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Changing experience of adverse medical events in the National Health Service: comparison of two population surveys in 2001 and 2013

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ABSTRACT

Care quality is important to patients and providers, but is hard to measure. This study aimed to examine changes in the frequency and severity of one quality measure - adverse events associated with medical care - in Great Britain over a 12-year period when available resources initially expanded and were subsequently constrained. Data on perceived adverse events, collected from two representative population surveys in 2001 and 2013, were analysed and compared. The samples consisted of 8,202 adults aged 15 and over in 2001 and 19,746 adults aged 15 and over in 2013. The main outcome measures were self-reported illness, injury or impairment caused in the opinion of the respondent by medical treatment or care. Respondents were also asked about the perceived severity of harm in terms of health and work, and any actions taken in response. The proportion of all respondents reporting that over the last three years they had suffered some illness, injury or impairment that in their opinion was caused by their medical treatment or care was 2.5% (497/19746) in 2013, compared with 4.8% (391/8202) in 2001, a reduction of 33% after adjusting for age, gender, income and social class differences between the two surveys. Perceived impact on health and work of these events was similar in both surveys, as was the proportion of injured respondents who pursued a legal claim for financial compensation, at 11% (53/497) in 2013 and 10.5% (41/391) in 2001. We also report multivariate analyses of perceived harm rates and severity, and propensity to seek, and accept, compensation. Our results suggest that the NHS became significantly safer over this period when measured by patient perceived harm from medical care. Our survey method could provide a valuable contribution to the monitoring of trends in health-care related adverse events and the impact of patient safety

initiatives.

Keywords: Great Britain; adverse events; medical errors; disease frequency surveys; quality indicators; compensation and redress

INTRODUCTION

Care quality (and how to encourage it) is of obvious importance to patients, but also to health care providers, who must strike a balance between treating each patient successfully and the need to allocate scarce resources across all patients. In many health care systems, this resource allocation problem includes the costs of compensating patients who are found to have suffered harm as a result of their treatment, and consequently interest has focused on the frequency and costs of adverse events associated with medical care.(Huehns & Fletcher, 2010) Hospital-acquired infections became an election issue during the 2005 UK general election, and continuing concerns about safety and quality of care led to several inspection and regulation bodies being brought together in a new Care Quality Commission in 2009. Resources available for improving care quality do, of course, need to be considered in the wider context of total health care budgets, which have varied markedly depending on the state of the economy and the political context. In the UK this translated into a period of significant growth in real expenditures from 1997 to 2010, with a freeze in real growth subsequently. This makes it increasingly important to explore ways of monitoring changes in aggregate health care quality in such a way that the efficacy of new resources, as well as regulatory initiatives, can be assessed.

Despite its clear importance for health systems, care quality has proved a difficult variable to measure: not only is it impractical for researchers to observe/record every clinical intervention, but it often takes time for a subsequent health problem to arise and there may be differences of opinion about the role of any given intervention in producing an adverse event. As a result, the actual frequency of adverse events in health care is difficult to establish. A wide range of research methods has been employed, including analysis of registries and administrative data,(Bridgewater et al., 2007) ethnographic analyses of routine clinical meetings(Andrews et al., 1997) and of clinical incidents,(Nicolini et al., 2011) studies of

complaint and litigation rates,(Fenn et al., 2000) and modelling using burden of disease methodology.(Jha et al., 2013) Using record review after hospital discharge,(Forster et al., 2003) the Harvard Medical Practice Study reported in 1991 that 3.7% of American patients suffered some sort of adverse event during hospitalization,(Brennan et al., 1991) with error potentially responsible for 58% of these adverse events, and some form of negligent care for 28%. A similar study conducted in Utah and Colorado in 2000 found that adverse events occurred in 2.9% of non-psychiatric discharges, again with 58% attributable to some form of error.(Studdert et al., 2000) We return to these widely-quoted studies in the Discussion. No such studies have been published in the UK, but one pilot study suggested that almost 11% of inpatients may be harmed during their hospital stay.(Vincent et al., 2001) A systematic review in 2008 of all studies using a standard definition to evaluate the incidence of adverse events in adult hospital patients and that included a minimum of 1000 patient records identified eight such retrospective record reviews (3 USA, 2 UK, 1 each in Australia, Canada and New Zealand) and reported a median adverse event rate of 9.2%.(de Vries et al., 2008) The evidence on whether adverse events are becoming more or less common over time is even sparser. A detailed retrospective casenote study of 2341 admissions in 10 hospitals in North Carolina between 2002 and 2007 found no significant changes in the overall rate of harms per 1000 patient-days or the rate of preventable harms.(Landrigan et al., 2010) Vincent and colleagues reviewed trends in a range of safety indicators in the UK and found significant improvements in important measures such as in-hospital mortality and mortality after surgery, but rising trends in other measures such as health care acquired infections and drug administration errors.(Vincent et al., 2008)

Our paper seeks to contribute to the literature on measuring adverse event rates, and to the evidence base on trends in the incidence of adverse events over time, with a view to commenting on the impact of changes to health care resourcing and care quality initiatives.

Unlike the above studies, we use a large population survey to obtain self-reported rates of adverse events arising from medical care in the British National Health Service. An initial survey was conducted in 2001 to inform the Chief Medical Officer's deliberations on reforming the approach to clinical negligence in the NHS,(Department of Health, 2003) and a subsequent one was conducted in 2013, both to give more recent estimates of the rate and severity of adverse health care events and responses to such events, but also to permit direct comparisons with the earlier study and assess changes over time.

We argue that this survey approach complements existing literature, and trends in patient centred care, by providing a patient perspective on adverse events, and does so in a way that is in line with the increasing role of patient reported outcome measures in assessing the impact of treatment and the quality of care. (Food & Drug Administration, 2006; Greenhalgh & Meadows, 1999; Valderas et al., 2008) Our approach has the important benefit of being consistent with widely accepted survey techniques in which large and representative samples can be obtained on a consistent and replicable basis, combining specific questions on adverse events with standardised information from respondents on demographic and other characteristics. The next section describes the survey methods and data. We then report the results before discussing the methods and findings.

METHODS AND DATA

A questionnaire was designed to provide data on the incidence of adverse events, where they happened, their severity in terms of health and employment, the response considered most appropriate, whether a legal claim was pursued, and the amount of compensation considered acceptable. In addition, demographic information was obtained on respondents' age, sex, region, ethnicity, level of qualification, social class, household composition and characteristics, and household income. The questionnaire was designed to be comparable

with the one used in 2001, with some additional options and bands for specific questions, and a new question reflecting changes in the possible types of legal help available. Information was not obtained directly from respondents on the total number of NHS or private treatment episodes they had experienced, and so when calculating adverse event rates per contact we rely on the sampling representativeness and size of the sample in assuming that overall rates of use corresponded to age- and sex-group norms. The 2013 survey was administered using the IPSOS-MORI polling agency in face to face interviews by trained interviewers to a randomly selected sample of adults in ten waves at weekly intervals during January-April 2013. Approximately 2,000 individuals across Great Britain were interviewed in each wave, giving a total sample size of 19,746. The 2001 survey was also administered using MORI, in face to face interviews by trained interviewers to a randomly selected sample of adults in four waves at weekly intervals during October and November 2001, with a final total sample size of 8,202. In both surveys, responses were collated by IPSOS-MORI, and supplied to the researchers as anonymised data files. The 2013 study was considered and given a favourable opinion by the Medical Sciences Inter-Divisional Research Ethics Committee at the University of Oxford.

Statistical analysis

The distributions of respondents by age, gender, region, income, education and social class are reported separately for each survey. Within each survey, we calculated the adverse event rate, defined as the proportion reporting that over the last three years they had suffered some illness, injury or impairment that in their opinion was caused by their medical treatment or care, using weights provided by the survey organization to reflect differential sample selection and non-response rates. To adjust for changes in income levels over time (over a period with significant wage inflation as well as real income changes), we mapped

individuals from the income category in which they placed themselves in the surveys (8 categories in 2001, 15 in 2013) into the most closely corresponding quintile of the national income distribution in each of these years.

We made comparisons between the two surveys in the perceived severity of adverse events, the response considered appropriate, actions taken and their outcomes, using *t* tests and chi-squared tests. To control for population changes over the 12-year time interval, and to assess the independent statistical effect of different factors, we used probit regressions to model the probability of reporting an adverse event. Survey year, age, gender, income, social class and region were used as covariates, with age, gender, income, social class and region entered directly and also interacted with survey year to capture the possibility that reporting behavior by different groups had changed over time.

RESULTS

Descriptive statistics for the sample by age, sex, social class, household income quintile, educational qualification and region, are given in Supplementary Table 1. (Insert link to supplementary file here.) In both surveys the sample was designed to be representative of the general population of Great Britain. When weighted for representativeness and response rates, there were no significant differences between the surveys in age distribution, gender, or region, but income distribution and levels of educational qualification in the general population and so in the sample had changed significantly, as expected, with more respondents in the highest categories: for example, the proportion with degree or higher degree qualifications rose from 5.1% in 2001 to 28.6% in 2013. The survey organization was satisfied that the sample met all tests of representativeness.

In the 2013 survey, 2.5% of those interviewed (497/19746) believed that over the last three years they had suffered some illness, injury or impairment that in their opinion was caused by

their medical treatment or care, 171 people (0.9%, or about one-third as many as those who said "yes") were not sure, refused to answer or did not know, and 19,078 (96.6%) reported no adverse event (Table 1).

In the 2001 survey, in response to the same question, 4.8% of those interviewed (391/8202) believed that over the last three years they had suffered some illness, injury or impairment that in their opinion was caused by their medical treatment or care, 8 people (0.1%) were not sure, refused to answer or did not know, and 7803 (95.1%) reported no adverse event. This difference in the proportion reporting an adverse event was highly statistically significant, (z=9.72, p <0.01). Including the "not sure" responses from the 2013 survey with the "Yes" category increases that proportion from 2.5% to 3.2%, but the difference over time remains highly statistically significant (z=6.36, p <0.01).

Table 2 shows the proportions reporting an adverse event in 2001 and 2013 by gender, age group, social grade and household income quintile. There was no evidence of significant differences in this response by gender in 2001, with some evidence of a slightly higher adverse event rate amongst women in 2013. There was evidence of an association between the proportion reporting an adverse event and age, this proportion declining with age in 2001 and increasing with age in 2013. There was also weak evidence that the reported adverse event rate was inversely associated with social grade.

Only approximately two-thirds of respondents who reported an adverse event were prepared to report their household income in 2001 or 2013. There was no evidence of statistically significant differences across income quintiles in 2001, but evidence of a trend in 2013, with highest rates of reported injury in the lowest income quintiles.

Supplementary Table 2 shows the location of reported incidents of injury, harm or impairment. (Insert link to supplementary file here.) The majority of incidents occurred in

NHS hospitals, followed by general practitioner contacts; there was no evidence of significant changes in this pattern over time.

Using population age-sex specific use rates for NHS hospitals, GPs and dentists, it is possible to estimate total health care contacts by the sample during the period covered by the survey, and then express the reported adverse events as proportions of health care use rates. Table 3 shows these results, which suggest that 0.94% of all NHS in-patient episodes, 0.79% of all day cases, and 0.06% of all out-patient visits in 2013 resulted in an adverse event. We cannot disaggregate the location of adverse events within NHS hospitals in 2001, but summing across all types of hospital contact (inpatient + outpatient + daycase), the overall adverse event per hospital contact was 0.62% in 2001 and 0.3% in 2013.

Comparable data for the private sector are sparse, but estimates of the volume of surgical inpatient and daycase activity – the largest single category of activity in this sector – allow us to estimate that in 2013 approximately 2.82% of private sector inpatient admissions and 0.33% of private daycases resulted in an adverse event. The proportion of all general practitioner consultations resulting in an adverse event fell from 0.08% in 2001 to 0.03% in 2013 ($p<0.01$), as did the adverse event rate for dental consultations (from 0.07% to 0.03%, $p<0.01$).

Table 4 shows the reported impact of the reported events on respondents' health and on their work. There were no significant differences in the reported impact on health between 2001 and 2013, with between 44% and 50% of reported adverse events classified as resulting in permanent or major disability. Responses to the impact on work were also similar: 35% in 2001 and 33% in 2013 reported having to take one month or more off work, retire, or move to a less demanding job.

When respondents were asked what kind of response they considered would have been most appropriate to the event that occurred (Table 5), the responses were highly stable over time,

the most commonly suggested response being an apology or explanation (34% in 2001, 33% in 2013), followed by an inquiry into the causes (18% in 2001, 16% in 2013), and support in coping with the consequences (12% in both surveys). The proportion who considered that financial compensation was the most appropriate response was just 8% in 2001 and 6% in 2013.

There was some relationship in both surveys between the severity of the event and the response considered most appropriate: for example, as the severity increased the proportion of respondents in 2013 who considered that an apology or explanation would be the most appropriate response fell from 45% to 15%, while the proportion expressing a preference for support in dealing with the consequences rose from 5% to 35%. The proportion stating that financial compensation is the most appropriate response to the event increased with the severity of the event, but did not rise above 15% in any severity category.

The proportion of respondents reporting an adverse event who stated they actually pursued a legal claim for financial compensation remained constant at 10.5% in 2001 and 10.7% in 2013 (Table 5b). This proportion was directly associated with the reported severity of the event, but even in the most severe category of permanent major disability the proportion seeking compensation did not rise above 18% in 2013. This is broadly consistent with replies to our question about responses considered appropriate, in which no more than 15% of respondents in any severity category considered financial compensation to be the most appropriate course of action.

Respondents who reported having experienced an illness, injury or disability as a result of their medical care were also asked about the amount of compensation that would have satisfied them, using a closed scale. A total of 99 respondents (20%) volunteered a positive figure in 2013, and 99 (25%) in 2001, and Table 5c shows the distribution of willingness to accept estimates for these respondents.

In both survey years the most commonly selected compensation amount was between £1,000 and £5,000. Setting the willingness to accept quantities at the midpoints of each range and the over £100,000 category as equal to £200,000, the mean amount of compensation that respondents seeking some positive amount were willing to accept was £36,700 in 2013 and £37,300 in 2001. Including at £0 the respondents who did not want financial compensation, but excluding respondents who refused to answer or did not know what would be acceptable, the expected value of willingness to accept across everyone who reported an adverse event was £7,300 in 2013 and £9,400 in 2001.

Finally, we conducted a multivariate analysis of the effect of income, age, sex, severity of event, social grade and region on whether or not a respondent reported an adverse event, the results of which are reported in Supplementary Table 3. (Insert link to supplementary file here.)

Results are shown using three definitions of an adverse event having occurred: 1) an event anywhere, including only those who said yes; 2) an event anywhere, including those who said yes or not sure; 3) an event in an NHS hospital, including only those who said yes. In comparison with reported adverse event rates in 2001 using these three definitions of 0.048, 0.048, and 0.027 (4.8%, 4.8% and 2.7%), the results indicate that, controlling for any age, gender, income and social class differences between the two surveys, rates were lower in 2013 by 0.016 (33%), 0.009 (19%) and 0.009 (36%) respectively. For comparison, the unadjusted rate of those reporting yes to an event anywhere fell from 0.048 to 0.025, a reduction of 48% (Table 1). There is no evidence that the fall in reported adverse events between the two years varies by gender, age or social grade, but in comparison with the lowest income quintile, quintiles 2-5 showed a larger reduction in the reported event rate across all three definitions examined, suggesting that the reported adverse event rate in the lowest income quintile showed much less change. This is in line with the univariate analysis reported in Table 2, showing a higher reported adverse rate in income quintile 1 in 2013.

DISCUSSION

Despite strong public and policy interest in adverse events related to medical care, quantitative information on their frequency, characteristics and variations over time has been sparse. We have reported here population-based estimates of the number of adverse events occurring in Great Britain as a result of medical care received, the severity of these events measured in various ways including the amount that respondents were willing to accept in financial compensation for their injury, the course of action that respondents considered appropriate as a response to an event, and the course of action pursued. Our questionnaire allows us to compare results in 2013 with results from a similar survey in 2001.

Our 2013 survey found that 2.5% of the adult population believed that, over the previous three years, they had suffered some illness, injury or impairment that in their opinion was caused by their medical treatment or care. This compared with a rate of 4.8% in 2001. Controlling where possible for socio-demographic differences between the two surveys, the reduction in the reported adverse event rate was 33%, and even after classifying all "Not Sure" responses as "Yes" in 2013, a significant reduction of 19% was observed.

Our results suggest that only 2 or 3 in every 10,000 general practitioner or dental consultations in 2013 resulted in some form of adverse event, compared with around 8 per 10,000 in 2001. For NHS hospital care the estimated rate per inpatient episode in 2013 was just under 1%, and for private sector inpatient care was approximately 2.8%; there are of course substantial differences in casemix between these sectors. These rates can be compared with rates of 3.7% and 2.9% in the widely-quoted Harvard and Utah/Colorado studies, which were based on record analysis of hospitalized patients and of course include events classified as errors which may not have resulted in any actual immediate or long-term harm to patients, whereas our survey specifically asked about subsequent "illness or injury". The rates reported in these studies will therefore be inflated by events not included in our study; conversely, these studies will exclude adverse events that were not apparent during the hospital episode, but manifested themselves after discharge and are reported in our study.

Concerning responses to adverse events, we found that barely one in ten people who felt they had experienced an adverse event considered financial compensation to be the most appropriate response, and a similar proportion actually pursued a legal claim for compensation. These numbers have remained stable over time, as has the mean amount of compensation deemed acceptable to those who considered that compensation was an appropriate response. This consistency makes it less likely that the differences detected

across our two surveys in perceived harm for medical care can be explained away by the survey samples or methods.

Our finding of a reduction in adverse event rates between 2001 and 2013 may seem contrary to a widespread perception that patient safety is an increasing problem, with an ever-rising tendency for health care providers to be sued for clinical negligence. As Figure 1 shows, the total number of new clinical negligence claims opened against the National Health Service Litigation Authority (NHSLA) actually fell substantially between 2001 and 2006 before rising again after 2008 to the earlier level. In addition, figures reported by the Compensation Recovery Unit, which has a statutory responsibility to recover costs incurred by NHS hospitals and Ambulance Trusts for treatment from injuries from personal injury claims, show(CRU, 2014) a substantial annual decline in clinical negligence claims that were closed over the period 2001 to 2008, followed by an increase thereafter (Figure 1). In both cases, the increase in claims from 2008 is arguably the consequence of the rise in no-win, no-fee lawyers entering the clinical negligence market and encouraging a higher propensity to claim.(Fenn et al., 2016) Such complex and conflicting patterns of improvement and deterioration revealed by different safety measures were commented on in the Introduction.(Vincent et al., 2008) Nevertheless, the marked fall in patient claims against the NHS after 2001 is consistent with our survey findings, and yet is often forgotten in the modern policy debate which takes a decline in hospital safety as a given.

It should also be borne in mind that, during most of the period covered by our two surveys, real expenditure on the NHS was increasing at a much higher than average rate: 6.4% annually between 1996/97 and 2010/11, compared with 4.0% over the entire NHS history up to 2011 and just 0.1% over the period from 2011/12 to 2014/15.(Crawford, 2012) This growth in real spending was accompanied by improved staffing levels, higher investment in equipment and buildings, and an increased emphasis on patient-centred care including shorter

lengths of stay and shorter waiting times. In addition, a series of institutional and contractual changes were implemented during this period, including enhanced hospital quality inspections, risk registers, new consultant contracts emphasizing clinical governance, and the establishment of the National Patient Safety Agency in 2001 and (as noted earlier) the Care Quality Commission in 2009. It would be disappointing if the increased real expenditure and these safety initiatives had no impact on quality of care. Over this same period, satisfaction with the NHS as measured in the British Social Attitudes survey rose from 42% in 2000 to over 60% by 2013, while the proportion of the population reporting that the NHS was the most important issue facing the country fell from 51% in 2000 to 24% in 2013; Figure 2 displays these trends and places the two surveys in that context. It is of course possible that the recent much slower rate of real expenditure growth may have reduced or reversed the trend towards improved patient safety suggested by our study, despite the continuing presence of the enhanced inspection and regulation bodies; our data cannot confirm or contradict that, but a repeat survey could test that hypothesis.

In illustrating that adverse event rates can change substantially over relatively short periods, our results also lend support to the idea that there is considerable scope for the NHS to invest in interventions that cost-effectively reduce harm to patients.

We conclude by reflecting briefly on our method of estimating adverse event rates, based on patient self-reporting. This approach will miss adverse events of which the patient was unaware, and errors such as "near misses" which did not result in perceived injury or impairment but which might have been detectable in patient notes. Qualitative work is required to obtain a better understanding of what respondents have in mind when they report a perceived injury or impairment. This particular population survey method will also omit the most serious adverse events that result in death or institutionalization. However, our method may capture adverse events that only became apparent after discharge from hospital –

for example, some post-operative wound infections – which may not have been captured by studies based on analysis of hospital notes. Our method is also relatively cheap (despite delivering a large representative sample with a large number of relevant co-variates), and can easily be replicated nationally or internationally. It is only one of many possible indicators of overall health system performance, but it is focused on quality of outcomes, based directly on the actual experience of users of NHS services, and in line with the increasing use of patient reported outcome measures. As such it could provide a valuable contribution to the monitoring of trends in health-care related adverse events and the impact of patient safety initiatives.

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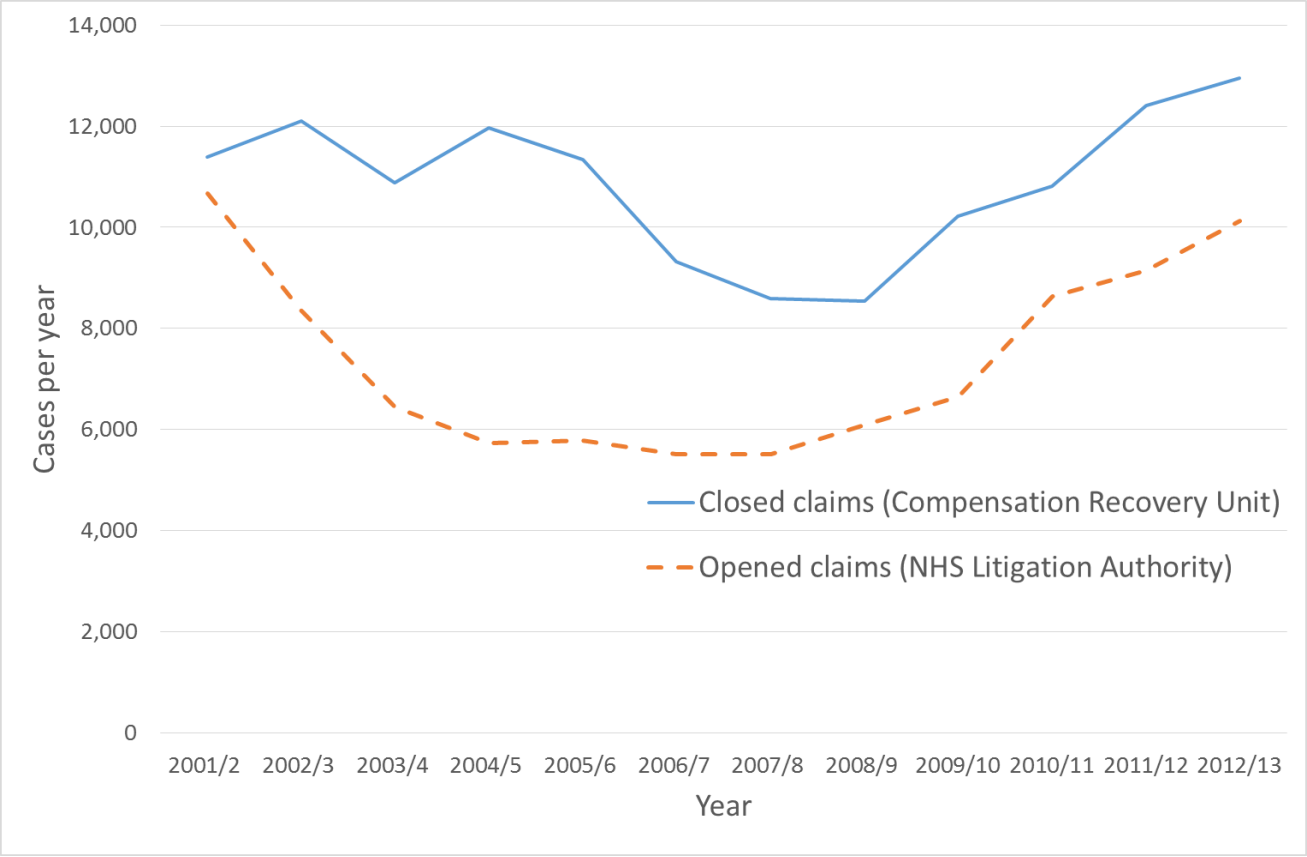
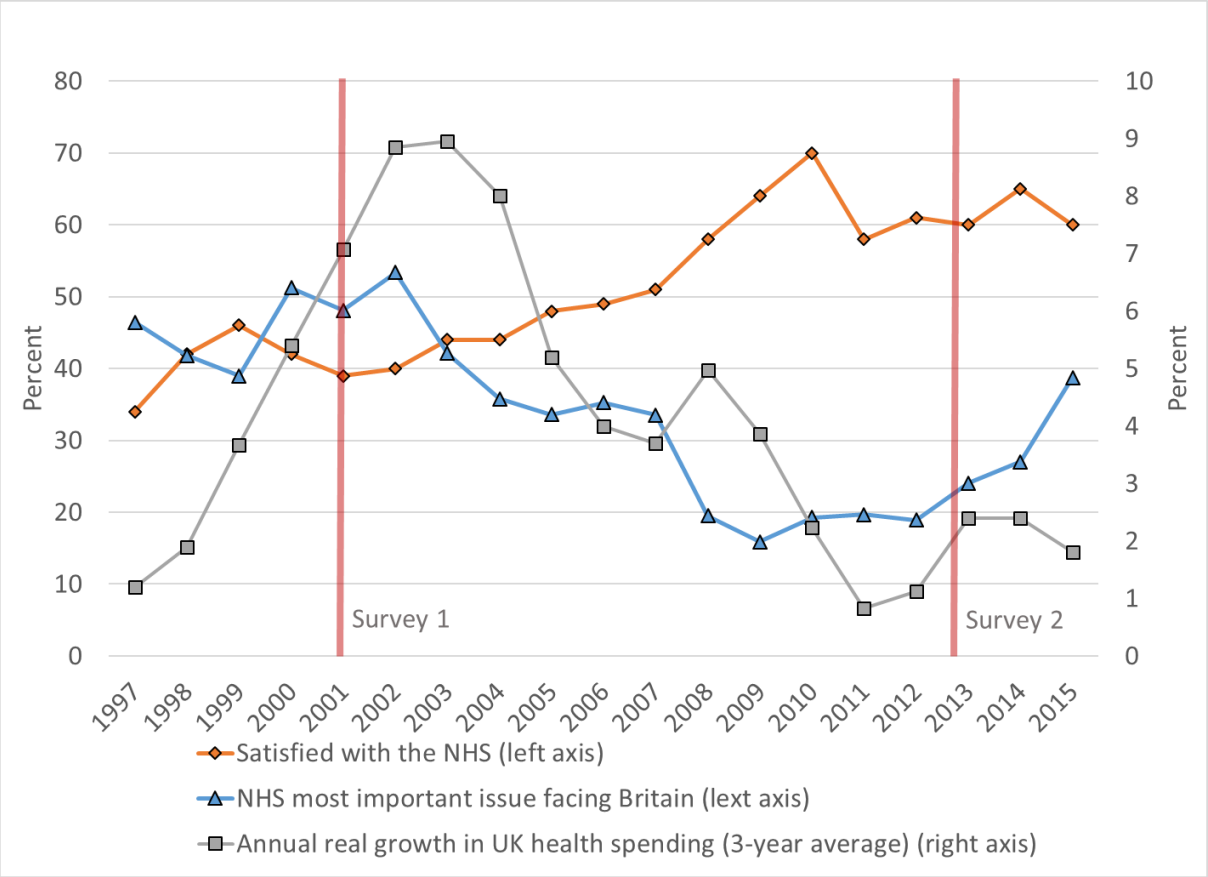
Figure 1: Trends in closed clinical negligence claims, and in opened claims, against NHS hospitals, England, 2001/02 to 2012/13



Sources: see text

Figure 2: Trends in a) the proportion of the UK population stating they are very or quite satisfied with the way the NHS is run; b) the proportion stating that the NHS is the most important issue facing the country; and c) annual growth in real expenditure on the NHS, 1997-2015



Notes: a) Those answering "Very satisfied" or "quite satisfied" to the question "All in all, how satisfied or dissatisfied would you say you are with the way in which the National Health Service runs nowadays?" British Social Attitudes 33, National Centre for Social Research, London. http://www.bsa.natcen.ac.uk/latest-report/british-social-attitudes-33/nhs.aspx accessed 3/3/2017 b) Those selecting the NHS when asked "What would you say is the most important issue facing Britain today?" Ipsos MORI Issues Index. Monthly data from 1997 to 2015, expressed as annual averages. https://www.ipsos-mori.com/researchpublications/researcharchive/2905/Issues-Index-2012-onwards.aspx?view=wide accessed 3/3/2017 c) Institute for Fiscal Studies. IFS Green Budget 2017: Health and social care spending, by Daria Luchinskaya, Polly Simpson and George Stoye. London, UK. 07 February 2017. https://www.ifs.org.uk/publications/8879 3-year rolling average.

Table 1: Over the last three years, have you suffered any illness, injury or impairment that in your opinion was caused by your medical treatment or care? (weighted)

	2001		2013		Test statistics for difference in proportions
	Frequency	Percent	Frequency	Percent	
Yes	391	4.8	497	2.5	P<0.01
No	7803	95.1	19078	96.6	
Not sure	0	0.0	133	0.7	
Refused	5	0.1	38	0.2	
Don't Know	3	0.0	0	0.0	
Total	8202	100	19746	100	

Table 2: Proportion reporting health care related adverse event by age, gender, social grade and household income quintile, 2001 and 2013. (weighted)

	2001			*2013*		
Variables & categories	**Yes (n)**	**Percent Yes***		**Yes/ Yes+ not sure (n)**	**Percent Yes/ Yes+not sure***	
Age:						
15-24	70	5.7	Test for	49/66	1.6/2.1	Test for
25-34	79	5.2	trend	61/80	1.9/2.5	trend
35-44	78	5.3	p<0.01	90/114	2.7/3.4	p<0.01/
45-54	62	4.7		76/94	2.3/2.8	p<0.01
55-64	40	3.9		84/111	3.0/3.9	
65+	62	3.8		138/167	3.5/4.2	
Gender:						
Men	201	5.0	p=0.25	202/276	2.1/2.9	p<0.01/
Women	190	4.5		295/353	2.9/3.5	p<0.05
Social Grade:						
AB	75	4.2	Test for	125/146	2.4/2.8	Test for
C1	100	4.4	trend	130/158	2.4/2.9	trend
C2	91	5.0	p=0.06	112/141	2.6/3.3	p=0.21/
DE	125	5.3		131/186	2.8/3.8	p<0.01
Household Income Quintile:						
1	43	4.0	Test for	103/128	4.7/5.8	Test for
2	81	5.5	trend	67/88	2.9/3.9	trend
3	54	4.7	p=0.95	60/79	3.1/4.1	p<0.01/
4	51	6.3		53/66	2.2/2.7	p<0.01
5	28	3.1		79/86	2.2/2.4	

***denominators in Supplementary Table 1**

Table 3: Estimated adverse event rates by location

Location	No. of reported incidents of injury, harm or impairment		Estimated number of health care contacts (age/sex adjusted) during 3 years by full sample		Estimated adverse event rate per contact (%)	
	2001	2013	2001	2013	2001	2013
In an NHS hospital	218	304	34,801	102,584	0.62%	0.30%
of which while an in-patient		*188*		19,968		0.94%
of which while an out-patient		*46*		73,923		0.06%
of which while a day-case		*69*		8,693		0.79%
In a private hospital	12	22				
of which while an in-patient		*16*		568		2.82%
of which while an out-patient		*2*				
of which while a day-case		*5*		1535		0.33%
With a general practitioner (GP)	91	105	109,824	326,330	0.08%	0.03%
With a dentist	21	17	28,628	79,424	0.07%	0.02%
Other*	48	50				
Total	391	497				

* Sources: Hospital activity: NHS: Living in Britain, 2002, Table 7.31; Health and Social Care Information Centre, Hospital Episodes Statistics 2012-13, http://www.hscic.gov.uk/pubs/
Hospital activity: Private: LaingBuisson Healthcare Market Review, 2001/02, LaingBuisson Private Acute Medical Care UK Market Report 2013/14.
GP consultations: General Household Survey 2002, Tables 7.19, 7.31. TSO, London, 2005, and Health and Social Care Information Centre, Trends in Consultation Rates in General Practice, 2014.
Dental consultations: Health and Social Care Information Centre, Annual Dental Health Survey 2009, Table 6.1.4, 2013 figure estimated by inflating 2009 figure for 2009-2013 overall consultation growth.

Table 4: Reported impact of event on respondents' health and work (weighted)

	2001		2013	
	Frequency	**Percent**	**Frequency**	**Percent**
Impact on Health				
Insignificant	41	10.6	35	7.0
Emotional Only	54	13.9	76	15.2
Temporary Minor Disability	119	30.5	120	24.1
Temporary Major Disability	59	15.1	80	16.0
Permanent Minor Disability	62	15.7	97	19.6
Permanent Major Disability	51	13.1	72	14.4
Don't Know	4	1.1	17	3.5
Refused	0	0.00	1	0.2
Impact on Work				
Not relevant – retired or not working at time	108	27.6	172	34.5
No Effect	63	16.1	77	15.5
Minor Effect, but no time off work	51	13.0	39	7.7
Had to take up to a week off work	31	7.9	31	6.3
Had to take up to a month off work	48	12.3	34	6.9
Had to take up to a year off work	45	11.6	58	11.7
Had to move to a less demanding job	16	4.1	20	4.0
Had to Retire	28	7.2	50	10.1
Don’t know	1	0.2	14	2.9
Refused	0	0.0	2	0.4
Total	391	100	497	100

Table 5: Response considered most appropriate to the event, and actual response (weighted)

	2001		*2013*	
	Frequency	**Percent**	**Frequency**	**Percent**
a) Response considered most appropriate to the event:				
An apology or explanation	135	34.5	165	33.2
An inquiry into the causes	71	18.3	79	15.9
Disciplinary action	15	3.8	14	2.9
Support in coping with consequences	47	12.0	61	12.3
Financial Compensation	31	8.0	31	6.1
Other*	92	23.4	147	29.6
Total	391	100	497	100
b) Did you pursue a legal claim for financial compensation, and if not, reasons:				
Yes	41	10.5	53	10.7
No, I didn't want financial compensation	149	38.1	219	44.0
No, it didn't occur to me	77	19.8	74	14.9
No, I didn't know how to go about it	10	2.6	17	3.5
No, I thought it would be too costly	8	2.1	8	1.6
No, I thought it would be too time-consuming	24	6.2	39	7.8
No, I was worried about the strength of my case	15	3.9	18	3.7
No Need	0	0.00	8	1.6
No, Recent Incident/Have not got around it	0	0.00	8	1.5
No, other reasons	62	15.9	35	7.1
Other*	3	0.7	17	3.4
Total	391	100	497	100
c) What is the least amount of compensation that would have satisfied you:				
None - I didn't want financial compensation	273	69.7	333	66.9
Up to £999	15	3.8	10	2.1
£1,000 to 4,999	28	7.2	25	5.1
£5,000 to 9,999	14	3.6	16	3.2
£10,000 to 19,999	18	4.5	19	3.9
£20,000 to 49,999	5	1.2	10	2.0
£50,000 to 99,999	6	1.5	8	1.6
£100,000 and over	13	3.3	11	2.3
Refused	1	0.2	11	2.1
Don’t know	19	4.9	54	10.8
Total	391	100	497	100

*= Other, Nothing, Can’t remember, Refused, No answer, Don’t know

Supplementary Table 1: Socio-economic characteristics of full sample 2001 and 2013: weighted

	2001		*2013*	
Variables & categories	**Frequency**	**Percent**	**Frequency**	**Percent**
Age:				
15-24	1228	15.0	3120	15.8
25-34	1534	18.7	3175	16.1
35-44	1480	18.1	3329	16.9
45-54	1336	16.3	3313	16.8
55-64	1024	12.5	2808	14.2
65+	1599	19.5	4002	20.3
Gender:				
Men	3994	48.7	9640	48.8
Women	4208	51.3	10106	51.2
Social Grade:				
AB	1784	21.8	5211	26.4
C1	2244	27.4	5523	28.0
C2	1808	22.0	4285	21.7
D	1447	17.6	3041	15.4
E	919	11.2	1686	8.5
Household Income Quintile:				
1 (lowest)	1052	19.6	2208	17.9
2	1473	27.4	2278	18.4
3	1138	21.2	1912	15.5
4	813	15.1	2402	19.4
5 (highest)	899	16.7	3566	28.8
Educational/Professional Qualifications:				
1 GCSE/O-level/CSE	4112	50.3	3768	19.1
2 Vocational qualifications	449	5.5	1917	9.7
3 A level or equivalent	277	3.4	3666	18.6
4 Bachelor Degree or equivalent	340	4.2	4231	21.4
5 Masters/PhD or equivalent	75	0.9	1429	7.2
6 Other	473	5.8	1350	6.8
7 No formal qualifications	2273	27.8	3102	15.7
8 Still studying	168	2.1	231	1.2
9 Don't know	35	0.4	53	0.3
Region:				
East Midlands	591	7.2	1470	7.4
Eastern	306	3.7	1899	9.6
London	1005	12.2	2521	12.8
North East	457	5.6	861	4.4
North West	914	11.1	2261	11.4
Scotland	736	9.0	1728	8.7
South East	1580	19.3	2774	14.0

South West	695	8.5	1744	8.8
Wales	426	5.2	987	5.0
West Midlands	723	8.8	1766	8.9
Yorkshire/Humberside	770	9.4	1736	8.8
Total	8202	100	19746	100

Supplementary Table 2: Location of reported incidents of injury, harm or impairment (weighted)

Location	2001		2013	
	Frequency	Percent	Frequency	Percent
In an NHS hospital	218	55.7	304	61.2
of which while an in-patient			*188*	*37.8*
of which while an out-patient			*46*	*9.3*
of which while a day-case			*69*	*13.9*
In a private hospital	12	3.1	22	4.44
of which while an in-patient			*16*	*3.2*
of which while an out-patient			*2*	*0.4*
of which while a day-case			*5*	*1.0*
With a general practitioner (GP)	91	23.3	105	21.1
With a dentist	21	5.4	17	3.4
Other*	48	12.3	50	10.1
Total	391	100	497	100

* At home, Elsewhere, Don’t know, Refused, No answer

Supplementary Table 3: Marginal effects from probit regression of likelihood of reporting an adverse event, combined 2001 and 2013 samples

	Yes		*Yes + Not Sure*		*Yes, NHS hospital*	
	Contrast†	P>t	Contrast†	P>t	Contrast†	P>t
Year						
(2013 vs base)	-0.016	0	-0.009	0.015	-0.009	0.002
Sex						
(Women vs base)	0.006	0.05	0.003	0.278	0.005	0.022
Year#sex						
(2013 vs base) (Women vs base)	0.011	0.117	0.007	0.3	0.006	0.279
Age						
(25-34 vs base)	0.003	0.611	0.006	0.337	0.003	0.517
(35-44 vs base)	0.014	0.013	0.016	0.007	0.008	0.081
(45-54 vs base)	0.003	0.572	0.005	0.395	0.003	0.552
(55-64 vs base)	0.007	0.217	0.010	0.09	0.002	0.603
(65+ vs base)	0.007	0.208	0.007	0.218	0.006	0.153
Year#age						
(2013 vs base) (25-34 vs base)	-0.012	0.365	-0.008	0.557	-0.007	0.527
(2013 vs base) (35-44 vs base)	-0.014	0.328	-0.011	0.456	-0.007	0.496
(2013 vs base) (45-54 vs base)	-0.005	0.693	-0.003	0.845	-0.009	0.428
(2013 vs base) (55-64 vs base)	0.003	0.822	0.008	0.592	0.000	0.983
(2013 vs base) (65+ vs base)	0.017	0.206	0.017	0.209	0.006	0.564
Income quintile						
(2nd Quintile vs base)	-0.006	0.215	-0.008	0.143	-0.001	0.775
(3rd Quintile vs base)	-0.007	0.224	-0.008	0.168	-0.003	0.502
(4th Quintile vs base)	-0.009	0.132	-0.013	0.032	-0.006	0.210
(5th Quintile vs base)	-0.018	0.001	-0.025	0	-0.009	0.026
Year#income quintile						
(2013 vs base) (2nd Quintile vs base)	-0.034	0.001	-0.036	0.001	-0.027	0.001
(2013 vs base) (3rd Quintile vs base)	-0.024	0.045	-0.026	0.035	-0.026	0.005
(2013 vs base) (4th Quintile vs base)	-0.050	0	-0.056	0	-0.038	0.000
(2013 vs base) (5th Quintile vs base)	-0.018	0.14	-0.028	0.023	-0.021	0.023
Social grade						
(C1 vs base)	0.002	0.677	0.001	0.8	0.000	0.879
(C2 vs base)	0.004	0.388	0.004	0.437	0.003	0.354
(D vs base)	0.001	0.887	0.006	0.299	0.000	0.999
(E vs base)	0.012	0.061	0.011	0.101	0.006	0.224
Year#social grade						
(2013 vs base) (C1 vs base)	-0.006	0.511	-0.007	0.463	0.007	0.331
(2013 vs base) (C2 vs base)	-0.009	0.389	-0.009	0.388	-0.001	0.871
(2013 vs base) (D vs base)	-0.019	0.127	-0.011	0.374	-0.002	0.860
(2013 vs base) (E vs base)	-0.032	0.037	-0.034	0.03	-0.017	0.175
F	3.02		2.63		2.37	
Prob > F	0		0		0	

N	17,497	17,584	17,241

*Region and year#region excluded from table for reasons of space; available from authors

† Direct effect of the year dummy on likelihood of reporting an adverse event, after controlling for all covariates and interactions effects