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## Patient Satisfaction with Hospital Care and Nurses in England: An Observational Study

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## TITLE PAGE

**Patient Satisfaction with Hospital Care and Nurses in England: An Observational Study**

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**Contributors:** LHA raised the funding, developed the idea for the study, interpreted results, drafted and revised manuscript; DMS conducted the analysis, drafted the results, contributed to manuscript revisions; JB collected survey data, contributed to manuscript development; LB contributed to results interpretation and manuscript drafting and revisions; AMR contributed to data collection, interpretation of results, manuscript revisions; PG contributed to obtaining data, results interpretation, manuscript development and revisions.

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## Patient Satisfaction with Hospital Care and Nurses in England: An Observational Study

### ABSTRACT (285 words)

**Objectives** –To inform healthcare workforce policy decisions by showing how patient perceptions of hospital care are associated with confidence in nurses and doctors, nurse staffing levels, and hospital work environments.

**Design** – Cross-sectional surveys of 66,348 hospital patients and 2,963 inpatient nurses.

**Setting** – Patients surveyed were discharged in 2010 from 161 National Health Service (NHS) trusts in England. Inpatient nurses were surveyed in 2010 in a sample of 46 hospitals in 31 of the same 161 trusts.

**Participants** - The 2010 NHS Survey of Inpatients obtained information from 50% of all patients discharged between June and August. The 2010 RN4CAST England Nurse Survey gathered information from inpatient medical and surgical nurses.

**Main outcome measures** – Patient ratings of their hospital care, their confidence in nurses and doctors, and other indicators of their satisfaction. Missed nursing care was treated as both an outcome measure and explanatory factor.

**Results** – Patients' perceptions of care are significantly eroded by lack of confidence in either nurses or doctors, and by increases in missed nursing care. The average number of types of missed care was negatively related to six of the eight outcomes-- odds ratios ranged from 0.78 (95% CI = 0.68 to 0.90) for excellent care ratings to 0.86 (95% CI = 0.77 to 0.95) for medications completely explained-- positively associated with higher patient-to-nurse ratios ( $b = 0.15$ , 95% CI = 0.10 to 0.19), and negatively associated with better work environments ( $b = -0.26$ , 95% CI = -0.48 to -0.04).

**Conclusions** – Confidence in nurses is of equal importance to confidence in doctors in patient perceptions of care. Patient perceptions of care are also strongly associated with missed nursing care, which in turn is related to nurse staffing and hospital work environments.

### Strengths and limitations of this study

- This is the first quantitative study to determine the association between patients' confidence in nurses and doctors, RN staffing, and patient experiences with hospital care in NHS hospitals in England using the national NHS Adult Inpatient Survey.
- Unique data previously unavailable enable a rigorous analysis of patient to RN staffing ratios, missed nursing care, and patient satisfaction with hospital care.
- The study uses cross-sectional data, and while a number of alternative explanations are considered in our models, we cannot rule out the possibility that omitted variables contribute to associations found.

## Patient Satisfaction with Hospital Care and Nurses in England: An Observational Study

### INTRODUCTION

Highly publicized reports citing preventable deaths and deficiencies in hospital care in England have uniformly concluded that inadequate hospital nurse (RN) staffing is a contributing factor (1-3). Studies confirm large variation in patient to RN ratios across National Health Service (NHS) hospitals, and this variation is associated with higher mortality in hospitals where RNs care for more patients each (4-6). However, despite national guidance on safe nurse staffing (7), substantial variation still exists and the value of higher RN staffing levels is still questioned at the policy level (8). Recently introduced NHS workforce initiatives have been framed in the unsubstantiated narrative that quality deficiencies in hospitals are due to “uncaring” nurses (9,10). The National Advisory Group on the Safety of Patients in England specifically advised that nurses and other NHS staff not be blamed for quality deficits, pointing instead to the need to address insufficient RN staffing (3). Nevertheless new workforce initiatives have been introduced by the NHS purportedly to produce more caring nurses. One such initiative creates a new provider category, the nursing associate, with substantially lower qualifications than RNs (11). Adding lesser trained providers to the hospital workforce without adding more RNs results in eroding the nursing skill mix that evidence suggests is associated with higher mortality and lower patient satisfaction (12). Also, the NHS is reinstating apprentice training for RNs (13), in direct opposition to a major recommendation of the 2010 Prime Minister’s Commission on the Future of Nursing and Midwifery in England (14) that all nursing education should take place in universities because evidence shows that hospitals with a higher proportion of bachelors-prepared nurses have significantly better patient outcomes (6,15,16).

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3 The concern about nurses being uncaring or lacking in compassion, and subsequent NHS  
4 nursing initiatives, have come about largely in response to case studies of poor care in a  
5 relatively small number of NHS trusts and anecdotal reports of patient dissatisfaction.  
6  
7 Surprisingly little use has been made of the NHS National Inpatient Survey of patients to inform  
8 strategies to improve care (17). When initiated in 2001, England's annual national survey of  
9 patients following a hospital inpatient stay was the first in the world; it aimed to make the NHS  
10 more patient-centered and more responsive to patient feedback (18). A report published in 2007  
11 using the NHS Inpatient Survey found evidence that the experiences of staff working in the NHS  
12 mirrored the experiences of patients receiving care (19). This is a worrisome finding given the  
13 evidence showing high nurse burnout and job dissatisfaction is common in NHS hospitals (10,  
14 20), and that 85% of RNs in NHS hospitals report not being able to complete needed nursing  
15 care due to lack of time associated with high patient to nurse workloads (21). Further, missed  
16 nursing care associated with high patient to nurse workloads is associated with an increased risk  
17 of patient mortality following common surgical procedures in nine European countries including  
18 England (22).  
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39 Studies of patients' experiences with inpatient care in the U.S., another country with  
40 mandated hospital patient satisfaction surveys, show that patients in hospitals with better RN  
41 staffing report higher overall ratings of their hospitals (23, 24). Missed nursing care is associated  
42 with less favorable patient satisfaction in U.S. hospitals (25) and European hospitals but not  
43 including England (26). There are not comparable studies in England using the NHS National  
44 Inpatient Survey that could help determine whether nursing is the problem or the solution to  
45 improving patient satisfaction in hospitals.  
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3 In this report we use survey data from the NHS National Inpatient Sample to determine  
4 the extent to which patient satisfaction is a function of specific aspects of care that pertain to  
5 nurses. For a subset of hospitals participating in the National Inpatient Survey, we link patient  
6 survey results to nurse surveys in the same hospitals that provide information on actual RN  
7 staffing and adequacy of hospital work environments as well as the extent of missed nursing care  
8 due to high workloads. The paper seeks to identify an action agenda that may hold promise for  
9 improving patients' experiences with hospital care in England.  
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## 20 21 **METHODS**

### 22 23 **Data sources and samples**

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27 Patient survey data are from the 2010 NHS Survey of Inpatients, which gathered  
28 information from over 66,000 patients who were discharged from 161 acute and specialist NHS  
29 trusts in England (27). Nurse survey data are from the 2010 RN4CAST-England study (28, 20)  
30 which gathered information from 2,963 inpatient medical and surgical direct care RNs in a  
31 representative sample of 31 of the same 161 NHS trusts. These 31 trusts comprise 46 different  
32 hospitals from which 12,581 of the 66,348 patients surveyed were discharged. Of these 12,851  
33 patients, 5,311 were in general medicine or general surgery wards. The sample of hospitals in  
34 which nurses were surveyed, described elsewhere in detail (21, 28), was a stratified random  
35 sample selected to include teaching and non-teaching hospitals of different sizes in every  
36 geographic region of England. There are no remarkable differences between the sample of  
37 hospitals in which nurses were surveyed and the other hospitals participating in the NHS Survey  
38 of Inpatients, nor were there any differences in patient characteristics or responses between the  
39 full NHS survey and the 31 trusts studied, as noted in the Appendix table. The response rate for  
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3 the NHS patient survey was 50%. The response rate for the nurse survey was 37%. The nurse  
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5 survey has good established predictive validity in previous research (6, 29), showing, for  
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7 example, that nurses' reports of quality of care are closely associated with patient mortality  
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9 derived from independent data sources (30).  
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14 Patients were not participants in the initial design of the overall study but were actively  
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16 engaged in the development of measures of patients' experiences with care used in the study.  
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18 The Picker Institute, developers of the NHS Adult Inpatient Survey, employed patient focus  
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20 groups and cognitive interviews with patients during pilot testing. Patients were offered one page  
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22 to describe what they thought of the inpatient questionnaire and which aspects of patient care  
23  
24 were most important to them. The qualitative research did not identify major questions missing  
25  
26 from the survey but it did lead to minor modifications that were incorporated (31). Patients in our  
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28 study are anonymous. We have a detailed plan to disseminate the study results through print,  
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30 broadcast, and social media in every participating country. We gratefully acknowledge the  
31  
32 contributions of participating patients in the acknowledgement section.  
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### 38 **Analysis strategy**

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41 These data were used to undertake three distinct but related analyses. First, we use patient  
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43 data from all 161 trusts to describe how patients rated their care, how their ratings varied  
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45 depending on their perceptions of whether there were enough nurses on duty to provide needed  
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47 care, and how they were as much a function of their confidence in nurses as their confidence in  
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49 doctors. We then used the nurse data from the 46 hospitals in the 31 trusts to describe the  
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51 variation in RN staffing and hospital work environments, and then used least-squares regression  
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53 models with and without control variables to show how lower RN staffing levels and poorer  
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3 work environments are related to needed but missed nursing care. Finally, since patient survey  
4 data were only available at the trust level, we merged the nurse data from the 31 trusts with  
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6 patient data from those same trusts and used logistic regression models to estimate whether and  
7  
8 to what extent the overall level of missed nursing care in the different trusts affect patients'  
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10 ratings of their care and their confidence in nurses, before and after controlling for potential  
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12 confounds. Because the nurse survey was restricted to nurses on medical and surgical units, this  
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14 final step of the analysis was restricted to patients in general surgical and medical wards (5,311  
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16 out of 12,851 patients in the study trusts).  
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## 22 RESULTS

### 23 Nurses, Doctors, and Patient Ratings of Care.

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29 **Table 1** and **Figure 1** use data from 66,348 patients in 161 trusts collected in the 2010  
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31 NHS Survey of Inpatients to show how patients' ratings of their care are highly associated with  
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33 their confidence in nurses and in doctors, and with their perceptions of whether there were  
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35 enough nurses to provide needed care. The first column of Table 1 shows the percentages of  
36  
37 patients responding to the NHS survey that reported having confidence and trust in the nurses  
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39 and doctors treating them, as well as the percentage that reported that there were enough nurses.  
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41 The second column of Table 1 shows the percentages of patients that rated their care as  
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43 excellent, based on how much confidence and trust they had in their nurses and doctors, and their  
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45 perceptions of the adequacy of the number of nurses on duty. Similar percentages of patients  
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47 always had confidence and trust in their doctors (80%) and nurses (75%), and very few patients  
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49 had no trust in their doctors and nurses (3% in each case). Only 60% of the patients indicated  
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51 that there were always enough nurses to care for them, and one in 10 patients indicated that there  
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53 were never or rarely enough nurses. Hospital care was rated excellent by over half of the patients  
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3 who indicated that they always had confidence and trust in their doctors (53%) and in their  
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5 nurses (55%). However, care was rated as excellent by only 10% of the patients who only  
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7 sometimes had confidence and trust in their doctors or nurses, and by only 3% of the patients  
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9 who never had confidence and trust in their doctors or nurses. Similarly, hospital care was rated  
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11 as excellent by 57% of the patients who indicated that there were always enough nurses to care  
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13 for them, while it was rated excellent by only 27% of the patients who said there were only  
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15 sometimes enough nurses, and by only 14% of the patients who said there were rarely or never  
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17 enough nurses.  
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22 While Table 1 makes it clear that nurses, like doctors, are importantly related to patients'  
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24 perceptions of the quality of their care, Figure 1 shows more directly that confidence and trust in  
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26 nurses is of equal importance to confidence and trust in doctors. Sixty percent of patients who  
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28 have confidence and trust in both doctors and nurses rate their care as excellent, while only three  
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30 percent of patients who have confidence and trust in neither rate their care as excellent. When  
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32 confidence and trust in either group erodes, the result is virtually identical. Only 16% of the  
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34 patients who have confidence and trust in their doctors but not nurses rate their care as excellent,  
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36 and only 17% of the patients who have confidence and trust in their nurses but not doctors rate  
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38 their care as excellent.  
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**Table 1. Patient Reports about Nurses and Doctors, and the Percent Indicating Their Care was “Excellent,” Based on Their Reports about Doctors and Nurses.**

<u>Patient Survey Question</u>		<u>Percent of Patients in Each Response Category</u>	<u>Percent of Patients in Each Response Category Indicating That Their Care was “Excellent”</u>
<b>Did you have confidence and trust in the doctors treating you?</b>	Yes, always	80.4%	52.6%
	Yes, sometimes	16.4%	9.4%
	No	3.1%	3.4%
	<b>Total</b>	<b>100.0%</b>	
<b>Did you have confidence and trust in the nurses treating you?</b>	Yes, always	75.1%	55.3%
	Yes, sometimes	21.7%	10.5%
	No	3.2%	2.8%
	<b>Total</b>	<b>100.0%</b>	
<b>Were there enough nurses on duty to care for you in the hospital?</b>	Always or nearly always	60.4%	57.3%
	Sometimes	29.5%	26.7%
	Never or rarely	10.1%	14.1%
	<b>Total</b>	<b>100.0%</b>	

**Source:** Data are from the 2010 NHS Survey of Inpatients, which involved 66,348 patients discharged from 161 trusts in England.

**Note:** The numbers reported exclude a small number (< 2%) of missing responses.

### Nurse Staffing, Work Environments, and Missed Nursing Care

Nurse (RN) staffing was estimated for the 46 hospitals included in RN4CAST-England by average nurse workloads in each hospital on the day shift. Nurses reported how many patients they cared for on their last shift, and then responses are averaged across all nurses in each hospital working the day shift. Nurse workloads averaged 8.6 patients per RN during the day, and ranged from 5.6 patients per RN to 11.5 patients per RN across the 46 hospitals. Patient to

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3 RN ratios were much higher and more variable at night so we elected to use day shift staffing  
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5 only in our analyses.  
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9 Hospital work environment was measured by the Practice Environment Scale of the  
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11 Nursing Work Index (PES-NWI), an extensively used survey-based measure with established  
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13 reliability and validity (32-35) leading to its adoption by the National Quality Forum as a nurse  
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15 sensitive quality of care indicator (36 ). The measure of work environment used is a composite  
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17 measure formed from 5 subscales (comprised of 28 nurse survey items) measuring resource  
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19 adequacy (4 items), nurse participation in hospital affairs (8 items), nursing foundations for  
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21 quality care (9 items), nurse manager ability, leadership, and support of nurses (4 items), and  
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23 nurse-physician relations (3 items). The staffing and resource adequacy subscale was dropped  
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25 from the global measure used in the analysis because of its high correlation with the direct  
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27 measure of RN staffing in the model, as in previous publications (37, 12).  
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34 What makes the variability in staffing and work environments across hospitals of  
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36 considerable importance is that when RNs have high patient loads, and when RNs practice in  
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38 poor work environments, necessary nursing care can be missed because of lack of time (21).  
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40 Nurses in this study were asked whether any of thirteen important types of nursing care were  
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42 needed but missed because of lack of time. **Figure 2** shows that while 7% of nurses reported  
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44 that they lacked time to complete necessary pain management, and 11% missed treatments and  
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46 procedures, much greater percentages reported lacking the time to educate patients and their  
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48 families (52%) and comfort or talk with their patients (65%). More than a quarter of the nurses  
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50 (27%) lacked the time to complete three or four of the types of care listed, just under one in five  
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52 (19%) lacked the time to complete five or six of them, and another 19% lacked the time to  
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54 complete seven or more of the 13 types of care listed.  
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**Table 2** provides regression coefficients that indicate the effects of RN staffing and the hospital work environment on the average number of types of missed care, before and after controlling for various hospital characteristics (including size, technology, and location), and characteristics of nurses that may have affected their reports of missed care, including their role (primary nurse or shared responsibility for group of patients with other nurses), full-time status, years of experience, and unit type (medical, surgical, or combined). Higher nurse workloads (higher patient to RN ratios) are significantly related to higher numbers of types of missed care, while better work environments are significantly related to fewer types of missed care, both before and after adjustment.

**Table 2. Regression Coefficients Indicating the Effects of Staffing and Practice Environment on Average Number of Types of Care Missed**

Regression Coefficients [and 95% Confidence Intervals]		
Effect on Missed Care of -	Unadjusted	Adjusted
Patient to Nurse Ratio	0.11*** [0.06,0.16]	0.15*** [0.10,0.19]
Practice Environment	-0.30* [-0.55,-0.05]	-0.26* [-0.48,-0.04]

**Source:** Data are from the 2010 RN4CAST-England study, which surveyed 2,963 inpatient medical and surgical direct care professional nurses (RNs) in a representative sample of 31 NHS trusts comprised of 46 different hospitals.

**Notes:** Adjusted Coefficients and confidence intervals are from regression models which control for hospital characteristics (Beds > 750, High Technology, and Location) and nurse characteristics (Nurse Role, Full-time Status, Years of Experience and Unit Type). Practice environment is measured by the PES-NWI tertile.

Single, double and triple asterisks denote coefficients that are significant at the .05, .01, and .001 levels, respectively.

**Figures 3 and 4** show how much the number of tasks left undone varies as a function of RN staffing and hospital work environments, as estimated from the adjusted models. As the

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3 number of patients per RN goes down, from 12 patients to 8 patients to 4 patients, the average  
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5 number of types of missed care goes down, from 4.4 (out of 13) to 3.8 to 3.2. And, as hospital  
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7 work environments improve, from relatively poor (lowest tertile) to average (middle tertile) to  
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9 relatively good (highest tertile), the average number of types of missed care also goes down,  
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11 from 4.2 to 4.0 to 3.7.  
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### 14 15 16 Missed Nursing Care and Patient Outcomes 17

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19 The association of the number of types of missed care with patient outcomes is shown in  
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21 **Table 3.** The coefficients in the table are odds ratios which indicate how much the odds on  
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23 providing a positive response to the nine different dimensions of patient satisfaction go down as  
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25 the average number of types of missed care goes up, both before (unadjusted) and after  
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27 (adjusted) taking account patient characteristics that might affect their responses, including  
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29 gender, age, length of stay, ward, number of long standing conditions, and type of admission  
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31 (emergent/urgent or planned). In all cases, the odds ratios are less than one, indicating that  
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33 positive patient appraisals of care decrease as the number of types of missed care increases; in  
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35 six of the eight aspects of patient care rated the odds ratios are significant, and range from 0.78 to  
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37 0.86. These values indicate, for example, that in hospitals in which the number of types of  
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39 missed care averaged 4.5 per nurse per shift, the odds on patients rating care as excellent and  
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41 responding that the purpose of medicines were completely explained were 22% lower and 14%  
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43 lower, respectively, than in hospitals in which the number of types of missed care averaged 3.5  
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45 per nurse per shift.  
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**Table 3. Odds Ratios Indicating the Effect of the Trust Median Number of Types of Care Missed on Various Patient Outcomes**

Effect of the Median Number of Types of Care Missed on Patient Outcomes	Odds Ratios [and 95% Confidence Intervals]	
	Unadjusted	Adjusted
<b>Rate Care Excellent</b>	0.79 <sup>***</sup>	0.78 <sup>***</sup>
	[0.69,0.90]	[0.68,0.90]
<b>Did Not Want To Complain About Care</b>	0.92	0.92
	[0.76,1.12]	[0.77,1.11]
<b>Always Felt Treated with Respect and Dignity</b>	0.89	0.92
	[0.78,1.02]	[0.81,1.06]
<b>Completely Explained Purpose of Medicines</b>	0.87 <sup>*</sup>	0.86 <sup>**</sup>
	[0.78,0.98]	[0.77,0.95]
<b>Doctors and Nurses Work Together Excellent</b>	0.84 <sup>**</sup>	0.82 <sup>**</sup>
	[0.74,0.94]	[0.72,0.93]
<b>Always Got Answers I Could Understand</b>	0.84 <sup>**</sup>	0.83 <sup>***</sup>
	[0.75,0.95]	[0.76,0.91]
<b>Always Have Confidence and Trust In Nurses</b>	0.86 <sup>*</sup>	0.85 <sup>*</sup>
	[0.74,0.99]	[0.73,0.99]
<b>Always or Nearly Always Enough Nurses</b>	0.87 <sup>*</sup>	0.85 <sup>**</sup>
	[0.76,0.99]	[0.75,0.96]

**Source:** Data are from a merged file that included information from 31 NHS trusts for which both patient information (from 5,311 general medical and surgical patients included in the 2010 NHS Survey of Inpatients) and nurse information (from 2,963 medical and surgical nurses surveyed in the 2010 RN4CAST-England study) were available.

**Notes:** Adjusted models control for hospital characteristics (Beds > 750, High Technology, and Location) and patient characteristics that might affect responses, including gender, age, length of stay, ward, number of long standing conditions and type of admission (emergent/urgent or planned).

Single, double and triple asterisks denote coefficients that are significant at the .05, .01, and .001 levels, respectively.



## DISCUSSION

National survey data from patients experiencing a hospitalization in an NHS hospital in England confirm that patients have a high level of trust and confidence in RNs, evidence that refutes the narrative blaming quality of care deficits in NHS hospitals on uncaring nurses. However, only 60 percent of patients indicated that there were always enough RNs to care for them, and one in 10 patients indicated that there were never or rarely enough RNs. The importance to patients of adequate RN staffing is evident in their responses; 57% of patients who indicated that there were always or nearly always enough RNs to care for them rated care as excellent, compared with only 14% of the patients who said there were rarely or never enough. These findings reinforce from patients' perspectives the importance of adequate hospital RN staffing.

Further insights into how quality of care might be improved in NHS hospitals is revealed when data from the NHS Inpatient Survey is linked with information on actual hospital RN staffing and nurses' assessments of the quality of their work environments. We found substantial variation across general acute hospitals in patient-to-nurse workloads. Nurses in some NHS hospitals are caring for twice as many patients at a time as nurses in other hospitals. Current NHS policies devolving greater autonomy to hospital management to make decisions about RN staffing may be contributing to the substantial observed variation in staffing, and have led experts to point to the need for checks and balances to minimize the risk of more quality failures linked to inadequate RN staffing (38). Our findings show that the substantial differences in RN staffing across NHS hospitals are associated with the extent to which needed nursing care is missed. The most frequently missed types of care include those that patients may readily recognize are missing--comforting and talking with patients, and teaching patients and family

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3 members how to manage care following discharge. Our results are consistent with other research  
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5 showing that higher patient workloads for RNs in NHS hospitals are associated with adverse  
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7 patient outcomes including higher hospital mortality (4, 5, 22). Initiatives such as those recently  
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9 adopted in Wales (39) establishing an upper limit to how many patients nurses can safely and  
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11 effectively care for holds promise for further improvements in patients' satisfaction with hospital  
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13 care, and may save lives as well.  
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17 Another modifiable feature of hospital care found to be relevant to patients' perceptions  
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19 of their care is the quality of the hospital work environment. In hospitals rated by nurses to have  
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21 less favorable clinical work environments, needed but missed nursing care is more extensive.  
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23 Patients' perceptions of care are less favorable when missed care is more extensive. Research  
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25 suggests that hospital work environments that support RNs to provide care efficiently and  
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27 effectively, and without constant interruptions because of operational failures such as missing  
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29 medications and equipment (40), are reasonably low cost interventions and return good value in  
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31 terms of better patient outcomes at the same or lower costs (41,42). Magnet hospitals formally  
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33 recognized for their good hospital work environments have significantly higher patient  
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35 satisfaction than matched non-Magnet hospitals (43). One of the first Magnet hospitals  
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37 accredited outside the U.S. was a NHS trust in England, which research showed significantly  
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39 improved its work environment and care quality during the process of achieving Magnet  
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41 accreditation (44). Unfortunately, the NHS merged the Magnet facility out of existence after a  
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43 year, and there has not been a Magnet accredited hospital in England in over 15 years.  
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51 Patients' confidence in both doctors and nurses is equally important in how patients rate  
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53 their hospitals; few patients that have high confidence in their doctors but little confidence in  
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55 their nurses rate their hospitals highly. This finding is relevant to policy decisions governing the  
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3 composition of the NHS workforce in England. Between 2010 and 2015, the number of  
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5 physician consultants (mostly inpatient physicians) increased by more than one-fifth while the  
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7 number of RNs increased only one percent (45).  
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10 Our study has many strengths including use of validated measures of patient satisfaction,  
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12 nurse staffing, hospital work environment, and missed nursing care across large numbers of NHS  
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14 hospitals. The study has limitations as well. Data from both patients and nurses is cross sectional  
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16 thus limiting causal inferences about the associations found. We take into account, to the extent  
17  
18 possible, alternative explanations about factors that could be associated with our findings  
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20 including characteristics of hospitals such as teaching status, and characteristics of the patients  
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22 responding to the national survey, including their health status since self-reported limiting long-  
23  
24 term conditions have been found to be associated with less favorable perceptions of care (46).  
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26 Our data are from 2010 but remain the only comprehensive data on hospital nurse workforce and  
27  
28 patient satisfaction across large numbers of NHS hospitals in England. Moreover, our interest is  
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30 in the relationship between patient satisfaction and nurse resources, and there is no reason to  
31  
32 expect the relationship to have changed since 2010. Indeed, Sir Robert Francis, author of the  
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34 public inquiry into quality of care deficiencies at the Mid Staffordshire NHS Trust (1),  
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36 commented as recently as July 2017 that safe nurse staffing in England still lacks a standardized  
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38 approach and substantial variation across hospitals in nurse staffing remains (47).  
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## 45 **CONCLUSIONS**

46  
47 Patients express a high level of confidence and trust in nurses, and their satisfaction with  
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49 hospital care is less favorable when they perceive there are not enough nurses available. The  
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51 narrative that quality deficits in hospitals are due to “uncaring” nurses is not supported by the  
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53 evidence. To the contrary, our findings suggest that ensuring adequate numbers of RNs at the  
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3 hospital bedside and improved hospital clinical care environments are promising strategies for  
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5 enhancing patient satisfaction with care.  
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4 hospitals that participated in our study, and the RN4CAST Consortium.  
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6

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8

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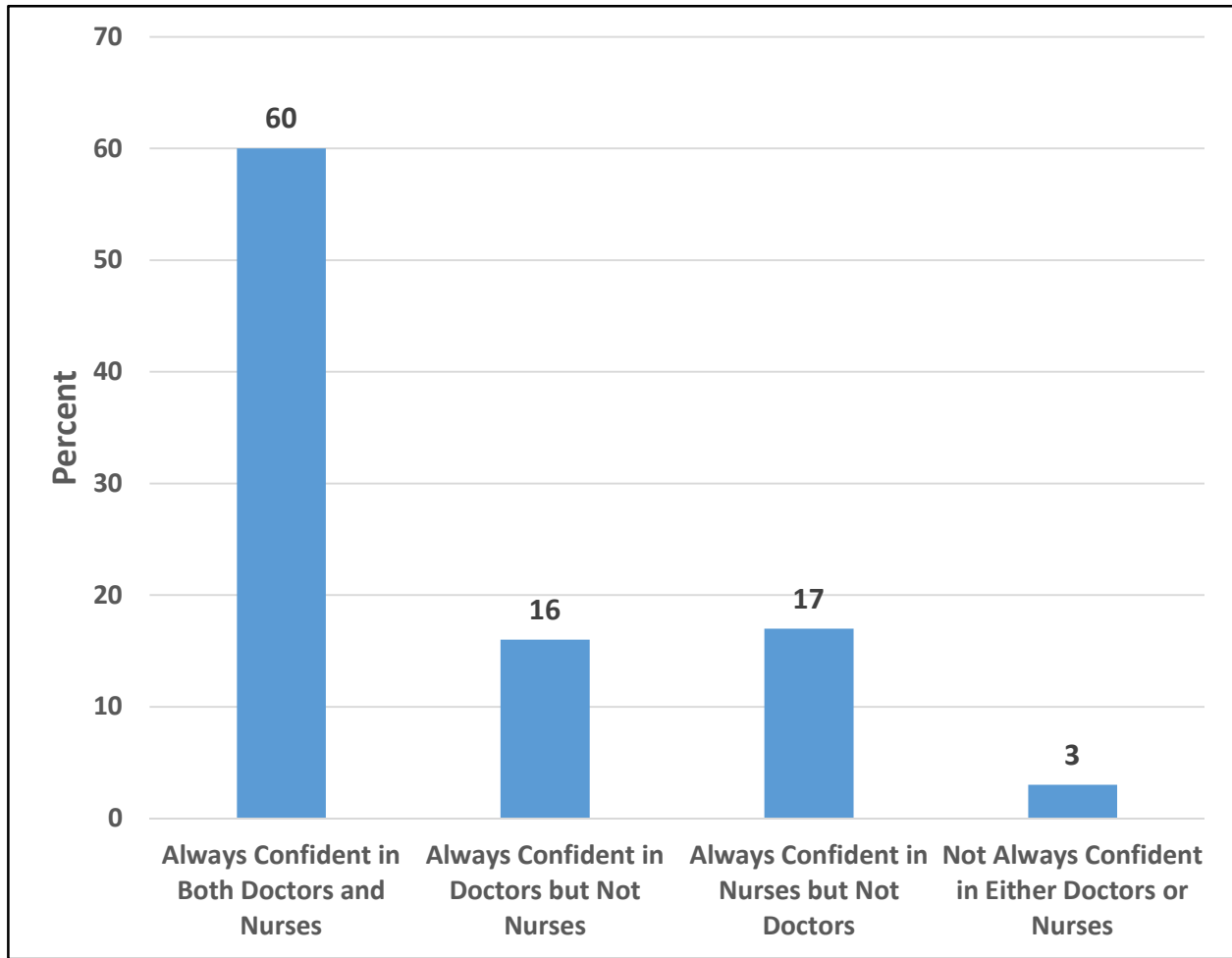
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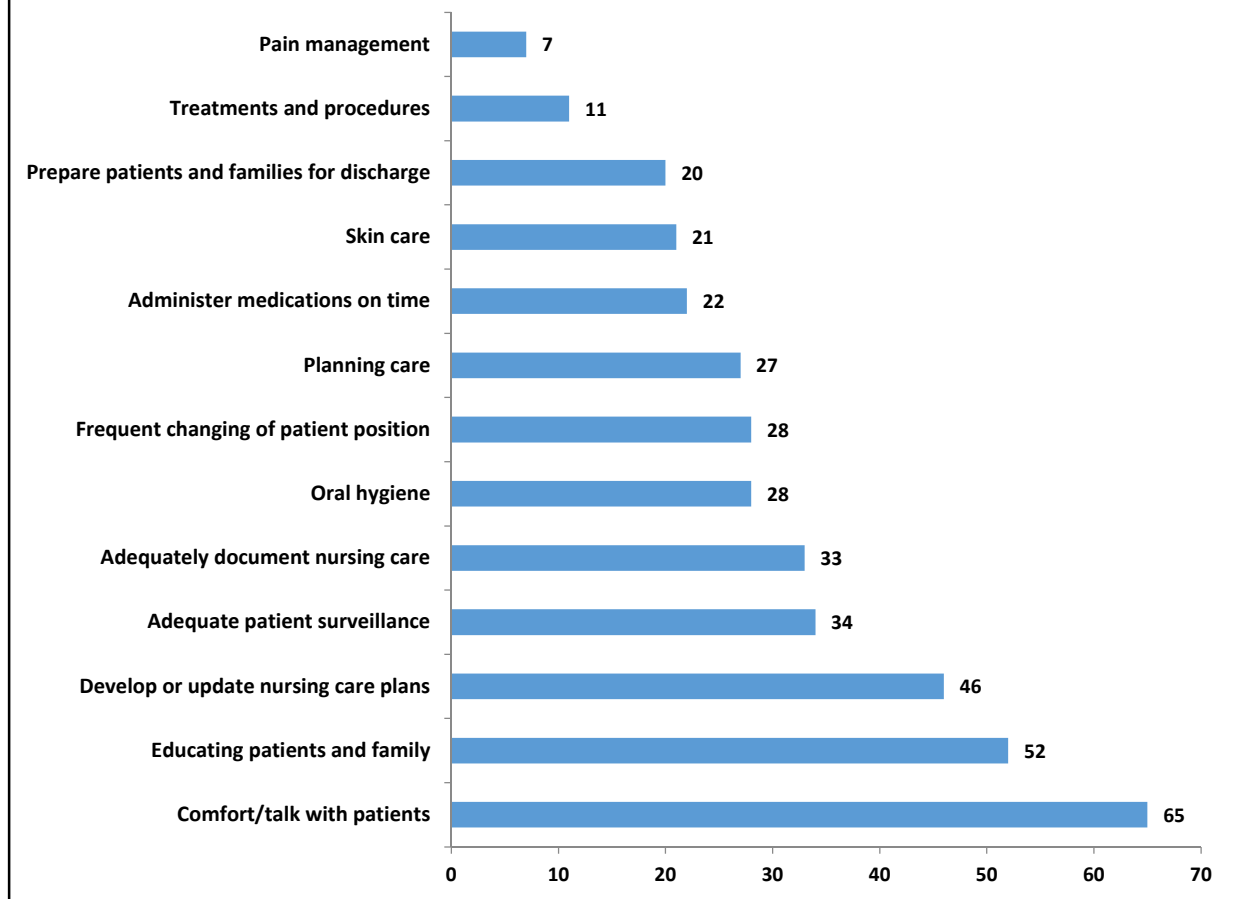
Figure 1. Percent of Patients Rating Their Care Excellent, by Confidence in Nurses and



Doctors

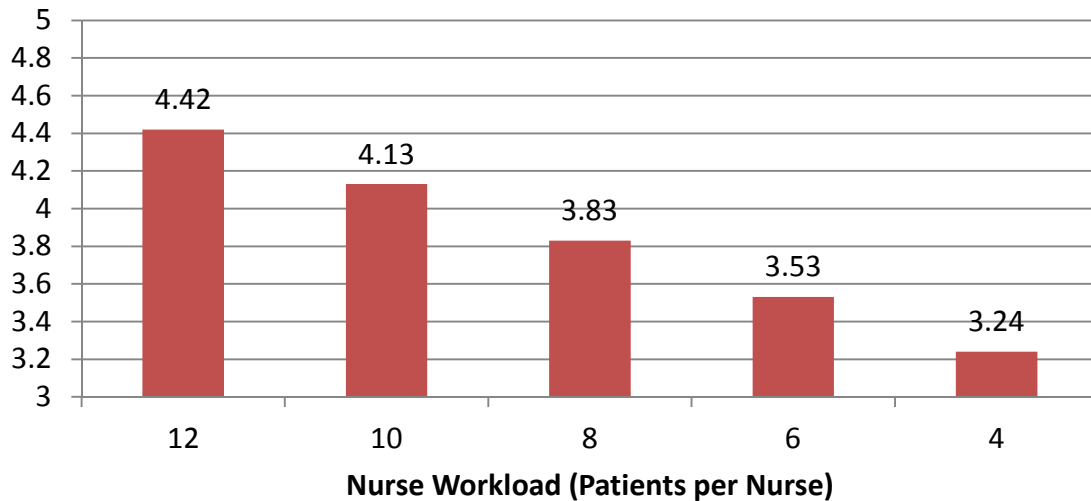
Source: Data are from the 2010 NHS Survey of Inpatients, which involved 66,348 patients discharged from 161 trusts in England.

**Figure 2. Percent of of Nurses Reporting That Different Types of Care Were Missed on Their Last Shift**



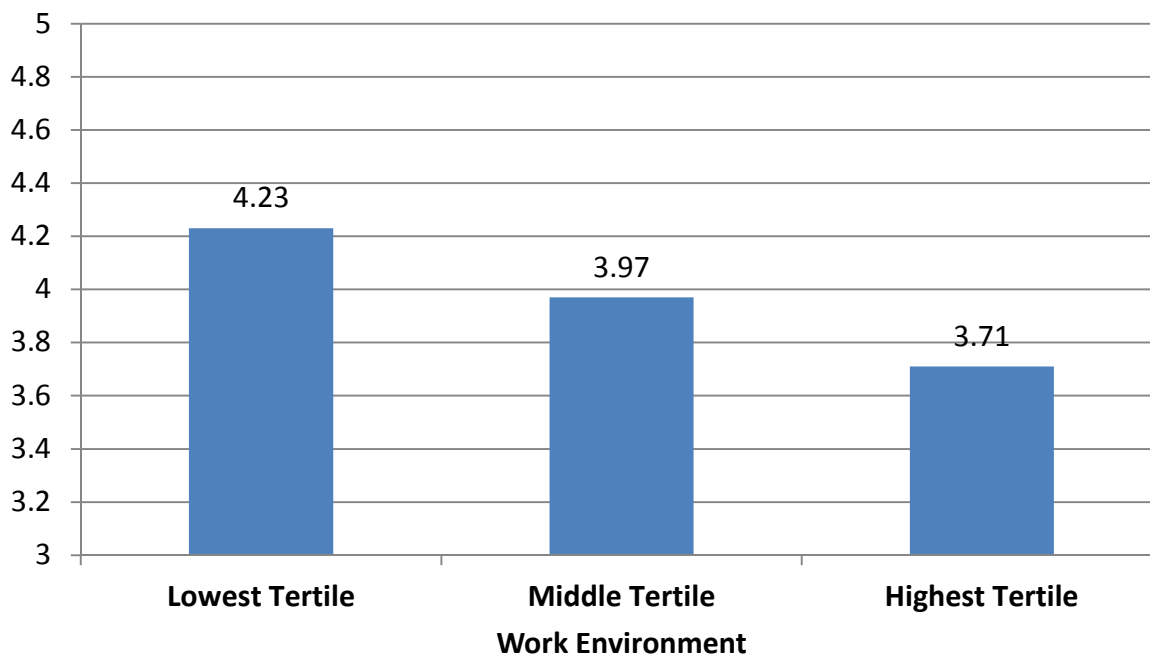
**Source:** Data are from the 2010 RN4CAST-England study, which surveyed 2,963 inpatient medical and surgical direct care professional nurses (RNs) in a representative sample of 31 NHS trusts comprised of 46 different hospitals.

Figure 3. Average Number of Types of Missed Care, by Nurse Workload



Source: Data are from the 2010 RN4CAST-England study, which surveyed 2,963 inpatient medical and surgical direct care professional nurses (RNs) in a representative sample of 31 NHS trusts comprised of 46 different hospitals.

Figure 4. Average Number of Tasks Left Undone, by Work Environment



Source: Data are from the 2010 RN4CAST-England study, which surveyed 2,963 inpatient medical and surgical direct care professional nurses (RNs) in a representative sample of 31 NHS trusts comprised of 46 different hospitals.

## Appendix

## Patient Responses To Survey Items Related to Their Care.

Survey Question	NHS Survey Sample		RN4CAST Sample	
	Number	Percent	Number	Percent
<b>Overall Rating of Care</b>				
Very Good, Good, Fair or Poor	11,290	61.3	3,183	62.0
Excellent	7,128	38.7	1,950	38.0
Total	18,418	100.0	5,133	100.0
<b>Wanted To Complain About Your Care</b>				
Yes	1,727	9.5	489	9.7
No	16,422	90.5	4,554	90.3
Total	18,149	100.0	5,043	100.0
<b>Felt Treated with Respect and Dignity</b>				
No or Only Sometimes	4,400	24.3	1,254	24.3
Always	14,031	75.7	3,899	75.7
Total	18,431	100.0	5,153	100.0
<b>Completely Explained Purpose of Medicines*</b>				
No or Only to Some Extent	3,909	28.7	1,170	30.4
Yes Completely	9,726	71.3	2,684	69.6
Total	13,635	100.0	3,854	100.0
<b>Doctors and Nurses Work Together Excellent</b>				
Very Good, Good, Fair or Poor	11,929	64.9	3,325	64.9
Excellent	6,443	35.1	1,801	35.1
Total	18,372	100.0	5,126	100.0
<b>Got Answers I Could Understand</b>				
No or Only Sometimes	6,330	37.4	1,790	37.9
Always	10,596	62.6	2,933	62.1
Total	16,926	100.0	4,723	100.0
<b>Always Have Confidence and Trust In Nurses</b>				
No or Only Sometimes	5,197	27.6	1,413	27.1
Always	13,619	72.4	3,806	72.9
Total	18,816	100.0	5,219	100.0
<b>Always Have Confidence and Trust In Doctors</b>				
No or Only Sometimes	4,636	24.7	1,294	24.9
Always	14,112	75.3	3,905	75.1
Total	18,748	100.0	5,199	100.0
<b>Enough Nurses on Duty to Care for You</b>				
Sometimes, Rarely or Never	8,343	44.6	2,363	45.5
Always or Nearly Always	10,378	55.4	2,832	54.5
Total	18,721	100.0	5,195	100.0

Note: Survey items for which differences are significant (at  $p < .05$ ) are denoted by asterisks.

STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies* (Note: page numbers below refer to the page numbers at the bottom of each page in the document, not the electronic page numbers).

	Item No	Recommendation
<b>Title and abstract</b>	1	(a) Indicate the study's design with a commonly used term in the title or the abstract <i>The observational and cross-sectional study design is noted in the Title Page (p. i) and Abstract page (p. ii, Title and Design sections).</i> (b) Provide in the abstract an informative and balanced summary of what was done and what was found <i>The study design, settings, participants, outcome measure and results are described in the Abstract (p. ii).</i>
<b>Introduction</b>		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported <i>The background and rationale are explained in the "Introduction" (p. 1-2)</i>
Objectives	3	State specific objectives, including any prespecified hypotheses <i>The primary objective of the study is stated in the last paragraph of the introduction (p. 2)</i>
<b>Methods</b>		
Study design	4	Present key elements of study design early in the paper. <i>Key elements of the study design are described in the Abstract (pg. ii) and in the Methods section of the paper (p. 3-4)</i>
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection. <i>The setting, locations and dates of the trusts, patients and nurses from which data were collected are given in the first paragraph of the Methods section (p. 3).</i>
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants. <i>We describe the sampling of trusts, patients and nurses in the Methods section (p. 3). We also reference prior publications which contain additional details in the text on that page.</i>
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable. <i>Key patient variables (including patient ratings of care and satisfaction, and nurse staffing, work environments, and missed nursing care) are described in general on p. 5-6, and additional details on control variables used are given in the note below Table 2 (p. 9).</i>
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group. <i>Data are from the NHS patient satisfaction survey and RN4CAST nurse survey as described on p. 3.</i>
Bias	9	Describe any efforts to address potential sources of bias <i>We attempted to obtain unbiased results by using logistic regression models before and after adjusting for hospital, nurse and patients characteristics, as indicated in the text and notes related to Tables 2 (p. 9) and 3 (p. 11).</i>
Study size	10	Explain how the study size was arrived at <i>We describe the sampling of trusts, patients and nurses in the Methods section (p. 3). We also reference prior publications which contain additional details in the text on p. 3.</i>

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Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why. <i>Some quantitative variables (i.e. nurse staffing, nurse experience, number of types of missed care) were treated as continuous and not grouped. We describe grouping of work environment in the Methods section (p. 3). Numerous control variables were dichotomous and represented by dummy variables [see notes to Tables 2 (p. 9) and 3 (p. 11) and related text.</i>
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding <i>We discuss the least squares and logistic regression models we used in the Analysis Strategy sub-section of the Methods section (p. 4).</i>
		(b) Describe any methods used to examine subgroups and interactions <i>We have not, as yet, investigated subgroup differences and interactions with these data.</i>
		(c) Explain how missing data were addressed <i>Information on missing data for the NHS Inpatient Survey are negligible, and described in previous work that we have referenced. We note that for the measures we considered (cf., Note for Table 1, p. 7) that the numbers reported exclude a small number (&lt; 2%) of missing responses. Missing information also was negligible for most of the measures derived from the nurse survey, and ranged from roughly 2% to 5%.</i>
		(d) If applicable, describe analytical methods taking account of sampling strategy. <i>Robust regression procedures were used to account for the clustering of patients and nurses in the hospitals and trusts.</i>
		(e) Describe any sensitivity analyses <i>We report unadjusted and adjusted results in Tables 2 (p. 9) and 3 (p. 11), and found that our results remained significant even after adjustment for potential confounds.</i>
<b>Results</b>		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. <i>The numbers of trusts, nurses and patients sampled are given in the abstract (p. ii) and on p. 3, where response rates are indicated).</i>
		(b) Give reasons for non-participation at each stage. <i>We note on p. 4 that nurse survey data were available for only some 31 of the 161 trusts for which</i>
		(c) Consider use of a flow diagram. <i>Not helpful here.</i>
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. <i>Numbers and characteristics of trusts and patients are shown in Tables 1 (p. 7), 2 (p. 9), and 3 (p. 11) (Also see related text). More detailed information on the trusts, patients and nurses in the study can be found in related papers that are cited.</i>
		(b) Indicate number of participants with missing data for each variable of interest.
Outcome data	15*	Report numbers of outcome events or summary measures. <i>The patient satisfaction outcome data is given in the Appendix (separate from Main Document).</i>
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included. <i>Unadjusted and adjusted estimates are</i>

*shown in Tables 2 (p. 9) and 3 (p. 11).*

(b) Report category boundaries when continuous variables were categorized.

**Category boundaries for the categorized continuous variable, nurse work environment, are described on p. 6-7 of Methods.**

(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period. **Not relevant.**

Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses <b>See 12b above.</b>
<b>Discussion</b>		
Key results	18	Summarise key results with reference to study objectives ( <i>see Discussion, p. 12-14 and Conclusion p. 14-15</i> )
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias. <b>See last paragraph in Discussion section on p. 14.</b>
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence <b>See Discussion (p. 12-14) and Conclusions sections (p. 14-15).</b>
Generalisability	21	Discuss the generalisability (external validity) of the study results. <b>While point estimates of factors (like the nursing characteristics) and satisfaction likely vary from trust to trust, we believe the associations found are likely generalizable to all NHS trusts, as we note in the conclusion at the end (p. 14-15).</b>
<b>Other information</b>		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based. <b>Funding is from the European Union's Seventh Framework Program (223468) and the National Institute of Nursing Research, National Institutes of Health (R01NR014855). The funders had no role in the research or the writing of this manuscript.</b>

\*Give information separately for exposed and unexposed groups.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at [www.strobe-statement.org](http://www.strobe-statement.org).



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## Patient Satisfaction with Hospital Care and Nurses in England: An Observational Study

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## TITLE PAGE

**Patient Satisfaction with Hospital Care and Nurses in England: An Observational Study**

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**Contributors:** LHA raised the funding, developed the idea for the study, interpreted results, drafted and revised manuscript; DMS conducted the analysis, drafted the results, contributed to manuscript revisions; JB collected survey data, contributed to manuscript development; LB contributed to results interpretation and manuscript drafting and revisions; AMR contributed to data collection, interpretation of results, manuscript revisions; PG contributed to obtaining data, results interpretation, manuscript development and revisions.

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**Competing interests:** None declared

**Ethics approval:** The study was approved by the University of Pennsylvania human subjects committee.

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## Patient Satisfaction with Hospital Care and Nurses in England: An Observational Study

### ABSTRACT (285 words)

**Objectives** –To inform healthcare workforce policy decisions by showing how patient perceptions of hospital care are associated with confidence in nurses and doctors, nurse staffing levels, and hospital work environments.

**Design** – Cross-sectional surveys of 66,348 hospital patients and 2,963 inpatient nurses.

**Setting** – Patients surveyed were discharged in 2010 from 161 National Health Service (NHS) trusts in England. Inpatient nurses were surveyed in 2010 in a sample of 46 hospitals in 31 of the same 161 trusts.

**Participants** - The 2010 NHS Survey of Inpatients obtained information from 50% of all patients discharged between June and August. The 2010 RN4CAST England Nurse Survey gathered information from inpatient medical and surgical nurses.

**Main outcome measures** – Patient ratings of their hospital care, their confidence in nurses and doctors, and other indicators of their satisfaction. Missed nursing care was treated as both an outcome measure and explanatory factor.

**Results** – Patients' perceptions of care are significantly eroded by lack of confidence in either nurses or doctors, and by increases in missed nursing care. The average number of types of missed care was negatively related to six of the eight outcomes-- odds ratios ranged from 0.78 (95% CI = 0.68 to 0.90) for excellent care ratings to 0.86 (95% CI = 0.77 to 0.95) for medications completely explained-- positively associated with higher patient-to-nurse ratios ( $b = 0.15$ , 95% CI = 0.10 to 0.19), and negatively associated with better work environments ( $b = -0.26$ , 95% CI = -0.48 to -0.04).

**Conclusions** – Patients' perceptions of hospital care are strongly associated with missed nursing care, which in turn is related to poor RN staffing and poor hospital work environments. Improving RN staffing in NHS hospitals holds promise for enhancing patient satisfaction.

### Strengths and limitations of this study

- This is the first quantitative study to determine the association between patients' confidence in nurses and doctors, RN staffing, and patient experiences with hospital care in NHS hospitals in England using the national NHS Adult Inpatient Survey.
- Unique data previously unavailable enable a rigorous analysis of patient to RN staffing ratios, missed nursing care, and patient satisfaction with hospital care.
- The study uses cross-sectional data, and while a number of alternative explanations are considered in our models, we cannot rule out the possibility that omitted variables contribute to associations found.

## Patient Satisfaction with Hospital Care and Nurses in England: An Observational Study

### INTRODUCTION

Highly publicized reports citing preventable deaths and deficiencies in hospital care in England have uniformly concluded that inadequate hospital nurse (RN) staffing is a contributing factor (1-3). Studies confirm large variation in patient to RN ratios across National Health Service (NHS) hospitals, and this variation is associated with higher mortality in hospitals where RNs care for more patients each (4-6). However, despite national guidance on safe nurse staffing (7), substantial variation still exists and the value of higher RN staffing levels is still questioned at the policy level (8). Recently introduced NHS workforce initiatives have been framed in the unsubstantiated narrative that quality deficiencies in hospitals are due to “uncaring” nurses (9,10). The National Advisory Group on the Safety of Patients in England specifically advised that nurses and other NHS staff not be blamed for quality deficits, pointing instead to the need to address insufficient RN staffing (3). Nevertheless new workforce initiatives have been introduced by the NHS purportedly to produce more caring nurses. One such initiative creates a new provider category, the nursing associate, with substantially lower qualifications than RNs (11). Adding lesser trained providers to the hospital workforce without adding more RNs results in eroding the nursing skill mix that evidence suggests is associated with higher mortality and lower patient satisfaction (12). Also, the NHS is reinstating apprentice training for RNs (13), in direct opposition to a major recommendation of the 2010 Prime Minister’s Commission on the Future of Nursing and Midwifery in England (14) that all nursing education should take place in universities because evidence shows that hospitals with a higher proportion of bachelors-prepared nurses have significantly better patient outcomes (6,15,16).

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3 The concern about nurses being uncaring or lacking in compassion, and subsequent NHS  
4 nursing initiatives, have come about largely in response to case studies of poor care in a  
5 relatively small number of NHS trusts and anecdotal reports of patient dissatisfaction.  
6  
7 Surprisingly little use has been made of the NHS National Inpatient Survey of patients to inform  
8 strategies to improve care (17). When initiated in 2001, England's annual national survey of  
9 patients following a hospital inpatient stay was the first in the world; it aimed to make the NHS  
10 more patient-centered and more responsive to patient feedback (18). A report published in 2007  
11 using the NHS Inpatient Survey found evidence that the experiences of staff working in the NHS  
12 mirrored the experiences of patients receiving care (19). This is a worrisome finding given the  
13 evidence showing high nurse burnout and job dissatisfaction is common in NHS hospitals (10,  
14 20), and that 85% of RNs in NHS hospitals report not being able to complete needed nursing  
15 care due to lack of time associated with high patient to nurse workloads (21). Further, missed  
16 nursing care associated with high patient to nurse workloads is associated with an increased risk  
17 of patient mortality following common surgical procedures in nine European countries including  
18 England (22).  
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39 Studies of patients' experiences with inpatient care in the U.S., another country with  
40 mandated hospital patient satisfaction surveys, reveal that better RN staffing is associated with  
41 higher overall patient ratings of their hospitals (23, 24). Missed nursing care is associated with  
42 less favorable patient satisfaction in U.S. hospitals (25) and in some European hospitals (not  
43 including England) (26). There are not comparable studies in England using the NHS National  
44 Inpatient Survey that could help determine whether better RN staffing and better clinical hospital  
45 work environments are associated with more favorable patient experience with hospital care.  
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3 This paper seeks to identify an action agenda that may hold promise for improving  
4 patients' experiences with hospital care in England. Specifically, we first provide evidence of  
5 the importance of RNs to patients using data from a large sample of patients in NHS hospitals in  
6 England to show how patients' experience with care is strongly related to their confidence in  
7 nurses as well as doctors, and their perceptions of whether there were enough nurses in their  
8 hospitals. We then use data from patients and nurses in a subset of these hospitals to show how  
9 lower nurse workloads and better nurse work environments are related to less missed nursing  
10 care and how, in turn, less missed nursing care is related to better patients' experience with their  
11 care.  
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## 24 25 **METHODS**

### 26 27 **Data sources and samples**

28  
29 Patient survey data are from the 2010 NHS Survey of Inpatients, which gathered  
30 information from over 66,000 patients who were discharged from 161 acute and specialist NHS  
31 trusts in England (27). Nurse survey data are from the 2010 RN4CAST-England study (28, 20)  
32 which gathered information from 2,963 inpatient medical and surgical direct care RNs in a  
33 representative sample of 31 of the same 161 NHS trusts. These 31 trusts comprise 46 different  
34 hospitals from which 12,581 of the 66,348 patients surveyed were discharged. Of these 12,851  
35 patients, 5,311 were in general medicine or general surgery wards. The sample of hospitals in  
36 which nurses were surveyed, described elsewhere in detail (21, 28), was a stratified random  
37 sample selected to include teaching and non-teaching hospitals of different sizes in every  
38 geographic region of England. There are no remarkable differences between the sample of  
39 hospitals in which nurses were surveyed and the other hospitals participating in the NHS Survey  
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3 of Inpatients, nor were there any differences in patient characteristics or responses between the  
4 full NHS survey and the 31 trusts studied, as noted in the Appendix table. The response rate for  
5 the NHS patient survey was 50%. The response rate for the nurse survey was 37%. The nurse  
6 survey has good established predictive validity in previous research (6, 29), showing, for  
7 example, that nurses' reports of quality of care are closely associated with patient mortality  
8 derived from independent data sources (30).  
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18 Patients were not participants in the initial design of the overall study but were actively  
19 engaged in the development of measures of patients' experiences with care used in the study.  
20 The Picker Institute, developers of the NHS Adult Inpatient Survey, employed patient focus  
21 groups and cognitive interviews with patients during pilot testing. Patients were offered one page  
22 to describe what they thought of the inpatient questionnaire and which aspects of patient care  
23 were most important to them. The qualitative research did not identify major questions missing  
24 from the survey but it did lead to minor modifications that were incorporated (31). Patients in our  
25 study are anonymous. We have a detailed plan to disseminate the study results through print,  
26 broadcast, and social media in every participating country. We gratefully acknowledge the  
27 contributions of participating patients in the acknowledgement section.  
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### 43 **Analysis strategy**

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46 These data were used to undertake three distinct but related analyses. First, we use patient  
47 data from all 161 trusts to describe how patients rated their care, how their ratings varied  
48 depending on their perceptions of whether there were enough nurses on duty to provide needed  
49 care, and how they were as much a function of their confidence in nurses as their confidence in  
50 doctors. We then used the nurse data from the 46 hospitals in the 31 trusts to describe the  
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3 variation in RN staffing and hospital work environments, and then used least-squares regression  
4 models with and without control variables to show how lower RN staffing levels and poorer  
5 work environments are related to needed but missed nursing care. Finally, since patient survey  
6 data were only available at the trust level, we merged the nurse data from the 31 trusts with  
7 patient data from those same trusts and used logistic regression models to estimate whether and  
8 to what extent the overall level of missed nursing care in the different trusts affect patients'  
9 ratings of their care and their confidence in nurses, before and after controlling for potential  
10 confounds. Because the nurse survey was restricted to nurses on medical and surgical units, this  
11 final step of the analysis was restricted to patients in general surgical and medical wards (5,311  
12 out of 12,851 patients in the study trusts).

## 27 RESULTS

### 31 Nurses, Doctors, and Patient Ratings of Care.

33 **Table 1** and **Figure 1** use data from 66,348 patients in 161 trusts collected in the 2010  
34 NHS Survey of Inpatients to show how patients' ratings of their care are highly associated with  
35 their confidence in nurses and in doctors, and with their perceptions of whether there were  
36 enough nurses to provide needed care. The first column of Table 1 shows that more than three  
37 fourths of patients responding to the NHS survey reported having confidence and trust in the  
38 doctors and nurses treating them, while only 60 percent reported that there were always or nearly  
39 always enough nurses to care for them. The second column of Table 1 shows the percentages of  
40 patients that rated their care as excellent, based on how much confidence and trust they had in  
41 their nurses and doctors, and their perceptions of the adequacy of the number of nurses caring for  
42 them. Hospital care was rated excellent by over half of the patients who indicated that they  
43 always had confidence and trust in their doctors or confidence and trust in their nurses, but by  
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3 only 3% of the patients who never had confidence and trust in their doctors or in their nurses.

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5 Similarly, hospital care was rated as excellent by over half of the patients who indicated that  
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7 there were always enough nurses to care for them, but by far lower percentages of patients who  
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9 said there were only sometimes enough, or rarely or never enough, nurses.  
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12 While Table 1 makes it clear that nurses, like doctors, are importantly related to patients'  
13 perceptions of the quality of their care, Figure 1 shows more directly that confidence and trust in  
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15 nurses is of similar importance to confidence and trust in doctors. In Figure 1 we show the  
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17 percent of patients that rated their care "excellent" after grouping the patients into four  
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19 categories, to distinguish patients who always have confidence and trust in both doctors and  
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21 nurses, in doctors but not nurses, nurses but not doctors, and neither doctors not nurses. Sixty  
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23 percent of patients who have confidence and trust in both doctors and nurses rate their care as  
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25 excellent, while only three percent of patients who have confidence and trust in neither rate their  
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27 care as excellent. When confidence and trust in either group erodes, the result is virtually  
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29 identical. Only 16% of the patients who have confidence and trust in their doctors but not nurses  
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31 rate their care as excellent, and only 17% of the patients who have confidence and trust in their  
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33 nurses but not doctors rate their care as excellent.  
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**Table 1. Patient Reports about Nurses and Doctors, and the Percent Indicating Their Care was “Excellent,” Based on Their Reports about Doctors and Nurses.**

<u>Patient Survey Question</u>		<u>Percent of Patients in Each Response Category</u>	<u>Percent of Patients in Each Response Category Indicating That Their Care was “Excellent”</u>
<b>Did you have confidence and trust in the doctors treating you?</b>	<b>Yes, always</b>	80.4%	52.6%
	<b>Yes, sometimes</b>	16.4%	9.4%
	<b>No</b>	3.1%	3.4%
	<b>Total</b>	100.0%	
<b>Did you have confidence and trust in the nurses treating you?</b>	<b>Yes, always</b>	75.1%	55.3%
	<b>Yes, sometimes</b>	21.7%	10.5%
	<b>No</b>	3.2%	2.8%
	<b>Total</b>	100.0%	
<b>Were there enough nurses on duty to care for you in the hospital?</b>	<b>Always or nearly always</b>	60.4%	57.3%
	<b>Sometimes</b>	29.5%	26.7%
	<b>Never or rarely</b>	10.1%	14.1%
	<b>Total</b>	100.0%	

**Source:** Data are from the 2010 NHS Survey of Inpatients, which involved 66,348 patients discharged from 161 trusts in England.

**Note:** The numbers reported exclude a small number (< 2%) of missing responses.

### Nurse Staffing, Work Environments, and Missed Nursing Care

Nurse (RN) staffing was estimated for the 46 hospitals included in RN4CAST-England by average nurse workloads in each hospital on the day shift. Nurses reported how many patients they cared for on their last shift, and then responses are averaged across all nurses in each hospital working the day shift. Nurse workloads averaged 8.6 patients per RN during the day, and ranged from 5.6 patients per RN to 11.5 patients per RN across the 46 hospitals. Patient to

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3 RN ratios were much higher and more variable at night so we elected to use day shift staffing  
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5 only in our analyses.  
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9 Hospital work environment was measured by the Practice Environment Scale of the  
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11 Nursing Work Index (PES-NWI), an extensively used survey-based measure with established  
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13 reliability and validity (32-35) leading to its adoption by the National Quality Forum as a nurse  
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15 sensitive quality of care indicator (36 ). The measure of work environment used is a composite  
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17 measure formed from 5 subscales (comprised of 28 nurse survey items) measuring resource  
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19 adequacy (4 items), nurse participation in hospital affairs (8 items), nursing foundations for  
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21 quality care (9 items), nurse manager ability, leadership, and support of nurses (4 items), and  
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23 nurse-physician relations (3 items). The staffing and resource adequacy subscale was dropped  
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25 from the global measure used in the analysis because of its high correlation with the direct  
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27 measure of RN staffing in the model, as in previous publications (37, 12).  
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34 What makes the variability in staffing and work environments across hospitals of  
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36 considerable importance is that when RNs have high patient loads, and when RNs practice in  
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38 poor work environments, necessary nursing care can be missed because of lack of time (21).  
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40 Nurses in this study were asked whether any of thirteen important types of nursing care were  
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42 needed but missed because of lack of time. **Figure 2** shows that while 7% of nurses reported  
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44 that they lacked time to complete necessary pain management, and 11% missed treatments and  
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46 procedures, much greater percentages reported lacking the time to educate patients and their  
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48 families (52%) and comfort or talk with their patients (65%). More than a quarter of the nurses  
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50 (27%) lacked the time to complete three or four of the types of care listed, just under one in five  
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52 (19%) lacked the time to complete five or six of them, and another 19% lacked the time to  
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54 complete seven or more of the 13 types of care listed.  
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**Table 2** provides regression coefficients that indicate the effects of RN staffing and the hospital work environment on the average number of types of missed care, before and after controlling for various hospital characteristics (including size, technology, and location), and characteristics of nurses that may have affected their reports of missed care, including their role (primary nurse or shared responsibility for group of patients with other nurses), full-time status, years of experience, and unit type (medical, surgical, or combined). Higher nurse workloads (higher patient to RN ratios) are significantly related to higher numbers of types of missed care, while better work environments are significantly related to fewer types of missed care, both before and after adjustment.

**Table 2. Regression Coefficients Indicating the Effects of Staffing and Practice Environment on Average Number of Types of Care Missed**

Regression Coefficients [and 95% Confidence Intervals]		
Effect on Missed Care of -	Unadjusted	Adjusted
Patient to Nurse Ratio	0.11*** [0.06,0.16]	0.15*** [0.10,0.19]
Practice Environment	-0.30* [-0.55,-0.05]	-0.26* [-0.48,-0.04]

**Source:** Data are from the 2010 RN4CAST-England study, which surveyed 2,963 inpatient medical and surgical direct care professional nurses (RNs) in a representative sample of 31 NHS trusts comprised of 46 different hospitals.

**Notes:** Adjusted Coefficients and confidence intervals are from regression models which control for hospital characteristics (Beds > 750, High Technology, and Location) and nurse characteristics (Nurse Role, Full-time Status, Years of Experience and Unit Type). Practice environment is measured by the PES-NWI tertile.

Single, double and triple asterisks denote coefficients that are significant at the .05, .01, and .001 levels, respectively.

**Figures 3 and 4** show how much the number of tasks left undone varies as a function of RN staffing and hospital work environments, as estimated from the adjusted models. As the

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3 number of patients per RN goes down, from 12 patients to 8 patients to 4 patients, the average  
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5 number of types of missed care goes down, from 4.4 (out of 13) to 3.8 to 3.2. And, as hospital  
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7 work environments improve, from relatively poor (lowest tertile) to average (middle tertile) to  
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9 relatively good (highest tertile), the average number of types of missed care also goes down,  
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11 from 4.2 to 4.0 to 3.7.  
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### 14 15 16 Missed Nursing Care and Patient Outcomes 17

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19 The association of the number of types of missed care with patient outcomes is shown in  
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21 **Table 3.** The coefficients in the table are odds ratios which indicate how much the odds on  
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23 providing a positive response to the nine different dimensions of patient satisfaction go down as  
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25 the average number of types of missed care goes up, both before (unadjusted) and after  
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27 (adjusted) taking account patient characteristics that might affect their responses, including  
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29 gender, age, length of stay, ward, number of long standing conditions, and type of admission  
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31 (emergent/urgent or planned). In all cases, the odds ratios are less than one, indicating that  
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33 positive patient appraisals of care decrease as the number of types of missed care increases; in  
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35 six of the eight aspects of patient care rated the odds ratios are significant, and range from 0.78 to  
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37 0.86. These values indicate, for example, that in hospitals in which the number of types of  
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39 missed care averaged 4.5 per nurse per shift, the odds on patients rating care as excellent and  
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41 responding that the purpose of medicines were completely explained were 22% lower and 14%  
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43 lower, respectively, than in hospitals in which the number of types of missed care averaged 3.5  
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45 per nurse per shift.  
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**Table 3. Odds Ratios Indicating the Effect of the Trust Median Number of Types of Care Missed on Various Patient Outcomes**

Effect of the Median Number of Types of Care Missed on Patient Outcomes	Odds Ratios [and 95% Confidence Intervals]	
	Unadjusted	Adjusted
<b>Rate Care Excellent</b>	0.79 <sup>***</sup> [0.69,0.90]	0.78 <sup>***</sup> [0.68,0.90]
<b>Did Not Want To Complain About Care</b>	0.92 [0.76,1.12]	0.92 [0.77,1.11]
<b>Always Felt Treated with Respect and Dignity</b>	0.89 [0.78,1.02]	0.92 [0.81,1.06]
<b>Completely Explained Purpose of Medicines</b>	0.87 <sup>*</sup> [0.78,0.98]	0.86 <sup>**</sup> [0.77,0.95]
<b>Doctors and Nurses Work Together Excellent</b>	0.84 <sup>**</sup> [0.74,0.94]	0.82 <sup>**</sup> [0.72,0.93]
<b>Always Got Answers I Could Understand</b>	0.84 <sup>**</sup> [0.75,0.95]	0.83 <sup>***</sup> [0.76,0.91]
<b>Always Have Confidence and Trust In Nurses</b>	0.86 <sup>*</sup> [0.74,0.99]	0.85 <sup>*</sup> [0.73,0.99]
<b>Always or Nearly Always Enough Nurses</b>	0.87 <sup>*</sup> [0.76,0.99]	0.85 <sup>**</sup> [0.75,0.96]

**Source:** Data are from a merged file that included information from 31 NHS trusts for which both patient information (from 5,311 general medical and surgical patients included in the 2010 NHS Survey of Inpatients) and nurse information (from 2,963 medical and surgical nurses surveyed in the 2010 RN4CAST-England study) were available.

**Notes:** Adjusted models control for hospital characteristics (Beds > 750, High Technology, and Location) and patient characteristics that might affect responses, including gender, age, length of stay, ward, number of long standing conditions and type of admission (emergent/urgent or planned).

Single, double and triple asterisks denote coefficients that are significant at the .05, .01, and .001 levels, respectively.

## DISCUSSION

National survey data from patients experiencing a hospitalization in an NHS hospital in England confirm that patients have a high level of trust and confidence in RNs, evidence that refutes the narrative blaming quality of care deficits in NHS hospitals on uncaring nurses. However, only 60 percent of patients indicated that there were always enough RNs to care for them, and one in 10 patients indicated that there were never or rarely enough RNs. The importance to patients of adequate RN staffing is evident in their responses; 57% of patients who indicated that there were always or nearly always enough RNs to care for them rated care as excellent, compared with only 14% of the patients who said there were rarely or never enough. Additional analyses undertaken (not shown) indicate that patients in hospitals with poorer RN staffing are much less likely to say there were always enough nurses to care for them. We estimate, from models that took account of numerous confounds, that the likelihood of patients saying there were always enough nurses to take care of them were about 40% lower in hospitals in which the average nurse took care of 10 patients than in hospitals in which the average nurse took care of 6 patients. These findings reinforce from patients' perspectives the importance of adequate hospital RN staffing.

Further insights into how quality of care might be improved in NHS hospitals is revealed when data from the NHS Inpatient Survey is linked with information on actual hospital RN staffing and nurses' assessments of the quality of their work environments. We found substantial variation across NHS general acute hospitals in patient-to-nurse workloads. Nurses in some NHS hospitals are caring for twice as many patients at a time as nurses in other hospitals. Current NHS policies devolving greater autonomy to hospital management to make decisions about RN staffing may be contributing to the substantial observed variation in staffing, and have led



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3 experts to point to the need for checks and balances to minimize the risk of more quality failures  
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5 linked to inadequate RN staffing (38). Our findings show that the substantial differences in RN  
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7 staffing across NHS hospitals are associated with the extent to which needed nursing care is  
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9 missed. The most frequently missed types of care include those that patients may readily  
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11 recognize are missing--comforting and talking with patients, and teaching patients and family  
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13 members how to manage care following discharge. Our results are consistent with other research  
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15 showing that higher patient workloads for RNs in NHS hospitals are associated with adverse  
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17 patient outcomes including higher hospital mortality (4, 5, 22). Initiatives such as those recently  
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19 adopted in Wales (39) establishing an upper limit to how many patients nurses can safely and  
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21 effectively care for holds promise for further improvements in patients' satisfaction with hospital  
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23 care, and may save lives as well.  
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30 Another modifiable feature of hospital care found to be relevant to patients' perceptions  
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32 of their care is the quality of the hospital work environment. In hospitals rated by nurses to have  
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34 less favorable clinical work environments, needed but missed nursing care is more extensive.  
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36 Patients' perceptions of care are less favorable when missed care is more extensive. Research  
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38 suggests that hospital work environments that support RNs to provide care efficiently and  
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40 effectively, and without constant interruptions because of operational failures such as missing  
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42 medications and equipment (40), are reasonably low cost interventions and return good value in  
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44 terms of better patient outcomes at the same or lower costs (41,42). Magnet hospitals formally  
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46 recognized for their good hospital work environments have significantly higher patient  
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48 satisfaction than matched non-Magnet hospitals (43). One of the first Magnet hospitals  
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50 accredited outside the U.S. was a NHS trust in England, which research showed significantly  
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52 improved its work environment and care quality during the process of achieving Magnet  
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3 accreditation (44). Unfortunately, the NHS merged the Magnet facility out of existence after a  
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5 year, and there has not been a Magnet accredited hospital in England in over 15 years.  
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8 Patients' confidence in both doctors and nurses is equally important in how patients rate  
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10 their hospitals; few patients that have high confidence in their doctors but little confidence in  
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12 their nurses rate their hospitals highly. This finding is relevant to policy decisions governing the  
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14 composition of the NHS workforce in England. Between 2010 and 2015, the number of  
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16 physician consultants (mostly inpatient physicians) increased by more than one-fifth while the  
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18 number of RNs increased only one percent (45).  
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22 Our study has many strengths including use of validated measures of patient satisfaction,  
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24 nurse staffing, hospital work environment, and missed nursing care across large numbers of NHS  
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26 hospitals. The study has limitations as well. Data from both patients and nurses is cross sectional  
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28 thus limiting causal inferences about the associations found. We take into account, to the extent  
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30 possible, alternative explanations about factors that could be associated with our findings  
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32 including characteristics of hospitals such as teaching status, and characteristics of the patients  
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34 responding to the national survey, including their health status since self-reported limiting long-  
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36 term conditions have been found to be associated with less favorable perceptions of care (46).  
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38 Our data are from 2010 but remain the only comprehensive data on hospital nurse workforce and  
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40 patient satisfaction across large numbers of NHS hospitals in England. Moreover, our interest is  
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42 in the relationship between patient satisfaction and nurse resources, and there is no reason to  
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44 expect the relationship to have changed since 2010. Indeed, Sir Robert Francis, author of the  
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46 public inquiry into quality of care deficiencies at the Mid Staffordshire NHS Trust (1),  
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48 commented as recently as July 2017 that safe nurse staffing in England still lacks a standardized  
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50 approach and substantial variation across hospitals in nurse staffing remains (47).  
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## CONCLUSIONS

Patients express a high level of confidence and trust in nurses, and their satisfaction with hospital care is less favorable when they perceive there are not enough nurses available. The narrative that quality deficits in hospitals in England are due to “uncaring” nurses is not supported by the evidence. To the contrary, our findings suggest that reducing missed nursing care by ensuring adequate numbers of RNs at the hospital bedside and improved hospital clinical care environments are promising strategies for enhancing patient satisfaction with care.

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For peer review only

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3 Figure 1. Percent of Patients Rating Their Care Excellent, by Confidence and Trust in Nurses  
4 and Doctors  
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7 Source: Data are from the 2010 NHS Survey of Inpatients, which involved 66,348 patients  
8 discharged from 161 trusts in England.  
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12 Figure 2. Percent of of Nurses Reporting That Different Types of Care Were Missed on Their  
13 Last Shift  
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16 Source: Data are from the 2010 RN4CAST-England study, which surveyed 2,963 inpatient  
17 medical and surgical direct care professional nurses (RNs) in a representative sample of 31 NHS  
18 trusts comprised of 46 different hospitals.  
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23 Figure 3. Average Number of Types of Missed Care, by Nurse Workload  
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26 Source: Data are from the 2010 RN4CAST-England study, which surveyed 2,963 inpatient  
27 medical and surgical direct care professional nurses (RNs) in a representative sample of 31 NHS  
28 trusts comprised of 46 different hospitals.  
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32 Figure 4. Average Number of Types of Missed Care, by Work Environment  
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35 Source: Data are from the 2010 RN4CAST-England study, which surveyed 2,963 inpatient medical and  
36 surgical direct care professional nurses (RNs) in a representative sample of 31 NHS trusts comprised of  
37 46 different hospitals.  
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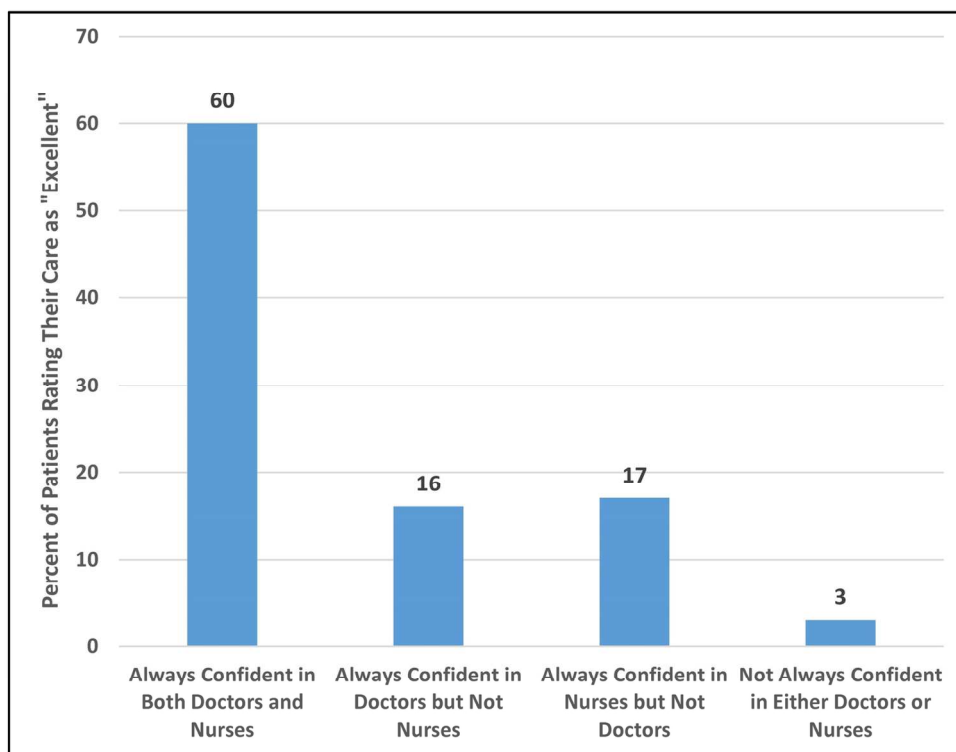


Figure 1. Percent of Patients Rating Their Care Excellent, by Confidence and Trust in Nurses and Doctors

Source: Data are from the 2010 NHS Survey of Inpatients, which involved 66,348 patients discharged from 161 trusts in England.

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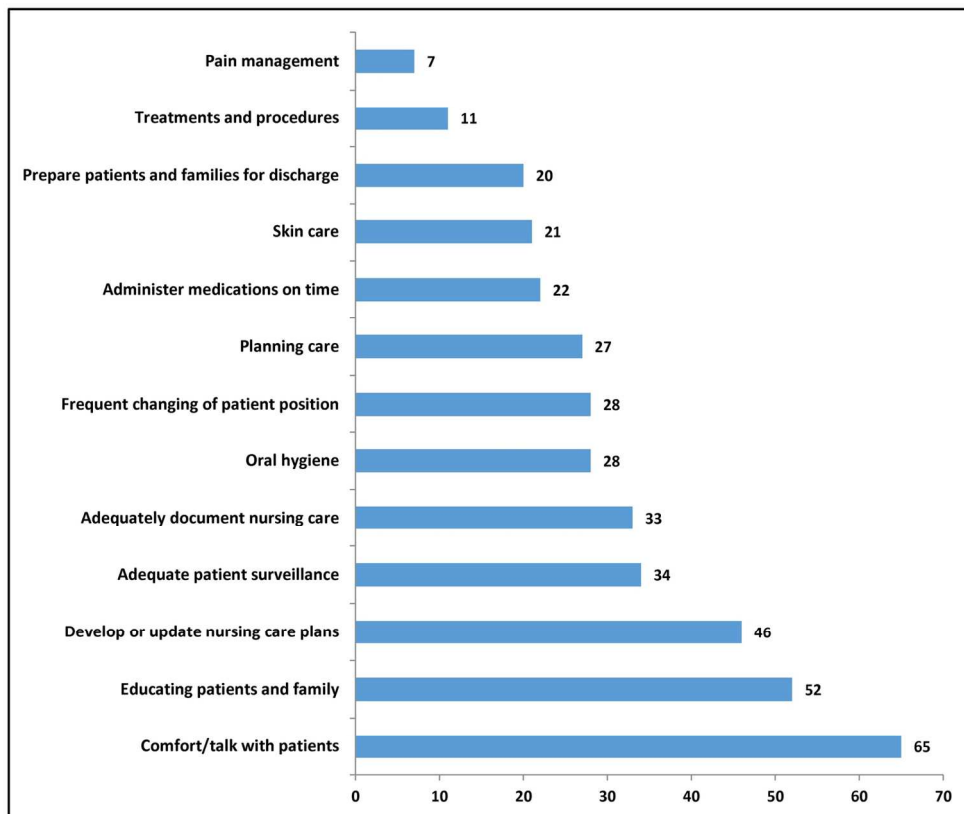


Figure 2. Percent of of Nurses Reporting That Different Types of Care Were Missed on Their Last Shift

Source: Data are from the 2010 RN4CAST-England study, which surveyed 2,963 inpatient medical and surgical direct care professional nurses (RNs) in a representative sample of 31 NHS trusts comprised of 46 different hospitals.

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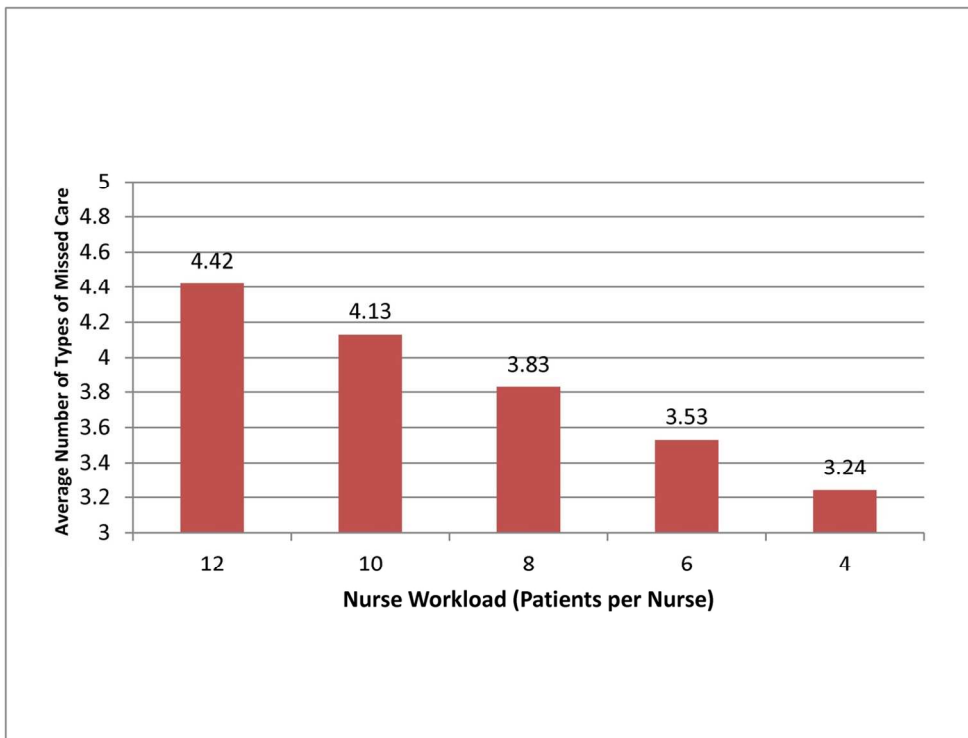


Figure 3. Average Number of Types of Missed Care, by Nurse Workload

Source: Data are from the 2010 RN4CAST-England study, which surveyed 2,963 inpatient medical and surgical direct care professional nurses (RNs) in a representative sample of 31 NHS trusts comprised of 46 different hospitals.

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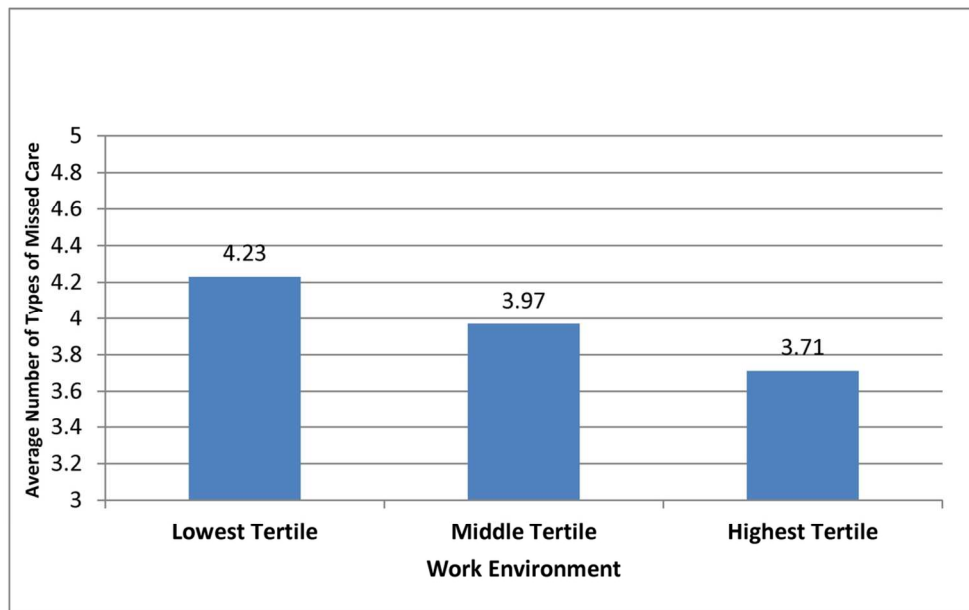


Figure 4. Average Number of Types of Missed Care, by Work Environment

Source: Data are from the 2010 RN4CAST-England study, which surveyed 2,963 inpatient medical and surgical direct care professional nurses (RNs) in a representative sample of 31 NHS trusts comprised of 46 different hospitals.

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## Appendix

## Patient Responses To Survey Items Related to Their Care.

Survey Question	NHS Survey Sample		RN4CAST Sample	
	Number	Percent	Number	Percent
<b>Overall Rating of Care</b>				
Very Good, Good, Fair or Poor	11,290	61.3	3,183	62.0
Excellent	7,128	38.7	1,950	38.0
<b>Total</b>	<b>18,418</b>	<b>100.0</b>	<b>5,133</b>	<b>100.0</b>
<b>Wanted To Complain About Your Care</b>				
Yes	1,727	9.5	489	9.7
No	16,422	90.5	4,554	90.3
<b>Total</b>	<b>18,149</b>	<b>100.0</b>	<b>5,043</b>	<b>100.0</b>
<b>Felt Treated with Respect and Dignity</b>				
No or Only Sometimes	4,400	24.3	1,254	24.3
Always	14,031	75.7	3,899	75.7
<b>Total</b>	<b>18,431</b>	<b>100.0</b>	<b>5,153</b>	<b>100.0</b>
<b>Completely Explained Purpose of Medicines*</b>				
No or Only to Some Extent	3,909	28.7	1,170	30.4
Yes Completely	9,726	71.3	2,684	69.6
<b>Total</b>	<b>13,635</b>	<b>100.0</b>	<b>3,854</b>	<b>100.0</b>
<b>Doctors and Nurses Work Together Excellent</b>				
Very Good, Good, Fair or Poor	11,929	64.9	3,325	64.9
Excellent	6,443	35.1	1,801	35.1
<b>Total</b>	<b>18,372</b>	<b>100.0</b>	<b>5,126</b>	<b>100.0</b>
<b>Got Answers I Could Understand</b>				
No or Only Sometimes	6,330	37.4	1,790	37.9
Always	10,596	62.6	2,933	62.1
<b>Total</b>	<b>16,926</b>	<b>100.0</b>	<b>4,723</b>	<b>100.0</b>
<b>Always Have Confidence and Trust In Nurses</b>				
No or Only Sometimes	5,197	27.6	1,413	27.1
Always	13,619	72.4	3,806	72.9
<b>Total</b>	<b>18,816</b>	<b>100.0</b>	<b>5,219</b>	<b>100.0</b>
<b>Always Have Confidence and Trust In Doctors</b>				
No or Only Sometimes	4,636	24.7	1,294	24.9
Always	14,112	75.3	3,905	75.1
<b>Total</b>	<b>18,748</b>	<b>100.0</b>	<b>5,199</b>	<b>100.0</b>
<b>Enough Nurses on Duty to Care for You</b>				
Sometimes, Rarely or Never	8,343	44.6	2,363	45.5
Always or Nearly Always	10,378	55.4	2,832	54.5
<b>Total</b>	<b>18,721</b>	<b>100.0</b>	<b>5,195</b>	<b>100.0</b>

Note: Survey items for which differences are significant (at  $p < .05$ ) are denoted by asterisks.

STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies* (Note: page numbers below refer to the page numbers at the bottom of each page in the document, not the electronic page numbers).

	Item No	Recommendation
<b>Title and abstract</b>	1	(a) Indicate the study's design with a commonly used term in the title or the abstract <i>The observational and cross-sectional study design is noted in the Title Page (p. i) and Abstract page (p. ii, Title and Design sections).</i>  (b) Provide in the abstract an informative and balanced summary of what was done and what was found <i>The study design, settings, participants, outcome measure and results are described in the Abstract (p. ii).</i>
<b>Introduction</b>		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported <i>The background and rationale are explained in the "Introduction" (p. 1-2)</i>
Objectives	3	State specific objectives, including any prespecified hypotheses <i>The primary objective of the study is stated in the last paragraph of the introduction (p. 2)</i>
<b>Methods</b>		
Study design	4	Present key elements of study design early in the paper. <i>Key elements of the study design are described in the Abstract (pg. ii) and in the Methods section of the paper (p. 3-4)</i>
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection. <i>The setting, locations and dates of the trusts, patients and nurses from which data were collected are given in the first paragraph of the Methods section (p. 3).</i>
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants. <i>We describe the sampling of trusts, patients and nurses in the Methods section (p. 3). We also reference prior publications which contain additional details in the text on that page.</i>
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable. <i>Key patient variables (including patient ratings of care and satisfaction, and nurse staffing, work environments, and missed nursing care) are described in general on p. 5-6, and additional details on control variables used are given in the note below Table 2 (p. 9).</i>
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group. <i>Data are from the NHS patient satisfaction survey and RN4CAST nurse survey as described on p. 3.</i>
Bias	9	Describe any efforts to address potential sources of bias <i>We attempted to obtain unbiased results by using logistic regression models before and after adjusting for hospital, nurse and patients characteristics, as indicated in the text and notes related to Tables 2 (p. 9) and 3 (p. 11).</i>
Study size	10	Explain how the study size was arrived at <i>We describe the sampling of trusts, patients and nurses in the Methods section (p. 3). We also reference prior publications which contain additional details in the text on p. 3.</i>

Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why. <i>Some quantitative variables (i.e. nurse staffing, nurse experience, number of types of missed care) were treated as continuous and not grouped. We describe grouping of work environment in the Methods section (p. 3). Numerous control variables were dichotomous and represented by dummy variables [see notes to Tables 2 (p. 9) and 3 (p. 11) and related text.</i>
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding <i>We discuss the least squares and logistic regression models we used in the Analysis Strategy sub-section of the Methods section (p. 4).</i>
		(b) Describe any methods used to examine subgroups and interactions <i>We have not, as yet, investigated subgroup differences and interactions with these data.</i>
		(c) Explain how missing data were addressed <i>Information on missing data for the NHS Inpatient Survey are negligible, and described in previous work that we have referenced. We note that for the measures we considered (cf., Note for Table 1, p. 7) that the numbers reported exclude a small number (&lt; 2%) of missing responses. Missing information also was negligible for most of the measures derived from the nurse survey, and ranged from roughly 2% to 5%.</i>
		(d) If applicable, describe analytical methods taking account of sampling strategy. <i>Robust regression procedures were used to account for the clustering of patients and nurses in the hospitals and trusts.</i>
		(e) Describe any sensitivity analyses <i>We report unadjusted and adjusted results in Tables 2 (p. 9) and 3 (p. 11), and found that our results remained significant even after adjustment for potential confounds.</i>
<b>Results</b>		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. <i>The numbers of trusts, nurses and patients sampled are given in the abstract (p. ii) and on p. 3, where response rates are indicated).</i>
		(b) Give reasons for non-participation at each stage. <i>We note on p. 4 that nurse survey data were available for only some 31 of the 161 trusts for which</i>
		(c) Consider use of a flow diagram. <i>Not helpful here.</i>
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. <i>Numbers and characteristics of trusts and patients are shown in Tables 1 (p. 7), 2 (p. 9), and 3 (p. 11) (Also see related text). More detailed information on the trusts, patients and nurses in the study can be found in related papers that are cited.</i>
		(b) Indicate number of participants with missing data for each variable of interest.
Outcome data	15*	Report numbers of outcome events or summary measures. <i>The patient satisfaction outcome data is given in the Appendix (separate from Main Document).</i>
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included. <i>Unadjusted and adjusted estimates are</i>

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*shown in Tables 2 (p. 9) and 3 (p. 11).*

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(b) Report category boundaries when continuous variables were categorized.  
**Category boundaries for the categorized continuous variable, nurse work environment, are described on p. 6-7 of Methods.**

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(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period. **Not relevant.**

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Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses <b>See 12b above.</b>
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**Discussion**

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Key results	18	Summarise key results with reference to study objectives ( <i>see Discussion, p. 12-14 and Conclusion p. 14-15</i> )
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias. <b>See last paragraph in Discussion section on p. 14.</b>
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence <b>See Discussion (p. 12-14) and Conclusions sections (p. 14-15).</b>
Generalisability	21	Discuss the generalisability (external validity) of the study results. <b>While point estimates of factors (like the nursing characteristics) and satisfaction likely vary from trust to trust, we believe the associations found are likely generalizable to all NHS trusts, as we note in the conclusion at the end (p. 14-15).</b>

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**Other information**

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Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based. <b>Funding is from the European Union's Seventh Framework Program (223468) and the National Institute of Nursing Research, National Institutes of Health (R01NR014855). The funders had no role in the research or the writing of this manuscript.</b>
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\*Give information separately for exposed and unexposed groups.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at [www.strobe-statement.org](http://www.strobe-statement.org).