

Should we pay the patient? Review of financial incentives to enhance patient compliance

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Abstract

Objective: To determine whether financial incentives increase patients' compliance with healthcare treatments.

Data sources: Systematic literature review of computer databases—Medline, Embase, PsychLit, EconLit, and the Cochrane Database of Clinical Trials. In addition, the reference list of each retrieved article was reviewed and relevant citations retrieved.

Study selection: Only randomised trials with quantitative data concerning the effect of financial incentives (cash, vouchers, lottery tickets, or gifts) on compliance with medication, medical advice, or medical appointments were included in the review. Eleven papers were identified as meeting the selection criteria.

Data extraction: Data on study populations, interventions, and outcomes were extracted and analysed using odds ratios and the number of patients needed to be treated to improve compliance by one patient.

Results: 10 of the 11 studies showed improvements in patient compliance with the use of financial incentives.

Conclusions: Financial incentives can improve patient compliance.

Introduction

Compliance can be defined as the extent to which a patient's behaviour coincides with medical advice.¹ Although non-compliance with medical advice is a problem, assessing it is not easy as no method of measuring compliance with appointments or medication is applicable in all settings.² About 6-20% of patients fail even to redeem their prescriptions,³⁻⁶ and 30-50% delay or omit doses.⁷ For medical appointments, failure rates between 19% and 28% are not uncommon.^{8,9}

Poor compliance may produce adverse effects on the quality of medical care and may waste resources. Firstly, it interferes with therapeutic efforts by reducing the benefits of the preventive or curative services offered. Secondly, non-compliance may cause unnecessary diagnostic and treatment procedures, thus generating further costs. Thirdly, poor compliance with treatment for infectious disease can increase the probability of the development of drug resistant strains and the possibility of infecting others. Finally, low compliance during a clinical trial may lead to overesti-

mation of therapeutic dosage, causing drug toxicity for compliant patients in actual practice.² On the other hand, non-compliance can sometimes reduce the cost and adverse effects of treatment, particularly if treatment is inappropriate.

Reviews of interventions to improve compliance have showed that the most common interventions are reminders in the forms of letter or telephone prompts to patients.^{10,11} A recent meta-analysis on this subject failed to include any trials testing the role of financial incentives. We reviewed the literature on the effectiveness of financial incentives to enhance patient compliance with medication and medical appointments.

Methods

Identification of studies

We searched Medline for 1966 through April 1997, Embase for 1980 through April 1997, PsychLit 1974 through March 1997, EconLit for 1966 through March 1997, and issue 2, April 1997, of the Cochrane Database of Clinical Trials. We used the following terms, seeking matches in the titles, abstracts, and descriptors: (compliance *or* adhere* *or* dropout*) *and* (incentive* *or* cash* *or* money *or* token* *or* payment*). We also searched on names of individual author who had published in this field. We contacted the lead authors of any relevant study to ask whether there were additional studies unknown to us and emailed the members of the health economics mail base, asking for any relevant references. Finally, we reviewed the reference list of each retrieved article and retrieved any relevant citations.

Inclusion criteria

We independently screened article titles and abstracts for relevance to the topic of the review. If the title or abstract suggested that the article might be relevant the article was retrieved.

The two reviewers independently assessed the relevant studies for adherence to a priori eligibility criteria. Only randomised trials with quantitative data concerning the effect of financial incentives on compliance with medication, medical advice, or medical appointments were included in the review. As well as randomisation, each study had to include a "free" treatment comparator (a group in which there was no financial charge to the patient). Financial incentives were defined as money, cash, or vouchers redeemable

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BMJ 1997;315:703-7

for other goods (food, clothes, gifts, etc). We excluded reimbursement payments such as travel expenses. Furthermore, the inclusion criteria required that the studies include adequate information to permit an evaluation of study design, target population, whether randomisation had taken place, response rates, and data measuring the effect of interventions.

For both the relevance and eligibility reviews, disagreement was resolved by consensus in a meeting between the two reviewers.

Analysis

We estimated the proportion of patients who were compliant in the intervention and control groups and the appropriate 95% confidence interval of the difference. We also estimated the odds of compliance as the proportion of patients in a given group who attended, divided by the proportion who did not attend. Odds ratios and their associated confidence intervals determined by the exact method¹² were calculated as the odds of compliance in the group that received the intervention divided by the odds of compliance in the control group. Odds ratios greater than 1.0 indicated a positive effect of the intervention on compliance. For studies that tried other methods of increasing compliance as well as testing financial incentives, we estimated the odds ratio of the alternative method and compared it with the odds ratio of using financial incentives. Because of the disparate nature of the study populations and incentives identified in our review, we made no attempt to pool the odds ratios from individual studies. The number of patients "needed to be treated" to improve compliance by one patient was also calculated for each study.¹³

Results

Selection

Electronic searches identified a total of 491 articles; 43 were selected as potentially relevant. Fifteen studies were excluded as they were not randomised,¹⁴⁻²⁸ eight studies were excluded because the trials compared the effect of different types of financial incentives without a control group as comparator,²⁹⁻³⁶ and two studies provided insufficient data for contingency tables to be developed.^{37, 38}

Seven studies were rejected on other methodological grounds. One study randomised only six unmatched clinics to three interventions, and there was strong evidence that the groups were unbalanced in key prognostic variables.³⁹ Another tested the value of a free follow up appointment and therefore was not considered to be a direct financial incentive.⁴⁰ In one study of using gifts for increasing the uptake of mammography it was unclear whether the actual mammogram was free to the patient⁴¹; in another the intervention was not free, as the participants to a weight control program had to still pay \$40.⁴² A study was excluded because randomisation to the non-incentive comparator group was abandoned after only a few patients and thus the bulk of the patients allocated to the incentive group were not randomised contemporaneously with those in the comparator group.⁴³ Finally, two studies were rejected on the grounds that compliance with treatment was measured indirectly, either through assessment of transplant patients' knowledge of anti-rejection measures⁴⁴ or through measures of carbon monoxide concentration for smoking cessation.⁴⁵

Table 1 Randomised studies of effect of providing financial incentives on patient compliance

First author and year of study	Patients and aim of study	Incentives and comparators
Reiss 1976	Low income parents. Aim: encourage uptake of dental appointments.	\$5 coupon redeemable for cash. Comparators: 1 prompt and 3 prompts (note, telephone call, home visit).
Shepard 1979	Hypertensive patients receiving treatment. Aim: maintain compliance with treatment.	Cash, lottery tickets. \$4 per appointment if diastolic blood pressure >5 mm Hg above target, \$8 if 1-5 mm Hg above target; \$12 if at or exceeded target for first time; \$16 if at or exceeded target second time. Comparators: standard care; counselling; peer support; home monitoring of blood pressure.
Reiss 1982	Parents of children receiving Medicaid. Aim: encourage preventive dentistry.	\$5 coupon redeemable for cash. Comparators: multiple contacts, problem solving, no intervention.
Yorkley 1984	Parents of preschool children. Aim: encourage child immunisation.	Lottery; prizes of \$100, \$50, \$25. Comparators: increased opening times; prompt asking parent to make appointment; specific prompt naming child; telephone contact; and no intervention.
Parrish 1986	Parents of children with behavioural difficulties. Aim: compliance with paediatric clinic appointment.	Lottery; \$10 voucher, for toys, meal, or bus tokens. Comparators: nothing, or child being placed at the bottom of the waiting list.
Morisky 1990	Mainly immigrants with tuberculosis. Aim: treatment and prevention of tuberculosis.	\$5-\$10 value per appointment, a further \$20-\$40 if treatment was completed without missed appointment; incentives were a mixture of cash, tokens, and vouchers. Comparator: reminder appointments.
Smith 1990	Low income teenage mothers. Aim: encourage postpartum appointment keeping.	Two incentive groups: coupon for baby milk or free gift. Comparator: normal appointment.
Jeffery 1993	Patients between 14 kg and 32 kg overweight for their height. Aim: weight loss.	\$25 if patient reached or maintained weight loss. Comparator: behavioural therapy and food provision and no treatment.
Higgins 1994	Patients >18 years old dependent on cocaine. Aim: behavioural treatment of cocaine dependency.	Points which could be spent on gifts (maximum value \$997.50 if cocaine free for first 12 weeks and \$24 for next 12 weeks). Comparator: no monetary incentive.
Stevens-Simon 1994	Low income pregnant teenagers. Aim: encourage postpartum appointment keeping.	Gift for mother. Comparator: no gift.
Pilote 1996	Homeless people with tuberculosis. Aim: treatment of tuberculosis.	\$5 cash per appointment attended. Comparators: peer health advisers and usual appointments.

Table 2 Results of review of studies using financial incentives to improve patient compliance

First author and year of study	Comparison of incentive group (I) v others (No in each group)	Percentage complying	Percentage improvement with incentive (95% CI of difference)	Odds ratio* (95% CI)	No needed to be treated†
Reiss 1976	I (12) v 1 prompt (13)	67 v 60	7 (-32 to 38)	1.3 (0.2 to 10.6)	14
	I (12) v 3 prompts (10)	67 v 23	44 (11 to 78)	6.7 (0.9 to 1.4)	2
	I (12) v 1 and 3 prompts (23)	67 v 39	28 (-6 to 61)	3.1 (0.3 to 18.1)	4
Shepard 1979	I (60) v peer group (60)	90 v 85	5 (-7 to 17)	1.6 (0.5 to 5.8)	20
	I (60) v standard care (60)	90 v 77	13 (0 to 23)	2.6 (0.8 to 9.0)	8
	I (60) v counselling (59)	90 v 86	4 (-8 to 15)	1.5 (0.4 to 5.5)	25
	I (60) v home BP (61)	90 v 84	6 (6 to 18)	1.8 (0.5 to 6.3)	17
	I (60) v all (236)	90 v 83	7 (-2 to 16)	1.8 (0.1 to 5.6)	14
Reiss 1982	I (50) v problem solve (25)	74 v 64	10 (-6 to 38)	1.6 (0.5 to 5.0)	6
	I (50) v multiple contact (23)	74 v 70	4 (-11 to 32)	1.2 (0.4 to 4.1)	10
	I (50) v no intervention (24)	74 v 38	36 (20 to 65)	4.7 (1.5 to 15.3)	2
	I (50) v all (72)	74 v 57	17 (0 to 34)	2.2 (0.1 to 5.2)	4
Yorkley 1984	I (120) v telephone (108)	56 v 19	37 (26 to 49)	5.6 (2.9 to 10.7)	3
	I (120) v no contact (119)	56 v 29	25 (14 to 39)	3.0 (1.7 to 5.4)	4
	I (120) v prompt (124)	56 v 34	22 (10 to 34)	2.5 (1.4 to 4.3)	5
	I (120) v specific prompt (119)	56 v 49	7 (-6 to 20)	1.3 (0.8 to 2.3)	14
	I (120) v access (125)	56 v 54	2 (-10 to 15)	1.1 (0.6 to 1.9)	50
	I (120) v all (584)	56 v 38	18 (8 to 28)	2.1 (0.0 to 3.2)	6
Parrish 1986	I (33) v waiting list (33)	61 v 82	-21 (-43 to 0)	0.34 (0.1 to 1.2)	—
	I (33) v nothing (33)	61 v 42	19 (-6 to 42)	2.1 (0.7 to 6.3)	5
	I (33) v all (66)	61 v 62	-1 (-22 to 19)	0.9 (0.2 to 2.4)	—
Morisky 1990	Active tuberculosis: I (43) v usual care (45)	98 v 91	7 (-3 to 16)	4.1 (0.4 to 208.3)	14
	Preventive: I (58) v usual care (59)	64 v 27	37 (20 to 54)	4.7 (2.0 to 11.2)	3
Smith 1990	I gift (193) v nothing (192)	23 v 22	1 (-7 to 9)	1.1 (0.6 to 1.8)	100
	I milk (149) v nothing (192)	37 v 22	15 (5 to 25)	2.1 (1.26 to 3.5)	7
Jeffery 1993‡	I (82) v therapy (80)	84 v 77	7 (-5 to 19)	1.5 (0.6 to 3.7)	14
	I (82) v nothing (40)	84 v 70	14 (-2 to 30)	2.3 (0.8 to 6.1)	7
	I (82) v all (120)	84 v 75	9 (-2 to 20)	1.8 (0.1 to 4.0)	11
Higgins 1994	I (20) v nothing (20)	75 v 40	35 (6 to 64)	4.5 (0.0 to 6.1)	3
Stevens-Simon 1994	I (108) v nothing (132)	82 v 65	17 (6 to 28)	2.5 (0.0 to 21.9)	6
Pilote 1996	I (82) v peer advisor (83)	84 v 75	9 (-2 to 22)	1.8 (0.8 to 4.2)	11
	I (82) v usual care (79)	84 v 53	31 (18 to 45)	4.7 (2.1 to 10.6)	3
	I (82) v all (162)	84 v 64	20 (9 to 31)	3.0 (0.1 to 6.3)	5

*Odds ratio of incentive group compared with all other groups.

†Number needed to be treated to improve compliance by one patient; incentive group compared with all other groups.

‡There were 5 groups: (1) incentive+therapy+food provision, (2) incentive+therapy, (3) therapy+food provision, (4) therapy, (5) no treatment. Groups 1+2 and 3+4 were pooled for the comparison.

Description of eligible studies and interventions

The eleven studies selected for detailed review were all conducted in the United States. Their publication dates ranged from 1976 to 1996.⁴⁶⁻⁵⁶

Two studies aimed to improve the rates of patients' adherence to an antituberculosis medical regimen,^{46 47} two sought to encourage parents to seek dental care for their children,^{48 49} and two others were aimed at parents of children, to encourage immunisation or attendance at a paediatric outpatient clinic.^{54 55} Another two studies tested incentives (milk coupons for the infant or a gift for the mother) to enhance compliance with postpartum appointments among indigent adolescents.^{50 51} Of the three remaining studies, one encouraged patients to complete a treatment programme for cocaine dependency⁵²; another (unpublished) study promoted antihypertensive treatment⁵³; and the remaining study promoted compliance with attendance to a weight reducing programme.⁵⁶

The incentives ranged from relatively small amounts of money (\$5) up to gifts worth nearly \$1000 for a treatment programme for cocaine dependency (table 1).

Quality

We made no attempt to formally rate the studies for quality; however, as is clear from table 2, most of the

studies were small and therefore had low statistical power. Furthermore, no study explicitly stated any prior power calculations to justify its sample size and no study indicated that the randomisation process was concealed.

Outcome

Ten out of the 11 studies showed that some form of financial incentive promoted compliance better than any alternative. A non-financial method of increasing compliance achieved a better result in only one study.⁵⁵

This study was set in a paediatric outpatient clinic for behaviourally disturbed children; the intervention was to tell the parents that if three successive appointments were missed then their child would be assigned to the bottom of the waiting list.

No study compared different amounts of monetary incentive. However, one study showed that free milk coupons for teenage mothers worked better than a free gift for the mother.⁵⁰

Discussion

The consumption of health care is generally sensitive to its price.⁵⁷ All things being equal, uptake or compliance will be lower when there is a financial charge than when health care is free to the patient. This review

showed that, even when free medical care is the alternative, the use of some form of financial inducement increases compliance. However, the examples of compliance identified in this review were highly visible, which is often not the case in many areas of medicine.

Effectiveness of financial incentives

Financial incentives tend to be more effective than other methods of improving compliance. For example, a small \$5 incentive for homeless people with tuberculosis was more effective than peer support.⁴⁷

Financial incentives can be more cost effective than alternative interventions—they can achieve greater compliance at lower cost.⁴⁸ However, the cost effectiveness of increasing compliance by whatever means will also depend on whether the extra compliance is worth the extra cost.⁵⁸ Financial incentives are likely to be cost effective if substantial treatment benefits accrue not only to the patient but to society at large—in economic parlance, if there are positive externalities to treatment. Treating or preventing tuberculosis is an example of this. If patients comply badly with treatment this not only leads to more expensive treatment for the individual patient later in the disease cycle but increases the possibility of the development of drug resistant strains of the disease and the infection of other people.⁵⁹ Great efforts have been made in the field of tuberculosis treatment (including financial incentives) to promote compliance.^{60 61} A further example is compliance with anti-rejection drugs by transplant patients, which reduces the possibility of rejection and in turn saves resources that would be needed for retransplantation.^{62 63}

If non-compliance is associated with low income, financial incentives might also improve equity. All things being equal, we would expect financial incentives to have a greater effect among low income patients. On the other hand, financial incentives may have negative consequences and may affect other aspects of the patient's behaviour. One of Titmuss's arguments against introducing financial incentives for blood donors was that although such payments might induce a greater supply of some donors (and possibly those whose donations should not be encouraged), it could reduce the supply of those who previously had not required any financial incentives.⁶³

Our review did not answer the question whether cash payment or payment in kind was more effective as no study made a direct comparison, but cash payment would be expected to be more effective. In a study of attendance at an AIDS prevention programme, when monetary payments were changed to food or gift vouchers, attendance declined considerably.¹⁹

Conclusions

Although this review showed a positive effect of financial incentives, all the randomised studies have been carried out in the United States; the results may not translate directly to another country with a different socioeconomic and cultural context. These results need to be supported by well designed randomised trials in other countries.

In areas of health care where important individual and or external effects are associated with non-compliance, monetary incentives may be relatively cost

Key messages

- Non-compliance with medical treatment is a widespread problem
- Non-compliance may lead to increased treatment costs in future
- Financial incentives can significantly reduce non-compliance
- Incentives can be cost effective, particularly for treatment of infectious disease
- Research in the context of the United Kingdom is required

effective. In these areas, compliant patients should receive payment.

We thank those authors who responded to our request for information, particularly Dr Shepard. We also thank the referees for their helpful comments, Nick Freemantle for his help in calculating the odds ratios confidence intervals and Professor Hugh Gravelle for helpful suggestions.

Funding: The National Primary Care Research and Development Centre is funded by the Department of Health. The views expressed in the paper are not necessarily those of the department.

Conflict of interest: None.

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(Accepted 28 May 1997)

A memorable patient Ward cleaner's clinical observation

It was a busy evening in the casualty department in India, where I was the medical student shadowing a senior doctor.

We were interrupted by the domestic cleaner, who ran up to us asking us to see a patient on the trolley rather urgently. Not waiting for an answer she took the senior doctor by the hand across the room to the patient. After an examination he concluded that she might have a suspected ruptured ectopic pregnancy, arranged for urgent blood tests, started her on appropriate initial treatment, and spoke to the gynaecology and obstetric resident, who received the patient, took her to the operating theatre, and confirmed the diagnosis. The patient recovered well from surgery and was later discharged.

I returned back to the domestic cleaner whose usual work is to tidy up the department and asked her how she recognised that all was not well with the patient, and what made her seek urgent medical help. Nonchalantly, she said, "Doctor, I have observed that patients on trolleys who persistently yawn while

waiting to see the doctor most often are rushed to operating theatre."

In hypovolaemic shock, one of nature's methods to improve oxygenation is to yawn, whatever the mechanisms involved. That act of observation from a lady without any letters behind her name has saved, and will continue to save, lives.

V M Sethukumar, *consultant in accident and emergency, King's Lynn*

We welcome filler articles up to 600 words on topics such as *A memorable patient*, *A paper that changed my practice*, *My most unfortunate mistake*, or any other piece conveying instruction, pathos, or humour. If possible the article should be supplied on a disk. Permission is needed from a patient or a relative if an identifiable patient is referred to. We also welcome contributions for "Endpieces," consisting of quotations of up to 80 words (but most are considerably shorter) from any source, ancient or modern, which have appealed to the reader.