cases • # individuals with ILI symptoms • # of individuals COVID-19 like syndrome cases 	<ul style="list-style-type: none"> • State level decline in documented COVID-19 cases over 14-days
Point of Care Testing Results and Testing Capacity: <i>Decrease in 'percent positive', testing sites can handle asymptomatic cases, decrease in avg time to report test results, state testing capacity</i>	<ul style="list-style-type: none"> • # of 'percent positive' tests, 14-day trend • % of test sites that can screen for asymptomatic cases • time from specimen to result • # of labs reporting need for additional equipment, supplies, reagent, staffing 	<ul style="list-style-type: none"> • State level reduction in % positive over 14-days • State level # of diagnostic tests per week
Public Health System Capacity: <i>State ability to safely identify individuals and their contacts who may have been exposed to COVID-19 and prevent transmission</i>	<ul style="list-style-type: none"> • % of public health agencies with sufficient contact tracers to support case investigation of every COVID-19 positive case within the state • capacity to contact at least 90% of all elicited contacts 	<ul style="list-style-type: none"> • Anecdotal datapoints on efforts to ramp tracing and isolation • Anecdotal datapoints on digital tracing efforts
Healthcare Facility & Worker Capacity: <i>Ability to care for all patients, surge capacity, ability to test at-risk healthcare workers</i>	<ul style="list-style-type: none"> • % of hospitals that can handle doubling of patient volume with sufficient PPE • % of hospitals that can care for all patients without using crisis standards of care • % of facilities with testing program for workers 	<ul style="list-style-type: none"> • National hospitalization and ICU census • Anecdotal datapoints on PPE and crisis standards of care

Source: White House Guidelines for Opening Up America Again 4/16, National Governors Association Roadmap to Recovery 4/21, Nephron Research Analysis

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Global Perspective

Total global confirmed cases of COVID-19 reached 4.25 million as of May 14th, representing an increase of 1.9% relative to the previous day. The US has the most confirmed infections in the world, followed by Russia, Spain, and the UK. Italy now has the fifth most recorded cases in the world, following a protracted period of being in the top three. Among the five countries with the most infections, the US saw the largest absolute increase in documented cases, with 25.2K (1.8%) additional individuals testing positive for the virus. This is the highest level of growth in the past week. Russia had the second highest case growth on May 14th, with confirmed cases increasing 10.0K (4.1%) d/d. Other key countries we are watching include Turkey, Germany, Brazil, and France.

Fig. 2: Confirmed Case Tracker, Top 5 Countries

Date	World Total	Top 5 Countries														
		U.S.			Russia			U.K.			Spain			Italy		
	Total	Total	D/D	% D/D	Total	D/D	% D/D	Total	D/D	% D/D	Total	D/D	% D/D	Total	D/D	% D/D
30-Apr	3,090,445	1,062,503	29,346	3%	106,498	7,099	7%	165,225	4,076	3%	212,917	2,144	1%	203,591	2,086	1%
1-May	3,175,207	1,095,681	33,178	3%	114,431	7,933	7%	171,257	6,032	4%	213,435	518	0%	205,463	1,872	1%
2-May	3,267,184	1,125,719	30,038	3%	124,054	9,623	8%	177,458	6,201	4%	215,216	1,781	1%	207,428	1,965	1%
3-May	3,349,786	1,152,006	26,287	2%	134,687	10,633	9%	182,264	4,806	3%	216,582	1,366	1%	209,328	1,900	1%
4-May	3,435,894	1,173,453	21,447	2%	145,268	10,581	8%	186,603	4,339	2%	217,466	884	0%	210,717	1,389	1%
5-May	3,517,345	1,195,605	22,152	2%	155,370	10,102	7%	190,588	3,985	2%	218,011	545	0%	211,938	1,221	1%
6-May	3,588,773	1,220,557	24,952	2%	165,929	10,559	7%	194,994	4,406	2%	219,329	1,318	1%	213,013	1,075	1%
7-May	3,672,238	1,248,137	27,580	2%	177,160	11,231	7%	201,205	6,211	3%	220,325	996	0%	214,457	1,444	1%
8-May	3,759,967	1,275,916	27,779	2%	187,859	10,699	6%	206,719	5,514	3%	221,447	1,122	1%	215,858	1,401	1%
9-May	3,855,788	1,301,095	25,179	2%	198,676	10,817	6%	211,368	4,649	2%	222,857	1,410	1%	217,185	1,327	1%
10-May	3,917,366	1,322,807	21,712	2%	209,688	11,012	6%	215,264	3,896	2%	223,578	721	0%	218,268	1,083	0%
11-May	4,006,257	1,340,412	17,605	1%	221,344	11,656	6%	219,187	3,923	2%	224,390	812	0%	219,070	802	0%
12-May	4,088,848	1,361,884	21,472	2%	232,243	10,899	5%	223,064	3,877	2%	227,436	3,046	1%	219,814	744	0%
13-May	4,170,424	1,382,304	20,420	1%	242,271	10,028	4%	226,467	3,403	2%	228,030	594	0%	221,216	1,402	1%
14-May	4,248,389	1,407,507	25,203	2%	252,245	9,974	4%	229,709	3,242	1%	228,691	661	0%	222,104	888	0%
Day/Day	77,965	25,203			9,974			3,242			661			888		
% d/d	1.9%	1.8%			4.1%			1.4%			0.3%			0.4%		

*Data for the US is sourced from The COVID Tracking Project. All else sourced from the World Health Organization.

Source: Nephron Research analysis of data from the World Health Organization and the COVID Tracking Project

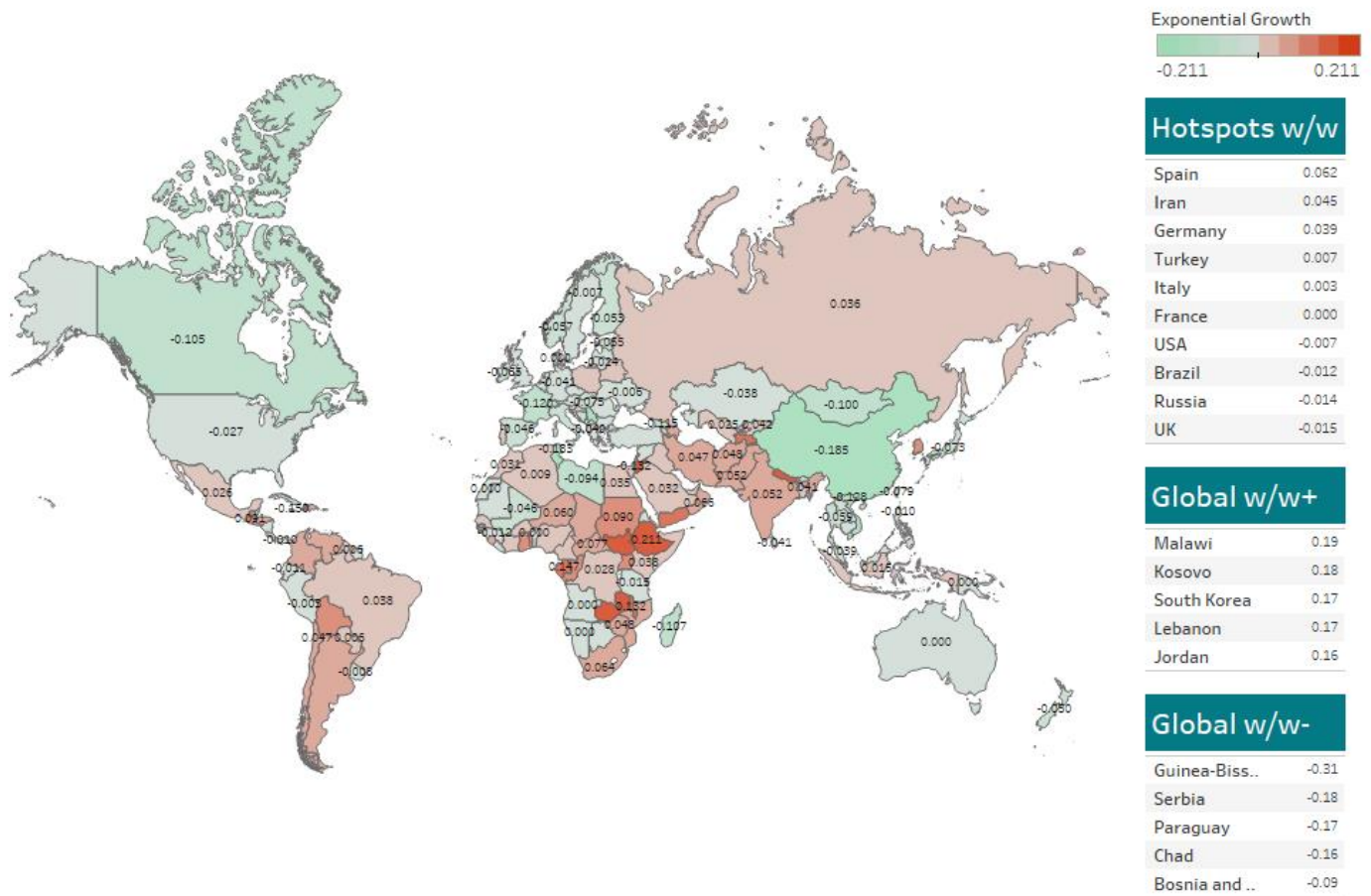
As seen in the figure below, our measure of the trajectory of case growth over the last 14-days shows that Asian countries continue to improve while European countries are stabilizing. We see increased activity in the mid-East, Africa and South America where identification and reporting present significant challenges. Spain has also recently shown upward trajectories of case growth. Second waves in Hong Kong and Singapore appear to be under control. We are watching India closely given significant implications for the pharma and medical supply chains.

Examining the coronavirus experience of China, Hong Kong and Korea, it appears that each has progressed through a roughly 8 to 10-week cycle. While each country is unique, the virus peaked within 3-4 weeks of suppression measures being introduced (vs 45-days in the U.S.) with the number of new cases declining over a period of 3-5 weeks as the populace continued to observe social distancing mandates. It is important to note that strict shelter in place mandates in these countries went together with extensive testing and tracing/isolation of potential carriers as social distancing mandates began to be relaxed and the economy open.

5 of the top-10 countries by # of cases are showing minimal or declining case growth, though data from Russia Iran and Turkey may not prove reliable

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Fig. 3: Trajectory of Daily Case Growth, Trailing 14-Days (green indicates declining trend/red indicates improving trend)



Source: Nephron Research analysis of Johns Hopkins Center for Systems Science and Engineering Data
 Note: Growth trajectory measured as exponential growth component of prior 14-day average daily case growth

Global deaths reached 292.0K, representing an increase of 4.6K (or 1.6%) relative to the prior day. Among the ten countries with the most confirmed infections, the US saw the largest absolute increase in deaths, recording growth of 1.7K (2.2%) d/d. Brazil saw the second largest absolute increase in deaths, with 881 individuals passing away from the virus. As of May 14th, the US continues to have the highest death toll in the world at 80.1K, followed by the UK (33.2K), Italy (31.1K), and Spain (27.1K).

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Fig. 4: Global Death Tracker, Top 10 Countries

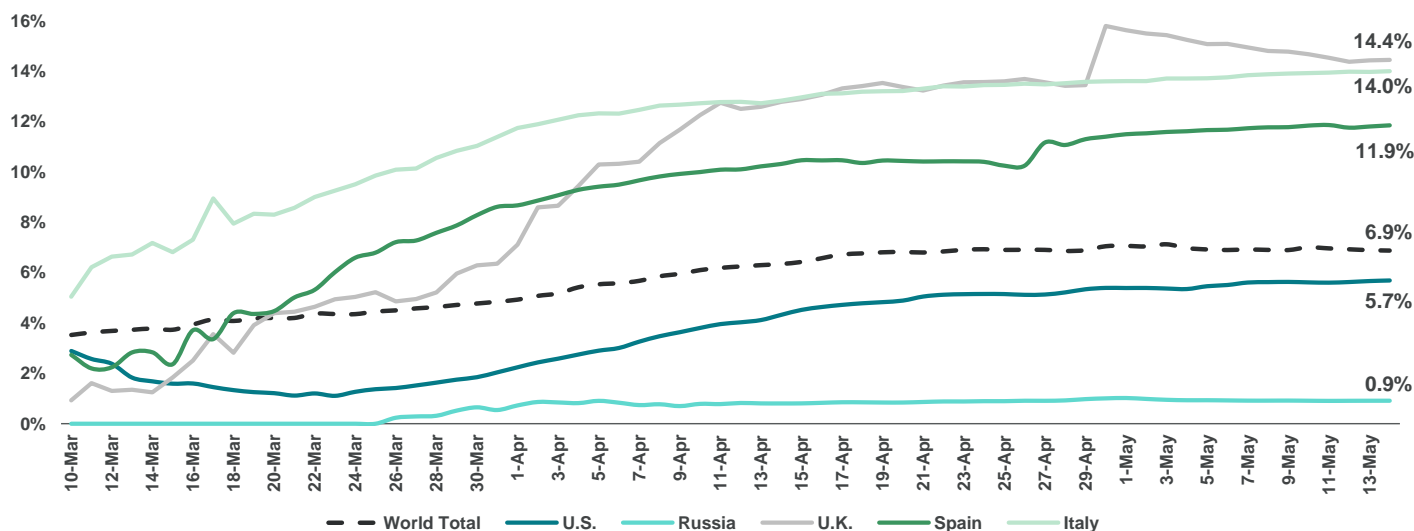
Date	World Total	Top 10 Countries									
		U.S.	Russia	U.K.	Spain	Italy	Brazil	Germany	Turkey	France	Iran
30-Apr	217,769	57,320	1,073	26,097	24,275	27,682	5,017	6,288	3,081	24,054	5,957
1-May	224,172	59,059	1,169	26,771	24,543	27,967	5,466	6,288	3,174	24,342	6,028
2-May	229,971	60,710	1,222	27,510	24,824	28,236	5,901	6,575	3,258	24,560	6,091
3-May	238,628	61,868	1,280	28,131	25,100	28,710	6,329	6,649	3,336	24,724	6,156
4-May	239,604	62,780	1,356	28,446	25,264	28,884	6,750	6,692	3,397	24,859	6,203
5-May	243,401	65,307	1,451	28,734	25,428	29,079	7,025	6,831	3,461	25,165	6,277
6-May	247,503	67,256	1,537	29,427	25,613	29,315	7,321	6,996	3,520	25,491	6,340
7-May	254,045	70,002	1,625	30,076	25,857	29,684	7,921	7,119	3,584	25,769	6,418
8-May	259,474	71,762	1,723	30,615	26,070	29,958	8,536	7,266	3,641	25,946	6,486
9-May	265,862	73,291	1,827	31,241	26,251	30,201	9,146	7,369	3,689	26,188	6,541
10-May	274,361	74,270	1,915	31,587	26,478	30,395	9,897	7,395	3,739	26,268	6,589
11-May	278,892	75,107	2,009	31,855	26,621	30,560	10,627	7,417	3,786	26,338	6,640
12-May	283,153	76,650	2,116	32,065	26,744	30,739	11,123	7,533	3,841	26,600	6,685
13-May	287,399	78,343	2,212	32,692	26,920	30,911	11,519	7,634	3,894	26,948	6,733
14-May	292,046	80,084	2,305	33,186	27,104	31,106	12,400	7,723	3,952	27,029	6,783
Day/Day	4,647	1,741	93	494	184	195	881	89	58	81	50
% d/d	1.6%	2.2%	4.2%	1.5%	0.7%	0.6%	7.6%	1.2%	1.5%	0.3%	0.7%

*Data for the US is sourced from The COVID Tracking Project. All else sourced from the World Health Organization.

Source: Nephron Research analysis of data from the World Health Organization and The COVID Tracking Project

The global case mortality rate has ticked up from 3.5% of confirmed cases on March 10th to 6.9% as of May 14th. Among the five countries with the most infections, the UK, Italy, and Spain have seen the largest increases in case mortality since March 10th. Over the past 66 days, the UK's case mortality rate has increased from 0.9% to 14.4%, while the death rate in Italy has moved from 5.0% to 14.0%. Over the same timeframe, Spain has seen its case mortality rate tick up from 2.7% to 11.9%. In comparison, **the case mortality rate in the US and Russia have consistently tracked under the global average.** Specifically, **the US case mortality has increased from 2.9% on March 10th to 5.7% as of May 14th, which compares favorably to the global average of 6.9%.** Russia's case mortality rate has increased from 0.2% on March 26th (when the first deaths were recorded) to 0.9% on May 14th. That said, there have been questions around the accuracy of the country's reported totals.

Fig. 5: Historical Case Mortality, Top 10 Countries (by total cases)



Source: Nephron Research analysis of data from the World Health Organization and The COVID Tracking Project

We now examine four key state thresholds for relaxation of social distancing and opening up the economy, beginning with case growth

At a national level, increased testing leads to variance but the underlying trend in case growth is declining

State Reopening Threshold: Decline in Cases

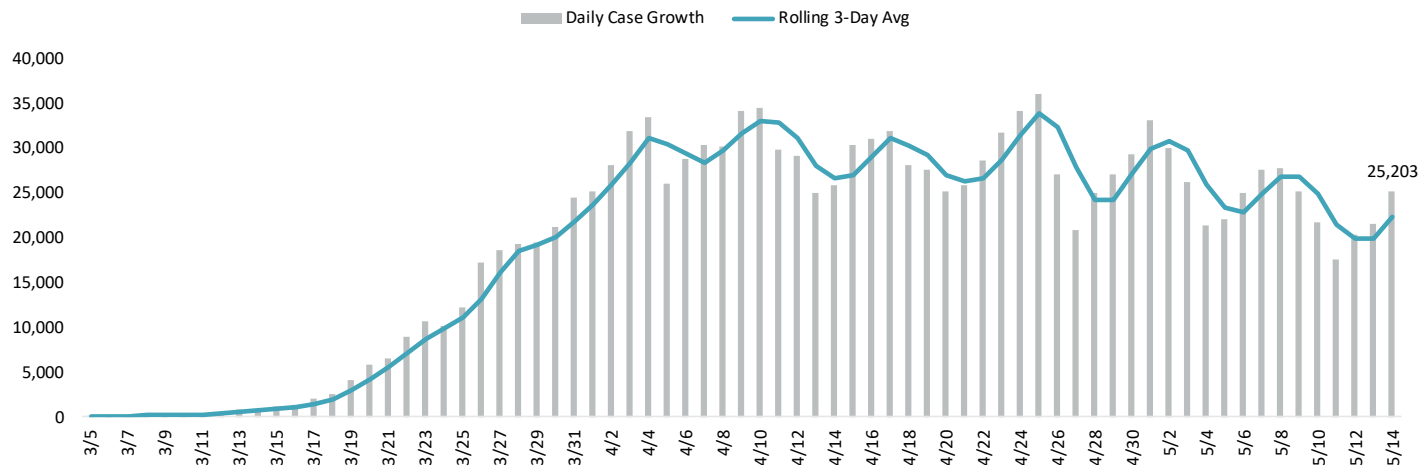
CASE IDENTIFICATION TREND GOAL: Decreasing rate of COVID-19 positive cases, influenza like illness (ILI) and COVID-19 syndromic cases

MEASURE: Reduction in state level documented COVID-19 cases OR reduction in state level positive COVID-19 tests as a percentage of total for a period of 14-days.

On the face of it, the **decline in cases** would appear to be the simplest measure and one that we would expect to be improving in many states some 40+ days post lockdown. However, the overall trend of decline has been upset by recent ebbs and flows in testing capacity and reporting that have skewed the data. As such, we train our focus on the trend in **positive tests as a percentage of total**, declines in which may represent a reduction in prevalence and/or an increase in testing (a confounding factor but a positive nonetheless as testing expands beyond those who are symptomatic and healthcare workers).

We saw a modest increase in new cases yesterday, while testing accelerated to elevated levels close to the peak. The modest case growth coupled with elevated testing led to the cumulative % of those testing positive to tick down by 25bps. We view this trend favorably as we would like to see growth in testing while new cases decline (or grow at a slower rate). **We continue to believe the growth in testing is the primary reason we are seeing any elevated positive case results, and vice versa.** Case growth grew by 25.2K yesterday which is below the peak level of adds on April 25th of 40.9K adds. We also remind that there tends to be some variation around weekends and coming out of the weekend (for reporting).

Fig. 6: National Daily New Positive Case Growth, March 5, 2020 to Present



Source: Nephron Research analysis of The COVID Tracking Project

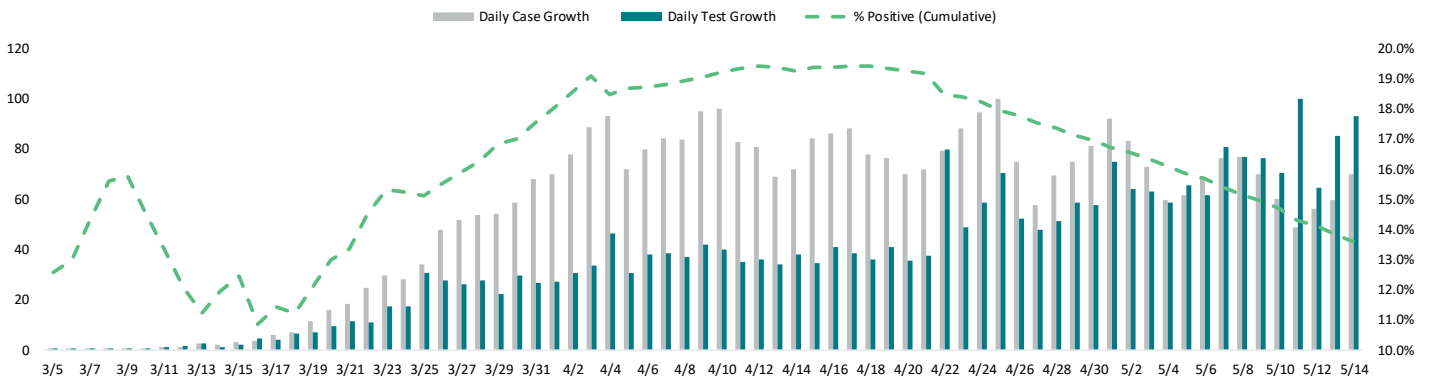
Next, we compare the number of new COVID-19 positive cases against the level of new testing. **What we have seen in recent weeks is that the growth in new cases is moving in line with growth in daily new testing. Prior to 4/22, there was a larger spread between the two metrics.** As we have previously noted, growth in absolute cases is not the best measure since this is directly correlated with elevated levels of testing. In the chart below, we look at daily case growth indexed to the day of max growth. This provides a better visualization of whether new cases are trending in the positive or negative direction. Similarly, we compare it against the number of daily tests indexed to the day of max daily tests.

In addition, the latest data suggests that the % of positive cases is 13.6%, which is down 25bps from the prior day. This is the lowest rate since March 21st. The percentage of positive cases ticked down

At a national level the trend of positive cases as a percentage of total inflected on 4/22 and has now been declining for 23-days

again for the 23rd day in a row as the total testing increased to over 10.3M tests, up by 367K tests from the prior day. As expected, as testing began to expand to those that are not symptomatic, we have begun to see a decline in the percentage of positive tests. We view inflection in this datapoint from increase to decrease as a key leading indicator. The data from 4/22 was the first sign of a meaningful decline in the % of cases that test positive and data from 5/11 shows there another meaningful inflection point in a positive direction.

Fig. 7: Indexed Daily Case Growth vs. Daily Test Growth vs. Cumulative % of Tested Cases that are Positive



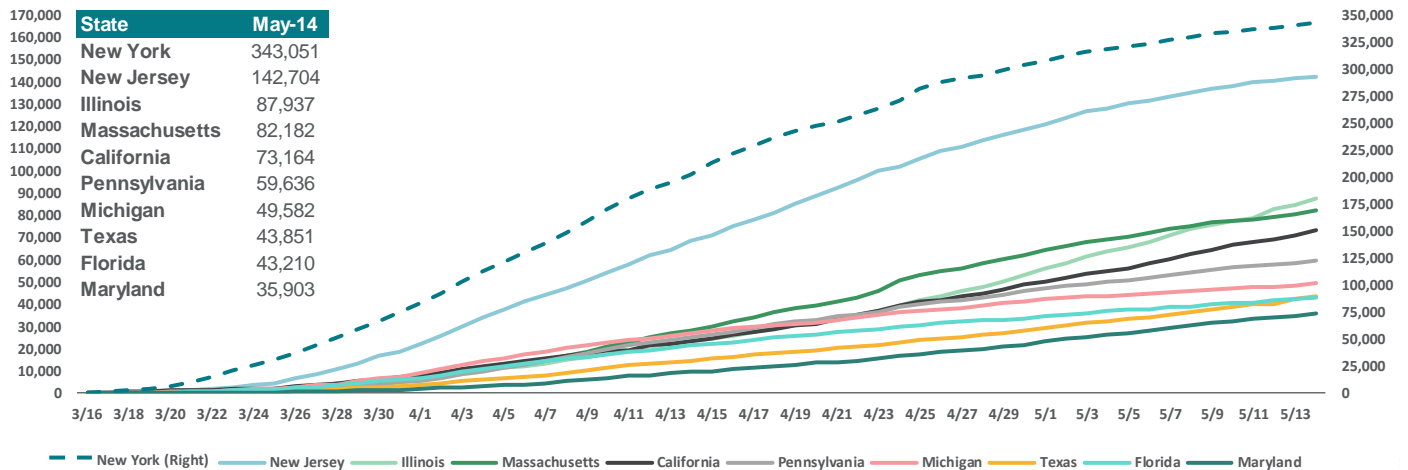
Source: Nephron Research analysis of The COVID Tracking Project

State Level Data:

State Level Data: Despite being among the top 10 states by cases, TX has already eased social distancing measures

New York has the most confirmed cases of any state in the country, with 343.1K cumulative cases as of May 14th. There is a significant drop-off between New York (plotted on a separate axis below) and New Jersey, with NJ having 142.7K documented cases (~42% of NY's total). There is also a steep decline in confirmed cases after the top two states, with the third highest state (Illinois) reporting 87.9K cases on May 14th, followed by Massachusetts (82.2K) and California (73.2K). For perspective, the barrier of entry into the top ten states is 35.9K cases (Maryland).

Fig. 8: Top 10 States in the US with Positive COVID-19 Cases



Source: Nephron Research analysis of The COVID Tracking Project

The following state-level dashboard monitors COVID-19 case growth threshold metrics required for progressing through the three phases of reopening. We have begun tracking two key metrics for monitoring signs of case growth rebounds in open states

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Fig. 9: Nephron Research State Case Growth Dashboard

State	Days Open	Cumulative Cases per 100K	% Pos / Daily Test	14-Day Trend (slope)	Avg Daily Cases (Prior 14-Days)	Case Threshold	Days Avg Daily Cases/100K > 10 Prior 14-Days	5-Day Trend (slope)	Sign of Rebound
South Carolina	25	157	5%	-0.010		Pass/Phase 1	0	-0.121	CLEAR
Alaska	21	53	0%	-0.068		Pass/Phase 1	0	+0.036	CAUTION
Oklahoma	21	125	3%	-0.021		Pass/Phase 1	0	+0.093	CAUTION
Georgia	21	334	7%	-0.020		Pass/Phase 1	0	-0.003	CLEAR
Montana	19	43	0%	-0.010		Pass/Phase 1	0	+0.220	CAUTION
Tennessee	18	242	4%	-0.047		Pass/Phase 1	+2	+0.075	REBOUND
Mississippi	18	351	8%	-0.019		Pass/Phase 1	+1	-0.001	CAUTION
South Dakota	17	420	7%	+0.049		Fail/Phase 1	+4	-0.325	
Wyoming	14	124	3%	-0.060		Pass/Phase 1	0	-0.013	CLEAR
Iowa	14	430	13%	-0.037		Pass/Phase 1	+12	+0.111	REBOUND
Colorado	14	350	6%	-0.036		Pass/Phase 1	+1	-0.231	CAUTION
Utah	14	206	4%	-0.020		Pass/Phase 1	0	-0.080	CLEAR
Idaho	14	127	8%	-0.012		Pass/Phase 1	0	+0.073	CAUTION
Texas	14	149	6%	-0.004		Pass/Phase 1	0	+0.035	CAUTION
North Dakota	14	216	3%	+0.004		Fail/Phase 1	0	+0.066	
Maine	14	116	102%	+0.007		Fail/Phase 1	0	-0.017	
Alabama	14	223	8%	+0.030		Fail/Phase 1	0	+0.024	
Missouri	11	167	4%	-0.065		Pass/Phase 1	0	-0.083	CLEAR
Kansas	11	257	6%	-0.060		Pass/Phase 1	+5	-0.182	CAUTION
Nebraska	11	465	11%	-0.050		Pass/Phase 1	+13	-0.221	CAUTION
Indiana	11	386	9%	-0.034		Pass/Phase 1	+4	-0.035	CAUTION
West Virginia	11	80	1%	-0.028		Pass/Phase 1	0	-0.075	CLEAR
Florida	11	196	4%	-0.009		Pass/Phase 1	0	+0.048	CAUTION
Arkansas	9	139	3%	+0.054		Fail/Phase 1	0	+0.100	
Hawaii	8	45	0%	-0.031		Pass/Phase 1	0	+0.065	CAUTION
Rhode Island	7	1,138	7%	-0.037		Pass/Phase 1	+14	-0.073	CAUTION
Pennsylvania	7	465	12%	-0.027		Pass/Phase 1	+1	-0.113	CAUTION
Arizona	7	172	13%	+0.002		Fail/Phase 1	0	+0.041	
North Carolina	7	156	7%	+0.002		Fail/Phase 1	0	+0.002	
Nevada	6	207	4%	-0.017		Pass/Phase 1	0	+0.019	CAUTION
New Hampshire	4	241	3%	-0.031		Pass/Phase 1	+1	-0.166	CAUTION
Ohio	3	224	6%	-0.019		Pass/Phase 1	0	-0.049	CLEAR
Wisconsin	2	193	6%	-0.027		Pass/Phase 1	0	-0.051	CLEAR
Vermont	Opening Today	148	0%	-0.147		Pass/Phase 1	0	-0.247	CLEAR
New Jersey	-	1,597	4%	-0.076		Pass/Phase 1	+14	-0.154	CAUTION
Massachusetts	-	1,154	8%	-0.071		Pass/Phase 1	+13	-0.153	CAUTION
New York	-	1,765	7%	-0.063		Pass/Phase 1	+11	-0.075	CAUTION
Washington D.C.	Opening Today	935	11%	-0.046		Pass/Phase 1	+14	-0.161	CAUTION
Michigan	-	494	5%	-0.042		Pass/Phase 1	+1	+0.064	REBOUND
Maryland	-	590	20%	-0.024		Pass/Phase 1	+14	-0.074	CAUTION
Louisiana	Opening Today	721	8%	-0.018		Pass/Phase 1	+3	+0.124	REBOUND
Newmexico	-	256	4%	-0.017		Pass/Phase 1	0	+0.022	CAUTION
Washington	-	225	4%	-0.013		Pass/Phase 1	0	-0.043	CLEAR
Illinois	-	695	16%	-0.010		Pass/Phase 1	+14	+0.081	REBOUND
Connecticut	-	995	12%	-0.010		Pass/Phase 1	+13	-0.012	CAUTION
Oregon	Opening Today	81	3%	-0.006		Pass/Phase 1	0	-0.058	CLEAR
Kentucky	-	157	4%	-0.004		Pass/Phase 1	0	+0.075	CAUTION
Virginia	Opening Today	322	15%	-0.001		Pass/Phase 1	+9	+0.015	REBOUND
California	-	183	5%	+0.002		Fail/Phase 1	0	-0.049	
Minnesota	-	236	12%	+0.009		Fail/Phase 1	+6	-0.034	
Delaware	-	735	16%	+0.032		Fail/Phase 1	+14	+0.062	

Source: Nephron Research analysis of The COVID Tracking Project, CDC Reopening Guidance, State Reopening Data obtained from <https://nyti.ms/2YwojJ1>

Case growth thresholds: 39 states and DC have passed. Examining the trajectory of case growth over the last 14-days, we find that 39 states and DC have demonstrated a sustained decline of which 26 have begun to loosen social distancing measures. **However, the daily case growth and five-day trend suggest 6 may be seeing a rebound and caution is warranted in another 24.**

- The case threshold measure is a 14-day downward sloping trend in new case growth, in line with the suggested measure in the CDC's technical guidance.

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- The sign of rebound after a state has passed the case growth threshold are an increase in 5-Day growth trend and at least one day of new cases/100K greater than 10, also in line with CDC technical guidance.
- It is important to recognize that outlined measures are lagging, not coincident, indicators of virus progression.
- We note that AR, SD, AL, ME, ND, NC and AZ have begun to open despite continuing to show an increase in case growth.

New York Focus:

NY case growth increased to 2.4K d/d, compared to an increase of 2.2K in the previous day. Despite the acceleration, this is the eighteenth consecutive day of growth below 5.0K.

In today's review of the data, New York remains the number one state with the most positive COVID-19 cases. **As a reminder, New York State implemented shelter at home and other mandates on March 22nd, and the data is now 53 days post that lockdown.** The number of cases per 100K residents in New York has risen to 1,763, compared to 1,751 in the previous day. As of May 14th, New York has an estimated 343.1K cases which is up 0.7% from the prior day. **Case growth increased to 2.4K d/d, compared to an increase of 2.2K in the previous day.** Despite the increase, absolute levels of growth remain subdued and this is the eighteenth consecutive day of growth below 5.0K. Though daily results have been volatile, case growth within the state has maintained a general downward trajectory since April 25th.

New Jersey remains the second largest state with 142.7K cases, which is up 0.8% from the prior day. Throughout the state, 1,607 per 100K residents have tested positive for the virus, up from 1,594 in the previous day. **Illinois has the third most cases**, with 87.9K confirmed cases (up 3.8% d/d). Approximately 694 per 100K residents have tested positive within the state. Massachusetts has the fourth most cases, with 82.2K confirmed diagnoses (up 2.1% d/d) and a prevalence of 1,192 per 100K residents. Rounding out the top 5 is **California**, with 73.2K cases (up 2.8% d/d) and a prevalence of 185 per 100K. **For perspective, the top 3 states alone represent ~41% of all cases in the US, which is down ~25bps from the prior day's data.** The top 5 states now represent 52% of total cases.

See Appendix for an expanded chart on historical case growth in the top 5 states.

County Level Focus:

In the chart below, we show the counties with the highest daily case growth. Based on the data as of May 13, 2020, **NYC has the highest daily case growth in the US, surpassing LA and Cook County.** The cases in these counties have grown as a percentage of total daily cases in the US. Other counties where the virus is spreading quickly includes Providence, RI, Worcester, MA and Tarrant, TX.

Fig. 10: COVID-19 Daily Case Growth in the Top 20 Counties

State	County	3/14/2020	3/21/2020	3/28/2020	4/4/2020	4/11/2020	4/18/2020	4/25/2020	5/2/2020	5/9/2020	5/10/2020	5/11/2020	5/12/2020	5/13/2020
NY	New York City	101	1,805	4,368	6,147	5,924	3,911	4,640	2,664	1,506	1,128	940	766	1,295
CA	Los Angeles	8	61	249	521	475	537	1,037	1,033	869	901	480	581	1,248
IL	Cook	13	133	335	898	1,057	1,304	1,805	2,155	1,895	1,438	981	726	936
RI	Providence			0	0	0	302	876	289	0	0	0	1,536	314
MA	Worcester	0	5	53	158	217	262	429	237	213	201	132	75	282
TX	Tarrant	1	10	24	58	68	185	147	142	171	83	485	50	266
MA	Middlesex	11	25	147	332	402	538	957	399	338	293	282	185	248
NY	Suffolk	8	193	650	1,408	1,279	853	1,039	373	331	238	241	209	243
PA	Philadelphia	2	9	128	432	492	518	651	669	470	364	330	102	242
TX	Harris	1	20	26	141	214	154	152	195	217	209	75	298	205
CT	Hartford		11	51	140	144	156	267	330	154	201	158	95	204
TN	Lake					0	0	26	0	0	0	0	2	201
VA	Fairfax	2	0	0	44	87	101	172	286	293	272	282	308	196
MD	Prince Georges				90	240	244	262	692	386	304	291	192	181
NV	Clark	8	52	93	154	135	113	129	139	43	88	46	12	176
MD	Montgomery	0	18	44	68	174	147	167	454	285	241	208	148	155
MO	St Louis				82	105	62	118	102	46	60	77	24	154
NY	Nassau	10	372	743	1,437	1,372	767	641	307	219	216	189	120	153
IL	Kane	0	2	20	22	21	48	99	151	170	150	185	123	152
CT	Fairfield	3	20	145	585	298	330	219	318	200	151	206	76	148
Sub-Total		168	2,736	7,076	12,717	12,704	10,532	13,833	10,935	7,806	6,538	5,588	5,628	6,999
Daily US Case Growth		755	6,532	19,353	33,518	29,881	28,015	35,936	30,038	27,779	25,179	21,712	17,605	20,293
% of Total US Cases		22.3%	41.9%	36.6%	37.9%	42.5%	37.6%	38.5%	36.4%	28.1%	26.0%	25.7%	32.0%	34.5%

Source: Nephron Research analysis of The New York Times

Next take the counties with the highest absolute number of COVID cases and adjust it to account for the population size. In the chart below, we show the number of positive COVID cases per 1MM in these counties. This speaks to the relative impact of COVID, rather than the sheer absolute number of cases. Surprisingly, despite the number of cases in New York City, the number of cases per 1MM is a little more than half of Rockland, NY cases per 1MM. **Among the counties with the most cases in the US, Rockland, NY has the highest density of COVID-19 cases per 1MM of population at 38,500 cases, followed by Westchester, NY with 32,672 cases per 1MM.** In all, 17 of the top 20 counties now have more than 1% of their populations that have tested positive. Rockland County is the highest at 3.9% of their population.

Fig. 11: Top 20 Counties in the US with Positive COVID-19 Cases per 1MM Population

State	County	3/14/2020	3/21/2020	3/28/2020	4/4/2020	4/11/2020	4/18/2020	4/25/2020	5/2/2020	5/9/2020	5/10/2020	5/11/2020	5/12/2020	5/13/2020
NY	New York City	26	745	3,570	7,594	11,792	15,745	18,606	20,674	21,985	22,121	22,234	22,325	22,616
IL	Cook	8	80	435	1,257	2,422	3,765	5,362	7,508	9,754	10,033	10,224	10,365	10,952
NY	Nassau	38	556	3,432	8,861	15,854	21,032	24,147	26,649	27,866	28,025	28,164	28,253	28,437
NY	Suffolk	20	251	2,292	6,877	12,659	16,954	20,727	23,051	24,531	24,693	24,856	24,997	25,264
CA	Los Angeles	4	29	146	455	840	1,135	1,847	2,412	3,018	3,108	3,155	3,213	3,429
NY	Westchester	162	1,128	7,428	12,765	18,684	23,231	27,526	30,213	31,942	32,130	32,344	32,437	32,672
PA	Philadelphia	2	27	335	1,442	3,485	5,406	7,498	9,556	11,058	11,288	11,496	11,561	11,855
MI	Wayne	3	123	1,035	3,485	6,025	7,565	8,807	9,701	10,189	10,267	10,332	10,400	10,512
MA	Middlesex	37	89	425	1,366	2,759	4,805	7,248	9,063	10,557	10,738	10,913	11,028	11,293
NJ	Bergen	18	367	1,614	5,220	9,577	12,726	15,408	16,981	17,924	18,026	18,160	18,266	18,397
NJ	Hudson	4	98	883	4,216	9,535	14,331	19,350	22,529	24,569	24,800	25,018	25,188	25,335
NJ	Essex	8	91	1,034	3,839	8,236	12,106	15,157	17,515	19,094	19,231	19,430	19,528	19,712
MA	Suffolk	18	59	427	1,478	3,071	4,925	7,263	9,004	10,121	10,239	10,347	10,400	10,556
NJ	Passaic	4	98	964	4,416	9,997	15,153	20,507	25,535	28,456	28,751	28,980	29,183	29,407
FL	Miami-Dade	3	46	320	1,238	2,318	3,247	4,021	4,560	5,029	5,094	5,155	5,214	5,325
NJ	Union	2	77	933	4,470	10,021	15,151	20,146	22,970	25,015	25,136	25,267	25,459	25,714
NJ	Middlesex	2	47	397	1,318	3,140	4,534	6,074	7,413	8,449	8,537	8,647	8,709	8,836
CT	Fairfield	8	129	797	2,880	5,491	7,575	10,841	12,310	13,653	13,813	14,031	14,112	14,455
NY	Rockland	28	310	4,472	13,165	21,861	27,585	30,974	36,257	37,905	38,061	38,218	38,319	38,500
MA	Essex	3	36	438	1,549	3,342	5,737	8,562	11,299	13,761	14,032	14,209	14,308	14,648
Sub-Total		397	4,387	31,379	87,891	161,107	222,708	280,071	325,197	354,877	358,122	361,183	363,266	367,915
Total US Cases		7	71	360	941	1,593	2,206	2,734	3,338	3,718	3,803	3,887	3,964	4,030

Source: Nephron Research analysis of The COVID Tracking Project, US Census Bureau

Focusing on growth in the top 5 counties, New York City has been able to bend the curve. New York City's growth as declined from a peak of 108% on March 18 to 0.7% on May 13th. This is a continuation

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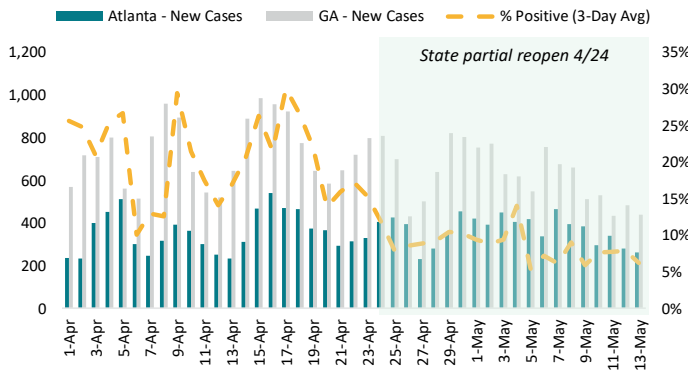
of a trend of low growth rates and is also the lowest number of absolute new cases since March 18th. **While it appears that city case growth has stabilized, we would expect growth in the number of cases as testing becomes more prevalent. It has been 51 days since the lockdown order to control the spread of COVID19.** As a reminder, Governor Cuomo announced on Friday, March 20 that all non-essential travel and in-office work will be banned starting on Sunday, March 22 – essentially announcing sweeping restrictions on movement in New York.

The other largest COVID counties in New York have stabilized as well. Each of their growth rates were under 1%. **However, the daily new cases added in Cook, Illinois remains elevated and the growth rate is ~1.7% and is the second largest county.** In addition, **Los Angeles surpassed Westchester this week and is now the 5th largest county in the US.** Case growth continues to be an imperfect analog for the expanding prevalence of coronavirus (a better measure of the expanding prevalence is testing). We continue to closely monitor case growth post social distancing mandates (IL also put such measures in place on March 21st and CA put measures in place on March 19th) in the top five counties. *See Appendix for an expanded chart on historical case growth in the top 5 counties.*

States are the laboratories of democracy: We are watching closely the social experiments occurring in GA, TN, SC, OK & MS

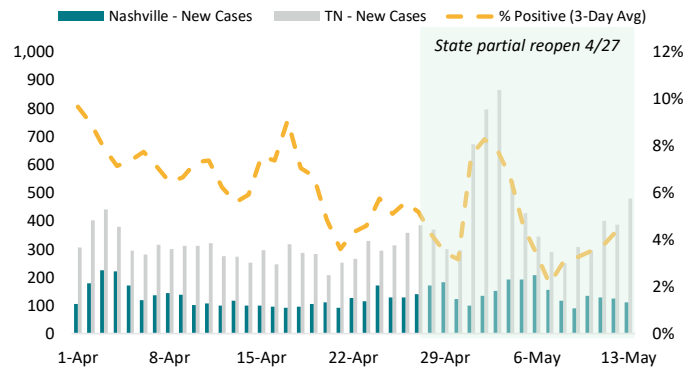
We are increasingly focused on case growth in states that have begun to relax social distancing measures, focusing on Georgia, Tennessee, South Carolina, Oklahoma and Mississippi. These states were among the earliest to partially re-open their economies. Within these states, we focused on the largest MSAs (based on population) within each of these states. When watching the post opening trends, keep in mind that the incubation of the virus can be as long as two weeks and that expanded testing may drive increases in the absolute number of positive cases. **Based on the data since states re-opened, we are now seeing an increase in the percentage testing positive in Tennessee.**

Fig. 12: Atlanta vs. Georgia Cases vs. % Tested Positive



Source: Nephron Research analysis of NYT COVID-19 Dataset
 Note: 3-day rolling average

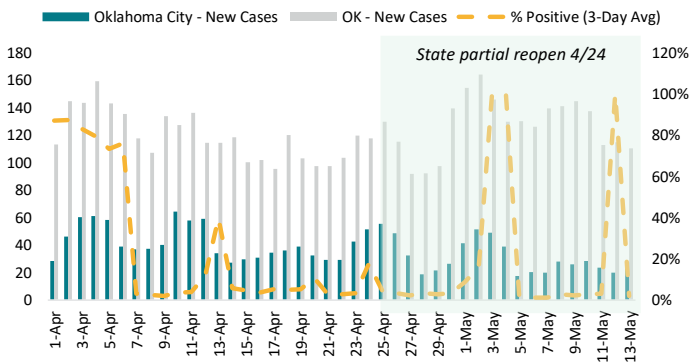
Fig. 13: Nashville vs. Tennessee Cases vs. % Tested Pos



Source: Nephron Research analysis of NYT COVID-19 Dataset
 Note: 3-day rolling average

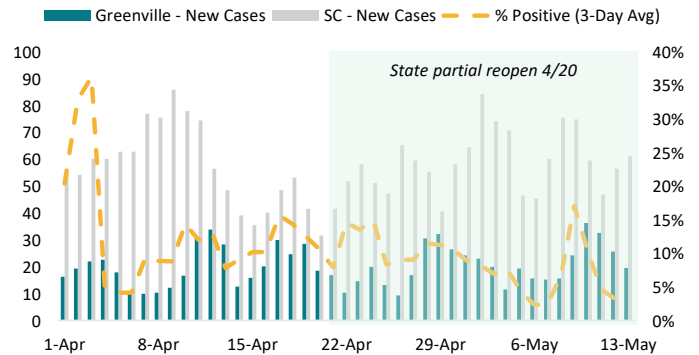
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Fig. 14: Oklahoma City vs Oklahoma vs. % Tested Positive



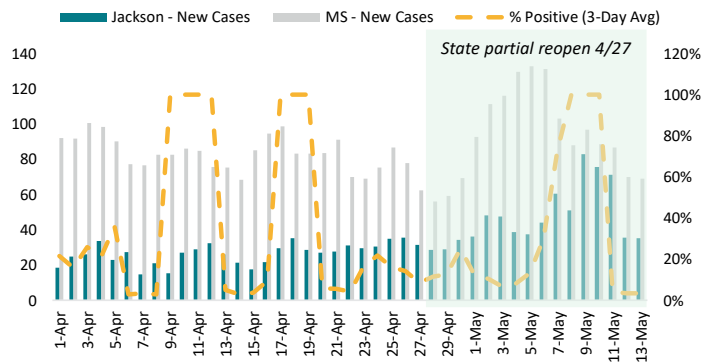
Source: Nephron Research analysis of NYT COVID-19 Dataset
 Note: 3-day rolling average

Fig. 15: Greenville vs. South Carolina vs. % Tested Positive



Source: Nephron Research analysis of NYT COVID-19 Dataset
 Note: 3-day rolling average

Fig. 16: Jackson vs. Mississippi vs. % Tested Positive



Source: Nephron Research analysis of NYT COVID-19 Dataset
 Note: 3-day rolling average

State Reopening Threshold: Diagnostic Testing Capacity

POINT OF CARE TESTING RESULTS & TESTING CAPACITY: Decrease in 'percent positive', testing sites can handle asymptomatic cases, decrease in average time to report test results, state testing capacity

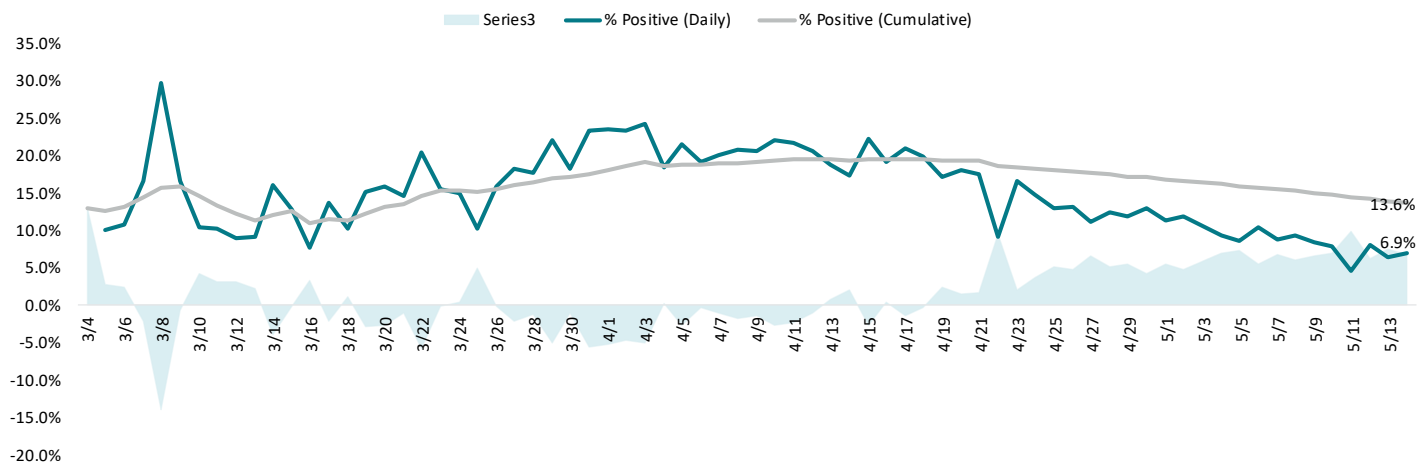
MEASURE: Reduction in state level percent positive tests over a 14-day period, percentage of sites that can screen for asymptomatic cases, time to specimen result, number of labs reporting a need for additional equipment, supplies, reagent and staffing.

Given that the increase in testing has served to skew the trend 14-day case growth trend, it makes sense to focus on the trend in positive tests as a percentage of total, which after remaining extremely static even as cases ramped in late March and early April, has begun to decline over the last three weeks as testing finally began to expand beyond those who were symptomatic and at-risk healthcare workers. As a result, the percentage of those testing positive daily inflected on April 18th and the daily percentage has fallen well below the cumulative percentage. The spread was approximately -68obps yesterday with the daily % positive at 6.9% vs. the cumulative % positive declining to 13.6%.

As shown in Fig 22, 44 states have demonstrated a decrease in % positive trend over the last 14-days

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Fig. 17: Daily % Testing Positive vs. Cumulative % Testing Positive



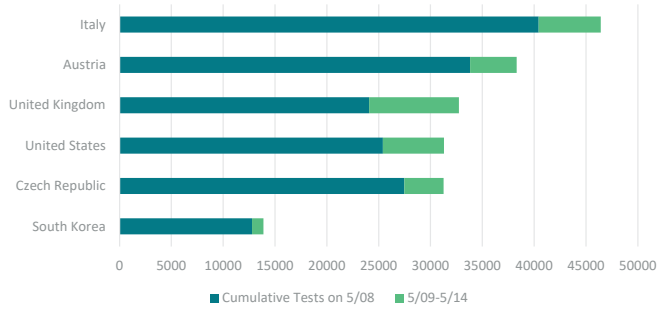
Source: Nephron Research analysis of The COVID Tracking Project

Notable Change: After many fits and starts, diagnostic testing is now running at the high end of ~2mn per week

After spending April 8th to 22nd stuck at a run rate of ~1mn tests per week, the weekly test rate appears to have increased to ~2.0mn over the last week inclusive of 368k tests reported yesterday. We saw an uptick in daily tests reported on April 22nd but this turned out to be largely driven by a change in reporting in CA. NJ recently cleared a large backlog of tests, but levels have returned to normal since. Given volatility in daily reports we have been careful to not overstate improvement. NY, CA and TX each contributed ~10% of the growth yesterday.

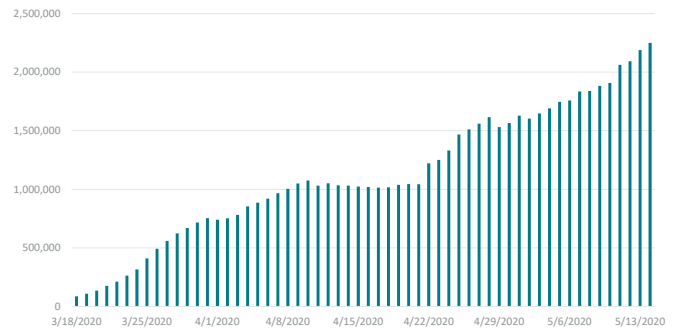
- While testing has improved, further expansion is needed. A run rate of ~2.0mn, represents an improvement but is still well below the 3.5-5.5mn per week that many public health experts and epidemiologists have suggested is required to enable material relaxation of social distancing measures. The American Enterprise Institute (AEI) and Duke Margolis both estimated a need for 750k test per week to start tracing, whereas Center for American Progress (CAP) estimated the need at 2.6mn per day and Harvard Safra put the daily total 5-20mn per day assuming social distancing interventions prove effective.
- The U.S. supply chain is experiencing a number of challenges. The initial challenge of securing an adequate supply of the reagent used in diagnostic kits has now given way to a potential bottleneck from the shortage in the specialized swabs used to test patients. Alternative testing mediums and swabs have been validated, and the U.S. Air Force is flying in Italian test strips three times a week. On April 17th, the FDA announced that after reviewing studies from United Health Group and the Gates Foundation it will allow a broader range of swabs to be used in tests and secured a U.S. manufacturer of polyester-based swabs compatible with COVID-19 testing with U.S. Cotton. The new guidelines allow for simple nasal swabs and can be conducted by the patient, dramatically reducing PPE required.

Fig. 18: Cumulative Tests Completed per 1mn Population



Source: Nephron Research analysis of The COVID Tracking Project and Country Websites

Fig. 19: New Tests Completed over Trailing 7-Days



Source: Nephron Research analysis of The COVID Tracking Project

Note: Data collected is up to date as of 4PM the prior day. Testing numbers compiled afterwards are not reflected in the above chart.

Author's Note: For incremental commentary on diagnostic and serological testing including the latest testing capacity and goals for manufacturers, labs and pharmacy partners, see the Company Impact section at the end of the report.

Testing Dashboard

The following state-level dashboard (Fig. 20 on the following page) monitors COVID-19 testing threshold metrics required for progressing through the three phases of reopening.

- As testing has expanded (trailing 7-day average run rate of 2.25mn), 44 states and D.C. have demonstrated a 14-day decline in the trend in % positive.
- No state has met the CDC metric of 14 consecutive days included in draft technical guidance. This metric is a high bar. Yet still we note that only five states have achieved our less stringent measure of 10 of the last 14 days. If we set the bar at a majority of the past 14 days (i.e. 9 days of the last 14) the number of states that pass rises to 27.
- The % positive remains above 10% in open states IA, AZ, NE and PA suggesting more testing is needed.

Fig. 20: Nephron Research State Testing Growth Dashboard

State	Days Open	Daily Tests per 100k (7-Day Avg)	Avg Daily Tests (Prior 14-Days)	% Pos / Daily	% Pos / Daily Consecutive Days of Decline	% Pos / Daily (Prior 14-Days)	Testing Threshold CDC: 14 of 14	Testing Threshold: 10 of 14	Testing Threshold: 8 of 14
South Carolina	25	69		5%	0		Fail-10%	Fail-10%	Fail-10%
Alaska	21	144		0%	0		Fail-10%	Fail-10%	Fail-10%
Oklahoma	21	91		3%	0		Fail-10%	Pass-10%	Pass-10%
Georgia	21	91		7%	0		Fail-10%	Fail-10%	Pass-10%
Montana	19	57		0%	1		Fail-10%	Fail-10%	Pass-10%
Tennessee	18	137		4%	1		Fail-10%	Fail-10%	Fail-10%
Mississippi	18	117		8%	0		Fail-10%	Fail-10%	Fail-10%
South Dakota	17	101		7%	5		Fail-10%	Fail-10%	Pass-10%
Wyoming	14	86		3%	0		Fail-10%	Fail-10%	Fail-10%
North Dakota	14	176		3%	1		Fail-10%	Fail-10%	Pass-10%
Utah	14	111		4%	0		Fail-10%	Fail-10%	Fail-10%
Texas	14	81		6%	1		Fail-10%	Fail-10%	Fail-10%
Colorado	14	57		6%	2		Fail-10%	Fail-10%	Pass-10%
Idaho	14	22		8%	0		Fail-10%	Fail-10%	Fail-10%
Alabama	14	78		8%	0		Fail-10%	Fail-10%	Fail-10%
Iowa	14	103		13%	2		Fail-15%	Fail-15%	Pass-15%
Maine	14	2		102%	0		Fail->25%	Fail->25%	Fail->25%
West Virginia	11	90		1%	0		Fail-10%	Fail-10%	Fail-10%
Missouri	11	54		4%	0		Fail-10%	Fail-10%	Pass-10%
Florida	11	75		4%	0		Fail-10%	Fail-10%	Pass-10%
Kansas	11	63		6%	1		Fail-10%	Fail-10%	Pass-10%
Indiana	11	75		9%	0		Fail-10%	Fail-10%	Pass-10%
Nebraska	11	114		11%	0		Fail-15%	Fail-15%	Pass-15%
Arkansas	9	74		3%	1		Fail-10%	Fail-10%	Fail-10%
Hawaii	8	34		0%	0		Fail-10%	Fail-10%	Fail-10%
Rhode Island	7	261		7%	7		Fail-10%	Pass-10%	Pass-10%
North Carolina	7	65		7%	0		Fail-10%	Fail-10%	Pass-10%
Pennsylvania	7	54		12%	0		Fail-15%	Fail-15%	Fail-15%
Arizona	7	45		13%	0		Fail-15%	Fail-15%	Fail-15%
Nevada	6	82		4%	0		Fail-10%	Fail-10%	Fail-10%
New Hampshire	4	112		3%	4		Fail-10%	Fail-10%	Pass-10%
Ohio	3	70		6%	1		Fail-10%	Pass-10%	Pass-10%
Wisconsin	2	77		6%	0		Fail-10%	Fail-10%	Pass-10%
Vermont	-	92		0%	0		Fail-10%	Fail-10%	Pass-10%
Oregon	-	45		3%	0		Fail-10%	Fail-10%	Fail-10%
Kentucky	-	123		4%	0		Fail-10%	Fail-10%	Pass-10%
Newmexico	-	200		4%	0		Fail-10%	Fail-10%	Fail-10%
Washington	-	66		4%	2		Fail-10%	Fail-10%	Fail-10%
New Jersey	-	253		4%	4		Fail-10%	Fail-10%	Pass-10%
California	-	94		5%	0		Fail-10%	Pass-10%	Pass-10%
Michigan	-	126		5%	0		Fail-10%	Fail-10%	Pass-10%
New York	-	153		7%	0		Fail-10%	Fail-10%	Pass-10%
Massachusetts	-	120		8%	1		Fail-10%	Fail-10%	Pass-10%
Louisiana	-	144		8%	0		Fail-10%	Fail-10%	Fail-10%
Washington D.C.	-	142		11%	0		Fail-15%	Fail-15%	Fail-15%
Connecticut	-	134		12%	0		Fail-15%	Pass-15%	Pass-15%
Minnesota	-	79		12%	1		Fail-15%	Fail-15%	Fail-15%
Virginia	-	72		15%	0		Fail-15%	Fail-15%	Pass-15%
Illinois	-	150		16%	0		Fail-20%	Fail-20%	Pass-20%
Delaware	-	139		16%	0		Fail-20%	Fail-20%	Fail-20%
Maryland	-	70		20%	0		Fail-20%	Fail-20%	Fail-20%

Source: Nephron Research analysis of The COVID Tracking Project, CDC Reopening Guidance, State Reopening Data obtained from <https://nyti.ms/2Ywoj1j>

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Given testing limitations, identifying prevalence in populations and geographies is key to slowing the spread

Recent Development: An early study suggests as many of 20% of NYC residents may possess COVID-19 antibodies

Contact-tracing is key to any effort to relax social distancing and reopen the economy

Initial Efforts to Determine Prevalence

Given the lack of testing to date, tests have been focused on those who were already symptomatic tests to evaluate prevalence in the broader population have only begun to be conducted. On April 4th, L.A. County's public health department announced a plan to test 1,000 randomly selected residents using one of the antibody tests and New York recently announced a broader initiative. This will help the department discover how many people have actually been infected, recovered and developed immunity to the virus. The answer to that question carries hefty ramifications for health officials – both at the state and national level – considering how to keep the public safe and restart economic activity.

- On April 22nd, NY Gov Cuomo shared preliminary results of a random antibody test of 3,000 people conducted by public health authorities that could imply roughly 20% of New Yorker City residents currently possess COVID-19 antibodies. The study of 3,000 included 1,300 New York City residents of which 21% tested positive as compared to 17% on Long Island and 12% in Westchester. The results were preliminary and the extent to which the tests taken at grocery and big-box stores is representative of the broader public is a major question. While more study is required, antibody testing will be a key measure in determining when to reopen the state alongside hospital utilization and test capacity.
- On April 20th we learned the results of the L.A. county study which found 4.1% (range of 2.8% to 5.6%) of adults tested positive for coronavirus antibodies, suggesting the rate of infection may be 40 times higher than the number of confirmed cases. The antibody tests indicate the death rate from the pandemic could be lower than currently thought but also suggests that the virus is being spread by patients that are asymptomatic. While researchers used a random sample of residents the opt in of the nature has led to a fair amount of criticism and we caution that the results should be ready as a single directional data point that is not so far off from what we have seen in other countries with more rigorous methods).
- A study conducted by Stanford University in Santa Clara County tested 3,330 volunteers for antibodies. The study found that just 1.5% of these volunteers were positive and an adjusted measure accounting for population bias suggested prevalence of 2.5-4%. Again the methods of the study have been criticized and given shortcomings should only be viewed as a directional data point in our view.

State Reopening Threshold: Public Health System Capacity

PUBLIC HEALTH SYSTEM CAPACITY: *State ability to safely identify individuals and their contacts who may have been exposed to COVID-19 and prevent transmission*

MEASURE: Reduction in the percentage of public health agencies with sufficient contact tracers to support case investigation of every COVID-19 positive case within the state. Capacity to contact at least 90% of all elicited contacts.

As testing expands, the focus turns to contact-tracing. We are following efforts to develop contact-tracing via state and local health departments and the application of digital solutions that may help expedite the manual process given the need to potentially track tens of thousands of cases. It is important to recognize that testing will never be adequate, reliable and fast enough to identify all cases in real time. As such, it is important that the U.S. substantially expand state and local health agency tracing capability alongside public health efforts to create studies to determine prevalence and mortality within communities and geographies.

- **The Association of State and Territorial Health Officials (ASTHO) estimates at least 100k tracers are needed over the next 4-6 weeks to enable the U.S. to open up, we would need 260k to replicate the level of testing in Wuhan.** This compares to ASTHO's estimate that the number of trained disease intervention specialists in U.S. state and territorial health agencies was only 2,200 or 1 in 150k Americans at the start of the pandemic. Former CDC director Tom Freidan has suggested as many as 300k tracers may be needed while a recent bipartisan proposal detailed below called for hiring of 180k tracers. Current CDC Director Robert Redfield stated in mid-April that the CDC was discussing with state officials the possibility of enlisting and training workers from the U.S. Census Bureau and volunteers from Peace Corps (7k volunteers) and AmeriCorps we see few signs of coordinated federal action.
- **Absent a national response, we are closely tracking state efforts alongside early reports of collaboration in the healthcare and tech industry that could lead to national solutions** (national solutions that unlike China leave it to individuals to opt in). In China, Korea, Singapore and Taiwan we saw successful deployment of cellphone-based apps that utilized location data (and credit card data and surveillance camera footage in the case of Korea) to help accelerate the process of tracing and informing individuals of potential exposure. While these apps proved effective, they clearly raise privacy concerns in the U.S. (as they have in Europe).

Unfortunately, we lack any solid data on the number of public health workers focused on tracing by state to compare to total case numbers and case trajectory. We continue to look for potential data in this area while sharing several anecdotal data points on efforts to ramp tracing and isolation and digital tracing endeavors.

- **A bipartisan group of former health officials has proposed a \$46.5bn COVID-19 emergency relief plan to expand national contact testing, tracing and isolation including the hiring of 180k contact-tracers.** The plan, backed by former FDA commissioners Scott Gottlieb (Trump) and Mark McClellan (Bush), as well as former CMS director Andy Slavitt (Obama) and former Senator Bill Frist was sent to Congress April 27. It would allocate \$12bn towards expanding the current contact tracing workforce by 180,000 people, \$4.5bn for turning vacant hotels into self-isolation facilities, and \$30bn to provide income to those who must social distance. It is not clear yet whether the administration or congress will embrace the proposal, but given the strong backing, we are following the plan closely as the next round of COVID-19 stimulus heats up.
- **Many states have already taken action to expand tracers.** Within **New York**, Gov Cuomo plans to hire 17k contact tracers. The Gov stated that 30 tracers are needed for every 100k people in order to adequately follow the path of the virus. The experience of past viral outbreaks suggests that public health workers typically require several hours over 2-4 days to complete a single case and will average 7 cases per day.
 - On May 8th it was reported that in New York City, Mayor De Blasio will assemble 1,000 disease tracers who will report to the public hospital system, Health and Hospitals, in partnership with the city Health Department which historically conducts contact tracing. It appears the Health Department will lend experts to Health and Hospitals which as a public benefit corporation can more quickly hire the tracers and enter into contract for housing of those that cannot quarantine at home.
 - In **Washington state** Gov Inslee stated that he expects to have 1,500 workers focused solely on contact tracing by the second week of May, inclusive of 700 existing public health workers and 500 National Guard members. **Michigan** has already trained 2,200 volunteers to conduct contact tracing. **Massachusetts** is working with Partners in Health to recruit 1,000 tracers.

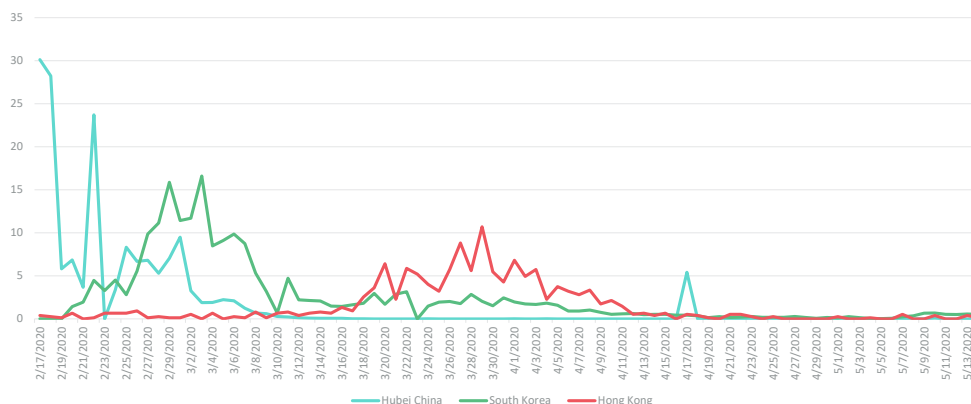
Hong Kong appeared to experience a modest increase in cases after lifting of restrictions

Maryland plans to add 1,000 workers in support of tracing. **Arkansas** has expanded its contact tracing team from 3 to 150 (despite never having a stay at home order). **North Dakota** has hired 300 tracers, primarily graduate students earning credit toward masters in public health and plans to expand to 500. **Mississippi** plans to add 20 staff while **Utah** reassigned 30 workers as of mid-April.

Recent activity in Hong Kong demonstrates the importance of post lock down tracing and isolation measures. Hong Kong was perhaps the country best positioned to respond to COVID-19 given that social distancing became ingrained in society after the SARS epidemic which disproportionately impacted the nation. Swift government action and strict social distancing measures and testing helped limit the spread of COVID-19 in Hong Kong. **Recent data suggests that following the relaxation of work restrictions in March, the number of cases increased with media reports pointing to an influx of expats returning and bringing the virus with them.**

- The experience of Hong Kong, where local health systems are actively tracing the interactions of those who test positive and citizens are submitting to testing and isolation shows us what will be required of the U.S. over the next 18-months (with state and local health departments working in partnership with local health systems).

Fig. 21: Hong Kong Daily Case Growth per 1mn appears to have flattened alongside with Hubei and South Korea



Source: Nephron Research analysis of Johns Hopkins Center for Systems Science and Engineering COVID data

It remains to be seen to what extent digital apps will be embraced within the U.S.

Given the lack of contact tracing capabilities, digital contact tracing apps could play an important role in limiting the progression of COVID-19 in the U.S. over the next 12-36 months. In China, Korea, Singapore and Taiwan we saw successful deployment of cellphone-based apps that utilized location data (and credit card data and surveillance camera footage in the case of Korea) to help accelerate the process of tracing and informing individuals of potential exposure. While these apps proved effective, they clearly raise privacy concerns in the U.S. (as they have in Europe) and it is unclear whether the decentralized nature of the U.S. response will render such efforts ineffective.

- **Apple and Google to develop contact-tracing apps.** Apple Inc. and Google have agreed to partner on developing contact-tracing smartphone technology that will alert users if they have come into contact with someone infected with COVID-19 while still preserving privacy. The goal is to provide the groundwork for public health contact-tracing app developers via the May release of API that public health organizations can leverage (the API will not be available to private companies).
 - The API will enable apps on the phone to use Bluetooth to determine if the smartphone has come within 30 feet of the phone of someone who later turns out to be infected with COVID-

19 (the apps will not track user location or identifying data). We expect participation and disclosure of COVID-19 diagnosis will be voluntary given the obvious privacy concerns. The goal would be for the individual who is alerted to significant exposure (as determined by the app developer) to be tested and isolated - which of course requires that testing is available for this to work – and then share their diagnosis so that others can be alerted.

- It appears that the companies will make the building blocks available to app developers in May and then embed it into the operating system in June. While there are significant limitations relating to self-reporting and the fact that COVID-19 can be treated without direct interaction, we view the effort as an important contribution that may help along-side a massive expansion of traditional contact-tracing methods.
- **MIT Safe Paths contact tracing platform.** MIT and Mayo Clinic are working with Facebook and the to create an open source platform that enables jurisdictions and individuals to provide data to public health officials in an anonymized fashion. A phone-based app that collects information using a technique known as differential privacy that can share information publicly without identifying the individuals represented. The app enables individuals to check if they have crossed paths with someone who is later diagnosed positive and allows public health officials to redact individual information when broadcasting location information to protect patients and local businesses.
- **Change Healthcare and Allscripts to contribute to Federal data registry.** On April 9th, it was reported that Change Healthcare and Allscripts have committed to donating data to help create a registry of Covid-19 patients by pooling medical records from across the country. The initiative is one of several sources of data the federal government is considering monitoring the spread of coronavirus in the U.S., another person familiar with the matter said. The registry wouldn't include patient names or other identifying details but would include detailed information about their past and current conditions and medications, drawing on data that originates from hospitals, pharmacies and health-insurance companies.
- **LabCorp and Ciox to create data registry for clinical research.** LabCorp and Ciox announced that an agreement to collaborate on a comprehensive U.S.-based COVID-19 patient data registry. This registry will house curated, HIPAA-compliant de-identified data sets to expedite clinical research and analyses related to COVID-19. This patient data registry is expected to enable researchers to better understand and characterize COVID-19 diagnoses and treatments and generate insights that will aid ongoing and future pandemic preparedness and prevention efforts.

State Testing Threshold: Healthcare Facility & Worker Capacity

HEALTHCARE FACILITY & WORKER CAPACITY: *Ability to care for all patients, surge capacity, ability to test at-risk healthcare workers*

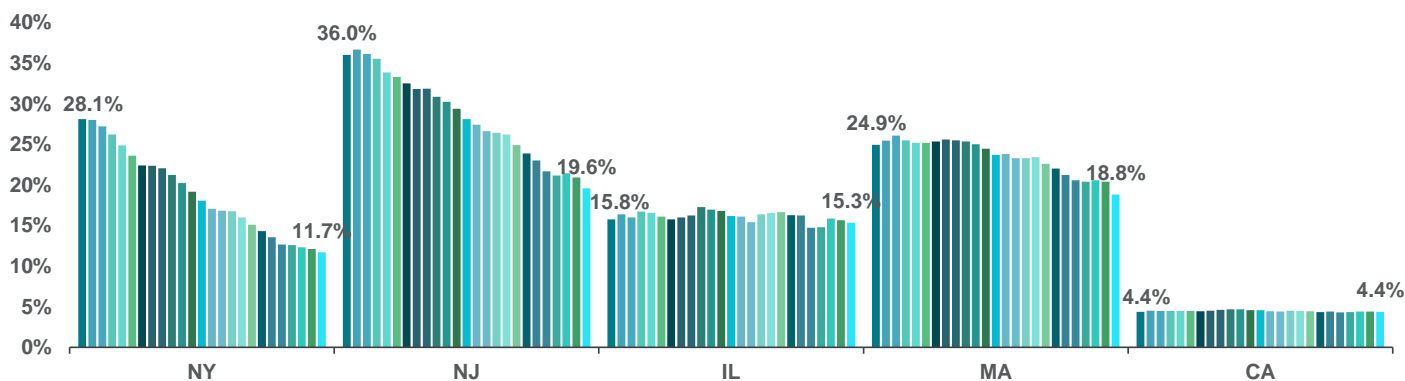
MEASURE: Percentage of hospitals that can handle doubling of patient volume within 24-hours with sufficient PPE, percentage of hospitals that can care for all patients without using crisis standards of care, percentage facilities with testing program for workers.

While state-level data on capacity is limited, we have tracked the number of current COVID-19 related-hospitalizations across the top 5 states with the most cases. We plot the number of current hospitalizations against total bed capacity (at the state level), to evaluate COVID-19's impact on hospital capacity across the hardest hit states. As can be seen below, New York and New Jersey have both seen material, sustained declines in COVID-19 hospitalizations. On April 19th, New York had ~16.1K active COVID-19 hospitalizations, representing 28.1% of the state's total bed capacity. Bed capacity utilization has since declined 1,640bps to 11.7% as of May 13th (the latest data available).

New Jersey has seen a comparable decline, with COVID-19 hospitalizations occupying 36.0% of the state’s bed capacity on April 19th, compared to 19.6% on May 13th (a decrease of ~1,650bps). Over the same time frame, **Massachusetts** has had a less pronounced decline in utilization, with 24.9% of beds occupied by COVID-19 patients on April 19th, compared to 18.8% on May 13th (a decrease of ~610bps).

In contrast, bed utilization has remained relatively flat in Illinois and California. On April 19th, Illinois reported approximately 4,599 COVID-related hospitalizations (~15.8% of beds). On May 13th, approximately 4,473 COVID-19 patients were hospitalized, representing 15.3% of the state’s total hospital beds. California’s capacity utilization has also remained relatively static, with 4.4% of beds occupied by COVID-19 patients on both April 19th and May 13th.

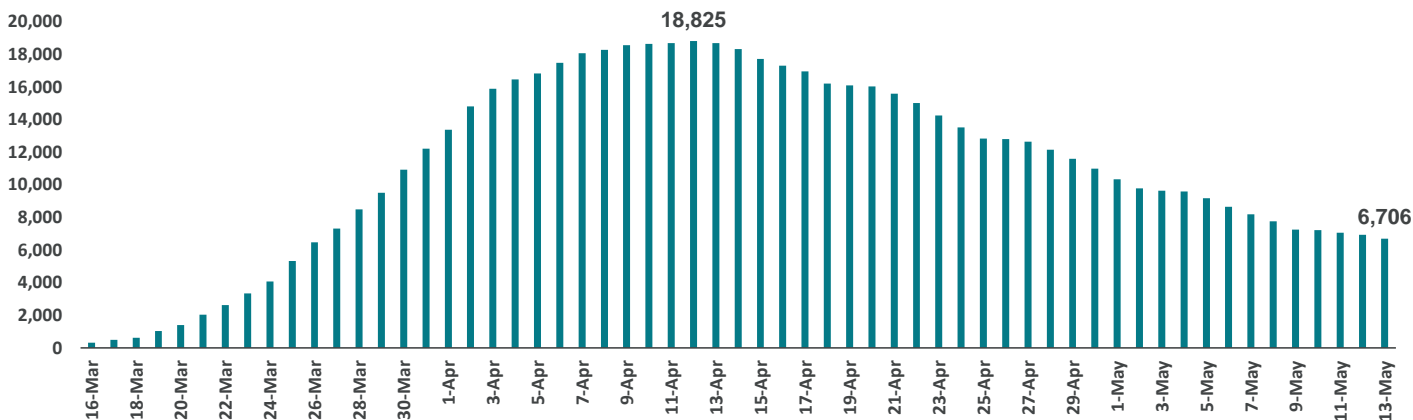
Fig. 22: Current COVID-19 Hospitalizations as % of State Hospital Beds



Source: Nephron Research analysis of state health department websites

Given the size of New York’s outbreak, we take a closer look at the progression of active coronavirus hospitalizations in the state below. As corroborated by the previous analysis, there has been a clear stabilization and decline in net new hospitalizations in New York since early April. The number of individuals within the New York hospital system declined each day from April 12th to May 13th. As of May 13th, there were 6.7K hospitalizations within the state, down from a high of 18.8K on April 12th.

Fig. 23: Total Hospitalizations, New York State



Source: Nephron Research analysis of New York Department of Health

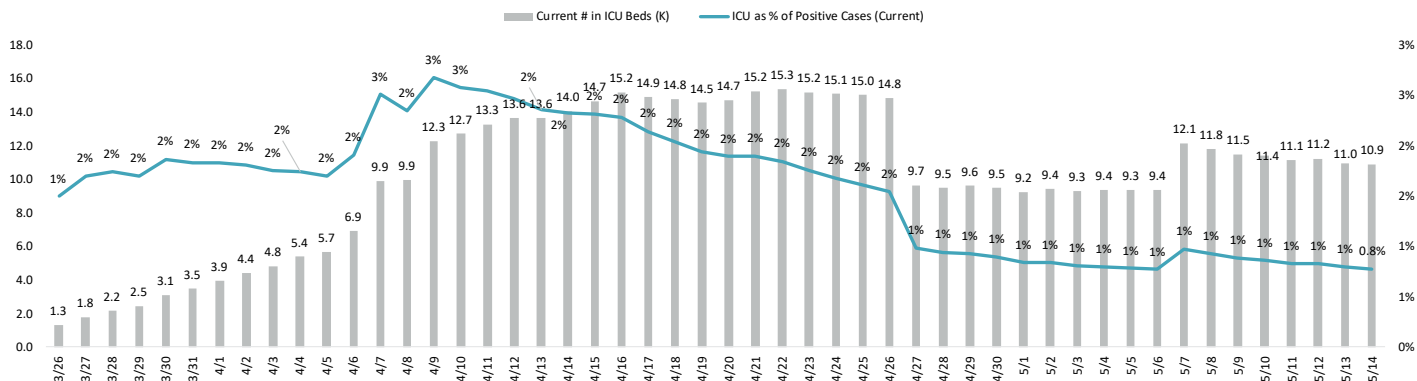
We are tracking ICU hospitalization rates – with ~0.8% utilization rate among positive cases

We next track current COVID ICU bed counts. This is important to monitor as we track national demand in the US for the limited set of ICU beds. **Based on the data so far, there are ~10.9K ICU beds**

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that are currently in use, which is a decrease of 0.7% from the prior day. Based on the current ICU bed utilization, the ICU rate (the % of positive cases that are now in ICU) is now 0.8% in the US, flat from the prior day.

Fig. 24: US ICU Patient Count vs ICU Count as a % of Positive Cases



Source: Nephron Research analysis of The COVID Tracking Project

We have not found a consistent data source on the percentage of hospitals that have access to adequate PP&E. The specific PPE measure for this threshold is the percentage of hospitals that can handle doubling of patient volume within 24-hours with sufficient PPE. Our best sources of information have been direct hospital interviews and commentary from GPO Premier Inc and the medical distributors. Relative to prior to the COVID-19 pandemic, swab orders are running 20x the normal rate while masks are up 10x, and many incremental PPE categories are up 3-5x. **The 'get healthy' dates on which supply is expected to meet demand are currently targeted for July though augmented supply and volumes from project Air Bridge may enable distributors to meet demand in late May or June.**

Coverage Universe Commentaries

Diagnostic Testing

Commercial lab capacity for diagnostic tests now expanded in excess of 100k+ tests per day. This expansion has helped to drive testing toward from 1mn tests per week to ~2.0mn+ tests per week, but we are still far from the goal of 5mn tests per week by May. Quest and LabCorp have worked through their backlog and it is now taking Quest 1-2 days to turn around tests (1 day for priority tests). The American Clinical Laboratory Association has become increasingly critical of the administration and congress, noting that the clinical labs have excess capacity and stating a need for clear federal goals for testing.

- FDA clears the way for expanded at-home testing.** On May 7th, the FDA responded to a recent study by United Health Group and the Gates Foundation that found self-collection of samples was viable by posting new guidelines allowing companies to develop and market home test kits. The FDA hopes this move will expand capacity and access however it is not clear if test developers will establish contracts with commercial labs or simply provide the test kit and leave it to the consumer to choose a lab and of course for this to work the lab needs to have processing capacity. The Gates Foundation is developing an app that can be used to order the kit and deliver lab results as well as assist with contact tracing.

Recent Development: The White House announced new testing goals on April 27th

- **The Trump administration** stated a near term goal to enable each state to test 2% of its population per month on April 27th but provided no time frame for achieving this goal of specifics on how the task force will work to address supply chain constraints and lab capacity.
- **Quest** is currently conducting 50k diagnostic tests per day and is targeting an expansion to 100k by the end of May.
- **Lab Corp** is expanding to 60k tests per day near term and has introduced a take home test. On May 12th the company announced expanded availability of its Pixel at home collection test kits beyond healthcare workers to those with COVID-19 symptoms.
- **Walgreens** announced plans to work with Lab Corp to open testing locations in 49 states and Puerto Rico with the ability to test more than 50k per week.
- **CVS Health** announced a plan to have 1,000 testing locations up and running by the end of May with a goal of processing 1.5mn tests per month.
- **Rite Aid** announced May 8th that it will significantly expand its COVID-19 testing effort with the addition of 46 no-charge testing sites (total of 71 sites in 12 states), most of which will operate through its stores' drive-through windows, beginning 11-May-20. This will bring total testing capacity to 10,000 tests per day in partnership with BioReference labs.
- **Kroger** announced plans to expand its drive through COVID-19 testing model to 50 locations and perform 100k tests by the end of May (vs 8,000 in 30 locations to date).

Antibody Testing

An antibody test which identifies the presence of antibodies in blood derived from a simple pin prick could play a key role in determining the true prevalence rate in the population and who is immune to the virus (assuming herd immunity). Such tests detect if a patient has been exposed to the virus, which is different from tests used to diagnose the disease. We see approval and mass production of such tests for clinic and home use as key to enabling the eventual liberalization of shelter-in-place measures. In early April, we began to hear concerns around the accuracy of serology tests that are being used without FDA review under *enforcement discretion policy* adopted by the FDA in March. **At present there are 90 antibody tests on the market but only Cellex and Roche's tests have received government approval and now there is concern that many of these tests may not be accurate.**

- **Antibody test concerns surfaced again on May 13th when NYU Langone Health released an initial study of Abbott ID Now that conjectured the test may miss 48% of infections.** The study was preliminary and Abbott has raised objections, but it raises important questions around test quality and reporting (we remain concerned that some labs and hospitals are reporting antibody tests in the diagnostic totals). The Abbott test currently accounts for roughly 15% of the market.

Following on recent announcements of antibody tests from Abbot, Roche and Cellex, both Quest and LabCorp have begun to perform antibody testing alongside their molecular diagnostic testing. Quest, which is initially utilizing tests from Abbot and EUROIMMUN/PerkinElmer expects to expand from 70,000 antibody tests per day at the end of this week to 150k tests per day by early May with antibody results reported within 1-2 days of collection. LabCorp's capacity now stands at 50,000 antibody tests per day and is expected to increase over the coming weeks and reach 200k per day by mid-May with results reported within 1-3 days. **The hope is that within a month the two clinical labs could be processing 2mn-3mn antibody tests per week.**

- **On May 3rd Roche received an FDA emergency use authorization for its new antibody test first announced on April 17th.** Shortly after Abbot's announcement in mid-April, Roche announced a

Recent Development: Quest and LabCorp are adding and expanding anti-body testing and Roche recently announced FDA EUA for its antibody test

high throughput antibody test which received FDA authorization on May 3rd. The company now expects to ramp production to 'double-digit' million per month beginning in June (though we note this is a global number whereas Abbot's 20mn goal is within the U.S.) with production reaching 100mn per month by year end.

- **On April 16th, Abbot announced it expects to make 4mn antibody tests available on its ARCHITECT system in April ramping to 20mn per month in June. On May 11th Abbot announced the availability of a second test on its Alinity I system with 30mn available in May.** These lab-based antibody tests are distinct from the ID NOW rapid molecular point of care diagnostic test discussed above. Both tests utilized the FDA's Emergency Use Authorization pathway. **Abbot now expects to have capacity for 60mn total antibody tests in June.**
- **On April 2nd, the FDA approved the first COVID-19 antibody test from Cellex.** Other makers of antibody tests include Becton Dickinson in the U.S. and DiaSorin in Italy.

Recent Development: FDA approves first saliva-based test

On April 14th, the FDA approved the first saliva-based coronavirus test under its emergency powers. The FDA deployed its emergency-use authorization to approve of the test from the Rutgers lab RUCDR Infinite Biologics, informing the university of its approval on Saturday. The new saliva-based test aims to allow for increased testing and safety for health professionals conducting screening and will be available via hospitals and clinics associated with the university with capacity of 10k tests per day. The benefits of the test include safety for those conducting screening as well as lower use of PPE and swabs currently impacted by shortages. While helpful in identifying positives, for now the FDA has directed patients that receive negative results to receive confirmation via a second test.

Hospitals

Our view of which states have demonstrated readiness to re-open will not always align with the states that choose to move forward with re-opening. There are several Southern (red) states that have already partially re-opened the economy over the past two weeks. South Carolina re-opened parts of the economy as early as April 20th, followed by Georgia, Alaska and Oklahoma on April 24th. **We then compare the states that have already re-opened against our Nephron Index of State Readiness to Open** (more information can be found in the report published on April 24, "*COVID-19 What a Deep Dive on New York Tells Us about a Blueprint to Re-opening*"). We ranked the states into four categories of "readiness" to re-open, with level 1 meaning the risk is still high and level 4 meaning there is lower risk. The metrics that we used to determine this index include: 1) absolute number of cases, 2) population adjusted number of cases, 3) absolute number of deaths, 4) absolute number of hospitalizations, and 5) 14-day trajectory of daily new cases. **Based on our index, only a few states were "ready" to open including Alaska, Montana, Idaho, Maine and North Dakota. States that were not ready included states such as Georgia.**

From the hospital perspective, we would like to see higher revenue exposure to states that have re-opened because it means there is a path to a "normal" healthcare environment and lower impact on the economy (assuming they reopen or never went into lockdown).

Based on states that have re-opened their economy, we estimate that UHS and CYH have the highest acute care revenue exposure to states that have partially re-opened at 79%. This is followed by HCA with ~76% of revenues in states that have partially re-opened (primarily Texas and Florida). Tenet has the lowest % of acute care revenues in these states at ~45% of revenues. **In terms of states that have been open the longest (i.e. 2 weeks+), Community Health has the highest exposure at 21.6%, followed by HCA at 10.8% and then UHS at 8.1%.**

Fig. 25: Hospital Acute Care Revenue Exposure to States that have Announced Partial Re-opens

Plans to Reopen	Date	Days Open	Nephron Risk				
			1= High / 4=Low	CYH	UHS	THC	HCA
South Carolina	4/20/2020	21	3	\$0	\$208	\$636	\$985
Alaska	4/24/2020	17	4	\$196	\$0	\$0	\$255
Georgia	4/24/2020	17	1	\$428	\$106	\$0	\$428
Oklahoma	4/24/2020	17	3	\$428	\$106	\$0	\$428
Montana	4/26/2020	15	4	\$0	\$0	\$0	\$0
Minnesota	4/27/2020	14	3	\$0	\$0	\$0	\$0
Mississippi	4/27/2020	14	2	\$620	\$0	\$0	\$72
Tennessee	4/27/2020	14	2	\$742	\$0	\$395	\$2,079
Alabama	5/1/2020	10	3	\$0	\$208	\$636	\$985
Colorado	5/1/2020	10	2	\$168	\$0	\$0	\$1,472
Idaho	5/1/2020	10	4	\$0	\$0	\$0	\$0
Iowa	5/1/2020	10	3	\$0	\$0	\$0	\$0
Maine	5/1/2020	10	4	\$0	\$0	\$0	\$0
North Dakota	5/1/2020	10	4	\$0	\$0	\$0	\$0
Texas	5/1/2020	10	2	\$1,455	\$961	\$2,453	\$10,160
Utah	5/1/2020	10	3	\$0	\$0	\$0	\$944
Wyoming	5/1/2020	10	4	\$0	\$0	\$0	\$0
West Virginia	5/3/2020	8	4	\$100	\$0	\$0	\$0
Florida	5/4/2020	7	1	\$2,129	\$608	\$2,101	\$8,833
Missouri	5/4/2020	7	2	\$321	\$0	\$0	\$883
Kansas	5/4/2020	7	3	\$0	\$0	\$0	\$1,149
Indiana	5/4/2020	7	2	\$1,547	\$0	\$0	\$143
Nebraska	5/4/2020	7	4	\$0	\$0	\$0	\$0
Arkansas	5/6/2020	5	4	\$658	\$0	\$0	\$0
Rhode Island	5/8/2020	3	2	\$0	\$0	\$0	\$0
Nevada	5/9/2020	2	3	\$0	\$1,888	\$0	\$1,173
Sub-Total				\$8,791	\$4,085	\$6,221	\$29,988
<i>% of Acute Care Revenue</i>				<i>78.5%</i>	<i>78.6%</i>	<i>44.9%</i>	<i>76.0%</i>
Open for 1 Week or More				\$8,133	\$2,197	\$6,221	\$28,815
<i>% of Acute Care Revenue</i>				<i>72.6%</i>	<i>42.3%</i>	<i>44.9%</i>	<i>73.0%</i>
Open for 2 Weeks or More				\$2,413	\$420	\$1,031	\$4,247
<i>% of Acute Care Revenue</i>				<i>21.6%</i>	<i>8.1%</i>	<i>7.4%</i>	<i>10.8%</i>

Source: Nephron Research and CMS

*Hospital data based on 2017

Managed Care

From the managed care perspective, we would generally like to see lower revenue exposure to states that have "re-opened," although it's uncertain if there is an adverse effect on long-term medical costs from delays in elective procedures. Based on the near-term impact, lower revenue exposure to states re-opening is a positive on medical costs in 2020. Our analysis below is focused solely on the insurance risk segments including commercial risk, Medicaid and Medicare. Similar to the hospital data, our revenue assumptions for Medicaid and commercial risk is dated back to 2018 but we believe the data is directionally accurate.

Based on states that have announced plans to re-open in the next week, we estimate that Humana has the highest exposure at 61.8% (driven by Texas and Florida). This is followed by Cigna with 50.1% of revenues (driven by Texas) in states planning to re-open. United and Anthem have just over 40% revenue exposure, while CVS and Molina have the lowest exposure at just over 30% of segment revenues (commercial risk, Medicaid and MA only) in states that are re-opening. In terms of states that have been open the longest (i.e. 2 weeks+), the exposure is much lower. Cigna has the highest exposure at 16.8%, followed by Humana at 15.7%.

Fig. 26: MCO Revenue Exposure (Medicaid / Commercial Risk / MA) to States that have Partially Re-Opened

Plans to Reopen	CVS	Anthem	Centene	Cigna	Humana	Molina	United
South Carolina	\$539	\$17	\$974	\$128	\$1,410	\$464	\$1,820
Alaska	\$49	\$0	\$0	\$0	\$1	\$0	\$13
Georgia	\$2,120	\$4,617	\$3,693	\$819	\$3,039	\$0	\$4,598
Oklahoma	\$428	\$1	\$0	\$6	\$644	\$0	\$1,255
Montana	\$8	\$3	\$0	\$20	\$344	\$0	\$20
Minnesota	\$183	\$1	\$0	\$0	\$1,330	\$0	\$213
Mississippi	\$62	\$0	\$1,980	\$173	\$978	\$393	\$1,271
Tennessee	\$293	\$2,245	\$111	\$1,901	\$1,922	\$0	\$4,211
Alabama	\$167	\$2	\$1	\$575	\$1,744	\$0	\$1,517
Colorado	\$301	\$2,449	\$0	\$511	\$850	\$0	\$3,372
Idaho	\$56	\$5	\$0	\$3	\$93	\$34	\$423
Iowa	\$708	\$2,390	\$1,634	\$1	\$288	\$0	\$1,114
Maine	\$405	\$1,030	\$165	\$53	\$104	\$0	\$320
North Dakota	\$2	\$0	\$0	\$0	\$51	\$0	\$11
Texas	\$3,410	\$5,027	\$7,738	\$2,398	\$7,556	\$2,253	\$12,961
Utah	\$381	\$5	\$0	\$82	\$147	\$424	\$1,350
Wyoming	\$18	\$2	\$0	\$3	\$2	\$0	\$62
West Virginia	\$864	\$544	\$0	\$3	\$1,094	\$0	\$207
Florida	\$4,680	\$5,426	\$10,301	\$1,594	\$11,731	\$787	\$12,438
Missouri	\$1,749	\$3,520	\$1,396	\$658	\$1,011	\$0	\$4,094
Kansas	\$782	\$802	\$1,085	\$31	\$502	\$0	\$1,572
Indiana	\$622	\$4,883	\$1,403	\$32	\$1,674	\$0	\$2,634
Nebraska	\$279	\$331	\$332	\$10	\$78	\$0	\$1,192
Arkansas	\$265	\$1	\$905	\$37	\$592	\$0	\$1,008
Rhode Island	\$42	\$8	\$0	\$3	\$0	\$0	\$533
Nevada	\$366	\$1,249	\$175	\$19	\$788	\$0	\$3,592
Sub-Total	\$18,777	\$34,561	\$31,892	\$9,060	\$37,972	\$4,355	\$61,802
<i>% of Revenue (MA/Medicaid/Comm Risk)</i>	<i>32.6%</i>	<i>42.0%</i>	<i>39.1%</i>	<i>50.1%</i>	<i>61.8%</i>	<i>30.6%</i>	<i>43.3%</i>
Open for 1 Week or More	\$18,105	\$33,303	\$30,811	\$9,000	\$36,591	\$4,355	\$56,668
<i>% of Revenue (MA/Medicaid/Comm Risk)</i>	<i>31.4%</i>	<i>40.5%</i>	<i>37.8%</i>	<i>49.8%</i>	<i>59.5%</i>	<i>30.6%</i>	<i>39.7%</i>
Open for 2 Weeks or More	\$3,681	\$6,885	\$6,757	\$3,046	\$9,666	\$857	\$13,400
<i>% of Revenue (MA/Medicaid/Comm Risk)</i>	<i>6.4%</i>	<i>8.4%</i>	<i>8.3%</i>	<i>16.8%</i>	<i>15.7%</i>	<i>6.0%</i>	<i>9.4%</i>

Source: Nephron Research analysis of data from CMS and Local State Health Websites

COVID-19 Pharma and Pharmacy Impact Analysis

Script trend data suggests the COVID-19 roller coaster is starting to slow

The impact of COVID-19 on script demand is like nothing we have seen over the last 20-years. A period of panic buying March 1-21 was followed by a period of destocking and reduced demand from shelter-in-place orders March 22-31. We are closely monitoring a new IQVIA measure of daily retail volume alongside more traditional (and tested) measures of weekly volume. While much noise was made when the daily volume dropped from +10% in mid-March to a -10% decline in late March, this measure has rebounded to -1% over the first 8- days of April. It will take several weeks to separate the relatively benign impact of destocking from the potentially more significant impact of fewer office visits and elective procedures.

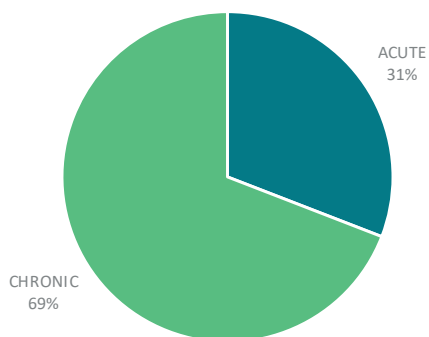
- **Chronic scripts account for 69% of total scripts.** Segmenting Total Rx (TRx) between those treating chronic disease on an ongoing basis and those treating acute conditions we find chronic scripts make up 69% of total. **There is a high probability such scripts will continue to be written and filled even during a 3-6mo period of disruption.**
- **Refill scripts account for 77% of total.** In order to capture all refill scripts we must aggregate the IQVIA category of 'Refill Scripts' (42% of total) and the 'New Refill Scripts' portion of 'New Scripts'

which encapsulates new refills in the period as opposed to refills on file. **In total refills, which are likely to continue to be written during a period of disruption account for 77% of total scripts.**

While COVID-19 and the resulting recession will weigh on the 19% of scripts attributable to new therapy starts, fully 77% of scripts are attributable to refills

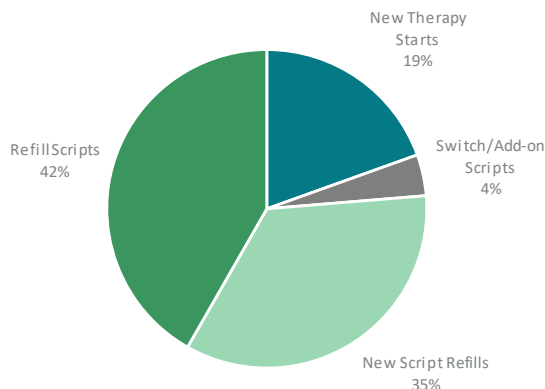
- **New Therapy Starts are only 19% of total.** The category of 'New Rx (NRx)' is somewhat of a misnomer as it includes New Therapy Starts as well as Switch/Add-on Scripts and New Script Refills. **Most important, the New Therapy Starts (NTS Rx) most likely to be significantly impacted by the decline in physician office visits and screening activity represent only 19% of Total Rx.**

Fig. 27: Chronic scripts account for 69% of Total Rx – should prove highly inelastic through pandemic and recession



Source: Nephron Research, Script data from IQVIA "SMART – US Edition", IQVIA Institute

Fig. 28: Refill scripts account for 77% of Total Rx – the new therapy starts most at risk account for 19%



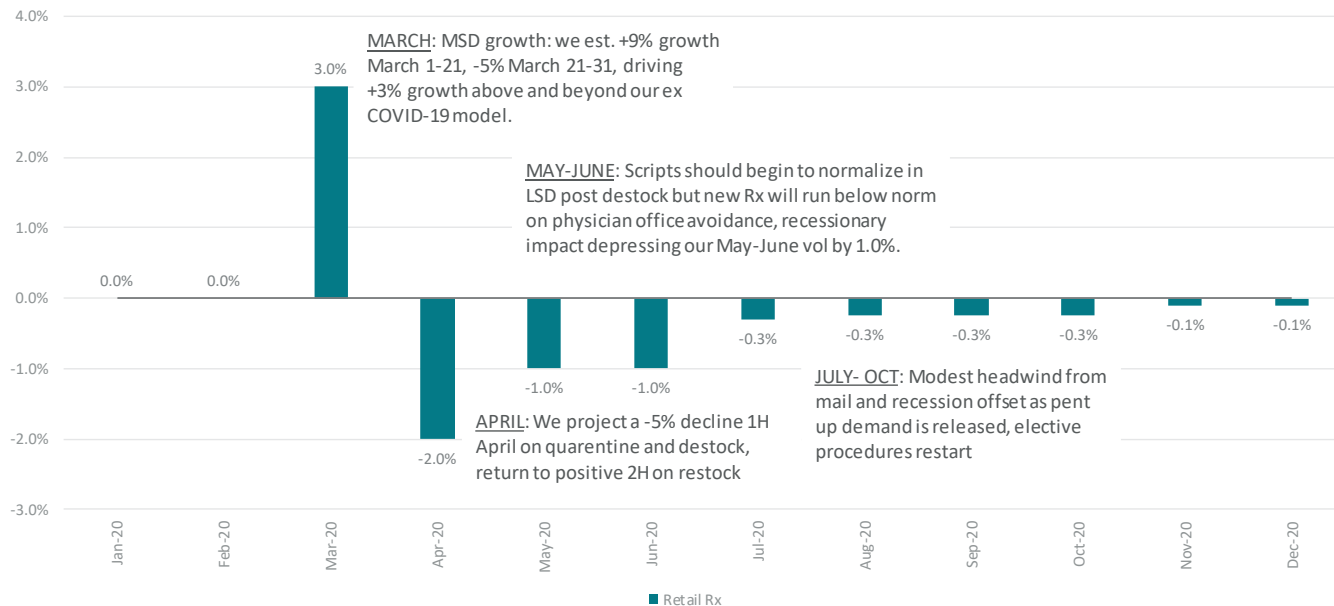
Source: Nephron Research, Script data from IQVIA "SMART – US Edition", IQVIA Institute

For a detailed analysis of the latest weekly and daily scripts trends, see our March 13th note: [New Script Trends Suggest COVID-19 Roller Coaster is Beginning to Normalize](#) in the Nephron Research library.

Nephron Research Outlook for 2020 COVID-19 Impact (by month)

We have attempted to estimate the incremental impact of COVID-19 on retail pharmacy volumes (above/below our initial 2020 estimates). **We expect a 3% outperformance in March will be offset by 2% underperformance in April, with script growth normalizing May to June but still suffering from physician office avoidance and a recessionary pressure (the later of which is likely a greater margin than revenue impact as volume shifts from commercial to Medicaid and cash/discount cards).** For the full year we project retail scripts will be less than 1% off from our original 2020 estimate.

We project the impact of the pandemic on volume will be less than 1% in 2020 but expect the recession will meaningfully shift lives between commercial, Medicaid, cash and discount cards

Fig. 29: Nephron Estimates of COVID-19 Incremental Impact: Retail Pharmacy Channel

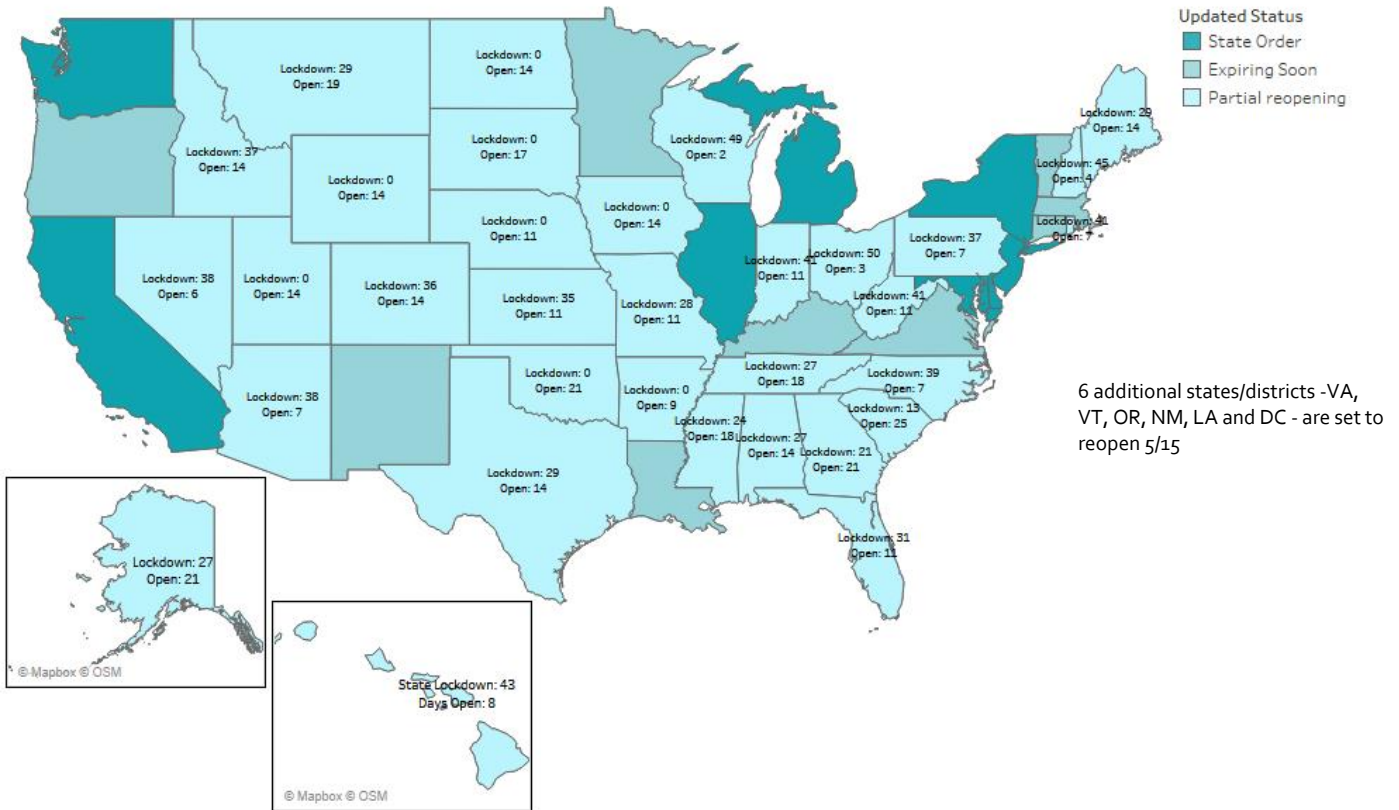
Source: Nephron Research

- Mail order impact is likely to be quite limited.** It is possible we may see a negative headwind in retail pharmacy from the shift to mail order. However, our discussions with pharmacists, PBMs and payors suggest that 70%-80% of the increase in mail in March was attributable to early refills vs only 20%-30% from first mail fills. While this number is likely to increase as we progress through the lock down, **even if 50% of elevated March mail growth is attributed to gains from the retail channel that are sustained through the year, this would represent only a -4obp headwind to retail pharmacy script growth.** We expect the actual impact will be far less than -4obp.
- The impact of the recession is far more concerning.** With unemployment insurance claims exceeding 16mn over the last three weeks we expect major changes in healthcare coverage for millions of Americans. The Nephron Research house view is that commercial insurance rolls will decline by 10mn members, or 6%, of which 1.25mn lives will shift to the exchanges. Of the remaining 8.75mn lives we assume 50% move to Medicaid (not a bad margin for pharmacy in the 25% of the market that is fee for service Medicaid, lower margin where managed) and 37.5% could simply go uninsured (potentially beneficial to pharmacy margins for cash payment but negative when consumers utilize discount cards). **We size the earnings headwind to CVS and Walgreens from recessionary margin shift as several orders of magnitude larger than pandemic volume reductions.**

For our pharmacy and PBM impact analysis see our March 13th CVS note: [CVS: COVID-19 Impact Analysis: 2020 EPS Impact Sized at -\\$0.47 \(7%\)](#) and our March 14th WBA note: [WBA: Updated to COVID-19 Impact Analysis: Pharmacy Margin Revised Downward](#).

Appendix Charts

Fig. 30: Days in State Lockdown vs. Days since Partial Reopening



Source: Nephron Research Graphic, State "Lockdown" Order Information obtained from <https://nyti.ms/2YwojJ1>

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Fig. 31: Trend in COVID-19 Cases for Top 5 States

Date	US Total	Top 5 States																			
		New York				New Jersey				Illinois				Massachusetts				California			
		per 100K	Total	D/D	% D/D	per 100K	Total	D/D	% D/D	per 100K	Total	D/D	% D/D	per 100K	Total	D/D	% D/D	per 100K	Total	D/D	% D/D
4-Mar	207	0	22			0	1			0	5			0	0			0	0		
5-Mar	275	0	33	11	50%	0	1	0	0%	0	5	0%		0	8	8		0	60	60	
6-Mar	387	0	76	43	130%	0	4	3	300%	0	6	0%		0	13	5	63%	0	69	9	15%
7-Mar	538	1	105	29	38%	0	6	2	50%	0	6	0%		0	13	0	0%	0	88	19	28%
8-Mar	721	1	142	37	35%	0	11	5	83%	0	7	0%		1	41	28	215%	0	114	26	30%
9-Mar	1,013	1	173	31	22%	0	15	4	36%	0	19	0%		1	92	51	124%	0	133	19	17%
10-Mar	1,280	1	216	43	25%	0	24	9	60%	0	19	0	0%	1	92	0	0%	0	157	24	18%
11-Mar	1,672	1	216	0	0%	0	30	6	25%	0	25	6	32%	1	95	3	3%	1	202	45	29%
12-Mar	2,142	2	421	205	95%	1	50	20	67%	0	32	7	28%	2	123	28	29%	1	202	0	0%
13-Mar	3,004	3	524	103	24%	1	50	0	0%	0	46	14	44%	2	138	15	12%	1	252	50	25%
15-Mar	4,842	4	729	205	39%	1	98	48	96%	1	64	18	39%	2	138	0	0%	1	293	41	16%
16-Mar	6,131	5	950	221	30%	2	178	80	82%	1	93	29	45%	2	164	26	19%	1	335	42	14%
17-Mar	8,254	9	1,700	750	79%	3	267	89	50%	1	161	68	73%	3	218	54	33%	1	483	148	44%
18-Mar	10,865	12	2,382	682	40%	5	427	160	60%	2	289	128	80%	4	256	38	17%	2	611	128	27%
19-Mar	15,063	21	4,152	1,770	74%	8	742	315	74%	3	426	137	47%	5	328	72	28%	3	1,058	447	73%
20-Mar	20,834	37	7,102	2,950	71%	10	890	148	20%	5	590	164	38%	6	413	85	26%	3	1,286	228	22%
21-Mar	27,367	53	10,356	3,254	46%	15	1,327	437	49%	6	759	169	29%	8	525	112	27%	3	1,286	0	0%
22-Mar	36,334	78	15,168	4,812	46%	22	1,914	587	44%	8	1,058	299	39%	9	646	121	23%	4	1,536	250	19%
23-Mar	47,013	107	20,875	5,707	38%	32	2,844	930	49%	10	1,285	227	21%	11	777	131	20%	4	1,733	197	13%
24-Mar	57,179	132	25,665	4,790	23%	41	3,675	831	29%	12	1,551	266	21%	17	1,159	382	49%	5	2,102	369	21%
25-Mar	69,473	158	30,811	5,146	20%	50	4,402	727	20%	15	1,865	314	20%	27	1,838	679	59%	5	2,102	0	0%
26-Mar	86,789	192	37,258	6,447	21%	77	6,876	2,474	56%	20	2,538	673	36%	35	2,417	579	32%	8	3,006	904	43%
27-Mar	105,462	229	44,635	7,377	20%	99	8,825	1,949	28%	24	3,060	522	21%	47	3,240	823	34%	10	3,879	873	29%
28-Mar	124,815	269	52,318	7,683	17%	125	11,124	2,299	26%	28	3,491	431	14%	62	4,257	1,017	31%	12	4,643	764	20%
29-Mar	144,297	306	59,513	7,195	14%	151	13,386	2,262	20%	36	4,596	1,105	32%	72	4,955	698	16%	14	5,708	1,065	23%
30-Mar	165,521	342	66,497	6,984	12%	187	16,636	3,250	24%	40	5,057	461	10%	83	5,752	797	16%	16	6,447	739	13%
31-Mar	189,998	390	75,795	9,298	14%	210	18,696	2,060	12%	47	5,994	937	19%	96	6,620	868	15%	19	7,482	1,035	16%
1-Apr	215,177	430	83,712	7,917	10%	251	22,255	3,559	19%	55	6,980	966	16%	112	7,738	1,118	17%	21	8,155	673	9%
2-Apr	243,235	475	92,381	8,669	10%	288	25,590	3,335	15%	61	7,695	715	10%	130	8,966	1,228	16%	23	9,191	1,036	13%
3-Apr	275,234	529	102,863	10,482	11%	337	29,895	4,305	17%	70	8,904	1,209	16%	151	10,402	1,436	16%	27	10,701	1,510	16%
4-Apr	308,752	584	113,704	10,841	11%	384	34,124	4,229	14%	82	10,357	1,453	16%	170	11,736	1,334	13%	30	12,026	1,325	12%
5-Apr	334,718	627	122,031	8,327	7%	422	37,505	3,381	10%	89	11,256	899	9%	181	12,500	764	7%	34	13,438	1,412	12%
6-Apr	363,465	672	130,689	8,658	7%	463	41,090	3,585	10%	97	12,262	1,006	9%	201	13,837	1,337	11%	36	14,336	898	7%
7-Apr	393,874	714	138,863	8,174	6%	500	44,416	3,326	8%	107	13,549	1,287	10%	221	15,202	1,365	10%	40	15,865	1,529	11%
8-Apr	424,045	768	149,316	10,453	8%	534	47,437	3,021	7%	119	15,078	1,529	11%	244	16,790	1,588	10%	43	16,957	1,092	7%
9-Apr	458,260	822	159,937	10,621	7%	574	51,027	3,590	8%	130	16,422	1,344	9%	275	18,941	2,151	13%	46	18,309	1,352	8%
10-Apr	492,848	877	170,512	10,575	7%	615	54,588	3,561	7%	141	17,887	1,465	9%	304	20,974	2,033	11%	49	19,472	1,163	6%
11-Apr	522,750	928	180,458	9,946	6%	655	58,151	3,563	7%	151	19,180	1,293	7%	332	22,860	1,886	9%	49	19,472	0	0%
12-Apr	551,906	970	188,694	8,236	5%	696	61,850	3,699	6%	165	20,852	1,672	9%	370	25,475	2,615	11%	55	21,794	2,322	12%
13-Apr	576,875	1,003	195,031	6,337	3%	727	64,584	2,734	4%	174	22,025	1,173	6%	390	26,867	1,392	5%	57	22,348	554	3%
14-Apr	602,795	1,039	202,208	7,177	4%	775	68,824	4,240	7%	183	23,247	1,222	6%	409	28,163	1,296	5%	59	23,338	990	4%
15-Apr	633,112	1,099	213,779	11,571	6%	800	71,030	2,206	3%	194	24,593	1,346	6%	434	29,918	1,755	6%	62	24,424	1,086	5%
16-Apr	664,129	1,143	222,284	8,505	4%	848	75,317	4,287	6%	203	25,733	1,140	5%	467	32,181	2,263	8%	66	26,182	1,758	7%
17-Apr	696,010	1,180	229,642	7,358	3%	883	78,467	3,150	4%	218	27,575	1,842	7%	499	34,402	2,221	7%	70	27,528	1,346	5%
18-Apr	724,047	1,217	236,732	7,090	3%	917	81,420	2,953	4%	230	29,160	1,585	6%	528	36,372	1,970	6%	73	28,963	1,435	5%
19-Apr	751,646	1,248	242,786	6,054	3%	960	85,301	3,881	5%	240	30,357	1,197	4%	552	38,077	1,705	5%	77	30,333	1,370	5%
20-Apr	776,830	1,272	247,512	4,726	2%	1,000	88,806	3,505	4%	249	31,508	1,151	4%	575	39,643	1,566	4%	78	30,978	645	2%
21-Apr	802,772	1,294	251,690	4,178	2%	1,040	92,387	3,581	4%	261	33,059	1,551	5%	598	41,199	1,556	4%	84	33,261	2,283	7%
22-Apr	831,374	1,322	257,216	5,526	2%	1,079	95,865	3,478	4%	277	35,108	2,049	6%	623	42,944	1,745	4%	90	35,396	2,135	6%
23-Apr	863,123	1,354	263,460	6,244	2%	1,126	99,989	4,124	4%	291	36,934	1,826	5%	668	46,023	3,079	7%	95	37,369	1,973	6%
24-Apr	897,319	1,396	271,590	8,130	3%	1,151	102,196	2,207	2%	313	39,658	2,724	7%	739	50,969	4,946	11%	99	39,254	1,885	5%
25-Apr	933,310	1,450	282,143	10,553	4%	1,188	105,523	3,327	3%	330	41,777	2,119	5%	774	53,348	2,379	5%	104	41,137	1,883	5%
26-Apr	960,343	1,481	288,045	5,902	2%	1,228	109,038	3,515	3%	346	43,903	2,126	5%	797	54,938	1,590	3%	107	42,164	1,027	2%
27-Apr	981,134	1,501	291,996	3,951	1%	1,252	111,188	2,150	2%	362	45,883	1,980	5%	819	56,462	1,524	3%	110	43,464	1,300	3%
28-Apr	1,006,137	1,517	295,106	3,110	1%	1,282	113,856	2,668	2%	380	48,102	2,219	5%	846	58,302	1,840	3%	114	45,031	1,567	4%
29-Apr	1,033,157	1,541	299,691	4,585	2%	1,309	116,264	2,408	2%	397	50,355	2,253	5%	874	60,265	1,963	3%	118	46,500	1,469	3%
30-Apr	1,062,503	1,565	304,372	4,681	2%	1,336	118,652	2,388	2%	418	52,918	2,563	5%	903	62,205	1,940	3%	124	48,917	2,417	5%
1-May	1,095,681	1,585	308,314	3,942	1%	1,364	121,190	2,538	2%	442	56,055	3,137	6%	933	64,311	2,106	3%	128	50,442	1,525	3%
2-May	1,125,719	1,609	312,977	4,663	2%	1,393	123,717	2,527	2%	462	58,505	2,450	4%	961	66,263	1,952	3%	132	52,197	1,755	3%
3-May	1,152,006	1,627	316,415	3,438	1%	1,427	126,744	3,027	2%	485	61,499	2,994	5%	988	68,087	1,824	3%	136	53,616	1,419	3%
4-May	1,173,453	1,640	318,953	2,538	1%	1,444	128,269	1,525	1%	504	63,840	2,341	4%	1,002	69,087	1,000	1%	139	54,937	1,321	2%
5-May	1,195,605	1,651	321,192	2,239	1%	1,470	130,593	2,324	2%	521	65,962	2,122	3%	1,020	70,271	1,184	2%	142	56,212	1,275	2%
6-May	1,220,557	1,665	323,978	2,786	1%	1,485	131,890	1,297	1%	538	68,232	2,270	3%	1,045	72,025	1,754	2%	149	58,815	2,603	5%
7-May	1,248,137																				

Fig. 32: Trend in COVID-19 Cases for Top 5 Counties

Date	US Total	Top 5 Counties														
		New York City			Cook			Nassau			Suffolk			Los Angeles		
		NY			IL			NY			NY			CA		
14-Mar	3,741	287			51			79			41			53		
15-Mar	4,842	457	170	59%	76	25	49%	98	19	24%	47	6	15%	69	16	30%
16-Mar	6,131	643	186	41%	76	0	0%	109	11	11%	63	16	34%	94	25	36%
17-Mar	8,254	1,340	697	108%	107	31	41%	131	22	20%	84	21	33%	144	50	53%
18-Mar	10,865	2,471	1,131	84%	179	72	67%	183	52	40%	116	32	38%	190	46	32%
19-Mar	15,063	4,408	1,937	78%	279	100	56%	382	199	109%	178	62	53%	231	41	22%
20-Mar	20,834	6,213	1,805	40.9%	412	133	48%	754	372	97%	371	193	108%	292	61	26%
21-Mar	27,367	9,045	2,832	45.6%	548	136	33%	1,234	480	64%	662	291	78%	351	59	20%
22-Mar	36,334	12,305	3,260	36.0%	805	257	47%	1,900	666	54%	1,034	372	56%	421	70	20%
23-Mar	47,013	14,904	2,599	21.1%	922	117	15%	2,442	542	29%	1,458	424	41%	536	115	27%
24-Mar	57,179	17,856	2,952	19.8%	1,194	272	30%	2,869	427	17%	1,880	422	29%	662	126	24%
25-Mar	69,473	21,393	3,537	19.8%	1,418	224	19%	3,285	416	14%	2,260	380	20%	799	137	21%
26-Mar	86,789	25,398	4,005	18.7%	1,904	486	34%	3,914	629	19%	2,735	475	21%	1,216	417	52%
27-Mar	105,462	29,766	4,368	17.2%	2,239	335	18%	4,657	743	19%	3,385	650	24%	1,465	249	20%
28-Mar	124,815	33,768	4,002	13.4%	2,613	374	17%	5,537	880	19%	4,138	753	22%	1,804	339	23%
29-Mar	144,297	37,453	3,685	10.9%	3,445	832	32%	6,445	908	16%	5,023	885	21%	2,136	332	18%
30-Mar	165,521	43,139	5,686	15.2%	3,727	282	8%	7,344	899	14%	5,791	768	15%	2,474	338	16%
31-Mar	189,998	47,439	4,300	10.0%	4,496	769	21%	8,544	1,200	16%	6,713	922	16%	3,011	537	22%
1-Apr	215,177	51,809	4,370	9.2%	5,152	656	15%	9,555	1,011	12%	7,605	892	13%	3,518	507	17%
2-Apr	243,235	57,159	5,350	10.3%	5,575	423	8%	10,587	1,032	11%	8,746	1,141	15%	4,045	527	15%
3-Apr	275,234	63,306	6,147	10.8%	6,473	898	16%	12,024	1,437	14%	10,154	1,408	16%	4,566	521	13%
4-Apr	308,752	67,551	4,245	6.7%	7,439	966	15%	13,346	1,322	11%	12,328	2,174	21%	5,277	711	16%
5-Apr	334,718	72,181	4,630	6.9%	8,043	604	8%	14,398	1,052	8%	12,933	605	5%	5,940	663	13%
6-Apr	363,465	76,876	4,695	6.5%	8,728	685	9%	15,616	1,218	8%	14,473	1,540	12%	6,360	420	7%
7-Apr	393,874	81,803	4,927	6.4%	9,509	781	9%	16,610	994	6%	15,561	1,088	8%	6,910	550	9%
8-Apr	424,045	87,028	5,225	6.4%	10,520	1,011	11%	18,548	1,938	12%	15,844	283	2%	7,530	620	9%
9-Apr	458,260	92,384	5,356	6.2%	11,415	895	9%	20,140	1,592	9%	17,413	1,569	10%	7,955	425	6%
10-Apr	492,848	98,308	5,924	6.4%	12,472	1,057	9%	21,512	1,372	7%	18,692	1,279	7%	8,430	475	6%
11-Apr	522,750	103,208	4,900	5.0%	13,417	945	8%	22,584	1,072	5%	19,883	1,191	6%	8,873	443	5%
12-Apr	551,906	106,763	3,555	3.4%	14,585	1,168	9%	23,553	969	4%	20,816	933	5%	9,192	319	4%
13-Apr	576,875	110,465	3,702	3.5%	15,474	889	6%	24,358	805	3%	21,643	827	4%	9,420	228	2%
14-Apr	602,795	118,302	7,837	7.1%	16,323	849	5%	25,250	892	4%	22,462	819	4%	10,047	627	7%
15-Apr	633,112	123,146	4,844	4.1%	17,306	983	6%	26,715	1,465	6%	23,278	816	4%	10,496	449	4%
16-Apr	664,129	127,352	4,206	3.4%	18,087	781	5%	27,772	1,057	4%	24,182	904	4%	10,854	358	3%
17-Apr	696,010	131,263	3,911	3.1%	19,391	1,304	7%	28,539	767	3%	25,035	853	4%	11,391	537	5%
18-Apr	724,047	134,436	3,173	2.4%	20,395	1,004	5%	29,180	641	2%	26,143	1,108	4%	12,021	630	6%
19-Apr	751,646	136,806	2,370	1.8%	21,272	877	4%	30,013	833	3%	26,888	745	3%	12,341	320	3%
20-Apr	776,830	139,325	2,519	1.8%	22,101	829	4%	30,677	664	2%	27,662	774	3%	13,816	1,475	12%
21-Apr	802,772	142,432	3,107	2.2%	23,181	1,080	5%	31,079	402	1%	28,154	492	2%	15,140	1,324	10%
22-Apr	831,374	145,855	3,423	2.4%	24,546	1,365	6%	31,555	476	2%	28,854	700	2%	16,435	1,295	9%
23-Apr	863,123	150,473	4,618	3.2%	25,811	1,265	5%	32,124	569	2%	29,567	713	2%	17,508	1,073	7%
24-Apr	897,319	155,113	4,640	3.1%	27,616	1,805	7%	32,765	641	2%	30,606	1,039	4%	18,545	1,037	6%
25-Apr	933,310	158,258	3,145	2.0%	29,058	1,442	5%	33,798	1,033	3%	31,368	762	2%	19,107	562	3%
26-Apr	960,343	160,489	2,231	1.4%	30,574	1,516	5%	34,522	724	2%	32,059	691	2%	19,528	421	2%
27-Apr	981,134	162,338	1,849	1.2%	31,953	1,379	5%	34,865	343	1%	32,470	411	1%	20,417	889	5%
28-Apr	1,006,137	164,841	2,503	1.5%	33,449	1,496	5%	35,085	220	1%	32,724	254	1%	20,976	559	3%
29-Apr	1,033,157	167,478	2,637	1.6%	34,880	1,431	4%	35,505	420	1%	33,265	541	2%	22,485	1,509	7%
30-Apr	1,062,503	169,690	2,212	1.3%	36,513	1,633	5%	35,854	349	1%	33,664	399	1%	23,182	697	3%
1-May	1,095,681	172,354	2,664	1.6%	38,668	2,155	6%	36,161	307	1%	34,037	373	1%	24,215	1,033	4%
2-May	1,125,719	174,331	1,977	1.1%	40,227	1,559	4%	36,519	358	1%	34,478	441	1%	24,894	679	3%
3-May	1,152,006	175,651	1,320	0.8%	42,324	2,097	5%	36,780	261	1%	34,855	377	1%	25,662	768	3%
4-May	1,173,453	176,874	1,223	0.7%	43,715	1,391	3%	36,965	185	1%	35,077	222	1%	26,217	555	2%
5-May	1,195,605	178,351	1,477	0.8%	45,223	1,508	3%	37,152	187	1%	35,275	198	1%	27,815	1,598	6%
6-May	1,220,557	180,216	1,865	1.0%	46,689	1,466	3%	37,350	198	1%	35,543	268	1%	28,644	829	3%
7-May	1,248,137	181,783	1,567	0.9%	48,341	1,652	4%	37,593	243	1%	35,892	349	1%	29,427	783	3%
8-May	1,275,916	183,289	1,506	0.8%	50,236	1,895	4%	37,812	219	1%	36,223	331	1%	30,296	869	3%
9-May	1,301,095	184,417	1,128	0.6%	51,674	1,438	3%	38,028	216	1%	36,461	238	1%	31,197	901	3%
10-May	1,322,807	185,357	940	0.5%	52,655	981	2%	38,217	189	0%	36,702	241	1%	31,677	480	2%
11-May	1,340,412	186,123	766	0.4%	53,381	726	1%	38,337	120	0%	36,911	209	1%	32,258	581	2%
12-May	1,360,705	187,250	1,127	0.6%	55,470	2,089	4%	38,434	97	0%	37,062	151	0%	33,180	922	3%
13-May	1,382,304	188,545	1,295	0.7%	56,406	936	2%	38,587	153	0%	37,305	243	1%	34,428	1,248	4%
Day/Day	21,599	1,295			936			153			243			1,248		
% d/d	1.6%	0.7%			1.7%			0.4%			0.7%			3.8%		

Source: Nephron Research analysis of The COVID Tracking Project

*Green highlights indicate effective date of stay-at-home orders

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