CRITICAL REVIEW OF THE DIAGNOSTIC AND STATISTICAL SUPPORT FOR COVID EPIDEMIC IN USA

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Abstract

Background: Two major flaws have been identified in collecting and interpreting the COVID epidemic data.
1) The United States ignored the International Guidelines for Certification and Classification (Coding) of COVID-19 as Cause of Death (20 April 2020 – WHO). The Guidelines suggested the use of U07.1 code for virus identified (certain) and U07.2 code for virus not identified (suspected but not objectively confirmed) cases of deaths. The American statistic used exclusively the U07.1 code causing confusion and endless disputes about the accuracy of COVID mortality estimates in this country.
2) Large number of natural, age related, expected deaths have been reported as COVID related deaths even if the virus reasonably couldn't play any causative role as the Underlying Cause of Death (UCOD).

Objective: A statistical method is suggested
1) to estimate the realistic proportion of test-confirmed COVID mortality relative to the less well confirmed causes of COVID deaths there viral-test is missing;
2) to estimate the number of seniors who could have passed away 'with' COVID but not 'because' of COVID infection.
1) The estimated maximal possible number of test-confirmed (true) cases of COVID deaths was based on the frequency of viral-test positivity in the population. It was possible because epidemiological studies indicated even distribution of infection in all categories of the persons in the entire population.
2) The age-normalized annual mortality (from actuarial tables) gives an idea how many persons could have died "normally" even without the COVID epidemic.

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Results: 1) COVID as the Underlying Cause of Death (UCOD) haven't been verified by specific laboratory viral test in ca. 40.3% of reported causes. These, exclusively HEARSAY information based cases violated the WHO guidelines for reporting COVID related deaths. (Use of U07.1 code).
2) Large number of natural, age related, expected deaths have been reported as COVID related deaths even if the virus reasonably couldn't play any causative role as UCOD. These PSEUDO COVID deaths were ca 46% of all reported COVID deaths. The oldest persons in this group were 85+ years old and comprised as much as 28% to all allegedly COVID fatalities (the GERONTO COVID deaths).
These errors significantly inflated the number of COVID deaths and the related mortality statistic.

Conclusions: The number of correctly identified COVID related deaths in our study is about 32% of the officially published number [171K instead of 533K, respectively]. The average FATALITY of COVID stays at ~0.54% and the MORTALITY 53/100K. (On May 2021).

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KEYWORDS
COVID; pandemic; CDC; USA; underlying cause of death; UCOD; who; code U07.1; mortality; lethality; fatality; hearsay; age; aging; pseudo; actuary table; WHO; virus; political; viral test; geronto; death certificate; bias; flu;

Introduction

There is a disagreement in the COVID literature regarding the lethality of the virus from the beginning of the pandemic [1, 2]. The possible reason of the – often heated – disagreements is the uncertain quality of the underlying statistical data.

Two major flaws can be identified in collecting and interpreting the COVID epidemic data:

A. "HEARSAY"- BASED DIAGNOSTIC: Defined as diagnosing COVID disease and/or COVID as the Underlying Cause of Death (UCOD) in the absence of sufficient laboratory evidence. Determination that COVID infection is the UCOD is not possible without access to relevant (timely and accurate) COVID specific viral test - that detects the actual presence of the virus (antigen) in the examined person. A physician's epidemiological diagnosis without laboratory test is notoriously uncertain [3.]

B. "PSEUDO" - COVID DIAGNOSTIC: Defined as diagnosing COVID disease and/or COVID as the Underlying Cause of Death (UCOD) in the non-pathogenic presence of the virus. The virus can be present in any person (young or old) without causing any disease on its own right or without significantly contributing to the death of a person who is dying as the consequence of some other disease or simply because of age limitations of the life.

The realistic determination of the status and course of COVID epidemic requires awareness of these possible diagnostic errors and the magnitude of their influence.
The evidence of the existence of these flaws in the COVID statistic - and the estimation of their magnitude - is based on two undisputable facts:

- The number of COVID related deaths is limited by the number of dying persons infected by the COVID virus. If the maximal number of infected persons is ‘x’ and the number of COVID related deaths is ‘y’, x-y>=0 and never <0. If x-y<0 the |x-y| is the number of erroneous determination of UCOD.

  [*For example*: If somebody tells you that he is working 25 hours a day he is mistaken, because there is only 24 hours in a day. The magnitude of his mistake is 1 hr.]

- Life is a time-limited activity that always ends - mostly naturally - after a number of years alive. This is certainly one of the most studied and most documented fact in the history of mankind. Large number of *Actuary Tables* are continuously constructed and shows the probability of a person at a certain age dying before their next birthday [4]. See ATTACHMENT I.

Persons dying as COVID positives will certainly receive corresponding UCOD determination. It might be correct at the bed-side, but certainly erroneous if it remains un-corrected and propagates into the CDC reports and incorrectly, misleadingly inflates vital parameters of the epidemic.
[For example: [Say, that an 85 years old COVID test positive woman dies. The physician will not be able to decide if the UCOD was really COVID in that single individual case or a “PSEUDO-COVID DEATH” where the virus positivity had no clinical significance. However an epidemiologist who have 1000 similar cases should understand that 516 women of 1000 in the same age are already dead without COVID infection and he should correct the COVID death statistic by removing 516 cases as “pseudo-COVID deaths”.]

CDC INSTRUCTION FOR DETERMINATION COVID RELATED DEATHS AND REPORTING USING THE U07.1 CODE

The Centers for Disease Control and Prevention (CDC) / US Dep. of Health & Human Services - ultimate health authority in USA -

a) Adopted the WHO’s code U07.1 for reporting COVID-19 deaths in cases when the virus had been identified (laboratory test, viral test, confirmed) [5, 6, 7].

[ICD-10-CM Official Guidelines for Coding and Reporting FY 2021 – p28: g.1) (a*): “Code only a conformed diagnoses of the 2019 novel coronavirus disease (COVID-19) as documented by the provider or documentation of a positive COVID-19 test result. For confirmed diagnoses, assign code U07.1, COVID-19.”]*

b) Did <u>not</u> adopt the WHO created code U07.2 for reporting COVID-19 when the virus was <u>not</u> identified (clinically diagnosed) however clearly instructed the providers <u>not to use U07.1</u> for reporting uncertain cases. [8]

[IDEM, p. 29: “If the provider documents "suspected," "possible," "probable," or “inconclusive” COVID-19, do not assign code U07.1. Instead, code the signs and symptoms reported.”]

c) Explained the importance of accurate and timely death reporting as fundamental to assess accurately the effects of pandemic and appropriately direct public health response [9].

[“Monitoring the emergence of COVID–19 in the United States and guiding public health response will also require accurate and timely death reporting. The purpose of this report is to provide guidance to death certifiers on proper cause-of-death certification for cases where confirmed or suspected COVID–19 infection resulted in death. As clinical guidance on COVID–19 evolves, this guidance may be updated, if necessary. When COVID–19 is determined to be a cause of death, it is important that it be reported on the death certificate to assess accurately the effects of this pandemic and appropriately direct public health response.”]

Numerous warnings have been published on the internet – mainly from practicing physicians – disclosing that the COVID epidemic is far less dangerous than the national media told the public. The COVID cases looked like a regular flue and not like a fatal disaster. a) The necessity of extreme restrictions have been criticized; b) It was suggested, that politicians and healthcare authorities are "*using a canon to kill a mosquito*". c) It became more and more obvious, that the original information for political decisions – the COVID statistic - is erroneous, the number of COVID deaths are over-estimated.
However it was not possible to estimate the magnitude of this incorrect estimation and the source of errors remained obscure.

METHODS

Sources of Statistical Data

Publicly available, official databases served as the sources to our analyses, like WORLDOMETER [10] and CDC [11].
Calculation life expectancies was based on Actuarial Life Tables, using the mean values of the sexes [12].
Calculation of the states 'political ratio', D/R was performed by dividing the number of left/democrat oriented (D) persons with the number of right/republican oriented (R) persons in the 50 states, based on the 2018 Gallup tracking and 2018 Gallup Poll Social Series surveys. – Cited in State Party Identification and Leaning, 2018 [13].

Clarifications [abbreviations]

- COVID-19 Deaths [CD] includes viral test confirmed [CD+] and viral test missing [CD?] lethality's (U07.1 AND U07.2, respectively), CD = [CD+] + [CD?]
- Total Tests [T] means COVID viral tests which detect active, ongoing virus infection - opposed to antibody tests which detect previous, already passed infection and the presence of immune response.
- Total Cases [C] means virus positive tests at the time of the sampling.
- Testing and positive tests are representative for the entire population and, consequently, the calculated frequency of test positivity - C/T – is approximately the same for all groups of the society, including those who die of any reason [14]. See ATTACHMENT II
- COVID viral test positivity doesn't mean COVID disease (majority of test positive persons are and remains symptom-free).
- By the same token, dying COVID test positive doesn't mean that the person's death was caused by the virus. The causal connection between test positivity and COVID death is not automatic.

RESULTS

Statistical Analyses

A. CALCULATION OF THE *"HEARSAY-BASED" DETERMINATION OF 'UCOD':* [ASSUMING COVID RELATED COUNTS OF DEATH IN THE ABSENCE OF LABORATORY CONFIRMATION BY SPECIFIC VIRAL TEST.]

The ratio of Total COVID cases (viral test positives), [C] and the number of total viral tests performed [T] provided an estimate of the frequency of COVID cases in the population. As much as 413 M viral test have been completed in the USA by the end of the 15 months of the initial period of the epidemic. [That is more than the entire population of the USA]. The number of positive tests were 31 M corresponding to **7.7%** of the tests, [C]/[T].
However the frequency of test positives (**C/T**) showed very large State-by-State variation, from 1.5% in VT to 26.5% in

SD.

The theoretical maximal number of persons who died when they were infected by the virus (viral test positives, but not necessarily sick or dying due to COVID) is 7.7 % of the total number of deaths, that is [CD+] = 318,369. However the reported number of COVID deaths was [CD] = 533,291.

The difference between theoretical maximum and reported number of COVID deaths gives us an estimate of the cases when the UCOD were determined to be COVID infection but it hadn't been confirmed by the necessary laboratory evidence, the specific viral test. These cases represent the "hearsay COVID deaths". The number of "*hearsay COVID deaths*" is estimated to be [CD?] = 214K deaths which is 40.3% of all reported "allegedly" COVID deaths. [See TABLE 1].

TABLE 1.

COVID STATISTIC [STATUS ON 2021.04.08]*

[POP]	USA POPULATION	327,533,774	
[D]	TOTAL DEATHS*	4,161,167	
[T-MO]	TOTAL MORTALITY - ALL DEATHS	1,270/100K	
[T]	TOTAL COVID TESTS	413,582,156	
[C]	TOTAL COVID CASES [TEST POS.]*	31,642,996	
[C]/[T]	CASE/TEST [%]	7.65	
[CD]-0	TOTAL COVID DEATHS [REPORTED]*	533,291	100%
[P-CD]	"PSEUDO"- COVID DEATHS:	245,206	46%
[G-CD]	"GERONTO"- COVID DEATHS: 85+ YEAR OLD	151,618	[28%]
[CD]-1	[CD] AFTER CORRECTION FOR [P-CD]	288,085	54%
[CD+]	COVID DEATS [TEST CONFIRMED]: 7.7% OF [D]	318,329	59.70%
[CD?]	"HEARSAY"- COVID DEATHS [NO TEST]	214,962	40.30%
	SUM	533,291	100.00%
[CD+]-2	CD-1 MINUS 40.3%= 116,098	171,987	32.25%
[MO]	MORTALITY [CORRECTED]	52.5/100K	
[FA]	FATALITY [CORRECTED]	0.54%	

*SUM OF 15 MONTHS DATA

The "*hearsay COVID death*" reporting by individual States had been estimated by the same way. (See **FIG. 1**).

The proportion of COVID death reporting without laboratory test confirmation, - [CD?] or "hearsay based", allegedly COVID deaths showed significant correlation with the Political Score (D/R ratio) of the respective States: Left dominated (democrat) States filed more "hearsay COVID deaths than right (republican) states. In some States as much as 90% of reported COVID deaths WERE NOT verified by viral test, i.e. they were "hearsay" cases. (**Fig. 2**).

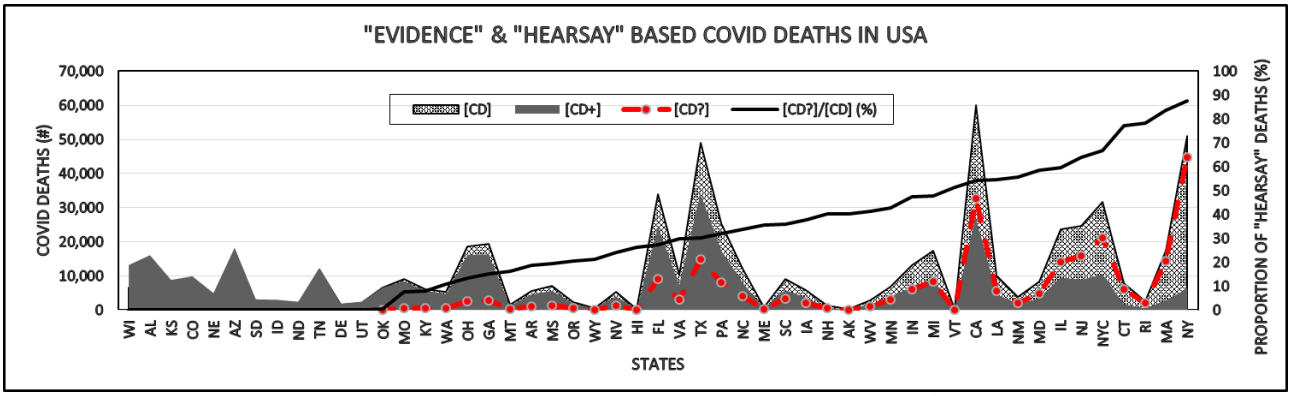

FIG. 1: The total number of reported COVID deaths [CD] are the sum of determinations: a) when the virus infection as the Underlying Cause of Death was "*evidence based*" (confirmed by laboratory viral test) [CD+] or b) "*hearsay based*" (laboratory viral test confirmation was missing) [CD?]. States were sorted in ascending order of the [CD?] / [CD+] ratio (%) that is the proportion of "hearsay deaths".

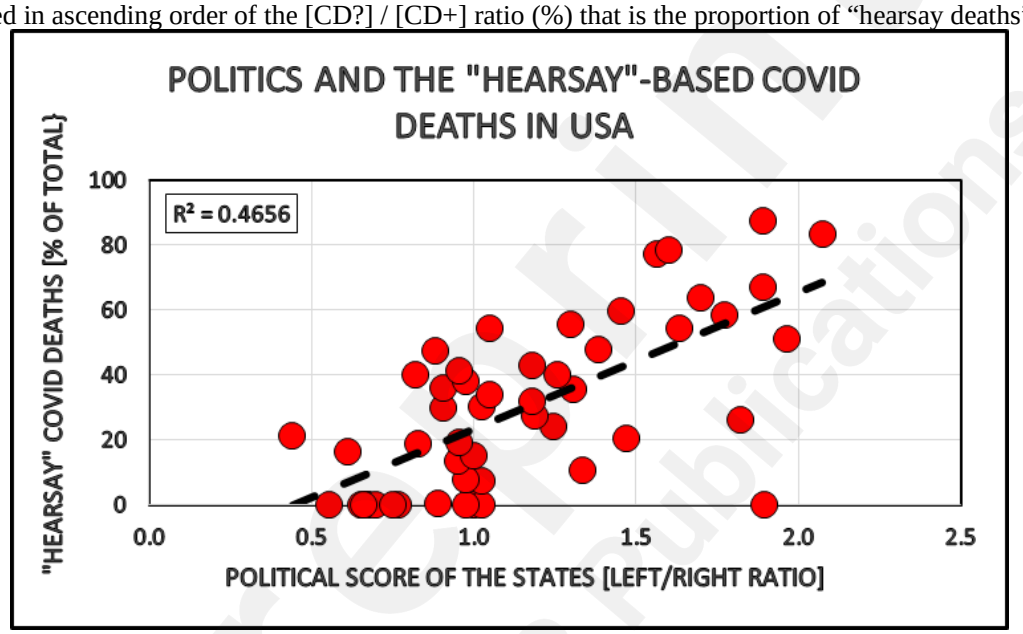

FIG. 2: The proportion of COVID deaths determinations without laboratory viral test evidence ("hearsay" cases) were plotted against the Political Score of the respective States.

The most extreme contributors to "hearsay based" COVID death reporting are listed in **TABLE II.** The seven selected states reported 225K COVID related deaths that is close to half of all COVID deaths in 50 States. However only 33% could have been confirmed by viral test and as much as 67% remained unconfirmed because of the absence of laboratory evidence. These are "hearsay" based COVID deaths. All these states had higher than average D/R score.

TABLE II

THE MOST EXTREME CONTRIBUTORS TO THE "HEARSAY" COVID DEATH REPORTING

State		[CD]	[CD+]	[CD?]	D/R	[CD?]/[CD] (%)
Michigan	MI	17,373	9,051	8,322	1.38	47.9
California	CA	59,985	27,391	32,594	1.63	54.3
Illinois	IL	23,702	9,524	14,178	1.45	59.8
New Jersey	NJ	24,749	8,937	15,812	1.70	63.9
New York City	NYC	31,598	10,448	21,150	1.89	66.9
Massachusetts	MA	17,358	2,854	14,504	2.07	83.6
New York	NY	51,120	6,412	44,708	1.89	87.5
SUM		**225,885**	**74,617**	**151,268**		
%		**100.0**	**33.0**	**66.9**	**171.0**	**66.2**

[CD]: TOTAL NUMBER OF REPORTED COVID DEATHS; [CD+]: THEORETICAL MAX. OF TEST POSITIVES;
[CD?]: DEATHS WITHOUT LAB. EVIDENCE ("HEARSAY" CASES); D/R: POLITICAL SCORE, DEMOCRAT/REPUBLICAN RATIO

B. DETERMINATION OF *"PSEUDO-COVID"* [AND *"GERONTO-COVID"* DEATHS: LETHALITY'S THERE CAUSATIVE ROLE OF COVID INFECTION IS REASONABLY NEGLIGIBLE.

The concept of determination of the "pseudo-COVID deaths is not meant for bed-side use on individual cases. It works only on larger statistical samples as a correct method to avoid overestimation of the fatality/mortality of a disease that might increase the anxiety of the public and might trigger overreaction of media and politicians.
The number of all allegedly COVID related deaths in different age groups was taken from the relevant database of CDC [15]. The number of reported COVID deaths in each age group were further divided into subgroups, using a Periodic Life Table [see **Attachment I**.]: **a**) those who could be alive and **b**) those who 'statistically' were already dead even without COVID infection.
The number of persons who statistically could have been expected to be dead even without COVID infection was estimated to be [PSE-CD] = 245,205 [45.9%] of all reported COVID deaths [CD] = 533,291 = 100%. This group represents not real COVID deaths, but "**PSEUDO-COVID**" deaths (or "**GERONTO-COVID**" cases). The remaining - [V-CD] = 288,085, = 54% - are statistically not predicted cases i.e. they can be real viral COVID deaths. See **TABLE III** and **FIG. 3**.

TABLE III.
SEPARATION OF "PSEUDO-COVID" SUBGROUP OF COVID DEATHS*

AGE GROUP	COVID DEATHS	PSEUDO-COVID	VIRAL-COVID	TOTAL DEATHS	RATIO (%)
AGE	[CD]	[PSE-CD]	[V-CD]	[TD]	[CD][TD]
<1	57	0	57	22,249	0.3
1-4	31	0	31	4,010	0.8
5-14	87	1	86	6,479	1.3
15-24	792	8	784	41,940	1.9
25-34	3,470	72	3,398	86,859	4.0
35-44	9,104	328	8,776	124,861	7.3
45-54	25,394	1,559	23,835	230,166	11.0
55-64	64,756	7,503	57,253	533,464	12.1
65-74	117,252	25,872	91,380	824,289	14.2
75-84	148,166	62,187	85,979	1,002,845	14.8
85+	164,182	147,676	16,506	1,226,820	13.4
All Ages [SUM]	**533,291**	**245,206**	**288,085**	**4,103,982**	**13.0**
% OF [CD]	100	45.98	54.00	769	

*SUM OF 15 MONTHS DATA

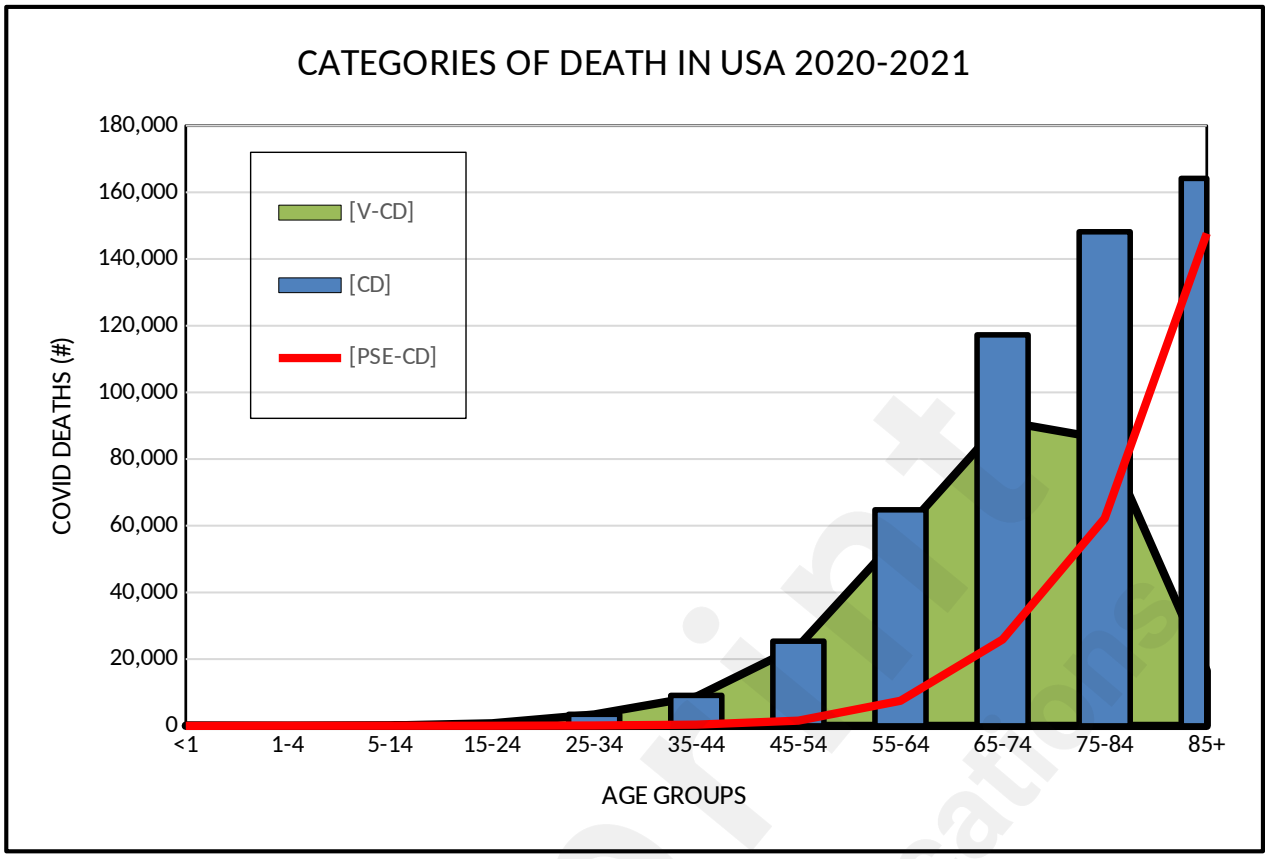

FIG. 3: All categories covers period 2020.01.01-2021.03.31. [CD]: reported number of all allegedly COVID related deaths. [TD]: total number of all kinds of deaths in USA. [PSE-CD]: pseudo-COVID deaths, [V-CD]: real, viral COVID death.

DISCUSSION

COVID epidemic is taken very seriously even if significant differences exist between the States regarding the length and enforcement of the restrictions. There are critical voices - already from the beginning of the epidemic – suggesting that in reality we are only dealing with another winter flu and our protective reactions are like "*using a cannon to kill a mosquito*". However the "flu-theory" have been rejected and the moderating voices have been silenced. The main argument for unusually strong defenses came from early mortality data, which suggested that COVID mortality is far higher than the regular flu's (1-3.4% compared to 0.1%). It was1.7% in our starting material (533,291 deaths of 31,642,996 infected).

Our results indicates that the official number of COVID fatality is strongly inflated by "*hearsay cases*" [laboratory confirmation is missing] and "*pseudo-cases* [COVID had no pathogenic effect]. We corrected the official fatality estimate, [CD] = 533,291 deaths, by subtracting [PSE-CD] = 245,205 "*pseudo cases*" and reducing the remaining [V-CD] = 288,085 cases with 40.3% corresponding to the calculated [CD?] = 116,098 "*hearsay*" -based COVID deaths. Our opinion is that the final number, [CD+] = 171,987 deaths, is the correct estimate of cases there the UCOD is the COVID virus with reasonable certainty. Consequently the corrected average fatality rate of the epidemic is [FA] = 0.54% and mortality rate, [MO] = 52.5/100K.

[Fatality, FA is defined as the number of deaths per 100 cases of a given disease.

Mortality, MO is defined as deaths (for a given illness)/unit of population (100,000 sick and well).

Overestimation of the mortality rate of a pandemic is a very serious error even if we pursue maximal tolerance for accidental mistakes in the medical profession. Too many people lost the quality of their life and the considerable costs of the epidemic is also rather obvious. It is difficult to understand how two relatively simple errors could occur today in the USA, in one of the most developed and sophisticated countries of the world.

- The necessity of evidence to support the diagnosis of a doctor is elementary requirement in the USA and the *evidence-based medicine* [16] is an established concept in this country. However a doctor's evidence-based approach to a sick patient or to a dead person can be very different. It wouldn't be surprising to find some degree of nonchalance in determining the UCOD. "*Dead is dead*".

[Evidence-based medicine (EBM) is defined as "*the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients*."]

- The CDC instructions are – or supposed to be – clear regarding the determination of COVID death and the specific use of the U07.1 code for reporting these deaths. The TABLE IV illustrates the doctor's dilemma when determining COVID deaths.

TABLE IV

POSSIBLE SCENARIOS WHEN DETERMINING 'COVID' AS UCOD

	A	B	C	D	COMMENT
	SIGNS	CONTACT	TEST	U07.1 CODE	
1	NO	NO	NO	NO	UCOD: NOT COVID
2	YES	YES	YES	YES	UCOD: COVID
3	YES	NO	NO	NO	UCOD: NOT COVID
4	NO	YES	NO	[NO]	UCOD: NOT COVID - **["HEARSAY" IF YES]**
5	NO	NO	YES	YES	UCOD: COVID - FULFILS CDC TEST CRITERIA
6	YES	YES	NO	[NO]	UCOD: NOT COVID - **["HEARSAY" IF YES]**
7	YES	NO	YES	YES	UCOD: COVID - FULFILS CDC TEST CRITERIA
8	NO	YES	YES	YES	UCOD: COVID - FULFILS CDC TEST CRITERIA

There is 3 kinds of information available for a physician who is diagnosing COVID disease or determining that COVID disease was the UCOD. [A + B + C = D].

A) Clinical signs: flu-like symptoms, highly unspecific – useless if the patient has complex symptomatology (other diseases).
B) Contact with others having or suspected for COVID infection. This is the classical "hearsay" information, highly unreliable.
C) Specific COVID laboratory viral test: this is the best evidence we have to confirm the presence of virus in the examined person. Misleading if confused with the antibody test [it detects past, no longer present infection]. The causality between virus and the actual disease has to be established by other methods, like chest X-ray.
D) The use of U07.1 code for reporting compliance with the CDC recommendation/order is motivated only in viral-test positive cases.

The statistically significant positive correlation between the calculated number of COVID deaths, there the UCOD hadn't been supported by the only available objective "evidence" (viral test) – "hearsay" COVID cases – and the D/R ratio of the states is especially disturbing. This finding certainly motivates serious attention and confirmation by other independent scientists.

CONCLUSIONS

COVID data is seriously tainted, the number of supposedly COVID related deaths are more than 300% inflated. Consequently the real average fatality of the COVID disease is less than a 1/3rd of the officially stated (i.e. ~ 0.54%). This strong overestimation of COVID fatality and it's consequences on the economy and life-quality of American peoples could have been avoided or at least mitigated if the Country follows the WHO recommendation for separating the viral test confirmed and COVID deaths (U07.1) from those there the UCOD was not supported by viral test by using distinctive U07.1

v. s. U07.2 diagnostic codes for reporting.
We believe that even better understanding of the fundamental rules of biological life would be beneficial to avoid diagnosing the death of very old people as disease.

Conflict of Interest

The author declare that he has no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Disclaimer

The first draft of this manuscript was already completed in May 2021 but no attempt was made to publish it. The outcome of a pandemic is always uncertain and it is necessary to execute a single and strict policy to protect the people,- as the USA certainly did - even if that policy turns out to be imperfect. However 3 years later, when the pandemic is over, publication of our critical notes is necessary. The author's intention is to encourage the responsible doctors, scientists, politicians to critically review their actions, honestly recognize their mistakes and learn from it. COVID is certainly not the last pandemic the mankind was facing.

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ATTACHMENT I.

Period Life Table, 2017

Exact age	Male			Female		
	Death probability a	Number of lives b	Life expectancy	Death probability a	Number of lives b	Life expectancy
0	0.006304	100,000	75.97	0.005229	100,000	80.96
1	0.000426	99,370	75.45	0.000342	99,477	80.39
2	0.00029	99,327	74.48	0.000209	99,443	79.42
3	0.000229	99,298	73.5	0.000162	99,422	78.43
4	0.000162	99,276	72.52	0.000143	99,406	77.45
5	0.000146	99,260	71.53	0.000125	99,392	76.46
6	0.000136	99,245	70.54	0.000113	99,379	75.47
7	0.000127	99,232	69.55	0.000104	99,368	74.47
8	0.000115	99,219	68.56	0.000097	99,358	73.48
9	0.000103	99,208	67.57	0.000093	99,348	72.49
10	0.000097	99,197	66.57	0.000092	99,339	71.5
11	0.000109	99,188	65.58	0.000098	99,330	70.5
12	0.000151	99,177	64.59	0.000113	99,320	69.51
13	0.000232	99,162	63.6	0.000138	99,309	68.52
14	0.000343	99,139	62.61	0.000172	99,295	67.53
15	0.000465	99,105	61.63	0.000211	99,278	66.54
16	0.000588	99,059	60.66	0.000251	99,257	65.55
17	0.00072	99,001	59.7	0.000293	99,232	64.57
18	0.000858	98,929	58.74	0.000336	99,203	63.59
19	0.000999	98,845	57.79	0.000379	99,170	62.61
20	0.001146	98,746	56.85	0.000425	99,132	61.63
21	0.001288	98,633	55.91	0.000472	99,090	60.66
22	0.001407	98,506	54.98	0.000515	99,044	59.69
23	0.001494	98,367	54.06	0.000551	98,993	58.72
24	0.001556	98,220	53.14	0.000582	98,938	57.75
25	0.00161	98,067	52.22	0.000612	98,880	56.78
26	0.001665	97,910	51.31	0.000646	98,820	55.82
27	0.001717	97,746	50.39	0.000684	98,756	54.85
28	0.001767	97,579	49.48	0.000729	98,689	53.89
29	0.001817	97,406	48.56	0.000779	98,617	52.93
30	0.001865	97,229	47.65	0.000833	98,540	51.97
31	0.001911	97,048	46.74	0.000887	98,458	51.01
32	0.00196	96,862	45.83	0.000939	98,370	50.06
33	0.002014	96,672	44.92	0.000988	98,278	49.1
34	0.002071	96,478	44.01	0.001034	98,181	48.15
35	0.002138	96,278	43.1	0.001085	98,079	47.2
36	0.002211	96,072	42.19	0.001143	97,973	46.25
37	0.002279	95,860	41.28	0.001205	97,861	45.3
38	0.002342	95,641	40.37	0.001271	97,743	44.36
39	0.002405	95,417	39.47	0.001345	97,619	43.41
40	0.002482	95,188	38.56	0.001429	97,488	42.47
41	0.002583	94,951	37.65	0.001524	97,348	41.53
42	0.00271	94,706	36.75	0.00163	97,200	40.59
43	0.00287	94,450	35.85	0.001748	97,042	39.66
44	0.003064	94,178	34.95	0.001881	96,872	38.73
45	0.003285	93,890	34.06	0.002029	96,690	37.8
46	0.003538	93,581	33.17	0.002195	96,494	36.88
47	0.003834	93,250	32.28	0.002386	96,282	35.96
48	0.004178	92,893	31.41	0.002605	96,052	35.04
49	0.004569	92,505	30.54	0.002851	95,802	34.13
50	0.004997	92,082	29.67	0.003118	95,529	33.23
51	0.005462	91,622	28.82	0.003403	95,231	32.33
52	0.005971	91,122	27.98	0.003714	94,907	31.44
53	0.006526	90,577	27.14	0.004052	94,554	30.55
54	0.007125	89,986	26.32	0.004415	94,171	29.68
55	0.007766	89,345	25.5	0.004813	93,755	28.81
56	0.008445	88,651	24.7	0.005233	93,304	27.94
57	0.009156	87,903	23.9	0.005647	92,816	27.09
58	0.009897	87,098	23.12	0.006043	92,292	26.24
59	0.010671	86,236	22.34	0.006441	91,734	25.39
60	0.011519	85,316	21.58	0.006886	91,143	24.56

Exact age	Male			Female		
	Death probability a	Number of lives b	Life expectancy	Death probability a	Number of lives b	Life expectancy
61	0.012419	84,333	20.83	0.007391	90,515	23.72
62	0.013307	83,286	20.08	0.007931	89,846	22.9
63	0.014164	82,177	19.35	0.008508	89,134	22.07
64	0.015032	81,013	18.62	0.009142	88,375	21.26
65	0.016013	79,795	17.89	0.009874	87,568	20.45
66	0.017138	78,518	17.18	0.010717	86,703	19.65
67	0.018362	77,172	16.47	0.01166	85,774	18.86
68	0.019693	75,755	15.77	0.012711	84,774	18.07
69	0.021174	74,263	15.07	0.013894	83,696	17.3
70	0.022889	72,691	14.39	0.015285	82,533	16.54
71	0.024869	71,027	13.71	0.016878	81,272	15.79
72	0.027095	69,261	13.05	0.018607	79,900	15.05
73	0.029587	67,384	12.4	0.020466	78,413	14.32
74	0.032394	65,390	11.76	0.022522	76,809	13.61
75	0.035668	63,272	11.14	0.024929	75,079	12.92
76	0.039396	61,015	10.53	0.027729	73,207	12.23
77	0.043453	58,611	9.94	0.030855	71,177	11.57
78	0.047826	56,065	9.37	0.034321	68,981	10.92
79	0.052649	53,383	8.82	0.038211	66,613	10.29
80	0.058206	50,573	8.28	0.042771	64,068	9.68
81	0.064581	47,629	7.76	0.047992	61,328	9.09
82	0.071657	44,553	7.26	0.053678	58,385	8.52
83	0.079465	41,361	6.79	0.05981	55,251	7.98
84	0.088141	38,074	6.33	0.066584	51,946	7.45
85	0.097854	34,718	5.89	0.074258	48,487	6.95
86	0.108747	31,321	5.48	0.083053	44,887	6.47
87	0.120919	27,915	5.08	0.093123	41,159	6.01
88	0.134425	24,539	4.71	0.10454	37,326	5.57
89	0.149273	21,241	4.37	0.117305	33,424	5.16
90	0.165452	18,070	4.05	0.131392	29,503	4.78
91	0.182935	15,080	3.75	0.146753	25,627	4.43
92	0.201679	12,322	3.48	0.163331	21,866	4.11
93	0.221637	9,837	3.23	0.181064	18,294	3.81
94	0.242747	7,656	3.01	0.199886	14,982	3.55
95	0.263672	5,798	2.81	0.218908	11,987	3.31
96	0.284014	4,269	2.64	0.237815	9,363	3.09
97	0.303355	3,057	2.49	0.256265	7,136	2.9
98	0.321268	2,129	2.36	0.273894	5,308	2.73
99	0.337332	1,445	2.24	0.290328	3,854	2.58
100	0.354198	958	2.12	0.307747	2,735	2.42
101	0.371908	619	2.01	0.326212	1,893	2.28
102	0.390503	388	1.9	0.345785	1,276	2.14
103	0.410029	237	1.8	0.366532	835	2.01
104	0.43053	140	1.7	0.388524	529	1.88
105	0.452057	80	1.6	0.411835	323	1.76
106	0.474659	44	1.51	0.436546	190	1.65
107	0.498392	23	1.42	0.462738	107	1.54
108	0.523312	11	1.34	0.490503	58	1.44
109	0.549478	5	1.26	0.519933	29	1.34
110	0.576951	2	1.18	0.551129	14	1.24
111	0.605799	1	1.1	0.584196	6	1.15
112	0.636089	0	1.03	0.619248	3	1.06
113	0.667893	0	0.96	0.656403	1	0.98
114	0.701288	0	0.9	0.695787	0	0.91
115	0.736353	0	0.84	0.736353	0	0.84
116	0.77317	0	0.78	0.77317	0	0.78
117	0.811829	0	0.72	0.811829	0	0.72
118	0.85242	0	0.66	0.85242	0	0.66
119	0.895041	0	0.61	0.895041	0	0.61

a Probability of dying within one year.

b Number of survivors out of 100,000 born alive.

Note: The period life expectancy at a given age for 2017 represents the average number of

ATTACHMENT II.

Source:
Center for Disease Control and Prevention (CDC) – https://www.cdc.gov/coronavirus/2019-ncov/COVID-data/investigations-discovery/hospitalization-death-by-age.html#footnote02

Accessed: 2021.05.02

Risk for COVID-19 Infection, Hospitalization, and Death By Age Group
(Updated Feb. 18, 2021)

Rate ratios compared to 5-17 year olds[1]

Risk for COVID-19 Infection, Hospitalization, and Death By Age Group

Rate compared to 5–17-years old[1]	0–4 years old	5–17 years old	18–29 years old	30–39 years old	40–49 years old	50–64 years old	65–74 years old	75–84 years old	85+ years old
Cases[2]	<1x	Reference group	2x	2x	2x	2x	1x	1x	2x
Hospitalization[3]	2x	Reference group	6x	10x	15x	25x	40x	65x	95x
Death[4]	1x	Reference group	10x	45x	130x	440x	1300x	3200x	8700x

All rates are relative to the 5–17-year-old age category. Sample interpretation: Compared with 5–17-year-olds, the rate of death is 45 times higher in 30–39-year-olds and 8,700 times higher in 85+-year-olds.

[1] Rates are expressed as whole numbers, with values less than 10 rounded to the nearest integer, two-digit numbers rounded to nearest multiple of five, and numbers greater than 100 rounded to two significant digits.

[2] Includes all cases reported by state and territorial jurisdictions (accessed 3/22/2021). The denominators used to calculate rates are based on the 2019 Vintage population, https://www.census.gov/newsroom/press-releases/2019/popest-nation.htmlexternal icon.

[3] Includes all hospitalizations reported through COVID-NET (https://www.cdc.gov/coronavirus/2019-ncov/COVID-data/COVID-net/purpose-methods.html, from 3/01/2020 through 3/13/2021, accessed on 3/23/2021). Rates are standardized to the 2020 US standard COVID-NET catchment population.

[4] Includes all deaths in National Center for Health Statistics (NCHS) provisional death counts (https://data.cdc.gov/NCHS/Provisional-COVID-19-Death-Counts-by-Sex-Age-and-S/9bhg-hcku, accessed on 3/22/2021).