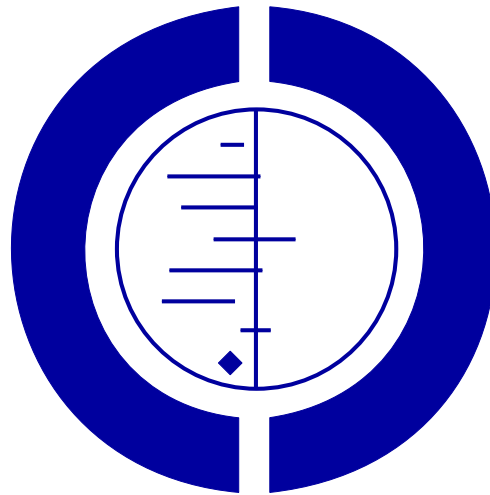


# Capitation, salary, fee-for-service and mixed systems of payment: effects on the behaviour of primary care physicians (Review)

Gosden T, Forland F, Kristiansen IS, Sutton M, Leese B, Giuffrida A, Sergison M, Pedersen L



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## ABSTRACT

### Background

It is widely believed that the method of payment of physicians may affect their clinical behaviour. Although payment systems may be used to achieve policy objectives (e.g. cost containment or improved quality of care), little is known about the effects of different payment systems in achieving these objectives.

### Objectives

To evaluate the impact of different methods of payment (capitation, salary, fee for service and mixed systems of payment) on the clinical behaviour of primary care physicians (PCPs).

### Search strategy

We searched the Cochrane Effective Practice and Organisation of Care Group specialised register; the Cochrane Controlled Trials Register; MEDLINE (1966 to October 1997); BIDS EMBASE (1980 to October 1997); BIDS ISI (1981 to October 1997); EconLit (1969 to October 1997); HealthStar (1975 to October 1997) Helmis (1984 to October 1997); health economics discussion paper series of the Universities of York, Aberdeen, Sheffield, Bristol, Brunel, and McMaster; Swedish Institute of Health Economics; RAND corporation; and reference lists of articles.

### Selection criteria

Randomised trials, controlled before and after studies and interrupted time series analyses of interventions comparing the impact of capitation, salary, fee for service (FFS) and mixed systems of payment on primary care physician satisfaction with working environment; cost and quantity of care; type and pattern of care; equity of care; and patient health status and satisfaction.

### Data collection and analysis

Two reviewers independently extracted data and assessed study quality.

### Main results

Four studies were included involving 640 primary care physicians and more than 6400 patients. There was considerable variation in study setting and the range of outcomes measured. FFS resulted in more primary care visits/contacts, visits to specialists and diagnostic and curative services but fewer hospital referrals and repeat prescriptions compared with capitation. Compliance with a recommended number of visits was higher under FFS compared with capitation payment. FFS resulted in more patient visits, greater continuity of care, higher compliance with a recommended number of visits, but patients were less satisfied with access to their physician compared with salaried payment.

### Authors' conclusions

It is noteworthy that so few studies met the inclusion criteria. There is some evidence to suggest that the method of payment of primary care physicians affects their behaviour, but the findings' generalisability is unknown. More evaluations of the effect of payment systems on PCP behaviour are needed, especially in terms of the relative impact of salary versus capitation payments.

## PLAIN LANGUAGE SUMMARY

Some evidence to suggest that the way in which primary care physicians are paid may affect their clinical behaviour

This review examined the impact of different payment systems on primary care physician behaviour. Three payment systems were included: capitation (payment is made for every patient for whom care is provided), salary, and fee for service (payment is made for every item of care provided). There was some evidence that primary care physicians provide a greater quantity of primary care services under fee for service payment compared with capitation and salary, although long-term effects are unclear. There was no evidence, however, concerning other important outcomes such as patient health status, or comparing the relative impact of salary versus capitation payment.

## BACKGROUND

It is widely believed that the method by which physicians are paid may affect their clinical and professional behaviour (Donaldson 1989). Payment systems have been manipulated in an attempt to achieve policy objectives such as improving quality of care, cost containment and recruitment to under-served areas. Little is known about the effects of the different types of payment system within primary care on these objectives (Scott 1995). It has been hypothesised, for example, that capitation payment reduces costs but also lowers quality of care compared with fee-for-service (FFS) and that a payment system that breaks the link between output and payment, such as salary, may be more efficient than performance related methods of remuneration (Gosden 1999).

The main categories of payment systems used to remunerate primary care physicians (PCPs) are salary, capitation and fee-for-service. Most countries have mixed systems of physician payment. A survey carried out in 1992 in the United States showed that 23 per cent of health plans paid their PCPs by salary, 35 per cent by capitation and 36 per cent by FFS (Hillman 1992). In Denmark, and the Netherlands PCP (general practitioners) income is derived from a mixture of capitation and FFS payments. In the UK and Norway, all three types of payment are used. This variability in the use of PCP payment systems may be due to differences between governments in their health care objectives, the structure and organisation of their health care sectors and the culture of the respective medical professions. It may also reflect the lack of consensus as to which type of payment system has the most favourable impact on PCP behaviour.

Under salary systems, PCPs are paid an annual salary usually to work a set number of hours per week per year. Capitation systems, on the other hand, pay PCPs an amount per patient registered with them or in their care. Under capitation and salary payment, the

PCP knows in advance the amount of payment they will receive before any care is provided. This is known as prospective payment and may encourage PCPs to contain costs. Under FFS payment, the PCP is reimbursed for each item of service provided (the fee often depends on the type of service) and occurs after care has been provided. Therefore, depending on the level of the fee, there is the incentive to deliver more care in order to inflate income. This can lead to supplier induced demand (SID) (Evans 1974) where the patient receives more care than they would have chosen if they had the required knowledge.

Although capitation and salaried payment are both prospective, they differ in the unit of payment; so the incentives that they provide are different. Salaried payment may not encourage any particular level of care to be provided. Capitation payment may encourage PCPs to hold larger patient list sizes, to increase income, which may result in a higher workload and shorter consultations. (Throughout the paper the term 'consultation' is used to refer to any physician-patient interaction.) Indeed, under a capitation system PCPs may try to attract patients to their practice by creating reputations for a higher quality of, or access to, care.

Generally, where physicians respond to these incentives salaried and capitation payments may encourage cost containment behaviour and result in under-treatment whereas FFS may encourage over-treatment (Woodward 1984). The theoretical impact of these payment systems on patient health status is not clear since under-treatment may be as detrimental to patient health as over-treatment.

Each type of payment system may result in different patterns and types of care as well as quantity. Under capitation payments there is the incentive to provide preventive care that reduces future costs, such as health promotion advice (Shimmura 1988). Salaried and capitation payment may encourage PCPs to refer or prescribe more

in order to contain costs (Maynard 1986). These changes may result in differential access for population sub-groups. For example, capitation systems may encourage PCPs to reduce access to patients with high levels of need in order to stay within the capitated amount per patient. This is a theoretical concept known as cream-skimming (Matsaganis 1994).

Payment systems may also influence job choice decisions and therefore the recruitment and retention of PCPs. For example, the variability of income under salary payments is likely to be lower than under capitation and FFS. In areas where income is expected to vary greatly, PCPs may be more likely to accept employment in salaried posts in under-served areas, since salary payment offers a fixed income and hence more financial security. Payment systems may also have different administration costs. FFS systems might require the most administration since claims have to be made for each item of service, whereas under capitation systems the physician claims a payment for each patient. Salary payment is perhaps administratively the most simple (Rosen 1989).

## OBJECTIVES

The purpose of this review is to evaluate the impact of different methods of payment to PCPs on: satisfaction with their working environment; the cost, quantity, type and pattern of care they provide; equity of care; and the overall quality of care in terms of patient health status and satisfaction.

## CRITERIA FOR CONSIDERING STUDIES FOR THIS REVIEW

### Types of studies

Study designs that meet Effective Practice and Organisation of Care Group criteria:

Randomised controlled trials (where PCPs are the unit of allocation) (RCTs);

Interrupted time series (ITS);

Controlled before-and-after studies (CBAs).

### Types of participants

Primary Care Physicians (PCPs) are medically qualified physicians who provide primary health care. Primary health care provides integrated, easy to access, health care services by clinicians who are accountable for addressing a large majority of personal health care needs, developing a sustained and continuous relationship with patients, and practising in the context of family and community (Vanselow 1995). Primary care physicians include general practitioners, family doctors, family physicians, family practitioners and other physicians working in primary health care settings who fulfil primary health care tasks.

### Types of intervention

The method of remuneration was defined as payment which directly determines or influences the personal income of the PCP. This review considered three types of payments and combinations of these:

Salary: where a lump sum payment is made to the PCP for a set number of working hours or sessions per week.

Capitation: where a payment is made to a PCP for every patient for whom they provide care.

Fee-for-service (FFS): where payment is made to a PCP for every item of service or unit of care that they provide. Target payments (which could be classified as FFS payment) are excluded from this review. This is because they are an unusual variety of FFS since the unit of payment is a block or target level of services. As such they are considered in a separate review (Giuffrida 2000).

The scope of the review was limited to the consideration of studies examining the effect of changes in systems of payment rather than levels. This reduces the number of confounding factors and helps to clarify cause and effect. Studies of fundholding in the UK and evaluations of organisation level payment systems in US managed care organisations (HMOs) (Miller 1994; Hillman 1992) were excluded from the review since the payments made to PCPs do not affect PCP personal income directly. Studies where it was not clear what type of PCP payment system was being evaluated were excluded.

### Types of outcome measures

It was anticipated that the studies included in this review would report a wide variety of outcome measures. Studies were included only if they reported objective measures of: health professional outcomes; health professional process; health services utilisation; health care costs; and patient outcomes. An additional necessary condition for inclusion was the presence of relevant and interpretable data. Furthermore, subjective outcomes were considered for inclusion in the review only if they were measured using standardised validated instruments.

## SEARCH METHODS FOR IDENTIFICATION OF STUDIES

See: Effective Practice and Organisation of Care Group methods used in reviews.

See: Collaborative Review Group search strategy

### 1. Electronic bibliographic databases

A search strategy was designed to locate relevant studies of the interventions of interest in this review, and another Cochrane review on target payments (Giuffrida 2000).

The following databases were searched:

BIDS Embase (1980 - October 1997)

BIDS ISI Social Science Citation Index (1981 - October 1997)  
ECONLIT (1969 - October 1997)  
Health Star (1975 - October 1997)  
HELMIS (1984 - October 1997)  
EPOC register (see SPECIALISED REGISTER under GROUP DETAILS)  
Cochrane Controlled Trials Register (CCTR)

Free text searches were carried out on the databases listed using the following terms (\* indicates wild card symbol): *salar\** or *fee\** or *capita\** or *reimburse\** or *payment* or *remunerat\** or *incentive\** or *financial*.

This search was run in conjunction with the following: *general practitioner\** or *family physician\** or *family practic\** or *general practice* or *gp* or *primary care* or *primary health care* or *primary care physician*.

MEDLINE (1966 - October 1997);  
This database was searched using the following MESH terms:  
"REIMBURSEMENT MECHANISMS" or  
"REIMBURSEMENT, INCENTIVE" or  
"FEES AND CHARGES" or "FEES, MEDICAL" or  
"INCOME" or "CAPITATION FEE" or "PHYSICIAN INCENTIVE PLANS" or "PRIVATE PRACTICE" or  
"PROSPECTIVE PAYMENT SYSTEM\*" or "PROSPECTIVE PAYMENT SYSTEM\* --ECONOMICS --EC" or "SALARIES AND FRINGE BENEFITS" or "PHYSICIAN'S PRACTICE PATTERNS"

With:  
"FAMILY PRACTICE" or "PHYSICIANS, FAMILY"

References already held by two of the reviewers (TG, FF), in personal bibliographic databases were also considered for inclusion in the review. Relevant studies were also identified by searching health economics discussion paper series of the following: the Universities of York, Aberdeen, Sheffield, Bristol, Brunel, McMaster; the Swedish Institute of Health Economics; and the RAND corporation.

#### 2. Other sources

The reference lists of located papers were scanned for studies of payment systems and relevant articles retrieved.

#### 3. Updating the review

Hand searching of journals will be considered when updating the review.

## METHODS OF THE REVIEW

### Selection of the studies:

Two reviewers independently assessed the list of studies identified by the searches, to identify relevant studies. Two reviewers independently read each relevant publication and selected studies

for review according to the inclusion criteria specified in the protocol. Any discrepancies were resolved by discussion between the reviewers.

### Quality assessment:

The quality of eligible studies was assessed independently by two reviewers using the criteria described by the EPOC group (see ADDITIONAL INFORMATION, ASSESSMENT OF METHODOLOGICAL QUALITY under GROUP DETAILS).

### Data collection:

Data extraction was completed by two reviewers independently using a checklist developed by EPOC modified for the purposes of this review (see ADDITIONAL INFORMATION, ASSESSMENT OF METHODOLOGICAL QUALITY under GROUP DETAILS).

### Analysis:

Study results were grouped according to type of intervention and the outcomes measured. If there were data missing from a study this was explicitly stated. Where possible, the absolute changes and relative percent changes in outcomes attributable to the intervention were calculated. Study results were not statistically pooled as there was heterogeneity in the content, design and outcomes of the included studies and there were only four studies. Conclusions were drawn on the basis of methodological quality, transferability and results of the studies.

## DESCRIPTION OF STUDIES

Electronic searching yielded a total of 5381 references and a further 118 references were identified from personal collections by two of the reviewers (TG, FF). There were 271 papers that were considered to merit scrutiny of the full article and a further 61 relevant studies were identified from the reference lists of papers. Among the 332 articles reviewed, eight papers met all the inclusion criteria for the review. Two papers related to one study (Hutchison 1996), two to another (Davidson 1992) and three papers were reports of another study (Krasnik 1990), so in total, four suitable studies were identified.

Two of the included studies are randomised controlled trials (Hickson 1987; Davidson 1992) and two are before and after designs controlled by a separate site (Krasnik 1990; Hutchison 1996). For details of each included study see TABLE: CHARACTERISTICS OF INCLUDED STUDIES.

Fourteen papers reported the findings of 12 studies which were within the scope of the review but did not satisfy the minimum methodological inclusion criteria for CBA and ITS designs (see CHARACTERISTICS OF EXCLUDED STUDIES). One ongoing study of relevance was identified and contact has been made with the authors to establish when the results will be available (Hutchison).

Characteristics of the interventions:

The column labelled 'Interventions' indicates the intervention payment method evaluated in each study. Two studies compared capitation and FFS payment. In the Davidson study PCPs paid by age-adjusted capitation rates were compared with two groups of FFS PCPs: one paid at the normal Medicaid fee rates and the new group who were paid higher fees (Davidson 1992). Capitation PCPs put aside \$25 a month to fund the cost of care not provided directly by themselves. If this budget was in surplus then the PCP received a 40 per cent bonus but if it was in deficit then they were liable up to the amount of \$2000 per child and 25 per cent of the total budget.

The Krasnik study compared the impact of introducing fees in a capitation system with a control group of PCPs already paid by capitation / FFS (Krasnik 1990). This study compared the number of primary care services provided and hospital referrals made by 100 PCPs selected at random from those already paid by capitation in Copenhagen city over a one week period at six months before their payment method changed to a mixed FFS / capitation system and six and 12 months after. This group was matched with 326 PCPs in Copenhagen county whose payment system was mixed FFS/capitation throughout the study.

Only one study compared PCP behaviour under salary and FFS payment systems (Hickson 1987). This study compared nine PCPs randomised to the salary (intervention) group and nine to the FFS control group.

Only one study compared a mixed capitation system with FFS. The Hutchison study compared the change from FFS to a mixed system of capitation and an ambulatory care incentive (Hutchison 1996). PCPs in the control group were paid by FFS. The Ambulatory Care Incentive Plan (ACIP) provided a financial bonus to the capitation payment programme when their rates of hospitalisation were below that of the average regional rate.

Characteristics of target populations (PCPs):

The included studies involved PCPs from the United States (Davidson 1992; Hickson 1987), Denmark (Krasnik 1990) and Canada (Hutchison 1996). The PCPs studied were resident paediatricians (Hickson 1987), general practitioners (Krasnik 1990), "primary care physicians" (Davidson 1992) and family physicians or general practitioners (Hutchison 1996). PCP characteristics (age, gender, career interest and time since graduation) were reported in only two studies (Hickson 1987; Hutchison 1996).

The PCPs involved in the studies were mostly volunteers. In the Hutchison study the sampling frame was those PCPs who joined the health service organisation between certain dates, whereas in the Hickson study it was PCPs in a university-based continuity clinic, and in the Davidson study those participating in the Children's Medical Program (CMP). Another study sampled PCPs depending on whether they practised inside or outside of the city of Copenhagen (Krasnik 1990).

Characteristics of participating patients:

Two studies examined the care provided by PCPs to children (Davidson 1992; Hickson 1987). The two other studies examined care to the general population registered to the PCP. Information on patient age was reported in two studies (Hickson 1987; Hutchison 1996). Only one study reported information on the gender of patients and the percentage of patients receiving social assistance and those who were regular users (Hutchison 1996). The Hickson study reported the patient's mother's age; the number of other children in the family; and the percentage of families with a father present in the home (Hickson 1987).

The method of recruiting patients was stated in two of the studies (Hickson 1987; Davidson 1992). One of these studies targeted patients for recruitment according to the date on which families of dependent children applied for recertification for aid (AFDC) at social centres (Davidson 1992). These patients were then approached for participation in the health programme that formed the sample for the study. In the second study (Hickson 1987), the participating PCPs recruited patients from their inpatient, emergency room, walk-in clinics or patients were assigned appointments by the clinic secretary.

## METHODOLOGICAL QUALITY

The methodological characteristics of each study are shown in TABLE: CHARACTERISTICS OF INCLUDED STUDIES.

Both RCTs had some risk of bias. Only one of the RCTs adequately concealed allocation (Hickson 1987); however, the remaining trial is likely to have used a centralised randomisation system. Rate of follow up of PCPs was not clear in either RCT. Rates of follow up of patients were only done in one RCT and the characteristics of participating and non-participating patients analysed (Davidson 1992). Blinding of the assessment of outcomes was not clear in either RCT. Indeed, in the Davidson study capitated PCPs self-reported the number of visits, making detection bias a distinct possibility. The authors estimated that these PCPs under-reported visits by 10 per cent. Only one of the RCTs tested for differences at baseline in outcomes between study and control groups and found they existed and the results were adjusted as a result (Davidson 1992). In neither RCT was it clear whether outcomes were reliably measured.

The risk of contamination is increased where PCPs are randomised within the same clinic. In the Hickson study, all 18 participating PCPs were in the same clinic, where peer review or other professional pressures may dilute the influence of payment systems. Since it was not clear whether or not PCPs were in separate practices in the second trial, the risk was scored as not clear (Davidson 1992). It was not clear in one of the RCTs how many PCPs were in each arm of the trial (Davidson 1992) whereas the other RCT was small, involving nine PCPs in each arm (Hickson 1987). Al-

though no power calculations were reported in either study, the Hickson trial did report statistically significant findings.

In each RCT the number of patients being treated by PCPs paid by different systems varied from 764 to 1991 in any one trial arm. Unit of analysis error was present in one of the trials (Davidson 1992) i.e. the PCPs were the units of randomisation but the patients were the units of analysis. This might lead to misleadingly small confidence intervals (type I error).

In both RCTs, the level of remuneration was set so that post intervention income would be the same in both payment groups if the same quantity of care were provided. This aspect of the design isolates the impact of payment type from the level of payment.

Two of the studies were before and after studies controlled by separate sites (Krasnik 1990; Hutchison 1996). The quality of these studies was assessed using different criteria to that for RCTs. In the Hutchison study PCPs in the control group were similar in their characteristics to those in the intervention group. In the Krasnik study it was not clear whether there were differences between PCPs in the intervention and control groups since only two PCP characteristics were analysed. It is likely that the two groups of PCPs were different given that the intervention group was recruited from Copenhagen city whereas the control group was recruited from PCPs outside of the city. It is unclear whether the unit of analysis was the same as the unit of allocation in both of these studies, therefore unit of analysis error could exist. Both studies calculated utilisation rates per 1000 patients but the unit of allocation was the PCP. In the Krasnik study the unit of analysis used in the calculation of utilisation rates in the intervention study was the PCP but the data for the control were in an aggregated form at region/county level. Only high rates of follow up of PCPs and blinded assessment of outcomes were done in the Hutchison study. In the Krasnik study the intervention group PCPs self-reported information on quantity of care outcomes, increasing the risk of detection bias. Baseline measurements were carried out in the Hutchison study and no differences found. In the Krasnik study utilisation rates were calculated in the form of an index with baseline levels of utilisation transformed to 100. Only the Hutchison study had reliable outcomes. There was protection against contamination, since the intervention and control PCPs in the Krasnik study were in separate geographical areas, and in the Hutchison study were in separate organisations.

## RESULTS

As described under 'Characteristics of intervention' above, FFS was the control group payment system in three of the four included studies. In the remaining study a mixed FFS/capitation system formed the comparator (Krasnik 1990). The interventions in the four studies were: mixed capitation systems; salary payment; and FFS. Since each of these intervention payment systems differ, the study results are grouped under three comparisons:

01.00.00 Comparison 1: Capitation payment versus FFS (2 studies)

01.01.00 Primary care physician visits/contacts

The Davidson study showed that, after adjustment for underreporting and controlling for patient demographic characteristics and baseline differences in utilisation, the number of primary care visits remained at the same level before and after the interventions were introduced (Davidson 1992). In the Medicaid comparison group and in the group of patients who refused to participate in the study the number of visits actually fell over this period. Differences in means between groups were not tested for statistical significance. Controlling for patient age, gender, month of enrolment and prior utilisation using regression analysis, capitation children had 0.5 to 0.6 more primary care visits per year and the new FFS group had 0.8 to 0.9 more visits compared with the comparison group.

The Krasnik study showed that the number of patient contacts (both face to face and telephone) carried out by capitation PCPs had increased six months after the payment change (Krasnik 1990). Twelve months after the intervention there were no differences between the study and control groups in the number of face to face contacts. The number of telephone consultations in the intervention group was higher than the baseline and the control group to a statistically significant level at six months and even after 12 months.

01.02.00 Prescriptions

In the Krasnik study the number of prescription renewals fell six months after their payment system changed to FFS/capitation. The quantity of prescription renewals made by PCPs in the intervention group was lower than the control group in both 'after' periods, but it was only after 12 months that these differences were statistically significant.

01.03.00 Diagnostic and curative services

In the Krasnik study the number of diagnostic and curative services provided by capitated PCPs, increased six months after the payment change. The number of diagnostic and curative services in the intervention group was higher than the baseline level and the control group to a statistically significant level even after 12 months.

01.04.00 Referrals to specialists and hospitals

In the Davidson study the number of non-primary care physician (specialist) visits increased for all study groups except in the capitation group where they decreased by eight per cent. Differences in means between groups were not tested for statistical significance. However, regression analysis showed that capitation children had significantly fewer of this type of visit per year compared with the comparison group. The new FFS group did not differ from the comparison group in the number of specialist visits.



In the Krasnik study the number of referrals to specialists and hospitals (which were not paid for by fees) fell after the change in payment system. Apart from a slight rise in referrals to hospital six months after the intervention, these outcomes also decreased in the control group. However, whilst the relative difference between the two study groups in referrals to both specialists and hospitals was not statistically significant six months after the intervention, the outcomes were significantly lower in the intervention group after 12 months.

#### 01.05.00 Health and emergency department visits

In the Davidson study the number of visits to the health and emergency departments increased more in the capitation and new FFS groups (+38 per cent) compared with the old FFS (+22 per cent) and the refusal group (+2 per cent). Differences in means between groups were not tested for statistical significance. However, regression analysis showed that the number of these visits was significantly lower in the capitation and new FFS group compared with the comparison group but there were no differences over time between these groups.

#### 01.06.00 Hospitalisations

In the Davidson study the number of hospitalisations decreased most in the capitation group (-54.7 per cent) and the least in the comparison (-36.1 per cent) and refusal (-30.6 per cent) groups. Differences in means between groups were not tested for statistical significance. However, regression analysis showed that the number of hospitalisations was significantly lower in the capitation and new FFS group compared with the comparison group but there were no differences over time between these groups.

#### 01.07.00 Compliance with guidelines on number of patient visits

In the Davidson study the percentage compliance with the New York Child Health Assurance Program (CHAP) guidelines for the recommended number of office-based and hospital clinic visits in the capitation group was lower than in the FFS group (ranging from eight to 12 percentage points difference across all age groups). Tests for statistical significance were not undertaken on these differences.

The authors adjusted the results for differences at baseline in the number of visits and the proportion of ethnic minority children in each group, using logistic regression. The results of the regression indicate that children of all ages were more likely to receive the guideline number of visits to office-based PCPs if the payment was FFS rather than the comparison group payment. In the capitation group it was only children aged over two years who were more likely to receive the recommended number of visits compared with the comparison group. Children aged between 13 and 24 months and between three and five years in the FFS group were more likely than those in the comparison group to reach the guideline number of both office-based and hospital clinic visits.

#### 01.08.00 Expenditure/costs

In the Davidson study the net expenditure per year of eligibility were \$56 higher for the new FFS group and \$76 higher for the capitation group than they would have been under the comparison group. These were calculated using estimates obtained from the regression results.

#### 02.00.00 Comparison 2: Salary payment versus FFS (1 study)

##### 02.01.00 Patient visits

In the Hickson study there were no statistically significant differences between salaried and FFS PCPs in the average number of patient visits attended per PCP, average number of sick-primary, and sick-follow up visits per patient per PCP (Hickson 1987). The average number of emergency visits per patient per PCP (a relative difference of 83.3 per cent) was significantly higher in salaried compared with FFS PCPs. Salaried PCPs carried out fewer scheduled and well child visits per enrolled patient per PCP on average compared with FFS PCPs and these differences were statistically significant.

##### 02.02.00 Number of patients enrolled

In the Hickson study the average number of patients enrolled per PCP (27 per cent relative difference) was significantly higher in salaried compared with FFS PCPs.

##### 02.03.00 Continuity of care

In the Hickson study salaried PCPs attended a lower percentage of visits to their own patients (a measure of continuity of care) compared with FFS PCPs and this was statistically significant.

##### 02.04.00 Compliance with guidelines on the number of patient visits

In the Hickson study a randomly selected sample of medical records was analysed to determine whether well-child visits were consistent with American Academy of Pediatrics' guidelines. The percentage of recommended visits missed was significantly higher in the group of salaried PCPs compared with FFS PCPs. It was not clear whether these visits were missed because the PCP had not scheduled the visit or whether the patient did not attend. Salaried PCPs had a lower percentage of visits in excess of a recommended number compared with FFS PCPs.

##### 02.05.00 Patient satisfaction

In the Hickson study differences between salaried and FFS PCPs in four dimensions of patient satisfaction (see Results table) were tested but only the access to PCP was statistically significant. This was rated as higher for salaried PCPs.

- Comparisons for which no studies were found:

Capitation versus salary

- Other comparisons for which data were found:

##### 03.00.00 Comparison 3: Mixed capitation systems versus FFS (1 study)

### 01.01.00 Hospital utilisation

The Hutchison study showed that hospital admissions ('separations') and hospital days per 1000 patients were significantly lower than baseline in both the intervention and control groups three years after the PCPs in the intervention group changed to capitation payment (Hutchison 1996). However the absolute difference between the two study groups for both of these outcomes was not statistically significant.

## DISCUSSION

Perhaps the most important finding of this review is the small number of studies that met the EPOC inclusion criteria. Only two RCTs and two controlled before and after studies were found. It is not surprising that the number of relevant publications identified and subsequently excluded was large since a broad search strategy was used. However, of the 332 articles that were reviewed a relatively large number of observational study designs were excluded. This suggests that this particular area of research has received a high level of attention but that there might be barriers to using 'robust' experimental study designs. For example, the use of experimental designs such as RCTs in this particular field of research may be restricted for political reasons. Also changes in PCP payment systems are often implemented suddenly, which prevents the use of controlled before and after designs and interrupted time series studies.

Bearing in mind the small number of studies, the methodological quality of the studies included in this review was highly variable. The included studies were limited in the range of outcomes and the payment systems they compared. None of the studies examined professional satisfaction with working environment, patient health status or equity outcomes. There were also no studies comparing capitation with salary payment that met our inclusion criteria. This represents a significant gap in knowledge about the impact of PCP payment systems.

The purpose of this review was to find evidence on five categories of outcomes. The first category was the impact of payment systems on PCP job satisfaction. However, none of the studies that fitted the inclusion criteria examined this outcome.

The second issue addressed by this review was whether the quantity and cost of secondary care referred services and primary care services was lowest in salaried and capitation systems and highest in a FFS system. In the Krasnik study referrals to specialists and hospitals decreased although the remuneration for such services remained capitation payment throughout the study (Krasnik 1990). Despite incentives to do so, FFS PCPs in the Canadian study whose payment changed to a capitation/bonus payment system, did not lower hospitalisation rates (Hutchison 1996).

The Davidson study found that the number of primary care and specialist visits in the new FFS group was greater than the num-

ber provided by capitation doctors (Davidson 1992). This provides evidence that capitation doctors may constrain the quantity of services provided in order to minimise costs to keep within the monthly capitated amount. (Since this review is concerned with changes in the type rather than the level of fees we have focused on the comparison between the two intervention groups.) The number of health and emergency department visits was the same in both the capitation and new FFS groups. Capitation PCPs probably have the least influence over this type of care or perhaps these visits were being used as substitutes for primary care visits. The number of hospitalisations was lower in the capitation group compared with the new FFS group, as might be expected, since capitated PCPs would have the incentive to minimise these costs. Despite some evidence of lower utilisation under capitation payment, health care expenditure was higher compared with the new FFS group.

The Davidson study also found that the percentage of patients receiving a number of visits from their PCP (either in the hospital clinic or office setting) exceeding the number recommended in CHAP guidelines was lower for those treated by capitation PCPs compared with FFS PCPs (Davidson 1992). However, statistical tests were not carried out. These results need to be interpreted cautiously as it was not clear whether randomisation was successful, as PCP characteristics were not reported, and there was unit of analysis error.

The Krasnik study found that the increase in the number of face-to-face and telephone consultations and the quantity of curative and diagnostic services was higher in PCPs after their remuneration changed from capitation to mixed capitation/FFS, compared with those already paid by capitation/FFS (Krasnik 1990). Similarly the fall in prescription renewals and referrals to specialists and hospitals was larger amongst the intervention rather than control group. The drop in referrals was unexpected because fees were not introduced to pay for them so their payment did not change from capitation. There may be a substitution effect here with services linked to fees being used as substitutes to those services being reimbursed under capitation. In this way PCPs can increase income from fees whilst minimising costs and therefore profits from capitation payments. The fall in prescription renewals was also a surprise since fees were introduced for them and this should encourage an increase rather than a decrease, which reduces income. This may be evidence that either PCPs do not respond to financial incentives or that the level of the fee was not sufficient to encourage such behaviour. These results are interesting as the differences in the rates of change in some of the outcomes, between the intervention and control groups, only became statistically significant in the second post intervention period, when both the intervention and control groups were paid in the same way. It would have been expected that the relative changes in the 'before' period, when the intervention group is paid by capitation, would be eliminated and the changes in the outcomes to be equal in both intervention and control group, when the type of remuneration is the same. It would

have been interesting to test the stability of the outcomes using a longer follow up period, to see if the rate of change eventually converged in both groups. PCP and patient characteristics were not reported in this study, so it was not clear whether the PCPs or patients in the intervention and control groups differed in any important way, which might explain the differences in their behaviour. Also, the authors did not test for the impact of baseline differences in outcomes.

The Hickson study found that salaried payment was associated with a lower number of scheduled and well child visits per enrolled patient compared with FFS PCPs, although emergency room visits were higher amongst patients of salaried PCPs (Hickson 1987). This difference in well child visits was partly due to FFS PCPs scheduling more unnecessary visits but also to inadequate scheduling by salaried PCPs. Even though FFS offers greater incentives to enroll patients (and therefore increase income) the average number of enrolled patients was higher amongst salaried PCPs. The authors adjusted the results for the disproportionate career interest in private practice amongst the salaried PCPs and found that the results were unchanged except for the difference in the number of patients enrolled, which became not significant. There were no differences in reported patient characteristics between the two groups. The authors did not, however, test for pre-intervention differences.

In summary, there is some evidence to suggest that the quantity of primary care services provided by PCPs under FFS payment was higher than that provided by capitated and salaried PCPs. The evidence concerning the impact of capitation payment on the number of hospital and specialist visits compared with FFS is mixed. There is evidence that salaried payment results in a lower number of primary care visits compared with capitation. Whilst each of the studies estimated quantity of care outcomes, only one measured the resource or cost consequences of the care provided by PCPs. The Davidson study found that capitation payment resulted in higher costs compared with FFS payment.

The third issue addressed by this review was whether FFS and capitation PCPs change the pattern and type of the care they provide when they have the incentive to do so. In addressing this hypothesis it is expected that FFS PCPs, in order to maximise income, would aim to provide a high volume of low cost activities, whereas capitation PCPs would deliver care that reduced future costs (e.g. preventive care, health promotion). However, there was no conclusive evidence found on this issue. The four included studies examined patterns of care by virtue of the fact that they examined the quantity of the various types of care provided. However, the Hutchison study only examined rates of hospitalisation and in the Hickson and Davidson studies it was not clear which types of services were more intensive of PCP time. In the Krasnik study there was no indication that more telephone consultations were being carried out instead of face to face contacts.

The fourth issue addressed was whether there were differences in access to care by population sub-groups differentiated by their level of need between the three payment systems. None of the included studies examined this issue.

The fifth issue addressed by this review was whether the three payment systems resulted in changes in clinical outcomes and patients' health status. None of the studies included in this review evaluated the impact of payment systems on patients' health. There was evidence that the overall satisfaction of patients of salaried PCPs did not differ from those of FFS PCPs (Hickson 1987) but without evidence of the effect on patient health status no conclusions can be made.

The generalisability of the findings of the included studies was not systematically determined and could be questioned. It is likely that all of the studies examined the behaviour of volunteer PCPs but only one of these (Krasnik 1990) compared the characteristics (PCP gender and time since graduation) of participating and non-participating PCPs and found no differences. There were also a number of different types of PCP involved in the studies and the contexts for each study were also very different. In the Hickson study the PCPs were resident paediatricians practising in an academic setting. More importantly there are professional, cultural, and organisational differences between practice settings which would influence the generalisability of the findings. In one study the PCPs in both of the intervention groups were remunerated at rates higher than in the control Medicaid scheme (Davidson 1992). Also in this study the authors found evidence of selection bias since those patients who had refused to participate had higher rates of health care utilisation.

## AUTHORS' CONCLUSIONS

### Implications for practice

From the few included studies there is evidence that payment systems do influence PCP behaviour. The evidence suggests that PCPs paid by FFS provide a higher quantity of primary care services compared with capitation and salary PCPs. However, this evidence of the impact of payment systems is not robust enough to be used and applied in every policy context.

### Implications for research

There is a dearth of robust studies evaluating the effects of PCP payment systems. It is in the interests of governments and patients alike to evaluate these changes, preferably using randomised control trial study designs. If RCTs are not possible due to practical or political reasons then at a minimum prospective study designs should be used.

Future studies in this area would benefit from longer follow up to determine the stability of the effects of changing from one payment system to another. Furthermore, it would be beneficial to

standardise interventions, data collection instruments and data sources (the latter two in order to reduce detection bias). More systematic and consistent reporting of the method of randomisation as well as information on the characteristics of PCPs, patients and practice settings is required. Evaluations measuring a larger range of outcomes are needed, examining under-researched issues such as the impact on: cost, access and equity of care; patient satisfaction and health status; and PCP satisfaction with their working environment. There should also be more consistent reporting of quantity of care outcomes.

## POTENTIAL CONFLICT OF INTEREST

None known.

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\*Indicates the major publication for the study

## TABLES

### Characteristics of included studies

Study	Davidson 1992
Methods	<p>RCT</p> <p>Concealment: NOT CLEAR</p> <p>Follow up:</p> <ul style="list-style-type: none"> <li>- providers: NOT CLEAR</li> <li>- patients: DONE</li> </ul> <p>Blinded assessment: NOT CLEAR</p> <p>Baseline: DONE</p> <p>Reliable outcomes: NOT CLEAR</p> <p>Contamination: NOT CLEAR</p> <p>Method of randomisation not clear</p> <p>Unit of analysis error</p> <p>Patients were not randomly allocated to either FFS or capitation and could select their PCP.</p> <p>Children patients and PCPs volunteered to be part of the Children's Medicaid Program (CMP).</p> <p>Patients did not know that PCPs were paid by either of two methods or which type of payment they were paid.</p>
Participants	<p>80 US PCPs agreed to participate out of 140 PCPs approached.</p> <p>Patients were recruited according to the date of Aid to Families of Dependent Children (AFDC) recertification which took place in at five social service centres. Those with dates one month before or after a certain date became the comparison group.</p> <p>891 children aged 18 and below in three groups: new FFS (N=1015), Capitation (N=764), Comparison group (N=1991).</p> <p>Rates of withdrawal of patients from CMP and switching between PCPs were similar in both new FFS and capitation groups.</p>
Interventions	<p>Intervention (1): Capitation</p> <p>Intervention (2): FFS (high rates)</p> <p>Control: FFS (low rates)</p> <p>Capitation PCPs were paid \$6 for 13 to 18 year olds; \$8.50 for 6 to 12 yrs; \$13.50 for 3 to 5 yrs; and \$18.50 for 2 yrs or younger. Each month \$25 was set aside for each child. This fund was used to pay for any covered service not provided by the PCP. PCPs received 40% of any surplus on this fund but were responsible for deficits up to a max of i)\$2000 per child per year and ii)25% of total annual capitation payments. Capitation fees were based on expected utilisation valued at the same market-level visit rates used for the FFS group.</p> <p>New FFS group (intervention 2): PCPs were paid a fee for comprehensive exams (including treatment), routine office visits, initial hospital visits and follow up hospital visits.</p> <p>FFS control/comparison group (traditional Medicaid): PCPs paid a fee for same services as new group but the fee was approximately half the size.</p>

## Characteristics of included studies (Continued)

The fees paid to the capitation group were based on expected utilisation and valued at the same rate as for the new FFS group.

Outcomes	<p>PROCESS OUTCOMES:</p> <ol style="list-style-type: none"><li>1. Average number of primary care physician visits per year per patient.</li><li>2. Average number of non-primary care physician visits per year per patient.</li><li>3. Average number of health and emergency department visits per year per patient.</li><li>4. Average number of hospitalisations per year per patient.</li><li>5. Per cent compliance with CHAP guidelines for:<ol style="list-style-type: none"><li>a) number of PCP visits; and</li><li>b) PCP+ outpatient clinic visits over a one year period for children aged:<ol style="list-style-type: none"><li>I. 0 -12 months (CHAP = 5)</li><li>II. 13 - 24 months (CHAP =3)</li><li>III. 25 - 36 months (CHAP = 2)</li><li>IV. 3 - 5 years (CHAP =1)</li></ol></li></ol></li></ol>
Notes	<p>PATIENT OUTCOMES: Not reported</p> <p>Both PCPs and patients had inducements to participate in study. PCPs were paid higher fees, received feedback on utilisation of care, and their patients would be guaranteed eligible for coverage for at least one year. This extended eligibility feature was an inducement to patients in addition to the opportunity to choose a personal physician.</p> <p>A substantial number (31%) of patients refused to participate in the trial and there were an unspecified number of withdrawals. However, no differences were found between the refusals and withdrawals and the patients in the FFS and capitation groups on the basis of: age; ethnicity; presence of a chronic or recurring illness; number of illness days; and utilisation of different types of care in the 6 months before enrolment. So refusal and attrition bias minimal.</p> <p>No details on the characteristics or number of PCPs were reported or compared across the two groups. The authors did not compare participating PCPs with those who did not participate.</p> <p>In contrast to the other two comparison groups Capitation PCPs self-reported the number of visits. The authors estimated that as a result, the extent of under-reporting of visits was 10 per cent.</p> <p>Authors used regression analysis to adjust results for differences in patient characteristics and baseline levels of care utilisation</p>
Allocation concealment	B – Unclear

Study	Hickson 1987
Methods	<p>RCT (Paediatric residents were initially matched for year of training and the day of the week their clinics were held. Each pair were randomised by a flip of a coin)</p> <p>Concealment: DONE</p> <p>Follow up:</p> <ul style="list-style-type: none"><li>- providers: NOT CLEAR</li><li>- patients: NOT CLEAR</li></ul> <p>Blinded assessment: NOT CLEAR</p> <p>Baseline: NOT CLEAR</p> <p>Reliable outcomes: NOT CLEAR</p> <p>Contamination: NOT DONE</p> <p>No unit of analysis error</p>
Participants	<p>PCPs were second year (n=10) and third year (n=8) paediatric residents who worked in the Continuity Clinic in the US between September 1983 and June 1984.</p>

## Characteristics of included studies (Continued)

	<p>No significant PCP differences in time since graduation, gender, interest in continuity.</p> <p>Career goal (academic / private practice): 1:8 in salary group and 5:4 in FFS group (p&lt;0.05).</p> <p>Patients were allocated by residents from their inpatient, emergency room and walk-in clinic or were assigned by the clinic secretary to the first available appointment.</p> <p>496 patients were treated by salaried paediatricians whereas 395 were cared for by FFS residents.</p> <p>No significant patient differences in salary group, mother's age, number of children at home, number of fathers in home.</p>
Interventions	<p>Intervention: Salary Control: FFS</p> <p>Salary group received \$20 per month. FFS group received \$2 per visit.</p> <p>These payments were designed to result in equal reimbursement based on historical consultation rates. \$2 fee was set to be equivalent to that received by private paediatrician.</p>
Outcomes	<p>PROCESS OUTCOMES:</p> <ol style="list-style-type: none"><li>1. Average number of patients enrolled per physician over 9 month period</li><li>2. Average number of patient visits attended per physician over 9 month period</li><li>3. % visits attended by patient's primary physician (continuity) over 9 month period</li><li>4. Emergency room visits / enrolled patients / physician over 9 month period</li><li>5. Av no. of scheduled visits per enrolled patient / physician over 9 month period</li><li>6. Av no. of completed visits per enrolled patient / physician over 9 month period</li><li>7. Av no. of sick, primary visits per enrolled patient / physician over 9 month period</li><li>8. Av no. of sick follow up visits per enrolled patient / physician over 9 month period</li><li>9. Av no. of well child visits per enrolled patient / physician over 9 month period</li><li>10. Compliance with American Academy of Paediatrics' guidelines:<ol style="list-style-type: none"><li>I. % of recommended visits missed over 9 month period</li><li>II. % of visits in excess of the recommended over 9 month period</li></ol></li></ol> <p>PATIENT OUTCOMES:</p> <ol style="list-style-type: none"><li>11) Patient satisfaction<ol style="list-style-type: none"><li>I. Humanness</li><li>II. Continuity / convenience</li><li>III. Access to physician</li><li>IV. Overall satisfaction</li></ol></li></ol>
Notes	<p>Generalisability: small sample size; academic setting; young residents.</p> <p>Salaried PCPs were more likely to have a career interest in private practice compared with FFS PCPs.</p> <p>Patients were children.</p>
Allocation concealment	A – Adequate
<b>Study</b>	<b>Hutchison 1996</b>
Methods	<p>CBA</p> <p>Similar control site: DONE</p> <p>Follow up: - providers: DONE - patients: NOT CLEAR</p> <p>Blinded assessment: DONE</p> <p>Baseline: DONE</p> <p>Reliable outcomes: DONE</p>



## Characteristics of included studies (Continued)

	Contamination: DONE
Participants	<p>PCPs in Ontario, Canada; 39 PCPs in study group and 77 in control.</p> <p>% of female PCPs - study 20.5%; control - 19.6%.</p> <p>Average PCP age: study - 44.7; control - 44.9.</p> <p>% certification in family medicine: study 61.5; control 59.7.</p> <p>Average number of patients in practice: study 2286; control 2341. 89,148 patients in study group and 180,255 in control.</p> <p>Average patient age (median): study - 36.3 (33.1); control - 35.2 (32.1).</p> <p>% of females: 56.1% in study group; and 55.5% in control.</p> <p>% receiving social assistance (% of regular users): 15.3% (23.4%) in study group; and 16.4% (23.6%) in control.</p>
Interventions	<p>Intervention: Capitation/incentive payment introduced to FFS PCPs Control: FFS</p> <p>Intervention group were paid by a mix of capitation and ambulatory incentive payments (ACIP).</p> <p>For each day of hospital care by which the regional rate exceeded the hospitalisation rate (hospital days per 1000 patients) for the practice, the practice received 1/3 of the mean hospital cost for each age-sex category.</p> <p>Control group were remunerated on a FFS basis throughout the study.</p>
Outcomes	<p>PROCESS OUTCOMES:</p> <p>1) Differences in age, sex and social assistance adjusted hospital separations per 1000 patients between one year before intervention and three years after;</p> <p>2) Differences in age, sex and social assistance adjusted hospital days per 1000 patients between one year before intervention and three years after.</p> <p>PATIENT OUTCOMES:</p> <p>None reported</p>
Notes	<p>When possible each physician in the study group was matched with 2 FFS PCPs according to the following criteria: a) same Forward Sortation Area (FSA: postal code) or FSA with similar socio-economic characteristics; b) academic vs community practice; c) part time vs full time; d) years from graduation; e) physician group size; f) practice size; g) primary care vs multispeciality group; h) sex; i) certification in family medicine; j) country of graduation; k) age</p>
Allocation concealment	D – Not used

Study	Krasnik 1990
Methods	<p>CBA</p> <p>Similar control site: NOT CLEAR</p> <p>Follow up:</p> <ul style="list-style-type: none"> <li>- providers: NOT CLEAR</li> <li>- patients: NOT CLEAR</li> </ul> <p>Blinded assessment: NOT DONE</p> <p>Baseline: DONE</p> <p>Reliable outcomes: NOT DONE</p> <p>Contamination: DONE</p> <p>Data collected 6 months before the intervention and at 6 and 12 months after (periods 1 and 2).</p>
Participants	<p>140 of 265 GPs in Copenhagen city, Denmark, volunteered to participate in the study. 10 were excluded because they were tutors of trainees. 100 were selected randomly as the study group.</p> <p>326 GPs in Copenhagen county formed the control group.</p>

### Characteristics of included studies (Continued)

	<p>GPs in Copenhagen city (from which the study GPs were selected) care for a total population of 470,000 patients whereas control GPs care for a total of 560,000 patients.</p>
Interventions	<p>Intervention: GPs in Copenhagen changed from capitation to capitation/FFS in October 1987 Control: GPs in Copenhagen county paid FFS/capitation</p> <p>GPs were paid fees (FFS) for face to face, telephone, and home visit consultations; and repeat prescriptions. Additional fees were payable for diagnostic and curative services, for 40 special services (e.g. cervical smear tests), for 40 special laboratory investigations performed in the practice (e.g. haemoglobin concentration) and for a few preventive services (e.g. immunisations).</p> <p>GPs working inside Copenhagen city were paid by capitation prior to October 1987. After this date fees were introduced for the above services.</p>
Outcomes	<p>PROCESS OUTCOMES: Differences between 6 months before intervention and 6 (period 1) and 12 months (period 2) after in:</p> <ol style="list-style-type: none"> <li>1. Face to face consultations over a 1 week period per 1000 patients</li> <li>2. Telephone consultations over a 1 week period per 1000 patients</li> <li>3. Renewal of prescription over a 1 week period per 1000 patients</li> <li>4. Diagnostic services over a 1 week period per 1000 patients</li> <li>5. Curative services over a 1 week period per 1000 patients</li> <li>6. Referrals to specialist over a 1 week period per 1000 patients</li> <li>7. Referrals to hospital over a 1 week period per 1000 patients</li> </ol> <p>PATIENT OUTCOMES: Not reported</p>
Notes	<p>Possible selection bias since GPs volunteered to participate in intervention group although a comparison of participating and non-participating GPs found they did not differ with respect to gender and time since graduation (<math>p&gt;0.05</math>).</p> <p>No information reported on patient characteristics so selection bias is a potential problem.</p> <p>Possible detection bias since activity data for the control group of GPs was derived from the billing of fees and from the hospital routine referral records. Whereas the same data were obtained for the intervention group by a self-completed questionnaire for each contact.</p>
Allocation concealment	D – Not used

### Characteristics of excluded studies

Bonham 1987	Less than two data points before and two after the intervention
Burkowitz 1995	Less than two data points before and two after the intervention
Burns 1998	Less than two data points before and two after the intervention
Guesser 1993	Less than two data points before and two after the intervention
Kelly 1996	Less than two data points before and two after the intervention
Langham 1995	Less than two data points before and two after the intervention
Leibowitz 1992	Patients rather than PCPs were not randomised
Lowy 1993	Less than two data points before and two after the intervention
Murray 1997	Less than two data points before and two after the intervention
Perkoff 1976	Patients rather than PCPs were not randomised
Stearns 1992	Less than two data points before and two after the intervention
Vohlonen 1989	Data in the pre-intervention period were not reported. PCPs in control group not similar in their characteristics. Payment system of one study group unclear.

## Characteristics of excluded studies (Continued)

### Characteristics of ongoing studies

Study	Hutchison
Trial name or title	Comparison of health care utilisation and costs in HSO and fee for service practice
Participants	PCPs
Interventions	Intervention: capitation Control: FFS
Outcomes	Health care utilisation. Costs.
Starting date	
Contact information	
Notes	

## ANALYSES

### Comparison 01. Capitation vs FFS

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Primary care physician visits/ contacts			Other data	No numeric data
02 Prescriptions			Other data	No numeric data
03 Diagnostic and curative services			Other data	No numeric data
04 Referrals to specialists and hospitals			Other data	No numeric data
05 Health and emergency department visits			Other data	No numeric data
06 Hospitalisations			Other data	No numeric data
07 Compliance with guidelines on number of patient visits			Other data	No numeric data
08 Expenditure/costs			Other data	No numeric data

### Comparison 02. Salary vs FFS

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Patient visits			Other data	No numeric data
02 Number of patients enrolled			Other data	No numeric data
03 Continuity of care			Other data	No numeric data
04 Compliance with guidelines on number of patient visits			Other data	No numeric data
05 Patient satisfaction			Other data	No numeric data

### Comparison 03. Mixed capitation systems vs FFS

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Hospital utilisation			Other data	No numeric data

#### INDEX TERMS

##### Medical Subject Headings (MeSH)

Capitation Fee; Fee-for-Service Plans; Fees, Medical; \*Fees and Charges; Physician's Practice Patterns [\*economics; standards]; Primary Health Care [\*economics]; \*Salaries and Fringe Benefits

##### MeSH check words

Humans

#### COVER SHEET

<b>Title</b>	Capitation, salary, fee-for-service and mixed systems of payment: effects on the behaviour of primary care physicians
<b>Authors</b>	Gosden T, Forland F, Kristiansen IS, Sutton M, Leese B, Giuffrida A, Sergison M, Pedersen L
<b>Contribution of author(s)</b>	Gosden T, Forland F, Kristiansen IS, Sutton M, Leese B, Giuffrida A were responsible for the planning of the review. Toby Gosden, Antonio Giuffrida, Frode Forland and Michelle Sergison conducted the searches. Toby Gosden recorded study data and wrote the main draft of the review. Gosden T, Forland F, Kristiansen IS, Sutton M, Leese B, Giuffrida A, Sergison M, Pedersen L assessed whether papers were relevant, obtained copies of papers and extracted study data. All authors commented on the text of the review.
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<b>Date new studies sought but none found</b>	Information not supplied by author
<b>Date new studies found but not yet included/excluded</b>	Information not supplied by author
<b>Date new studies found and included/excluded</b>	Information not supplied by author
<b>Date authors' conclusions section amended</b>	Information not supplied by author
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**Analysis 01.01. Comparison 01 Capitation vs FFS, Outcome 01 Primary care physician visits/contacts**

**GRAPHS AND OTHER TABLES**

**Primary care physician visits/contacts**

Study	Type of study	Outcomes	Absolute changes	Relative changes	Notes
Davidson 1992	RCT	PROCESS OUTCOMES: Differences between each intervention group and control group in average number of primary care physician visits per year per patient 1) during study and 2) 6 months before change	PROCESS OUTCOMES (= intervention lower than control): Capitation: 1)+0.71; 2)+0.16 FFS: 1)+0.84; 2)+0.62	PROCESS OUTCOMES: Capitation: 1)+29%; 2)+5% FFS: 1)+34%; 2)+20%	Differences in means not tested for statistical significance. Regression coefficients: Capitation: 1)+0.59 (p<=0.05); 2)+0.22 (ns) FFS: 1)+0.92 (p<=0.01); 2)+0.77 (p<=0.01)
Krasnik 1990	CBA	PROCESS OUTCOMES: Differences between 6 months before intervention and 6 months (period 2) after in : 1) Face to face consultations over a 1 week period per 1000 patients 2) Telephone consultations over a 1 week period per 1000 patients	PROCESS OUTCOMES (= intervention lower than control): 1) +7.2 (period 1) (s); -0.5 (period 2) (ns) 2) +10.2 (s); +11 (s)	PROCESS OUTCOMES: 1) +130.9%; -10.2% 2) +121.4%; +250%	

### Analysis 01.02. Comparison 01 Capitation vs FFS, Outcome 02 Prescriptions

#### Prescriptions

Study	Type of study	Outcomes	Absolute differences	Relative differences	Notes
Krasnik 1990	CBA	PROCESS OUTCOMES: Differences between 6 months before intervention and 6 (period 1) and 12 months (period 2) after in : Renewal of prescription over a 1 week period per 1000 patients	PROCESS OUTCOMES (-= intervention lower than control): - 9 (period 1)(ns); -27.4 (period 2) (s)	PROCESS OUTCOMES: - 105.8%; -370.3%	

### Analysis 01.03. Comparison 01 Capitation vs FFS, Outcome 03 Diagnostic and curative services

#### Diagnostic and curative services

Study	Type of study	Outcomes	Absolute differences	Relative differences	Notes
Krasnik 1990	CBA	PROCESS OUTCOMES: Differences between 6 months before intervention and 6 (period 1) and 12 months (period 2) after in : 1) Diagnostic services over a 1 week period per 1000 patients 2) Curative services over a 1 week period per 1000 patients	PROCESS OUTCOMES (-= intervention lower than control): 1) +32.8 (s); +52.2 (s) 2) +88.6 (s); +79.8 (s)	PROCESS OUTCOMES: 1) +618.9%; +715.1% 2) +1476.7%; +532%	

### Analysis 01.04. Comparison 01 Capitation vs FFS, Outcome 04 Referrals to specialists and hospitals

#### Referrals to specialists and hospitals

Study	Type of study	Outcomes	Absolute differences	Relative differences	Notes
Davidson 1992	RCT	PROCESS OUTCOMES: Differences between each intervention group and control group in average number of non-primary care physician visits per year per patient 1) during study and 2) 6months before change	PROCESS OUTCOMES (-= intervention lower than control): Capitation: 1)-0.23; 2)+0.01 FFS: 1)+0.05; 2)+0.06	PROCESS OUTCOMES: Capitation: 1)-29%; 2)+2% FFS: 1)+6%; 2)+10%	Differences in means not tested for statistical significance. Regression coefficients: Capitation: 1)-0.25 (p<=0.01); 2)-0.24 (p<=0.01) FFS: 1)+0.03 (ns); 2)-0.03 (ns)
Krasnik 1990	CBA	PROCESS OUTCOMES: Differences between	PROCESS OUTCOMES (-= intervention lower	PROCESS OUTCOMES: 1) -1550%; -1110.5%	

## Referrals to specialists and hospitals (Continued)

Study	Type of study	Outcomes	Absolute differences	Relative differences	Notes
		6 months before intervention and 6 (period 1) and 12 months (period 2) after in : 1) Referrals to specialist over a 1 week period per 1000 patients 2) Referrals to hospital over a 1 week period per 1000 patients	than control): 1) -9.3 (ns); -21.2 (s) 2) -9.7 (ns); -33.7 (s)	2) -334.5%; -1604.8%	

### Analysis 01.05. Comparison 01 Capitation vs FFS, Outcome 05 Health and emergency department visits

#### Health and emergency department visits

Study	Type of study	Outcomes	Absolute differences	Relative differences	Notes
Davidson 1992	RCT	PROCESS OUTCOMES: Differences between each intervention group and control group in average number of health and emergency department visits per year per patient 1) during study and 2) 6 months before change	PROCESS OUTCOMES (= intervention lower than control): Capitation: 1)-0.30; 2)-0.27 FFS: 1)-0.33; 2)-0.15	PROCESS OUTCOMES: Capitation: 1)-25%; 2)-18% FFS: 1)-28%; 2)-10%	Differences in means not tested for statistical significance. Regression coefficients: Capitation: 1)-0.32 (p<=0.01); 2)-0.08 (ns) FFS: 1)-0.31 (p<=0.01); 2)-0.24 (ns)

### Analysis 01.06. Comparison 01 Capitation vs FFS, Outcome 06 Hospitalisations

#### Hospitalisations

Study	Type of study	Outcomes	Absolute differences	Relative differences	Notes
Davidson 1992	RCT	PROCESS OUTCOMES: Differences between each intervention group and control group in average number of hospitalisations per year per patient 1) during study and 2) 6	PROCESS OUTCOMES (= lower in intervention than control): Capitation: 1)-0.02; 2)-0.01 FFS: 1)+0.02; 2)+0.06	PROCESS OUTCOMES: Capitation: 1)-37%; 2)-11% FFS: 1)+35%; 2)+66%	Differences in means not tested for statistical significance. Regression coefficients: Capitation: 1)-0.02 (p<=0.05); 2)-0.02 (ns) FFS: 1)+0.01 (ns); 2)-0.04 (ns)

## Hospitalisations (Continued)

Study	Type of study	Outcomes	Absolute differences	Relative differences	Notes
		months before change			

### Analysis 01.07. Comparison 01 Capitation vs FFS, Outcome 07 Compliance with guidelines on number of patient visits

#### Compliance with guidelines on number of patient visits

Study	Type of study	Outcomes	Absolute changes	Relative changes	Notes
Davidson 1992	RCT	<p>PROCESS</p> <p>OUTCOMES:</p> <p>Per cent compliance with CHAP guidelines for:</p> <p>a) number of PCP visits; and</p> <p>b) PCP+ outpatient clinic visits over a one year period for children aged:</p> <p>1) 0 -12 months (CHAP = 5)</p> <p>2) 13 - 24 months (CHAP =3)</p> <p>3) 25 - 36 months (CHAP = 2)</p> <p>4) 3 - 5 years (CHAP =1)</p>	<p>PROCESS</p> <p>OUTCOMES (-= intervention lower than control):</p> <p>1) a)-10; b)-11</p> <p>2) a)-12; b)-12</p> <p>3) a)-8; b)-8</p> <p>4) a)-8; b)-10</p> <p>Note: significance not reported</p>	<p>PROCESS</p> <p>OUTCOMES:</p> <p>1) a)-12.7%; b)-13.3%</p> <p>2) a)-15%; b)-15%</p> <p>3) a)-9.4%; b)-9.1%</p> <p>4) a)-8.7%; b)-10.4</p>	<p>CHAP - New York's Child Health Assurance Program periodicity schedule, based on the AAP Guidelines for Health Supervision.</p> <p>Authors used logistic regression to explain compliance. The regression adjusted for higher 6 months utilisation in FFS and capitation groups prior to CMP and a larger group of ethnic minority patients in FFS group. (s denotes <math>p &lt; 0.05</math>):</p> <p>Regression coefficients:</p> <p>1) a)0.39 (ns) (intervention); 0.56(s) (Ctrl); b)0.04 (ns) (intervention); 0.10 (ns) (Ctrl).</p> <p>2) a)0.31 (ns) (intervention); 0.80(s) (Ctrl); b)0.05 (ns) (intervention); 0.50(s) (Ctrl).</p> <p>3) a)0.55(s) (intervention); 0.68(s) (Ctrl); b)0.22 (ns) (intervention); 0.47 (ns) (Ctrl).</p> <p>4) a)0.64(s) (intervention); 1.00(s) (Ctrl); b)0.18 (ns)</p>



**Compliance with guidelines on number of patient visits** (Continued)

Study	Type of study	Outcomes	Absolute changes	Relative changes	Notes
					(intervention); 0.58(s) (Ctrl).

**Analysis 01.08. Comparison 01 Capitation vs FFS, Outcome 08 Expenditure/costs**

**Expenditure/costs**

Study	Type of study	Outcomes	Absolute differences	Relative differences	Notes
Davidson 1992	RCT	PROCESS OUTCOMES: Differences between both intervention groups and control group in average net expenditure	PROCESS OUTCOMES: Capitation: +\$75.67 FFS: +\$56.19		Expenditure data for the Medicaid control group not reported and confidence intervals for cost estimates not reported.

**Analysis 02.01. Comparison 02 Salary vs FFS, Outcome 01 Patient visits**

**Patient visits**

Study	Type of study	Outcomes	Absolute changes	Relative changes	Notes
Hickson 1987	RCT	PROCESS OUTCOMES Average number of: 1) Patient visits attended per physician over 9 month period 2) Emergency room visits / enrolled patients / physician over 9 month period 3)scheduled visits per enrolled patient / physician over 9 month period 4)completed visits per enrolled patient / physician over 9 month period 5)sick, primary visits per enrolled patient / physician over 9 month period 6) sick follow up visits per enrolled patient / physician over 9 month period 7) well child visits per enrolled patient / physician over 9 month period	PROCESS OUTCOMES (= intervention lower than control): 1) -6.8 (ns) 2) +10 (s) p<0.01 3) -0.86 (s) p<0.01 4) -0.49 (s) p<0.05 5) +0.03 (ns) 6) -0.09 (ns) 7) -0.43 (s) p<0.01	PROCESS OUTCOMES: 1) -6.1% 2) +83.33% 3) -23.3% 4) -18.1% 5) +3.2% 6) -27.3% 7) -30.3	

### Analysis 02.02. Comparison 02 Salary vs FFS, Outcome 02 Number of patients enrolled

#### Number of patients enrolled

Study	Type of study	Outcomes	Absolute changes	Relative changes	Notes
Hickson 1987	RCT	Average number of patients enrolled per physician over 9 month period	PROCESS OUTCOMES (-= intervention lower than control): +11.7 (s) p<0.05	PROCESS OUTCOMES: +27%	

### Analysis 02.03. Comparison 02 Salary vs FFS, Outcome 03 Continuity of care

#### Continuity of care

Study	Type of study	Outcomes	Absolute changes	Relative changes	Notes
Hickson 1987	RCT	PROCESS OUTCOMES: % visits attended by patient's primary physician (continuity) over 9 month period	PROCESS OUTCOMES (-= intervention lower than control): -8.3 (s) p<0.05	PROCESS OUTCOMES: -9.6%	

### Analysis 02.04. Comparison 02 Salary vs FFS, Outcome 04 Compliance with guidelines on number of patient visits

#### Compliance with guidelines on number of patient visits

Study	Type of study	Outcomes	Absolute changes	Relative changes	Notes
Hickson 1987	RCT	PROCESS OUTCOMES: Compliance with American Academy of Paediatrics' guidelines: 1) % of recommended visits missed over 9 month period 2) % of visits in excess of the recommended over 9 month period	PROCESS OUTCOMES (-= intervention lower than control): 1) +6.4 (s) p<0.01 2) -13.3 (s) p<0.01	PROCESS OUTCOMES: 1) +213% 2) -73.9%	

### Analysis 02.05. Comparison 02 Salary vs FFS, Outcome 05 Patient satisfaction

#### Patient satisfaction

Study	Type of study	Outcomes	Absolute changes	Relative changes	Notes
Hickson 1987	RCT	PATIENT OUTCOMES: Patient satisfaction 1) Humanness 2) Continuity / convenience 3) Access to physician 4) Overall satisfaction	PATIENT OUTCOMES: Patient satisfaction: 1) humanness (ns); 2) continuity / convenience (ns); 3) access to physician: higher in salary (s) (p<0.05). 4) overall satisfaction (ns);	PATIENT OUTCOMES: No data reported.	

### Analysis 03.01. Comparison 03 Mixed capitation systems vs FFS, Outcome 01 Hospital utilisation

#### Hospital utilisation

Study	Type of study	Outcomes	Absolute changes	Relative changes	Notes
Hutchison 1996	CBA	<p>PROCESS OUTCOMES:</p> <p>1) Differences in age, sex and social assistance adjusted hospital separations per 1000 patients between one year before intervention and three years after;</p> <p>2) Differences in age, sex and social assistance adjusted hospital days per 1000 patients between one year before intervention and three years after.</p> <p>PATIENT OUTCOMES:</p> <p>None reported</p>	<p>PROCESS OUTCOMES (-= intervention lower than control):</p> <p>1) -0.2 (p=0.312)</p> <p>2) +3 (p=0.774)</p>	<p>PROCESS OUTCOMES:</p> <p>1) +0.4%</p> <p>2) -3.7%</p>	