COVID-19
Tower Health Testing Update

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May 19, 2020

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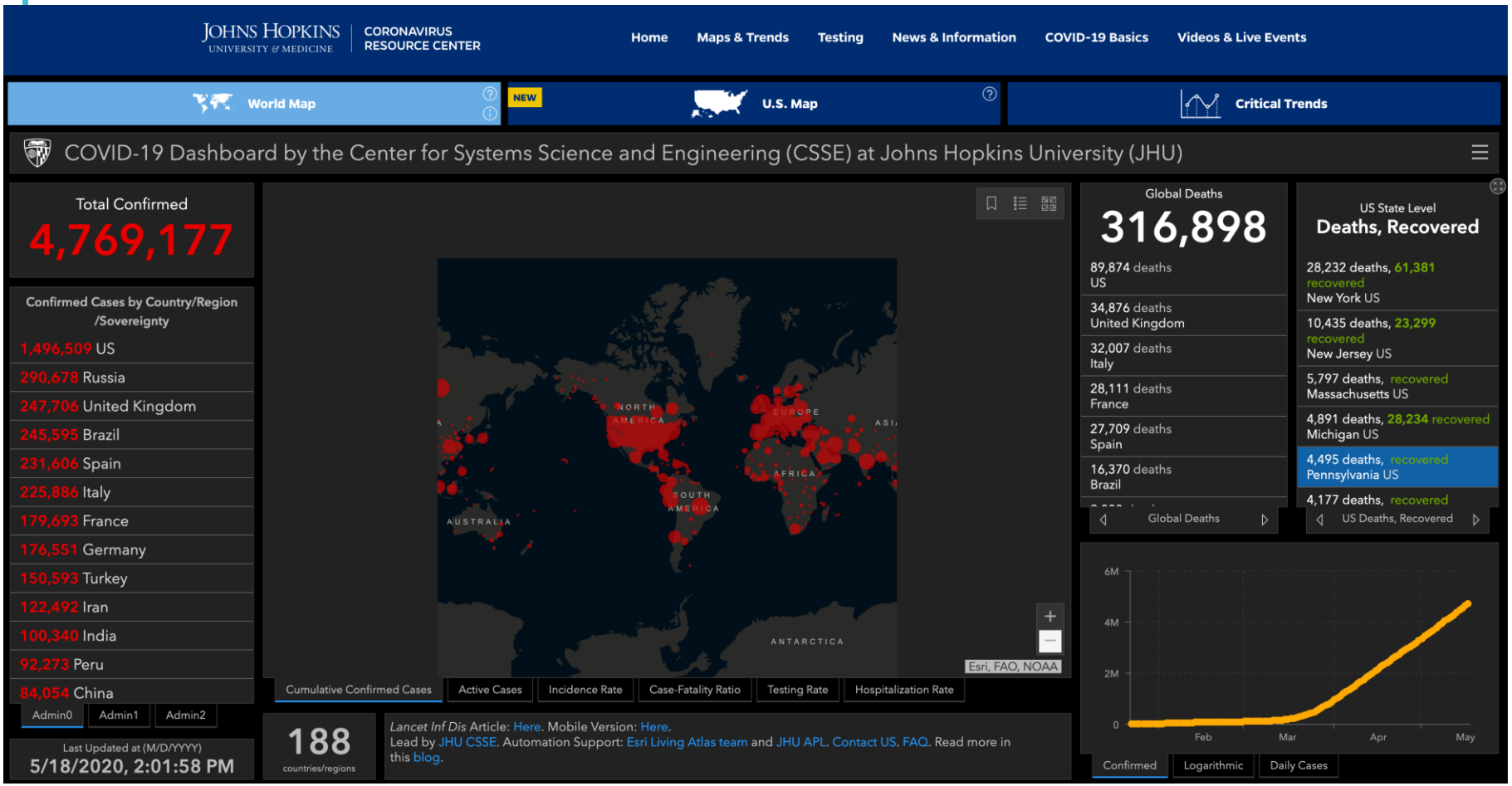

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Last updated on May 18, 2020

TOTAL CASES	TOTAL DEATHS
1,480,349	89,407
13,284 New Cases*	698 New Deaths*

(6%)

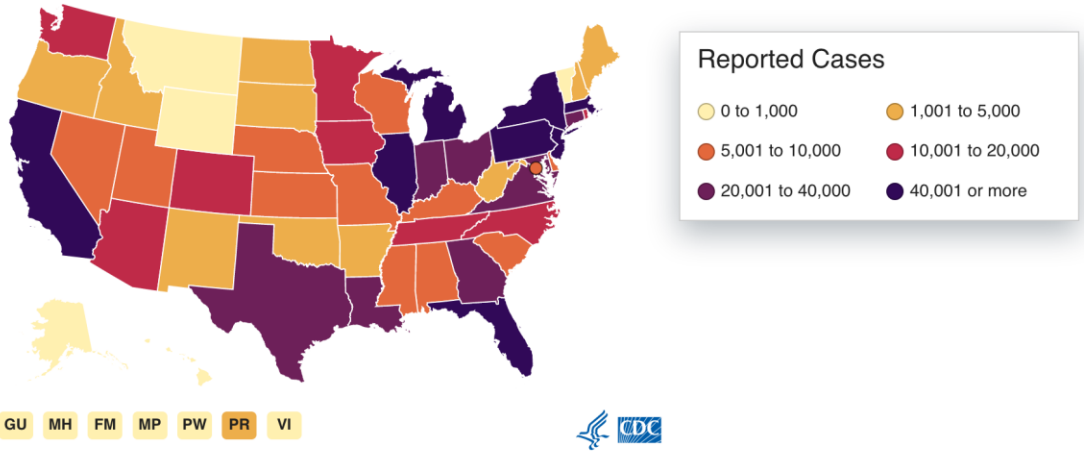
*Compared to yesterday's data

About the Data

Cases & Deaths by State

24 states report more than 10,000 cases of COVID-19.

This map shows COVID-19 cases and deaths reported by U.S. states, the District of Columbia, and other U.S.-affiliated jurisdictions. Hover over the map to see the number of cases and deaths reported in each jurisdiction. To go to a jurisdiction's health department website, click on the jurisdiction on the map.



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Pennsylvania totals – May 18, 2020

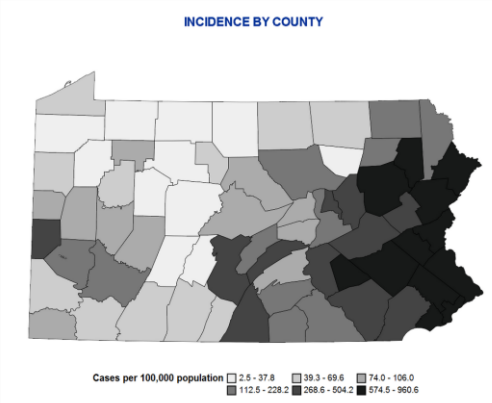
Case Counts, Deaths, and Negatives

Total Cases*	Deaths	Negative
63,056	4,505	277,553

19.4% of those tested are positive

6.7% mortality

Incidence by County



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Positive Cases by Age Range to Date

Age Range	Percent of Cases*
0-4	< 1%
5-12	< 1%
13-18	1%
19-24	6%
25-49	37%
50-64	26%
65+	29%

** Percentages may not total 100% due to rounding*

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Hospitalization Rates by Age Range to Date

Age Range	Percent of Cases
0-29	2%
30-49	5%
50-64	10%
65-79	20%
80+	18%

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Cases by County

County	Total Cases	Percent of State's Cases	Cases per 100,000	Total Deaths
Philadelphia	16,140	25.9%	1,019	1,022
Montgomery	5,872	9.4%	707	620
Delaware	5,619	9%	991	478
Bucks	4,439	7.1%	707	422
Berks	3,677	5.9%	873	208
Lehigh	3,470	5.6%	940	139
Northampton	2,703	4.3%	885	199
Luzerne	2,526	4.1%	796	127
Lancaster	2,508	4%	460	187
Chester	2,118	3.4%	403	220

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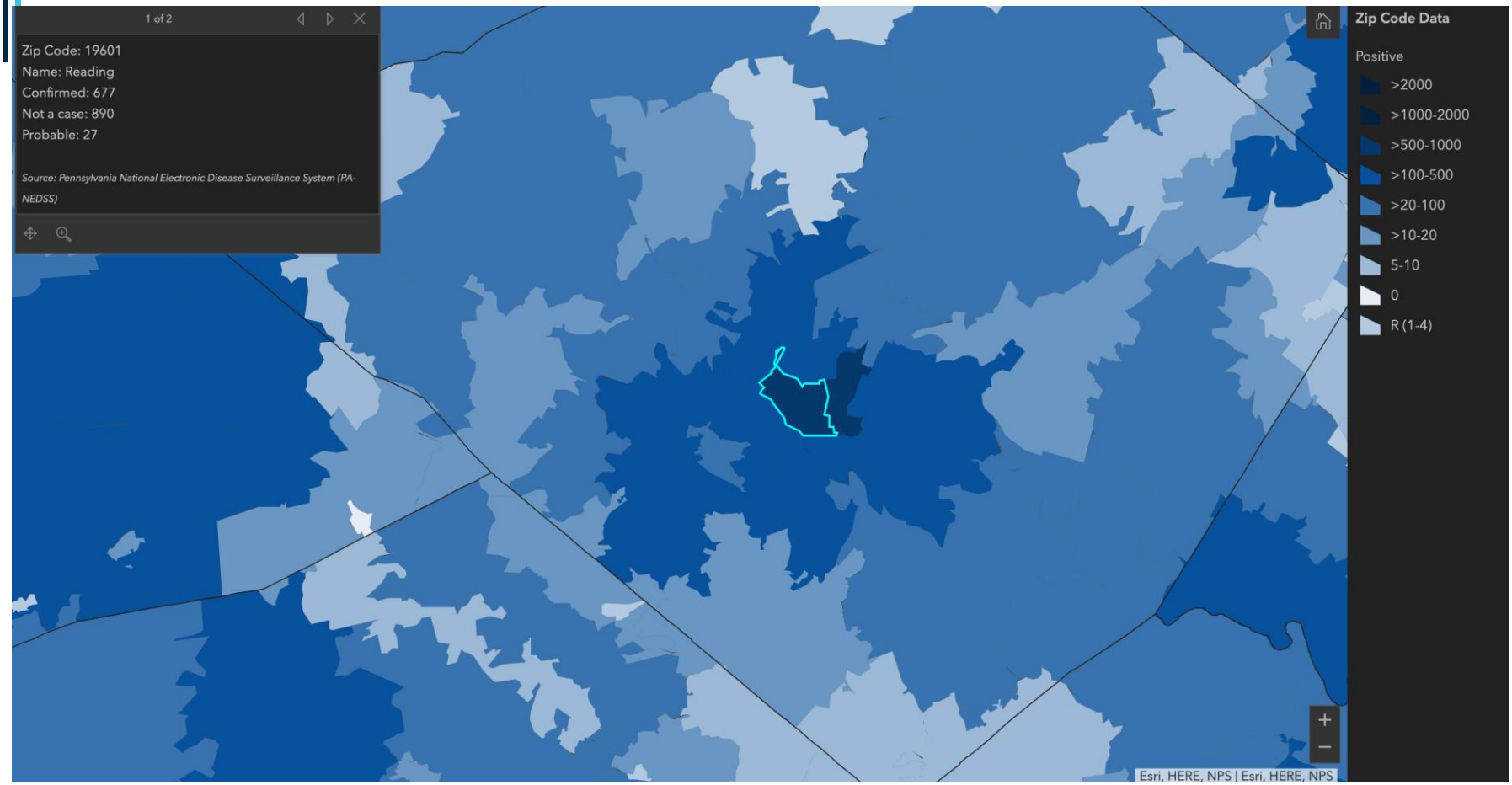

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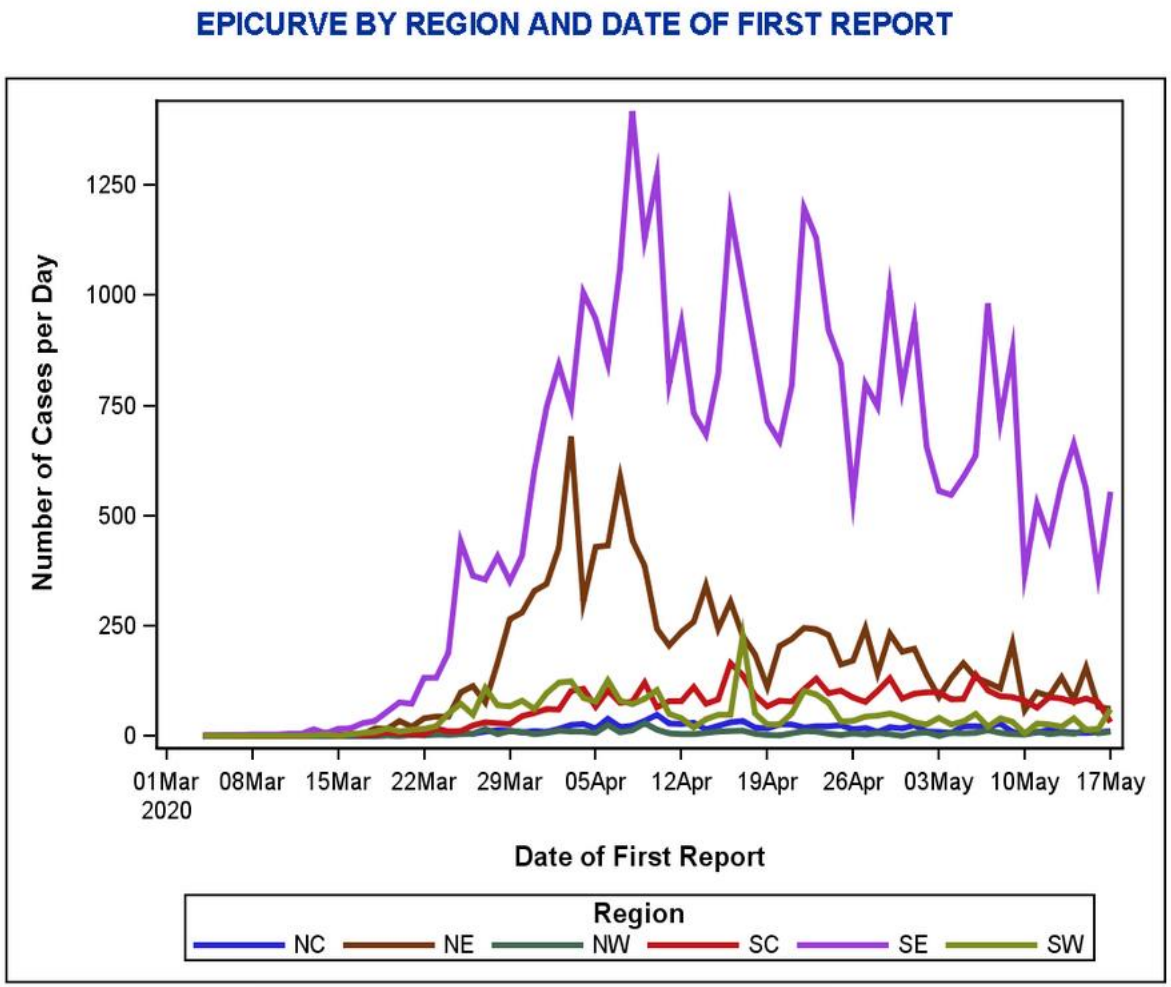
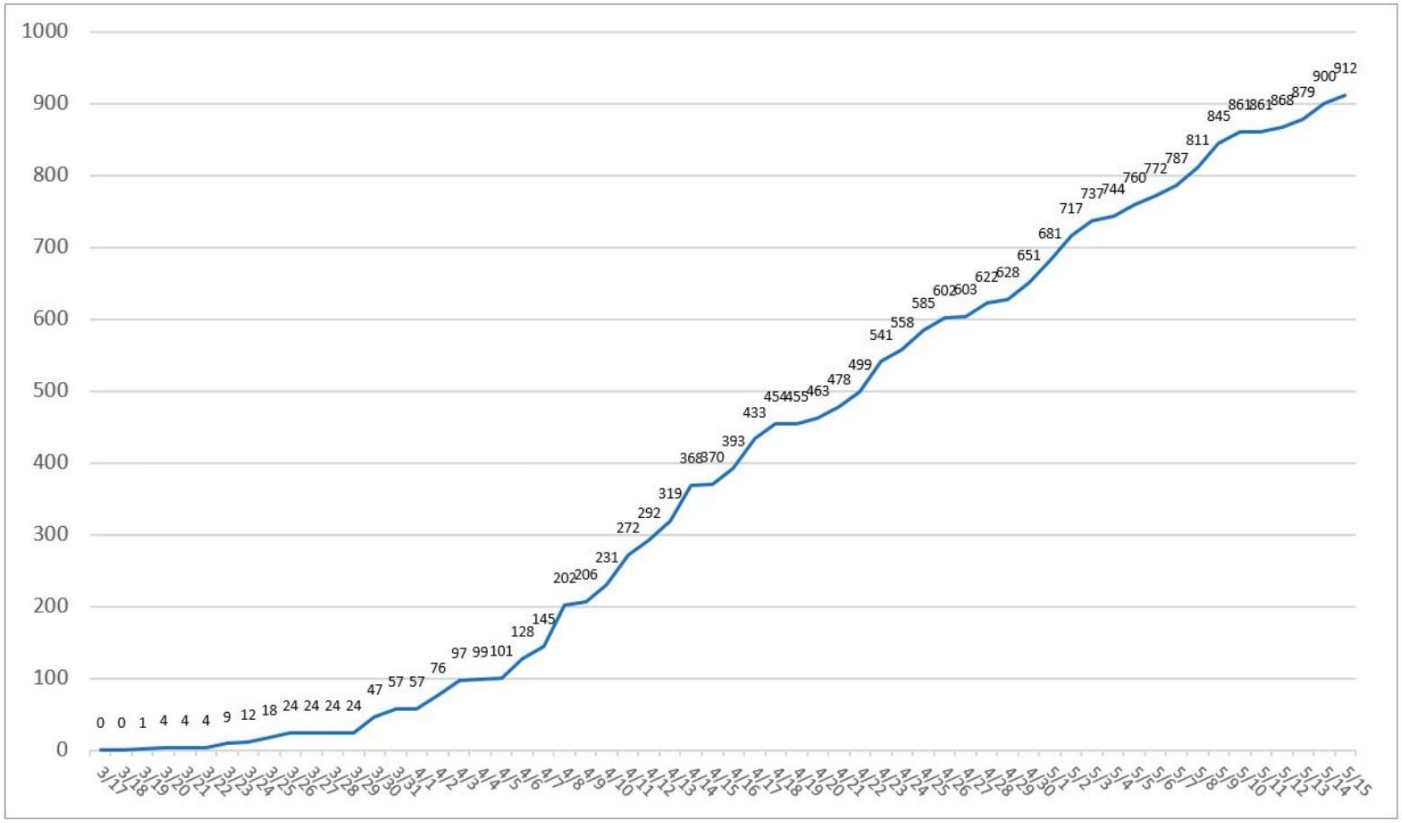
EpiCurve by Region



Reading Hospital Testing Data to Date

Number of Completed Tests Resulted to Date	3040
Percent Negative	70%
Percent Positive	30%

Cumulative Total of Positive Cases Tested by Reading Hospital



Additional Reading Hospital COVID-19 Data

COVID-19 Positive Inpatients Currently at Reading Hospital	83
Percent of COVID-19 Patients Currently in Critical Care (ICU) at Reading Hospital	11%
Percent of COVID-19 Patients Currently on a Ventilator at Reading Hospital	8%
Total Inpatient Deaths at Reading Hospital, among Patients with known COVID-19	75

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The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Clinical Characteristics of Coronavirus Disease 2019 in China

W. Guan, Z. Ni, Yu Hu, W. Liang, C. Ou, J. He, L. Liu, H. Shan, C. Lei, D.S.C. Hui, B. Du, L. Li, G. Zeng, K.-Y. Yuen, R. Chen, C. Tang, T. Wang, P. Chen, J. Xiang, S. Li, Jin-lin Wang, Z. Liang, Y. Peng, L. Wei, Y. Liu, Ya-hua Hu, P. Peng, Jian-ming Wang, J. Liu, Z. Chen, G. Li, Z. Zheng, S. Qiu, J. Luo, C. Ye, S. Zhu, and N. Zhong, for the China Medical Treatment Expert Group for Covid-19*

- Published 4/30/2020
- 1099 patients with Covid-19, 552 hospitals in China through January 29, 2020.
- Primary composite end points:
  - Admission to an intensive care unit (ICU),
  - The use of mechanical ventilation, or
  - Death.
- The most common symptoms were fever (43.8% on admission and 88.7% during hospitalization) and cough (67.8%). Diarrhea was uncommon (3.8%).
- The median incubation period was 4 days.
- On admission, ground-glass opacity was the most common radiologic finding on chest computed tomography (56.4%).
- Lymphocytopenia was present in 83.2% of the patients on admission.

Symptoms near the time of presentation in various cohorts

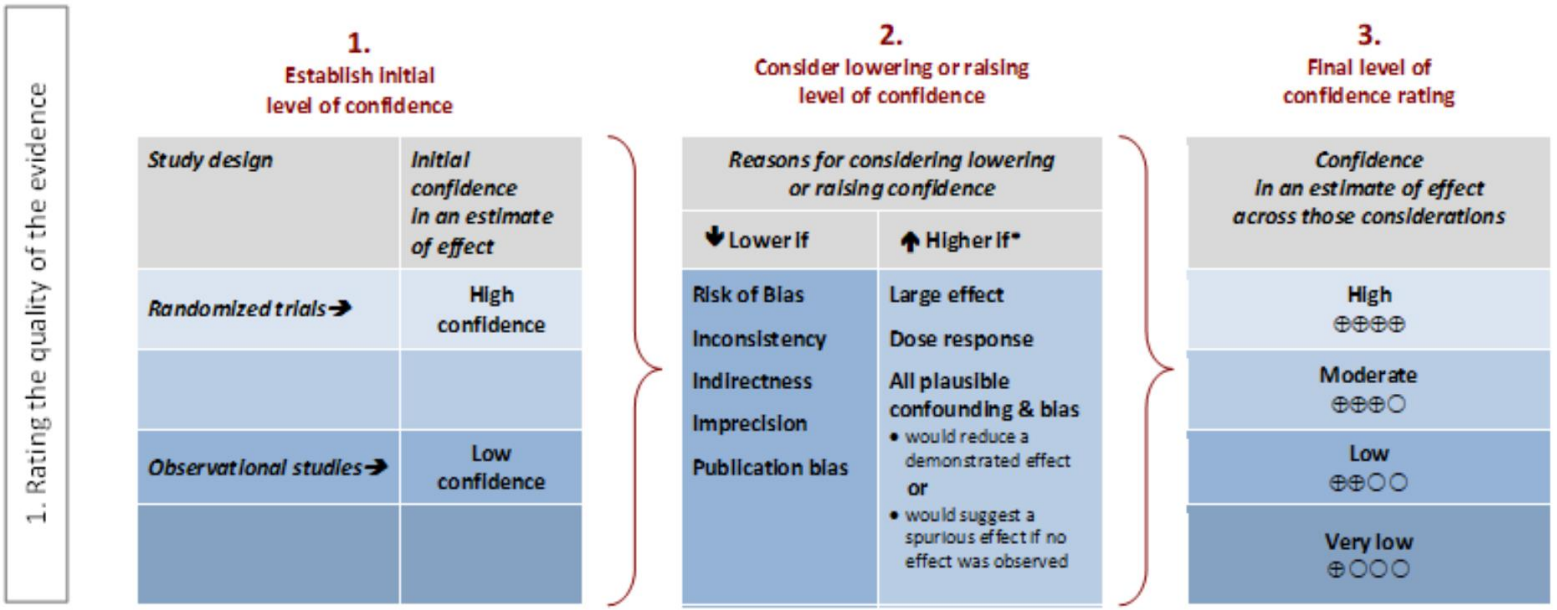
	Guan et al. NEJM (largest cohort)	Shi et al Lancet	Yang et al. Lancet (critically ill pts)	Chen et al.	Huang et al.	Xu et al. BMJ
Constitutional						
Fever	473/1081 (43%)	18/21 (86%)	46/52 (88%)	82/99 (83%)	40/41 (98%)	48/62 (77%)
Myalgia	164/1081 (15%)		6/52 (12%)	11/99 (11%)		
Headache	150/1081 (14%)	2/21 (10%)	3/52 (6%)	8/99 (8%)	2/38 (8%)	21/62 (34%)
Upper respiratory						
Rhinorrhea	53/1081 (5%)	5/21 (24%)	3/52 (6%)	4/99 (4%)		
Sore throat	153/1081 (14%)			5/99 (5%)		
Lower respiratory						
Dyspnea	205/1081 (19%)	9/21 (43%)	33/52 (64%)	31/99 (31%)	22/40 (55%)	2/62 (3%)
Chest tightness		5/21 (24%)				
Cough	745/1081 (68%)	15/21 (71%)	40/52 (77%)	81/99 (82%)	31/41 (76%)	50/62 (81%)
Sputum	370/1081 (34%)	3/21 (14%)			11/39 (28%)	35/62 (56%)
Hemoptysis	10/1081 (1%)				2/39 (5%)	2/62 (3%)
Gastrointestinal						
Nausea/Vomiting	55/1081 (5%)	2/21 (10%)	2/52 (6%)	1/99 (1%)		
Diarrhea	42/1081 (4%)	1/21 (5%)		2/99 (2%)	1/38 (3%)	3/62 (8%)

-The Internet Book of Critical Care, by @PulmCrit

Overview of IDSA guidelines for testing

- Updated 5/6/2020

Figure 2. Approach and implications to rating the quality of evidence and strength of recommendations using the GRADE methodology (unrestricted use of the figure granted by the U.S. GRADE Network)



IDSA Recommendations: Testing of symptomatic patients

Recommendation 1: The IDSA panel recommends a SARS-CoV-2 nucleic acid amplification test (NAAT) in symptomatic individuals in the community suspected of having COVID-19, even when the clinical suspicion for COVID-19 is low (strong recommendation, very low certainty of evidence).

Remarks:

- The panel considered symptomatic patients to have at least one of the most common symptoms compatible with COVID-19 (**Table 1**).
- Clinical assessment alone is not accurate in predicting COVID-19 diagnosis.
- The panel considered timeliness of SARS-CoV-2 NAAT results essential to impact individual care, healthcare institution, and public health decisions. In the outpatient setting, results within 48 hours of collection is preferable.

Table 1. Symptoms Compatible with COVID-19

Symptoms may appear **2-14 days after exposure to the virus.** People with these symptoms or combinations of symptoms may have COVID-19*	*Respiratory symptoms alone* • Cough • Shortness of breath or difficulty breathing *Or at least two of these symptoms* • Fever • Chills • Repeated shaking with chills • Muscle pain • Headache • Sore throat • New loss of taste or smell

Children have similar symptoms to adults and generally have mild illness.

*This list is not all inclusive.

Centers for Disease Control and Prevention. Symptoms of Coronavirus. Available at: https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html. Accessed 3 May 2020.

What specimen should be collected?

Recommendation 2: The IDSA panel suggests collecting nasopharyngeal, or mid-turbinate or nasal swabs rather than oropharyngeal swabs or saliva alone for SARS-CoV-2 RNA testing in symptomatic individuals with upper respiratory tract infection (URTI) or influenza like illness (ILI) suspected of having COVID-19 (conditional recommendation, very low certainty of evidence).

Remarks:

- This recommendation does not address testing a combination of specimen types due to lack of evidence.
- The panel considered symptomatic patients to have at least one of the most common symptoms compatible with COVID-19 (**Table 1**).

Table 3. GRADE Summary of Findings of Test Accuracy Results for Prevalence/Pre-Test Probability of 10% for different specimen types

	Oral	Nasal	Nasopharyngeal (NP)	Nasal (2 studies NP as comparator)	Saliva	Mid-turbinate
Sensitivity %(95% CI)	56 (35 to 77)	76 (59 to94)	97 (92 to 100)	95 (87 to 100)	85 (69 to 94)	100 (93 to 100)
Specificity %(95% CI)	99 (99 to 100)	100 (99 to 100)	100 (99 to 100)	100 (99 to 100)	100 (99 to 100)	100 (99 to 100)

Outcome	Effect per 1,000 patients tested						№ of patients (studies)	Test accuracy CoE [f]
	pre-test probability of 10% [e]							
	Oral	Nasal	Nasopharyngeal	Nasal (2 studies)	Saliva	MT		
True positives (patients with COVID-19)	56 (35 to 77)	76 (59 to 94)	97 (92 to 100)	95 (87 to 100)	85 (69 to 94)	100 (93 to 100)	Oral: 645 (4) Nasal: 412 (7) NP: 185 (4) Nasal (2 studies): 85 (2) Saliva: 39 (1) MT: 50 (1)	⊕◯◯◯ VERY LOW [a,b,c,d]
False negatives (patients incorrectly classified as not having COVID-19)	44 (23 to 65)	24 (6 to 41)	3(0 to 8)	5 (0 to 13)	15 (6 to 31)	0 (0 to 7)		
True negatives (patients without COVID-19)	891 (891 to 900)	900 (891 to 900)	900 (891 to 900)	900 (891 to 900)	882 (684 to 900	900 (882 to 900)	Nasal 457 (2) Saliva: 489 (1) MT: 452 (1)*	⊕◯◯◯ VERY LOW [a,b,c,d]
False positives (patients incorrectly classified as having COVID-19)	9 (0 to 9)	0 (0 to 9)	0 (0 to 9)	0 (0 to 9)	18 (0 to 216)	0 (0 to 18)		

Explanations: This table is based on applying the sensitivity and specificity estimates to calculate True and false positives and negatives in a hypothetical population of 1000 individuals.
*No studies reported on the specificity of oral and NP

Recommendation 3: Swab collection by patients or healthcare providers (symptomatic)

Recommendation 3. The IDSA panel suggests that nasal and mid-turbinate (MT) swab specimens may be collected for SARS-CoV-2 RNA testing by either patients or healthcare providers, in symptomatic individuals with upper respiratory tract infection (URTI) or influenza like illness (ILI) suspected of having COVID-19 (conditional recommendation, low certainty of evidence).

Remarks:

- Appropriate specimen collection and transport to the laboratory is critical. General instructions for swab-based SARS-CoV2 testing are shown in **Table 4**. Additional resources can be found below.
- A clear, step-by-step protocol needs to be presented to patients attempting self-collection. This could be in the form of a short video or printed pamphlet with illustrations.
- The majority of self-collection studies were performed in the presence of a healthcare worker.
- The available evidence for nasal and MT swabs as alternatives to healthcare personnel collection is based on assessment of symptomatic patients. Data on self-collection in asymptomatic individuals is currently unavailable.
- The panel considered symptomatic patients to have at least one of the most common symptoms compatible with COVID-19 (**Table 1**).

Table 5. GRADE Summary of Findings of Test Accuracy Results for Prevalence/Pre-Test Probability of 10% for Self-Collected versus Healthcare Collected samples

Self-collected nasal	**Sensitivity: 0.95 (95% CI: 0.88 to 1.00)** **Specificity: 1.00 (95% CI: 0.99 to 1.00)**			
Health care worker collected	**Sensitivity: 0.94 (95% CI: 0.86 to 1.00)** **Specificity: 1.00 (95% CI: 0.99 to 1.00)**			
Outcome	**Effect per 1,000 patients tested** pre-test probability of 10% [c]		**№ of patients (studies)**	**Test accuracy CoE [d]**
	Self-collected nasal	Health care worker collected		
True positives (patients with COVID-19)	95 (88 to 100)	94 (86 to 100)	200 (3)	⊕⊕◯◯ LOW [a,b]
	1 more TP in Self-collected Nasal			
False negatives (patients incorrectly classified as not having COVID-19)	5 (0 to 12)	6 (0 to 14)		
	1 fewer FN in Self-collected Nasal			
True negatives (patients without COVID-19)	900 (891 to 900)	900 (891 to 900)	600 (3)	⊕⊕◯◯ LOW [a,b]
	0 fewer TN in Self-collected Nasal			
False positives (patients incorrectly classified as having COVID-19)	0 (0 to 9)	0 (0 to 9)		
	0 fewer FP in Self-collected Nasal			

Recommendation 5: The IDSA panel suggests performing a single viral RNA test and not repeating testing in symptomatic individuals with a low clinical suspicion of COVID-19 (conditional recommendation, low certainty of evidence).

Remarks:

- A low clinical suspicion should be informed by epidemiological information available in for the region coupled with clinical judgment.
- The panel considered symptomatic patients to have at least one of the most common symptoms compatible with COVID-19 (**Table 1**).

Recommendation 6: The IDSA panel suggests repeating viral RNA testing when the initial test is negative (*versus* performing a single test) in symptomatic individuals with an intermediate or high clinical suspicion of COVID-19 (conditional recommendation, low certainty of evidence).

Remarks:

- Intermediate/high clinical suspicion typically applies to the hospital setting and is based on the severity, numbers and timing of compatible clinical signs/symptoms.
- Repeat testing should generally occur 24-48 hours after initial testing and once the initial NAAT result has returned as negative.
- Another specimen type, preferably a lower respiratory tract specimen if the patient has signs/symptoms of LRTI, should be considered for repeat testing.
- The panel considered symptomatic patients to have at least one of the most common symptoms compatible with COVID-19 (**Table 1**).

Recommendation 7: The IDSA panel makes no recommendations for or against using rapid (i.e., test time ≤ 1hour) versus standard RNA testing in symptomatic individuals suspected of having COVID-19 (knowledge gap).

Recommendation 8: The IDSA panel suggests SARS-CoV-2 RNA testing in asymptomatic individuals who are either known or suspected to have been exposed to COVID-19 (conditional recommendation, very low certainty of evidence).

Remarks:

- Known exposure was defined as direct contact with a laboratory confirmed case of COVID-19.
- Suspected exposure was defined as working or residing in a congregate setting (e.g., long-term care, correctional facility, cruise ship, factory, among others) experiencing a COVID-19 outbreak.
- The risk of contracting SARS-CoV-2 may vary under different exposure conditions.
- This recommendation assumes the exposed individual was not wearing appropriate PPE.
- The decision to test asymptomatic patients will be dependent on the availability of testing resources.

Recommendation 9: The IDSA panel suggests against SARS-CoV-2 RNA testing in asymptomatic individuals with no known contact with COVID-19 who are being hospitalized in areas with a low prevalence of COVID-19 in the community (conditional recommendation, very low certainty of evidence).

Remarks:

- Asymptomatic individuals are defined as those with no symptoms or signs of COVID-19.
- A low prevalence of COVID-19 in the community was considered communities with a prevalence of <2%.
- This recommendation does not apply to immunocompromised individuals.
- This recommendation does not apply to individuals undergoing time-sensitive major surgery or aerosol generating procedures.

Recommendation 10: The IDSA panel recommends direct SARS-CoV-2 RNA testing in asymptomatic individuals with no known contact with COVID-19 who are being hospitalized in areas with a high prevalence of COVID-19 in the community (i.e., hotspots) (conditional recommendation, very low certainty of evidence).

Remarks:

- Asymptomatic individuals are defined as those with no symptoms or signs of COVID-19.
- A high prevalence of COVID-19 in the community was considered communities with a prevalence of ≥10%.
- The decision to test asymptomatic patients (including when the prevalence is between 2 and 9%) will be dependent on the availability of testing resources.

Recommendation 11: The IDSA panel recommends for SARS-CoV-2 RNA testing in immunocompromised asymptomatic individuals who are being admitted to the hospital regardless of exposure to COVID-19 (strong recommendation, very low certainty of evidence).

Remarks:

- This recommendation defines immunosuppressive procedures as cytotoxic chemotherapy, solid organ or stem cell transplantation, long acting biologic therapy, cellular immunotherapy, or high-dose corticosteroids.

Recommendation 12: The IDSA panel recommends SARS-CoV-2 RNA testing (*versus* no testing) in asymptomatic individuals before immunosuppressive procedures regardless of a known exposure to COVID-19 (strong recommendation, very low certainty of evidence).

Remarks:

- This recommendation defines immunosuppressive procedures as cytotoxic chemotherapy, solid organ or stem cell transplantation, long acting biologic therapy, cellular immunotherapy, or high-dose corticosteroids.
- Testing should ideally be performed as close to the planned treatment/procedure as possible (e.g. within 48-72 hours).
- Many of these patients require frequent, repeated or prolonged visits to receive treatment.
- This recommendation does not address risks or strategies to deal with SARS-CoV-2 transmission in outpatient settings such as infusion centers.

Recommendation 13: The IDSA panel suggests for SARS-COV-2 RNA testing in asymptomatic individuals (without known exposure to COVID-19) who are undergoing major time-sensitive surgeries (conditional recommendation, very low certainty of evidence).

Remarks:

- The panel defined time-sensitive surgery as medically necessary surgeries that need to be done within three months**.**
- Testing should ideally be performed as close to the planned surgery as possible (e.g., within 48-72 hours).
- To limit potential poor outcomes, deferring non-emergent surgeries should be considered for patients testing positive for SARS-CoV-2.
- Decisions about PPE use for the aerosol generating portions of these procedures may be dependent on test results when there is limited availability of PPE. However, there is a risk for false negative test results, so caution should be exercised by those who will be in close contact with/exposed to the upper respiratory tract (e.g., anesthesia personnel, ENT procedures).
- The decision to test asymptomatic patients will be dependent on the availability of testing resources.
- This recommendation does not address the need for repeat testing if patients are required to undergo multiple surgeries over time.

Recommendation 14: The IDSA panel suggests against SARS-CoV-2 RNA testing in asymptomatic individuals without a known exposure to COVID-19 who are undergoing a time-sensitive aerosol generating procedure (e.g., bronchoscopy) when PPE is available (conditional recommendation, very low certainty of evidence).

Remark:

- The panel defined time-sensitive procedures as medically necessary procedures that need to be done within three months.
- Procedures considered to be aerosol generating are listed in **Table 9**.

Recommendation 15: The IDSA panel suggests SARS-CoV-2 RNA testing in asymptomatic individuals without a known exposure to COVID-19 who are undergoing a time-sensitive aerosol generating procedure (e.g., bronchoscopy) when PPE is limited, and testing is available (conditional recommendation, very low certainty of evidence).

Remark:

- The panel defined time-sensitive procedures as medically necessary procedures that need to be done within three months.
- Testing should be performed as close to the planned procedure as possible (e.g., within 48-72 hours).
- Decisions about PPE will be dependent on test results because of limited availability of PPE. However, there is a risk for false negative test results, so caution should be exercised for those who will be in close contact with/exposed to the patient's airways.
- Procedures considered to be aerosol generating are listed in **Table 9**.
- The decision to test asymptomatic patients will be dependent on the availability of testing resources.
- This recommendation does not address the need for repeat testing if patients are required to undergo multiple procedures over time.

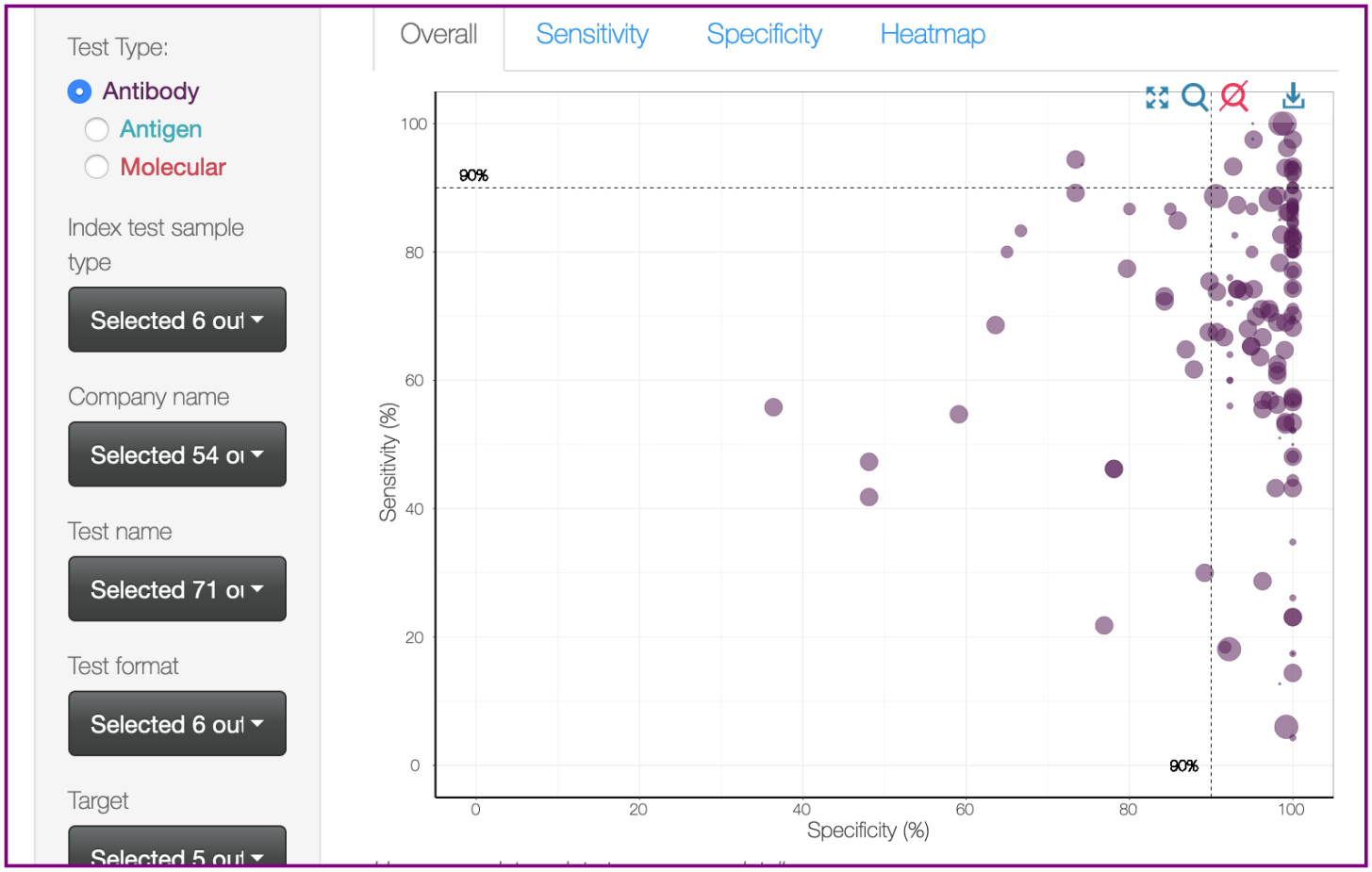
IDSA - Antibody testing 5/4/202

- As serological testing for SARS-CoV-2 advances, there are multiple issues that need to be addressed, from test quality to interpretation.
- Unlike molecular tests for COVID-19 (e.g., PCR), antibody tests may be better suited for public health surveillance and vaccine development than for diagnosis.
- The current antibody testing landscape is varied and clinically unverified, and these tests should not be used as the sole test for diagnostic decisions.
- Further, until more evidence about protective immunity is available, serology results should not be used to make staffing decisions or decisions regarding the need for personal protective equipment.

- **Some FDA-authorized COVID-19 antibody tests are estimated to have 96-98% specificity, which would mean that a positive test result is more likely a false-positive result than a true positive result if the prevalence or pretest probability is 5% or less.**

- The Foundation for Innovative New Diagnostics (FIND), a global non-profit organization driving innovation in the development and delivery of diagnostics, is conducting an independent evaluation of performance data for SARS-CoV-2 immunoassays to help inform procurement and implementation decisions for countries and health programs. The dataset could also help inform clinical validation studies for these tests.

View full screen dashboard



Testing challenges

- Inadequate capacity
- Unvalidated tests
  - Antibody tests
    - False negative risks if performed early in disease course, especially in mild disease
    - False positive risks, particularly with tests for Immunoglobulin M (IgM) and potential cross-reactivity with common cold coronaviruses (e.g. HKU1, NL63, OC43, 229E).
  - PCR
    - False negative tests related to inadequate sampling or low viral load

Questions/Discussion

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