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National Child Mortality Database

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Child Suicide Rates during the COVID-19 Pandemic in England: Real-time Surveillance

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The NCMD legal basis to collect confidential and personal level data under the Common Law Duty of Confidentiality has been established through the Children Act 2004 Sections M - N, Working Together to Safeguard Children 2018 (https://consult.education.gov.uk/child-protection-safeguarding-and-family-law/working-together-to-safeguard-children-revisions-t/supporting_documents/Working%20Together%20to%20Safeguard%20Children.pdf) and associated Child Death Review Statutory & Operational Guidance (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/859302/child-death-review-statutory-and-operational-guidance-england.pdf).

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Summary

How we carried out the real-time surveillance study

The National Child Mortality Database (NCMD) responded to the pandemic by accelerating its notification and analysis service to develop a real-time surveillance system. This report describes findings from that system relating to death by suicide. We recognise that the death of each child is a devastating loss that profoundly affects bereaved parents as well as siblings, grandparents, extended family, friends and professionals. No two suicide deaths are the same, but by pooling information across all notifications, we aimed to identify any changes in incidence and common risk factors.

Likely suicides occurring between 1st January 2020 and 17th May 2020 were identified from NCMD records. Rates pre and during lockdown (from 23rd March 2020) were compared using negative binomial regression models. A second comparison was made between deaths occurring between 1st April to 17th May in 2019 and 2020 characteristics of cases pre- and post-lockdown were compared.

The findings in this report are based on small numbers of deaths and are therefore inconclusive. However, following discussions with NHSE, and in view of widespread concerns about the impact of the pandemic and measures to control its spread on children's mental health and wellbeing, we agreed to make these findings available in a summary report.

Main findings

In 2020, during the 82 days before lockdown, there were 26 likely child suicides and a further 25 in the first 56 days of lockdown (Rate ratio (RR) 1.41 (95% CI 0.80-2.46), $p=0.230$), and the proportion of cases under 15 years of age appeared higher (28.0% vs 11.5%, $p=0.173$), but these differences did not reach statistical significance. In a similar proportion of pre-lockdown (33%) and post-lockdown (36%) cases, the child or young person was currently in contact with mental health or social care services. A diagnosis of Autism Spectrum Disorder (ASD) or Attention Deficit Hyperactivity Disorder (ADHD) had been recorded in six (25%) pre-lockdown and in six (24%) post-lockdown. Comparing 2020 with 2019 gave similar results. In 12 (48%) of the 25 post-lockdown deaths, factors related to Covid-19 or lockdown were thought to have contributed to the deaths.

Key messages

There is a concerning signal that child suicide deaths may have increased during the first 56 days of lockdown, but risk remains low and numbers are too small to reach definitive conclusions. Amongst the likely suicide deaths reported after lockdown, restriction to education and other activities, disruption to care and support services, tensions at home and isolation appeared to be contributing factors. Previous research has highlighted suicide risk in people with autism. We found a quarter of individuals both pre and post lockdown had ASD or ADHD. Although the finding of increased risk is unconfirmed statistically, clinicians and services should be aware of the possible increase and the need for vigilance and support.

Why was this real-time surveillance study undertaken?

The COVID-19 pandemic is one of the biggest global challenges faced in our lifetime. The speed with which the virus has spread and the direct and indirect impact it has had on the everyday lives of people all over the world, as a result of the public health measures put in place to contain its spread, is unprecedented. In England alone, by the 17th of May, over 145,000 people had tested positive for COVID-19, and over 34,000 COVID related deaths had been identified.¹

There is concern about the impact of the COVID pandemic, and the physical distancing measures taken to control its spread, on the mental health and wellbeing of children and young people and, as a result, about the possibility of a rise in suicide.^{2,3} Suicide rates in children are low compared to other demographic groups but the rate in the under 20s has been rising in England and Wales since around 2010.⁴ Young people in their late teens also have the highest rate of non-fatal self-harm, a key suicide risk factor, and this rate appears to have risen in recent years.⁵ Children and young people are therefore seen as a high priority for suicide prevention in the UK and many other countries. Multiple factors contribute to an individual's risk of suicide.⁶ Additional stressors during the pandemic may include fears that a family member or oneself will develop COVID-19, the impact of bereavement, isolation, loneliness and loss of social supports, disruptions to care and support and fears about accessing it, school closure and exam disruption, and exposure to domestic violence and family tensions.³

Public health responses to COVID-19 need to balance interventions to control the spread of the disease against the unwanted impacts that such interventions may have on population health, arising, for example, from school closures, loss of independence and challenges accessing health and social services. This balance will vary as COVID-19 incidence changes over time.

Surveillance of suicide rates is a potentially important approach to identifying any adverse impacts of COVID-19 and the public health measures to prevent its spread on population mental health.² However nationally reported suicide rates in England are based on the confirmation of cause of death at coroners' inquests, with the average time between a likely suicide death occurring and completion of the inquest process around six months; making official statistics unsuitable as a means of providing immediate monitoring.⁷ "Real-time" surveillance, by which likely suicide deaths are collated as soon as possible after they occur, provides a timely alternative. Deaths notified to NCMD provide an opportunity for the real-time surveillance of likely child suicides prior to legal determination at inquest.

We investigated trends in likely child (aged under 18 years) suicides in England from 1st January to 17th May 2020, a period including the initial eight week period of lockdown (23rd March to 17th May), after which lockdown restrictions began to be eased. The analysis is based on the opportunity for real-time surveillance offered by NCMD.⁸

How we carried out the real-time surveillance study

The NCMD collects data from the 58 Child Death Overview Panels (CDOPs) that review the deaths of all children who die before their 18th birthday in England.⁹ There is a legal responsibility for CDOPs to notify NCMD of any death of someone aged under 18 years within 48 hours of it occurring, using an electronic system. The NCMD commenced data collection on 1st April 2019. NCMD notification data includes details on deaths referred to the coroner; such deaths do not appear in official statistics until after an inquest has occurred, often many months later.

The notification details provided for all deaths reported to the NCMD, from the 1st January 2020 to the 17th May 2020 were reviewed and categorised by four people (three paediatricians and one NCMD Manager with CDOP expertise) to identify likely suicide deaths. Where there was not full agreement, the cases were reviewed by each member of the team again. Cases where there was still disagreement were then reviewed by a researcher with expertise in suicide research (DG), blind to the date of death. In keeping with the approach used in previous research,¹⁰ this final review categorised the likelihood that these deaths were by suicide as: high, moderate, low or unclear, based on all the available information.

The characteristics of the deaths categorised as highly or moderately likely to be by suicide and occurring before (1st January 2020-22nd March 2020) and during lockdown (23rd March – 17th May 2020) were compared. To take account of any possible seasonal differences in trends and risk factors,¹¹ notification data (only) were reviewed for a second comparison group of deaths, categorised in the same way, for the dates of 1st April 2019 to the 17th May 2019. NCMD began data collection on 1 April 2019, so information on deaths occurring prior to this were not available. Categorisation was performed in the same way as the 2020 data.

In addition to the information provided in the notification details field, additional data from the notification form were reviewed:

- Sex of individual (female, male, other (including not known))
- Ethnic Group (Asian or Asian British, Black or Black British, Mixed, Other, Unknown, White)
- Age at death
- Deprivation decile of the child's home address using the Index of Multiple Deprivation (IMD).¹² Decile of deprivation is calculated using 7 main domains (income, employment, education, health, crime, access to housing and services, and living environment) and is calculated from the child's postcode to a granularity of around 1500 people.
- Method of suicide, and
- Free text description (of varying detail) of circumstances surrounding the death (including, in some cases, information on apparent precipitants of the likely suicide, social environment, and history of contacts with services).

For all deaths that occurred in 2020, a bespoke questionnaire was sent to each CDOP that had notified a likely suicide death to gather further information. Both the pre and post-lockdown questionnaires requested information about any history the individuals had of past or current contact with mental health or social services and related psychiatric diagnoses. In addition, the post-lockdown questionnaire also requested information on whether there was any evidence that lockdown and/or school closure contributed to the child's death and whether any difficulties had been identified in accessing mental health or social services during lockdown. Investigation of the deaths was at an early stage, so information provided in the questionnaires was preliminary and only partially complete. In all post-lockdown cases enough information was provided to enable analysis and in two pre-lockdown cases not enough information was available and therefore these cases were excluded from the qualitative analysis.

Statistical analysis

Our primary analysis was based on those deaths between 1st January 2020 and 17th May 2020 (n=51) where it was considered suicide was highly or moderately likely to be the cause of death. We carried out a sensitivity analysis, repeating the analysis including the cases where there was initial disagreement on cause, and the subsequent expert opinion was that the chance of suicide was unclear or low (n=53). The sociodemographic characteristics of cases occurring before and after the 23rd March 2020 were compared using Fishers exact test for categorical data and Mann-Whitney U for age and deprivation decile. Where numbers were small, sex coded as 'other' was not included. Ethnicities other than white were grouped as "other". The data were collapsed to provide frequency counts of events per day. The incidence after March 22nd were compared initially using a negative binomial regression model. For the regression models, an underlying at risk population of 12,023,568 was used (based on Office for National Statistics mid-2019 estimates for children under the age of 19 years in England).¹³ A sensitivity analysis was conducted, comparing the linear trend in event rates between the periods preceding and during lockdown. To complement this analysis a further comparison was made using the initial model of deaths between 1st April until 17th May in 2020 vs. 2019. No adjustment for other trends was made for this model. Analysis was performed using Stata Version 14. Data were analysed on 12th June 2020.

In interpreting the findings, we used p-values to determine the strength of statistical evidence for a particular trend or association, p-values of <0.05 are conventionally used to judge the statistical significance / confidence in an association. Due to the rarity of child suicide, our analyses lack statistical power to detect anything but marked differences in suicide rates.

Note on statistics in this report

Scientific reports often present findings accompanied by p-values and confidence intervals. P-values give the probability that a difference similar to the one observed could have occurred by chance. A p-value of <0.05 is conventionally used as evidence of "statistical significance" i.e. the finding is unlikely to have occurred by chance. The 95% confidence intervals (CI) for a finding express the range of values within which the true value is likely to lie. When the number of people in a study is small the confidence interval and the range of possible values is wide.

What we found

Quantitative analyses

26 likely suicide deaths were identified in the 82 days before lockdown (1st January to 22nd March 2020) and 25 in the 56 days of lockdown (23rd March 2020-17th May 2020). There was a possible, but not statistically significant, trend that likely suicide deaths may have increased after 22nd March compared to the period from 1st January 2020 to 22nd March 2020 (Rate ratio (RR) 1.41 (95% CI 0.80-2.46) $p=0.230$). A second regression model, estimating the trend in event rates during the periods preceding and during lockdown gave comparable results (RR per week after lockdown: RR 1.15 (95% CI 0.94-1.42), $p=0.171$), while evidence for trend prior to lockdown was weak (RR 0.98 (95% CI 0.89-1.07), $p=0.637$). A similar increase in risk was observed when comparing deaths notified from 1st April 2020-17th May 2020 ($n=21$) with those between 1st April 2019 and 17th May 2019 ($n=14$) (RR 1.50 (95% CI 0.75-2.99); $p=0.249$).

There was no evidence that the characteristics of individuals involved in likely suicide deaths in terms of sex, ethnicity or IMD decile were different in the lockdown period compared to the immediately preceding period of 2020 and the same period the previous year (see Table 1). Suicide deaths in children aged under 15 years are rare¹⁴, and initial review of the deaths indicated a high proportion of deaths in younger children. Consequent statistical comparison supported this observation; the proportion of cases younger than 15 years appeared higher in the post-lockdown period (7 (28.0%) vs 3 (11.5%), $p=0.173$) and in 2020 vs 2019 (6 (28.6%) vs 0 (0.0%), $p=0.0612$), although this difference did not reach conventional levels of statistical significance.

A final model repeated the analysis to also include cases where there was initial disagreement on cause, and the subsequent expert opinion was that the chance of suicide was unclear or low (additional two cases: $n=53$). This produced similar, if slightly attenuated, results to the main analysis (during vs pre-lockdown: RR 1.38 (95% CI 0.80-2.35), $p=0.247$); 2020 vs 2019: RR 1.40 (95% CI 0.72-2.72), $p=0.316$).

Table 1

Characteristics of likely child suicides a) in 2020 pre vs post lockdown (23 March) and b) from 1 April to 17 May in 2019 vs. the same period in 2020

	Number with data	Pre-lockdown (1st Jan 2020 to 22nd March 2020)	Lockdown (23rd March 2020 to 17th May 2020)	p-value	Number with data	2019 (1st April 2019 to 17th May 2019)	2020 (1st April 2020 to 17th May 2020)	p- value*
Deaths		26	25			14	21	
Duration (days)		82	56			47	47	
Population								
Sex	50			0.578	33			>0.999
Male		14 (53.8%)	15 (62.5%)			9 (69.2%)	13 (65.0%)	
Female		12 (46.2%)	9 (37.5%)			4 (30.7%)	7 (35.0%)	
Ethnic Group	38			>0.999	29			>0.999
White		13 (76.5%)	16 (76.2%)			9 (75.0%)	13 (76.5%)	
Other		4 (25.5%)	5 (23.8%)			3 (25.0%)	4 (23.5%)	
Age (Years)	51	16.5 (15.6-17.5)	16.7 (14.4-17.5)	0.578	35	17.1 (16.0-17.6)	16.7 (14.4-17.3)	0.143
Deprivation (IMD) Decile	51	6.5 (2.8-8.3)	5.0 (2.5-6.5)	0.155	34	5.0 (3.0-7.5)	4.0 (2.0-5.0)	0.210

Results are number (%) or median (interquartile range)

*p <0.05 is considered statistically significant

Review of 2020 cases

In both time periods the most common method used for likely suicide was hanging. We were unable to obtain detailed information on two deaths before lockdown and so the review of cases was limited to 24 in the pre lockdown period and 25 in the period during lockdown.

Pre lockdown cases

Of the 24 cases reviewed, in eight (33%) the individuals were specified as being under current follow-up with mental health services or social care and a further six (25%) children had previous contact with mental health services or social care. Altogether, 14 (58%) were reported as having some current or past contact with services. In 12, this contact was with mental health services; six (25% overall) of these children had a diagnosis of ASD, ADHD or both.

Post lockdown cases

Of the 25 cases, nine (36%) were specified as being under current follow up with mental health services or social care and a further eight (32%) children had previous contact with mental health services or social care. Altogether, 17 (68%) were reported as having some current or past contact with services. In 13, this contact was with mental health services; six (24% overall) of these children had a diagnosis of ASD, ADHD or both.

Potential lockdown-related factors in deaths after March 22nd

COVID-19 related factors were reported by CDOPs to have contributed to the likely suicide in 12 (48%) of the 25 cases identified during lockdown. The reported COVID-19 role varied; restrictions to education and other activities, disruption to care and support services, tensions at home and isolation were all listed.

Discussion of findings

There is a signal that child suicide deaths increased in the post lockdown period, although due to small numbers and wide confidence intervals, a small reduction in risk or an over two-fold increase in risk cannot be ruled out. Assuming a background rate of suicide seen in the pre-COVID period; we estimate that we would have needed a near doubling in the rate of suicides (RR 1.83) to have 80% power to be sure of identifying a difference at conventional levels of statistical significance. A sensitivity analysis including deaths where there was less certainty of suicide somewhat weakened the association. Where populations are small, rates and proportions can be unreliable since a small change in the number of suicides will have a large impact on rates and proportions. When this occurs, it is demonstrated by relatively wide confidence intervals (ranges in brackets). In these analyses any comparisons should be interpreted with caution and particular attention paid to overlapping confidence intervals (error bars) where differences are then not statistically significant i.e. we cannot say there is a 'true' difference.

Amongst the likely suicide deaths reported during lockdown, restrictions to education and other activities, disruption to care and support services, tensions at home and isolation appeared to be important factors; although the reporting of these factors may be due to increased scrutiny during the lockdown. While child suicide remains a rare event, over the 2020 period used in this work, NCMD data shows that suicide was the overall cause of 4% (n=51) of child deaths; but accounted for 10% (n=10) of deaths between 10 and 14 years and 31% (n=41) of deaths of 15-17 year olds. Using ONS data for population size, this approximates to 0.8 suicides per 100,000 children per year for those 10 to 14 years old, and 5.9 suicides per 100,000 children per year for those 15 to 17 years old. In contrast, for the period of 2019 used in this work; overall suicide accounted for 3.5% (n=14) of childhood deaths, no suicides occurred below the age of 15, while they accounted for 30.4% (n=14) of deaths of 15 to 17 year olds.

Furthermore, suicide deaths represent the tip of the iceberg of suicidal behaviour and mental distress; for every suicide death in a 12-17 year old, it is estimated that there are approximately 100 (in males) and 1000 (females) times more hospital attendances for self-harm; and the figures for non-hospital presenting self-harm are approximately 10 times higher again.²⁵

The COVID-19 pandemic comes at a time when there is growing concern over rising suicide and self-harm rates in young people^{4,14,15} and part of the possible increase may be due to a continuation of this trend. While the COVID-19 pandemic is recent, previous coronavirus outbreaks have been associated with increases in suicide rates in older adults in Hong Kong¹⁶, as have other, historic, viral pandemics in the USA (all ages)¹⁷. A UK national study suggested that academic pressures were an important factor in 32% of suicides in 10-19 year olds, bereavements in 25% and social isolation or withdrawal in 21%,¹⁸ and all such factors are likely to contribute to risk during the pandemic.

The causal processes contributing to each suicide death are complex. Suicide is often associated with multiple factors including adversity in early childhood, bullying, personal and parental mental illness, exposure to suicidal behaviour in others and genetic vulnerability.⁶ During this period of lockdown,

known factors such as isolation¹⁶, loss of social support, disruptions to care and support and potential exam disruption³, or direct anxiety regarding viral illness, may become greater; as may limitations in accessing social, mental health, and other services while the NHS and other providers try to adapt to new ways of working. However, it is possible that, for some people, social distancing may lead to an improvement in their symptoms (e.g. those with school phobias). The proportion of children in contact with services was similar amongst children who died in the pre and post lockdown periods (33% vs 36%) - although other reports have raised concerns about those with mental health needs^{19,20}.

We also found little evidence that children with ASD or ADHD were at increased risk during the pandemic, although children with these diagnoses comprised around a quarter of all the likely suicide deaths in our study pre and post lockdown. Our work adds to existing concerns regarding self-harm and suicide in this patient group²¹⁻²³. In particular, one recent population-based study from Sweden, which reported a seven-fold increase in the risk of death by suicide (largely in adulthood) in a sample whose average age at recruitment was 19.8 years, compared age-matched peers without ASD; although, again, like the overall rate, it remains a rare event.²⁴

There are several limitations to our analysis. As child suicides are rare, the analysis is based on small numbers of deaths, meaning we had limited statistical power to detect anything but major increases in incidence. Repeating the analysis later in the year may bring further clarity and precision to the overall estimates albeit alongside changes in the social distancing and education policies. However, the possible rise in suicides seen in England is consistent with concerns raised through the Child Death Review Programme in Wales. Dr Ros Reilly, lead of the Programme, and Prof Ann John undertook a case review of eight likely suicide deaths in children between January and May 2020. The average number of suicide deaths in children in Wales is usually around seven per year [personal communication]. Other important caveats of this analysis include the possibility of seasonal variations in suicide risk. Some of the rise seen in this analysis could be related to seasonal fluctuations in suicide; although the variations tend to be small (<10%),¹¹ and we found similar increases in risk when adjusting for underlying trend and when comparing identical periods in 2019 and 2020. In addition, categorisation of each death was based on limited data, and most deaths in this analysis are awaiting full CDOP review. It is possible that some deaths may be unreported, due to the CDOPs themselves not being notified that the death has occurred, or reported too late to be included in this work; although all cases in 2020 so far have been reported within two weeks of the date of death.

Conclusions

It is possible that child suicide deaths may have increased during the first phase of the English COVID-19 lockdown period, but the result is too imprecise to be sure. The causes are unclear but restrictions to education and other activities, disruption to care and support services, tensions at home and isolation appeared to be important factors. A continued focus on children previously known to mental health services during periods of social distancing appears appropriate.

What this study tells us

- There is a possible trend that child suicide deaths may have increased during the first phase of the English COVID-19 lockdown period.
- The causes are unclear but restrictions to education and other activities, disruption to care and support services, tensions at home and isolation appeared to be important factors.
- A continued focus on children previously known to mental health services during periods of social distancing appears appropriate.

What this study can't tell us

- Due to small numbers, while the rate of likely suicides appears to have increased, this may simply be due to chance.
- The study may have under-estimated the true figure for some of the contributory factors, since mortality review and inquest conclusions are not yet available.
- We were unable to compare children and young people who died with others who did not die and therefore cannot be certain of risk factors or establish cause and effect.
- The number of suicides is based on provisional notification data and after full mortality review and evidence from inquests, some of these suicide deaths may eventually receive a different conclusion about cause of death.
- These findings are for England, and may not be generalisable across the UK, however, Wales has reported similar concerns.

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