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James, Marilyn and Stokes, Elizabeth (2013) Spending by primary care practices-does it show what we expect? International Journal of Health Planning and Management, 29 (3). pp. 244-259. ISSN 1099-1751

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Spending by primary care practices—does it show what we expect?

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SUMMARY

Background Over recent years, a number of policies and financial incentives in primary care have been proposed to tackle issues such as deprivation and health outcomes. This article investigates the association between healthcare spending, deprivation and outcomes. It argues that individual practice data are analysed before blanket application and acceptance that one size fits all in a local area.
Methods Financial data were analysed alongside key outcome data, including quality and outcomes framework (QOF) indicators for a large urban primary care trust (PCT) in the UK. The PCT had a large population and number of practices, including single-handed practices and an average list size in excess of 5000. The PCT will remain anonymous.
Results There was no relationship between primary care investment and the practices' deprivation score. There was a strong statistically significant negative correlation between QOF payments and deprivation, (correlation $= -0.46$, $p < 0.001$). There were only weak links between primary care investment and health outcomes. There was no relationship between high emergency spending and health outcome.
Conclusions The data presented suggest that one size does not necessarily fit all—in terms of providing the appropriate incentives in primary care, nor do national incentives and policies always have the desired effect. © 2013 The Authors. *International Journal of Health Planning and Management* published by John Wiley & Sons, Ltd.

KEY WORDS: primary care policy; investment; outcome; QOF indicators; deprivation

INTRODUCTION

Expenditure on healthcare continues to grow, but the actual growth in real terms is slowing to around 1% in the UK. At the same time, life expectancy in Western Europe has increased (Mackenbach *et al.*, 2013). Although this paper is written from the perspective of the English health system, health is undoubtedly a challenge for all governments. There are a number of common factors across all health services that make the findings of this paper relevant across Europe, Australasia, Asia and

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America. More than ever, the purchasers of healthcare seek to obtain the most in terms of healthcare benefits from limited healthcare resources, especially when such resources are stretched by growing population numbers both in the developed and in the less developed world (United Nations Population Division, 2010).

The publically financed UK National Health Service (NHS) is based on a strong primary care system and relies on the primary care physician in terms of providing healthcare and in acting as a gatekeeper for secondary care. This paper was written using data from an English primary care trust (PCT). PCTs were the forerunner to the present clinical commissioning groups (CCGs) in England. PCTs were responsible for managing general practice (GP) services within the area and commissioning secondary care on their behalf. By 2006, there were 152 PCTs across England. The new CCGs that have replaced PCTs were designed to bring healthcare closer to the patient, empowering smaller geographical zones of GPs to provide primary care services and commission secondary care services for their population. Although the original plan was to have over 500 CCGs across England, the current number stands at 211(NHS England, 2013a). These vary considerably in terms of the size of the population they serve.

The reforms to the NHS in the government White Paper of 2010 (DH, 2010) and the establishment of CCGs (DH, 2011) make it crucial that GPs fully understand the relationship between their investment in healthcare and patient outcomes. To maximise investment return, a GP consortia needs to understand the relationship between their current spending and outcomes.

Primary care is becoming an increasingly important theme across nations. It is argued that health outcomes are better in countries with a strong primary care system (Kringos et al., 2013). Australia published its first national primary healthcare strategy in 2010 (Australian Government Department of Age and Aging, 2010), with key components including regional integration, finance and performance, better management of chronic conditions and equity and equality. Moore (Moore et al., 2013) argues that healthcare costs in the USA could be reduced by some 30%, and better management of chronic diseases is one way, he states, this could be achieved. Phillips (Phillips and Bazemore, 2010) also argued that the USA could actually reduce overall healthcare spending if it doubled primary care investment to 10–12% of total healthcare spending. Rechel (Rechel and McKee, 2009) highlights the central European nations' efforts to strengthen primary healthcare and the special attention they give towards emulating the British system of primary care.

Clinical commissioning groups are essentially a devolved manager of primary care services for the central government. This theme of decentralisation is common across the world. It is embedded in the American state system; it is central within the Australian system, common across Europe (Hacker, 2009; Mackenbach et al., 2013), popular in Asia (Singh, 2008) and Latin America (Bossert et al., 2003), and Pavolini (Pavolini and Vicarelli, 2012) argues that it is the cornerstone of the Italian health reforms. Unfortunately, decentralisation can lead to geographical inequalities (Rechel and McKee, 2009; Gelormino et al., 2011; Pavolini and Vicarelli, 2012).

Classic investment theory dictates that the provider of healthcare—whereby we understand provider in this case as an organisation that purchases healthcare from secondary sources to provide for its population—CCG or PCT will be seeking to

maximise their net present value (NPV) from investment. They will set investment rules on this basis in terms of economic efficiency. In this case, this would require the PCT or CCG to put the funds where the return is greatest in terms of healthcare return. This may be in stark contrast to where the greatest need occurs in each of the wards within its domain. A PCT/CCG driven by needs assessment may wish to invest their capital somewhat differently than the NPV rule. In 2004, an allocation formula was introduced into primary care in England and Wales, which was further modified to enable PCTs to pay practices more or less money to correct for historical inequities and address areas of need. (DH, 2002)

In the last 10 years, a number of policies have been introduced to incentivise the primary care purchasing function to achieve efficiency and to improve health outcomes for the population in England and Wales. These include the recent White Paper (DH, 2010); the Darzi report 'High Quality Care For All' (DH, 2008); quality, innovation, productivity and prevention (Appleby *et al*., 2010); quality and outcomes framework (QOF) (DH, 2004a); payment by results (PbR) (DH, 2004b) and the new general medical services (GMS) contract (DH, 2003a, 2003b), as well as the implementation of numerous local initiatives. The question is do these initiatives work and are primary care practices achieving outcomes from these initiatives that policy makers desired? The aforementioned policies clearly show that repeated governments are wedded to quality and efficiency making a difference to the health of the nation. The White Paper promised to increase healthcare spending and ensure it provides equality to all; Darzi emphasised high quality locally led care; quality, innovation, productivity and prevention also talks of quality of care whilst seeking to re-invest the planned efficiency savings back into patient care; payment by results, by removing price competition and gaming, hopes to drive each hospital towards efficiency and move towards products differentiated in terms of their quality, and the GMS contract puts emphasis on choice, productivity and now public health (NHS England, 2013b).

The QOF is used as a key indicator in this work. The QOF, introduced in 2004, is a set of key quality indicators of health and disease management in areas such as coronary heart disease (CHD) and diabetes. The primary care practice is incentivised to deliver healthcare in these areas and rewarded financially for achieving targets— for example, obtaining blood pressure and cholesterol within defined limits for those at risk. The more the practice achieves the set targets, the greater the financial reward for the practice. Although some targets have been in place since the inception of QOF, others change depending on current health needs and priorities. The targets chosen for this analysis have remained important throughout. QOF seeks to achieve positive health outcomes whilst at the same time providing incentives and income for the primary care practice. In a review article in 2010, Steel and Willems (Steel and Willems, 2010) felt that the evidence base surrounding the impact of QOF was sketchy, and further research was necessary to inform changes in QOF to achieve equity and improvements in health. They argue, 'Most studies show little relationship between QOF achievement and health service activity or health outcomes.' This work aims to further investigate this relationship.

In this paper, we follow the same themes exploring whereby quality as measured by the QOF indicators, improves when linked to the amount of healthcare

investment received per person. The aforementioned is a gross oversimplification of the health service policy. Set amidst all these national policies however, it is easy to see why a CCG would think that investment and achievement of QOF targets and the linked payments should improve the health of their population.

This paper used detailed data from a PCT to examine some commonly held beliefs about primary care spending, and whether it resulted in the outcomes decision makers desired. It poses some beliefs held by the PCT and policy makers and seeks to establish whether they are true.

The commonly held beliefs under examination are

- practices with a high level of deprivation receive a high investment in primary care,
- high QOF payments or high investment payments relate to good outcomes and
- high emergency care spending and secondary care spending indicate poor patient outcomes

The analysis presented in this paper is based on detailed data from one financial year from a single, anonymous PCT. Although audited accounts and public health indicators are freely available, the level of data used in this analysis by primary care practice would not be available to the general public and was used with permission from the PCT. The findings of this research work are potentially controversial and may be detrimental if taken out of context for any single employee of the PCT in question. Therefore to preserve anonymity of all the employed PCT staff and to enable full and frank publication of the full result set, with the consent of the PCT's staff and senior management, the identity of the PCT will not be published. The messages are key for any CCG (DH, 2011) trying to understand its relationship between primary care spending and outcomes. The issues will be shared by many primary care commissioners, and therefore it is important that such findings should be in the public domain to assist the thinking and decision making processes of commissioners.

METHODS

The population is urban and deprived with an average index of multiple deprivation score in 2007 of around 50. It has in the order of 100 practices including a number of single-handed practices. The PCT has a large population of around half a million and a large number of practices with an average list size in excess of 5000. The analysis was undertaken using data for financial year 2007/2008. The period was chosen for the quality of the data in that financial year and its completeness. The data and analysis examined investment from the PCT and allowances for QOF payments. Each practice's spending and outcomes were considered.

Detailed financial data for 2007/2008 were obtained for each GP practice in the PCT. Data were obtained on the QOF payments, the quality payments made to GPs for achieving certain standards of care across a range of areas. In addition, practice investment was collected, this is the payment received by the primary care practice from the PCT. It is based on a range of factors including list size, practice population, deprivation and historical spending patterns. Practice investment did not include QOF payments; hence, double counting was avoided.

Secondary care expenditure was obtained, broken down into accident and emergency, daycase, elective and non-elective inpatients and new and follow-up outpatient appointments, which allows us to split spending into elective and emergency secondary care spending. Pharmacy expenditure was also obtained. Elements of expenditure for each practice were divided by the list size, to calculate average expenditures per person, so that comparisons between practices could be made.

Practice characteristics and financial data were linked to a number of quality indicators from the QOF standards that reflected both the high disease mortality and morbidity areas for the PCT and within the UK. The QOF indicators chosen came from the following diseases: diabetes, CHD, stroke and chronic obstructive pulmonary disease (COPD). These indicators were chosen on discussion with specialists in public health as representing a number of key indicators and disease areas. Their validity was further discussed with officers from the finance department. The following lists the QOF targets chosen for detailed analysis.

- Stroke—the percentage of people with BP 150/90 or below.
- CHD—the percentage of people with total cholesterol 5 or below.
- Diabetes—the percentage of people with HbA1c 7.5 or below.
- Emergency admissions—exacerbation of COPD per 1000 practice population (DH 2004a)

Many of the indicators are useful for a number of diseases and do not relate solely to a single disease. Together, these were used to assess whether investment was linked to the quality of service provided by the GP practices. The paper explores the evidence around investment and outcome and examines whether some commonly held beliefs (outlined in the previous texts) surrounding investment and outcome hold.

All practices in the PCT were included in the analysis; hence, any outliers were included. This was a naturalistic data-set, and the analysis aimed to present the PCT with findings that wholly reflected the real world situation. Sufficient time had elapsed from the submission of returns such that missing data did not occur because of time lags. Data were analysed using the SPSS statistical package.

RESULTS

The following sections present the results under the headings of each of the three hypotheses under investigation, to determine whether the evidence supported the assertions that were made.

Practices with a high level of deprivation receive a high investment in primary care

In this analysis alone, the Primary Care Trust's Medical Services practices were excluded. These were salaried practices with staff directly employed by the PCT, rather than the usual model of independent GP practices. They are as such a manufactured subgroup specifically created by the PCT to attract GPs to areas of high deprivation.

The belief that high deprivation is associated with high investment did not hold true as illustrated by Figure 1.

There is no discernable relationship between practice investment per person and the practices' deprivation score. Practices with high and low investment had high deprivation scores (correlation = 0.16, $p = 0.13$).

Although no relationship was found between investment and deprivation, there is a strong statistically significant negative correlation between QOF payments per person and deprivation, (correlation = -0.46, $p < 0.001$). This showed that the more deprived the location, the less QOF money the practice received per person. It therefore implies that practices in the most deprived locations were least able to reach their QOF targets and as such yield good patient outcomes. This finding is perhaps not surprising and represents an area PCTs may wish to address.
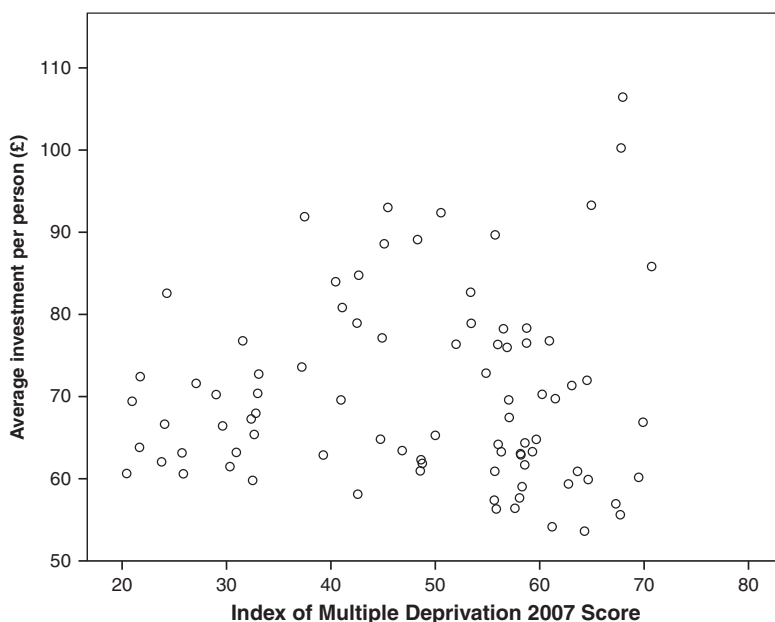

Figure 1. The relationship between average investment per person (£) and deprivation

High quality and outcomes framework payments or high investment payments relate to good outcomes

There were only a few weak links between primary care investment and specific outcomes. Although we did not examine every single outcome or QOF target, the key QOF targets and high disease prevalence groups were examined as defined by the PCT. Weak positive relationships were found between primary care investment and CHD, the percentage of people with total cholesterol of 5 mmol/l or below, and diabetes, the percentage of people with HbA1c of 7.5 or below. An example can be found in Figure 2.
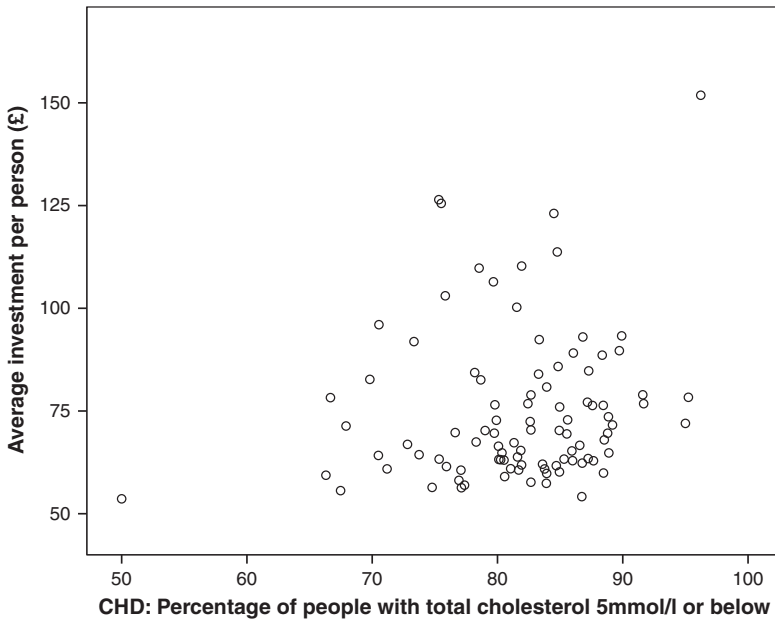
Figure 2. The relationship between average investment per person (£) and the QOF indicator
CHD; the percentage of people with total cholesterol 5mmol/l or below

Weak positive relationships were also found between QOF payments and CHD, the percentage of people with total cholesterol of 5 mmol/l or below, and stroke, the percentage of people with BP 150/90 or below. A weak negative correlation was found between QOF payments and emergency admissions for exacerbations of COPD per 1000 population. Hence practices receiving more QOF money per person were also those with fewer emergency admissions for COPD; this implies that better control in primary care was preventing unnecessary accident and emergency admissions.

There is therefore a trend towards QOF payments being related to better patient outcomes, but this relationship is only weak and requires further monitoring. The clear relationship that was anticipated between QOF payments and outcomes did not exist. All these findings should be interpreted with caution as there are a number of outliers that could have influenced the findings.

High emergency care spending and secondary care spending indicate poor patient outcomes

A commonly held belief is that high emergency care spending is synonymous with poor population health and health outcome. The analysis showed that this relationship did not hold. In one of the indicators, diabetes: the percentage of people with HbA1c 7.5 or below, there was a weak negative relationship with emergency secondary care spend (correlation = −0.31, p = 0.002). This showed that the better controlled the diabetes, the less was spent on emergency care. It was encouraging to observe this finding. This is shown in Figure 3.
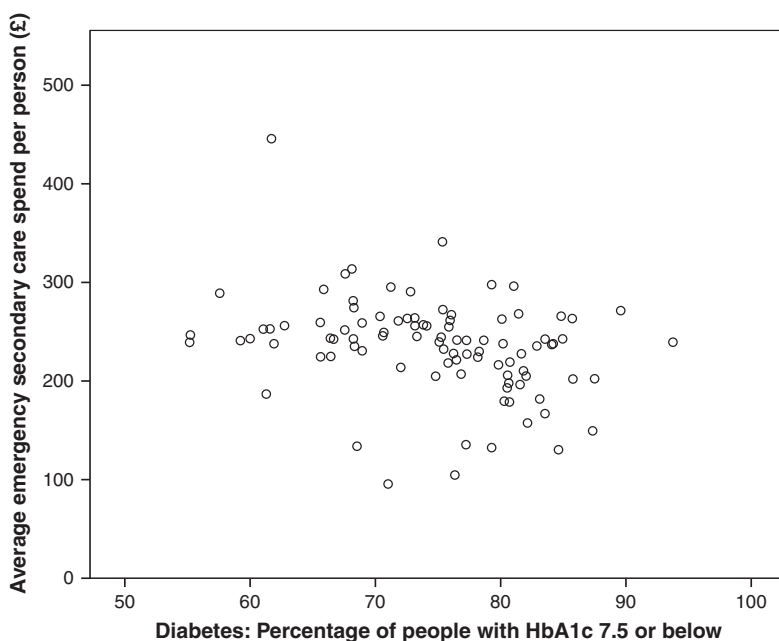
Figure 3. The relationship between average emergency secondary care spend per person (£) and the QOF indicator diabetes; the percentage of people with HbA1c 7.5 or below

Surprisingly and in conflict with the finding in the previous texts, there was a weak positive relationship between emergency secondary care spending and emergency admissions for exacerbations of COPD per 1000 population (correlation = 0.50, $p < 0.001$). There was no relationship between emergency secondary care spending and CHD, the percentage of people with total cholesterol of 5 mmol/l or below, or stroke, the percentage of people with BP 150/90 or below.

It is worth exploring further the proportion of spending on emergency care within secondary care spending in general. Approximately 62% of secondary care spending was on emergency care, and 38% on elective care. There was strong statistically significant positive correlation between elective and emergency secondary care spend (correlation = 0.51, $p < 0.001$). This indicates that those practices that spend highly on emergency secondary care also spend highly on elective care. Similarly, there was strong statistically significant positive correlation between pharmacy spend and total secondary care spend (correlation = 0.54, $p < 0.001$); as well as between pharmacy spend and both elective and emergency secondary care spend. In terms of pharmacy and secondary care spend; therefore, those who spend highly in one area tend to spend highly in other areas. Hence the assumption that spending on emergency care may be a result of underspending on elective or pharmaceutical care does not hold true. Similarly, no relationship was found between primary care spending and secondary care spending. Those practices that have a high primary care spend, for example, did not have compensatory low spend in secondary care.

DISCUSSION

As health service managers, decision makers and policy makers, the incentive is to deliver health policy based on what seem to be logical premises and indeed the commonly held beliefs listed at the start of this paper; however, this may be a dangerous pathway to take when the data do not support such policies. The evidence presented in this paper suggests that none of the commonly held beliefs under discussion could be supported by the data.

Although the study was conducted in a large urban environment, the findings and the commonly held beliefs could apply to a large number of areas across the UK and beyond. Firstly, the study has a primary focus on investment and outcome. Many CCGs may assume that increasing investment will likely bring about improvements in outcome. The relationship shown here was not a simple one and signalled it is important to compare theory with evidence in practice. Whatever the geographical location, policy should be based on data and evidence. Although the findings of this work may be less applicable to remote rural settings, much of the UK, Europe and indeed the developing world is becoming increasingly urbanised, and the findings of this work could be easily transferable to a large number of city settings and urban conurbations.

Discussing investment in healthcare or the public sector is complicated and fraught with difficulties. The select committee of 2006 (House of Commons Health Committee, 2006) argues that three key difficulties are:

- the funding formula itself,
- poor central management and
- poor local management.

It is not surprising therefore that the relationship between investment and outcome seems less than perfect. Although this paper makes no judgement on the quality of management either centrally or locally, it does examine how data around funding translates to outcomes.

Richardson (Richardson, 1998) argues in the case of public sector investment that the NPV rule may not apply and other conditions such as politics may be equally important drivers. Equally, Arrow and Lind (Arrow and Lind, 1970) argue that public investment should carry a different discount rate to private investment. It follows therefore that public investment may not follow the same rules as private investment and may not be judged in the same way.

The relationship between purchasers and providers is blurred yet further in healthcare by the agency relationship. Stalebrink and Sacco (Stalebrink and Sacco, 2006) highlight the problems of dealing with this agency relationship and the influence of institutional characteristics. In terms of primary care commissioning by a PCT or CCG, this is indeed a double agency relationship whereby the PCT invests in a primary care practice, which in turn passes on this contract relationship to a secondary care organisation. Baxter argues (Baxter *et al.*, 2008) that it is this 'principle agent' relationship that is important and drivers within an organisation such as the clinicians within primary care, or a secondary care hospital, can be just as important in determining whether a national policy works, as the policy itself.

A weak agency Baxter further argues can lead to issues of 'creeping commissioning' and ideas rolling forward without conscious decision making and hospitals driving the priorities and decisions made by CCGs. With the advent of CCGs, at least one element of this complex agency relationship is removed. Hence the contractual relationship between PCT and GPs is removed as the GPs, in terms of the CCGs, become direct commissioners.

The results did not support the hypothesis that practices with a high level of deprivation receive a high investment in primary care. Tudor Hart in his seminal paper in the Lancet (Tudor Hart, 1971) argued that 'the availability of good medical or social care tends to vary inversely with the need of the population served.' The hypothesis tested in this research does not look directly at availability but uses proxy measures such as access to investment and ability to meet QOF targets. In terms of investment, the results show that there is no relationship between the practices' level of investment and deprivation. Although not directly supporting Tudor Hart's assertion, it does illustrate that areas of most need do not receive the extra investment that may enable them to improve their populations' health. Tudor Hart argues that 'The force that creates and maintains the inverse care law is the operation of the market.' Hence Tudor Hart himself indicates that the problem is not just about access but the existing capital stock of the area such as poor premises and equipment and a shortage of staff. Capital as such is an area that could be addressed by further investment.

Asthana in the Select Committee Report on Health Care Deficits (House of Commons Health Committee, 2006) argued that basing resource allocation on current access is flawed. The baseline level of access she argued may be too high or too low originally for the disease pool it represents. Similarly, she claimed that there was an inverse relationship between deficits and high levels of deprivation. Asthana argued that the likelihood of deficits in affluent areas suggested that either wealthier groups use healthcare services more than is necessary, or that inadequate levels of funding are provided for these areas. Although some may argue that affluent areas tend to be in deficit, because wealthier people demand more healthcare services, Asthana found that the average service use in deprived areas is significantly greater than that in less deprived areas, for a range of measures.

Watt in his 2002 follow-up article (Watt, 2002) suggests that even if investment to less deprived practices increases, the problem itself may not diminish. He uses the analogy of a swimming pool. 'Family doctors in affluent areas are standing in the shallow end with their feet on the bottom, whereas those in deprived areas are treading water in the deep end, receiving deprivation payments for their trouble.' Hence they may indeed be receiving investment, but this investment is dwarfed by the underlying problem of the disease pool. Interestingly, Watt moves away from the traditional public health focus of concentrating on hard to evaluate or unevaluated interventions but instead argues for better targeted delivery of clinical interventions, with proven effectiveness. Such interventions, for example bariatric surgery, may not be sufficiently reflected by the achievement of QOF targets and subsequent payments.

Asthana argues that it cannot be assumed that increasing investment alone will improve outcomes, and that need is not merely related to deprivation, but to the age profile of the population (Asthana and Gibson, 2008). Ageing populations, even in affluent areas, may have poor access to care relative to need. Using the

same logic, old and ageing populations in deprived areas would suffer the most. Hence, the argument is that not only is outcome linked to deprivation but also to demography.

This limited evidence is supported by early findings from Ashworth (Ashworth *et al.*, 2007) and Sahota (Sahota *et al.*, 2008) in Walsall. The findings presented here and the work of Ashworth (Ashworth *et al.*, 2007) and Sahota (Sahota *et al.*, 2008) would suggest that there is not a simple relationship between the level of deprivation within a practice and the amount of investment it receives. It would appear that insufficient investment is detrimental to a practice achieving its QOF targets. This result is supported by the findings from Ashworth and Armstrong (Ashworth and Armstrong, 2006).

The evidence that high QOF payments or high investment payments bring about good patient outcomes is somewhat weak. It is supported in this work by the findings relating to CHD and diabetes and in terms of the reduced admissions to secondary care for COPD. The findings regarding COPD of practices receiving more QOF money per person, were also those with fewer emergency admissions for COPD, are consistent with the findings of Downing (Downing *et al.*, 2007). Downing also showed that fewer emergency admissions were related to achieving QOF targets in this area. This message is further echoed in Cooper's work on waiting lists (Cooper *et al.*, 2009) 'between 1997 and 2007, waiting times for elective knee replacements, hip replacements, and cataract repairs dropped significantly and equity, measured as the variation in waiting times according to socioeconomic status, improved.' This gives some degree of hope that government targets and incentives can move not only efficiency in the right direction but at the same time improve equity.

It can be argued that other factors such as practice size influence patient outcome more directly than QOF payments; however, a paper by Tahrani (Tahrani *et al.*, 2008) showed that the differences observed between patient outcome and practice size disappeared following the introduction of QOF. Morgan, in early work on practice payments (Morgan and Beerstecher, 2006), found that smaller investments per patient were related to better quality scores than higher investments per patient. This evidence would point to the importance of historical artefacts and the time they take to work through the system (Asthana, 2011).

The evidence in this work regarding the QOF and its link to outcome and investment is limited. This is in line with a thought piece produced by Gillam (Gillam and Steel, 2013). He questions whether QOF payments produce better outcomes or better recording. Better outcomes he indicates may still not be achieved by practices because of factors beyond the control of the QOF, such as access to services. Others argue that the evidence in favour of the QOF is limited. Sohhet (Shohet *et al.*, 2007) shows a modest rise in cost effectiveness and a fall in mortality and hospital admissions as a result of the QOF, Fleetcroft (Fleetcroft *et al.*, 2010) models the gains and shows evidence that they only occur in the first year of QOF and not subsequent years. Dusheiko (Dusheiko *et al.*, 2011) found that better primary care management (as measured by QOF) was associated with reduced hospital costs for only one of 10 chronic diseases studied - stroke. By contrast, we found no association between emergency secondary care spending and stroke, the percentage of people with BP 150/90 or below. Walker (Walker *et al.*, 2010) shows that although some QOF

payments are cost effective, there is no relationship between the size of payment and the size of the health gain. In short, as to whether the QOF has improved, the population health Gillam (Gillam and Steel, 2013) concludes 'we don't know,' and recommends that the proportion of GP income commanded by the QOF be reduced.

Throughout the last decades of health service policy, there has been a growing tension between equity and efficiency. Sassi and Le Grand (Sassi and Le Grand, 2001) argued that there was a 'failure to strike an acceptable balance between the policy goals of equity and efficiency when these conflict.' It could be argued that the policies examined here focus on efficiency, whilst forgetting the underlying problem that equity and deprivation can play in the ability to achieve the goal of efficiency, or indeed the CCGs desire to pursue the goal of efficiency over equity. Oliver (Oliver *et al.*, 2002) in a comment in *The Lancet* argues that it is not only national policy that is important in addressing inequality but that local policy must also play a role. This paper illustrates the use of national policy whilst allowing for local policy adjustments in investment. The effects however of both policies appeared to be somewhat random and inconsistent.

The results showed that high spending in one area, for example, pharmacy, tended to be associated with high spending in another area such as elective care. Other than in COPD, no evidence could be found that high primary care spending resulted in less emergency care spending. This relationship requires further investigation. It implies that potentially where low spending occurs in primary care, then demand for emergency care is also low, a substitution relationship is therefore not present but the services are instead complementary. Where for example people utilise considerable primary care resources, the implication is again spend on pharmacy and emergency care is also high, again implying a complementary relationship between pharmaceutical care, primary care, secondary care and emergency care. Others have also found this complementary relationship. In a study of five developed countries (including the UK and USA), Wilton (Wilton and Smith, 2002) found that growth in expenditure per capita on community physician services was significantly positively correlated with growth in expenditure per capita on inpatient care. This is also consistent with work on areas of high utilisation and where patients frequently attend for care. Heywood (Heywood *et al.*, 1998) found that the top 3% of frequent attenders consume five times as many prescriptions and hospital contacts compared with less frequent attenders. This would be consistent with the assertion that high consumption in one area, is accompanied by high consumption in another area, in this case of medical goods and services.

The data presented here showed that there is wide variation in terms of practice spend and outcome. This finding is supported in the work of Wennberg (Wennberg, 2011), who reported widespread variation between practices. It would seem that the variation could as likely be an artefact of historical spending and individual practice characteristics as of any patient level characteristics. Gray in the NHS Atlas of Variation (Gray and Da Silva, 2010) argues that it is imperative that such unnecessary variation be tackled.

A limitation of this work is that only cross-sectional data were analysed. With data collected at one point in time, it is not possible to draw inferences on causality and determine if an association is found between two variables—which is the cause and

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published by John Wiley & Sons, Ltd.   *Int J Health Plann Mgmt* 2014; **29**: 244–259.

which is the effect. Time series data would have enabled us to look at whether trends were changing over time, and whether for example the influence of historical payments was reducing over time or not.

Although the new GMS contract of 2004 was supposed to improve local resource allocation, it would seem from evidence presented here that there is not a direct link between the local allocation of resources, investment and outcome. This situation could be made worse by the advent of CCGs. The population served by a CCGs, is much smaller than a PCT and may be small enough to bring about financial instability (Asthana and Gibson, 2011) as population numbers in a CCG are not large enough to enable the risk pooling required to allow such a system to operate efficiently (Asthana *et al.*, 2011). The analysis by Rhys (Rhys *et al.*, 2010) suggested that changes to the resource allocation system did not improve equitable monetary allocation for equal need; he further highlighted that current funding depends more on historical funding patterns than specific changes to the capitation formula. Rhys argued that a needs-based formula is preferable over Carr-Hill's utilisation-based formula. Determining how to allocate healthcare resources is a problem that is not going away. The NHS Commissioning Board has for now rejected the introduction of the new allocation formula designed and commissioned from the Nuffield Trust that shows accurate person-based data in predicting costs (Lacobucci, 2012). The issue seems to be that equity and need may suffer. Ironically, this effects either end of the spectrum—the wealthy that does not access health services because of private care and the poorer groups who delay. It could be argued that such concerns are mirrored by the findings of this paper.

Buyx (Buyx *et al.*, 2011) suggests an alternative to the current allocation and recording system by maintaining that it is not rationing by cost effectiveness that should be the driver, but clinical effectiveness, at the same time excluding those procedures that yield minimal effective care, perhaps as such reducing variation, tackling efficiency rather than equality. However, in the work presented here, there are only weak positive relationships between QOF payments and outcomes, which would lessen the argument for allocation by effectiveness alone.

Hawkes (Hawkes, 2009) commenting on the proposed changes from the Advisory Committee on Resource Allocation (ACRA), using work from Brunel University reported that it is impossible to combine need and inequality. The new resource allocation formula is to be used in parallel with a separate formula for health inequalities using disability adjusted life years. Although the north of the country gained from this complex model, the model he reported may be flawed in that the weight attached to inequality is set by politicians and the rate of moving to the need and equality target is undetermined. Hawkes is clear however that resource allocation is a jungle 'man-eating statisticians, steeped in the lore of the jungle and ready to pounce at the sound of a breaking twig. Wizards uttering incantations dance around a cooking pot stocked with tasty data, brewing up heaven knows what. The light is dim, and understanding is even dimmer.' (Hawkes, 2009).

There are indications that there is a growing desire to allocate resources systematically in a data-driven environment (Smith, 2008), and credible progress has been made in the use of data and funding formulae. Better local knowledge

and targeting lead to greater efficiency in the management of resources and reduction in inequalities (Pavolini and Vicarelli, 2012). The appropriate use of data is something that would be echoed in the works of this paper and the recognition that not only do different localities require different treatment in resource allocation, but also do different wards within those localities. The importance of managing decentralised systems is one that is as important for less-developed countries as the developed world in terms of national growth and a fair political regime.

CONCLUSIONS

The key message from this work is that the findings of the analysis did not support the commonly held beliefs. The analysis presented suggests that investment in primary care and practice spend is not closely related to the outcomes of the service provided or any of the practice characteristics explored. Investment appears to relate most closely to historical payments. A key message to PCTs and commissioning bodies may be that financial spending on primary care alone does not improve patient outcomes. The picture here presented is a useful starting point for commissioners to undertake further analysis and highlights some potentially fruitful avenues for further research. Any commissioner wishing to understand its investment budget and how this relates to patient outcome would be well advised to take the first exploratory steps towards understanding their spending, leastwise not to make non-evidence-based assumptions around spending and outcome but to examine the real outcomes in practice. It is likely that financial incentives need to relate more closely to individual practice characteristics and patterns of behaviour. Gray (Gray and Da Silva, 2010) stresses that awareness is the first step towards addressing variations in practice; the work presented here echoes such sentiments and exhorts PCTs and their successors to determine where variation lies without making assumptions around its cause and the policy solutions. Health systems (Rechel and McKee, 2009) need to respond to the needs of their populations.

ACKNOWLEDGEMENTS

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