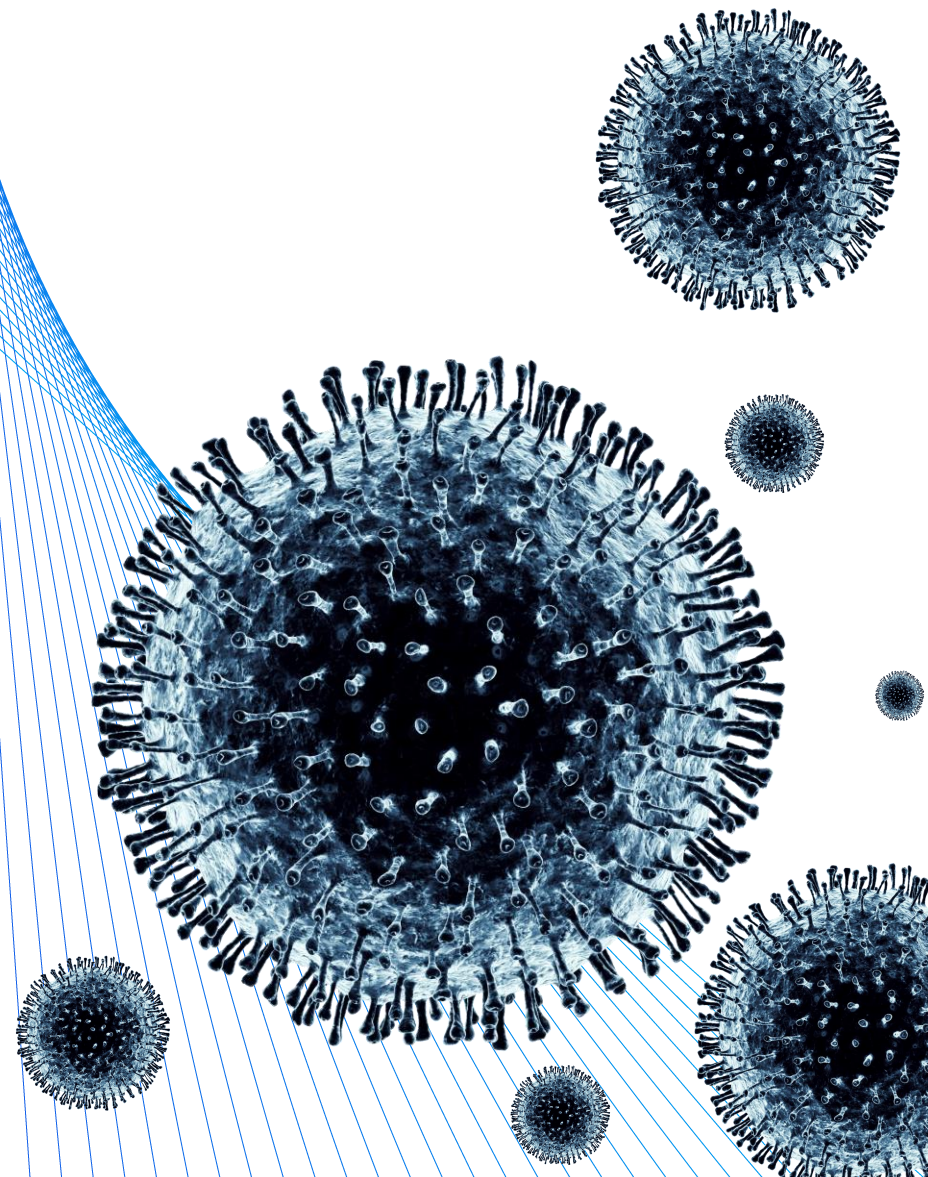McKinsey & Company

COVID-19 Crisis: US Healthcare Provider and Payer Preparedness

Chapter 1 – Epidemiology and Scenarios

DOCUMENT INTENDED TO PROVIDE INSIGHT AND BEST PRACTICES RATHER THAN SPECIFIC CLIENT ADVICE

Updated: March 17, 2020

Solving the humanitarian challenge is the top priority. Much remains to be done globally to prepare, respond, and recover, from protecting populations at risk, to supporting affected patients/ families/ communities, to developing a vaccine. To address this crisis, countries including the US will need to respond in an evidence-informed manner, leveraging public health infrastructure and proactive leadership.

This document is meant to help with a goal: provide a summarized fact base on the disease to date, insights on potential scenarios, and potential actions US healthcare providers and payers may consider.

In addition, we have developed a broader perspective on implications for businesses across sectors that can be found here: https://www.mckinsey.com/business-functions/risk/our-insights/covid-19-implications-for-business**.** This supplemental material discusses implications for the wider economy, businesses, and employment; and sets out some of those challenges and how organizations can respond in order to protect their people and navigate through an uncertain situation.

For all formal guidance, you can find **up-to-date information at CDC's COVID-19 website**, with a section specific to healthcare professionals: https://www.cdc.gov/coronavirus/2019-ncov/healthcare-facilities/index.html

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COVID-19 appears to be more dangerous than the flu

Latest as of March 16, 2020

Features of the disease to date[1]

1.5-2x

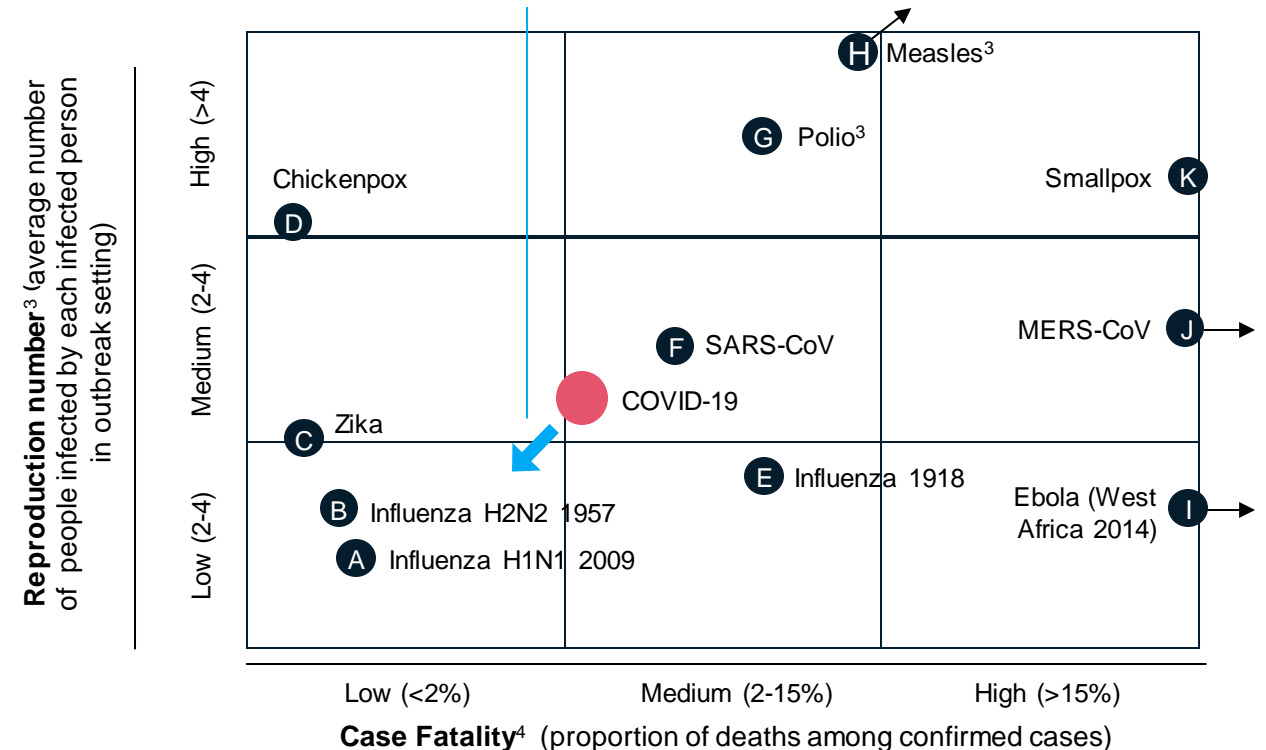Higher reproduction than the flu

Up to 20%

Of cases have a severe/critical form of the disease[6]

~0.9%

Case Fatality Ratio in South Korea after widespread testing. CFR appears higher where cases are missed and is higher when health systems are overwhelmed[2]

Comparison to other diseases[5]

Early identification of the disease, intensification of viral control, and treatment, when available, will reduce reproduction number and case fatality

Reproduction number[3] (average number of people infected by each infected person in outbreak setting)

High (>4)
Medium (2-4)
Low (2-4)

H Measles[3]
G Polio[3]
Chickenpox
D
K Smallpox
F SARS-CoV
MERS-CoV J
COVID-19
C Zika
E Influenza 1918
B Influenza H2N2 1957
A Influenza H1N1 2009
Ebola (West Africa 2014) I

Low (<2%)   Medium (2-15%)   High (>15%)

Case Fatality[4] (proportion of deaths among confirmed cases)

1. Evidence on exact numbers are emerging, however expected to decrease as viral containment measures intensify and treatments are developed
2. WHO estimates the global average CFR at 3.4%, dependent on conditions such as patient age, community immunity, and health system capabilities. Latest case fatality ratios were calculated as death/cases
3. In outbreak setting or the introduction of a new disease
4. Case Fatality numbers reflect outbreak settings and factors such as the patient's age, community immunity and health system capabilities
5. Estimates are very context and time-specific, however are provided from prior outbreaks based on academic lit review
6. WHO estimates 15% severe and 5% critical

The global spread is accelerating with more reports of local transmission

Latest as of March 17, 2020

Impact to date

>167,500

Reported confirmed cases

>6,600

Deaths

>150

Countries or territories with reported cases[1]

>80

Countries or territories with evidence of local transmission[2]

~40

Countries or territories with more than 100 reported cases[1]

0.3%

China's share of new reported cases March 10th-16th

~75%
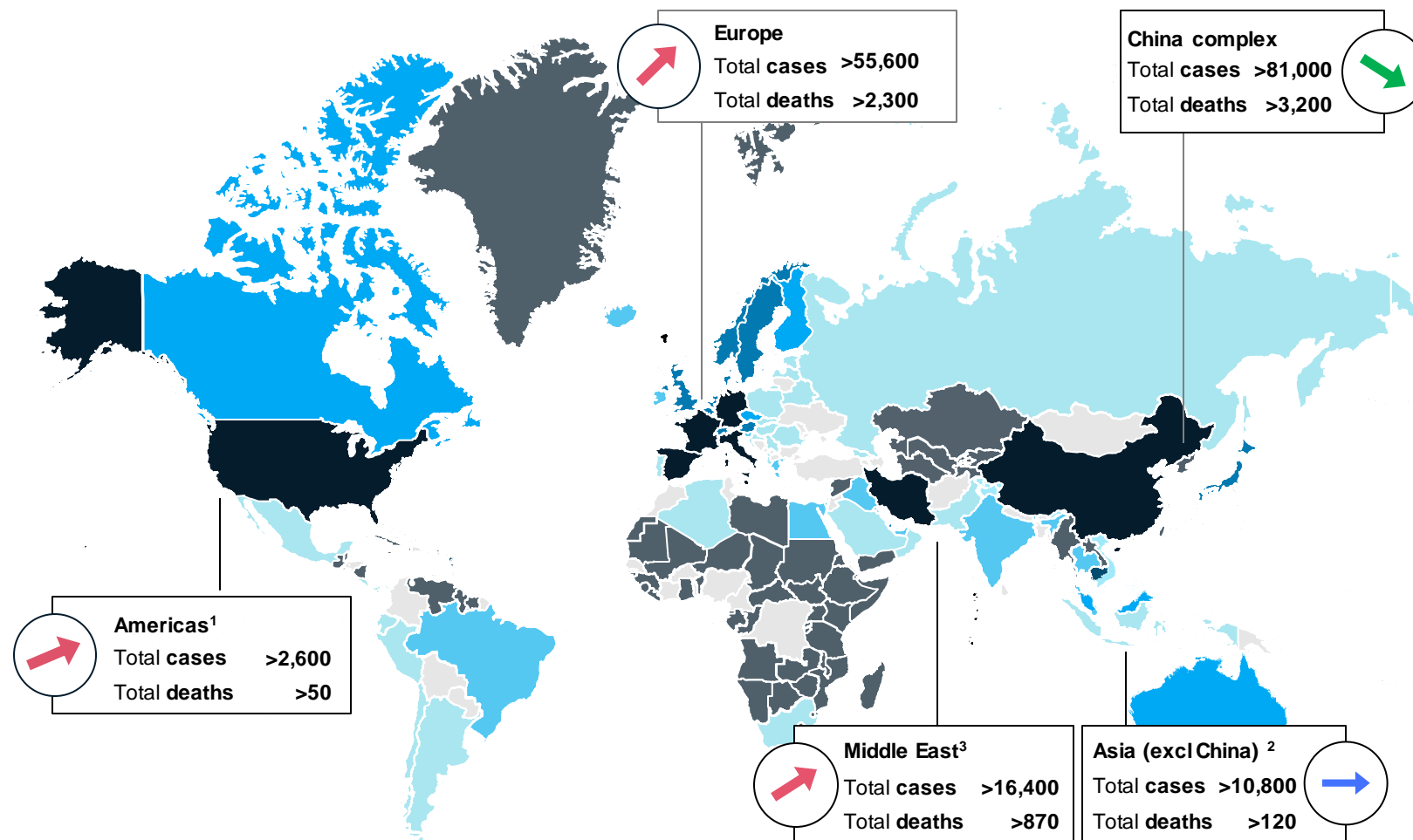
New reported cases on March 10-16th from Europe

>45

New countries with cases March 10th-16th

The virus is located in five major "transmission complexes"

A complex is an area with confirmed local transmission, and more than 100 confirmed cases, where it is difficult to prevent people's movement

Europe
Total **cases** >55,600
Total **deaths** >2,300

China complex
Total **cases** >81,000
Total **deaths** >3,200

↗ Propagation trend

☐ Mature/ on-going propagation

⬚ Early propagation

■ > 1000 reported cases

■ 250-999

■ 100-249

■ 50-99

■ 10-49

■ <10

Americas[1]
Total **cases** >2,600
Total **deaths** >50

Middle East[3]
Total **cases** >16,400
Total **deaths** >870

Asia (excl China) [2]
Total **cases** >10,800
Total **deaths** >120

1. WHO data is lagging new s reports for the US; In the US, CDC reports >3,400 cases; NY Times reports >5,000 cases
2. Includes Western Pacific and South-East Asia WHO regions; excludes China; Note that South Korea incremental cases are declining, how ever other countries are increasing
3. Eastern-Mediterranean WHO region

Progression varies widely among countries

Country			Status	Recent Actions

China

>81,000 Cases **>3,200** Deaths **~4.0%** Case Fatality[2]

New cases at low levels throughout China

- Strict containment and mandatory 14-day quarantine for inbound travelers
- Significant testing at facilities and in Hubei
- Construction of makeshift field hospitals

South Korea

>8,200 Cases **>70** Deaths **~0.9%** Case Fatality[2]

New cases declined ~70% in the last week with potential decline or plateau[1]

- Significant preparedness & rapid regulatory approval process for tests
- Rapid roll-out of diagnostics (e.g., drive-through tests)
- Hospitalization now available for lower-severity cases & significant hospital coordination

Italy

>24,700 Cases **>1,800** Deaths **~7.3%** Case Fatality[2]

~3,500 new cases on March 16th – the highest in the world, corresponding to a ~140% increase in the last week[1]

- Efforts initially focused on Northern Italy, but the country is now in nationwide lockdown
- Schools and non-essential businesses closed
- Accelerated medical training & graduation to relieve shortage of healthcare workers

US[3]

>1,600 Cases **>40** Deaths **~2.4%** Case Fatality[2]

US cases are increasing daily, however official reporting may be lagging[3]

- National emergency declared on March 13 with Congress aiming to provide testing free of charge
- 48 states have declared emergency with a range of actions including school and business closures, bans on gatherings, and large-scale testing plans
- Varied local responses at city and municipality levels

1. Number of new confirmed cases on March 16th compared to March 9th
2. Case Fatality calculated as (total deaths) / (total cases) – this rate is evolving and dependent upon several factors, including number of suspected cases that are tested
3. WHO data is lagging news reports for the US; In the US, CDC reports >3,400 cases; NY Times reports >5,000 cases

Overall, ~20% of cases are estimated to be severe/critical, requiring significant health capacity for testing and critical care infrastructure
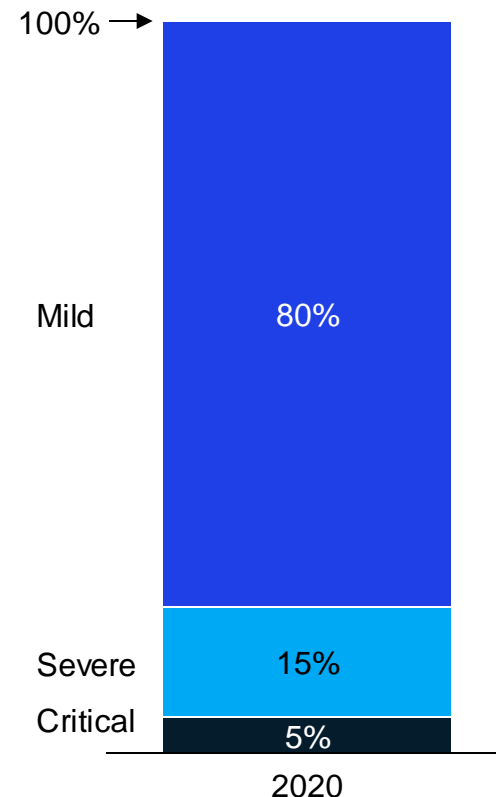
Context

WHO estimates ~20% of COVID-19 cases are severe (requiring oxygen) or critical (requiring ventilation)

This reflects a higher level of severity compared to influenza for instance

At a country level, mild cases may go undiagnosed

WHO estimated global distribution by severity of symptoms

100% →

Mild — 80%

Severe — 15%

Critical — 5%

2020

Severity by country may vary

China

As of February 24, 2020 (~45K cases)

- Similar mix of mild / severe / critical confirmed cases to WHO estimate
- ~16K suspected cases were left undiagnosed, driven by testing limitations

Italy

JAMA

ICU admissions in first two weeks represented 16% of all patients who tested positive for COVID-19

News reports

| March 3, 2020	March 10, 2020	March 12, 2020
56% of patients who tested positive for COVID-19 are hospitalized	ICUs almost at full capacity in Lombardy, region hardest hit by COVID-19	Northern regions trying to expand ICU capacity with and 230+ ICU spots added

To date, there are potentially over 5,726 reported cases in the US
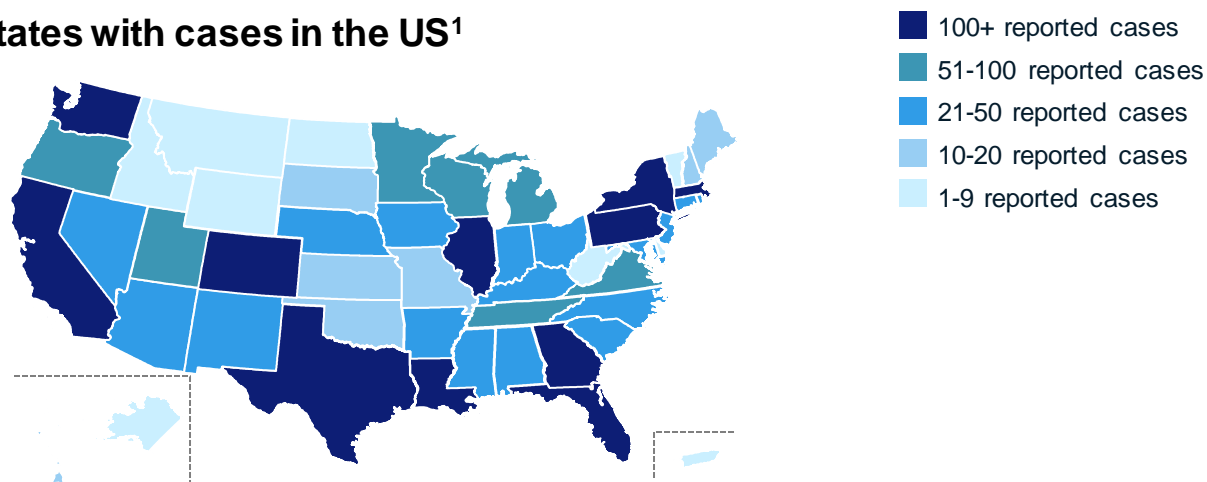## Growth in cases as of March 17, 2020

Approximate

Trend of confirmed COVID-19 cases in US
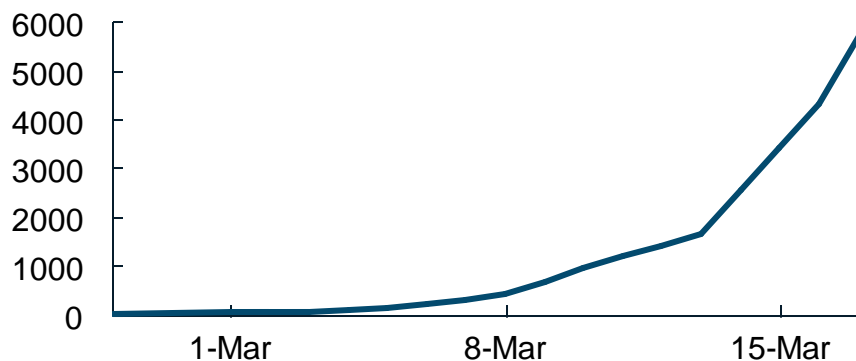
5,726+ total cases reported with significant growth in the last week

States with cases in the US[1]

- ■ 100+ reported cases
- ■ 51-100 reported cases
- ■ 21-50 reported cases
- ■ 10-20 reported cases
- ■ 1-9 reported cases

5,726+
Total cases

50
States with cases of COVID-19[1]

107+
Deaths due to COVID-19

US media sources appear in some instances to be ahead of official WHO / CDC case counts; we are showing the highest widely reported figure

1. Plus Washington, D.C., and three U.S. territories

Source: New York Times, Johns Hopkins CSSE, CDC

US: Two scenarios for COVID-19 spread

US situation could evolve one of two ways, which can inform contingency planning

Moderate[2]: Largest metro areas impacted

Severe[2]: Generalized spread

Degree and rate of spread[1]

Several major clusters of disease (metro areas / regions) with less impact in other parts of the country. Seasonality of the virus **leads to a peak in April and a plateau in new cases by end of Q2. Total cases 50K – 500K**

Case transmission is not contained, **accelerates in the near term, continues over a longer duration (>3months)** and becomes widespread - **ultimately reaches 500K – 10M+ cases** before plateauing towards end of 2020

Severity of disease

Health systems challenged by rising cases; significant acceleration in cases, **Mortality rate at ~0.75-1%**

Health systems challenged by exponential case growth; higher disruption in areas with lower care access and lesser prepared/equipped health systems; **Higher mortality upwards of 0.75-2%**

Affected regions

5-7+ metro clusters see cases in the thousands - low **hundreds of thousands**. More limited cases in other areas

Widespread throughout country, with **all major US cities experiencing a significant quarantine in March/April**, with some areas extending quarantine dependent on spread

As US data is reported, scenarios will be updated in real time

1. Rates and cases reported here represent confirmed cases, not symptomatic patients
2. These align to the 'Delayed Recovery' and 'Prolonged Contraction' scenarios as described on McKinsey.com: https://mckinsey.com/covid-19

How could this play out in a major metropolitan area?

Several factors to consider in major metropolitan cities for COVID-19 burden

1

Coastal cities and urban centers which have **high inbound and outbound travel** will likely host the largest growth in new cases

2

Local transmission (i.e., patients with no ties to international sources) becomes primary mode of spread in large urban centers where population density increases proximity to asymptomatic and mildly symptomatic patients. Local transmission is also possible in secondary town / rural areas

3

Public health measures such as social distancing and work from home recommendations are **likely to vary by city** based on local disease severity and population tolerance for restrictions

4

Access to healthcare will also vary with major metropolitan areas having the greatest access
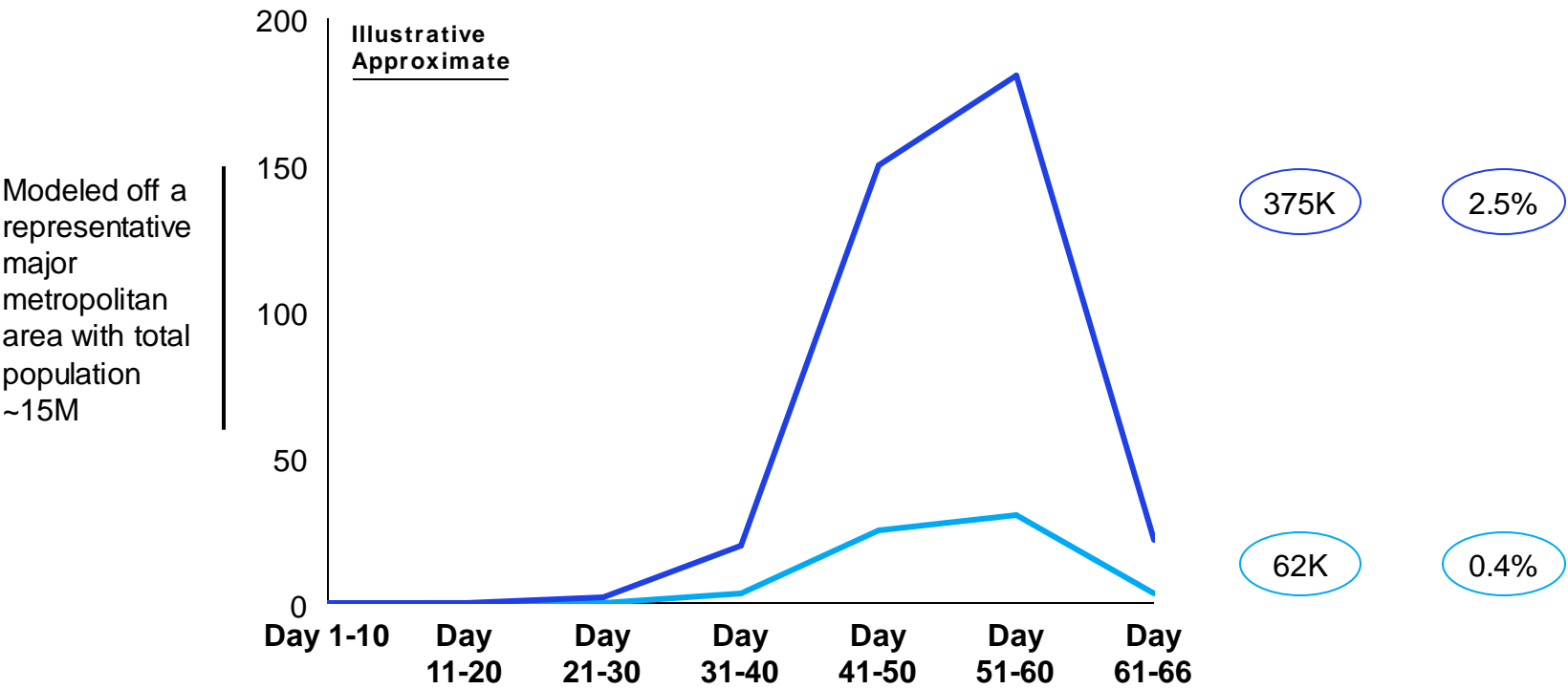
Representative major metropolitan area: Scenario of COVID-19 disease burden
Scenario US disease spread based on China experience

— Moderate transmission in the US   — Severe transmission in US

Approximate forecast of patients infected with COVID-19 over 66 days[1] *(K)*

	Total COVID-19 patients	% popu-lation infected

Illustrative Approximate

Modeled off a representative major metropolitan area with total population ~15M

375K   2.5%

62K   0.4%

200
150
100
50
0

Day 1-10   Day 11-20   Day 21-30   Day 31-40   Day 41-50   Day 51-60   Day 61-66

Key assumption:

Time course and percentage of infections over time mapped according to China experience as reported in JAMA

Multiple factors likely will make the US curve different:
1. Number of entry points
2. Public health containment procedures
3. Access to healthcare (including diagnostics)
4. Patient characteristics
5. No zoonotic event in the US

1.Cumulative - line indicates the number of new COVID-19 cases predicted at each time step
2.Calculated as adult ICU beds + general medical/surgical adult beds + burn care beds + other special care beds + intermediate nursing care beds

Source: JAMA Characteristics of and Important Lessons From the Coronavirus Disease 2019 (COVID-19) Outbreak in China; https://jamanetwork.com/journals/jama/fullarticle/2762130