

# Putrefaction in the pandemic: a comparative study of the frequency of advanced decomposition change in coronial autopsies since the start of the COVID-19 pandemic

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## ABSTRACT

**Aims** The aim of this study is to evaluate whether there has been a significant change in the frequency of markedly decomposed bodies having coronial autopsies since the UK's first COVID-19 lockdown.

**Methods** We compared coronial autopsies (n=263) performed by one pathologist at a central London mortuary in the 1 year before and after 23 March 2020 by analysing their autopsy reports and coronial documentation.

**Results** We have shown that there has been a significant increase of 70.5% (p=0.001) in the frequency of markedly decomposed bodies having coronial autopsies since the first lockdown. This is associated with a 38% increase (p=0.0001) in the rate of those dying at home and a 52.4% decrease (p=0.00003) in the rate of those dying in hospital who go on to have a coronial autopsy in our facility. Our results suggest that the most significant factor behind the increased frequency in advanced decomposition change since the first lockdown is this increase in coronial autopsies for deaths at home relative to deaths in hospital.

**Conclusion** Our results support the idea that perimortem social isolation will lead to an increased frequency of advanced decomposition changes seen at autopsy. We suggest that it could be possible to use the frequency of advanced postmortem decomposition change in a population as a surrogate marker for social isolation in future studies. Our study also illustrates a changing environment where the increasing prevalence of postmortem decomposition changes could affect the accuracy of autopsy reports and the medicolegal consequences thereof.

## INTRODUCTION

The COVID-19 pandemic has led to countries around the world adopting various different measures to contain the spread of the SARS-CoV-2 virus. In the UK, the first national lockdown started on 23 March 2020. The lockdown consisted of a government mandate for all people to 'Stay at Home', closing most non-essential workplaces and forbidding social mixing between households. From 23 March 2020 until 22 March 2021 the government of the UK has announced three separate national lockdowns comprising nearly half of that entire year, with there being various social restrictions and distancing measures in force during the intervening days.

The effects of these social restrictions on successfully containing the spread of the virus have been well studied and demonstrated.<sup>1</sup> Nevertheless, the lockdowns and the intervening periods of time have caused abrupt societal changes, which include an increase in social isolation and loneliness in the UK population.<sup>2,3</sup>

The purpose of this study is to review whether more people are reaching a more advanced stage of decomposition postmortem since the start of the lockdowns, and if this is the case to try to work out why.

Decomposition is a natural, inevitable process that occurs postmortem via putrefaction, mummification, adipocere formation or a combination of these, dependent on environmental circumstances.<sup>4</sup> Every type of decomposition progresses through various stages, and the most commonly seen would initially be putrefaction. The timeframe over which all types of decomposition occur is very variable depending on numerous extrinsic factors: temperature, atmospheric pressure, humidity, exposure, presence of clothing,<sup>4</sup> etc.

Except in some exceptional circumstances, a body reaching such a state of putrefaction is indicative of the deceased living in a state of perimortem social isolation, either voluntary or involuntary. This person would have had to have been dead for a significant period of time, in the region of at least several days, with nobody aware of or reporting their absence.

We hypothesise that the frequency of marked decomposition change in coronial autopsies would have increased in the past year compared with the previous one due to the abrupt change in social behaviour leading to increased social isolation as a result of the COVID-19 pandemic.

## METHODS

### Selection of cases

We analysed all coronial autopsy cases undertaken or supervised by a single consultant histopathologist on behalf of a central London coroner between 23 March 2019 and 22 March 2021. This comprised a total of 263 cases.

Up until 1 September 2020 the consultant pathologist did autopsy work 2 days/week, but subsequently has reduced this to 1 day/week (accounting for the reduced case load in the 2020–2021 cohort below, and also the relative decrease in winter cases



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in the 2020–2021 cohort). None of the cases included were forensic cases or suspicious deaths. The cases were assigned by the coroner, minimising bias towards certain causes/modes of death and meaning that the cases examined in this study are representative of the overall case load for the mortuary.

Most of the deceased died in the London borough of Westminster or the borough of Kensington and Chelsea. Ten cases died in South West London jurisdictions, but had autopsies at our facility due to capacity needs. All these areas would be classed as urban and population dense. The demographics of these regions are very varied, comprising some of the wealthiest areas of the UK as well as some of the most impoverished.<sup>5,6</sup> The population in these areas is also very mixed in terms of ethnicity and age.<sup>7</sup> The sample included in this study is therefore fairly representative of the UK as a whole.

All of the cases were analysed by reviewing their autopsy reports and the coroner's request form and attached documentation. These contained all the information needed for the data collection.

The data were split into two categories: 2019–2020 (comprising all cases that died from 23 March 2019 to 22 March 2020) and 2020–2021 (comprising all cases that died from 23 March 2020 to 22 March 2021). The null hypothesis for the purpose of this study is that the frequency of decomposition change and other parameters in 2020–2021 should be the same as in 2019–2020. The null hypothesis was tested using  $\chi^2$  goodness of fit test and Welch's t-test for the non-binary variables. The statistical analysis was performed using *Microsoft Excel 2016*.

### Analysis of decomposition

An autopsy was classed as 'decomposed' for the purposes of data collection if the autopsy report made reference to findings of 'moderate', 'marked' or 'severe' decomposition change as well as some qualifier as to what these changes were (eg, 'significant skin slippage...large number of maggots'). Mild decomposition change or findings consistent with early decomposition (eg, 'greening of the skin', 'early marbling') were excluded from the final decomposed count.

These descriptive terms of 'moderate', 'marked' or 'severe' are intrinsically subjective; however, due to the fact that every autopsy in our study was performed or overseen by the same consultant pathologist, these descriptions are in fact very consistently applied to specific decomposition findings. In this context, these terms as a group are generally characterised by physical findings including: significant skin slippage, discolouration, blistering and breakdown; the production of purge fluid; internal organ/tissue breakdown; infestation by maggots; fungal bloom; skeletisation/mummification.

Even acknowledging the wide variability in decomposition rates due to environmental factors, we can reasonably assume that a body reaching these levels of decomposition change would have had a postmortem interval of at least 1–2 weeks in a temperate environment like London's (barring any extreme, unique or aberrant climatic conditions).<sup>4</sup> If we were to use Gelderman's Total Decomposition Score (TDS),<sup>8</sup> these findings would certainly equate to a TDS of at least 9 in all cases.

### Variables

Known factors affecting decomposition rate were also investigated to see if there would be any other variables contributing to a change in the frequency of marked decomposition. The time of year that bodies were discovered was analysed, as it is known that the warmer temperatures of the summer months

will accelerate decomposition,<sup>9</sup> with the opposite being true in colder temperatures experienced in winter,<sup>10</sup> although central heating and London's microclimate may act as confounding variables in this interpretation. For this study, summer is classed as 21 June to 20 September and winter is classed as 21 December to 20 March.

It is also known that bodies with a high body mass index (BMI) tend to decompose faster,<sup>11</sup> and so the BMI of all cases was analysed, with a specific subset analysis of only the markedly decomposed cases to see if there was any difference between cohorts.

There was consideration that some of the bodies may have died of sepsis, possibly related to COVID-19 in the 2020–2021 cohort. It is observed that sepsis deaths have a faster rate of decomposition.<sup>12</sup> If our 2020–2021 cohort had more sepsis-related deaths it could be biased towards more advanced decomposition. The mortuary in which this study took place did not test bodies for SARS-CoV-2, they instead used a risk assessment questionnaire to assess the deceased's perimortem risk of COVID-19 infection (eg, did they have a history of cough prior to death?). Due to many of these decomposed individuals not having had recent contact with their relatives, friends or other useful parties, these questionnaires were not particularly helpful in these instances. In order to assess whether there was any difference in possible COVID-19 and sepsis rates, total lung weights were analysed and compared between cohorts. It is known that sepsis and COVID-19 infection will generally increase combined lung weights.<sup>12,13</sup> Combined lung weight is not a specific finding to COVID-19/sepsis; however, it is fairly sensitive, and so if there is an increase in the frequency sepsis deaths between cohorts we should expect to see a general increase in combined lung weights.<sup>12</sup>

If a person's place of death was the same as their home address they were classed as having died 'at home'. Other classifications were that they died in 'hospital', in a 'hotel', they were of 'no fixed abode' or died 'elsewhere'.

Causes of death were also analysed, and the total number of 'unascertained' cases was counted.

### RESULTS

**Table 1** and **figures 1–2** demonstrate the results of the data collection (see online supplemental materials 1 and 2) across both years; with 159 cases performed by the authors for 23 March 2019 to 22 March 2020 (2019–2020) and 104 cases performed on 23 March 2020 to 22 March 2021 (2020–2021). The absolute number of autopsies carried out over the same time periods at our mortuary was 391 for 2019–2020 and 528 for 2020–2021, demonstrating a 35% increase.

#### Changes in decomposition frequency

The most significant findings from this study are that of an increase in the frequency of bodies showing marked decomposition change in 2020–2021 compared with 2019–2020 (increase of 70.5%,  $p=0.001$ ).

Almost all (98.2%) of the markedly decomposed cases from both cohorts had died at home; only one of the decomposed cases from 2020 to 2021 had died 'elsewhere'. No hospital deaths demonstrated marked decomposition.

#### Changes in location of death

There is also a statistically significant change in the rate of cases which died at home and at hospital, with a 38% increase ( $p=0.0001$ ) in the frequency of home deaths ( $p=0.0001$ ) and a

**Table 1** Results for coronial autopsies, March 2019 to March 2021

	2019–2020	2020–2021	% change in rate	P value
Total cases (n=263)	159	104		
Male	88 (55.3%)	61 (58.7%)		0.497
Mean age at death	65	62		0.147
Mean BMI (kg/m <sup>2</sup> )	27.3	27.4		0.962
Mean BMI of decomposed cases (kg/m <sup>2</sup> )	26.0	25.5		0.829
Mean lung weight (g)	1262	1214		0.482
Mean lung weight in decomposed cases (g)	927	940		0.898
Mean days from death to autopsy	5.95	7.76		<0.001
Deaths showing marked decomposition	26 (16.4%)	29 (27.9%)	+70.5	<b>0.001</b>
Deaths at home	82 (51.6%)	74 (71.2%)	+38.0	<0.001
Deaths at home showing marked decomposition	26 (31.7%)	28 (37.8%)	+19.3	0.257
Deaths at hospital	61 (38.4%)	19 (18.3%)	-52.4	<0.001
Deaths at hotels	2 (1.3%)	4 (3.8%)		<b>0.018</b>
Deaths with no fixed abode	4 (2.5%)	1 (1.0%)		0.311
Deaths elsewhere	8 (5.0%)	6 (5.8%)		0.731
Deaths in summer (21 June to 20 September)	45 (28.3%)	28 (26.9%)		0.489
Deaths in winter (21 December to 20 March)	37 (23.3%)	20 (19.2%)		
Total 'Unascertained' cause of death	5 (3.1%) (80% of these had marked decomposition)	5 (4.8%) (100% of these had marked decomposition)	+52.9	0.331

P values highlighted in bold suggest statistical significance  
 BMI, body mass index.

52.4% decrease ( $p=0.00003$ ) in the frequency of hospital deaths having coronial autopsies in 2020–2021.

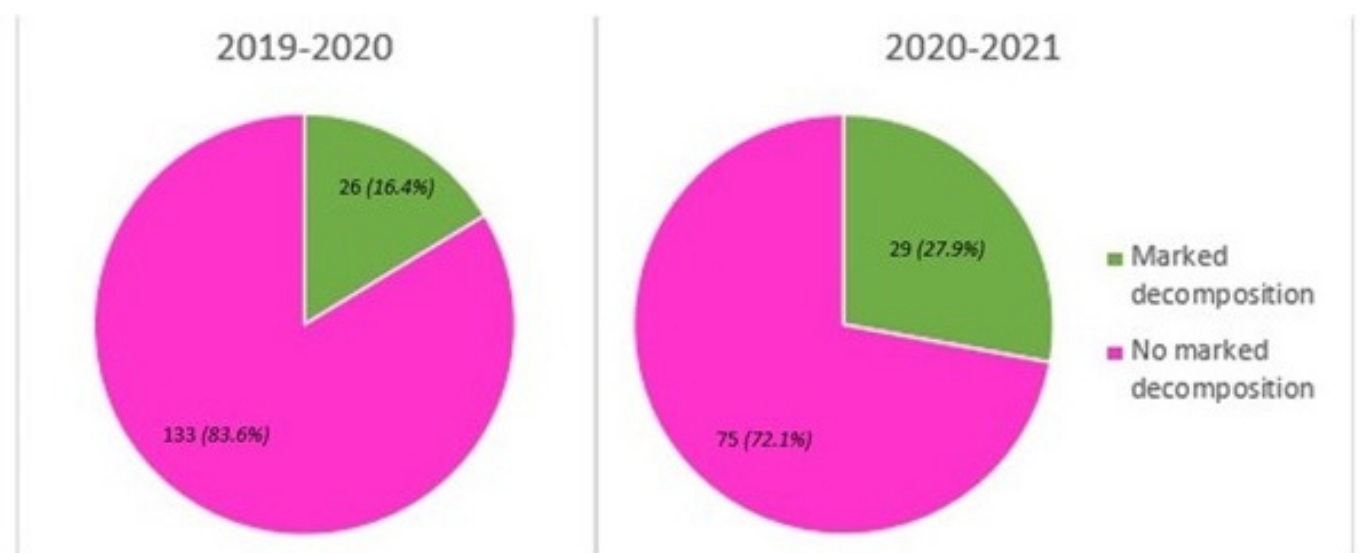
The frequency of advanced decomposition in home deaths was also compared between cohorts. This demonstrated a 19.3% increase in the rate of home deaths showing marked decomposition in 2020–2021, but this was not statistically significant ( $p=0.257$ ). Of note, every single markedly decomposed case that died at home lived alone.

### Other findings

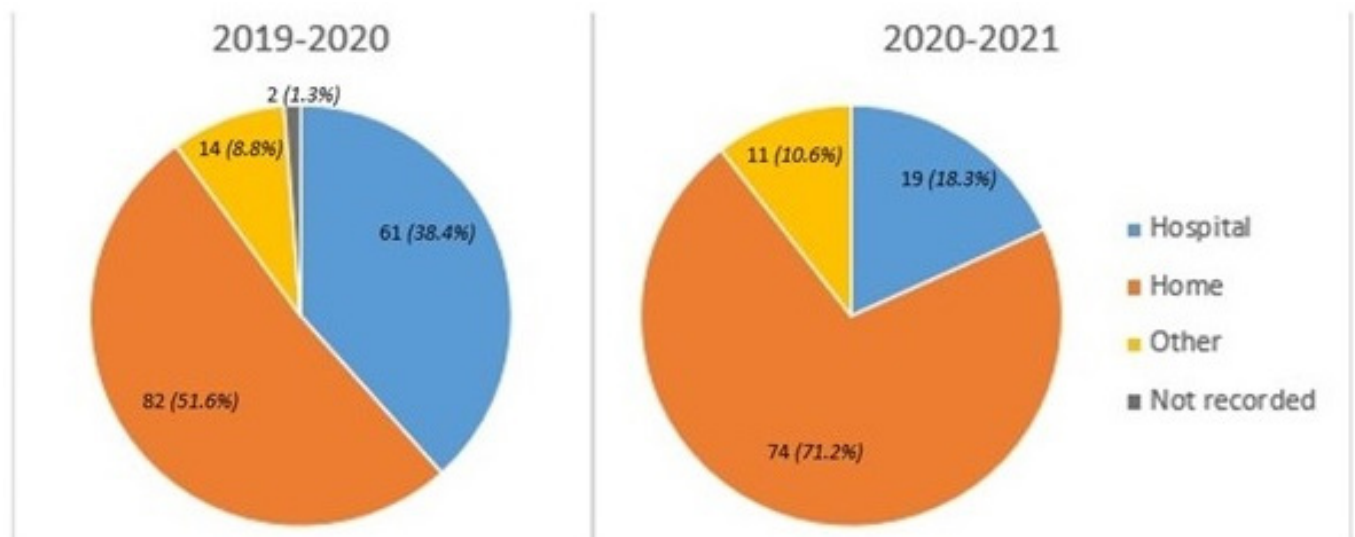
There was a statistically significant increase in the number of days in between body discovery and the autopsy taking place in 2020–2021, on average it was 1–2 days longer ( $p=0.0004$ ). This was likely a result of the higher mortuary total case load

in 2020–2021 causing delays. It would nevertheless not affect frequency of decomposition change as any delay happened after the body had been delivered to the mortuary and refrigerated. There was no recorded delay in transferring the body from the scene of discovery to the mortuary or a change in this process between cohorts.

The frequency of autopsy reports assigning cause of death as 'unascertained' demonstrated a 52.9% increase in 2020–2021; however, this change was not statistically significant ( $p=0.331$ ); this is most likely due to the sample size being too small, as the absolute number of 'unascertained' cases is generally very low (3.8% across both cohorts). Of the 10 'unascertained' deaths, 90% of them showed marked decomposition change.



**Figure 1** Frequency of marked decomposition change of studying cases.



**Figure 2** Frequency of places of death of studying cases.

There was no significant difference in sex distribution, age, BMI or lung weights between the cohorts. Although there was a relative drop in the number of cases performed in the winter of 2020–2021 compared with summer cases, this difference was not significant ( $p=0.489$ ) when compared with 2019–2020 where there was a comparable decrease in cases performed during winter.

## DISCUSSION

The results of this study demonstrate a significant increase in the frequency of coronial autopsies demonstrating marked/advanced decomposition change. Given the absence of any significant change in other variables which could contribute to an increased rate of decomposition, we can conclude that the driver behind the increased frequency of advanced decomposition is the observed increase seen in the relative frequencies of autopsies for those dying at home compared with those dying in hospital. We believe that this change in the distribution of place of death for coronial autopsies is itself linked to the increased social isolation caused by the COVID-19 pandemic.

We contend that the main reason behind home deaths being an independent factor leading to advanced decomposition change is that a death at home is more likely to not be reported until a late stage of decomposition. A death at home, if living alone and not in regular, meaningful contact with other people (ie, socially isolated), can easily be missed and unreported until chance discovery by a passer-by (eg, postman concerned about the build-up of correspondence outside a front door) or the process of decomposition itself reveals the death (eg, by the smell of decomposition or presence of flies). A death in hospital is in general not a death with any degree of perimortem social isolation as although the patient may have been isolated prior to arrival at hospital, by the time of death they would have been attended to and cared for by many people.

The COVID-19 pandemic and its associated lockdowns have forced people into their homes for extended periods of time unlike anything else in history, most likely accounting for our documented increase in the frequency of home deaths. We have also shown that the proportion of deaths at home showing marked decomposition was not significantly greater in 2020–2021 than in 2019–2020. This suggests that our observed increase in the frequency of advanced decomposition change was not due to

the pandemic and its associated social restrictions significantly altering the general behaviour/attitudes around those who live alone and die at home, but rather it is simply indicative of the absolute increase in the number of home deaths caused by the COVID-19 pandemic

Since the start of the pandemic there has been an excess in deaths at home and in hospital compared with the previous year<sup>14</sup>—Public Health England (PHE) data show that most excess deaths are related to COVID-19 infection. The total number of excess hospital deaths was lower than the number of hospital deaths mentioning COVID-19, meaning that there was a decrease in hospital deaths from non-COVID-19-related causes. On the contrary, the majority of excess deaths at home during this period were not related to COVID-19 infection.<sup>14</sup>

We can infer from this PHE mortality data the explanation behind our observed decrease in the frequency of coronial autopsies for hospital patients. This is most likely due to the fact that the majority of hospital deaths in this period were COVID-19 related, and these deaths generally did not necessitate post-mortem examination or even referral to the coroner.

This leads to questions about how people are dying at home, as over 80% of excess home deaths in the last year were not due to COVID-19.<sup>14</sup> We can surmise from the PHE data that there were likely deaths at home in the 2020–2021 cohort which would have otherwise occurred in hospital had they happened in 2019–2020. Extrapolating further, if these people had been in hospital we can consider that maybe they would not have died at all, if their condition/illness was readily treatable, for example. Others have already suggested that some of the excess deaths at home may be due to healthcare avoidance behaviours as a result of the pandemic.<sup>15–17</sup>

## Limitations, consequences and further work

Our study is limited by its sample size and fairly narrow geographical reach. Our study represents a high-density, urban, multiethnic population, and the results may not be representative of other social environments. It would be interesting and useful to see if similar results are seen in suburban or rural populations, for example, and so we believe more studies of this type should be performed.

We hypothesise that the results of this study could be extrapolated backwards, such that advanced decomposition changes

found at autopsy could be used as a surrogate, quantifiable marker of social isolation and, by extension, loneliness. Our results could permit future sociological studies to be performed by examining the frequency of advanced decomposition change in between different population groups or geographic regions to monitor or compare their levels of social isolation.

Our study's information has important ramifications for the autopsy process, as bodies with significant decomposition changes are less likely to provide reliable, accurate causes of death due to the degradation of tissue and toxicology.<sup>8</sup> This can lead to bereaved families having more uncertainty regarding the death of a loved one. It could also lead to medicolegal consequences, as assigning accurate cause or culpability for any death at inquest or trial is much more difficult if the autopsy's information is limited by decomposition.<sup>18</sup> This relates to the absolute increase in the frequency of 'unascertained' deaths in our 2020–2021 cohort compared with the previous year, and we can see from our data set that almost all 'unascertained' deaths demonstrated advanced decomposition change.

### Take home messages

- ▶ We have demonstrated a significant increase in the frequency of bodies in advanced states of decomposition having coronial autopsies since the first COVID-19 lockdown.
- ▶ We have also demonstrated a significant increase in the frequency of coronial autopsies for deaths at home relative to deaths in hospital.
- ▶ We believe that both these findings are linked by the COVID-19 pandemic and its associated social restrictions: (a) increased perimortem social isolation and healthcare avoidance behaviour would have led to a higher frequency of undiscovered deaths at home which were more likely to show advanced decomposition changes; (b) there was likely a lower frequency of coronial autopsies for hospital deaths as the majority of these deaths were due to COVID-19 and did not necessitate an autopsy.
- ▶ We suggest that the frequency of advanced decomposition could be used as a surrogate marker for social isolation. This may be used to compare rates of social isolation between different population groups or geographical areas over time.
- ▶ Pathologists, coroners and families should be aware of the changing environment around autopsies and the possible drop in accuracy/reliability as a result of the increased frequency of advanced decomposition change.

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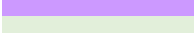
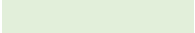
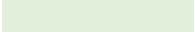
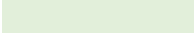
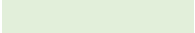
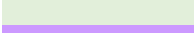
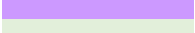
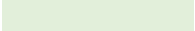
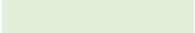
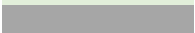
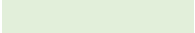
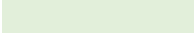
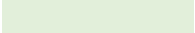
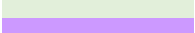
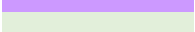
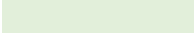

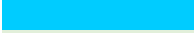
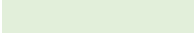
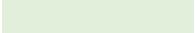
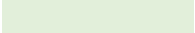
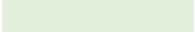
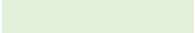
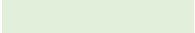
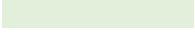




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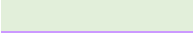

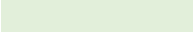
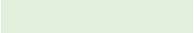
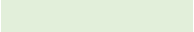
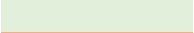

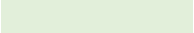
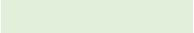




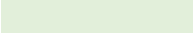


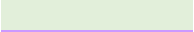


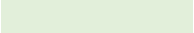
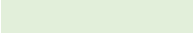
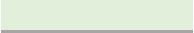

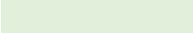
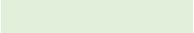
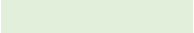
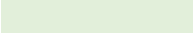
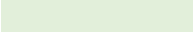
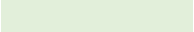
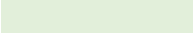



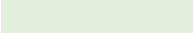
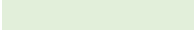
Theodore Estrin-Serlui <http://orcid.org/0000-0002-1347-928X>

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## Deaths from March 23rd 2019 -&gt; March 22nd 2020

Case number	Death -> PM days	Sex (0=F; 1=M)	Place of death	Cause of death	Decomp (0=N; 1=Y)	BMI	Combined lung weight (g)
1	2	0	Home		0	NR	1068
2	1	1	Elsewhere		0	NR	1998
3	2	1	Home		1	17	1220
4	3	0	Home		0	24	1330
5	20	0	Home		1	22	1221
6	1	1	Hospital		0	22	1896
7	18	1	Home		1	23	475
8	10	1	Home		0	19	1370
9	10	0	Hospital		0	24	1050
10	10	1	Hospital		0	32	1314
11	19	0	Home		0	35	731
12	11	1	Home		0	23	1422
13	9	0	Home		0	26	496
14	8	1	Home		1	NR	720
15	5	0	Home		1	NR	562
16	6	1	Home		1	34	1011
17	6	1	Home		0	30	1278
18	6	1	Home		1	36	1074
19	3	0	Home		0	26	1056
20	7	0	Home		0	38	908
21	3	1	Home		1	27	1565
22	4	1	Hospital		0	31	2476
23	4	1	Hospital		0	16.9	NR
24	3	1	Hospital		0	27.3	2159
25	8	1	Home		0	15.7	729
26	6	0	Elsewhere		0	29	1321
27	12	1	Hospital		0	19	1802
28	7	0	Home		0	31	1232
29	4	1	Hospital		0	33	1868
30	2	1	Home		0	22	1044
31	1	1	Elsewhere		0	NR	1368
32	5	1	Home		0	27	1368

33	8	0	Home		1	17	780
34	8	1	Home		0	30	1160
35	4	0	Home		0	36	1078
36	4	1	Hospital		0	28	1466
37	2	0	Hospital		0	30.2	1123
38	6	1	Elsewhere		0	35	1304
39	3	1	Home		0	29	1508
40	2	1	Home		0	18	642
41	6	0	Hospital		0	29	1608
42	6	0	Hospital		0	NR	1480
43	9	0	Home		1	23	896
44	1	1	Home		0	29	1574
45	3	0	Home		1	30	898
46	3	0	Home		0	24	565
47	9	1	Hospital		0	27	1365
48	4	0	Hospital		0	22.5	1171
49	3	1	Hospital		0	28	2406
50	3	0	Home		0	19	914
51	5	1	NFA		0	21	968
52	4	1	Home		0	25	1780
53	3	0	Home		0	16	543
54	3	1	Hospital		0	22.7	1230
55	6	1	Hospital		0	51.4	1591
56	3	0	Home		1	20	657
57	2	1	Home		0	21	1153
58	4	1	Home		0	26	1078
59	9	0	Hospital		0	26	1015
60	6	1	Home		0	35	1330
61	6	0	Home		1	41	1187
62	25	0	Hospital		0	32	1577
63	3	1	Hospital		0	24	1187
64	7	1	Hospital		0	25	1354
65	3	1	Home		0	25	1670
66	4	1	Home		0	25	1255
67	11	0	Hospital		0	28	1238
68	11	0	Hospital		0	22	836

69	4	1	Hospital	0	32	2363
70	6	1	Home	0	33	1682
71	8	1	Hospital	0	27.7	1269
72	6	1	Hospital	0	27	NR
73	4	0	Hospital	0	29	2710
74	3	1	Home	0	19.5	1048
75	3	0	Hospital	0	17	1047
76	3	1	Elsewhere	0	28	438
77	3	0	Home	1	32	728
78	7	0	Hospital	0	22	588
79	4	1	Elsewhere	0	33.9	1488
80	5	0	Hospital	0	39	372
81	10	0	Hospital	0	49	1038
82	6	0	Hospital	0	22	1288
83	5	0	Home	0	21	1282
84	2	0	Hotel	0	27	940
85	8	1	Hospital	0	20.1	846
86	7	1	Home	0	30	1732
87	4	0	Home	1	17.8	363
88	10	0	NFA	0	23	1308
89	8	0	Home	0	20	1981
90	0	1	Home	1	20	1064
91	5	1	Home	0	32	1407
92	1	1	Hospital	0	30	NR
93	13	0	Hospital	0	27.9	651
94	4	0	Home	0	17	2120
95	4	1	Hospital	0	24	1048
96	3	1	Home	0	33.8	1492
97	9	1	Hospital	0	15	1004
98	8	0	Home	0	16	776
99	7	1	Home	1	27	1174
100	10	1	Hospital	0	32	894
101	4	1	Home	0	28	1696
102	14	0	Not recorded	0	26	717
103	13	1	Hospital	0	24	1574
104	0	0	Home	0	20	820



105	6	1	Home	0	32	1312
106	5	0	Home	0	23	2224
107	5	0	Home	0	30	864
108	5	1	Hospital	0	50	1786
109	5	0	Hospital	0	34	1919
110	11	1	NFA	0	22	942
111	6	1	Hospital	0	51	2023
112	11	1	Hospital	0	16.7	1302
113	7	0	Hospital	0	23	1159
114	5	0	Home	0	30.5	1431
115	4	1	Home	1	30	812
116	6	1	Hospital	0	16	1612
117	3	1	Home	0	27	1268
118	6	1	Hospital	0	27	2502
119	6	0	Home	1	25	800
120	1	0	Home	0	27.6	1187
121	4	0	Home	0	43	1065
122	8	0	Hospital	0	19	736
123	8	0	Home	1	25	606
124	8	0	Home	1	19	1160
125	10	1	Hospital	0	16	1626
126	12	1	Hospital	0	20	1223
127	11	1	Hospital	0	23.2	1567
128	7	0	Hospital	0	30	1866
129	6	1	Home	0	38	1353
130	3	1	Home	0	28	1072
131	7	1	Home	0	NR	NR
132	6	0	Home	0	72.6	1156
133	6	1	Home	1	26	774
134	5	0	Home	0	NR	1088
135	5	0	Hospital	0	39.8	1736
136	5	1	Hospital	0	21	2154
137	4	1	Hospital	0	24	1390
138	3	1	Home	0	21.5	970
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140	2	0	Home	0	19	802

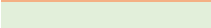
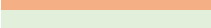
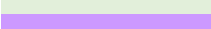
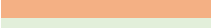

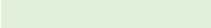
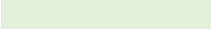
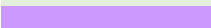
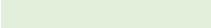
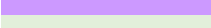
141	4	1	Home	1	26	1198
142	10	0	Hospital	0	27	1984
143	2	0	Home	0	18.5	1229
144	9	0	Home	0	20.7	768
145	6	1	Home	1	25.4	1240
146	13	0	Hospital	0	34	1266
147	2	0	Home	0	40	1126
148	5	0	Hospital	0	38.4	1355
149	5	1	Hotel	0	32.3	1508
150	8	1	Home	1	31.5	859
151	11	0	Hospital	0	NR	NR
152	5	1	Hospital	0	19.5	1440
153	3	1	Not recorded	0	16	746
154	3	0	Hospital	0	35.6	2480
155	6	1	Hospital	0	51.9	1203
156	3	1	Home	1	29	1054
157	3	1	NFA	0	31	1129
158	4	1	Elsewhere	0	30	1616
159	3	1	Elsewhere	0	27	1682
Total cases	159				Drug/EtOH-related 21	0.132
					Presumed Suicide 9	0.057
Total M	88	0.553			Otherwise unnatural (2	0.013
Total F	71	0.447			Unascertained 5	0.031
Mean BMI	27.3				Not recorded 1	0.006
Mean Lung weight	1262				Natural 121	0.761
Marked decomposition	26	0.164				
Decomp at home	26	0.317			Total "unnatural"	32 0.201
Mean BMI decomp	26.0					
Mean decomp lung weight	927					
No marked decomposition	133					
Mean Death to PM date	5.95					

% Decomp = 80%

Place of death:

Elsewhere	8	0.050	0.088
NFA	4	0.025	
Not recorded	2	0.013	
Hotel	2	0.013	
Hospital	61	0.384	
Home	82	0.516	
Not in Hospital	96	0.604	
Other	14		
Not recorded	2		
Winter 21/12 to 20/0337		0.233	
Summer 21/06 to 20/ 45		0.283	

## Deaths from March 23rd 2020 -&gt; March 22nd 2021

Case number	Death -> PM days	Sex (0=F; 1=M)	Place of death	Cause of death	Decomp (0=N; 1=Y)	BMI	Combined lung weight (g)
1	6	0	Home		0	31	1542
2	7	1	Home		0	24	980
3	13	0	Home		0	21	1082
4	1	1	Home		1	NR	1070
5	15	0	Home		0	22	866
6	11	1	Home		0	30	1706
7	7	0	Home		0	16	314
8	5	1	Home		0	24	1310
9	7	0	Home		0	30	722
10	5	1	Home		0	26	598
11	4	0	Home		1	15.5	458
12	14	1	Elsewhere		1	23	1782
13	2	0	Home		0	20	1110
14	5	1	Home		0	26	1610
15	3	1	Elsewhere		0	21	1968
16	8	0	Home		0	22	1042
17	8	1	Home		0	29	1142
18	8	1	Hospital		0	23	1804
19	7	1	Home		0	26.6	1408
20	4	1	Home		0	28	1542
21	7	0	Home		0	25	1342
22	10	1	Hospital		0	33	1850
23	7	1	Home		0	33	1092
24	11	1	Home		0	30	2010
25	9	1	NFA		0	24	1586
26	8	0	Home		0	51	1232
27	10	1	Home		1	15	548
28	11	0	Home		0	21	NR
29	7	1	Home		0	25	1666
30	6	0	Home		0	37	850

31	6	1	Elsewhere	0	30	910
32	4	0	Home	0	16	828
33	5	1	Home	0	20	1241
34	4	1	Elsewhere	0	27	1756
35	3	1	Home	0	41	1140
36	6	0	Elsewhere	0	23	764
37	5	0	Home	1	22	1854
38	15	0	Hospital	0	20	1460
39	8	1	Home	1	22	360
40	6	0	Hospital	0	33	1932
41	5	0	Home	0	38	1058
42	5	0	Hotel	0	52	1234
43	3	1	Elsewhere	0	22	1420
44	3	1	Home	0	30	NR
45	5	1	Hospital	0	30	1614
46	5	1	Home	0	43	1226
47	5	1	Hospital	0	15.2	1778
48	5	0	Home	0	31	1462
49	8	1	Home	1	22	532
50	3	0	Home	1	38	1354
51	8	0	Home	1	19	651
52	7	1	Hospital	0	28	2079
53	4	1	Home	0	32	1924
54	7	1	Home	1	31	903
55	3	1	Home	1	28	1116
56	9	0	Home	0	17	804
57	6	0	Home	1	34	831
58	16	1	Home	0	25	1134
59	4	0	Home	0	22	1050
60	13	1	Home	1	12	304
61	13	1	Home	1	23	1646
62	13	1	Home	0	28	1172
63	8	1	Home	0	33	1299
64	7	1	Home	1	41	1813

65	6	0	Home		0	20	1532
66	6	0	Home		1	20	688
67	8	1	Home		1	17.6	834
68	11	1	Hospital		0	30	1607
69	8	0	Hospital		0	69	1820
70	6	1	Home		1	21.3	384
71	6	0	Home		1	24	676
72	4	0	Hotel		0	32	1130
73	5	1	Home		0	35	2322
74	5	1	Home		1	28	951
75	2	0	Home		0	44	792
76	6	1	Home		1	22	1079
77	5	1	Home		0	35	1542
78	4	0	Hotel		0	31.5	1055
79	9	0	Hospital		0	15.2	1023
80	6	0	Hospital		0	19	1112
81	5	1	Hotel		0	26	1486
82	11	0	Hospital		0	28.7	1484
83	10	1	Home		1	24.7	800
84	2	1	Home		0	23	922
85	11	1	Home		0	24	1573
86	6	0	Home		1	32.8	855
87	6	1	Home		1	48	1392
88	19	0	Hospital		0	NR	NR
89	10	1	Hospital		0	30.1	1255
90	14	1	Home		0	13.4	330
91	12	1	Hospital		0	26.8	1463
92	18	0	Hospital		0	35.7	1520
93	14	1	Hospital		0	NR	NR
94	19	1	Hospital		0	25	2018
95	15	0	Hospital		0	23.9	1261
96	13	1	Home		1	35.5	1192
97	19	0	Home		0	19.1	1615
98	11	0	Home		1	22.7	964

99	10	1	Home	0	26.1	932
100	4	1	Home	0	26.8	NR
101	7	0	Home	1	NR	625
102	10	1	Home	1	20.9	NR
103	6	0	Home	1	26.7	654
104	5	1	Home	0	34.3	1200

Total recorded cases	104		Welch T test	Drug/EtOH-related	11	0.106	
Total M	61	0.587		Presumed Suicide	11	0.106	
Total F	43	0.413		Otherwise unnatural	0	0.000	
Mean BMI	27.4		<b>0.962</b>	Unascertained	5	0.048	% Decomp = 100%
Median BMI	26.0			Not recorded	1	0.010	
IQR BMI	9.1			Natural	76	0.731	
Mean Lung weight	1214		<b>0.482</b>				
Median Lung weight	1182						
IQR Lung weight	667						
Marked decomposition	29	0.279		Total "unnatural"	22	0.212	
Decomp <b>at home</b>	28	0.378					
Mean BMI decomp	25.5		<b>0.829</b>				
Mean decomp lung weight	940		<b>0.898</b>				
Mean Death to PM days	7.76		<b>0.0004</b>				
Median death to PM	7.00						
IQR Death to PM	5						
No marked decomposition	75						
Place of death:							
				Decomp <b>at home</b>	1.193		

Change in frequency of death type 2019 -> 2020:

Elsewhere	6	0.058	Total decomp	1.705
NFA	1	0.010	Presumed Suicides	1.869
Not recorded	0	0.000	Drug	0.801
Hotel	4	0.038	<b>Death at home</b>	1.380
Hospital	19	0.183	<b>Death in hospital</b>	0.476
Home	74	0.712	<b>Death not in hospita</b>	1.354
Not in Hospital	85	0.817	"Unnatural"	1.051
Other	11		Unascertained	1.529
Not recorded	0			
Winter 21/12 to 20/3	20	0.192		
Summer 21/6 to 20/9	28	0.269		

Decomp table	Decomp	Not Decomp	Total	$\chi^2$ value	$\alpha = 0.05, DF = 1$	3.841
Observed	29	75	104	10.112	p value	<b>0.001</b>
Expected	17	87	104			
Home table	Home	Not Home	Total			
Observed	74	30	104	15.967	<b>0.0001</b>	
Expected	54	50	104			
Decomp @ Home	Decomp	Not Decomp	Total			
Observed	28	46	74	1.284	<b>0.257</b>	
Expected	23	51	74			
Hospital table	Hospital	Not Hospital	Total			
Observed	19	85	104	17.761	<b>0.00003</b>	
Expected	40	64	104			
Hotel table	Hotel	Not Hotel	Total			
Observed	4	100	104	5.610	<b>0.018</b>	
Expected	1	103	104			



NFA table	NFA	Not NFA	Total		
Observed	1	103	104	1.024	<b>0.311</b>
Expected	3	101	104		
Elsewhere table	Elsewhere	Not elsewhere	Total		
Observed	6	98	104	0.118	<b>0.731</b>
Expected	5	99	104		
Unnatural table	Unnatural	Not Unnatural	Total		
Observed	22	82	104	0.068	<b>0.794</b>
Expected	21	83	104		
Unascertained table	Unascertained	Ascertained	Total		
Observed	5	99	104	0.944	<b>0.331</b>
Expected	3	101	104		
Drug/EtOH table	Drug/EtOH	Not Drug/EtOH	Total		
Observed	11	93	104	0.628	<b>0.428</b>
Expected	14	90	104		
Presumed suicides	Suicide	Not suicide	Total		
Observed	11	93	104	4.708	<b>0.030</b>
Expected	6	98	104		
Sex table	Male	Female	Total		
Observed	61	43	104	0.460	<b>0.497</b>
Expected	58	46	104		
Season table	Summer	Winter	Spring/Fall	Total	
Observed	28	20	56	104	1.430
Expected	29	24	50	104	<b>0.4893</b>