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Measure	Desired Change	Yesterday in the U.S.
No. of Tests	Increase	Up 11.8% (Cumulative)
Positive Test Rate	Decline	Up to 16.6% (from 15.9%)
No. of Cases	Plateau	Up 15.3%, But Rate is Slowing
% of Deaths Per Case	Decline	Down slightly to 1.7% (v. 1.8%)
No. of Deaths / 1M Pop.	Plateau	Up to 7.5 (from 6.7)
Recoveries : Deaths	Increase (>1:1)	1.8 (from 1.5)

Yesterday's Highlights:

- Sunday brought an encouraging decline in the number of new cases in every country we are tracking. Of course, a single data point does not constitute a trend but, we will take any good news at this point. Half of the U.S. states reported a decline in new cases, with the largest declines (in order) by New York, Louisiana, Massachusetts, and Michigan; largest day-over-day increases in new cases were reported in Illinois, Connecticut, Nevada and Pennsylvania
- While the media continues to focus on total cases and deaths – which are no doubt important – viruses grow exponentially, until such time that the virus' spread is stopped (such as by development of natural human immunity, behavioral changes, etc.). As an exponentially-growing process, the numbers get large fast – and lend themselves to "headlines". To better understand how the virus is spreading, and when it nears and reaches its peak, we have been illuminating movement in the rate of daily change in cases

  We first reported yesterday that the U.S. struggled for about three weeks, as its cases were increasing at a steady or faster rate each day, not declining as expected. Since March 22, however, cases have been increasing each day at an increasingly slower rate (a pattern already established in other countries we are monitoring).

  We also note that New York – the hardest hit state in the U.S. - has seen a decline in its rate for 5 consecutive days
- Joining New York, 8 states have experienced day-over-day declines in the rate of case increases for at least 3 consecutive days (AK, AL, AZ, HI, IN, MS, NY and OH); four states have experienced the opposite trend (KS, MD, ND, WA)
- Recoveries from the virus in the U.S. were up 40.9% on Sunday from Saturday (1,324 v. 713). Recoveries out-number deaths from the virus: 4,562 to 2,484
- While the U.S. has both the most cases in the world, and the highest rate of increased cases by day, the concentration (cases per 1M) and death rate from the virus in the U.S. remains low, relative to other countries we are tracking
- Spain continues to report the highest concentration of cases of the countries we track, followed by Italy; Germany is a distant third.
- Italy has the highest death rate among these countries (11.0% of cases), followed by Spain (8.4%); the U.S.'s rate is 1.7%
- Italy and Iran continue to move closer to peak spread in the virus, as their cases are increasing at an steadily declining rate

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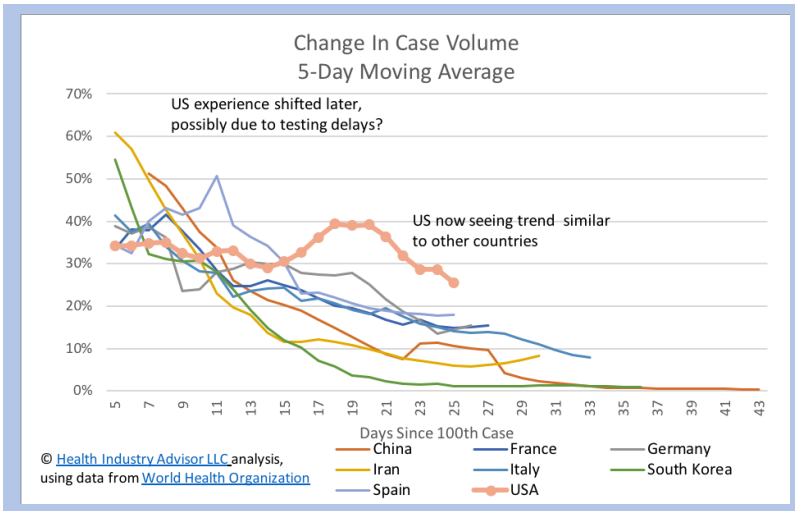
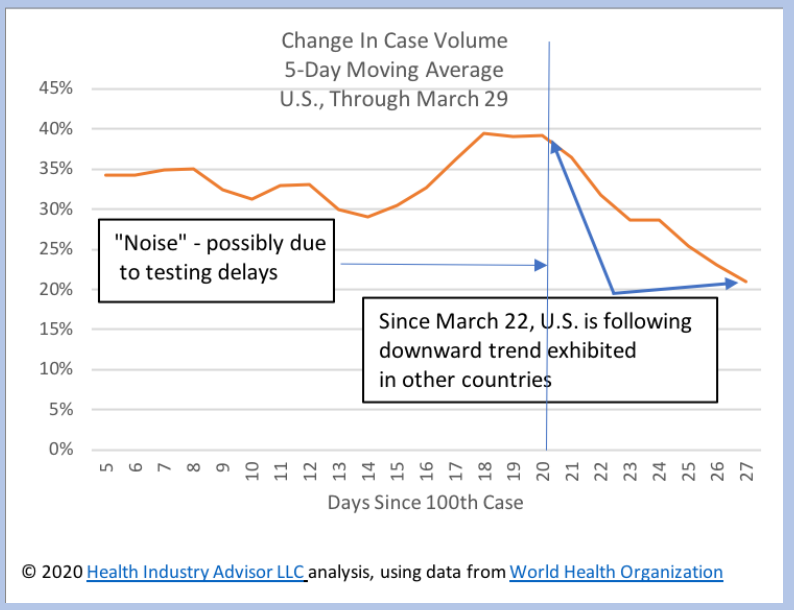
Information provided as a courtesy, based on data from the above-named sources. HIA has no responsibility for the accuracy and updating of any data. Sources: worldometers.info; covidtracking.com, Financial Times
Graphics depict data as of March 29, 2020



Many countries exhibit a consistent time-based pattern for daily changes in cases. This pattern didn't emerge in the U.S., however, until March 22:



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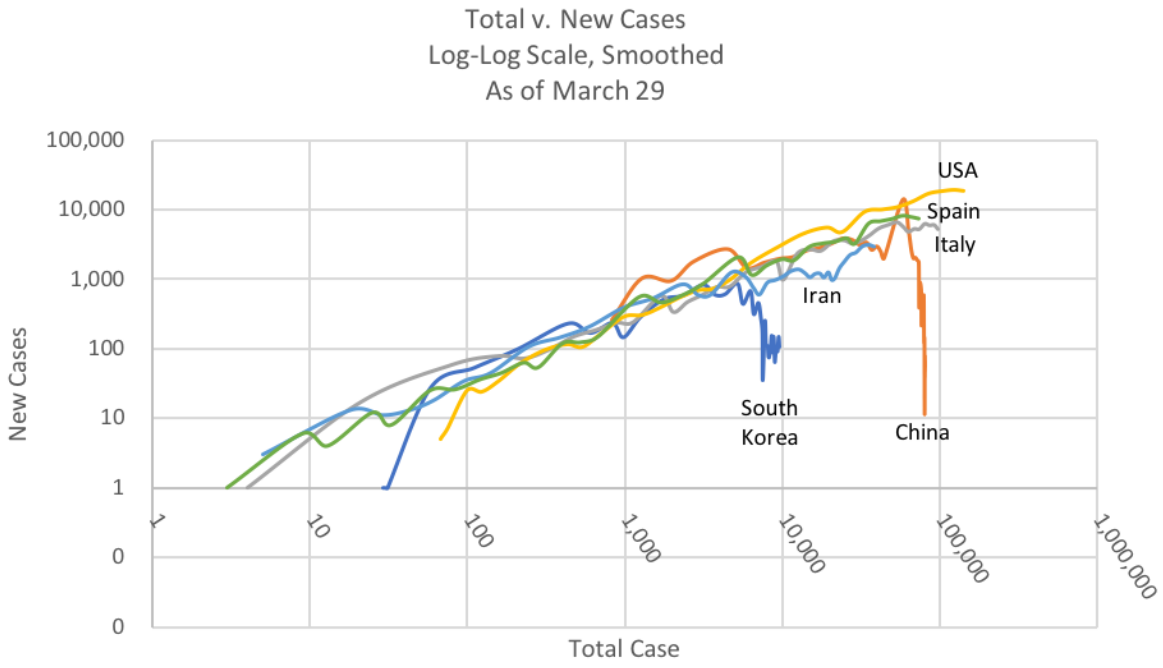
With special thanks to Gary Colpaert, Froedtert Health in Milwakee, WI. Gary altered me to a video podcast from minutephysics: "How to tell if we're beating COVID-19". According to the podcast, the following is how a physicist looks at data from an exponential growth process.

Note the striking similarity and linear nature in the data for every country – at least up to a point for China and South Korea. Indeed that is a characteristic of a process experiencing exponential growth; its only when the plot line falls off its linear trend - as it did for China and South Korea - that we know contagious growth is waning.



Credit to minutephysics podcast for the construct of depicting the data in this fashion

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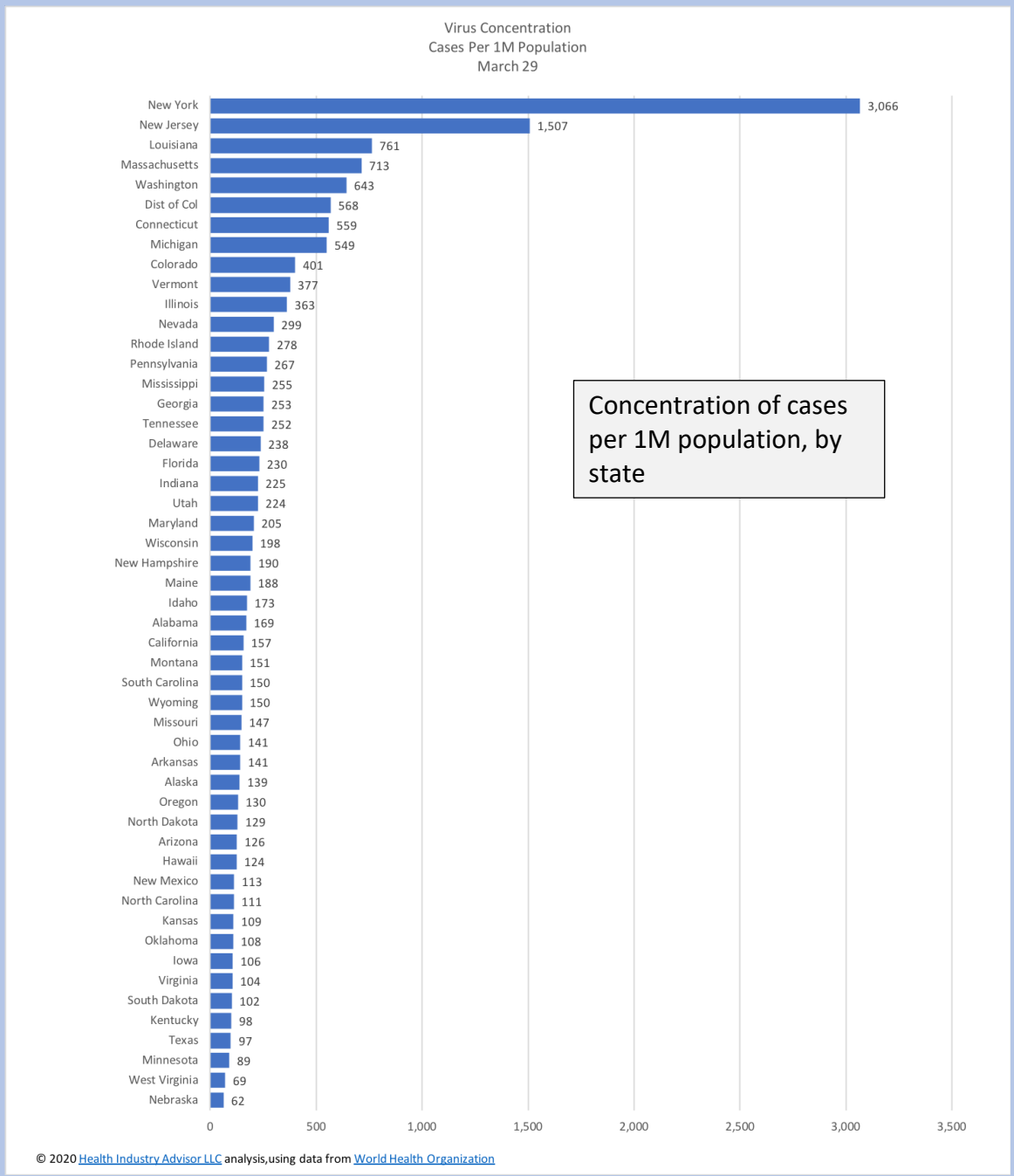

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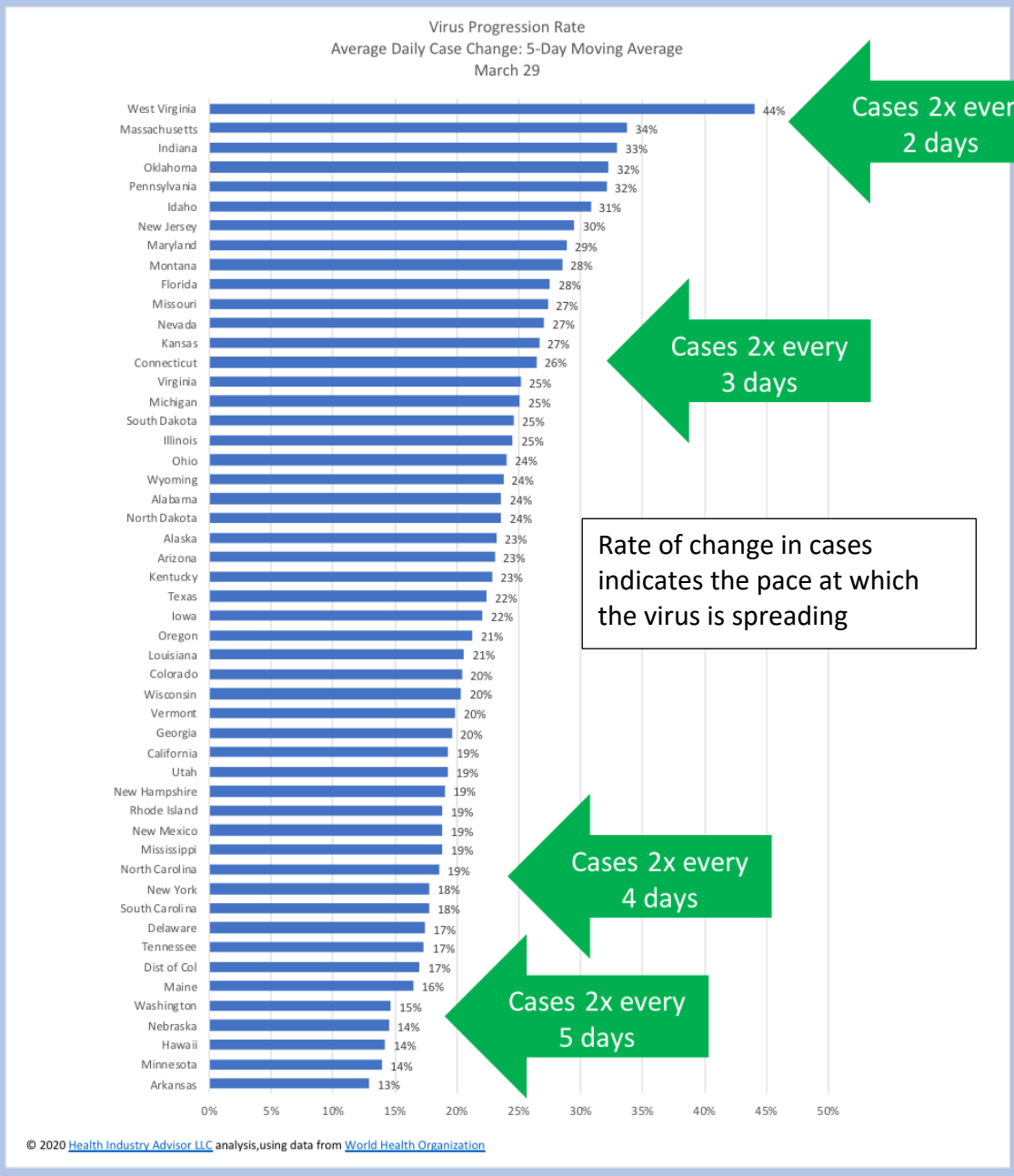
This visual shows the rate at which cases are increasing in every U.S. state.



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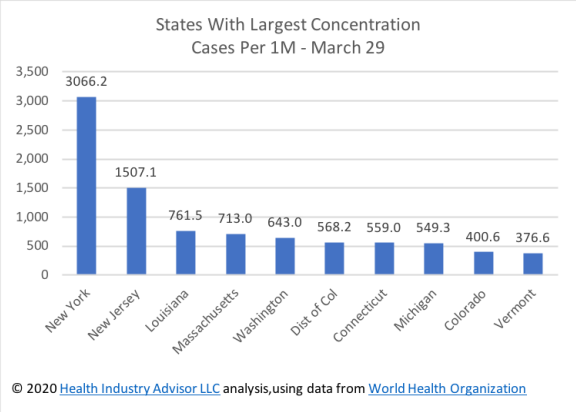
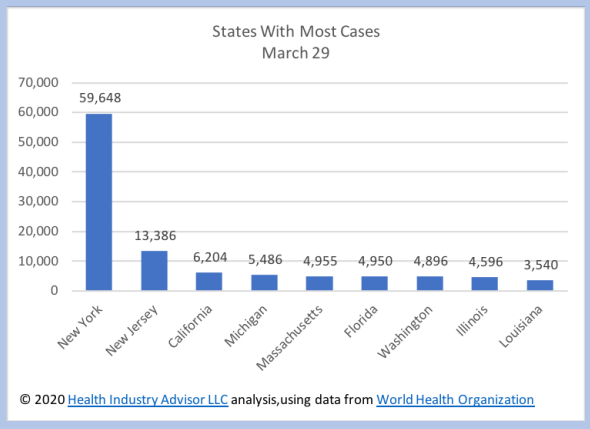
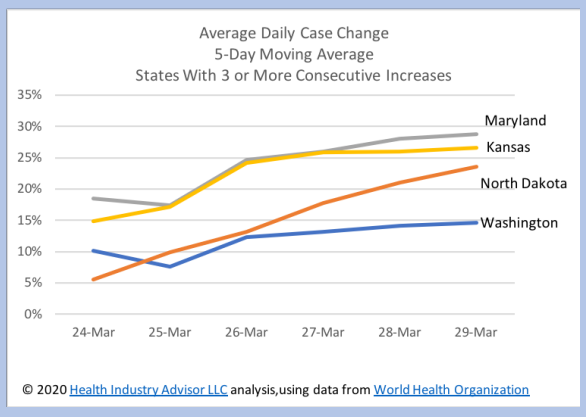
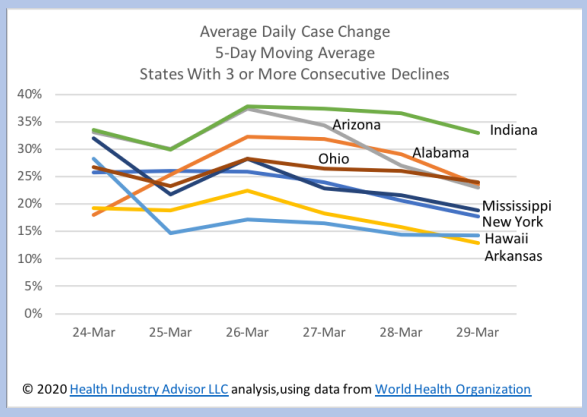




A sign of rapidly-spreading infections:
Four states have experienced 3 of more consecutive days with increasing case growth rates:



A sign of slowing infections:
Eight states have experienced 3 of more consecutive days with declining case growth rates:



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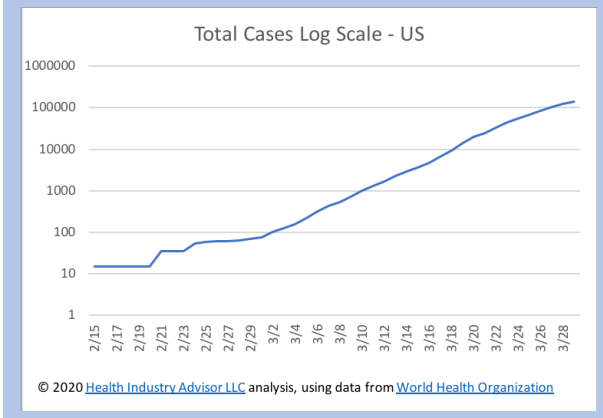

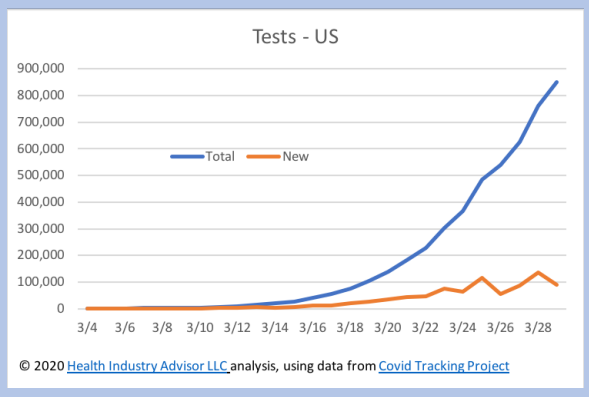

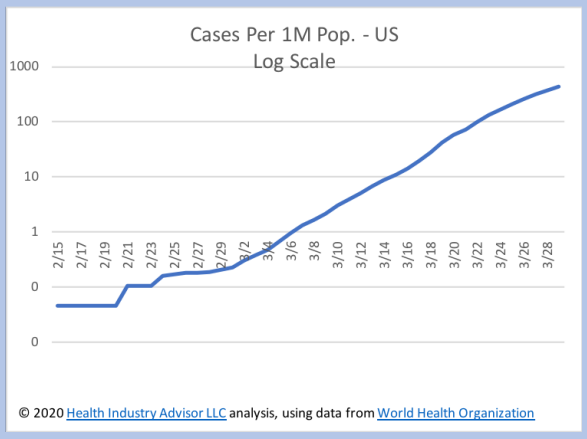

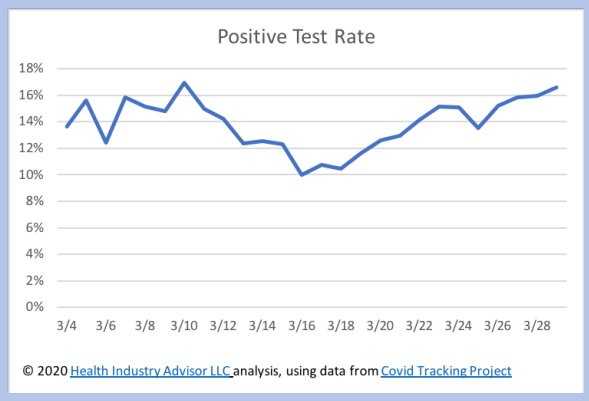

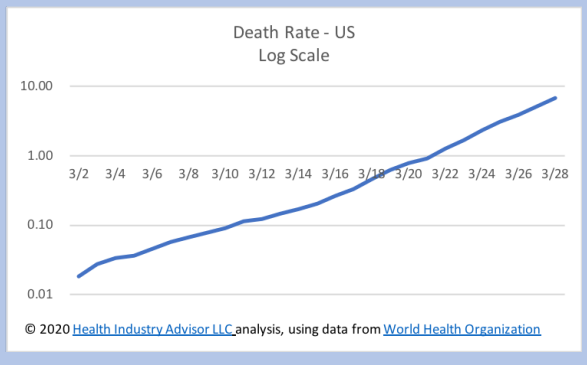

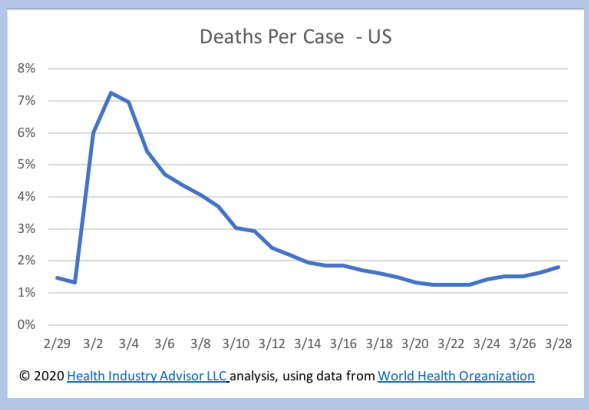

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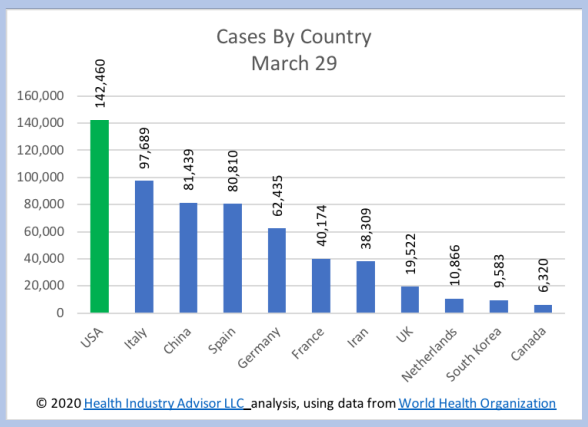

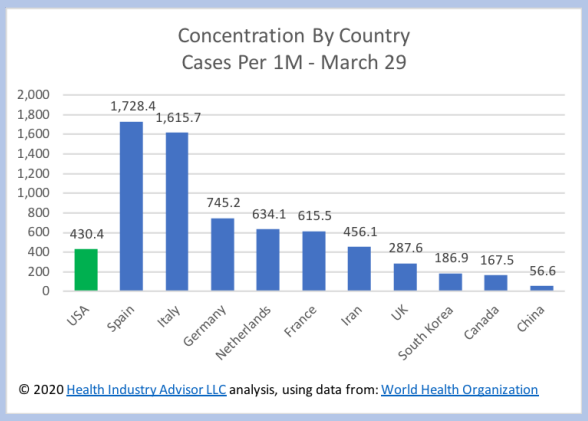

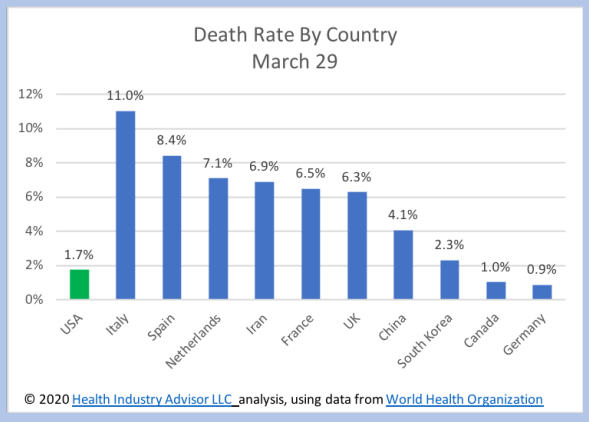

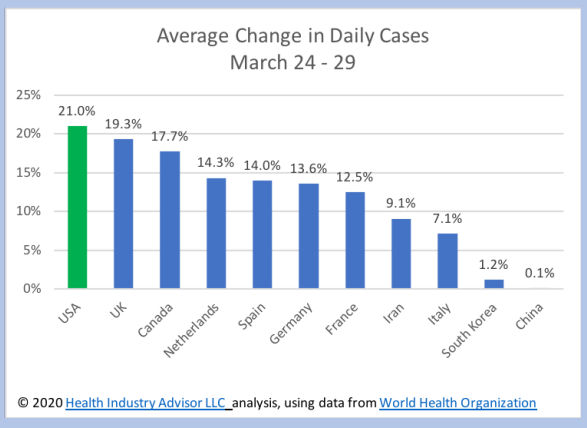

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