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Impact of 'high profile' public reporting on utilisation and quality of maternity care in England: A Difference-In-Difference analysis

Abstract

Objectives

To evaluate the impact of high profile public reporting on utilisation and perceived quality of maternity services in England

Methods

Analysis of national hospital administrative data using difference in difference models with propensity score matching and analysis of two maternity surveys from 2007 and 2010. Outcomes were counts of women admitted for delivery of a baby and the percentage of women rating their care positively in 2007 and 2010

Results

Hospitals publicised as providing the best maternity care in England had fewer admissions annually and lower occupancy rates (63.0% vs. 77.3%; p=0.09) than the national comparison group. Hospitals publicised as providing the worst maternity care were predominantly in the greater London area, with more women aged 15-34 years in their catchment areas than the national comparison group. There was no statistically significant change in overall maternity admissions in the best hospitals (+ 2.2%, p=0.40 at six months), or the worst hospitals (- 2.8%, p=0.49 at six months) during any period in the thirty-six months after public reporting relative to baseline. Compared to the national comparison group the worst rated hospitals experienced greater improvements in perceived quality after public reporting but these findings were not maintained in the matched analysis

Conclusions

High profile public reporting of maternity care in England was not associated with changes in the utilisation of maternity services or improvements in patient reported quality. These findings provide further evidence that public reporting is unlikely to drive major improvements in health system performance through the mechanism of patient choice.

Introduction

Many health systems have instituted public reporting of performance data to improve quality, safety, responsiveness and accountability [1]. While public reporting has been postulated to improve health system performance via several mechanisms, most policy focus has centred on the selection pathway. This involves the market-like mechanisms of 'choice', whereby patients (or advocates for them such as their family doctor) use publicly reported performance information to make informed decisions on where they receive care, and the associated 'competition' between healthcare providers to attract patients, in order to increase their market share[2, 3].

Choice of provider has recently become enshrined in health policy in England through the National Health Service (NHS) Constitution which states that providing information to support choice is a major priority for the NHS [4, 5]. This commitment is supported by a series of reforms undertaken over the past decade including the expansion of public reporting, *Payment by Results,* a form of activity based funding for hospitals introduced in 2003/04 where the 'money follows the patient' [6], and *Choose and Book*, an electronic booking system introduced in 2005, which permits choice of any provider in the country at the point of referral [7, 8].

Existing evidence provides little support for the selection pathway as a mechanism for health system improvement. For example a systematic review published in 2008 found that public reporting of performance data did not influence patient choice of hospitals with physician recommendation and geographical proximity being more important factors[1]. It has been suggested that this absence of effect is due to lack of time or motivation among patients to seek out this information and difficulties in understanding performance data when they do[9]. . Although some research findings identifies a role for the publication of performance information in healthcare quality improvement, the mechanisms behind this are still debated[1]. However most of this evidence comes from examination of a few select schemes in the United States, mainly focused on cardiac surgery and there is a lack of research in other countries and clinical areas [11].

Here we test the hypothesis that 'high profile' public reporting of the quality of maternity care in England will influence women's choice of healthcare provider. We use the example of widespread media reporting of an English Healthcare Commission report in early 2008, which presented simple data showing the ten best and ten worst maternity providers in the country. Although data was released on the quality of maternity care for all hospitals, including those in the control group, other hospitals were not subject to such media reporting. Our hypothesis is based on assumptions that pregnant women may be more proactive in seeking (and more responsive when receiving) publicly reported information, and have greater scope to use this to inform their choice of provider.

Methods

Context

In July 2008, the English healthcare regulator published *Towards Better Births* a major report which provided scored assessments of NHS trust in England providing maternity care [12]. These assessments were based on: - (1) a survey in June 2007 of 26,000 women who had recently given birth; (2) a web based maternity questionnaire filled out by service managers on issues such as staffing arrangements and; (3) a voluntary web based survey of trust staff (completed by staff at half of hospitals and comprising 4,950 responses).

The information from the patient survey was released on a website called *Birth Choice UK* in November 2007 [13], where patients could see how well individual hospitals performed. Hospitals were not ranked in the Healthcare Commission report, or on the *Birth Choice UK* website. In January 2008 the patient survey information was accompanied by considerable media interest in many national outlets (such as the BBC, The Times, The Daily Telegraph), which focused on the ten best and worst performers and cited them by name (for example the BBC website included headlines such as “NHS maternity units falling short” [14]). There was substantial additional coverage in local newspapers in areas where maternity services were reported as doing particularly well or badly.

The hospitals in the best and worst groups are listed here **[Text box here]**

Sample

There were 146 hospital trusts providing maternity services in England for the duration of the study We excluded 35 trusts with fewer than 100 maternity admissions or fewer than 100 Caesarean sections in any six month period during the study. We excluded one trust (Bromley

NHS hospitals trust) in the worst performing group as it merged to become South London Healthcare NHS Trust during the study period, as well as two specialist women's trusts. We grouped the sample into the ten best and nine worst performing hospitals and used the remaining 89 trusts as a national comparison group.

Data

We used maternity data from Hospital Episode Statistics (HES), the national administrative database for hospital activity in England, for the financial year 2006/07 to 2010/11.HES maternity data captured 96% of all hospital births in England in 2008 [15]. Data on number of maternity beds in each hospital was taken from the Health and Social Care Information Centre. Data on the demographic characteristics of the local areas come from 2006/07 population projections from the Office for National Statistics [16]. Information on the geographical position of NHS hospitals came from the NHS Organisation Data Service.

All analyses are at NHS trust level, which is a single or small group of hospitals in a defined geographical area operated by the same management team. We refer to trusts as hospitals hereafter for consistency. Geographical distance data was calculated from the population weighted centroid of each patient's Lower Super Output Area (LSOA) and the hospital trust where the birth occurred.

Data for the three measures of quality come from the NHS Maternity Survey, a postal survey conducted in 2007 [17] (of 26,042 women) and 2010 [18] (of 25,488 women).

Outcome measures

The main outcome measure was counts of women admitted for delivery of a baby by six month period for each NHS hospital. Secondary outcome measures were: - (1) percentage of women giving birth by caesarean section (2) percentage of deliveries to mother's over the age of 35 years (3) percentage of mothers from the 20% most deprived areas in England, based on Index of Multiple Deprivation (IMD) income scores, and (4) percentage of mothers from the 20% least deprived areas in England, based on IMD income scores. These groups were examined separately in order to assess if different groups were more sensitive to public reporting, due to these demographic characteristics or clinical need (for C-Sections). For example, women in less deprived areas may be more likely to attend a non-local hospital which may led to changes in patient utilisation by them but not by other patients. We also examined the percentage of women admitted to their nearest hospital (shortest geographical distance) to ascertain if public reporting may have changed the distance women were willing to travel to attend particular hospitals.

Outcomes from the patient surveys were the percentage of women reporting that the care they received during: - (1) pregnancy (2) labour and birth and (3) after the birth of their child, was excellent, very good or good.

Analysis

We used a Difference-in-Difference study design, which is a quasi-experimental method commonly used for policy evaluation [19]. We compared the numbers of maternity admissions to hospitals reported as the best or worst in the country with accompanying high profile media coverage relative to a comparison group which did not receive this media coverage to evaluate whether public reporting was associated with changes in admissions. Separate analyses were used for the best and worst groups, to compare each to the relevant comparison groups. We

used panel data regression with fixed and used the log of the difference between our treated and untreated groups, so that results can be interpreted as relative changes from the baseline. This was set as the period from Sept 2007 to March 2008, which incorporates both when the information was put on the *Birth Choice UK* website, and media reporting. Choice of this baseline is based on the rationale that women close to their delivery date would have already chosen a provider and that any effects would be more likely to be found among women at early stages of their pregnancy.

We first compared admissions in our best and worst group to the national comparison group. NHS hospitals within 10km of the best or worst hospitals were excluded from the analysis, as their patient numbers may have been affected if patients moved here from the best or worst hospitals, which would amplify any possible effects. We then construct two additional comparison groups using propensity score matching, where the propensity score represents the probability of being in the worst or best group, using data from 2006/07. We examined a large number of demand and supply variables potentially relevant in explaining the probability of being in the worst (or best) hospital group including: number of maternity beds, number of GPs in the catchment area, percentage of catchment area classified as urban and number of other NHS hospitals within 10 or 20km. Standard balancing tests for matching suggest that number of admissions and deprivation in the hospital catchment area were the most appropriate variables for matching. The matched group comprised the three most similar hospitals to each hospital in the best or worst group in terms of their propensity score.

Survey analysis

Changes in quality scores derived from the NHS Maternity Survey between 2007 and 2010 in the best and worst hospitals and two comparison groups were calculated using z-tests. The two comparison groups were: - (1) national comparison group (2) the ten hospitals with the most

similar quality scores to the mean score achieved by the best or worst hospitals in 2007. This second comparison group addresses the possibility of the best group being subject to a ceiling effect, due to their high scores in 2007.

Sensitivity analyses

We conducted a number of sensitivity analyses to test the robustness of our findings which included:- 1. excluding hospitals within 20km of the best or worst hospitals (rather than 10km – see **Tables A4 and A5**), 2. using a different baseline period **(Tables A6 and A7),** 3. using five comparison hospitals in the matched analysis rather than three **(Tables A8 and A9).** The appendix also contains details on the average distances travelled for admission over the time period **(Table A10)** as well as the percentage of women admitted to their closest hospital (**Table A11).**

Results

In 2006/07, the best hospital group had fewer maternity admissions (3,283 vs. 4,574, p=0.02) and the worst hospitals had more admissions than the national comparison group (5,309 vs. 4,574, p=0.21), although the latter difference was not statistically significant **(Table 1).** The best hospital group also had a lower occupancy rate of maternity beds than the national comparison group (63.0% vs. 77.3%, p=0.09). Both the best and worst hospital groups had a smaller percentage of deliveries from women living in affluent areas than the national comparison group (10.5%, 9.4% and 17.0% respectively, p=0.09 and p=0.06). Nearly half of admissions to the worst hospital group were in women living in the most deprived quintile in England (45.7% vs. 26.0% nationally, p<0.01). The worst hospital group had more NHS hospitals within a 10km radius than the best group (20 vs. 12), and a larger population aged 15-34 years in their catchment area which reflects the fact that most were based in London. Findings from

propensity score matching are presented in **Appendix Table A1** and the t-tests of differences before and after matching indicate that comparison groups generated by our matching are more similar to the best and worst hospitals than the standard national comparison group.

Impact of public reporting on maternity admissions in best and worst hospitals

Trends in overall admission numbers for the best and worst group are shown in **Figure 1**.

In the best hospitals there was no significant percentage change in the overall number of maternity admissions (+2.2% at 6 months post baseline; p=0.40) after public reporting **(Table 2).** There were no significant changes in maternity admissions within subgroups, including women having a C section, those living in deprived areas, or for whom this was the closest hospital after baseline. There were small but significant decreases (-1.1%; p=0.01) in maternity admissions in women age over 35 years in the best hospitals 19-30 months post baseline. There were no statistically significant changes in the percentage of women attending the best hospitals for which this was their closest hospital.

In the worst hospitals there was no significant percentage change in the overall number of maternity admissions (-6.8% at 7-12 months post reporting; p=0.09) after public reporting **(Table 3)**. The worst performing hospitals did experience a significant increases in the percentage of maternity admissions in women over the age of 35 years (+1.6%, p<0.01 19-24 months post baseline) and the percentage of births by C–section which persisted until the end of the study period (+1.2%, p=0.05 for 1-12 months post baseline). There was a decrease in the

percentage of women for whom one of the worst hospitals was their closest hospital from 13 months post baseline until the end of the study period (e.g. -4.2%, p<0.01 at 13-18 months).

Impact of public reporting on perceived quality of maternity care in best and worst hospitals

In a patient survey in 2007 the best hospital group was performing significantly better and the worst group less well than the national comparison group (**Table 4**). Between 2007 and 2010 the best group improved more slowly than nationally on all three outcomes (e.g. +5.8% for overall care after birth compared to +8.4% nationally, p<0.01). However, when matched to hospitals with similar levels of satisfaction in 2007, the best group improved faster on one measure (care during labour, +4.4% vs. +1.0%, p<0.01), less well on one (care after birth) and similarly on one (care during pregnancy). The worst group experienced greater improvement than the national comparison group between 2007 and 2010 on all three patient reported outcomes. In the analysis matched to hospitals with similar levels of satisfaction in 2007 the worst hospitals performed less well on one outcome (care during pregnancy, +6.5% vs. +9.5%, p<0.001), similarly on one outcome (care during labour) and better on one outcome (care after birth).

Sensitivity analyses

Results from our unmatched analysis (**Tables A2 and A3**) and our sensitivity analyses were substantially similar to the matched analysis presented above (**Tables A4 to A9)**. **Table A10** shows that the average distance travelled to attend the best hospitals was much further than for

the worst hospitals (14.4km vs. 4.7km at baseline) and that this did not change over the study period. **Table A11** shows the percentage of women who attended their closest hospital during the time period and suggests a small decline in the percentage of women at the best hospitals for whom this was their closest hospital (84.0% vs. 84.3% at baseline).

Discussion

Our study findings indicate that public reporting on the quality of maternity services in England in 2008, which received widespread coverage in the media, had no significant impact on utilisation or perceived quality of services. We found that the overall number of maternity admissions did not significantly decrease in the nine hospitals widely reported as providing the worst maternity care and did not increase in the ten hospitals widely reported as providing the best maternity care. The percentage of women rating their hospital care positively improved more in the worst rated hospitals compared to our national comparison group, but this finding did not hold when we matched with hospitals with similar satisfaction levels at baseline. This suggests that this effect may have been due to regression to the mean and that high profile public reporting may not have stimulated improvements in quality within these hospitals. It should be noted however, that there were national improvements in many outcomes over this period, which have been attributed primarily to increased financial resources and strong performance management over this period.[20]

Effects of the release of these specific reports on patient utilisation and quality of care have not been studied in detail previously, however anecdotal evidence recently presented to the Nuffield Trust in interviews with service managers suggests that providers ranked as most well performing in these maternity reports did experience a surge in demand for care, and that this

caused problems in managing extra demand within capacity constraints [21]. It is possible that these effects were too modest to be picked up as statistically significant, and that even small changes caused capacity problems. Our findings however, are consistent with previous research which suggests that public reporting is unlikely to drive major improvements in health system performance through the mechanism of patient selection [1, 22]. It is also consistent with work on changes in hospital utilisation in response to high profile reporting of negative events in the English NHS, which found that effects were were very modest and not sustained[23]. Research on the potential link between the introduction of market-like competition in the NHS and reductions in cardiovascular disease mortality has contended that this may be due to patients becoming more responsive to quality metrics [24]. This research however, was based on a different clinical area and did not explicitly consider what information was available to patients

Much of the impetus for the public release of performance information comes from work in 2003 on two pathways to improvement. The first is selection - that information will cause patients to preferentially attend good providers, thus placing pressure on providers to improve, and the second is change in care - information will cause providers to better direct their efforts (the quality improvement pathway) [2]. A third pathway, the reputation pathway, has also been proposed, whereby providers are encouraged to improve by their desire not to have the reputation of themselves or their workplace tarnished, rather than any specific concerns of patient numbers [3] . The architects of the reputation pathway set out three key elements for success – that a report is widely disseminated, that it is easily understandable, and that it will be followed up withsubsequent reports on performance[25]. It should be noted that the media coverage associated with the HC report examined here satisfies the first two of these criteria, but not the third. It remains possible that improvements may have been experienced if this

reporting had been designed explicitly in line with the recommendations of the reputation pathway

The findings here provide only limited support for the change in care pathway, whereby hospitals are motivated by the release of data on their quality relative to peers. It also provides limited support for the idea is selection as there were only weak effects on patient numbers, and the reputation pathway – as hospitals publicised as poorly performing did not improve conclusively more than other hospitals. Our findings concur with those from a randomised trial of releasing information to the public on quality of obstetric care, which found no associated changes in market share. This study did however, find increases in obstetric quality after information release, although this was based on selected quantitative indicators, such as adverse events, as opposed to the patient reported outcomes used here [3]. Achieving improvements in quality may be constrained by a number of factors. For example, most of the worst performing hospitals in our sample were based in London, where recruitment and retention of staff is challenging due centralised pay regulation in the NHS and the high cost of living.ch [26].

Strengths and limitations

This is the first studywhich has examined changes in utilisation after high profile reporting and correlated this reporting against patient experience measures. Although previous work has examined the impact of high-profile healthcare scandals using a similar framework[23], and some studies have linked market-like competition to changes in patient utilisation[24], this study addresses a noted lack of research evidence on the routine release of performance information in England. Nonetheless the study has a number of strengths and limitations. Measures of

quality used are derived from previously validated representative surveys. Also, findings from sensitivity analyses were broadly consistent with our main analyses. Weaknesses of the study include that more detailed data covering patient flows, referrals and patient surveys would be required to determine causal links between information release and these outcomes. During the study period there were other concurrent changes in the NHS in England such as reconfiguration of some maternity services and changes in guidelines for the management of patients. Nonetheless, given our efforts to match NHS hospitals to different comparison groups it seems unlikely that such structural changes may have affected our results. The quality data used in this study comes from only three measures of the overall patient experience of maternity care in England, although these were the three most closely linked to overall rating [27]. Although not a main focus of the study, it would have been preferable to use more detailed data on travel times for the analysis we undertook on changes in distance to maternity services, and also to have used the individual hospital site they were admitted to. These data were unfortunately not available for this study.

A recent report commissioned by the Secretary of State for Health in England recommended maternity services as an area which could be prioritised for the development of such ratings as it is considered high risk due to the high number of negligence claims [21]. Our finding that high profile public reporting and associated media coverage of maternity care in England did not have a major impact on utilisation or patient reported quality of care raises a question about the likely impact of this approach. Internationally, the number of countries introducing public reporting schemes is increasing, including Denmark [28], the Netherlands [29] and Canada [30]. Evaluation of the impact of these schemes on market share and quality should be carefully evaluated. Proponents of choice in public services have argued that only small shifts in utilisation, in the order of 5 to 10%, are needed in order to drive up quality [31]. However, this assertion has not been empirically tested in healthcare settings and is not supported by our

finding that the worst group experienced a small (6%) - but not significant - reduction in utilisation without any accompanying improvement in quality. It should be remembered however, that even the control group in this case was subject to some public reporting insofar as their quality data was publicly available.

There are unanswered questions arising from this research. While this study focused on the specific clinical area of maternity, there are major changes imminent across the whole of the NHS. The English NHS recently started to publish information from the Family and Friends Test (whereby patients are asked how likely they are to recommend a service) in July 2013 [32] with the explicit intention that patients can use these scores to make choices. A further area for future research is whether certain groups of patients are more or less likely to respond to public reporting. We found some potentially important subgroup effects which could be explored in further research. Future work could also be extended by using other measures of quality of maternity care than the patient reported outcomes used here. The mediating impact of the media, family and friends and medical professionals in conveying this information also deserves further investigation.

Conclusion

Despite policy emphasis that the public release of information is key mechanism for quality improvement by shifting patients away from poor services and towards good services, we identified limited evidence to support this in the context of maternity care in England. Our findings caution against simplistic assumptions that being publicised as a good or poor quality, provider in both official and media reports is sufficient to drive improvements through market pressures alone.

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