



Healthcare payor management practices are associated with health system performance and population health

Stephen J. Dorgan^{a,*}, Timothy Powell-Jackson^b, Andrew Briggs^a

^a Department of Health Services Research & Policy, London School of Hygiene & Tropical Medicine, 15 - 17 Tavistock Place, London, WC1H 9SH, UK

^b Department of Global Health and Development, London School of Hygiene & Tropical Medicine, 15 - 17 Tavistock Place, London, WC1H 9SH, UK

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ABSTRACT

Good management practice has long been seen as critical to improving the performance, quality, and efficiency of healthcare systems. Better hospital management practice has been shown to correlate with improved clinical quality and performance. However, the association between the management practices of healthcare payors, the performance of the healthcare systems they oversee, and the health of their managed populations, has not been explored quantitatively. We collected data for all 152 healthcare payors and 53 million residents in England to explore the relationships between payor management practices and the performance of the healthcare system each payor managed. First, we found that better healthcare payor management practices are associated with improved health system performance in the domains of quality and value for money, and with improvements in the overall health and well-being of the managed population. Second, we found better payor management practice is associated with improvements in specific outcome metrics related to healthcare system effectiveness, safety, and value for money. Finally, we found no association between payor management practices and metrics for patient experience and access. These findings provide the first known quantitative evidence of a link between healthcare payor management practice and health system performance. They may also help both governments and payors themselves understand what healthcare system performance improvements might be possible from improving the management practices of healthcare payors.

1. Introduction

Healthcare expenditure continues to grow faster than both the global economy (WHO, 2019) and the economies of most nations, so absorbing an increasing share of national income (OECD, 2015). Good management practice has long been seen as critical to improving the performance, quality, and efficiency of healthcare systems while containing costs (OECD, 2015; Lega et al., 2013; Bradley et al., 2015; Berwick and Fox, 2016). Nevertheless, at least 20% of all healthcare resources are wasted due to ineffective management, governance, operations and clinical care (OECD, 2017; WHO, 2010) for which politicians often blame healthcare managers (Discombe, 2023). This has prompted observers of healthcare systems to ask “Does management matter?” and “If management does matter, what is the relative value of specific aspects of management” (Lega et al., 2013).

Over the last 15 years a wide body of quantitative empirical evidence has demonstrated that management, and specifically management

practices, do matter. This has been shown via the assessment and analysis of the management practices of over 13,000 firms and 4,000 public sector schools and hospitals, across 35 nations (Scur et al., 2021).

The empirical research to date on the role management practice plays in healthcare has focused almost exclusively upon healthcare providers, primarily hospitals and other service providers (Agarwal et al., 2016; De Regge and Eeckloo, 2020; Hu et al., 2022; Mabuchi et al., 2020). This body of research has found that better healthcare provider management practice is associated with improvements in health outcomes (Bloom et al., 2020), quality (Tsai et al., 2015), and efficiency (Sosa-Rubí et al., 2021). The central role management practice plays in improving healthcare provision has been demonstrated across both high-income countries (McConnell et al., 2013; Tsai et al., 2015), and low- and middle-income countries (Sosa-Rubí et al., 2021). However, to our knowledge, there is no similar research on the impact healthcare payor management practices might have upon both health system performance and the health of payors’ managed populations.

* Corresponding author.

E-mail addresses: Stephen.Dorgan@lshtm.ac.uk (S.J. Dorgan), Timothy.Powell-Jackson@lshtm.ac.uk (T. Powell-Jackson), Andrew.Briggs@lshtm.ac.uk (A. Briggs).

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Yet, healthcare payors are critical participants in health systems, be they publicly funded universal coverage systems, as in England, or 'mixed' systems with many different health insurance providers, as in the US. Depending upon the system, payors are responsible for: implementing policy; commissioning efficient, effective healthcare; health system management, and; improving the health and wellbeing of their managed populations. The lack of quantitative insight into payor management practice and its association, if any, with health system performance and the health of the populations they manage presents a clear gap in the literature. With this article we attempt to close some of that gap by extending the literature on management practice and its association with performance into both health system performance and healthcare payors, using the same methodological approach that has become central to empirical research over the last two decades into the relationship between management practice and both organisational and system performance (Scur et al., 2021; Agarwal et al., 2016; De Regge and Eeckloo, 2020; Hu et al., 2022; Mabuchi et al., 2020; Bloom et al., 2020; Tsai et al., 2015; Sosa-Rubí et al., 2021; McConnell et al., 2013).

This article has three goals. First, to examine whether better healthcare payor management practices are associated with improved health system performance and the health of a payor's managed population. Second, to investigate whether better payor management practice is associated with improvements in specific healthcare system performance metrics. Third, to explore the relative size of any performance improvements associated with improved management practice. The data cover all 152 healthcare payors in England, which were responsible for an £84 billion annual spend on healthcare for 53 million residents.

We focus on payor management in England's National Health Service (NHS) in 2010. The structure of the NHS at the time had 152 publicly funded healthcare payors. Each payor defined, commissioned, managed, and paid for the healthcare services delivered to a given geographically bounded population. Collectively these payors covered the entire population of England. We examined the association between these healthcare payors' management practices, the performance of the healthcare systems they managed, and the health and well-being of their managed populations. The tool used to measure management practice has recently been shown to be robust and valid (Dorgan et al., 2024), and the datasets analysed cover all 152 public payors and the entire population of England at the time.

Using data for each healthcare payor and their managed populations, we posed three questions: First, is better healthcare payor management practice associated with better healthcare system performance? Second, is better healthcare payor management practice associated with improved performance in specific health system metrics? Third, what is the relative response in specific healthcare system performance metrics associated with improved payor management practices? We anticipate that any insights obtained may be relevant for healthcare payors in other countries, irrespective of how they are financed.

Our findings suggest that better healthcare payor management practice is associated with improved health system performance in the domains of quality and value for money, and with improvements in the overall health of the managed population. As a result, improving healthcare payor management practices may be an overlooked lever for governments, regulators, and healthcare funders to tackle, and even constrain, the seemingly inexorable growth of healthcare expenditure as a share of national incomes.

2. Relevant literature

2.1. Conceptualising management

The role management practice plays in influencing performance has been investigated across a wide range of research disciplines, such as Organisational Behaviour, Management, Economics, and Public Policy. However, despite a century of work to define management, there has

historically been little consensus on what 'management' is. This historical ambiguity resulted in dozens of theoretical models (Nadrifar et al., 2016) and definitions of management practice (Kaehler and Grundei, 2019) and prevented quantitative evaluations as to what impact, if any, management might have upon performance.

2.2. Measuring management

A game-changer in the quantitative assessment of management practice was the development in 2002 of a novel, robust, yet simple tool and assessment methodology to measure management practice (Dorgan and Dowdy, 2002). This tool provided a new means of quantitatively measuring management practices by: 1) identifying management practice domains considered important to performance; 2) specifying the management practices defining each domain; 3) defining what 'good' and 'bad' practice is for each management practice using an explicit scale, and; 4) using calibrated open-ended questioning by trained interviewers to conduct assessments. The World Management Survey (WMS) and its variants has this tool and assessment methodology at its core (Bloom and Van Reenen, 2007), and has been used successfully to assess the management practices of over 35,000 public and private organisations across 35 nations (Scur et al., 2021). The overwhelming evidence across countries, industries, and sectors is that better management practice is associated with better organisational performance (Scur et al., 2021).

2.3. Management in healthcare

In healthcare, management practice has long been considered a key factor in the performance of healthcare organisations and central to healthcare system improvement (Dorros, 2006; Vriesendorp, 2010; Bradley et al., 2015), albeit without a robust quantitative evidence base. Several quantitative empirical studies have explored associations between management practice, organisational performance, and health outcomes in hospital settings (Bradley, 2012; Shortell, 1994; Asaria et al., 2021) typically using a healthcare version of the WMS assessment tool (Agarwal et al., 2016; Tsai et al., 2015; McConnell et al., 2013, 2016). These studies consistently indicate that better management practice is associated with better outcomes for patients in acute healthcare settings. However, to our knowledge, there is no quantitative evidence for a link between healthcare payor management practices and the performance of either the health systems they manage or the outcomes they achieve for their managed populations.

2.4. Relevant theory

Why might healthcare payor management practices be associated with better performance? To motivate the empirical analysis, we provide an overview of relevant theory that frames a more detailed discussion of the programme theory in Section 3.2.

Principal-agent theory is a common lens through which to examine the complex relationships between different parties in a healthcare system. Relevant to this paper is the key relationship between healthcare payors (the principal) who delegate to healthcare providers (the agent) certain tasks (deciding upon and providing patient care). These relationships are characterised by: 1) information asymmetry, where providers have better information on patient needs and treatment options, while payors have limited information on provider behaviour, and; 2) Misaligned objectives, where the goals of principals and agents don't align, e.g., providers may have other objectives beyond providing cost-effective patient care. These factors, and financial incentives in particular, create scope for behaviours not in the patient's or health system's interest. Typical approaches to address these issues and align incentives focus upon contracting mechanisms, payment methods, monitoring, and target setting (Smith et al., 1997), all closely related to management practice, which itself is recognised as an important factor

in strengthening the governance, performance, and outcomes delivered by healthcare systems (Brinkerhoff and Bossert, 2013). However, while the theory implies a link between principal (i.e., payor) management practice, health system performance, and population health this link is poorly understood and has not been investigated quantitatively.

3. Study setting, data and methods

3.1. Study setting

Primary Care Trusts (PCTs) were created in England's National Health Service in 2000. By 2006 PCTs had responsibility for the contracting and payment for healthcare service delivery from a range of providers for their managed populations. As a result, PCTs became healthcare payors, responsible for commissioning and paying for almost all care delivered to the population that lived within their geographic boundaries. Online Appendix 2 provides a simple conceptual overview of the NHS in England in the period 2006–2013.

PCTs were designed, and expected, to function as state-funded healthcare payors, fulfilling the payor role within a healthcare system that clearly delineated between healthcare payors, healthcare providers, regulators, and supervisors. As such, PCTs were legally independent, autonomous entities, with their own independent boards, management teams, budgets, and unique managed population. A PCT did not raise funds from its managed population via insurance premia. Rather, annual block grant funding was provided directly from central government general tax revenues to each PCT, based upon the managed population size, need, deprivation, location, and demographics. PCTs were responsible for identifying their population's healthcare needs, defining their own strategy, and managing their own budgets and resources. They identified, negotiated, and contracted directly with service providers to provide both the quantity and quality of healthcare services required to meet their population's needs. With these service providers, PCTs chose whether to fund claims, dispute payments, and renegotiate costs as necessary. Many different contractual forms existed, e.g. block grant, capitation, fee-for-service. The contractual forms used by PCTs with individual service providers varied based upon historical precedent, service type, geography and convenience. Primary care service contracts were primarily capitation-based. Secondary care contracts were mostly activity-based, with nationally fixed, diagnosis-related, case-based, fee-for-service tariffs to reimburse providers for the volume and case-mix of their service activity. As prices were fixed for secondary care, money 'followed' the patient, meaning secondary care providers competed for patients based upon quality rather than price. Private providers were also permitted to compete for elective surgery. While patients had no choice in their payor (they were assigned to the PCT within whose geographic boundary they lived), they could choose their acute healthcare provider from hundreds available within a system with no co-payments or deductibles, where care was free to the patient at the point of delivery.

In 2006 the UK's Department of Health (DH) found less than 40% of all PCTs met the minimum standards expected of effective healthcare payors (Health Committee, 2009) and so, embarked upon the World Class Commissioning Assurance programme (WCC) (Dept. of Health, 2009) to assess and improve the management practices of all 152 PCTs in England. The result was a unique set of management practice data for all English healthcare payors responsible for procuring, contracting, managing, and paying for the healthcare services delivered to 53 million residents. However, a change in government meant this management practice dataset was never published in a consolidated form or explored quantitatively.

3.2. Programme theory

Despite no quantitative proof that better PCT management practice delivered improved health system performance, PCT management

practice was believed to influence health system performance and so population health via a well-defined mechanism (Dept. of Health, 2006). This mechanism, grounded within principal-agent theory, suggested improved contracting (Evans, 2006), strategic purchasing (Figueras et al., 2005), and stakeholder management (McHugh et al., 2012) as levers to improve health system performance. PCTs were the primary fund-holders, tasked with identifying their population's needs and then contracting, incentivising, performance managing, and paying service providers to provide a defined quality and quantity of healthcare services to meet their population's needs. As a result, PCTs had (in theory) both the role and the levers within the healthcare system to compel healthcare service providers to deliver the services specified to meet their resident population needs. Therefore, the mechanism theorised was that PCT choices and management practices defined what services and resources were deployed, how providers behaved, and the quality and accessibility of care, so determining the performance of the healthcare system, and ultimately the health and well-being of the resident population. This mechanism, with health system performance mediating the influence of PCT management practice upon health outcomes, was the intent of the NHS system design at the time (Dept. of Health, 2006), is described in the qualitative literature (Sheaff et al., 2013; Checkland et al., 2012; Allen, 2013), and is illustrated in Fig. 1. It is this mechanism that is explicitly explored in this study.

3.3. Tool development

The creator of the original WMS tool led the development of a similar tool to assess healthcare payor management practice. Online Appendix 3 provides an overview of the tool development steps that follow. First, management practice domains believed essential to a PCT's performance as an effective healthcare commissioner and payor were identified. These domains were identified via a literature review and inputs from NHS leaders, health system leaders, PCT leaders, and international experts in both healthcare service commissioning and strategic procurement. Second, within each management practice domain, specific management practices considered essential for high performance and

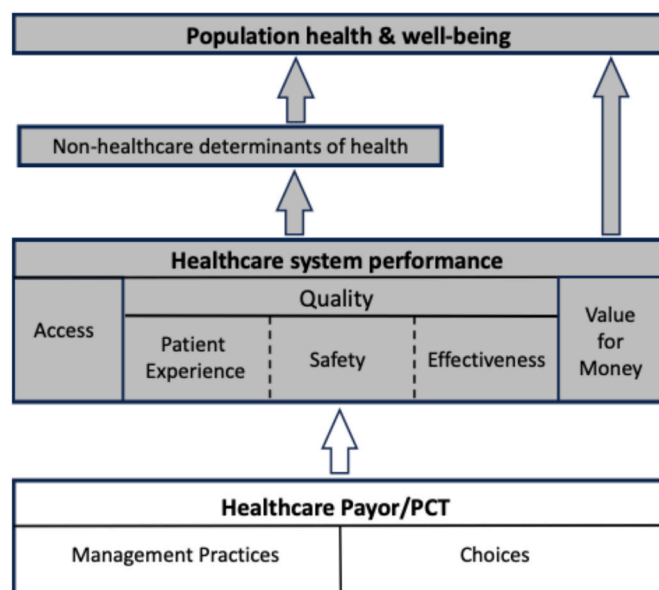


Fig. 1. Theoretical model of health system performance mediating healthcare payor management practices' influence upon population health.

Notes: Shown in grey is a simplified overview of the OECD Framework for Healthcare System Performance Measurement (Carinci et al., 2015) adapted by the authors. Within the original OECD Framework, Patient Experience is described as "Responsiveness/Patient Centeredness", and Value for Money is described as "Cost".

capable of assessment were identified. Third, experts in management practice assessment tool design created an explicit rating system for each management practice that clearly defined the actions required to attain a particular rating on a 4-point scale.

The assessment tool structure, content, and approach were tested and refined in 12 workshops over a 5-month period with experts in international healthcare, assessment tool design, healthcare commissioning, and strategic procurement, along with senior leaders and policy experts from the UK's Department of Health, PCTs, healthcare providers, and the PCT supervisory agencies.

Two pilots were conducted to refine the assessment tool and methodology. First, a small pilot was conducted with 5 PCTs within the same geographic region, followed by a second non-evaluative assessment of all 152 payors (PCTs) in England. The finalised assessment tool evaluated 11 management practice domains, each defined by three specific management practices which were individually assessed and rated. Online [Appendix 4](#) provides an overview of the 11 management practice domains and 33 management practices assessed, along with an example of the assessment grid for one of the 11 management practices assessed ([Dept. of Health, 2009](#)).

3.4. Data collection

3.4.1. Participants and evaluators

The healthcare payor management practices data were collected as a part of the WCC programme led by the UK's Department of Health between January and July 2010. All 152 PCTs in the English NHS system participated in the programme. During on-site evaluations the entire senior leadership team of a PCT participated and was interviewed.

The evaluation team included trained independent analysts who conducted an initial 'desktop review' of relevant materials. This desktop review was then passed to a five-person panel of external independent experts for a full day of on-site face-to-face interviews and evaluations. The independent expert panel included: 1) an Executive Director from a leading US health insurer to provide international best practice insight; 2) a PCT Chief Executive from another health economy to provide NHS best practice insight; 3) a Medical Director or senior clinician from another health economy to provide clinical insight; 4) a Director of Adult or Children's Services to provide local government and social care insight, and; 5) a Director from the PCT's supervising agency to provide local health economy insight ([Dept. of Health, 2009](#)).

3.4.2. Assessment procedures

Each PCT was provided with detailed briefing materials, guidance, tools, and training on how to execute their part of the assessment. In addition, they were provided with data on over 250 key public health metrics for their managed population. PCTs self-assessed their own performance using the assessment tool, identified other organisations they worked with to provide anonymous feedback directly to assessors, and provided the evidence they based their self-assessed ratings upon. A team of independent analysts reviewed PCT submissions, the anonymous feedback, and other data to independently rate each PCT in a 'desktop review' of the evidence base.

The panel of external independent experts used both the desktop review of the evidence base and the PCT's self-assessment to conduct 8–10 hours of structured interviews with senior PCT managers. Interviews used open-ended questions to enable detailed discussions of complex topics, and concepts. Assessors were trained to probe for specific examples of the management practices deployed in an open-ended conversational style, in semi-structured interviews ([Knott et al., 2022](#)), so each assessor could score the PCT in specific dimensions of the framework.

3.4.3. Limiting assessment bias

Several strategies were deployed to limit survey and respondent bias during the assessment. Assessors were trained in how to execute

interviews, including mock interview training. Six or more senior leaders were interviewed in each payor to limit bias associated with a single person's perspective. Interviews were conducted in private, with confidentiality assured, to minimise social desirability bias. Each interview had multiple assessors who scored responses independently. To reduce rating subjectivity, scores were assigned based upon organisations demonstrating that specific management practices were deployed. In addition, interviews were observed by independent non-interviewers to ensure consistent ratings across interviewers and organisations. Upon completion of all assessments, based upon their notes and the information gleaned during interviews, the panel of five assessors agreed upon a single final score on a 4-point scale ranging from 1 ('worst') to 4 ('best') for each management practice. Further details of the scoring grid, approach, and methodology can be found in Online [Appendix 3 & 4](#) ([Dept. of Health, 2009](#)).

3.5. Health system performance variables

Assessing the performance of healthcare systems is challenging and requires consideration of multiple domains of performance. The OECD Framework for Healthcare System Performance Measurement has been used for many years to assess country-level health system performance with internationally comparable and reliable performance indicators ([Carinci et al., 2015](#)). This framework considers health system performance across three distinct domains: access, value for money, and quality, with the domain of quality further sub-divided into effectiveness, safety, and patient experience. A simplified overview of this well-established framework is shown in [Fig. 1](#). Using the OECD's list of recommended performance measures ([Carinci et al., 2015](#)), we identified metrics in each performance domain over which PCTs were expected to have influence, and for which they were specifically held to account by regulatory and supervisory agencies. In total, we sourced 26 such performance measures for all 152 payors/PCTs in the English healthcare system for the period 2009–10. These health system performance measures were generated by various government agencies to hold PCTs to account for their performance and rate of improvement. This list of 26 individual health system performance measures included life expectancy at birth as our measure of overall population health and well-being, as PCTs were also tasked with improving the health of their managed populations. All the performance variables selected are in the public domain and each performance variable's description and source is shown in [Appendix Exhibit A1](#).

3.6. Payor management practice variables

Our primary independent variables were the management practices of individual healthcare payor organisations. We sourced the original assessments, detailing the management practice scores for all 152 healthcare payors from the UK Government's Web Archive ([UK Government Web Archive](#)), to create a consolidated healthcare payor management practice dataset.

The acceptability, reliability and validity of the management practice assessment tool, and dataset, were assessed using analytic methods recommended in the literature to validate tools and scales for health, social and behavioural research ([Boateng et al., 2018](#)). In summary, item analyses tested for: missing data; inter-item redundancy; internal consistency; maximum endorsement frequencies, and; ceiling effects. Then, Exploratory Factor Analysis (EFA) was conducted to develop summary measures of management practice from the 33 individual management practices assessed. A single, convergent EFA solution was confirmed using three different factor retention rules: the Kaiser Criterion, a Scree Test, and Parallel Analysis. An item factor loading threshold of 0.45 was used for factor retention as that is the loading required for significance at the 0.05 level for a dataset with 152 samples ([Hair et al., 2019](#)). The payor management practice assessment tool is found to measure two distinct latent factors of healthcare payor management practice. The

summary score for each factor is the simple mean of its component items. This retains the ability to interpret the factors directly and maintains the 1–4 scale of the original assessment scorecard. Finally, a battery of acceptability, reliability, and predictive validity tests were conducted on the management practice factors identified by the EFA to ensure they were free from error, were internally consistent, measured the same construct, and provided stable, replicable results. An overview of the analyses, tests, results, and factors are provided in Online Appendix 5.

The result is a payor management practice assessment tool that measures two distinct latent factors of healthcare payor management practice on a scale of 1–4, with convergent validity, discriminant validity, internal consistency, and high reliability (Dorgan et al., 2024). The first factor identified, “*Optimising efficiency*”, relates primarily to a payor’s internal management practices. This first factor is similar to the single management factor identified by other quantitative management practice tools, such as the WMS tool (Bloom and Van Reenen, 2007), which assess practices internal to the organisation. The second factor identified, “*Engaging other health system participants*” assesses the organisation’s external role and influence of healthcare providers, patients, and the public within the broader healthcare system. Such externally focused management practices have been identified by qualitative researchers as being central to the role well-managed healthcare payors play, especially within publicly funded healthcare systems (Checkland et al., 2012; Sheaff et al., 2013).

3.7. Control variables

Our study used a cross-sectional observational design, so we do not make causal claims. Nonetheless, we included additional controls in the analysis to improve the robustness of the findings. Healthcare system performance and outcomes are affected by a wide range of confounding variables relating to, amongst others, the population managed and the structure of the local healthcare system. Therefore, for each payor, data were obtained on the managed population’s level of deprivation, ethnicity, age structure, and gender. Also obtained were data relating to the structure and funding of the healthcare system such as the number of family physicians (called GPs in England), and the healthcare payor’s income. In addition, data was sourced for variables demonstrated in the literature as being key confounders or determinants of specific health system performance variables. Examples of this include: antibiotic prescription rates, obesity prevalence, and geography, all known determinants of healthcare associated infections. The definition, description, and source for each of the control variables are described in Appendix Exhibit A2.

3.8. Statistical analysis

We conducted descriptive analyses of each payor, including their structural characteristics, their management practice scores, and the health system performance metrics for their geographically bounded managed population.

Assessing relationships between two measures of payor management and 26 performance metrics creates the potential for false discovery. For example, with a critical value of 0.05 there is a 93% probability with 52 hypothesis tests that at least one null hypothesis is falsely rejected, a *Type I error*, leading to the “false discovery” of a significant relationship where none actually exists ($1 - 0.95^{52} = 93\%$). To mitigate such concerns, we adopted two strategies. First, we reduced the number of primary hypotheses tested by creating summary indices for population health and well-being, and healthcare system performance in the domains of quality, access, and value for money. Summary index tests are robust to over-testing, test for general effects, and are often more powerful than individual outcome tests. Second, in exploring relationships between specific health system performance metrics and management practices we controlled for the False Discovery Rate (FDR).

Controlling for FDR in exploratory analyses has been shown to have greater power than other multiple hypothesis correction methods (Anderson, 2008; Groenwold et al., 2021). We used a generalized least-squares weighting method (Anderson, 2008) to create our summary indices, and a two-stage adaptive step-up procedure (Benjamini et al., 2006) to control for the FDR.

We built multivariable regression models to explore relationships between the health system performance indices, our primary dependent variables, and the two payor management practices, our independent variables. As the dependant variable indices were standardised, we standardised (z-scores) all other variables. Our regression models included robust standard errors and controlled for payor income, the number of family doctors, and the managed population’s deprivation, ethnicity, age profile, and rurality.

Next, we built a series of multivariable regression models to explore relationships between specific health system performance metrics as dependant variables and our two independent payor management practice variables. For the 24 performance variables that were continuous in nature we conducted Ordinary Least Squares (OLS) regressions which included robust standard errors. For each dependant variable, we controlled for relevant confounding variables detailed in the literature. Two of the 26 performance variables were ordinal in nature and scored on a discrete 1–4 point scale. These variables were those that independently rated a payor’s performance in “*managing finances*” (how each PCT managed its finances to deliver value for money) and “*managing resources*” to (how effectively financial and human resources were managed to meet current and future population healthcare needs). Associations between these two dependent variables and our payor management practice independent variables were explored using Ordinal Logistic Regression. In total, we estimated 26 models with two dependant variables. We controlled for the FDR to reduce the potential for Type I errors and to confirm whether performance variables remained significantly associated with management practice given the 52 hypotheses tested.

Finally, to explore the relative magnitude of any performance improvements associated with improved management practice, we identified relative improvements in health system performance metrics associated with better management practices. To assess relative improvement magnitudes, we identified the level of performance improvement associated with a payor moving from the bottom quartile to the top quartile of management practice. This improvement we expressed as a percentage of each performance variable’s mean to enable comparisons across multiple performance variables with different scales.

Detailed regression model specifications are provided in Appendix Exhibits A3 & A6-A12. All statistical analyses were conducted using Stata 18.

4. Results

4.1. Descriptive statistics

Our dataset includes the management practices of all 152 payors in England and 26 healthcare system performance metrics for their matched geographically bounded managed populations. Table 1 describes the characteristics of the payors, and the managed populations investigated. Details of individual interview respondents were not collected as the entire senior management team of each organisation was interviewed and scores were assigned at the organisation level. On a scale of 1–4 the average management practice scores were 1.92 (standard deviation ± 0.36) for *Optimising efficiency* and 2.53 (standard deviation of ± 0.33) for *Engaging other health system participants*. There is considerable variation in both the payors and their respective managed populations. The largest payor received over 10 times the funding allocation of the smallest (£1.7 billion Vs £163 million), while their managed population was over 13 times the size of the smallest (1.3

Table 1
Characteristics of payor organisations.

| Characteristic | Mean | SD | Min | Max |
|---|--------|--------|--------|----------|
| Management practices | | | | |
| <i>Optimising efficiency</i> | 1.92 | 0.36 | 1.11 | 2.67 |
| <i>Engaging with other health system participants</i> | 2.53 | 0.33 | 1.44 | 3.67 |
| Funding Allocation (£ million) | 526.52 | 263.63 | 163.41 | 1,709.70 |
| Managed Population (000s) | 360.77 | 197.47 | 94.23 | 1,316.39 |
| Funding per capita (£ thousands) | 1.59 | 0.197 | 1.25 | 2.14 |
| Share of population over 65 (%) | 86.18 | 11.73 | 37.25 | 97.33 |
| Ethnicity (% white) | 0.16 | 0.04 | 0.07 | 0.25 |
| Hospital Provider Concentration (HHI) | 0.52 | 0.20 | 0.15 | 0.94 |
| GPs/100,000 population ^a | 69.56 | 8.74 | 53.75 | 99.08 |
| Index of Multiple Deprivation | 23.56 | 8.44 | 8.81 | 45.31 |
| Rurality index ^b | 2.60 | 1.55 | 1.00 | 6.00 |

Notes: $N = 152$ Management scores range from 1 to 4. HHI: Herfindahl–Hirschman index.

^a GP: General Practitioner, i.e., primary care physician.

^b Index, with 1 being most urban and 6 being most rural.

million Vs 94,000). There are similar, though smaller, variations in both the demographics of the managed population (ethnicity, share over-65 years, deprivation) and the structure of the healthcare delivery system (number of GPs per capita, hospital provider concentration, rurality).

4.2. Relationship between management practices and health system performance

Table 2 shows the relationship between the health system performance index for the healthcare system performance domains investigated and our independent variables: the two payor management practices. This table summarises regression results presented in Appendix Exhibits A3 & A8. Shown is the standardized (z-score) response in a system performance index to a one-standard-deviation increase in management practice, as identified in multivariable OLS regression models with payor management practice as predictor variables.

We found no significant relationship between the payor management

Table 2
Multivariate OLS regressions coefficients of management practice scores and health system performance metrics.

| OECD health system performance domain metrics | Management Practices | |
|---|-----------------------|--|
| | Optimising efficiency | Engaging with other health system participants |
| Population health & well-being | −0.0244 (0.0398) | 0.0970** (0.0369) |
| Value for money | 0.145 (0.0958) | 0.321*** (0.0816) |
| Quality (Effectiveness) | 0.0623 (0.0961) | 0.323*** (0.0867) |
| Quality (Safety) | −0.18 (0.0923) | 0.197** (0.0715) |
| Quality (Experience) | −0.00792 (0.0572) | 0.0152 (0.0564) |
| Access | −0.0656 (0.0949) | 0.125 (0.120) |

Notes: Multivariable OLS regression model coefficients for domains of healthcare system performance as unique dependent variables and payor management practice as predictor variables. All variables have been standardized using z-scores. Depicted is the response in system performance indices to a one-standard-deviation increase in management practice. Each summary index is composed of the performance metrics within the relevant domain shown in Fig. 2. All regressions control for payor income, number of family doctors, and the managed population's deprivation, ethnicity, age profile, rurality. Quality regression also controls for share of the female population 25–29 years. Appendix Exhibits A3 & A8 provide detailed model specification and regression results. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

practice of *Optimising efficiency* and our measures of health system performance (Table 2). However, we did find that a one-standard-deviation (sd) improvement in the management practice of *Engaging other health system participants* was associated with improvements in value for money (0.321 sd, $p < 0.001$) and the quality sub-domains of effectiveness (0.323 sd, $p < 0.001$) and safety (0.197 sd, $p = 0.007$) (Table 2). The same management practice improvement was significantly associated with improvements in the health and well-being of the managed population (0.097 sd, $p = 0.01$). We did not find any significant relationship between payor management practices and the measures for access to healthcare and patient experience.

4.3. Relationship between management practices and individual healthcare metrics

Fig. 2 shows the results from exploring relationships between specific health system performance metrics as dependant variables and our two independent payor management practice variables. This figure summarises the results presented in Appendix Exhibits A4–A12. Shown are z-score point estimates and 95% confidence intervals for health system performance variables investigated via OLS regressions with payor management practices as the predictor variables. Also shown are levels of significance having controlled for potential False Discovery Rate (FDR) across the 52 hypotheses tested.

Payors with better management practices performed significantly better, i.e., an FDR corrected q -value < 0.05 , in 12 of the 26 health system performance variables underpinning our indices when testing each performance variable in isolation. Of these 12 health system performance metrics, only two metrics, breast cancer screening and MMR vaccine uptake, were found to be significantly improved in payors better at management practices to *Optimise efficiency*. Payors better at *Engaging other health system participants* performed significantly better in the other 10 metrics, spread across the performance domains of Value for money, Effectiveness, and Safety.

Of note is that *Optimising efficiency* is negatively associated with a range of outcomes, e.g., infection rates, cancer treatment waits, and ED admissions. However, none of these measures, nor any of the other performance indicators for patient experience or access to healthcare are statistically significant following an FDR correction.

4.4. Relative value of management practice improvements

Table 3 details the relative improvement in performance for the health system metrics found in Fig. 2 to be significantly associated with better payor management practice. Shown is the improvement in each health system performance metric associated with a payor improving their management practice from bottom-quartile performance to top-quartile performance.

In the domain of value for money, an improvement in management practice equivalent to a payor improving its management practice from the bottom-quartile to the top-quartile in performance was associated with a 6.7%–14.0% improvement in the various metrics investigated ($q < 0.05$).

In the domain of health system quality, improving payor management practice from bottom- to top-quartile performance was significantly associated with a 7.65% ($q = 0.006$) improvement in mortality amenable to healthcare and an 8.57% ($q = 0.006$) improvement in mortality amenable to healthcare excluding ischaemic heart disease. The same bottom- to top-quartile improvement in management practice was associated with improvements in: breast cancer screening rates of 3.41% ($q = 0.006$), cancer survival rates of 1.47% ($q = 0.041$), and; years of life lost to both circulatory diseases 6.73% ($q = 0.037$) and cancer 4.42% ($q = 0.011$). While improvements in MMR vaccination rates associated with a payor moving from bottom- to top-quartile in management practice were modest 5.98% ($q = 0.031$), the improvements in smoking cessation and healthcare-associated infections were

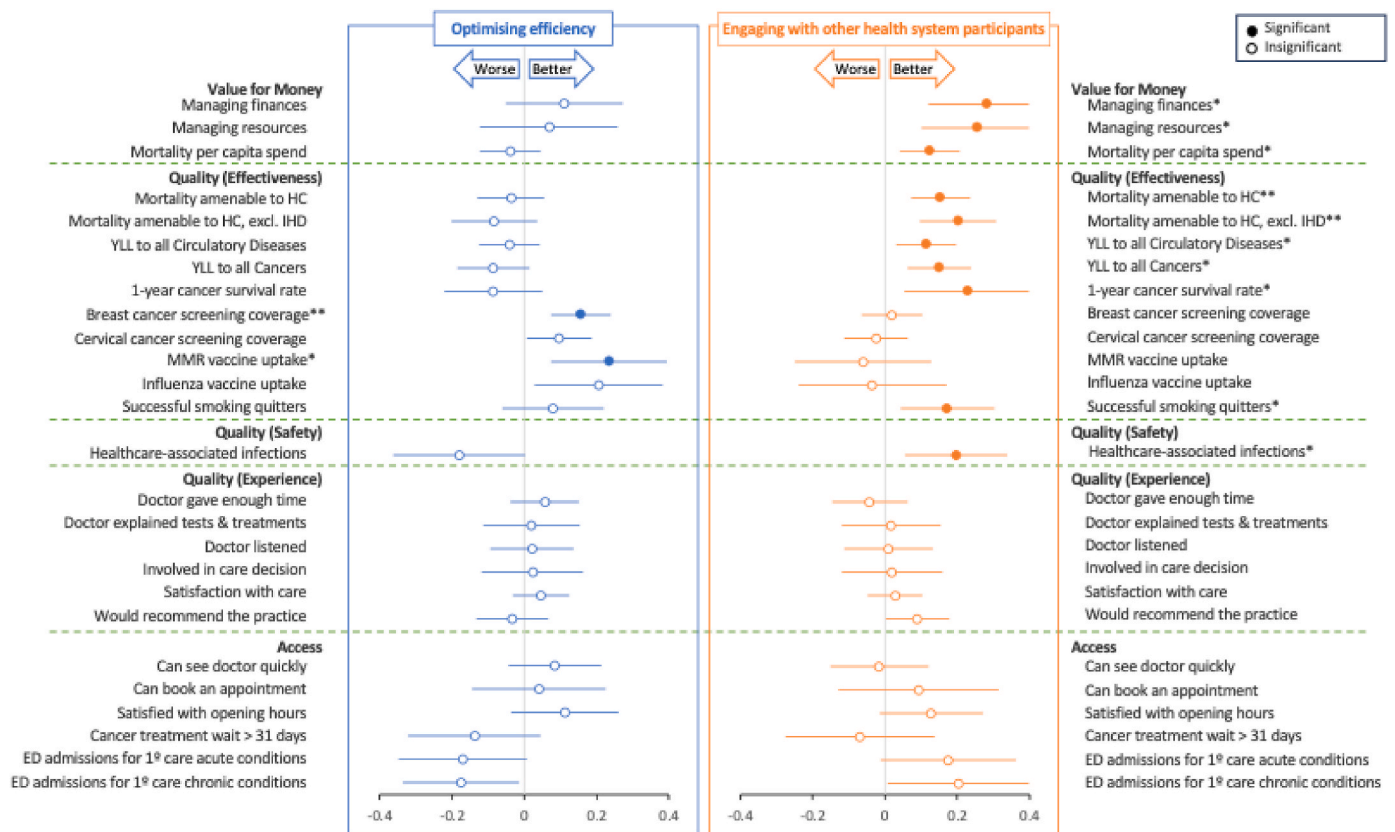


Fig. 2. Relationship between payor management practices and individual healthcare metrics.

Notes: Multivariable OLS models with the variables shown as the dependent variables and payor management practices as the predictor variables. Shown are z-score point estimates and 95% confidence intervals for the health system performance variables investigated. Regressions control for deprivation, income per capita, number of GPs per capita, ethnicity, share of the population >65 years, and other known confounding variables. Some outcomes (e.g., mortality) are flipped to ensure that positive associations equate to improvement. See Appendix Exhibits A6-A12 for detailed model specifications and results. IHD: Ischaemic Heart Disease, YLL: Years of life lost. Significance shown is of q -values (i.e., FDR corrected p -values) * $q < 0.05$, ** $q < 0.01$, *** $q < 0.001$.

large at 12.86% ($q = 0.040$) and 17.33% ($q = 0.035$), respectively.

5. Discussion

In this study of all 152 healthcare payors in England, we found better payor management practice is robustly associated with both better healthcare system performance and the health status of a payor's managed population. We found that better payor management practice is significantly associated with improved value for money and improvements in the health system quality sub-domains of effectiveness and safety. Payors with better management practices led healthcare systems with significantly higher levels of performance across a broad range of individual healthcare performance metrics than their less well-managed peers. Finally, we have found evidence, albeit indirect, to support the mechanism detailed in Fig. 1 of healthcare service provider and system performance mediating payor management practice's influence of a managed population's health and well-being. These findings align with the literature on principal-agent issues in healthcare (Smith et al., 1997; Brinkerhoff and Bossert, 2013) and that on improved contracting (Shortell et al., 1994), strategic purchasing (Figueras et al., 2005), and stakeholder management (McHugh et al., 2012) as a means of improving health system performance.

Our results also align with the existing literature showing that better management practice is related to improved outcomes and performance at both the healthcare provider level, and the district level (Bloom et al., 2020; Tsai et al., 2015; Sosa-Rubí et al., 2021; McConnell et al., 2013; Fetene et al., 2019). Our study contributes to this literature by being the first, to the best of our knowledge, to provide quantitative evidence on

how the management practices of healthcare payors interact with both overall health system performance and individual healthcare metrics, and to do so for a set of payors responsible for commissioning and managing healthcare services for an entire nation's population.

We found the management practice *Optimising efficiency* is associated with some well-known high-value interventions that were led by the healthcare payors and the family physicians they directly oversaw, such as cancer screening and vaccination uptake. In contrast, the practice of *Engaging other health system participants* was associated with interventions and activities, such as smoking cessation and patient safety, that require substantial collaboration with and amongst healthcare providers and other actors across the healthcare system. This aligns with the qualitative literature describing the convenor, or 'animateur', role that successful public sector healthcare payors, and their managers, adopt to improve healthcare system performance through the influencing and engagement of other providers and/or actors (Sheaff et al., 2013; Checkland et al., 2012). The lack of a statistically significant association between smoking cessation and *Optimising efficiency* may be due to smoking cessation being a top priority for all the organisations investigated, resulting in little variation between payors in the internal management practices related to smoking and so constraining one's ability to identify a statically significant association due to a lack of variation. We found *Optimising efficiency* to be associated with lower levels of safety and some dimensions of access, albeit statistically insignificantly. We wonder whether this could be due to attempts by payors to constrain provider costs leading to poorer performance, this is worthy of further study.

We found the improvements associated with better payor

Table 3
Magnitude of health system performance improvements associated with moving from bottom-quartile to top-quartile in management practice.

| Performance variables | Mean | Improvement | Improvement in the mean | q-value |
|--|--------|-------------|-------------------------|---------|
| Value for Money | | | | |
| Managing finances | 2.72 | 0.38 | 14.03% | 0.027 |
| Managing resources | 2.30 | 0.31 | 13.54% | 0.031 |
| Mortality per capita spend | 0.62 | 0.04 | 6.69% | 0.029 |
| Quality (Effectiveness) | | | | |
| Mortality amenable to healthcare | 94.85 | 7.26 | 7.65% | 0.006 |
| Mortality amenable to healthcare, excl. IHD | 56.36 | 4.83 | 8.57% | 0.006 |
| Years of life lost to all Circulatory Diseases | 90.97 | 6.12 | 6.73% | 0.037 |
| Years of life lost to all Cancers | 147.83 | 6.54 | 4.42% | 0.011 |
| 1 Year Cancer survival rate | 74.14 | 1.09 | 1.47% | 0.041 |
| Breast cancer screening rates ^a | 75.58 | 2.58 | 3.41% | 0.006 |
| MMR vaccination rates ^a | 82.68 | 4.94 | 5.98% | 0.031 |
| Successful smoking quitters | 948.80 | 121.98 | 12.86% | 0.040 |
| Quality (Safety) | | | | |
| Healthcare-associated infection rate | 0.54 | 0.09 | 17.33% | 0.035 |

Notes: Multivariable OLS models with the variables shown as the dependent variables and payor management practices as the predictor variables. Depicted is the response in each performance metric associated with a payor moving from the bottom quartile to the top quartile in a management practice. Regressions control for deprivation, payor income per capita, number of GPs per capita, ethnicity, share of the population >65 years, and other known confounding variables.

^a Response to *Optimising efficiency*, all other responses shown are those to *Engaging other health system participants*. See Appendix Exhibits A6-A12 for detailed regression models and results. IHD: Ischaemic Heart Disease. Significance shown is of *q*-values, i.e., FDR corrected *p*-values.

management practices were large in individual health system performance metrics within the domains of healthcare system effectiveness, safety, and value for money. Interestingly, we find no such relationship between payor management practices and measures of patient reported experience and access to healthcare, which are considered pre-requisites for good health services and better outcomes generally. This could be due to poor data reliability. Others have found patients often report performance as ‘good’ or ‘very good’ in surveys despite trained assessors finding performance is actually poor (Burt et al., 2017). Given the growing importance of patient-reported measures in managing healthcare systems and how central patient access is to better outcomes, this too is worthy of further study.

This study extends both the quantitative empirical literature exploring the role management practice plays in hospital and district-level administrators (Bloom et al., 2020; Tsai et al., 2015; Sosa-Rubí et al., 2021; McConnell et al., 2013; Fetene et al., 2019), and the qualitative literature on how payor power and influence might be mediated to improve performance (Sheaff et al., 2013; Checkland et al., 2012), by providing quantitative insights into the relationship between healthcare payor management practices and health system performance. It also extends the literature on how publicly funded health system performance might be improved beyond the attempted use of market-based reforms (Allen, 2013), competition (Allen et al., 2017), and local agency partnerships (Alderwick et al., 2022).

This study addressed two key questions on the role of management practice in healthcare payors, namely: “Does management matter?” and

“If management does matter, what is the relative value of specific aspects of management” (Lega et al., 2013). First, we demonstrated that healthcare payor management practice does matter. Better managed payors were associated with significantly better performance in both local healthcare systems and population health performance metrics. Second, we showed that there are differences in individual health system performance metric responses associated with better payor management practices, and that these responses differ for each of the two management practices measured.

Our study has several limitations. First, the management practice assessment tool assessed management practices relevant to publicly funded healthcare payors in a high-income country with an established public healthcare system. We believe (and hope) similar tools can be developed and deployed for other healthcare systems and payors, just as the World Management Survey tool was adapted for other settings (Hu et al., 2022). Second, being a cross-sectional observational study, we do not claim to identify causal relationships, as there may be unobserved, and unaccounted for, confounding factors. Third, we used summary indices to mitigate the problem of multiple inference and test for general effects. Summary indices, by their very nature, do not explain what is going on in their underlying indicators. To address this, we explored and reported on individual performance variable responses to management practice. This creates, inevitably, a multiple inference problem. Even with a correction for false discovery this means our analysis of specific performance metrics can only be considered exploratory. Fourth, it is possible that some of the findings presented here may be due to unobserved differences between PCTs and their managed populations. This possibility remains despite our controlling for known determinants of both health system performance and population health, and the evidence that better PCT management practices (as measured by the tool used here) is not determined by PCT size, funding, geography, or the managed population’s size and wealth (Dorgan et al., 2024). Finally, our analysis cannot speak to the possible benefits associated with individual payors improving their management practices over time. Investigating that requires the construction and analysis of a panel dataset.

Our findings have important implications for policy makers and healthcare payors. As healthcare costs consume an ever-increasing share of national incomes, delivering more and better healthcare for populations remains a key challenge. Given the unique role healthcare payors play in co-ordinating and managing healthcare providers, healthcare services, patients, and the public, our findings suggest that improving some specific healthcare payor management practices, specifically those associated with *Engaging other health system participants* may be a means of improving healthcare provider and healthcare system performance. The large gains in healthcare system performance associated with better payor management practices might provide a meaningful policy intervention to slow the seemingly inexorable growth of healthcare expenditure as a share of national income.

For payors in other healthcare systems improving payor management practices might be a lever to improve the quality of healthcare delivered, while also improving both costs and the health and well-being of the managed population.

For England’s new Integrated Care Boards (ICBs), which now perform the core functions of the payors investigated in this study (as described in Section 3.1), explicitly incorporating a management practice assessment and improvement regime might be a cost-effective means for England’s NHS to improve management practices and get more for the over £100 billion ICBs spend on healthcare services annually.

6. Conclusion

We found better healthcare payor management practices were strongly associated with better healthcare system performance across the domains of quality and value for money. Additionally, we found positive associations between payor management practices and specific

metrics of healthcare effectiveness, safety, and value for money. Finally, we found that the health and well-being of a payor's managed population is positively associated with better payor management practice.

Improving payor management practice may be an overlooked means of improving health system performance. Further research to understand possible returns to improved payor management practice over time will provide insight into whether payor management practice improvement interventions could be effective in delivering more, better healthcare for less.

CRedit authorship contribution statement

Stephen J. Dorgan: Writing – original draft, Formal analysis, Conceptualization. **Timothy Powell-Jackson:** Writing – review & editing, Supervision. **Andrew Briggs:** Writing – review & editing, Supervision.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.socscimed.2025.117780>.

Data availability

Data will be made available on request.

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