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# Does Leadership Matter for Healthcare Service Quality? Evidence from NHS England

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# Does Leadership Matter for Healthcare Service Quality? Evidence from NHS England

**Abstract**

In this paper we provide first-hand evidence that leadership quality matters for the quality of healthcare provision, based on NHS England hospital trust data between 2010 and 2014. This is the first paper to study this relationship using individual leadership styles, namely, task-, relations-, change- and integrity-oriented, and for different metrics of quality of healthcare provision, including staff and patient satisfaction survey measures and clinical performance indicators. We find that task-oriented leadership has the strongest relationship with staff-rated hospital quality while change-oriented leadership relates most to patient satisfaction and the clinical measure. We also find some evidence that organizational autonomy and competition across hospitals moderates the effect of leadership quality on healthcare quality. Overall, our results indicate that ideal healthcare leaders should behave as integrated leaders and that leadership matters at all levels of organizational hierarchy. This has important policy implications for continued support for the development and funding of integrated leadership programs in healthcare.

**Keywords:** Healthcare Leadership, Integrated Leadership, Service Improvement, Public Service, England

## 1. Introduction

In almost every country, health-care costs have been rapidly rising which has led to a great policy emphasis on improving the quality and efficiency of healthcare providers. One possible way to achieve this is through improving leadership quality. The essence of leadership in organizations lies in affecting and coordinating individual and collective efforts to accomplish and reach shared objectives. Over a century of research into leadership has generated strong evidence that an organization's success depends upon its managers' leadership (Wang et al. 2011; Behrendt et al. 2017). Nevertheless, there is still a need for rigorous empirical research on the impact of leadership in public sector organizations, given the limited amount of research on the topic reported in scientific journals (van Wart 2013) and especially in public healthcare sector. Our paper aims to fill this gap by asking whether leadership quality can predict organizational outcomes in healthcare sector. Adopting Yukl's (2012) taxonomy on effective leadership behaviors we test whether *integrated* leadership quality through task-, relations-, change- and integrity-oriented leadership have an effect on public hospital service quality. We concentrate on the special case of secondary care in the English National Health Service (NHS) and focus on leadership at all levels of organizational hierarchy from team leaders to senior executives. We achieve this by compiling a unique data set from various publicly available sources covering recent five year period and using advanced statistical techniques to test our hypotheses.

Healthcare, and especially the English NHS, is a crucial context in which to explore the link between leadership and service quality. First, hospital outcomes are critically important, as improving quality and minimizing variations in health services are one of the most important objectives of governments and societies as a whole. Second, there is a gap in our understanding of the impact of different leadership styles on healthcare outcomes and validating leadership theories in the healthcare context is a step forward in scientific advancement. Third, we respond

to the debates on the nature and effectiveness of leadership in healthcare organizations where significant financial and non-financial resources are spent on leadership development (Ham 2012; Storey & Holti 2013). The reforms implemented within the English NHS during the last decade have increased competition and the autonomy of health organizations. This has granted healthcare leaders more control over the administration and regulatory procedures, thus allowing us to assess whether the effect of leadership quality on healthcare service quality is moderated by organizational autonomy and competition. It is now widely accepted that leadership development in the healthcare sector is beneficial for health service quality (King's Fund, 2012; Macfarlane et al. 2012), and yet there is a dearth of scientific research in this area. With very little existing scientific evidence on the effects of leadership quality on the quality of healthcare services, it is still arguable whether public resources spent on leadership development in healthcare sector is justified. Our paper is the first to offer a rigorous investigation of whether effective leadership styles are linked to better healthcare outcomes in hospitals measured by three distinct indicators.

Decision-makers in public healthcare settings must navigate in an environment influenced by complex social and political forces, persistent shortages of health professionals, requirements to use performance and safety indicators, and prevailing calls for transparency. Furthermore, managers and leaders in most publicly owned healthcare organizations are expected to do more with less, which has led to the need for leaders with more complex and multi-dimensional capabilities. Efforts to validate leadership theories in healthcare sector have been limited to case studies of a small number of healthcare organizations (Wong & Cummings 2007; Fitzgerald et al. 2013), and have focused on more specific fields of healthcare (Verschueren, et al. 2013; Harris et al. 2014). While these field-specific case studies and evidence provide important insights into the effects of leaders on healthcare outcomes, there is a need for a more universal test of leadership theory within the sector. By consolidating data from various sources

over a five year period for English acute hospital trusts, we provide a longitudinal test of leadership theory in a healthcare sector.

In the UK, there has been sustained policy pressure to improve the quality and consistency of healthcare through structural changes such as granting more organizational autonomy to providers (CMND 7615, 1979; Griffith's Report, 1983; Department of Health, 2001), by setting performance standards and targets and increasing competition across providers (Department of Health 2002, 2005). As result of this, hospitals are monitored by Clinical Commissioning Groups (CCG) and a large number of outcome measures are reported and published. Given the wealth of data on hospital outcomes, we test the effect of leadership quality on a battery of healthcare quality measures from the perspective of staff-rated, patient-rated and objective clinical outcomes. We use integrated leadership framework that incorporates leadership skills, traits, behaviours, styles and situational variables in a single theoretical model to explain leaders' influence on service quality (Yukl 2002; Fernandez 2005. Fernandez et al. 2010). This paper is the first to test the integrated leadership theory, as recommended by Behrendt et al. (2017), on various healthcare outcomes as our dependent variables, and provides a holistic picture of leadership effectiveness in the healthcare sector while integrating leadership from ward to board level.

Leadership involves management but it is more than just management, the latter being summarised as 'getting the job done'. Our study thus is closely related to the study of management practices and patterns on healthcare outcomes. Clinical participation on executive boards and in senior management positions has significant effects on hospital outcomes such as standardized death rates (Jiang et al. 2009, Veronesi et al. 2013), media generated quality rankings in various medical specialities (Goodall 2011), and healthcare-commission rated service quality (Hammer et al. 2013; Veronesi et al. 2013). The number of clinicians on boards has an effect on the hospital's financial performance (Molinari et al. 1993; 1995) and on patient

experience (Veronesi et al. 2015). Bloom et al.'s (2015) survey of hospital managers has shown that hospitals facing more competition have higher management quality scores. Their study provides suggestive evidence that management quality may be a mechanism through which higher hospital competition translates to better healthcare outcomes (Cooper et al. 2011). More recently, Mannion et al. (2017) reported only limited evidence that board level management competencies matter for patient safety in NHS hospitals. Our study contributes to this line of research by providing a more direct link between leadership quality and healthcare outcomes.

## 2. Theoretical Background

Leadership essentially involves organising the human and technical resources needed to achieve an organisation's goals. The main objective in leadership research has been to identify aspects of behaviour that explain leaders' impact on the performance of teams, work units and organizations. Throughout its history, the study of leadership has mostly been done by disparate leadership theories and models with little desire to propose a unified model of leadership. Without such unification the test of the theories lack parsimony and unveil only one piece of the puzzle. More recently, however, there has been a growing attempt to integrate leadership models synthesizing existing knowledge regarding leadership effectiveness (Fernandez et al. 2010; Yukl 2012; Behrendt et al. 2017). The validation of integrated leadership theories is still in its early days and especially lacking in its empirical application in the healthcare sector. Given the importance that policy makers have placed on the development of healthcare leadership in England and around the world (McAlearney & Butler 2008; West et al. 2014), this paper sheds light on the effects of leadership quality on healthcare outcomes within an integrated framework.

We adopt the framework of integrated leadership developed by Fernandez et al. (2010) and relatedly by Yukl (2012) to explore the effects of leadership on service quality in English hospital trusts. We conceptualize leadership quality according to four leadership styles that

leaders must adopt. These leadership styles involve diverse functions, attributes and skills, which often lead to conflicting values and goals. Especially as the healthcare sector is currently undergoing organizational pressure, economic stress, increasing penetration of markets, and frequent changes, these leadership styles may become more difficult to adopt effectively. The leadership styles that we investigate in this paper are as follows.[1]

**Task-oriented leadership**

Task-oriented leadership expresses a concern for accomplishing the goals of the group which are aimed at defining and organizing the group's activities. More generally, Rubicon model applied to leadership theory states that task-oriented leaders should strengthen the motivation to pursue shared goals (Behrendt et al. 2017). Task-oriented behaviors include setting and communicating goals and performance standards; planning, directing and coordinating the activities of followers; maintaining clear channels of communication; monitoring compliance with procedures and goal achievement; and providing feedback. Good task-oriented leadership has been shown to positively affect organizational outcomes in the form of effective planning (Kim 2002), clarifying work requirements (Amabile et al. 2004), monitoring work processes (Wang et al. 2011), and problem solving abilities (Morgeson 2005).

**Relations-oriented leadership**

Relations-oriented leadership involves reflecting concern for the welfare of subordinates and a desire to foster good interpersonal relations among organizational members. The relations-oriented leaders treat subordinates as equals, show concern for their well-being, appreciate and recognize their work, provide them with opportunities for personal growth, and involve them in the decision-making processes. Relations-oriented behaviours overlap with participative

[1] Differently from Fernandez et al. (2010), we exclude diversity–oriented leadership because of the limited availability of the NHS Staff Survey data measuring diversity-oriented leadership behaviours in the years 2010-2015.

leadership defined as giving subordinates influence over important decisions made in the organization (Kim 2002; Huang et al. 2010). Participative leadership, however is only one component of—, the employee empowerment component—a broader set of relations-oriented behaviours aimed at promoting the well-being of workers. Relations-oriented behaviour fosters a harmonious and emotionally supportive work environment that contributes to higher levels of employee job satisfaction and motivation in the form of supporting (Amabile et al. 2004) and developing (Kim & Yukl 1995; Edmondson 2003) followers, recognizing their potential and achievements (Bradler et al. 2016). Relation-oriented leadership has been studied previously in the healthcare context but only in more specific fields of healthcare such as nursing: Wong & Cummings (2007) and Verschueren et al. (2013) find significant effects of nursing leadership on patient satisfaction, mortality rates, adverse events and complications.

**Change-oriented leadership**

Change-oriented leadership behaviour "is primarily concerned with improving strategic decisions; adapting to the change in the environment; increasing flexibility and innovation; making major changes in processes, products, or services; and gaining commitment to the changes" (Yukl 2008, p.712). When change in the environment is gradual and there is no sudden crisis, employees may not recognize the need for change. Leaders can provide information and consult on strategies on adopting the required change, and how similar work units are performing in other organizations. Leaders who engage in change-oriented behaviour can increase performance by making their organizations more adaptive and responsive to the external environment (Ekvall & Arvonen, 1991). Change-oriented leaders may be more effective at identifying the most promising strategic initiatives for their organizations. Change-oriented leaders can also encourage employees to search for creative solutions to problems facing the organization. Change-oriented leadership has been studied extensively as one of the most positive leadership behaviours to improve organizational outcomes through advocating

and envisioning change, encouraging innovation and facilitating collective learning (Bass 1985; Judge & Piccolo 2004; Wright & Pandey 2009; Yukl 2012). Change-oriented leadership has not been previously studied in the healthcare context, especially within an integrated framework. In a changing fiscal environment of recent years, change-oriented leadership may be the most effective leadership behaviour to bring about organizational success.

**Integrity-oriented leadership**

Integrity of standard virtues, honesty and selflessness in working hard to discourage and prevent unethical conduct and to maintain an environment safe for the disclosure of wrongdoing is another important leadership trait. Many researchers have emphasized the importance of fairness within organizations as a factor enhancing employee motivation (Janssen 2001; Brown et al. 2005; Kim 2005; Rubin 2009). A number of meta-analysis reveal that fair human resource practices and procedural justice within organizations determine employee's job quality within organizations as well as organizational performance (Colquitt et al. 2001, Wright et al. 2005). Orazi et al. (2013) find that integrity-oriented leadership is particularly effective in increasing employees' work effort in highly bureaucratic settings of federal and national offices. In public sector organizations such as in NHS hospitals, there is a strong demand for legality, fairness, and equitable treatment of staff and patients, and hence the value the followers put on leaders with integrity may even be stronger.

**Integrated Leadership**

Traditionally transactional leadership has been the leading theory to explain organizational outcomes. Recent examinations have revealed the increasing importance of other leadership styles commonly referred to as transformational leadership (Bass 1985; Ekvall & Arvonen 1991; Fernandez 2008; Palanski & Yammarino 2009). Burns (1978) is credited with suggesting there is a dichotomy in leadership between transformational and transactional leadership. Nevertheless, whereas Burns saw these as distinct leadership styles, Bass (1985, 1997)

suggested that the relationship between these styles and approaches is more complex and that both leadership styles are necessary for the success of organizations. Bass developed the full range leadership model based on his belief that transformational and transactional leadership are not mutually exclusive to each other but are leadership patterns that all leaders possess and use depending on the contextual situation. Our empirical approach evaluates the effects of leadership behaviour on healthcare outcomes looking at the four disaggregated leadership styles (task-, relation-, change-, and integrity-oriented) separately but also evaluating an aggregated "integrated" conceptualization of leadership behaviours.

Leadership models have focused on upper-echelon theories where the characteristics of senior executives (their age, charisma, gender, communication, style, etc.) affect organizational outcomes through affecting employee motivation (Wang et al. 2011). There is however a newly emerging concept of *shared* leadership (also known as distributed or dispersed leadership) that aims at integrating effective leadership behaviours (Gronn 2002; Fernandez et al. 2010). This strand of literature argues for the need of re-conceptualization of leadership as a role by various organizational members operating at different levels of organizational hierarchy. It has been recognized that effective leadership in the healthcare sector is needed from the board to the ward and should involve clinicians as well as managers (King's Fund 2011). Given the previous work on distributed leadership (Currie & Lockett, 2011, Gronn, 2000; 2009), Fitzgerald et al. (2013, p.236) define distributed leadership in NHS as "a multi-professional organization consisting of three levels spread across senior, middle and lower organizational levels". Moving on from a concept of heroic leaders, who turn around organisational performance, to seeing leadership as shared and distributed throughout the NHS, we empirically study the effects of leadership quality from lower levels of organizational hierarchy to senior management of hospital trusts by testing the following hypothesis.

***Hypothesis 1:*** *Leadership quality as measured by task-, relation-, integrity-, and change-oriented leadership styles captured by the integrated-leadership measure will significantly predict healthcare quality as measured by staff-, patient-rated satisfaction and a clinical quality.*

## 3. Healthcare Sector in Focus

Potentially important structural changes in public administration have taken place in the recent years around the world. New Public Management reforms have led to the restructuring of (vertically integrated) public organisations to create semi-autonomous organizations with their own (corporate style) boards (Pollitt & Bouckaert 2011). In the health sector, Saltman et al. (2011) discuss how the emergence of public hospitals in some European countries have been reformed as public owned enterprises with greater financial and institutional autonomy. In the UK, the reform resulted in the introduction of foundation trust hospitals and private–sector healthcare providers following the Health and Social Care Act (2003). By granting financial and executive autonomy to public hospitals and introducing competition with private sector providers, the policy aimed to reduce costs and waiting times and promote innovation and responsiveness to patients throughout the healthcare system (Allen 2009; Cooper et al. 2016).

Cannela & Monroe's (1997) strategic leadership theory proposes that managers should have sufficient discretion in order to affect organizational outcomes. The reforms in England have unquestionably increased autonomy and competition in healthcare sector which created a context in which healthcare leaders have high levels of discretion to influence outcomes (Veronesi & Keasey 2012; Wright et al. 2012). Such an autonomy and competitive pressure on UK public hospitals allows organizational policy makers to make more careful staff recruitment and staff progression decisions with an emphasis on developing strong leaders who can make a difference for service quality and outcomes. Leaders in the current system may feel more responsible for their followers and strive to achieve higher results (Wang & Cheng 2010;

Ng et al. 2008). Beyond this, healthcare leaders in England are more responsive to the increasing number of publicly available information on hospital outcomes and patients' freedom of choice and may be able to implement clinically led changes aimed at improving services more efficiently.

On the other hand, there is research that suggests that regardless of the enhanced autonomy and competition, hospital managers still find themselves exposed to the web of accountability which encourages overtly risk averse behaviour and discourages innovation (Allen et al. 2012). The adoption of aggressive target policy by the English NHS coupled with the publication of hospital outcome indicators, such as mortality rates, waiting times and patient experience resulted in strong sanctions for poor performing hospital managers. The sanctions are the dismissal of senior hospital managers for substandard performance against the targets, and the rewards consist of granting of greater autonomy for those who perform well. This policy has been termed as "target and terror" as per Propper et al.'s (2008) study which looks at the positive effects of this policy on hospital waiting times. While there is an increasing number of studies suggesting that effective management and leadership quality in hospitals have a positive effect on performance outcomes (Bloom et al. 2015), the extent to which this effect is due to various leadership styles, managerial autonomy and competition remains unclear. We thus test the following hypotheses.

***Hypothesis 2:*** *The organizational autonomy of a hospital will moderate the effect of leadership quality on the healthcare service quality.*

***Hypothesis 3:*** *The level of competition a hospital faces will moderate the effect of leadership quality on the healthcare service quality.*

There have been very few empirical tests on the effects of leadership quality on outcomes within the NHS despite the popularity of leadership development programs. The NHS

managers – their numbers, rates of pay and overall costs – are often the subject of contentious debate in the media and among politicians and policy-makers. Some commentators suggest that the NHS is bureaucratic and over-managed and that much of the NHS management is unnecessary (Walshe & Smith 2011). Researchers at the King's Fund, however, have disagreed with these views and have argued that collective leadership within the NHS could achieve significant service improvements and transform the way health care is provided (West et al. 2014). Meanwhile the scientific literature only acknowledges the importance of effective nursing leadership on patient outcomes. The review studies by Wong & Cummings (2007) and Verschueren et al. (2013) focus on the effects of nursing leadership on patient satisfaction, mortality rates, adverse events and complications. The association is the strongest for the adverse events and complications especially for the leadership behaviours that were transformational and relation-oriented. Furthermore, Harris et al.'s (2014) recent study of historical role-models and nurse leaders show that transformational leaders create an environment open to innovation and communication that enhance healthcare quality.

## 4. Data and Methodology

To study the effect of leadership quality on healthcare outcomes we focus particularly on the NHS hospital sector in England. In 2015, 1 780 000 people were employed by NHS England with a budget of around £107 billion a year in funds. Nearly half (47%) of the NHS budget was spent on acute and emergency care (NHS England 2014). During the 2000s, there has been a large growth in publicly available data in the healthcare sector, though the data that are available tend to be at a reasonably aggregate level (e.g., at hospital group—known as hospital trusts in the UK). We use the publicly available data provided by the Health and Social Care

Information Centre (HSCIC) for performance indicators and control variables and compile our own unique dataset to measure leadership quality from NHS staff surveys.[2]

Our data consists of 152 English acute specialist and non-specialist NHS trusts within a 5 year period of 2010-2014 which continuously participated in the annual NHS Staff Survey. Due to the process of data compilation from different sources, the merged dataset covers a sample of 118 trusts. This leaves us with an unbalanced panel of 591 observations with a minimum of 4 years of observations per hospital. The sample is adequately representative of the whole acute hospital trust population in terms of performance indicators, leadership quality and other observable characteristics. Table 1 summarizes all of our variables and presents descriptive statistics for each variable and correlation coefficient matrices.

### 4.1 Dependent variables

Service quality in hospitals is difficult to measure so regulators and researchers typically use a wide range of performance indicators. Propper & Wilson (2003) report more than 35 performance outcomes of healthcare in the UK which see thorough scrutiny both by the members of public and government monitoring agencies. We use a number of performance indicators from three different sources that we believe present a good mix of measures from various perspectives as our dependent variables: a more subjective staff-rated and patient-rated hospital quality, and a more objective clinical quality. This allows us to present a more thorough test of leadership theory in the healthcare context.

***Staff-rated quality.*** We use two questions from the NHS Staff Survey as a measure of staff rated hospital quality both in terms of place to work and place to receive treatment. As "staff are critical to the success of contemporary organizations, their satisfaction is both a vital quality

[2] HSCIC is tasked with the responsibility for collecting, analysing and presenting health and social care data. All of our data is acquired in aggregated hospital trust level from this source.

measure for an organization, as well as an outcome in itself" (Trottiers et al 2008). The percentage of staff agreeing or strongly agreeing to the statement "I recommend my organization as a good place to work" (*RecWork*) and "If a friend or relative needed treatment I would be happy with the standard of care provided by my organisation" (*RecTreatm*) are the measures of hospital quality from the staff perspective. On average, around 64% of staff recommend their hospital as a place to work ranging from 20.2% to 79.2% (with a standard deviation of 10.1). Similarly, on average around 59.2% of staff recommend their hospital as a place to receive treatment ranging from 33.2% to 89.5% (with a standard deviation of 9.5). While the staff rated hospital quality measure has been used by researchers to inform policy-makers (West & Dawson for King's Fund 2012), as far as we know, we are the first study in the scientific literature to use these measures as service quality indicators.

***Patient-rated quality***. In each acute NHS hospital trust, 850 patients are surveyed annually. These include a random sample of all adult inpatients and exclude maternity patients and patients who had a termination of pregnancy. During the years of 2010-2014, the survey response rates range from the lowest of 47% in 2014 to the highest of 53% in 2011 (Care Quality Commision 2015). CQC have divided the 20 questions (presented in Table A1 of the Appendix), to five domains of Access and Waiting (*Access*), Safe, High-Quality, Coordinated-Care (*Coordination*), Better Information, More Choice (*Information*), Building Closer Relationships (*Relationships*) and Clean, Friendly, Comfortable Place to be (*Comfort*) with an *Overall* score summarizing all the above into one. The *Overall* scores are relatively high ranging from 67.1 to 82.7 (with a standard deviation 2.51) as in most other studies analysing patient experience. However, this upward scaling of patient-rated hospital service quality is not believed to affect the validity of the responses (Thi et al. 2002; Pérotin et al. 2013). For an alternative analysis of the patient satisfaction scores analyzed with factor analysis please see Appendix A. Data on patient experience have not always been found to systematically relate

to key aspects of hospital quality (Leonard, 2008). However, this type of measure is suitable as one alternative performance indicator to assess aspects of service quality that are observed by patients.

***Clinical quality*:** The clinical outcome we use is the age-standardized hospital mortality rates within 30 days of emergency surgery (*Non-ElectiveDeath*). Some deaths following non-elective surgery may be potentially preventable through better emergency access to surgeons, theatres and diagnostics, and better identification and care of high-risk patients before and after surgery. The NHS may be helped to prevent some of these deaths by seeing comparative figures and learning lessons from follow-up investigations (Clinical Indicators Team 2016). We choose this measure because both the US and UK regulators use death rates as part of a broader set of measures of hospital quality (Kessler & McClellan 2000; Bloom et al. 2015). Using emergency surgeries helps to reduce selection bias because elective cases may be non-randomly distributed across hospitals. Also, death rates are well recorded annual measures that cannot be easily "gamed" by administrators trying to hit government targets (as opposed to for example, waiting times or infection rates). In our data, the average death rate is 3667 deaths per 100 000 inpatient spells for non-elective procedures ranging from 1857 to 6449 (with a standard deviation of 717.6) across hospital trusts and years.

### 4.2 Independent variables

We use a validated measure of leadership styles and integrated leadership quality as our main independent variables (Fernandez et al. 2010). We adopt a similar approach to Fernandez et al. (2010) who use 2006 Federal Human Capital Survey conducted by US Office of Personnel Management to measure integrated leadership quality. We construct a measure of four leadership styles using answers to the questions in NHS Staff Survey in the years of 2010, 2011, 2012, 2013 and 2014 which provides us with a panel dataset. The dataset was downloaded from NHS Staff Survey website (www.nhsstaffsurveys.com), where the data is presented in

anonymized aggregated hospital trust level. The identified questions asked staff to report on the behaviour of and attitudes towards superiors at multiple levels of organizational hierarchy, including low level supervisors and team leaders, managers and senior executives. These survey items represent organizational members' perceptions of leadership distributed across their organizations without reference to a solo or focused leader (Gronn, 2002; Fernandez et al. 2010). The groupings of questions into each leadership behaviour are presented in Table 2 and are aimed at mirroring Fernandez et al. (2010)'s validated instrument. Similarly, we create an index for each leadership role by constructing standardized summated rating scales for each leadership style category. The integrity-oriented leadership has the highest average score (mean 0.72, std.dev 0.033) followed by relation-oriented (mean 0.64, std.dev 0.046), change-oriented (mean 0.59, std.dev 0.055) and task-oriented (mean 0.55 std.dev 0.045) leadership role. Panel B of Table 1 summarizes the correlation coefficients between the leadership styles.[3]

The selected questions into leadership styles should be relatively reliable to measure the same leadership style by having internal consistency or being at least associated. We use association-based Cronbach's alpha to test reliability of our measures, where an alpha value above 0.70 is preferred. The Cronbach's alphas for the four leadership style groupings are 0.82 (relations-oriented leadership), 0.77 (task-oriented leadership), 0.78 (integrity-oriented leadership) and 0.84 (change-oriented leadership). We also assessed the construct validity. The survey items selected for each of the categories exhibit face validity and appear to be measuring the leadership styles described by Fernandez et al. (2010). The four categories and the items contained in them also seem to capture many, if not all, of the facets of the four leadership style

[3] Alternatively, we could have used factor or principal component analysis to reduce the questions per each grouping into one factor or component. However, doing so would result in losing some data for two questions defining change-oriented leadership role which did not exist in some years of the NHS Staff Survey (see Table 2). We have, however, conducted such analyses and the results are identical to the ones reported in this paper.

definitions of Fernandez et al. (2010) and Yukl (2012), thus providing good evidence of content validity.

Next, we create an integrated leadership variable by exploratory factor analysis. The four measures of leadership styles load to the integrated leadership measure with loadings ranging from 0.72 (integrity-oriented) to 0.88 (relations-oriented). With an eigenvalue of 2.72, the four leadership roles explain 96% of the variation in the integrated leadership factor. Together with the four leadership roles, we use integrated leadership as our main independent variable of interest to predict the dependent variables of hospital service quality.

### 4.3 Control Variables

Following a standard approach in the NHS acute care sector research (Pérotin et al. 2013; Veronesi et al. 2013, Bloom et al. 2015), we control for variables related to patient case mix of age profile (*MeanAge*), rate of emergency admissions (*EmergRate*), levels of hospital trust activity (*DayEpsRate*; *OccupancyRate*), and financial investment to improve hospital facilities (*CapitalInv*). We also include factors such as case load, measured as the number of admissions divided by the total staff number (*CaseLoad*), mean waiting times for admission (*MeanWait*) and the severity of cases treated using the length of stay in hospital for each patient as a proxy (*MedianLOS*). Taken together, these controls help to distinguish between hospitals, given the available resources and particular patient populations and how these, in turn, may affect the dependent variables. Lastly, to control for the possible impact of organizational and contextual factors, we take into account the size of trusts as measured by the number of beds (*TotalBeds*). This is in line with the line of research which suggests that patient experience tends to be worse in larger organizations (Sjetne et al. 2007). In addition to the observable characteristics, we control for any unobservable time invariant characteristics of hospitals (such as culture, age of facilities, resources and patient characteristics) by the empirical strategy we employ. Below we lay out our model and discuss our estimation strategy in detail.

### 4.4 Moderator Variables

Given the recent public reforms in the English healthcare sector to increase the autonomy of and competition among hospitals, it is of interest to test whether the effect of leadership quality on healthcare service quality is moderated by autonomy and competition. As noted earlier, since 2003 a growing number of trusts have been reconfigured through a process of authorization into a more independent organizational form in relation to the management of resources and strategic orientation (Veronesti et al. 2015). These hospitals have been granted a Foundation Trust (FT) status. Currently there are 84 foundation trusts out of total of 135 acute non-specialist trusts and 17 foundation trusts out of total of 18 acute specialist trusts.[4] As such, the foundation trust status dummy variable (*FT*) serves as a useful proxy for assessing the level of organizational autonomy and greater flexibility in strategic and operational matters. We create an interaction term between the dummy variable and the leadership quality in order to test *Hypothesis 2* as to whether the interaction term has a significantly positive coefficient (for the death rates significantly negative).

Similarly to Propper et al. (2007) and Bloom et al. (2007), we define a hospital's catchment area as 15km, a commonly used definition in England. The hospitals less than 30km away can be considered as competitors as their catchment areas will overlap. We thus define the competition (*Compet*) measure as the number of other hospitals within a 30km radius. The variable takes the values from 0 to 26 with a mean (std. dev) of 7 (7.12) hospitals in the 30km catchment area. As an ordinal variable we create an interaction term with the leadership quality. We test *Hypothesis 3* by testing whether the interaction term has a significantly positive coefficient (for the death rates significantly negative coefficient).

[4] NHS Statistics, fact and figures. http://www.nhsconfed.org/resources/key-statistics-on-the-nhs (access 07/09/2017)

### 4.5 Empirical Strategy

We test for Hypothesis 1 and assess the predictive power of leadership quality on hospital quality by estimating the following model at hospital level:

$$HospQuality_{it} = \alpha_1 + \beta_1 LeadQuality_{it} + \gamma_1 Z_{it} + u_{1i} + \epsilon_{1it}$$

*[Equation 1.]*

Where $HospQuality$ represents the nine dependent variables of staff- and patient-rated hospital quality and death rates form non elective procedures, $LeadQuality$ represents the four leadership roles and the integrated leadership variable we construct. $Z_{it}$ is a set of hospital-level control variables in hospital $i$, year $t$; $\alpha_1$, $\beta_1$ and $\gamma_1$ are coefficients to be estimated, $u_{1i}$ represents the hospital-specific intercept (fixed effect) allowing for unobserved heterogeneity, and $\epsilon_{it}$ is the idiosyncratic error, where $u_{1i} + \epsilon_{it}$ represents the composite error.

Random effects (RE) or fixed effect (FE) models control for unobserved effects in panel data models by removing unobserved effects through differencing or demeaning. RE and FE models are asymptotically equivalent in terms of efficiency, but inconsistent even with large T when variables are endogenous. To deal with this issue, we conduct a Hausman test to determine which model is preferred. The Hausman tests the null hypothesis that the coefficients estimated by the efficient RE estimator are equal to those from the consistent FE estimator. According to our results, the RE model is rejected and therefore we omit all time-invariant hospital-level controls and estimate our models using the FE estimator with robust standard errors.[5]

[5] The results from pooled OLS, RE and hybrid model (Schunk 2013) panel regressions show similar results both qualitatively and quantitatively to the ones reported in the next section and are available upon request.

To test for Hypotheses 2 and 3, we conduct a mediation analysis by using interaction terms and estimate the following equation. Given that *FT* status and *Comp* variables are time invariant, we use a RE model for simplicity.[6]

$$HospQuality_{it} = \alpha_2 + \beta_2 LeadQual_{it} + \psi_{2i} LeadQual_{it} \times FT_i + \mu_{2i} LeadQual_{it} \times Comp_i +$$

$$+ \psi_1 FT_i + \mu_1 Comp_i + \gamma_2 Z_{it} + u_{2i} + \epsilon_{2it}$$

*[Equation 2]*

To ease the interpretation of the independent variables on the dependent variables we standardize all variables for our estimation. This also allows us to use linear regression models where our dependent variables are no longer a percentage or a proportion. We can thus make inferences about the coefficients in terms of how the dependent variable changes as a result of a one standard deviation change in the independent variable.

As the correlation coefficients among our four leadership roles are above 0.50 (see Table 1), to avoid multicollinearity we estimate the effect of each leadership style on hospital quality individually. We also estimate the model with our constructed integrated leadership variable as our dependent variable separately.

**5. Results**

Table 3 reports the coefficients from the fixed effect panel regressions estimating the effect of leadership quality on hospital quality. Each cell of the table corresponds to an individual regression with one independent variable, one leadership behaviour as a dependent variable and a set of controls. The regression analysis showing the effect of controls on our dependent

[6] In a set of unreported regressions we also estimate pooled OLS and a hybrid model which produce quantitatively and qualitatively similar results to the ones reported in this section.

variables are reported in the Appendix of the paper and the robustness analysis using different sets of controls are available upon request.

In the first two columns of Table 3, our dependent variable is the staff rated hospital quality. We find that the integrated leadership score and all of the four leadership styles have positively signed coefficient and are statistically significant in predicting staff recommendation to work and receive treatment in a given hospital. Furthermore, given the magnitude of coefficients we can note that task-oriented leadership has the largest influence on the recommendation to receive treatment and the recommendation to work in a hospital: one standard deviation in task-oriented leadership quality improves staff rating of a hospital as a good place to receive treatment by 0.428 and as a good place to work by 0.669 standard deviations. The relations-oriented leadership on the other hand, has the smallest influence: one standard deviation increase in relations-oriented leadership quality improves staff rating of a hospital as a good place to receive treatment by 0.176 and as a good place to work by 0.431 standard deviation.

*Result 1a: Leadership quality significantly and positively affects staff-rated hospital quality: task-oriented leadership style has the highest effect, while the relation-oriented leadership style has the lowest effect on the staff-rated hospital quality.*

Overall, we find that the coefficients of leadership roles on staff-rated quality are higher than the coefficients from patient-rated and clinical hospital quality. These coefficients however may be prone to a number of confounds such as common source bias (Dionne et al. 2002; Meier & O'Toole 2013). The bias manifests itself with an endogenous relationship between the independent and dependent variables that is inherent to how the data is collected. In our case, the staff who rates their leaders also rate the hospital being a good place to work and receive treatment. It is thus very likely that staff ratings of leaders may be affected by their disposition towards their hospitals or vice versa. This observation, however, does not preclude the

possibility that part of the reported coefficients indeed captures staff's view of how hospital leaders shape their organization.

Secondly, we focus on hospital quality rating coming from a different data source. The results using the patient satisfaction scores as the dependent variable are reported in columns 3 to 8 of Table 3. We find that leadership quality has a positive and significant effect on the overall patient satisfaction score and on four out of the five patient satisfaction categories, including Coordination, Information, Relationships and Comfort. The change-oriented leadership quality has the highest impact on the above mentioned domains: e.g. one standard deviation increase in change-oriented leadership increasing overall patient satisfaction score by 0.249 standard deviations. For the Access (waiting times and admission) category, we find only limited statistical significance, with relations- and integrity-oriented leadership predicting patient satisfaction with access to the hospital at the 10% significance level. This is not surprising since the Access category includes components of patient satisfaction regarding hospital quality that may be out of hospital leaders' control, such as the waiting times and emergencies which result in admission dates being changed. In the Appendix, we also present results using two factors summarizing patient satisfaction scores as dependent variables (Table A2). We find consistent results that leadership quality is a positive and significant predictor for both factors of patient satisfaction.

*Result 1b: Leadership quality significantly and positively affects patient-rated hospital quality: change-oriented leadership style has the highest effect on the patient-rated hospital quality. Leadership quality has no effect on Access category of patient-satisfaction.*

Lastly, in column 9 of Table 3, we test whether leadership quality has an impact on a clinical measure of hospital quality, namely age standardized death rates from non-elective procedures. We find that integrated leadership and all individual leadership roles except integrity-oriented

leadership have a negative and significant impact on death rates at the 1% significance levels. In terms of magnitude change-oriented leadership role has the highest effect on death-rates: one standard deviation increase in change-oriented leadership quality decreases the death rate by 0.213 standard deviations. This result is consistent with previous cross sectional studies which have looked at the effects of competition (Propper et al. 2004), management quality (Bloom et al. 2015) and nurse education levels on (Aiken et al. 2003) on patient mortality. Our paper extends these results to a longer time horizon covering a five-year period and finds consistent results.

*Result 1c: Leadership quality significantly and positively affects hospital's clinical quality: change-oriented leadership style has the highest effect while integrity-oriented leadership style has the lowest effect on the hospital's clinical quality.*

In the Appendix, we report the effect of controls on our dependent variables (Table A3). We find that the rate of emergency admissions and the mean age of the patient population predict staff recommendation of their hospital as a place to receive treatment. Hospitals with higher levels of activity as measured by the rates of emergency admissions and occupancy rates receive higher ratings from staff as places to work. However, staff rate hospitals as places to work more negatively when the case load on staff is higher. As expected, we find that trust size, case load and percentage of bed occupancy have a negative impact on patient experience especially on the ratings of access (Veronesi et al. 2015). At the same time, consistent with previous studies, we find that hospitals with older patient populations receive higher patient satisfaction scores especially in the domain of building closer relationships (Perotin et al. 2013; Veronesi et al. 2015). Lastly, we find a highly significant effect of severity of cases a hospital faces, as measured by median length of stay, and case load on death rates: a one standard deviation increase in the severity of cases and case load, increases death rates by 0.15 and 0.27 standard deviations, respectively.

### 5.1 Moderator analysis of autonomy and competition

Is leadership quality more effective in predicting healthcare quality in hospitals that are more autonomous and face higher competition? To answer this question we run regressions with interaction terms. The results are reported in Table 4.

To test for Hypothesis 2, we look at the sign and the significance levels of the coefficients for the interaction terms between the leadership styles and the FT status of the hospital. We find limited support that the hospital autonomy moderates the leadership effects on hospital quality. The only significant positive result is the moderation effect of FT status on the Relationships subdomain of patient-rated healthcare quality: 1 standard deviation increase in relation-oriented leadership increases the patient satisfaction in the Relationships domain by 0.151 standard deviations in non-FT hospitals and by 0.151+0.073=0.224 standard deviations in FT hospitals, which is statistically significant at 5% level. Similar result holds for change-oriented leadership style as well, but this is only significant at 10% level. Overall, 1 standard deviation increase in integrated leadership increases the patient satisfaction in the Relationship domain by 0.123 in the non-FT hospitals and by 0.123+0.093=0.216 standard deviations in FT hospitals. We do not find any moderation effect of foundation status on leadership effects for other measures of healthcare quality.

*Result 2: We find limited support for the moderator effect of hospital autonomy on the leadership effects on healthcare quality: only in the Relationships domain of the patient satisfaction scores, better leadership in more autonomous hospitals results in a better patient-rated healthcare quality.*

To test for Hypothesis 3, we look at the sign and the significance levels of the coefficients for the interaction terms between the leadership styles and the intensity of the competition a hospital faces. We find moderator effect of leadership quality on healthcare quality by

competition similar to the autonomy. The moderation effect is existent only for the patient-rated healthcare quality. The leadership quality has a stronger effect on the Relationships domain of the patient satisfaction scores in more competitive hospitals for relations-, integrity- and change-oriented leadership styles and in the Information domain for the relations-oriented leadership style. There is also some evidence that the effect of change-oriented leadership style on non-elective death rate is moderated by competition: the coefficient of -0.152 for the interaction terms is however significant at 10% significance level.

*Result 3: We find some evidence that the effect of leadership quality on healthcare quality is moderated by competition a hospital faces: the moderator effect is significant in the Relationships and Information domains of patient satisfaction scores and death rates from non-elective surgeries.*

## 6. Robustness Analysis

To test the robustness of our results, we used various combinations of explanatory and control variables and a series of additional estimation techniques - feasible generalized least squares (FGLS) and Arellano-Bover/Blundell-Bond estimation. FGLS estimation assumes a heteroskedastic error structure with no cross-sectional correlation of the error variance–covariance matrix. To account for the possibility that hospital quality and leadership quality may be reversely causal to each other, we use Arellano–Bover/Blundell–Bond dynamic estimation to treat leadership quality as endogenous, the concern being not necessarily that leadership quality may drive hospital quality improvement but that good leaders are recruited to the hospital trusts that are already successful.

The results reported in Tables A4 and A5 of the Appendix and are highly consistent with those reported in Table 3. We note that in the Arellano-Bond estimations integrated leadership loses its significance for hospital death rates, however we still observe a significant negative effect

of change-oriented leadership on death rates at the 5% level. As noted earlier, this emphasises the importance of transformational leadership practices on organizational outcomes highlighted in previous studies (Dvir et al. 2002; Judge & Piccolo, 2004; Wright & Pandey, 2009).

To additionally address the issue of endogeneity we use a two-stage least squares regression for panel data using the lag of the independent variables as instruments. The explanatory variables denoted here as *Z* include: age profile (*MeanAge*), rate of emergency admissions (*EmergRate*), levels of hospital trust activity (*DayEpsRate*; *OccupancyRate)*, financial investment to improve hospital facilities (*CapitalInv*), case load measured as the number of admissions divided by the total staff number (*CaseLoad*), mean waiting times for admission (*MeanWait*) and the severity of cases treated using the length of stay in hospital for each patient as a proxy (*MedianLOS*).

$$LeadershipQuality_{it} = \alpha_4 + \beta_4 LeadershipQuality_{it-1} + \gamma_4 Z_{it} + u_{4i} + \epsilon_{4it}$$

*[Equation 3.]*

The results of the first stage regressions are reported in Table A6 of the Appendix with the F-statistics showing significant model identification in the first stage. In the second stage regressions, the predicted value of leadership quality obtained from the first stage is now used as an independent variable to explain hospital quality, as measured by staff and patient survey scores and hospital death rate.

$$HospitalQuality_{it} = \alpha_5 + \beta_5 \widehat{LeadershipQuality}_{it} + \gamma_5 Z_{3it} + u_{5i} + \epsilon_{5it}$$

*[Equation 4.]*

This further analysis, which provided comparable results, supports our main finding that leadership quality positively influences hospital service quality as rated by staff, patients and

clinical measurements. Consistent with the previous results task- and change-oriented leadership behaviours have the most significant effects in all domains of healthcare outcomes. We find very limited effect of leadership quality with a marginally significant effect of integrated leadership behaviours on the Access scores of patient satisfaction. We also observe slightly weaker effect of leadership on clinical outcomes with non-significant effects of relations- and integrity-oriented leadership styles on hospital death rates.

As a further robustness check for the conceptualization of our leadership measures, we look at the correlations between leadership quality measures and the number of hospital managers being promoted and dismissed in a hospital. We standardize the number of dismissed and promoted managers in a hospital in a given year by hospital's size (number of staff). Table A7 of the Appendix reports the regression results on the association between the lag of our leadership quality measures and managerial promotion and dismissals. Integrated leadership scores significantly predict the managerial promotion and dismissal rates with 1 standard deviation increase in integrated leadership score increasing promotions by 0.25 standard deviations and decreasing dismissals by 0.26 standard deviations. Confirming the previous results on the specific leadership styles, two leadership styles stand out: change-oriented leadership has the highest impact on promotion rates while task-oriented leadership has the highest impact on dismissal rates.

## 7 Concluding Discussion

Given the extended period of fiscal austerity, the public sector faces continued pressure to control costs and reduce expenditure. Whilst the NHS budget has been ring-fenced, the NHS is still required to fill a funding gap of between £22-66 billion by 2020. In light of this, healthcare leaders carry a heavy burden of organizational performance and are instrumental in the delivery of high quality, yet cost-effective efficient healthcare services. The effectiveness

of leadership in NHS is thus an important and salient policy question that also holds wider relevance to the rest of the public sector leadership development.

Despite an enormous amount of discussion about public sector leaders and, more specifically, healthcare leaders, there has been relatively little broad-scale empirical analysis on the subject (van Wart 2013). Based on NHS hospital trust level data between 2010 and 2014, this paper represents the first broad-scale study within the public sector leadership literature that investigates whether leadership matters for healthcare quality. We examine this relationship for both integrated and individual leadership style measures based on Yukl's (2012) conceptualization of effective leadership styles. This also constitutes the first study to consider various measures of healthcare sector quality, namely staff, patient-rated hospital quality and clinically measured patient mortality rates within NHS England trusts.

Does leadership quality matter for healthcare outcomes? Yes, it does. For almost all domains we find a significant positive effect of leadership quality on hospital service quality. Specifically, our results emphasise the importance of the change-oriented leadership style in terms of willingness to adapt and adopt new policies, on feedback from patients and on clinical quality measures. On the other hand, we find that task-oriented leadership behaviour is more effective for staff-rated quality measures, namely, recommending the hospital as a place to work and receive treatment. We also find that increased organizational autonomy and competition facilitating leadership effects on patient-rated healthcare quality. From the data reported in this article it is not possible to explain precisely why this is happening. One possibility is that the governing boards and directors of more autonomous and more competitive hospitals are more motivated to make selective choices of leaders in organizations who focus on more patient-centric healthcare service. Indeed, it may be that FTs and more competitive hospitals, through higher representation of clinicians on governing boards (Veronesi et al. 2015), have moved closer to a "developmental culture" characterized by a

greater concern for innovation and advancement and clinical teams being given more freedoms and responsibilities.

Our results have important implications for policy makers highlighting the importance of strong leadership development programs and, more specifically, focusing on particular leadership styles which, as our results suggest, have a significant impact on healthcare quality. More importantly, our analysis of leadership across organizational hierarchies, from team leaders to senior managers, suggests that leadership development matters at all levels. Our study points to the support and development of change-oriented leadership styles (such as openness for innovation, feedback, adaptation and responsiveness to external environments), and task-oriented leadership styles in particular (such as articulating an appealing vision, providing meaning and a sense of purpose in what staff needs to achieve, and clarifying the objectives of the job) as they seem to have the greatest impact on hospital outcomes. Notwithstanding, an ideal healthcare leader should encompass all effective leadership styles in an integrated way: leading with the integrity and ethics of an integrity-oriented leader, with the flexibility and responsiveness of a change-oriented leader, with a precision and focus of a task-oriented leader, and with the emotional touch of a relations-oriented leader. Indeed, in practice we are starting to see the rise of leadership development programs in the healthcare sector, such as the NHS Leadership Academy (established in 2014) whose training models are based on integrating effective leadership styles.

While our findings provide strong evidence for a link between leadership quality and healthcare outcomes, a couple of caveats need to be noted. Firstly, although most researchers agree that the task, relations, change and integrity elements are clearly distinguished, not all agree on the conceptual clarity of the specific elements that define each (Lowe et al. 1996; Trottier et al. 2008). The leadership styles that we analyse are adopted from previous literature but they are not exhaustive. The integrated leadership model lacks some of the roles associated with

leadership, such as external roles of being a figurehead, liaison, spokesperson, entrepreneur and negotiator (Javidan & Waldman 2003; Fernandez et al. 2010). It is also worth noting that our study focuses on the measurement of leadership quality as perceived by followers (hospital staff), and not as observed by third parties. Thus, further research could incorporate a more exhaustive list of leadership styles and differentiate between perceived and observed measures of leadership quality in healthcare organizations.

Secondly, measuring the dependent and independent variables based on different data sources we ensure our results do not suffer from common source bias. However, a thorny methodological issue that may arise in this study is simultaneity bias. Attribution theory of leadership posits that followers make positive attributions of leaders for a variety of reasons, including when the organization performs well (Awamleh & Gardner, 1999; Lord & Maher, 1991). In our panel data framework, we partially control for this issue by evaluating the changes in the dependent variables on the independent variables. Using the lag of leadership quality as an instrument and estimating a two-stage model significantly reduces the simultaneity bias and provides consistent results; however, we cannot completely exclude it. We invite further research on this using randomized control trials and field experiments to test for leadership theories within the healthcare sector. It is unfortunate that up to now it has been extremely difficult to conduct field experiments within public sector domains and experimental studies are limited to a very few (Dvir et al. 2001; Belle 2013; D'Adda 2011; Antonakis et al. 2014).

## References


Aiken, L. H., Clarke, S. P., Cheung, R. B., Sloane, D. M., & Silber, J. H. (2003). Educational levels of hospital nurses and surgical patient mortality. *Jama*, *290*(12), 1617-1623.

Allen, P. (2009). Restructuring the NHS again: supply side reform in recent English health care policy. *Financial accountability & management*, *25*(4), 373-389.

Allen, P., Keen, J., Wright, J., Dempster, P., Townsend, J., Hutchings, A., & Verzulli, R. (2012). Investigating the governance of autonomous public hospitals in England: multi-site case study of NHS foundation trusts. *Journal of health services research & policy*, *17*(2), 94-100.

Amabile, T. M., Schatzel, E. A., Moneta, G. B., & Kramer, S. J. (2004). Leader behaviors and the work environment for creativity: Perceived leader support. *The Leadership Quarterly*, *15*(1), 5-32.

Antonakis, J., d'Adda, G., Weber, R., & Zender, C. (2014). *Just words? Just speeches? On the economic value of charismatic leadership*. Working Paper.

Awamleh, R., & Gardner, W. L. (1999). Perceptions of leader charisma and effectiveness: The effects of vision content, delivery, and organizational performance. *The Leadership Quarterly*, *10*(3), 345-373.

Bass, B. M. (1985). Leadership: Good, better, best. *Organizational dynamics*, *13*(3), 26-40.

Bass, B. M. (1997). Does the transactional–transformational leadership paradigm transcend organizational and national boundaries?. *American psychologist*, *52*(2), 130.

Behrendt, P., Matz, S., & Göritz, A. S. (2017). An integrative model of leadership behavior. *The Leadership Quarterly*, *28*(1), 229-244.

Bellé, N. (2013). Leading to make a difference: A field experiment on the performance effects of transformational leadership, perceived social impact, and public service motivation. *Journal of Public Administration Research and Theory*, 24(1), 109-136.

Bloom, N., Propper, C., Seiler, S., & Van Reenen, J. (2015). The impact of competition on management quality: evidence from public hospitals. *The Review of Economic Studies*, rdu045.

Bradler, C., Dur, R., Neckermann, S., & Non, A. (2016). Employee recognition and performance: A field experiment. *Management Science*, *62*(11), 3085-3099.

Brown, M. E., Treviño, L. K., & Harrison, D. A. (2005). Ethical leadership: A social learning perspective for construct development and testing. *Organizational behavior and human decision processes*, *97*(2), 117-134.

Burns, J. M. (1978). Leadership. NY Harper & Row.

Cannella, A. A., & Monroe, M. J. (1997). Contrasting perspectives on strategic leaders: Toward a more realistic view of top managers. *Journal of Management*, *23*(3), 213-237.

Chen, X. P., & Farh, J. L. (1999). The effectiveness of transactional and transformational leader behaviors in Chinese organizations: Evidence from Taiwan. In *annual meeting of the Academy of Management, Chicago*.

CMND 7615 (1979). National Health Service, Report. *Royal Commission*.

Colquitt, J. A., Conlon, D. E., Wesson, M. J., Porter, C. O., & Ng, K. Y. (2001). Justice at the millennium: a meta-analytic review of 25 years of organizational justice research. *Journal of Applied Psychology*, 86(3), 425-445.

Cooper, Z., Gibbons, S., Jones, S., & McGuire, A. (2011). Does hospital competition save lives? Evidence from the English NHS patient choice reforms. *The Economic Journal*, *121*(554), 228-260.

Cooper, Z., Gibbons, S., & Skellern, M. (2016). Does competition from private surgical centres improve public hospitals' performance? Evidence from the English National Health Service.

CQC 2015. Trends in the adult inpatient survey 2005-2014: Statistical Release. http://www.cqc.org.uk/content/trends-adult-inpatient-survey-2005-2014

d'Adda, G. (2012). Leadership and influence: Evidence from an artefactual field experiment on local public good provision. Working Paper.

Department of Health. (2002), Improvement, Expansion and Reform: The Next 3 Years. Priorities and Planning Framework 2003 – 2006, London, Department of Health.

Department of Health (2005), Healthcare Output and Productivity: Accounting for Quality Change, London, Department of Health.

Department of Health. NHS performance ratings acute trusts 2000/01. London: DoH, 2001.

Dionne, S. D., Yammarino, F. J., Atwater, L. E., & James, L. R. (2002). Neutralizing substitutes for leadership theory: Leadership effects and common-source bias. *Journal of applied psychology*, *87*(3), 454-463.

Dvir, T., Eden, D., Avolio, B. J., & Shamir, B. (2002). Impact of transformational leadership on follower development and performance: A field experiment. *Academy of management journal*, *45*(4), 735-744.

Edmondson, A. C. (2003). Speaking up in the operating room: How team leaders promote learning in interdisciplinary action teams. *Journal of management studies*, *40*(6), 1419-1452.

Ekvall, G., & Arvonen, J. (1991). Change-centered leadership: An extension of the two-dimensional model. *Scandinavian Journal of Management*, *7*(1), 17-26.

Fernandez, S. (2005). Developing and testing an integrative framework of public sector leadership: Evidence from the public education arena. *Journal of Public Administration Research and Theory*, *15*(2), 197-217.

Fernandez, S. (2008). Examining the effects of leadership behavior on employee perceptions of performance and job satisfaction. *Public Performance & Management Review*, *32*(2), 175-205.

Fernandez, S., Cho, Y. J., & Perry, J. L. (2010). Exploring the link between integrated leadership and public sector performance. *The Leadership Quarterly*, *21*(2), 308-323.

Fitzgerald, L., Ferlie, E., McGivern, G., & Buchanan, D. (2013). Distributed leadership patterns and service improvement: Evidence and argument from English healthcare. *The Leadership Quarterly*, *24*(1), 227-239.

Goodall, A. H. (2011). Physician-leaders and hospital performance: is there an association?. *Social science & medicine*, *73*(4), 535-539.

Griffiths, R. (1983). NHS management inquiry: report to the Secretary of State for Social Services. *Department of Health and Social Security, London*.

Gronn, P. (2000). Distributed properties: A new architecture for leadership. *Educational management & administration*, *28*(3), 317-338.

Gronn, P. (2002). Distributed leadership as a unit of analysis. *The leadership quarterly*, *13*(4), 423-451.

Gronn, P. (2009). From distributed to hybrid leadership practice. In *Distributed Leadership* (pp. 197-217). Springer Netherlands.

Ham, C. (2012). Leadership and engagement for improvement in the NHS: Together we can. *Report from the King's Fund on Leadership Review*.

Hammer, A., O.A. Arah, M. DerSarkissian, C.A. Thompson, R. Mannion, C.Wagner, (2013). The Relationship between Social Capital and Quality Management Systems in European Hospitals: A Quantitative Study, *PLoS ONE,* 8.

Harris, R., Bennett, J., & Ross, F. (2014). Leadership and innovation in nursing seen through a historical lens. *Journal of advanced nursing*, *70*(7), 1629-1638.

Clinical Indicators Team (2016). Indicator specification: Compendium of population health indicators. Hospital Episode Statistics: Deaths within 30 days of a hospital procedure: surgery (non-elective admissions). Health & Social Care Information Centre.

Huang, X., Iun, J., Liu, A., & Gong, Y. (2010). Does participative leadership enhance work performance by inducing empowerment or trust? The differential effects on managerial and non-managerial subordinates. *Journal of Organizational Behavior*, *31*(1), 122-143.

Janssen, O. (2001). Fairness perceptions as a moderator in the curvilinear relationships between job demands, and job performance and job satisfaction. *Academy of management journal*, *44*(5), 1039-1050.

Javidan, M., & Waldman, D. A. (2003). Exploring charismatic leadership in the public sector: Measurement and consequences. *Public Administration Review*, *63*(2), 229-242.

Jiang, J. H., Lockee, C., Bass, K., & Fraser, I. (2009). Board Oversight of Quality: Any Differences in Process of Care and Mortality?. *Journal of Healthcare Management*, *54*(1), 15-29.

Judge, T. A., & Piccolo, R. F. (2004). Transformational and transactional leadership: a meta-analytic test of their relative validity. *Journal of applied psychology*, *89*(5), 755.

Kessler, D. P., & McClellan, M. B. (2002). How liability law affects medical productivity. *Journal of health economics*, *21*(6), 931-955.

Kim, S. (2002). Participative management and job satisfaction: Lessons for management leadership. *Public administration review*, *62*(2), 231-241.

Kim, S. (2005). Individual-level factors and organizational performance in government organizations. *Journal of public administration research and theory*, *15*(2), 245-261.

Leonard, K. L. (2008). Is patient satisfaction sensitive to changes in the quality of care? An exploitation of the Hawthorne effect. *Journal of health economics*, *27*(2), 444-459.

Lord, R. G., & Maher, K. J. (1991). Cognitive theory in industrial and organizational psychology. *Handbook of industrial and organizational psychology*, *2*, 1-62.

Lowe, K. B., Kroeck, K. G., & Sivasubramaniam, N. (1996). Effectiveness correlates of transformational and transactional leadership: A meta-analytic review of the MLQ literature. *The leadership quarterly*, *7*(3), 385-425.

Macfarlane, F., Duberley, J., Fewtrell, C., & Powell, M. (2012). Talent management for NHS managers: human resources or resourceful humans?. *Public Money & Management*, *32*(6), 445-452.

Mannion, R., Davies, H. T. O., Jacobs, R., Kasteridis, P., Millar, R., & Freeman, T. (2017). Do Hospital Boards matter for better, safer, patient care?. *Social Science & Medicine*, *177*, 278-287.

McAlearney, A. S. & Butler, P. W. (2008). Using leadership development programs to improve quality and efficiency in healthcare. *Journal of Healthcare Management*, *53*(5), 319.

Meier, K. J., & O'Toole, L. J. (2013). Subjective organizational performance and measurement error: Common source bias and spurious relationships. *Journal of Public Administration Research and Theory*, *23*(2), 429-456.

Molinari, C., Morlock, L., Alexander, J., & Lyles, C. A. (1993). Hospital board effectiveness: relationships between governing board composition and hospital financial viability. *Health Services Research*, *28*(3), 358.

Molinari, C., Alexander, J., Morlock, L., & Lyles, C. A. (1995). Does the hospital board need a doctor? The influence of physician board participation on hospital financial performance. *Medical care*, 170-185.

Morgeson, F. P. (2005). The external leadership of self-managing teams: intervening in the context of novel and disruptive events. *Journal of Applied Psychology*, *90*(3), 497-511.

Ng, K. Y., Ang, S., & Chan, K. Y. (2008). Personality and leader effectiveness: a moderated mediation model of leadership self-efficacy, job demands, and job autonomy. *Journal of Applied Psychology*, *93*(4), 733.

NHS England. 2014. Understanding the New NHS: A guide for everyone working and training within the NHS. BMJ: Charlesworth Press.

Orazi, D. C., Turrini, A., & Valotti, G. (2013). Public sector leadership: new perspectives for research and practice. *International Review of Administrative Sciences*, *79*(3), 486-504.

Palanski, M. E., & Yammarino, F. J. (2009). Integrity and leadership: A multi-level conceptual framework. *The Leadership Quarterly*, *20*(3), 405-420.

Pérotin, V., Zamora, B., Reeves, R., Bartlett, W., & Allen, P. (2013). Does hospital ownership affect patient experience? An investigation into public–private sector differences in England. *Journal of health economics*, *32*(3), 633-646.

Pollitt, C., & Bouckaert, G. (2011). *Public Management Reform: A comparative analysis-new public management, governance, and the Neo-Weberian state*. Oxford University Press.

Propper, C., Burgess, S., & Green, K. (2004). Does competition between hospitals improve the quality of care?: Hospital death rates and the NHS internal market. *Journal of Public Economics*, *88*(7), 1247-1272.

Propper, C., Sutton, M., Whitnall, C., & Windmeijer, F. (2008). Did 'Targets and Terror'ReduceWaiting TimesinEngland for Hospital Care?. *Health Care*, *8*(2), 5.

Rubin, E. V. (2009). The role of procedural justice in public personnel management: Empirical results from the Department of Defense. *Journal of Public Administration Research and Theory*, *19*(1), 125-143.

Saltman, R.B., A. Durán and H.F.W. Dubois. 2011. Governing Public Hospitals: Reform Strategies and the Movement Towards Institutional Autonomy. Copenhagen: European Observatory on Health Systems and Policies.

Storey, J., & Holti, R. (2013). Towards a New Model of Leadership for the NHS. NHS Leadership Academy, The Open University

Sjetne, I.S., M.Veenstra andK. Stavem. (2007). The Effect of Hospital Size and Teaching Status on Patient Experiences with Hospital Care: A Multilevel Analysis, *Medical Care,* 45(3), 252–58.

Thi, P. L. N., Briancon, S., Empereur, F., & Guillemin, F. (2002). Factors determining inpatient satisfaction with care. *Social science & medicine*, *54*(4), 493-504.

Trottier, T., Van Wart, M., & Wang, X. (2008). Examining the nature and significance of leadership in government organizations. *Public Administration Review*, *68*(2), 319-333.

Van der Wal, Z., De Graaf, G., & Lasthuizen, K. (2008). What's valued most? Similarities and differences between the organizational values of the public and private sector. *Public administration*, *86*(2), 465-482.

Van Wart, M. (2013). Lessons from leadership theory and the contemporary challenges of leaders. *Public Administration Review*, *73*(4), 553-565.

Veronesi, G., & Keasey, K. (2012). A (new) model of board of directors: evidence from the National Health Service. *International Journal of Public Sector Management*, *25*(4), 272-286.

Veronesi, G., Kirkpatrick, I., & Altanlar, A. (2015). Clinical leadership and the changing governance of public hospitals: implications for patient experience. *Public Administration*, *93*(4), 1031-1048.

Veronesi, G., Kirkpatrick, I., & Vallascas, F. (2013). Clinicians on the board: what difference does it make?. *Social Science & Medicine*, *77*, 147-155.

Verschueren, M., Kips, J., & Euwema, M. (2013). A review on leadership of head nurses and patient safety and quality of care. In *Leading in Health Care Organizations: Improving Safety, Satisfaction and Financial Performance*. Emeral Insights edition. 14, 3-34.

Walshe, K., & Smith, L. (2011). The NHS management workforce. *London: Kings Fund*.

Wang, A. C., & Cheng, B. S. (2010). When does benevolent leadership lead to creativity? The moderating role of creative role identity and job autonomy. *Journal of Organizational Behavior*, *31*(1), 106-121.

Wang, H., Tsui, A. S., & Xin, K. R. (2011). CEO leadership behaviors, organizational performance, and employees' attitudes. *The Leadership Quarterly*, *22*(1), 92-105.

West, M., Eckert, R., Steward, K., & Pasmore, B. (2014). Developing collective leadership for health care. *London: The King's Fund*.

West, M., & Dawson, J. (2012). Employee engagement and NHS performance. *The King's Fund*, *1*, 23.

Wong, C. A., & Cummings, G. G. (2007). The relationship between nursing leadership and patient outcomes: a systematic review. *Journal of nursing management*, *15*(5), 508-521.

Wright, P. M., Gardner, T. M., Moynihan, L. M., & Allen, M. R. (2005). The relationship between HR practices and firm performance: Examining causal order. *Personnel psychology*, *58*(2), 409-446.

Wright, B. E., & Pandey, S. K. (2009). Transformational leadership in the public sector: Does structure matter?. *Journal of public administration research and theory*, 20(1), 75-89.

Yukl, G. (2008). How leaders influence organizational effectiveness. *The leadership quarterly*, *19*(6), 708-722.

Yukl, G. (2012). Effective leadership behavior: What we know and what questions need more attention. *The Academy of Management Perspectives*, *26*(4), 66-85.

# Tables

**Table 1: Descriptive Statistics of the variables and correlation coefficients**

| **A Dependent Variables:** | **Mean** | **Std. Dev** | **Obs** | **1.** | **2.** | **3.** | 4. | 5. | 6. | 7. | 8. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Staff Rated RecWork | 63.9 | 10.1 | 591 | | | | | | | | |
| 2. Staff Rated RecTreatm | 56.1 | 9.5 | 591 | 0.851 | | | | | | | |
| 3. Patient Satisfaction Overall | 75.6 | 2.51 | 590 | 0.336 | 0.511 | | | | | | |
| 4. Patient Satisfaction Access | 83.6 | 2.97 | 590 | 0.231 | 0.375 | 0.792 | | | | | |
| 5.Patient Satisfaction Coordination | 64.5 | 3.53 | 590 | 0.237 | 0.383 | 0.891 | 0.594 | | | | |
| 6. Patient Satisfaction Information | 67.1 | 3.31 | 590 | 0.428 | 0.567 | 0.876 | 0.589 | 0.731 | | | |
| 7. Patient Satisfaction Relationships | 83.5 | 2.62 | 590 | 0.225 | 0.393 | 0.879 | 0.617 | 0.754 | 0.700 | | |
| 8. Patient Satisfaction Comfort | 79.2 | 2.21 | 590 | 0.315 | 0.472 | 0.839 | 0.591 | 0.677 | 0.689 | 0.728 | |
| 9. Non-Elective Death Rate (age stand. per 100,000 emergency admissions) | 3667.4 | 717.6 | 587 | -0.061 | -0.047 | -0.128 | -0.146 | -0.105 | -0.081 | -0.179 | -0.028 |
| **B Independent Variables:** | 10. | 11. | 12. | | | | | | | | |
| 10. Relations-Oriented Leadership Score | | | | | | | | | | | |
| 11. Integrity-Oriented Leadership Score | 0.6517 | | | | | | | | | | |
| 12. Task-Oriented Leadership Score | 0.7472 | 0.5827 | | | | | | | | | |
| 13.Change-Oriented Leadership Score | 0.8023 | 0.7498 | 0.7188 | | | | | | | | |
| **C Controls** | 14. | 15. | 16. | 17. | 18. | 19. | 20. | 21. | | | |
| 14. DayEpsRate | | | | | | | | | | | |
| 15. EmergRate | -0.6451 | | | | | | | | | | |
| 16. MedianLOS | 0.3027 | -0.1743 | | | | | | | | | |
| 17. MeanAge | 0.372 | 0.105 | 0.2159 | | | | | | | | |
| 18. OccupancyRate | -0.1516 | 0.1161 | 0.1261 | 0.0194 | | | | | | | |
| 19. CapitalInv | 0.0435 | -0.1702 | 0.0413 | -0.1001 | -0.0899 | | | | | | |
| 20. TotalBeds | 0.0971 | -0.1434 | 0.022 | -0.0704 | -0.1857 | 0.303 | | | | | |
| 21. MeanWait | -0.0182 | -0.0494 | 0.0809 | 0.0236 | 0.0675 | 0.0096 | -0.0329 | | | | |
| 22. CaseLoad | 0.0538 | -0.0418 | -0.2501 | 0.0571 | 0.0179 | -0.1429 | -0.1946 | 0.0704 | | | |

**Table 2. Leadership Quality Survey Questions**

| |
|---|
| **Relations-oriented leadership role:** |
| I know who the senior managers are here |
| My immediate manager... |
| ... encourages those who work for her/him to work as a team |
| ... can be counted on to help me with a difficult task at work |
| ... asks for my opinion before making decisions that affect my work |
| ... is supportive in a personal crisis |
| … takes a positive interest in my health and well-being |
| My appraisal left me feeling that my work is valued by my organisation |
| I am satisfied with the support I get from my immediate manager. |
| Senior managers here try to involve staff in important decisions |
| My manager supported me to receive this training learning or development? |
| **Task-oriented leadership role** |
| Communication between senior management and staff is effective |
| My immediate manager gives me clear feedback on my work |
| The appraisal helped me improve how I do my job. |
| The appraisal helped me agree clear objectives for my work |
| **Change-oriented leadership role** |
| Senior managers act on staff feedback (missing in 2010 and 2011) |
| My organizations acts on patient feedback. |
| We are given feedback about changes made in response to reported errors, near misses and incidents. |
| Senior managers encourage staff to suggest new ideas for improving services. (missing in 2012, 2013, and 2014) |
| As a result of your appraisal, were any training, learning or development needs identified? |
| When errors, near misses or incidents are reported, my managers takes action to ensure that they do not happen again |
| **Integrity-oriented leadership role** |
| My organisation treats staff who are involved in an error, near miss or incident fairly |
| My organisation encourages us to report errors, near misses or incidents |
| My organisation treats reports of errors, near misses or incidents confidentially |
| Does your organisation act fairly with regard to career progression / promotion, regardless of ethnic background, gender, religion, sexual orientation, disability or age? |

*All survey items have responses ranging either from Strongly Disagree to Strongly Agree or Yes/No. The data downloaded from NHS Staff Survey website is at hospital trust level and demonstrates the proportion of the staff answering either Agree or Strongly Agree to the statement.*

**Table 3: The Effect of Leadership on Hospital Quality**

| | Staff-Rated | | | Patient-Rated | | | | | Clinical |
|---|---|---|---|---|---|---|---|---|---|
| **Dependent Variable** | (1) RecTreatm | (2) RecWork | (3) Overall | (4) Access | (5) Coordination | (6) Information | (7) Relationships | (8) Comfort | (9) Non-Elective Death Rate |
| *Integrated Leadership* | 0.334*** | 0.623*** | 0.220*** | 0.099 | 0.123*** | 0.282*** | 0.302*** | 0.144*** | -0.161*** |
| | (0.034) | (0.031) | (0.038) | (0.053) | (0.036) | (0.039) | (0.039) | (0.042) | (0.041) |
| *Relations-Oriented Leadership* | 0.176*** | 0.431*** | 0.188*** | 0.098* | 0.097** | 0.210*** | 0.292*** | 0.121*** | -0.094*** |
| | (0.028) | (0.027) | (0.029) | (0.042) | (0.029) | (0.033) | (0.029) | (0.033) | (0.034) |
| *Task-Oriented Leadership* | 0.428*** | 0.669*** | 0.163*** | 0.084 | 0.091* | 0.248*** | 0.173*** | 0.097* | -0.138*** |
| | (0.036) | (0.036) | (0.047) | (0.061) | (0.041) | (0.048) | (0.050) | (0.048) | (0.048) |
| *Integrity-Oriented Leadership* | 0.339*** | 0.543*** | 0.184*** | 0.119* | 0.118*** | 0.214*** | 0.213*** | 0.124** | -0.080* |
| | (0.034) | (0.039) | (0.036) | (0.051) | (0.034) | (0.044) | (0.039) | (0.042) | (0.045) |
| *Change-Oriented Leadership* | 0.361*** | 0.613*** | 0.249*** | 0.087 | 0.163*** | 0.311*** | 0.328*** | 0.183*** | -0.213*** |
| | (0.033) | (0.032) | (0.034) | (0.049) | (0.034) | (0.038) | (0.037) | (0.042) | (0.048) |
| N | 583 | 583 | 582 | 582 | 582 | 582 | 582 | 582 | 579 |

** p<0.05 ** p<0.01 *** p<0.001. Standardized beta coefficients come from separate regressions and are from fixed effect panel regressions; Robust standard errors in parentheses. All regression include the list of controls reported in the Table A2 of the Appendix.*

**Table 4: Moderation Analysis between leadership quality and hospital autonomy and competition**

| | Staff-Rated | | | Patient-Rated | | | | | Clinical |
|---|---|---|---|---|---|---|---|---|---|
| **Dependent Variable** | (1) RecTreatm | (2) RecWork | (3) Overall | (4) Access | (5) Coordination | (6) Information | (7) Relationships | (8) Comfort | (9) Non-Elective Death Rate |
| *Int.Leadership* | 0.381*** | 0.640*** | 0.154** | 0.097 | 0.099* | 0.204*** | 0.123** | 0.127* | -0.089 |
| *IntLead ✕ FT* | -0.053 | 0.019 | 0.036 | -0.016 | 0.028 | 0.045 | 0.093** | 0.000 | -0.021 |
| *IntLead✕Compet* | 0.005 | -0.029 | 0.040 | 0.013 | -0.013 | 0.060 | 0.105** | 0.024 | -0.093 |
| | | | | | | | | | |
| *R.O.Leadership* | 0.214*** | 0.463*** | 0.140*** | 0.110 | 0.095* | 0.153*** | 0.151*** | 0.092 | -0.045 |
| *R.O.Lead✕FT* | -0.064* | -0.006 | 0.014 | -0.032 | -0.003 | 0.026 | 0.073** | -0.003 | -0.030 |
| *R.O.Lead✕Compet* | 0.040 | 0.016 | 0.053* | 0.021 | 0.009 | 0.067* | 0.097*** | 0.047 | -0.063 |
| | | | | | | | | | |
| *T.O. Leadership* | 0.499*** | 0.681*** | 0.106 | 0.077 | 0.054 | 0.186** | 0.017 | 0.109 | -0.136* |
| *T.O.Lead ✕ FT* | -0.048 | 0.023 | 0.043 | 0.001 | 0.063 | 0.037 | 0.085 | -0.003 | 0.015 |
| *T.O.Lead✕Compet* | -0.041 | -0.034 | 0.025 | 0.012 | -0.043 | 0.057 | 0.094 | -0.007 | -0.029 |
| | | | | | | | | | |
| *I.O.Leadership* | 0.405*** | 0.557*** | 0.138** | 0.191** | 0.095 | 0.173*** | 0.031 | 0.090 | -0.047 |
| *I.O. Lead ✕ FT* | -0.014 | 0.028 | 0.013 | -0.053 | 0.017 | 0.035 | 0.048 | 0.013 | -0.016 |
| *I.O.Lead✕Compet* | -0.040 | -0.008 | 0.078 | 0.017 | 0.023 | 0.060 | 0.194*** | 0.072 | -0.029 |
| | | | | | | | | | |
| *C.O. Leadership* | 0.394*** | 0.635 | 0.184*** | 0.126 | 0.133** | 0.229*** | 0.139*** | 0.154** | -0.044 |
| *C.O. Lead ✕ FT* | -0.032 | 0.017 | 0.029 | -0.039 | 0.015 | 0.057 | 0.074* | 0.008 | -0.043 |
| *C.O.Lead✕Compet* | -0.003 | -0.029 | 0.046 | 0.005 | 0.008 | 0.042 | 0.132*** | 0.036 | -0.152* |
| | | | | | | | | | |
| N | 583 | 583 | 582 | 582 | 582 | 582 | 582 | 582 | 579 |

** p<0.05 ** p<0.01 *** p<0.001. Standardized beta coefficients come from separate regressions and are from random effect panel regressions; Robust standard errors are not reported to fit the results in the table but are available upon request. All regression include the list of controls reported in the Table A2 of the Appendix. Int: integrated leadership, R.O.: relation-oriented, T.O.: task-oriented, I.O.: integrity-oriented, C.O.: change-oriented. FT denotes Foundation Trust hospitals, and Compet is the number of other hospitals in the 30km radius.*

# Appendix

**Table A1. NHS Inpatient Survey questions**

| ***Subgrouped by the Care Quality Commission domains*** |
|---|
| **Access** |
| Was your admission date changed by the hospital? (Factor 1: 0.0144; Factor 2: 0.008) |
| How do you feel about the length of time you were on the waiting list before your admission to hospital? (Factor 1: 0.017; Factor 2:0.017) |
| From the time you arrived at the hospital, did you feel that you had to wait a long time to get to a bed on a ward? (Factor 1: -0.016, Factor 2: 0.006) |
| **Coordination** |
| Sometimes, a member of staff will say one thing and another will say something quite different. Did this happen to you? (Factor 1: 0.115; Factor 2: 0.008) |
| On the day you left the hospital, was your discharge delayed by any reason? (Factor 1: 025; Factor 2: -0.001) |
| Did any member of staff tell you about any danger signals you should watch for after you went home? (Factor 1: 0.005; Factor 2: 0.309) |
| **Information** |
| Were you involved as much as you wanted to be in decisions made about your care and treatment? (Factor 1: 0.071; Factor 2: 0.088) |
| Did a member of staff explain the purposes of the medications you were to take at home in a way you could understand? (Factor 1: -0.063; Factor 2: 0.211) |
| Did a member of staff tell you about medication side effects to watch for when you went home? (Factor 1: -0.064; Factor 2: 0.414) |
| **Relationships** |
| When you had important questions to ask the doctor, did you get answers that you could understand? (Factor 1: -0.006; Factor 2: 0.063) |
| Did doctors talk in front you as if you weren't there? ((Factor 1: 0.248; Factor 2: -0.032) |
| When you had important questions to ask a nurse, did you get answers that you could understand? (Factor 1: 0.255; Factor 2:-0.038) |
| Did nurses talk in front of you as if you weren't there? (Factor 1: 0.377; Factor 2: -0.062) |
| **Comfort** |
| Were you ever bothered by noise at night from other patients? (Factor 1: -0.012; Factor 2: 0.004) |
| Were you ever bothered by noise at night from hospital staff? (Factor 1: 0.005; Factor 2: 0.013) |
| In your opinion, how clean was the hospital room or ward that you were in? (Factor 1: 0.003; Factor 2: -0.010) |
| How would you rate the hospital food? (Factor 1: -0.019; Factor 2: 0.007) |
| Were you given enough privacy when being examined or treated? (Factor 1: 0.036; Factor 2: -0.021) |
| Overall, did you feel you were treated with respect and dignity while you were in hospital? (Factor 1: 0.043; Factor 2: 0.014) |
| Do you think the hospital staff did everything they could to help control your pain? (Factor 1: -0.014; Factor 2: 0.0.023) |

*Note: Each items' loading to our PatientSat1 and PatientSat2 factors are in parentheses.*

**Table A2: Dependent Variable: Patient Satisfaction Factors**

| | Factor 1 | Factor 2 |
|---|---|---|
| *Integrated Leadership* | 0.319*** | 0.202*** |
| | (0.038) | (0.366) |
| *Relations-Oriented Leadership* | 0.310*** | 0.125 *** |
| | (0.029) | (0.030) |
| *Task-Oriented Leadership* | 0.176*** | 0.208*** |
| | (0.048) | (0.043) |
| *Integrity-Oriented Leadership* | 0.206*** | 0.185*** |
| | (0.039) | (0.039) |
| *Change-Oriented Leadership* | 0.344*** | 0.246*** |
| | (0.037) | (0.035) |
| N | 582 | 582 |

*The coefficients come from separate regressions, * p<0.05 ** p<0.01 *** p<0.001. Standardized beta coefficients are from fixed effect panel regressions; Robust standard errors in parentheses. All regression include the list of controls reported in Table A2 of the Appendix.*

**Table A3: The effect of Control variables on Dependent Variables**

| **Hospital Quality** | **Staff-Rated** | | | **Patient-Rated** | | | | | **Clinical** |
|---|---|---|---|---|---|---|---|---|---|
| **Controls** | **(1) RecTreatm** | **(2) RecWork** | **(3) Overall** | **(4) Access** | **(5) Coordination** | **(6) Information** | **(7) Relationships** | **(8) Comfort** | **(9) Non-Elective Death Rate** |
| *DayEpsRate* | 0.037 | 0.153 | 0.134 | -0.016 | 0.091 | 0.148 | 0.192 | 0.197* | -0.159 |
| | (0.0815) | (0.121) | (0.110) | (0.130) | (0.121) | (0.107) | (0.116) | (0.113) | (0.116) |
| *EmergRate* | 0.129* | 0.294*** | 0.101 | -0.015 | 0.047 | 0.176 | 0.092 | 0.150 | -0.032 |
| | (0.0735) | (0.112) | (0.119) | (0.117) | (0.134) | (0.118) | (0.130) | (0.136) | (0.134) |
| *MedianLOS* | -0.018 | -0.041 | 0.011 | -0.004 | -0.015 | 0.013 | 0.003 | 0.071 | 0.150*** |
| | (0.0364) | (0.0457) | (0.0397) | (0.0440) | (0.0516) | (0.0520) | (0.0402) | (0.0454) | (0.0558) |
| *MeanAge* | -0.196* | 0.218 | 0.233 | 0.109 | 0.257* | 0.168 | 0.418*** | 0.042 | -0.010 |
| | (0.101) | (0.152) | (0.142) | (0.177) | (0.150) | (0.145) | (0.147) | (0.144) | (0.143) |
| *OccupancyRate* | 0.046 | 0.158*** | 0.013 | -0.116*** | 0.031 | 0.093** | 0.046 | -0.009 | -0.001 |
| | (0.0334) | (0.0521) | (0.0403) | (0.0428) | (0.0460) | (0.0465) | (0.0454) | (0.0422) | (0.0486) |
| *CapitalInv* | -0.016 | -0.009 | -0.010 | -0.014 | -0.007 | 0.010 | -0.017 | -0.018 | -0.012 |
| | (0.0217) | (0.0326) | (0.0170) | (0.0244) | (0.0200) | (0.0336) | (0.0295) | (0.0181) | (0.0272) |
| *TotalBeds* | 0.103 | 0.088 | -0.236** | -0.424*** | -0.111 | -0.334** | 0.046 | -0.151 | -0.152 |
| | (0.110) | (0.143) | (0.118) | (0.129) | (0.118) | (0.140) | (0.148) | (0.189) | (0.186) |
| *MeanWait* | -0.008 | -0.063 | -0.027 | -0.095 | 0.003 | 0.019 | -0.013 | -0.054 | 0.011 |
| | (0.0410) | (0.0540) | (0.0670) | (0.0680) | (0.0553) | (0.0907) | (0.0557) | (0.0420) | (0.0377) |
| *CaseLoad* | -0.020 | -0.102* | -0.151*** | 0.014 | -0.130** | -0.189*** | -0.229*** | -0.109* | 0.296*** |
| | (0.0425) | (0.0532) | (0.0526) | (0.0658) | (0.0508) | (0.0577) | (0.0558) | (0.0554) | (0.0579) |
| N | 583 | 583 | 582 | 582 | 582 | 582 | 582 | 582 | 579 |
| $R^2_{within}$ | 0.022 | 0.065 | 0.047 | 0.033 | 0.033 | 0.055 | 0.088 | 0.032 | 0.082 |

**Table A4: The Effect of Leadership on Hospital Quality: Feasible Generalized Least Squares Model**

| | Staff-Rated | | | Patient-Rated | | | | | Clinical |
|---|---|---|---|---|---|---|---|---|---|
| **Dependent Variable** | (1) RecTreatm | (2) RecWork | (3) Overall | (4) Access | (5) Coordination | (6) Information | (7) Relationships | (8) Comfort | (9) Non-Elective Death Rate |
| *Relations-Oriented Leadership* | 0.427*** | 0.642*** | 0.238*** | 0.134*** | 0.155*** | 0.302*** | 0.252*** | 0.173*** | -0.118*** |
| | (0.034) | (0.030) | (0.036) | (0.039) | (0.037) | (0.037) | (0.036) | (0.039) | (0.041) |
| *Task-Oriented Leadership* | 0.566*** | 0.733*** | 0.108*** | 0.041 | 0.060 | 0.241*** | 0.015 | 0.088** | -0.053 |
| | (0.034) | (0.030) | (0.039) | (0.041) | (0.040) | (0.040) | (0.040) | (0.042) | (0.043) |
| *Integrity-Oriented Leadership* | 0.564*** | 0.653*** | 0.337*** | 0.286*** | 0.236*** | 0.357*** | 0.282*** | 0.288*** | -0.080** |
| | (0.030) | (0.029) | (0.034) | (0.037) | (0.036) | (0.035) | (0.035) | (0.037) | (0.040) |
| *Change-Oriented Leadership* | 0.561*** | 0.736*** | 0.253*** | 0.144*** | 0.173*** | 0.327*** | 0.216*** | 0.228*** | -0.070* |
| | (0.031) | (0.027) | (0.036) | (0.039) | (0.037) | (0.037) | (0.037) | (0.039) | (0.041) |
| *Integrated Leadership* | 0.529*** | 0.741*** | 0.168*** | 0.066 | 0.103*** | 0.281*** | 0.126*** | 0.132*** | -0.082* |
| | (0.034) | (0.029) | (0.038) | (0.041) | (0.039) | (0.039) | (0.039) | (0.041) | (0.042) |
| N | 583 | 583 | 582 | 582 | 582 | 582 | 582 | 582 | 579 |

** p<0.05 ** p<0.01 *** p<0.001. Standardized beta coefficients come from separate regressions and are from FGLS panel regressions; Robust standard errors in parentheses. All regression include the list of controls reported in Table A2 of the Appendix.*

**Table A5: The Effect of Leadership on Hospital Quality: Arellano–Bover/ Blundell–Bond**

| | Staff-Rated | | | Patient-Rated | | | | | Clinical |
|---|---|---|---|---|---|---|---|---|---|
| **Dependent Variable** | (1) RecTreatm | (2) RecWork | (3) Overall | (4) Access | (5) Coordination | (6) Information | (7) Relationships | (8) Comfort | (9) Non-Elective Death Rate |
| *Relations-Oriented Leadership* | 0.090** | 0.341*** | 0.125*** | 0.081 | 0.007 | 0.127*** | 0.271*** | 0.060 | 0.027 |
| | (0.035) | (0.036) | (0.032) | (0.050) | (0.034) | (0.037) | (0.034) | (0.038) | (0.044) |
| *Task-Oriented Leadership* | 0.396*** | 0.554*** | 0.009 | 0.019 | -0.054 | 0.127** | 0.055 | -0.104 | -0.081 |
| | (0.040) | (0.042) | (0.063) | (0.080) | (0.060) | (0.060) | (0.068) | (0.067) | (0.069) |
| *Integrity-Oriented Leadership* | 0.286*** | 0.517*** | 0.107** | 0.066 | 0.011 | 0.136** | 0.213*** | 0.045 | -0.062 |
| | (0.048) | (0.048) | (0.050) | (0.070) | (0.053) | (0.059) | (0.052) | (0.057) | (0.072) |
| *Change-Oriented Leadership* | 0.337*** | 0.595*** | 0.157*** | 0.115* | 0.043 | 0.204*** | 0.271*** | 0.062 | -0.130** |
| | (0.035) | (0.032) | (0.048) | (0.069) | (0.052) | (0.052) | (0.051) | (0.061) | (0.063) |
| *Integrated Leadership* | 0.278*** | 0.551*** | 0.127*** | 0.091 | -0.009 | 0.185*** | 0.276*** | 0.013 | -0.034 |
| | (0.038) | (0.034) | (0.047) | (0.067) | (0.047) | (0.050) | (0.051) | (0.055) | (0.056) |
| | 353 | 353 | 351 | 351 | 351 | 351 | 351 | 351 | 351 |

** p<0.05 ** p<0.01 *** p<0.001. Standardized beta coefficients come from separate regressions and are from Arellano-Bond linear dynamic panel data regressions; Robust standard errors in parentheses. All regression include the list of controls reported in Table A2 of the Appendix.*

**Table A6: Two Stage Least Squares using Lag of Leadership Quality as an Instrumental Variable**

| **First Stage Results** | **Integrated Leadership** | **Relation-Oriented leadership** | **Task-Oriented Leadership** | **Change-Oriented Leadership** | **Integrity-Oriented Leadership** |
|---|---|---|---|---|---|
| *LaggedLeadership* | 0.308 (0.055)*** | 0.047 (0.053) | 0.173 (0.060) *** | 0.405 (0.052)*** | 0.081 (0.057) |
| *Prob>F* | *0.000* | *0.367* | *0.0044* | *0.000* | *0.1637* |
| *Centered $R^2$* | *0.2061* | *0.1359* | *0.0879* | *0.2725* | *0.1419* |
| *Kleibergen-Paap Wald Stat* | *30.83* | *0.815* | *8.217* | *58.617* | *1.948* |

| **Second Stage Results** | **(1) RecTreatm** | **(2) RecWork** | **(3) Overall** | **(4) Access** | **(5) Coordination** | **(6) Information** | **(7) Relationships** | **(8) Comfort** | **(9) Non-Elective Death Rate** |
|---|---|---|---|---|---|---|---|---|---|
| *Integrated Leadership* | 0.713 (0.12)*** | 1.125 (0.135)*** | 0.608 (0.147)*** | 0.287 (0.173)* | 0.533 (0.159)*** | 0.738 (0.172)*** | 0.599 (0.135)*** | 0.438 (0.154)*** | -0.942 (0.235)*** |
| *Relations-Oriented Leadership* | 3.593 (3.78) | 5.636 (5.768) | 2.923 (3.147) | 1.527 (1.76) | 2.800 (3.13) | 3.489 (3.785) | 2.546 (2.623) | 1.975 (2.23) | -4.91 (5.06) |
| *Task-Oriented Leadership* | 1.096 (0.301)*** | 1.69 (0.39)*** | 0.969 (0.392)** | 0.538 (0.429) | 0.784 (0.379)** | 1.092 (0.406)*** | 0.981 (0.393)** | 0.810 (0.40)** | -1.171 (0.549)** |
| *Integrity-Oriented Leadership* | 2.149 (1.386) | 2.95 (1.756)* | 2.009 (1.41) | 1.359 (1.163) | 1.854 (1.344) | 1.895 (1.36) | 1.909 (1.291) | 1.55 (1.19) | -2.24 (1.678) |
| *Change-Oriented Leadership* | 0.537 (0.07)*** | 0.832 (0.074)*** | 0.517 (0.111)*** | (0.199 (0.138) | 0.432 (0.114)*** | 0.633 (0.135)*** | 0.586 (0.107)*** | 0.357 (0.120)*** | -0.680 (0.147)*** |

*Standardized beta coefficients are from instrumented 2SLS panel data regressions; Robust standard errors are in parentheses. The coefficients of second stage results come from separate regressions using the predicted leadership quality measures as independent variables, * p<0.05 ** p<0.01 *** p<0.001. All regression include the list of controls reported in Table A2 of the Appendix.*

**Table A7: The relationship between leadership quality measures and managerial redundancy rates**

| **Dependent Variable:**<br>**Lag of** | **Number of Managers Promoted (standardized)** | **Number of Managers Dismissed (standardized)** |
|---|---|---|
| *Integrated Leadership* | 0.253 (0.059)*** | -0.266 (0.101)** |
| *Relations-Oriented Leadership* | 0.197 (0.045)*** | -0.163 (0.063)** |
| *Task-Oriented Leadership* | 0.209 (0.060)*** | -0.176 (0.0787)** |
| *Integrity-Oriented Leadership* | 0.179 (0.066)*** | -0.093 (0.077) |
| *Change-Oriented Leadership* | 0.257 (0.070)*** | -0.155 (0.035) |

*Each cell report coefficients from a separate regression, * p<0.05 ** p<0.01 *** p<0.001. Standardized beta coefficients are from fixed effect panel regressions; Robust standard errors in parentheses. All regression include the list of controls reported in Table A2 of the Appendix.*