Lessons learned? The Impact of Never Events on Hospital Safety Culture

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Introduction

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Hospitalizations themselves can be an (unfortunate) cause of harm.

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More intuitively, this research also finds that high-performing teams will have lower levels of avoidable patient harm.

Research Question

Explore medical incident reporting as a measure of team performance and study the ability of managers to improve performance in an environment that is:

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Specifically, **whether hospital trust leadership teams in English NHS hospitals are able to improve clinical performance** in the face of increased pressure from standards authorities, government, and the media.

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- lead to a board level response to implement new procedures (Care Quality Commission, 2019).

Overall, a powerful impetus for improved organizational performance in terms of patient safety.

Never event - media example

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Overall cost for the NHS was £14,546,778.

Cost for NHS - media example

Hospitals

This article is more than 5 years old

Man circumcised in hospital mix-up gets £20,000 payout

Terry Brazier, 70, was meant to undergo bladder Botox procedure at Leicester hospital

Haroon Siddique

Mon 5 Aug 2019 12.16 BST

Share

The hospital trust said it was 'deeply and genuinely sorry' for the mistake. Photograph: Richard Vernalls/PA

Our contribution

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- Estimate the causal effect of increased management attention on patient safety following a never event, for NHS England.
- Utilize occurrence of never events at a particular time (half-year) in a particular hospital trust as quasi-random event, conditional on time and trust fixed effects.
- Since hospital trusts will experience a never event at various times, and in some cases repeatedly, we use a staggered diff-in-diff (DD) estimator (Wooldridge, 2021).
- Also test hypothesis that healthcare leaders face particularly strong incentives to improve safety performance when a never event is covered in the media.

Findings

Our results provide evidence that following a never event:

- increase in the number of all incidents reported,
- driven by $\uparrow$ in the number of low-severity incidents (0.24 SD),
- but a $\downarrow$ in the number of incidents leading to severe harm (0.1 SD) and death (0.18SD).

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The media become aware of, and cover, a subset of never events. Coverage in a local newspaper is associated with:

- 0.74SD $\uparrow$ in the number of low-severity incidents reported
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- and fatal incidents (2.14SD).

As a robustness check we also use coroners' preventable death reports as a measure of management pressure.

Related literature

First, management, incentives, and healthcare performance and particularly work on outcomes in the UK NHS.

- Gaynor et al. (2013) find that the introduction of competition between hospitals in England led to improved patient outcomes at lower cost.
- Bloom et al. (2015) show that exogenous increases in competition between English hospitals lead to improved management decisions.
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Third, broader literature outside economics that studies HIs, medical safety, and never events specifically, Elliott et al. (2018).

Data and Methods

Data Sources - Incidents

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Main variable of interest: number of incidents reported during a six-month period, from 2010 until 2021.

Classification: categories of severity, namely no, low, moderate, severe degree of harm, or death.

Other data sources

Never events: Use annual published data from the Strategic Executive Information System (StEIS), a national system used for recording serious medical incidents.

- Main treatment: indicator taking the value 1 if at least one never event occurred between April and March, 0 otherwise.
- Since these are yearly data, we consider both periods inside a year as treated.

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- Match articles that mention a "never event" from newspapers across the country, with our data on healthcare incidents.
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Preventable deaths: Published reports (from coroners) for deaths that are considered "preventable" across England.

- Construct alternative treatment variable, 1 if a preventable death report has been addressed towards an NHS provider during the same six-month interval, and 0 otherwise.

Methodology - Considerations

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There may be units that are treated initially, then $\rightarrow$ do not experience a never event over the next periods (returning to the untreated group) but then $\rightarrow$ return once more to the treated group if a never event occurs.

Therefore, our design needs to take into account that:

- different units may be treated in different points of time,
- treatment does not assign them permanently in treated group.

Methodology - Staggered Diff-in-Diff with exit

To capture the differences in units and time periods we use a staggered intervention design with entry and exits, following Wooldridge (2021).

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Underlying assumption: mean of the potential outcome under no intervention (i.e., if a never event does not happen at any point), varies systematically in these time cohorts.

Therefore, any shock to the mean of the potential outcome at time t does not affect the probability of exit (i.e., no occurrence of a never event should not increase the probability of experiencing a never event).

Regression - Framework

By allowing the probability of exit to be correlated only with time-constant observables and unobservables, this strict exogeneity assumption on time-varying treatment indicators provides consistent estimation of our parameters, in a similar manner to a fixed-effects panel regression.

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$$y_{it} = \beta_0 + \beta_1 \text{treat\_NE}_{it} + \sum_{t=1}^{T} \gamma_t \text{epoch}_t + \sum_{j=11}^{24} \sum_{k=j}^{24} \delta_{jk} \Delta_{it}^{jk} + \alpha_i + \epsilon_{it} \tag{1}$$

y – number of medical incidents

treatment – 1 for the occurrence of at least one never event provider i, period t

epoch – series of time dummies for each period t

Δ – the series of individual period treatment dummies

α and ϵ – provider fixed effects and the error term

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- allows the staggered exit and re-entry nature of the treatment

α captures unobserved time-invariant characteristics of the providers

Results

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Table : Effect of Never Events on Incidents - Main result

	(1) Incidents	(2) No Harm	(3) Low Harm	(4) Mod. Harm	(5) Sev. Harm	(6) Death
Never Event	644.1***	598.2***	91.64*	-41.52***	-1.835*	-2.386***
	(131.7)	(100.4)	(52.44)	(12.26)	(1.029)	(0.896)
Adjusted R^2	0.868	0.849	0.699	0.500	0.459	0.496
Mean	4082.7	2905.6	1001.2	152.0	14.47	9.500
SD	3228.0	2526.6	918.2	163.6	18.52	13.30
Observations	4944	4944	4944	4944	4944	4944

Table reports the effect of never events on medical incidents (as reported in NRLS database, between 2010-2021), disaggregated for various degrees of harm (Incidents consist of events with no harm, low harm, moderate harm, severe harm and death). Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Interpretation of findings

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On the other hand, a never event is associated with a reduction in incidents of moderate harm, severe harm and deaths.

Hence, actions taken in the aftermath have a differential impact on the patterns of incidents occurring across an average provider.

- increase the likelihood of reporting
- seemingly decrease the likelihood of serious events

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Seems plausible that never events do not necessarily impact incident reporting in the same way, and that highly publicized cases may have a disproportionate effect.

To empirically assess the disproportionate effect of media coverage on healthcare incidents, we interact our Article measurement with our main treatment variable, in a triple-diff-in-diff estimation.

Results - Media effect

Table : Effect of Never Events on Incidents - Triple Diff.

	(1) Incidents	(2) No Harm	(3) Low Harm	(4) Mod. Harm	(5) Sev. Harm	(6) Death
Never Event	639.4***	584.2***	98.79*	-39.66***	-1.706*	-2.273**
	(131.5)	(99.69)	(53.38)	(12.09)	(1.025)	(0.901)
NE x Article	1021.9***	1878.1***	-673.7***	-152.4***	-1.673	-28.52***
	(140.6)	(113.4)	(57.81)	(11.57)	(1.133)	(0.649)
Adjusted R^2	0.868	0.849	0.699	0.503	0.458	0.495
Mean	4082.7	2905.6	1001.2	152.0	14.47	9.500
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Observations	4944	4944	4944	4944	4944	4944

Table reports the effect of never events on medical incidents, when media coverage is taken in account.
Article treatment captures media exposure during the period a never event was reported.
Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Alternative treatment

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We use reports addressed towards hospitals or healthcare providers, matching their publication date with our six-month healthcare incidents intervals.

Results - Alternative treatment

Table : Effect of Preventable Deaths on Incidents

	(1) Incidents	(2) No Harm	(3) Low Harm	(4) Mod. Harm	(5) Sev. Harm	(6) Death
P.D Report	395.9***	300.5***	107.9**	-11.97	-1.470**	0.929
	(89.85)	(85.00)	(42.14)	(9.044)	(0.593)	(0.568)
Adjusted R^2	0.866	0.845	0.699	0.495	0.458	0.493
Mean	4082.7	2905.6	1001.2	152.0	14.47	9.500
SD	3228.0	2526.6	918.2	163.6	18.52	13.30
Observations	4944	4944	4944	4944	4944	4944

Table reports the treatment effect of preventable death reports on medical incidents. Treatment variable is each Preventable Death report that was addressed towards a NHS trust, as published by coroners in England. Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Heterogeneous effects

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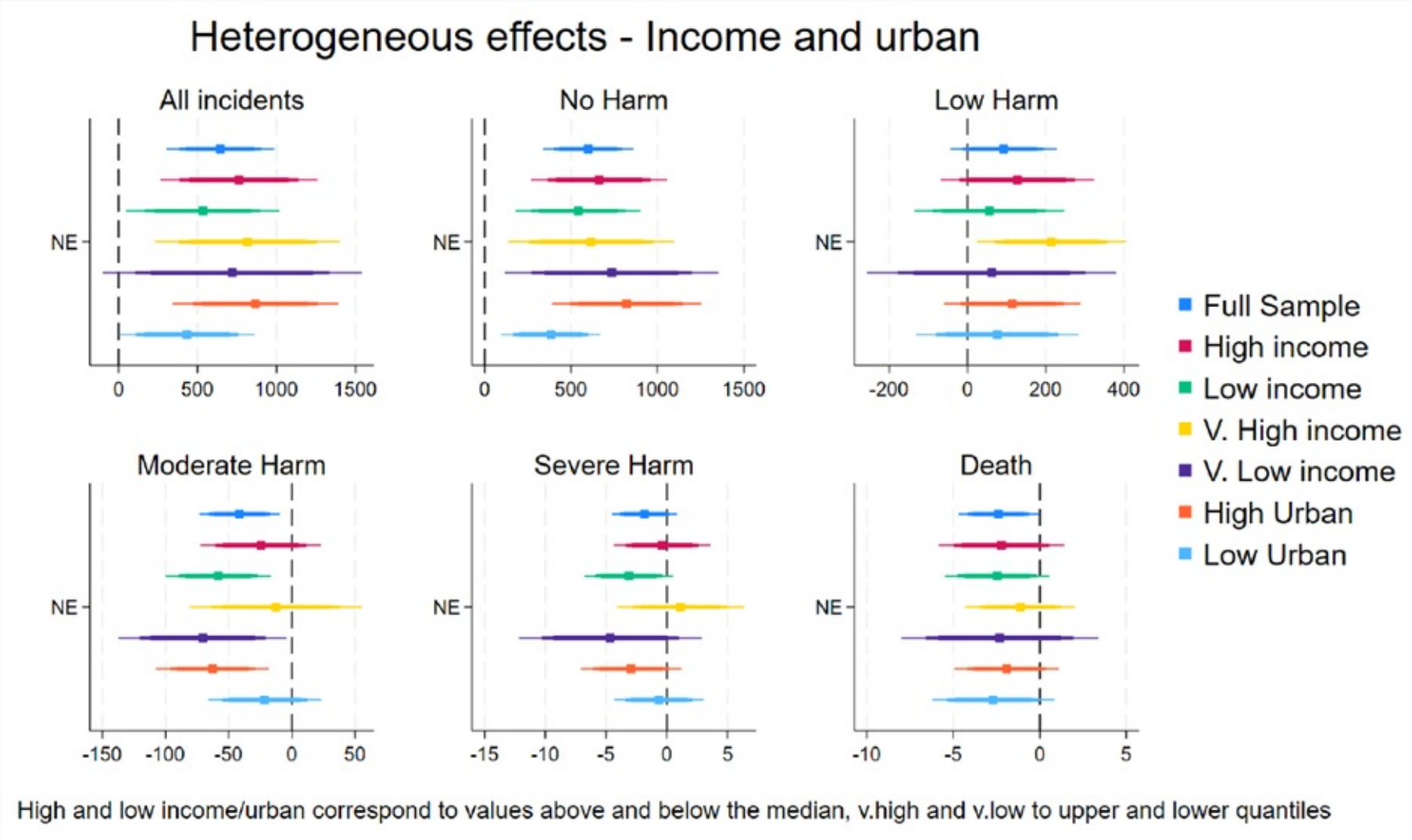
We split the sample in the following ways - keeping only providers located:

- places with high, low, very high, very low income
- places that have high or low urban activity

Results - Heterogeneous effects



Conclusion

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- Using a staggered difference-in-differences framework we provide causal evidence that increased managerial attention following quasi-random never-events, leads to improvements in hospital safety.
- Also provide evidence that never events covered in the media may reinforce incentives to improve safety performance.

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- Using a staggered difference-in-differences framework we provide causal evidence that increased managerial attention following quasi-random never-events, leads to improvements in hospital safety.
- Also provide evidence that never events covered in the media may reinforce incentives to improve safety performance.
- Our results also hold when we use alternative treatments as proxies for never events.

Thank you for your time!

Questions and suggestions welcomed