Reducing Patient Mortality in Hospitals: The Role of Human Resource

Michael A West
Aston Business School

James P Guthrie
School of Business
University of Kansas

Jeremy F Dawson
Aston Business School

Carol S Borrill
Institute of Work, Health & Organizations
The University of Nottingham

Matthew Carter
Aston Business School

2006

This study was funded by the UK National Health Service Executive North Thames Organization and Management Group via Regional Research & Development funding (1998-2001).

Abstract

Developing effective health care organizations is increasingly complex as a result of demographic changes, globalization and developments in medicine. This study examines the potential contribution of organizational behavior theory and research by investigating the relationship between systems of human resource management (HRM) practices and effectiveness of patient care in hospitals. Relatively little research has been conducted to explore these issues in health care settings. In a sample of 52 hospitals in England, we examine the relationship between the HRM system and health care outcome. Specifically, we study the association between high performance HRM policies and practices and standardized patient mortality rates. The research reveals that, after controlling for prior mortality and other potentially confounding factors such as the ratio of doctors to patients, greater use of a complementary set of HRM practices has a statistically and practically significant relationship with patient mortality. The findings suggest that managers and policy makers should focus sharply on improving the functioning of relevant HR management systems in health care organizations as one important means by which to improve patient care.

Similar to other organizations, hospitals are concerned with maximizing effectiveness through the adoption of appropriate management policies and practices. Unlike most other organizations, however, "effectiveness" in hospitals can be measured partly by their success in treating illness and avoiding deaths. Also unlike many other sectors, little research has examined and identified the management policies and practices that promote effectiveness in hospital settings.

In this paper we build upon and extend previous work on strategic human resource management (SHRM) to examine the influence of a "bundle" or "system" of HR policies and practices on a critically important organization-level healthcare outcome: patient mortality in acute hospitals in England. In the pages that follow, we review relevant literature and theory, describe our research method and present and discuss our findings.

Quality of Care and Inpatient Mortality in Hospitals

Since Florence Nightingale and others first documented wide variations in hospital inpatient death rates in the 19th century through to today, policy makers have drawn attention to variations in hospital performance and specifically patient mortality rates (Buckle, 1865; Jarman et al., 1997; Nightingale, 1863). Not surprisingly, researchers have particularly sought to determine the causes of these variations in patient mortality. Age of patients and severity of illness on admission are likely explanations but even after these are taken into account a large amount of variance is unexplained (Al-Haider & Wan, 1991; Bradbury, Stearns, & Steen, 1991; Chassin, Park, Lohr, Keesey, & Brook, 1989; Iezzoni et al., 1996; Park et al., 1990). An obvious explanation is that such variations reflect differences in quality of care (DuBois, Rogers, Moxley, Draper, & Brook, 1987).

Quality of care is defined as the "degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge" (Lohr & Schroeder, 1990). Although it is not a simple matter to relate quality of care to in-patient mortality in hospitals, some cases make the link clear. The example of myocardial infarction best illustrates this. Clinical research has firmly established the benefits of certain therapeutic procedures (such as acute reperfusion or restoration of blood flow to organs, therapy with aspirin and beta blockers - see Yusuf, Anand, Avezum, Flather, & Coutinho, 1996). Variations in the applications of these preventive and therapeutic processes explain differences in acute myocardial infarction mortality rates in hospitals and that improved process performance leads to improved outcomes (Marciniak, Ellerbeck, & Radford, 1998).

One approach to studying quality of care as a predictor of patient mortality has been to study the ratio of qualified staff to number of patients. Jarman et al. (1999) examined data from the English National Health Service (NHS) and found that the number of doctors per 100 hospital beds, and the ratio of general practitioners (known as primary care physicians in the USA) per 100,000 population were significant negative predictors of standardised inpatient mortality. The proportion of A grade nurses (auxiliary nurses still in training) to the overall number of nurses also emerged as a significant (positive) predictor. Research has made little progress in identifying the factors that may mediate or

moderate the relationships between staffing levels and inpatient mortality, nor possible third factors that might account for the observed relationships.

Among the studies that have investigated the relationships between specific work conditions and patient mortality there is considerable contradictory evidence (Kazanjian et al., 2005). For example, of 10 studies investigating the relationship between nursing workload and patient mortality, five studies reported a positive relationship, three a negative relationship and two no significant relationship. Similarly, of nine studies that have explored inter-professional relationships and patient mortality, six found positive associations and three no significant association (Kazanjian et al., 2005).

The problems of limited understanding about such an important outcome arise partly because there is little use of relevant OB theory and methodology in the health care field (e.g., Flood & Fennel, 1995; E. West, 2001). In the health services research literature however, there is a growing sense that structural and organizational aspects of hospitals are important factors in care giving quality and that is not just the qualifications and experience of attending physicians that matter (Flood, 1994). This does not mean "…. that physicians are unimportant for quality but that organizational context is far more important in setting limits (upper and lower) for physicians than formerly recognized" (Flood, 1994).

We therefore adopted what has been a powerful OB paradigm for understanding organizational performance and applied this the study of hospital inpatient mortality (Arthur, 1992; Batt, 2002; Datta, Guthrie & Wright, 2005; Guthrie, 2001; Huselid, 1995; Neal, West, & Patterson, in press; Patterson, West, & Wall, 2004). Specifically, we focused on the relationship between hospital HRM systems and patient mortality in hospitals.

Why focus on HRM? Donabedian (1980) provides a sophisticated and well-used model of patient care quality in which he identifies two basic aspects of patient care: technical and interpersonal. Technical aspects of care refer to the appropriate application of professional knowledge and skills to promote healthcare. Interpersonal aspects of care involve both the relationships between patients and healthcare professionals as well as the contextual aspects of care. We and others propose that human resource policies and practices are likely to influence patient care quality by impacting both technical and interpersonal aspects of quality care (Flood, 1994; Laschinger, Shamian & Thomson, 2001).

Our primary focus is on systems of HRM practices, as opposed to individual practices, and their relationship to quality of patient care. Consistent with both theory and previous empirical work, we argue that it makes more sense to hypothesise HR *system* effects (the combined effects of a bundle of HR practices, consistent with a Strategic Human Resource Management (SHRM) theoretical orientation) in relation to a system outcome variable such as patient mortality. Preuss (2003) argues that "high performance" HR systems can improve healthcare outcomes in hospital settings in part because they promote effective information processing and decision-making in environments where this is critical. He suggests that

investments in high performance work systems will yield superior health care – and reduced costs – because these systems increase employees' capacity to interpret "equivocal" information on an ongoing basis and allow them to act directly upon this information. Preuss found that aspects of high performance work systems (e.g., increased employee knowledge and broad task responsibilities among nurses) directly impact a measure of hospital medication errors (frequently linked to patient mortality). This effect was partly mediated by improvements in information quality.

SHRM and Organizational Performance

Research and theorising in relation to strategic human resource management (SHRM) reinforces this argument. Wright and McMahan (1992) define strategic human resource management as "the pattern of planned human resource deployments and activities intended to enable an organization to achieve its goals." SHRM studies have focused on explicating the strategic role that HR can play in organizational functioning. More specifically, much of SHRM research has focused on establishing a link between strategic HR policies and practices and organizational level measures of performance. As part of this latter perspective, human resource systems are viewed as an integral part of the organizational "architecture" influencing organizational effectiveness. Unlike traditional research in the HR literature, SHRM research is typically conducted at the business unit or organizational-level of analysis. Reflecting this orientation, recent HR research has focused on 'bundles' or systems of HR policies and practices thought to promote skills, commitment and performance such that employees become a source of sustainable organizational success (Levine, 1995; Pfeffer, 1998).

As discussed by Dyer and Reeves (1995), HR policies and practices may impact multiple measures of organizational effectiveness, including human resource outcomes (e.g., turnover, absenteeism), organizational outcomes (e.g., productivity, inpatient mortality) and financial outcomes (e.g., profits, market value). In industrial settings, SHRM studies have empirically linked HRM systems with turnover (e.g., Arthur, 1994; Batt, 2002; Guthrie, 2001), productivity (e.g., Arthur, 1994; Datta et al., 2005; Guthrie, 2001; Koch and McGrath, 1996; MacDuffie, 1995; Neal, Patterson, & West, 2005; Patterson, West, Lawthom & Nickell, 1997), product/service quality (e.g., MacDuffie, 1995; Youndt, Snell, Dean and Lepak, 1996) and firm profitability and market value (e.g., Delery and Doty, 1996; Huselid, 1995). And, we propose, inpatient mortality in hospitals. We consider the theoretical links between the elements of a high performance HRM system and patient mortality briefly below and argue that is the combined effects of these policies and practices that affect the overall system.

High Performance HRM Systems and Patient Mortality

A number of authors have previously developed approaches to measuring "high commitment" or "high involvement" HRM systems – which we call 'high performance' HRM systems in this paper. They propose that HRM practices that form an overlapping, synergistic system of practices are likely to yield employees capable of positively impacting organizational performance. These HRM practices affect performance by enhancing employees' knowledge/skills and commitment and by providing them with the

discretion necessary to capitalize on these skills and commitment (see for examples of research in other sectors Arthur, 1992; Batt, 2002; Datta et al.., 2005; Guthrie, 2001; Huselid, 1995; Neal, West, & Patterson, in press; Patterson, West, & Wall, 2004). While there is variance in the specific items included as "high commitment" or "high performance" HRM practices, both conceptual (e.g., Pfeffer, 1998) and empirical work tends to focus on HRM practices related to:

- Performance appraisal/management
- Training
- Decentralization
- Participatory mechanisms
- Team-based structures
- Employment security
- Staffing (recruitment/selection)
- Compensation

We include the first six of these practices in our study of high performance HRM in the NHS for reasons specific to that context discussed later. In the tradition of SHRM research referred to above, we examine the influence of a "bundle" or "system" of HR policies and practices on a critically important organization-level healthcare outcome: patient mortality. First we consider the question: how would these individual practices theoretically be likely to affect in-patient mortality in hospitals?

Performance appraisal/management is designed to clarify individuals' roles and objectives in their work, to provide them with feedback on performance, to determine their development needs and to communicate to them their value and importance to the organization (Bernardin, Hagan, Kane & Villanova, 1998; Bernthal, Rogers & Smith, 2003; Fletcher & Williams, 1985). Within a hospital, staff who are clear about their roles and objectives and have their development needs met, are likely to perform their roles more effectively and thereby provide better patient care thus influencing patient mortality. This would apply to receptionists who take case histories from patients (with a greater or lesser degree of accuracy and comprehensiveness) or to nurses monitoring patients in intensive care units, responding according to agreed protocols in a crisis and communicating effectively at the change of shift so the incoming staff are clear about the situation of each patient (poor processes, failure to follow agreed procedures and poor communication between professionals can directly cause patient deaths; Department of Health Expert Group, 2000).

Similar arguments are relevant to considering how staff training may be related to patient mortality. The purpose of training is to provide employees with the skills they need to perform their jobs and to improve their performance over time. To the extent that hospitals provide for all staff groups' training needs and produce relatively higher levels of knowledge and skill relevant to patient care (be it those who clean the wards and thus influence infection rates or those who carry out emergence surgery for patients with acute myocardial infarction), effective training will give them the skills to provide a higher quality of patient care and potentially reduce levels of patient mortality (Gattiker, 1995; Morrow, Jarrett, & Rupinski, 1997; Wilson, Burke, Priest, & Salas, 2005).

The importance of team working by health professionals is recommended repeatedly because of the evidence that it enables shared knowledge and understanding about patient needs, good decision making, lower error rates and more effective patient recovery (Borrill, West, Shapiro, & Rees, 2000; Firth-Cozens, 1998; West & Borrill, 2006). For example, Morey et al. (2002) applied a model developed for aviation crew team-training to emergency room employees in hospitals. The training focused primarily on communication and coordination and was provided to Emergency Room (ER) teams comprised of physicians, nurses and technicians. Using an experimental design, they found that this team-training initiative positively affected ER staff attitudes and, importantly, also significantly reduced ER clinical error rates (from 30.9% to 4.4%) – highly likely to influence mortality rates in the critical environment of ER. Thus, when hospital staff work in teams they are more likely to be both able and willing to share and utilize their tacit knowledge. They are better able to act upon the ambiguous information often found in health care settings because of their training, involvement in decision making and the shared learning associated with team working.

Another key element of a high performance HRM system is staff involvement, which refers to attempts by employers to find more participative ways in which to manage staff (Marchington, Goodman, Wilkinson & Ackers, 1992). It is 'a participative process to utilise the entire capacity of workers, designed to encourage employee commitment to organizational success' (Cotton, 1996). Decentralization of decision making and enabling employees to exert influence over their work are twin strategies to encourage staff involvement. Heller, Pusic, Strauss, & Williams (1998) argue that not involving staff has consequences for individuals and organizations; employees have a substantial reservoir of untapped resources (in terms of experience and skill) that they can make available to the organization. For example, they are better able to act upon the ambiguous information often found in health care settings because of their training, involvement in decision making and the shared learning associated with team working.

Not involving staff in the decision processes is a frustration for employees as well as a loss of potential (Lawler, Ledford, & Mohrman, 1992). In addition, involving a wider range of people in decision-making can reduce the risk of 'group think' (Janis, 1972). Involvement in decisions about goals can increase motivation (Locke, 1968) and help to improve communication and cooperation; employees can coordinate with each other, which will help save management time. By disseminating the experience of employee problem solving, involvement can contribute to organizational learning.

Recent research suggests that health care employees who report higher levels of direct involvement report high levels of role clarity, loyalty, innovation and cooperation with co-workers which, in turn have been related to quality of patient care (West et al., 2005). Research with nurses supports these arguments. Aiken, Smith and Lake (1994) studied nurses in "magnet" hospitals (a designation of quality provided by the American Nurses Association) and found that increased autonomy and decision-making latitude, empowerment and nurse/physician collaboration together were associated with lower patient mortality rates.

Finally, employment security is an element of a high performance HRM system likely to enhance commitment and to ensure the retention of skills developed through training and appraisal and to maintain effective team work as a result of not disrupting established relationships (Hartley, Jacobsen, Klandermans, & van Vuuren, 1991; Pfeffer, 1998). Workforce instability and reductions are argued to be particularly deleterious in knowledge-intensive, service industries (Cascio, 2002), such as healthcare. Moreover, employment security is associated with higher levels of employee job satisfaction. In turn, healthcare workers' satisfaction levels have been linked with employee retention (Hinshaw & Atwood, 1984; McCloskey, 1990; Stratton, Dreher, Juhl & Gelz, 1995), patient satisfaction and quality of healthcare (Tarnowski-Goodell & Van Ess Coeling, 1994; Tumulty, Jernigan & Kohut, 1994; Weisman & Nathanson, 1985; Tzeng & Katefian, 2002).

In this study, we are cognizant of trying to avoid many of the research design limitations inherent in previous work, especially issues associated with simultaneity and reverse causality (cf. Wright, Gardner, Moynihan & Allen, 2005). Much of the work to date suffers from – and acknowledges -- these limitations. For example, a study by West et al. (2002) found an association between hospitals' HR systems and patient mortality rates. However, as discussed by these authors, due to data availability constraints the patient mortality data in that study were contemporaneous (i.e., spanned the same time period) with the human resource practice data (which were also somewhat limited). In the study described here, we gathered data on mortality rates for the period subsequent but proximate to the period to which the HRM practices data applied (see below). In addition, in testing for the influence of HRM on patient outcomes, West et al. did not control for the previous healthcare performance records of the hospitals. This design limitation, evident in much of the SHRM research, increases concerns associated with the interpretation of causality, reducing the ability to isolate the "HRM effect" (Wright et al., 2005). To deal with this problem, we gathered data on mortality rates in hospitals for the three year period prior to the point at which we gathered data on the bundle of HR practices and used these data to control for prior mortality. In effect this enables us to determine whether the likely direction of causality is from HRM practices to mortality rather than vice versa. Our goal in this paper therefore, is to offer a more rigorous test than has been possible in previous research of the following primary hypothesis:

Hypothesis 1: Greater use of a system of high performance human resource policies and practices will be associated with lower rates of patient mortality.

Organizational Context

Acute care hospitals in the England are funded by the National Health Service (NHS) and provide free patient care to all UK citizens. These acute care hospitals are managed by "Trusts". These Trusts are charged with providing high quality health care in an efficient manner. Trusts have latitude in developing and implementing strategies to meet these charges. They also decide on a strategy for how the hospital will develop, so that services improve. Acute Trusts employ a large part of the NHS workforce, including nurses, doctors, pharmacists, midwives and health visitors as well as people in

professions allied to medicine (PAMs) - physiotherapists, radiographers, podiatrists, speech and language therapists, counsellors, occupational therapists and psychologists. There are many other non-medical staff including receptionists, porters, cleaners, specialists in information technology, managers, engineers, caterers and domestic and security staff. Participating hospitals ranged in size from 2,000 to 7,500 employees.

Unlike in the United States, where there is a sharp separation between the providers of healthcare (a wide array of non-profit and for-profit entities) and the payers for healthcare, the English National Health Service (NHS) is a publicly financed healthcare system. Established nearly 60 years ago, the NHS not only pays directly for most health expenses, it also employs the doctors and nurses that provide them, and in most cases owns and runs its hospitals and clinics. In fact, the NHS employs the vast majority of healthcare workers in the UK and is the largest organization in Europe. Under the aegis of the NHS, "acute care hospitals" are the primary hospitals in the UK

Method

Sample and Data Collection

Human Resource Management Directors from 137 acute hospitals were identified as potential study participants. Of those organizations contacted, representatives of eighty-one hospitals agreed to participate (a 59% response rate). In a check for non-response bias, we found no significant performance differences between responding and non-responding hospitals. The healthcare industry was experiencing significant restructuring and consolidation activity during the time of survey administration. Consequently, 18 of the hospitals that provided survey data were lost to the study because they subsequently merged, resulting in incomparable performance data across time. An additional hospital was too small to be included in the patient mortality database and a number of cases were lost due to missing data on study variables. The final sample size available for exploring the primary research question was therefore 52 hospitals. We again checked for representativeness, finding that sample hospitals did not significantly differ from population performance statistics. The sample mean hospital income was £90 million which compares to the population mean income of £86 million. With respect to the primary study outcome of interest, the sample mean for the mortality ratio was 99.0 which compares with a national population value of 100.0.

To increase response rates, identified HR Directors were given the option of completing the survey via telephone interview or by post. Twenty five respondents chose to complete the survey in a telephone interview, with the remainder (27) opted to complete the questionnaires in writing and returning them via the postal services (thirteen of these enlisted the help of a colleague on one or more sections of the questionnaire). The surveys were conducted from mid 1999 through 2000. While the majority of respondents were HR Directors, in some cases data were provided by other management staff (e.g., Chief Executives). Those who answered by post tended to respond to more questions relative to those responding via telephone; however, there is no evidence that

the content of the answers of these two groups differed in any part of the questionnaire. Neither were there any detectable differences due to interviewers.

Measures

HRM System. Given our interest in assessing the impact of a system of HR policies and practices on healthcare outcomes, we utilized data on a range of HR-related items to construct our HRM system measure. Our HR system measure includes items reflecting hospital policy and practice with respect to training, performance management, participation, decentralization, involvement, use of teams, employment security and *Investor in People* (IiP) status. This set of HR items is reflective of "high involvement" or "high commitment" HR systems and, outside of the IiP status item (which is idiosyncratic to this study) all are elements that have appeared in previous measures of such systems (e.g., Arthur, 1994; Guthrie, 2001). These items are further described below.

Two items related to training. *Assessment of training needs* was measured for each occupational group (doctors, nurses and midwives, PAMs, ancillary staff, professional and technical staff, administration and clerical staff and managers). Response categories ranged from "never" to "every 3 months". In order to tap into the specificity and comprehensiveness of training efforts – *sophistication of training policy* - , a second question asked respondents to indicate which of the occupational groups had access to tailored and formal written statements about training policy and entitlements.

Appraisal or sophistication of performance management practices was measured using several items. Respondents rated the priority their hospital placed on conducting performance appraisals on all employees (responses were on a five-point scale, ranging from "not at all" to "to a very great extent"). They were also asked to indicate the percentage of staff in each occupational group receiving an appraisal in the previous 12 months and the frequency of these appraisals. Respondents also estimated the percentage of each occupational group that received training in the conduct of performance appraisals and whether the appraisal system was subjected to systematic evaluation. In aggregate, these items provided a measure of the sophistication and extensiveness of the performance management system.

Participation or *contribution of staff views* was measured by asking respondents to assess the extent to which the hospital had a priority "to provide mechanisms to enable staff to contribute their views". *Staff involvement in decision making* was measured by asking respondents to rate the extent to which the hospital had a priority "to enable and encourage staff to take an active role in decision-making". Five-point response categories for both of these items ranged from "not at all" to a "very great extent". Respondents also provided information on the *centralization of decision-making*. For eleven different decision categories (e.g., "spending unbudgeted money"; "create a new post"; "fill a vacancy"; "promote a staff member"; "selection of an applicant", etc.), respondents were asked to indicate the "lowest level at which staff have authority to make decisions (actions can be taken without waiting for confirmation from above)". For each category, respondents indicated the lowest level staff person that could make this

decision. Levels of staff provided in the response categories were staff nurse, ward manager, business manager, clinical director, executive director and chief executive. Summing responses across the eleven decision categories provided a measure of the decentralization of organizational decision-making.

To assess the relative use of a team-based organizational structure – *team working* - , respondents estimated the "percentage of staff working in teams within the hospital". As a measure of *employment security*, respondents were asked whether there had been any workforce reductions during the previous two years. Finally, respondents were asked about their current *Investors in People* (IiP) status. IiP is an initiative of the British government's Department for Education and Employment (http://www.investorsinpeople.co.uk/IIP/Web/default.htm). Launched in 1991, the IiP designation is provided to organizations that exhibit an exemplary approach to people management in relation to 10 standards. To become accredited as an IiP, organizations have to satisfy a range of stringent criteria in relation to areas such as business strategy, leadership and management, reward and recognition, staff involvement but with a a particular emphasis on learning and development. Respondents were asked to indicate whether they were currently an IiP organization, were currently preparing for an IiP or IiP was not being considered.

Instead of clustering or categorizing firms into discrete typologies of HR systems (e.g., Arthur, 1994), each firm's scores on the above items were standardized and aggregated into a single HR system index ($\alpha = 0.74$). A high score on the HR system measure indicates relatively intensive use of "high commitment" (Arthur, 1994) or "high involvement" (Lawler, 1992; Levine, 1995) human resource practices. On the other hand, lower scores on this measure indicate less extensive use of this system and a more traditional approach to management.

The use of a single HR system index is supported in arguments made by Becker and Huselid:

> *we agree with the extant practice in the empirical literatures that an index derived from prior empirical work is the more appropriate measure of the HRM system. First, a single index reflects the notion of a single HRM system as a strategic asset. Second, since the typical index is a summation of individual elements of the HRM system, it implies that within the broad middle range of the index there are multiple ways to increase its value. For example, a strong emphasis on one or two policies will have the same index value as more modest attention to a wide range of polices* (1998: 64).

A single index seems appropriate for this study in that we are addressing the basic research question of whether or not greater use of a *system* of complementary HR practices will impact organization-level measures of healthcare. Moreover, the use of a single index is consistent with conceptual arguments stipulating that complementary practices need to be utilized as a "bundle" or "system" in order to maximize positive benefits. Pfeffer, for example, says that: "Implementing practices in isolation may not

have much effect, however, and, under some circumstances be counterproductive. For instance, increasing the firm's commitment to training activities won't accomplish much unless changes in work organization permit these more skilled people to actually implement their knowledge" (Pfeffer, 1998: 96). Finally, consistent with these arguments, much of the research in this area has proceeded on this basis, summing sets of HR practice into a single scale representing a measure of organisations' relative use of a high performance "system" and examining effects on organizational performance (e.g., Arthur, 1994; Batt, 2002; Datta et al., 2005; Guest, Michie, Conway & Sheehan, 2003; Guthrie, 2001; Wright et al., 2005).

Hospital healthcare performance. As an organization-level measure of healthcare performance, we used the Standardised Mortality Ratio (SMR), first described by Jarman, Gault, Alves, Hider, Dolan, Cook, Hurwitz and Iezzoni (1999). The SMR, sometimes referred to as the "Jarman Index", is a robust measure of healthcare performance that has quickly become a standard metric of hospital healthcare quality. It is utilized by the NHS and other policy groups, as well as by healthcare and medical researchers and has appeared in discussions of healthcare quality in the popular press.

The SMR data are annual statistics, with a calendar year beginning April 1 of each year. For each hospital, each inpatient admission during the year is coded for age, sex, length of stay, primary diagnosis, whether the admission was on a planned or emergency basis, and the number of bodily systems affected by disease. In addition, also calculated are the percentage of patient admissions with one of the 15 most serious primary diagnoses (responsible for 50% of all deaths), and the percentage both of cases and of deaths with comorbidities (that is, subdiagnoses) in each of the 85 diagnoses that led to 80% of all deaths. The number of deaths that would normally be expected, given this case mix, is then calculated. The ratio of actual deaths to expected number of deaths is then multiplied by 100 to give the SMR. For further details on this calculation, see Jarman et al. (1999).

Standardizing the ratio allows valid comparisons across different hospitals serving different communities. A hospital with an SMR of 100, indicates that the number of patients who died is exactly as would be expected taking into account the standardization factors. An SMR above 100 means more patients died than would be expected; one below 100 means that fewer than expected died. For example, two hospitals in similar locations in different cities could have approximately the same profile of 10,000 admissions over a year. However, one of these hospitals could have an SMR of 105, the other of 95. This would indicate that 5% more patients than average (840 compared with an average of 800) had died in the first hospital, but 5% fewer than average (760) had died in the second.

Since we were interested in examining healthcare outcomes subsequent – yet proximate – to our collection of HR system data, we utilized the SMR data for the April, 2000 – April, 2001 period. Although it would have been desirable to use the SMR data for a longer period than this, the ongoing restructuring of the NHS in England meant that

several more hospitals merged not long after this, rendering data unobtainable and further decreasing our sample size.

Control variables. In order to more properly identify and isolate any HR system effects, our multivariate analyses controlled for a number of variables that might influence hospitality mortality rates. In choosing our control variables, we adopt the recommendations of Becker (2005) – specifically, to choose controls that prior research has shown to be related to the dependent variable, and that are significantly (or nearly significantly) related to it in the present study.

In their analyses, Jarman et al. (1999) showed associations between a number of other factors and hospital mortality rates, including the ratio of doctors per bed, NHS facilities per 100,000 population and number of GPs per 100,000 population. These were all significantly related to mortality rates in our analysis. Because of these significant relationships we therefore also controlled for these factors.

In addition, it was important to control for each hospital's prior healthcare (i.e., mortality rate) performance. Recall that our HR system data were collected primarily in the latter part of 1999 and early 2000. The primary outcome variable utilized in the analyses is patient mortality rates (SMR data) from the 2000-2001 time period. In order to further isolate the HR system impact on healthcare quality, we control for the average SMR for the three-year period (1995-1998) prior to the collection of the HR survey data.

Results

Means, standard deviations and variable inter-correlations are displayed in Table 1. The bivariate associations indicate associations between a number of the control variables and subsequent mortality. The HR system variable also correlates with subsequent patient mortality rates ($r = -.45$, $p < .001$).

Table 1: Means, standard deviations and correlations of all study variables

	Mean	SD	1.	2.	3.	4.	5.
1. Prior mortality	101.84	9.21					
2. Subsequent mortality	94.44	9.43	0.76***				
3. HR System[a]	0.00	0.53	-0.25	-0.45***			
4. Doctors per 100 beds	0.30	0.07	-0.37**	-0.25	0.03		
5. NHS facilities per 100,000 population	3.60	2.34	-0.31*	-0.28*	0.09	-0.10	
6. GPs per 100,000 population	5.19	0.83	-0.14	-0.26*	0.05	-0.05	0.21

[a] Computed as the mean of standardized variables
* $0.01 < p < 0.05$; ** $0.001 < p < 0.01$; *** $p < 0.001$

Table 2 presents OLS regression analyses including all controls – except for prior mortality. The control variables, entered as a block, account for 26% of the variance in subsequent mortality rates, with *NHS facilities per 100,000 population*, *GPs per 100,000* and *doctors per 100 beds* displaying statistically significant associations. The HR system variable accounts for a significant ($p < .01$) proportion of subsequent mortality (16.9%).

Table 2: The relationships between patient mortality and hospital HRM practices

Predictor variable	β	ΔR^2
1. Control variables		0.264**
Doctors per 100 beds	-0.295*	
NHS facilities per 100,000 population	-0.259*	
GPs per 100,000 population	-0.319*	
2. HR System	-0.413***	0.169***

Figures shown in central portion of table are standardised regression (beta) weights from a regression with mortality as the dependent variable
* $0.01 < p < 0.05$; ** $0.001 < p < 0.01$; *** $p < 0.001$

Finally, in the most important test of the research question, Table 3 now adds hospitals' *prior mortality* rates as an additional control variable. The addition of prior mortality accounts for 33.5% ($p < .001$) of the variance beyond the other set of controls. The HR system variable still accounts for a significant ($p < .01$) proportion of the

variance in subsequent mortality rates (7.8%), but the addition of the prior mortality variable has reduced the HR system effect.

Table 3: The relationships between patient mortality and hospital HRM practices, controlling for prior mortality

Predictor variable	β	ΔR^2
1. Control variables		0.264**
Doctors per 100 beds	-0.295*	
NHS facilities per 100,000 population	-0.259*	
GPs per 100,000 population	-0.319*	
2. Prior mortality	0.691***	0.335***
3. HR System	-0.289**	0.078**

Figures shown in central portion of table are standardised regression (beta) weights from a regression with mortality as the dependent variable
* $0.01 < p < 0.05$; ** $0.001 < p < 0.01$; *** $p < 0.001$

Although we argue for theoretical reasons that the appropriate focus should be on the effects of a bundle or system of synergistic HR practices, we conducted post-hoc analyses to explore whether particular HR practices had stronger associations with mortality than others. Table 4 presents a series of OLS regression analyses, including all controls, showing the contribution of individual HR variables (entered separately). The results reveal significant added variance is explained by: a sophisticated performance management/appraisal system (an additional 6% of the variance in patient mortality); employment security (3.3%); and IiP status (4.1%). While these values are relatively small in terms of effect sizes, we note that the control for prior mortality is particularly conservative and that the practical significance of these effects (three to six fewer deaths per hundred) is high.

Table 4: The relationships between patient mortality and individual HRM practices,

Predictor variable	β	ΔR^2
1. Control variables		0.264**
Doctors per 100 beds	-0.295*	
NHS facilities per 100,000 population	-0.259*	
GPs per 100,000 population	-0.319*	
2. Prior mortality	0.691***	0.335***
3. HR Practices (entered separately)		
Assessment of training needs	-0.098	0.009
Sophistication of training policy	-0.151	0.020
Centralization	-0.156	0.024
Team working	-0.001	0.000
IiP status	-0.208*	0.041*
Appraisal	-0.262*	0.060*
Staff involvement in decision making	-0.153	0.022
Contribution of staff views	-0.122	0.014
Employment security	-0.188*	0.033*

* $0.01 < p < 0.05$; ** $0.001 < p < 0.01$; *** $p < 0.001$

Discussion and Conclusion

While there is a burgeoning strategic human resource management (SHRM) literature focusing on industrial settings, relatively little analogous research has been conducted in healthcare settings. The objective of this research project was to invoke a strategic human resource management (SHRM) perspective to investigate whether systems of HR policies and practices can affect important healthcare outcomes. Within study limitations, our findings suggest that HR systems are related to the quality of healthcare and specifically patient mortality in hospitals. Above and beyond the effects of a set of important controls, our results suggest that people management systems that emphasize a set of complementary "high involvement" policies and practices (i.e., an emphasis on training, performance management, participation, decentralized decision making, involvement, teams and employment security) may be successful in contributing to high-quality healthcare.

While documenting statistical associations are important, illustrating the practical significance of results is also important. To do so, we use the regression results to estimate the impact of changing the relative use of the HR system within our sample of firms. If all other variables are held at their mean values, the model estimates that increasing the use of our HR system variable from 1 s.d. below the sample mean to 1 s.d. above the sample mean will decrease patient mortality from 104.0 to 96.0, or a 7.7% decrease in the number of deaths. If prior mortality is also held constant at its mean value, this decrease is still from 102.8 to 97.2 – a 5.4% decrease in the number of deaths.

Although our study does not allow a precise specification of the mediating mechanisms, the data and previous work – both inside and outside of healthcare settings – provide some clues. Previous research suggests that organizations that score higher on our HR system measure are likely to have employees who (1) are clear about their roles and goals in their organizations (a result of appraisal and team working) (2) have relatively higher levels of knowledge and skill (e.g., through an emphasis on training and performance management); (3) are both able and willing to share and utilize their tacit knowledge as a result of decentralization of decision-making and higher levels of involvement; (4) are better able to act upon the ambiguous information often found in health care settings because of their training, involvement in decision making and the shared learning associated with team working; (5) are empowered to bring their higher skills, tacit knowledge and higher-quality information to bear upon complex healthcare problems because of decentralization of decision making and employee involvement practices enabling them to influence their work and working conditions; (6) are likely to coordinate more effectively as a result of team working; (7) have higher satisfaction levels because of these high performance HR systems and high employment security (which spills over into better patient satisfaction) and (8) are therefore less likely to leave, leading to a retention of both human and social capital – vital in a context in which staff shortages are an international problem. Taken together these behaviors are likely to influence the quality of patient care and therefore patient mortality.

The post-hoc analyses we conducted to explore whether particular HR practices had stronger associations with mortality than others suggest an important role for the following HR components: a sophisticated performance management/appraisal system; employment security; and IiP status (an indicator of the emphasis on effective people management in general and learning and development in particular). We interpret these results to suggest that the mediating mechanisms in our sample for the relationships between HRM systems and patient mortality are most likely to be 1, 2, 7, and 8 above. Appraisal may be especially potent in the complex and demanding environment of a hospital in providing goal and role clarity for hospital staff; in identifying areas of development needs; and in ensuring staff feel valued and supported, thereby enrolling their commitment and citizenship. We assessed not just how widespread appraisal was across each of the hospitals, but also its quality. The findings perhaps indicate how important both these elements of spread and quality are in determining the influence of appraisal in the spectrum of a high performance HR system.

The result for employment security – especially important in markets where there is a shifting demand for labour, such as healthcare -- also appears especially important. Jeffrey Pfeffer (1998) argues in his book, *The Human Equation*, that the current practice of diminished employment security is contrary to effective human resource management. He views employment security as a practice that will, over time, build trust between workers and employers, ultimately yielding greater cooperation and a stronger esprit des corps. In addition, empirical evidence suggests that creativity declines during downsizing/workforce reduction, with downsizing survivors exhibiting behavioral rigidity (Cameron, Whetton & Kim, 1987) and risk-aversion (Cascio, 1993). All of these

outcomes should be particularly detrimental in knowledge intensive, service industries (Cascio, 2002).

Investors in People (IiP),which has a particular emphasis on training and development, is a widely used standard in the UK for encouraging excellence in people management and the development of people focused cultures. To the extent that achieving the standard illustrates the existence of a high performance work system and a people focused culture, it is perhaps not surprising that this variable also emerged as a significant element of the constellation of high performance HRM systems we examined.

Nevertheless, the strong relationship between the overall scale measure of the high performance HRM system and patient mortality, suggests that it is the combination of a 'bundle' of high performance HR practices that is necessary. Such practices are likely to be mutually reinforcing and coherent as an interconnected system, and therefore produce the behaviors described above that lead to the provision of high quality health care and, as a consequence, lower patient mortality. Pfeffer (1998), for example, argues that providing employment security enhances the mutual commitment needed to effectively capitalize on the use of delegated decision-making authority, teams, information sharing, and other workplace innovations. As argued by scholars such as Pfeffer, "high performance" HR practices implemented in isolation are less likely to be as effective.

There are a number of limitations in the study. First, while our HR system measure is much broader than many previous studies in healthcare settings (e.g., Preuss, 2003) it is still not completely comprehensive. We did not include measures of compensation or recruitment and staffing in our scale of high performance HRM because they were not relevant or responsive in the context of this study. In other healthcare settings and in other countries, these may be vital elements of a high performance HRM system. Therefore researchers should not simply duplicate our measure across contexts without careful prior research. Second, we have a fairly small sample and results may be somewhat idiosyncratic or sample-specific. Third, although we tested for non-response bias and found none, the potential remains for non-response bias to impact results. Fourth, as noted above, we do not investigate the mediating linkages between HR systems and healthcare. Future work needs to address this latter deficiency given the potential significance in practice of our findings.

Finally, as has often been the case in SHRM research, the issue of causality needs to be addressed. Scholars (e.g., Gerhart, 1999; Wright et al., 2005) have pointed out that many research designs do not eliminate the possibility that firm performance may impact the adoption or reporting of HR policies and practices. In healthcare settings, hospitals that develop reputations for good patient care may attract "better" managers and employees and this, in turn, may lead to some changes in the work environment. The temporal ordering of our data collection helps ameliorate some of this concern. By controlling for prior mortality, we have demonstrated that a causal link from mortality to HR is highly unlikely. However, an even stronger argument for a causal link from HR practices to mortality can be made if the relationship between the HRM system and subsequent mortality is significantly stronger than the link between prior mortality and

the HRM system. To address this issue, we fitted the data to a structural equation model, in which the HR system variable was correlated with both subsequent and prior mortality. The fit of the model when the parameters were allowed to be estimated freely was, of course, perfect (chi-squared = 0.0, d.f. = 0). However, the fit of the model when the correlations between HR and the two mortality variables were constrained to be equal was significantly worse (chi-squared = 4.4, d.f. = 1; p = .036). Therefore it can be concluded that the correlation between HR and subsequent mortality is stronger than the correlation between HR and prior mortality. Although this still does not prove a causal relationship, it provides far more support for the argument. Despite this evidence, time-series designs are needed to more clearly delineate the HRM – healthcare relationship.

There are some further caveats. Applying the results from this study to healthcare contexts rather different from the UK publicly funded system may be premature, since issues of cost effectiveness of treatments are likely to be more urgent in some privately funded systems (for example in the US), producing an element in the organizational system that may moderate the impact of people management factors on system outcomes. Moreover, given the relative uniformity of hospital types in the UK, it may be easier to discern the impact of people management systems upon quality of care and patient mortality than in more heterogeneous health care systems. However, we suggest that high performance work systems in organizations charged with delivering health care are likely to produce beneficial effects on patient care because they encourage effective skill development, effective role performance, citizenship, coordination, decision making and information processing. We suggest that such behaviors are likely to influence patient care regardless of the type of health care organization studies (community mental health, inpatient mental health, elderly care, paediatric inpatient care, oncology and hospice care).

We also urge caution in consideration of the outcome measure employed. Patient mortality is a striking measure since death is one of the most emotive topics for us. Its advantages are that it is generally meaningful from all stakeholders' perspectives and it is useful when clinical outcomes of interest are determined by multiple elements of the system. The disadvantages are that it can be difficult to attribute outcomes to specific aspects of care or to specific elements of the system; it can be difficult to adjust for patient differences, random variations and selection effects; and it can be unclear how to "fix" quality problems identified by poor outcome results (Shojania, Showstack & Wachter, 2001). There is also the concern that the indicator may have different meanings in different organizational cultures. In one, encouraging critically ill inpatients to leave the hospital to die at home with their families may be an indicator of low mortality for good reasons, while in another, the strategy may be to keep critically ill patients in hospital in order that everything possible is done to save them or to reduce distress or discomfort to them and their relatives. Although we raise this as a possible concern, we do not believe this to be an issue in our sample because of the consistency of cultural orientation in this regard in English hospitals in the state system.

We suggest there are a number of important and intriguing theoretical questions arising from our research. The most obvious is to identify the mechanisms mediating the

relationships between the HRM system variable and patient mortality more precisely than was possible in the present study. In particular, following Donabedian's (1980) influential theoretical formulation, it is important to discover how HRM systems differentially influence technical aspects of care (e.g., diagnosis, treatment, postoperative care) and interpersonal aspects of care (e.g., warmth, support, extent of contact, and continuity of care). Although we argue for the potency of HRM systems, it is also important to discover which aspects of those systems differentially affect these two aspects of care and, thereby, patient outcomes – including patient mortality. Preuss (2003) argues that HRM systems affect healthcare outcomes because they promote effective information processing and decision making. Future research is needed to determine if and how these effects occur and how information processing and decision making, in turn, influence patient outcomes. Future research should also focus on whether and how HRM systems influence the extent of cooperation and multidisciplinary team working amongst hospital staff since this has been repeatedly shown to be related to patient outcomes (West & Borrill, 2006). Moreover, we need to determine which aspects of HRM systems affect most powerfully the integration of professional contributions to patient care in hospitals.

Identifying mediating mechanisms of the relationship between HRM systems and patient mortality, however, will prove challenging. The main reason for this is that the processes occur over multiple levels of analysis. HRM systems are formulated at the organizational level, but experienced at both the individual and team or group levels (e.g. individual appraisal; multidisciplinary team working). These would then lead to changes in the mediating variables at lower levels, such as the technical and interpersonal aspects of care described above. The effects of the mediators, however, would be felt at the organizational level in terms of the final outcome: patient mortality. Such cross-level mediation creates challenges for the researcher. First, the mediators need to be theoretically linked with the higher-level constructs via a cross-level framework. A template for such a framework is provided by Ostroff & Bowen (2000), who explain how HRM systems can link to such variables as organizational and psychological climate, and employee attitudes, behaviours, skills and abilities, and how these then affect performance and outcomes. Second, mediation cannot be tested with the normal procedures (e.g. Baron & Kenny, 1986) due to the different levels involved. While we urge researchers to test for mediators, they must do so using techniques which allow linkage of individual behaviour to a higher level (and vice versa), such as those provided by Goodman (2000).

There are clear practical implications of these findings. Leaders in healthcare organizations should focus sharply on developing a sophisticated and internally coherent HRM system that encourages high performance and commitment amongst employees. This includes ensuring a sophisticated and effective approach to appraisal that is applied across most or all staff groups; implementing a sophisticated training needs analysis and training strategy; encouraging employee involvement in decisions affecting their work and the conditions in which they work; decentralizing decision making; encouraging team working; providing employment security; and, in other contexts, it is likely to include ensuring approaches to staffing and compensation that encourage high performance. Given the practical significance of our findings, we communicated the results of our

research to policy makers at the head of the English NHS, using communication methods that went beyond formal reports (including developing DVDs and accompanying pamphlets that were sent to every hospital chief executive in England). At national policy level, senior managers embraced the findings and used them to support a national initiative in the HRM area to produce a high performance HRM system for all 1.4 million NHS staff (see http://www.dh.gov.uk/assetRoot/04/08/42/14/04084214.PDF). Organizational researchers can influence policy, we discovered, when we communicate the results of our research to opinion leaders and via media that are sensitive to the many demands on the time of senior leaders and policy makers and ensure messages are communicated clearly via appropriate media.

Health services in many countries are facing rapidly increasing demands as a result of environmental forces and demographic changes. Ageing populations place more demands on health services because of the increased likelihood of poor health associated with ageing. Moreover, health service workforces themselves are ageing and some countries foresee an alarming shortage of health care practitioners as their existing workforces age and fail to be replaced. Globalisation and ease of international travel has made it more likely that diseases such as SARS, avian flu and AIDS can become global epidemics. In some countries too, patients have demanded more choice over their treatments. The use of the internet has made some patients as or even more expert than health care providers about their disorders and associated treatments. And it has provided them with knowledge about the relative performance of medical practitioners and health care organizations. For example, data on hospital mortality rates are now routinely reported on the web for many countries. Organizations faced with such environmental turbulence and uncertainties have to respond appropriately to meet the challenges that face them. Research identifying the management policies and practices that promote adaptation and effectiveness has proceeded apace in many settings but, we suggest, not equally as fast in health care settings. Organization behavior and HRM theorists and researchers therefore have much to offer health care organizations. We are hopeful, that this study will stimulate continued interest in identifying and specifying the manner in which people management policies and practices impact the delivery of efficient, effective healthcare.

Acknowledgement: This study was funded by the NHS Executive North Thames Organization and Management Group via Regional R & D funding. We are also extremely grateful to Sir Brian Jarman for his comments on an earlier version of this paper and his help with accessing the SMR data. We are grateful also to one of the co-editors of the Special Issue, Dr. Ranga Ramanujam, and two anonymous reviewers for their insightful and constructive comments on an earlier version of this paper. We acknowledge with gratitude the professional and dedicated support of the very busy NHS HR Directors and their colleagues who were both cooperative and helpful.

Footnote

[1] Although we measured a wide range of HR policies/practices, we do not include items related to staffing and compensation in the HR scale. With respect to staffing, we included survey item measures similar to those employed by previous authors who have examined the link between "high involvement" HR systems and organizational performance (e.g., Guthrie, 2001; Huselid, 1995). Specifically, we collected data asking respondents to indicate the relative emphasis on internal vs. external candidates for hiring employees across each occupational group and to describe their relative use of panel interviews ("formal interview with at least 2 interviewers"), person/job specifications and psychometric testing. Our analysis indicated a marked lack of variance in the relative use of these staffing practices. This probably reflects two contextual factors: first, the HR Directorate in the English Department of Health provides clear direction for trusts to follow in relation to such processes and second, there was a shortage of staff in most occupational groups and therefore little variation in selection strategies at the time the data were gathered. Lack of variance limits the ability to find empirical relationships. In addition, and perhaps because of this invariance, the inclusion of staffing measures to our HR system index reduced the scale reliability below acceptable levels (i.e., below .70). With regard to remuneration, both conceptual and empirical work in the "high commitment" HR literature has emphasized two aspects of compensation: (1) Using person-based (i.e., skill or knowledge-based) pay structures and (2) using group-based pay-for-performance plans. These are thought to be associated with a number of benefits, including greater employee competency and satisfaction. and to align employee interests with those of top management. However, neither of these reward practices was utilized in NHS Trusts. Pay, at the time of the study, was determined nationally and there was virtually no variation between hospitals in compensation policies and practices. It therefore made conceptual sense not to include compensation items in the HR scale.

References

Aiken LH, Smith HL, Lake ET. (1994). Lower Medicare mortality among a set of hospitals known for good nursing care. *Medical Care*, *32*, 771-787.

Aiken, L.H., Sochalski, J. & Lake, E.T. (1997). Studying outcomes of organizational change in health services. *Medical Care, 35,* NS6-NS18.

Al-Haider, A. S., & Wan, T. T. H. (1991). Modelling organizational determinants of hospital mortality. *Health Services Research, 26,* 303-323.

Arthur, J.(1992). The link between business strategy and industrial relations systems in American steel minimills. *Industrial and Labor Relations Review*, *45*: 488-506.

Arthur, J.B. (1994). Effects of human resource systems on manufacturing performance and turnover. *Academy of Management Journal, 37*(3), 670-687.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology, 51,* 1173-1182.

Batt, R. (2002). Managing customer services: Human resource practices, quit rates, and sales growth. *Academy of Management Journal*, *45*, 587-597.

Becker, T. (2005). Potential Problems in the Statistical Control of Variables in Organizational Research: A Qualitative Analysis with Recommendations. *Organizational Research Methods, 8,* 274-289.

Bernthal, P.R., Rogers, R.W. & Smith, A.B. (2003). *Managing performance: Building accountability for organizational success.* Pittsburgh, PA: Developmental Dimensions International.

Bernardin, H.J., Hagan, C.M., Kane, J.S. & Villanova, P. (1998). Effective performance management. In J.W. Smither (ed.), *Performance appraisal: State of the art in practice*. San Francisco: Jossey-Bass, pp. 3-48.

Borrill, C. West, M.A., Shapiro, D. & Rees, A. (2000). Team working and effectiveness in health care. *British Journal of Health Care, 6*, 364-371.

Bradbury, R.C., Stearns, F. E., & Steen, P. M. (1991). Interhospital variations in admission severity-adjusted hospital mortality and morbidity. *Health Services Research, 26,* 407-424.

Buckle, E. (1865). *Vital and economical statistics of the hospitals, infirmaries, etc. of England and Wales for the year 1863*. London: Churchill.

Bush, J.P. (1988). Job satisfaction, powerlessness, and locus on control. *Western Journal of Nursing Research*, *10,* 718-731.

Cameron, K.S., Whetton, D.A. & Kim, M.U. (1987). Organizational dysfunctions of decline, *Academy of Management Journal*, 30: 126-138.

Cascio, W.F. (2002). *Responsible restructuring: Creative and profitable alternatives to layoffs*. San Fransisco: Berrett-Koehler.

Cascio, W. (1993). Downsizing: what do we know? What have we learned? *Academy of Management Executive,* 7: 95–103.

Chassin, M. R., Park, R. E., Lohr, K. N., Keesey, J., & Brook, R. H. (1989). Differences among hospitals in Medicare mortality. *Health Services Research, 24,* 1-31.

Cotton, J. L. (1996). Employee involvement. In C. L. Cooper and I. T. Robertson (eds.). *International review of industrial and organizational psychology* (Volume 11, pp. 219-242). Chichester, England: John Wiley.

Datta DK, Guthrie JP, Wright PM. (2005). HRM and labor productivity: Does industry matter? *Academy of Management Journal,* 48(1): 135-145.

Delery, J. E., & Doty, H. D. (1996). Modes of theorizing in strategic human resource management: Tests of universalistic, contingency, and configurational performance predictions. *Academy of Management Journal, 39*(4), 802-835.

Delery, J.E. & Shaw, J.D. (2001). The strategic management of people in work organizations: Review, synthesis and extension. In. K.M. Rowland & G.R. Ferris (eds). *Research in Personnel and Human Resource Management*, Greenwich, CT: JAI Press, 165-197.

Department of Health Expert Group (2000). An organization with a memory: report of an expert group on learning from adverse events in the NHS chaired by the Chief Medical Officer. London: Department of Health.

Donabedian, A. (1980). *The definition of quality and approaches to its assessment. Vol. 1: Explorations in quality assessment and monitoring.* Ann Arbor: Health Administration Press.

Dubois, R. W., Rogers, W. H., Moxley, J. H., Draper, D., & Brook, R. H. (1987). Hospital in-patient mortality: is it a predictor of quality? *New England Journal of Medicine, 317,* 1674-1680.

Dyer, L. & Reeves, T. (1995). Human resource strategies and firm performance: What do we know and where do we need to go? *The International Journal of Human Resource Management*, *6*, 656-670.

Firth-Cozens, J. (1998) Celebrating teamwork. *Quality and Safety in Health Care, 7 (Supplement),* S3-S7.

Fletcher, C., & Williams, R. (1985). *Performance appraisal and career development.* London: Hutchinson.

Flood, A.B. & Fennell, M.L. (1995). Through the lenses of organizational sociology: The role of organizational theory and research in conceptualizing and examining our health care system. *Journal of Health and Social Behavior*, *Extra Issue*, 154-169.

Flood, A.B. (1994). The impact of organizational and managerial factors on the quality of care in health care organizations. *Medical Care Review, 51*, 381-428.

Gattiker, U. E. (1995). Firm and taxpayer returns from training of semiskilled employees. *Academy of Management Journal, 38,* 1152–1173.

Gerhart, B. (1999). Human resource management and firm performance: Measurement issues and their effect on causal and policy inferences. In P.M. Wright, L.D. Dyer, J.W. Boudreau & G.T. Milkovich (Eds.), *Research in Personnel and Human Resources Management, Supplement 4* (pp. 31-51). Greenwich, CT: JAI Press.

Goodman, P. S. (2000). *Missing organizational linkages: Tools for cross-level research.* Thousand Oaks, CA: Sage.

Guest, D.E., Michie, J. Conway, N. & Sheehan, M. (2003). Human resource management and corporate performance in the UK. *British Journal of Industrial Relations*, 41: 291-314.

Guthrie, J. P., (2001). High involvement work practices, turnover and productivity: Evidence from New Zealand. *Academy of Management Journal*, *44*, 180-190.

Hartley, J.F., Jacobsen, D., Klandermans, B. & van Vuuren, T. (Eds.). (1991). *Job insecurity: coping with jobs at risk.* London: Sage.

Heller, F. A., Pusic, E., Strauss, G., & Wilpert, B (1998). *Organizational participation: myth and reality.* Oxford: Oxford University Press.
Hinshaw, A.S. & Atwood, J.R. (1984). Nursing staff turnover, stress and satisfaction: Models, measures, and management. In H.H. Werley & J.J. Fitzpatrick (Eds.), *Annual Review of Nursing Research,* (Vol. 1. pp. 133-153), New York: Springer Publishing Company.
Huselid, M.A. (1995). The impact of human resource management practices on turnover, productivity, and corporate financial performance. *Academy of Management Journal*, *38*, 635-672.
Iezzoni, L. I., Ash, A. S., Shwartz, M., Daley, J., Hughes, J. S, & Mackiernan, Y. D. (1996). Judging hospitals by severity-adjusted mortality rates: the influence of the severity-adjusted method. *American Journal of Public Health, 86,* 1379-1387.
Investors in People. (2005) http://www.investorsinpeople.co.uk/IIP/Web/default.htm. Web site accessed January 24,.
Irvine, D.M. & Evans, M.G. (1995). Job satisfaction and turnover among nurses: Integrating research across studies. *Nursing Research*, *44*, 246-253.
Janis, I. L. (1972). *Groupthink: A study of foreign policy decisions and fiascos.* Boston: Houghton Mifflin.
Jarman, B., Gault, S., Alves, B., Hider, A., Dolan, S., Cook, A., Hurwitz, B., & Iezzoni, L. I. (1999). Explaining differences in English hospital death rates using routinely collected data. *British Medical Journal, 318,* 1515-1520.
Jarman, B., Lang, H., Ruggles, R., Wallace, M., Gault, S., & Astin, P. (1997). *The contribution of London's academic medicine to healthcare and the economy – report commissioned by the deans of the medical schools of the University of London.* London: University of London.
Kazanjian, A., Green, C., Wong, J., & Reid, R. (2005). Effect of the hospital nursing environment on patient mortality: a systematic review. *Journal of Health Services Research and Policy, 10,* 111-117.
Koch, M.J. & McGrath, R.G. (1996). Improving labor productivity: Human resource management policies do matter. *Strategic Management Journal*, *17*, 335-354.
Laschinger, H.K.S. & Havens, D.S. (1996). Staff nurse empowerment and perceived control over nursing practice. *Journal of Nursing Administration*, *26*, 27-35.
Laschinger, H.K.S., Shamian, J. & Thomson, D. (2001). Impact of magnet hospital characteristics on nurses' perceptions of hospital burnout, quality of care and work satisfaction. *Nursing Economics*, *19*: 209-219.
Lawler, E. 1992. *The ultimate advantage: Creating the high-involvement organization.* San Francisco:Jossey-Bass.
Lawler, E. E., Ledford, G., & Mohrman, S. (1992). *Employee involvement and total quality.* San Francisco: Jossey Bass.
Levine, D. (1995). *Reinventing the workplace: How business and employers can both win*. Washington, DC: Brookings Institution.
Locke, E. A. (1968). Toward a theory of task motivation and incentives. *Organizational Behavior and Human Performance, 3,* 157-189.
Lohr, K. N., & Schroeder, S. A. (1990). A strategy for quality assurance in Medicare *New England Journal of Medicine, 322,* 707-712.

MacDuffie, J. (1995). Human resource bundles and manufacturing performance: Organizational logic and flexible production systems in the world auto industry. *Industrial and Labor Relations Review*, *48*, 197-221.

Marchington, M., Goodman, J., Wilkinson, A., & Akers, P. (1992). *New developments in employee involvement.* London: Department of Employment.

Markiniak, T. A., Ellerbeck, E. F., & Radford, M. J. (1998). Improving the quality of care for Medicare patients with acute myocardial infarction: results from the Cooperative Cardiovascular Project. *Journal of the American Medical Association, 279,* 1351-1357.

McCloskey, J.C. (1990). Two requirements for job contentment: Autonomy and social integration. *Journal of Nursing Scholarship*, *22*, 140-143.

Morey, J.C., Simon, R., Jay, G.D., Wears, R.L., Salisbury, M., Dukes, K.A. & Berns, S.D. (2002). Error reduction and performance improvements in the emergency department through formal teamwork training: Evaluation results of the MedTeams project. *Health Services Research, 37*, 1553-1581.

Morrow, C. C., Jarrett, M. Q., & Rupinski, M. T. (1997). An investigation of the effect and economic utility of corporate-wide training. *Personnel Psychology, 50,* 91–119.

Neal, A., West, M.A., Patterson, M.G. (in press). Do organizational climate and strategic orientation moderate the relationship between human resource management practices and productivity? *Journal of Management, 31,* 1-21.

Nightingale, F. (1863). *Notes on hospitals.* London: Longman Green.

Ostroff, C., & Bowen, D. E. (2000). Moving HR to a higher level: HR practices and organizational effectiveness. In K. K. Klein & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions and new directions*. San Francisco, CA: Jossey-Bass, 211-266.

Park, R. E., Brook, R. H., Kosecoff, J., Keesey, J., Rubenstein, L., & Keeler, E. (1990). Explaining variations in hospital death rates, randomness, severity of illness, quality of care. *Journal of the American Medical Association, 264,* 484-490.

Patterson, M., West, M. A., Lawthom, R., & Nickell, S. (1997). *Impact of People Management Practices on Business Performance.* London: Institute of Personnel and Development, Issues in People Management; No. 22.

Patterson, M., West, M.A. & Wall, T.D. (2004). Integrated manufacturing, empowerment, and company performance. *Journal of Organizational Behavior, 25,* 641-665.

Pfeffer, J. (1998). *The human equation: Building profits by putting people first*, Boston, MA: Harvard Business School Press.

Preuss, G.A. (2003). High performance work systems and organizational outcomes: The mediating role of information quality. *Industrial and Labor Relations Review, 56*, 590-605.

Shojania, K. G., Showstack, J., & Wachter, R. M. (2001). Assessing hospital quality: a review for clinicians. *Effective Clinical Practice, 4,* 82-90.

Stratton, T.D., Dunkin, J.W., Juhl, N. & Geller, J.M. (1995). Retainment incentives in three rural practice settings: Variations in job satisfaction among staff registered nurses. *Applied Nursing Research*, *8*, 73-80.

Tarnowski-Goodell, T. & Van Ess Coeling, H. (1994). Outcomes of nurses' job satisfaction. *Journal of Nursing Administration*, *24*, 36-41.

Tumulty, G., Jernigan, I.E. & Kohut, G.F. (1994). The impact of perceived work environment on job satisfaction of hospital staff nurses. *Applied Nursing Research*, *7*, 84-90.

Tzeng, H.M. & Katefian, S. (2002). The relationship between nurses' job satisfaction and inpatient satisfaction: An exploratory study in a Taiwan teaching hospital. *Journal of Nursing Care Quality, 16*, 39-47.

Weisman, C.S. & Nathanson, C.A. (1985). Professional satisfaction and client outcomes: A comparative organizational analysis. *Medical Care*, *23*, 1179-1192.

West, E. (2001). Management matters: The link between organization and quality of patient care. *Quality in Health Care*, *10*, 40-48.

West, M. A., & Borrill, C.S. (2006). The influence of team working. In J. Cox, J. King, A. Hutchinson., A., and P. McAvoy (eds). Understanding doctors' performance, (pp.106-122).Oxford: Radcliffe Publishing.

West, M. A., Borrill, C. S., Carter, M., Scully, J., Dawson, J. F., & Richter, A. (2005). *Working together: staff involvement and organizational performance in the NHS.* London: Department of Health.

West, M. A., Borrill, C., Dawson, J., Scully, J., Carter, M., Anelay, S., Patterson, M., & Waring, J. (2002). The link between the management of employees and patient mortality in acute hospitals. *The International Journal of Human Resource Management, 13*(8), 1299-1310.

Wilson, K. A., Burke, C. S., Priest, H. A., & Salas, E. (2005). Promoting health care safety through training high reliability teams**.** *Quality and Safety in Health Care, 14*, 303-309.

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 Pscyhology*, 58: 409-446.

Wright, P.M. & McMahan, G.C. (1992). Theoretical perspectives for strategic human resource management. *Journal of Management*, *18*, 295-320.

Youndt, M. A., S. A. Snell, J. W. Dean, & D. P. Lepak. (1996). Human Resource Management, Manufacturing Strategy, and Firm Performance. *Academy of Management Journal*, *39*, 836-65.

Yusuf, S.,Anand, S., Avezum, A. Jr., Flather, M., & Coutinho, M. (1966). Treatment for acute myocardial infarction: overview of randomized trials. *European Heart Journal, 17 (Supplement F),* 16-29.