Charging for NHSPlus: An Inferential Study based on the Internal Provision of Occupational Health Services within the NHS

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Abstract

Background

The concept of 'NHSPlus'was introduced by the UK Secretary for Health in 2000 in an address to the London School of Economics, a key element being the possibility of the NHS offering occupational health service to employers on a fee earning basis. This was formalised in the NHS Plan (2000), which stated that NHSPlus was to be set up as a national agency that would operate without imposing any financial burden on the taxpayer. The requirement that this agency should be self-funding brings into focus the nature of the resources required to operate such a service and how external clients should be charged for the service.

Aim

In this study, the existing provision of occupational health services to over 100,000 NHS staff by thirteen NHS occupational health services of various sizes was analysed, with the objective of inferring what an appropriate charge-out rate might be to third parties, and in particular whether published rates based on NHSPlus case studies were economically viable.

Method

Data collected on the allocation of doctors and nurses to this function in relation to the number of NHS clients serviced were used to investigate the nature of the resourcing relationship using regression analysis. The relationship was found to be stable enough to provide a good approximation to staff requirements (the key resource requirement), allowing inferences to be drawn concerning the economic cost and hence the break-even rate of charge for the service. This was then compared to the employer charge rates in the NHSPlus published case studies.

Conclusions

The results suggest that the *per capita* charges to external clients are lower that the *per capita* cost of internal occupational health provision within the NHS, raising questions about the viability of the service.

Key words: occupational health; NHSPlus; resource model; professional charges.

Introduction

Previous work on the provision of Occupational Health Service (OHS) by the United Kingdom National Health Service (NHS) has tended to concentrate on the operational details of setting up the service rather than the economic issues surrounding such provision (1). It was the broader economics issues that the UK Secretary of State for Health emphasised in announcing the 'NHSPlus' concept in his address to the London School of Economics in 2000, with the NHS providing to external clients the type of service which was being provided internally:

> 'I am interested in exploring whether there is scope for the NHS more generally to provide similar occupational health services to employers. 'NHSPlus' if you like. A service of this sort might be particularly valuable for small and medium-sized firms which lack the size to organise in-house services but where ill-health amongst key employees can have devastating consequences.'(2)

This model of occupational health provision envisaged by the Secretary of State for Health parallels in part that of Japan (3,4,5), where organisations such as the Nishinihon Occupational Health Center provide occupational health services to small and medium size companies, some of which do not have the resources to meet Japanese legal requirements. However the lower level of occupational health provision in the UK (6) suggests that it is not only UK companies at the smaller end of the spectrum that are possible clients for the NHS trusts.

This address by the Secretary of State for Health was followed up in the NHS Plan (7), which stated that NHSPlus was to be established as a national agency. The business plan for NHSPlus was designed to ensure that these new services were to be provided at no cost to the taxpayer and would build upon local services provided by hospitals and Primary Care Trusts. Surpluses were to be reinvested in the expansion and improvement of NHS services. It was intended to launch NHSPlus(8) in 2001, with its coverage developing as the capacity of the NHS expanded. In fact, the idea was already operational at the time of the announcement by the Secretary of State for Health with NHS Trusts already making occupational health provision available to

small and medium sized enterprises in their areas and charging employers for these services, although the charging philosophy was aimed at covering costs rather than generating surpluses that could be reinvested to improve the service

Some evidence on whether or not the charge rates can realistically be viewed as containing an element of surplus are provided in this study, where the illustrative charge rates to external employers in four published NHSPlus case studies (9) are compared with the cost estimations generated from the empirical analysis of OH provision within the NHS.

Following this discussion the procedure adopted in this study is first to establish that there is a stable relationship which captures the required resource levels of the main cost components of occupational health provision within the NHS, namely Occupational Health Physicians (OHPs) and Occupational Health Nurses (OHNs); and secondly, to infer from this relationship (after including additional estimates of additional costs such as vaccines and clerical assistance) what levels of charges to external clients would have to be implemented to cover the cost of the service. These costs are then compared with the charges to the employers in the published NHSPlus case studies and conclusions drawn on the basis of both cost recovery and of comparison with commonly used fee models of other professions.

The cost model is based on data collected on the resourcing of occupational health provision to over 100,000 NHS staff by all thirteen occupational NHS health services of various sizes. The reason for concentrating on NHS internal provision was (1) because the data were available and reliable, and (2) to provide a check of the extent of likely variation within a relatively homogenous group. Clearly, if the variation had been excessive then this would have weakened the extent to which inferences could have been drawn. The thirteen occupational health services covered the 'old' Trent region across South Yorkshire, Lincolnshire , Derbyshire and Leicestershire. It covered the full service to the NHS including acute, community, mental health and ambulance services across the Region. It provided a representative sample ranging from small to large, non-income generating to large providers across the NHS and other organisations. Whereas this is a reasonable enough sample to make inferences about the requirements for operating an occupational health scheme within the NHS,

it is acknowledged that a certain amount of care must be taken in extrapolating these results to other occupational groups.

Methods

Two focus groups were set up in the Trent Region, consisting of an Occupational Health Senior Nurses focus group and an Occupational Health Physicians focus group. The registration forms of all participants requested detailed information on income generation, the size of NHS occupational health services in relation to the number of NHS staff they served and details of the full-time equivalents of Occupational Health Nurses (OHNs) and Occupational Health Physicians (OHPs) attending to these clients. Table 1 shows that some of these health services already generated significant non-NHS income, with the proportion of 'non-NHS income to budget' generally increasing with the size of the service. Again, there was a tendency for the larger services to operate on a contract basis rather than on the basis of service provided (ie a 'pay-as-you-go' basis).

Table 1. Summary of non-NHS income generation from 13 health services (source: focus group Registration forms)

Number of NHS staff serviced by OH team	Proportion of non NHS income earned as a % of total budget	Fee for service only	Contract &fee for service	Contracts & fee for service & possible national contracts
1700	5%	Y		
3000	15%	Y		
3300	5%	Y		
4000	5%	Y		
4000	5%		Y	
5300	35%		Y	
6000	5%	Y		
6500	10%		Y	
9000	7%	Y		
12000	30%		Y	
14500	20%		Y	
15500	34%			Y
16000	25%		Y	

The discussion in the focus groups made it clear that the resources consumed in providing OH services consisted mainly of staff time. This view is reflected in the

NHSPlus case studies considered subsequently, where it is indicated that external clients provide most of the facilities themselves, with non-staff resources provided by the NHS tending to consist of use of standard medical equipment (eg spirometry equipment), low cost disposables and travel expenses. With the provision of services to the NHS, vaccines are estimated to be 20% of non pay costs or approximately 3.5% of total costs (Nottingham Occupational Health 2003) – these estimates are of a similar order to actual data from Kings Mill (now Sherwood Hospitals NHS Trust) and Nottingham Occupational Health used to estimate non-pay costs subsequently. Staff resourcing is shown in table 2 (compiled from the focus group registration forms) which shows the full-time equivalents of Occupational Health Nurses (OHNs) and Occupational Health Physicians (OHPs) in relation to the NHS clients serviced.

Table 2. Full-time equivalent provision of OHNs and OHPs in relation to the number of NHS clients served (source: focus group registration form).

Clients	OHNs	OHPs	Ratio OHN/OHP
1700	1.5	0.1	15.0
3000	2.2	0.9	2.4
3300	1.6	0.4	4.0
4000	1	0.2	5.0
4000	3.1	0.1	31.0
5300	2.5	1	2.5
6000	4.2	0.56	7.5
6500	4.5	2	2.3
9000	7.6	2	3.8
12000	7	1.2	5.8
14500	13.5	4.5	3.0
15500	9	4.2	2.1
16000	10.4	3.4	3.0

Data on salary rates were obtained from NHS Whitley scales, which were used in conjunction with the estimated staffing relationships to generate costing information.

Regression Analysis

The first task is to try to explain the existing NHS OH resource provision using the data of table 2. – i.e. to investigate how the numbers of OHNs and OHPs vary with the number of clients. Given that an approximately linear relationship appears to exist between the number of OHNs and OHPs and the number of clients, regression analysis was used to investigate this.

Table 3 shows the results of running simple linear regressions of client numbers on first the number of OHNs and secondly the number of OHPs. Initially a constant term is included to capture any non-proportional scale variation (ie the extent to which greater scale of operations might lead to lower proportional costs) (models 1a and 2a). In model 1a the constant turns out not to be significant at the 5% level on the basis of a t-value of 1.58. This combined with the high R^2 value of 87.3% suggests that there are good grounds for seeing the relationship between number of clients and OHN requirements as being linear. That this relation is also proportional is confirmed in model 1b where the constant is suppressed, resulting in only a small drop in R^2 value. The implication is that one OHN is required for every 1,387 clients (model 1b).

The relationship between client number and OHPs (model 2a) gives a good fit (R^2 = 80.5%) but in this case the constant term is significantly different from zero (t= 3.24). This intercept value of 3,085 clients suggests that there could be diseconomies of scale (ie that an increasing number of OHPs does not result in the same proportional increase in client base). This view is supported by running the model with the constant suppressed (model 2b), which reduces its power to explain the variation in the data to 61.8%. A likely explanation for this is that, with a larger number of OHPs, there are likely to be doctors in training who will see a smaller number of patients.

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Table 3. Individual regressions of client numbers against OHNs (model 1) and OHPs (model 2). The 'a' models include a constant, the 'b' models have the constant suppressed.

Models	Constant	Coefficient of OHNs	Coefficient of OHPs	R^2 %
1a	1424	1208		87.3
	(1.58)	(8.67)		
1b	-	1387		84.3
		(16.03)		
2a	3085		2952	80.5
	(3.24)		(6.73)	
2b	-		3988	61.8
			(9.92)	

(note: t-stats against a null of zero shown in brackets)

The possibility of substitution of OHNs for OHPs (or *vice versa*) suggests that a better way of investigating the combined resource requirement is to use a multiple regression approach regressing client number against both OHNs and OHPs. The results of this are shown in table 4.

Table 4. Multiple regression of client number on OHNs and OHPs

model	Constant	Coefficient of OHNs	Coefficient of OHPs	R^2 %
3a	1683	903	846	88.3
	(1.78)	(2.58)	(0.95)	
3b	-	1261	391	
		(4.03)	(0.42)	-

(note: t-stats against a null of zero shown in brackets)

The R^2 statistic is unreliable for multiple regression where the constant is suppressed and is not reported

This specification (model 3a) appears at first sight to give a reasonable fit to the data on the basis of an R^2 goodness of fit statistic of over 88%.   The t-statistic of the constant term suggests that the constant is not significantly different from zero at the 5% level, so a proportional relationship cannot be ruled out. However, the t-statistic for the OHP coefficient indicates that it is not significantly different from zero, from which one might be tempted to conclude that no OHPs are required to service the

occupational health activity. That this is a mistaken inference becomes clear when the correlation coefficient between the numbers of nurses (OHNs) and doctors (OHPs) is investigated. This turns out to have the high value of 0.916, indicating the presence of multicollinearity between the numbers of OHNs and OHPs – ie the variables are so closely correlated that it is difficult to be too certain as to how much each of the two explanatory variables is driving the regression result. Suppressing the constant (model 3b) does little to clear up the problem – the coefficient of OHPs is not significant and the values of the coefficients are unstable (ie they have changed considerably) due to the multicollinearity problem. Further experimentation using a dummy variable to distinguish the health services operating on a contract basis (see table 1) also failed to resolve this problem. A way round this difficulty, given that the ratio of OHPs to OHNs is an important component of resource planning, is to investigate the OHP to OHN relationship directly.

A regression of OHNs on OHPs gave the results reported in table 5 both with the constant (model 4a) and with the constant suppressed (model 4b). In this case, suppressing the constant does not appear to reduce the explanatory power despite the constant term being marginally significant. The implication is that the ratio of 2.85 OHNs per OHP is valid over a reasonable range of client numbers. Using a categorical dummy variable to capture any specific effect that might be attributable to those health services operating on a contract basis (table 1) did not give any explanatory power to the contract / no-contract dichotomy. The implication is that the service provision both with and without a contract is essentially the same.

Table 5: Number of OHNs regressed against number of OHPs

Models	Constant	Coefficient of OHPs	R^2 %
4a	**1.55**	**2.33**	83.4
	(2.32)	(7.59)	
4b		**2.85**	81.2
		(11.6)	

(note: t-stats against a null of zero shown in brackets)

In summary, this empirical analysis suggests that a planning ratio of 2.85 OHNs (nurses) per OHP (physician) is the (statistical) norm for the provision of OH to NHS staff, although there is inevitably some variation around this as is evident from the raw data in table 2. The regression equations 1b and 2b suggest that the number of clients serviced by one OHN is 1387 and by one OHP is 3988. The ratio of 3988/1387 is 2.87, which is close to the OHN to OHP ratio of 2.85 obtained in model 4b. There is therefore enough consistency in these results for these figures to be viable as planning values for OH provision within the NHS, while at the same time acknowledging that there is an element of non-proportionality in the case of OHP provision.

Financial analysis of OH provision to the NHS

Since the OHN and OHP requirements were found to be approximately proportional to the number of clients serviced (with some caveats in the case of OHPs), it is possible to work out an average cost per client using the figures in the last paragraph together with salary information (see table 6). This gives an estimated cost per client for OH provision in the NHS. Our starting point is to assume that the value of an OHN's or OHP's time is equal to their rate of pay plus 'on costs' (i.e. employers' National Insurance contributions) on the basis of replacement cost arguments. That is to say that, for staff who are serving external clients, the lost work activity elsewhere could in theory be made up by buying in more labour to replace them at the going salary rate plus employers' National Insurance.

In order to estimate the cost per client, an estimate for non-clinical staff costs (vaccines, clerical costs etc) was obtained from the financial records of Kings Mill and Nottingham Occupational Health services for 2000/1. Kings Mill (now Sherwood Hospitals NHS Trust) is a small occupational health service, providing minimal services outside the NHS, whereas Nottingham Occupational Health provides service across the local economy, as well as the health economy.   These direct non-staff costs were aggregated and averaged to give an estimated non-staff cost per client of £12.48 per year. Taking these together with the staff resources estimated from the regressions and staff costs based on the average of the NHS Whitley scales leads to the an estimate of the annual cost per client as depicted in table 6 of £47.00 (the on-

costs have been assumed to be 9% employer National Insurance These estimated costs are now compared with the indicative costs in the NHSPlus published case studies.

Table 6.

Annual SalaryAssumptions including oncosts (ie employer National Insurance contributions), based on average salary, allocated to provide a cost estimate per client.		
	£ (assumed costs including 9% N.I.)	**Comment**
OHP Doctor	£56,272 x 1.09 = £61,336	Consultant approx £48905 - £63,640 plus on-costs
OHN Nurse	£24,352 x 1.09 = £26,544	F/G approx £23285 - 25420 plus on-costs
Estimations from regression analysis		
Clients per OHP		3988
Clients per OHN		1387
OHNs per OHP		2.85
Estimated costs for 1000 NHS clients		
		£
OHPs	£61,336 x 1000/3988	15,380
OHNs	£26,544 x 1000/1387	19,137
	Total clinical salaries apportioned	34,517
	Clerical and non staff costs	12,480
Total cost of service provision for 1,000 clients		46,997
Cost per client		£47.00

NHSPlus – OH provision to non-NHS clients

In providing OH services to clients outside the NHS the specific degrees of risk attaching to the nature of the clients' activities will be a factor in determining the appropriate OH practices implemented e.g. exposure to specific chemicals may demand further blood tests and respiratory investigations. The employers section of the NHSPlus website gives four case studies outlining costs to employers of OH provision for various types of organisation. These costs, stated on a *per capita* basis, are summarised in table 7. As can be seen, the range of work activities covers a broad

range and the charge per client varies considerably from £19.85 to £41.77 per year. However, of crucial significance to this study, these charges to the various businesses are in all cases below the estimated cost of OH provision within the NHS estimated earlier of £47 per client per year. The implication is that not only would NHSPlus fail to make a profit at these charge rates, but it would also fail to cover its costs unless the service could be provided without any increase in OHNs or OHPs. This could only be achieved if the OH service were consistently running below capacity, which does not seem likely.

Table 7. Summary of charges for OH provision as per NHSPlus case studies for employers (9)

case	Nature of Business	Number of clients (employees)	Total charge £	£ Charge per client per year
1	Vehicle repair/spray	20	640	32.00
2	Government laboratory	60	2,506	41.77
3	Manufacturing	150	2,977	19.85
4	Engineering	400	14,487	36.22
5	<NHS comparison>			Cost: £47.00

A further means of trying to justify the low charges to the businesses in table 7 would be to argue that the businesses are less hazardous than the NHS, and therefore there is less work to be done per client. In the absence of further information it is questionable as to whether working in the NHS is more hazardous than working in a spray shop (case 1) or in a government laboratory where dangerous and carcinogenic substances are being handled (case 2), but even if this were true there is clearly little or no surplus being generated. Again, it is difficult to avoid the conclusion that the service would make a loss in the long-run if priced in this way.

What should the charge rate be for NHSPlus services? The two models commonly used by professional firms are market rates and cost plus. In a competitive market, any premium above the market rate for the job has to be justified by product

differentiation – ie value adding activity which will justify higher rates. The main competition to the NHSPlus is provided by BMI Medical Services and BUPA Occupational Health Services, but this competition is differentiated by being offered by organisations which only offer private medicine and the charge rates for OH are correspondingly much higher. Within its own segment of the market, the NHS has no direct competition and therefore the market rate is not observable. We therefore turn to cost plus.

There are various cost-plus approaches in use, two common ones for professional practices such as lawyers or accountants are (1) the ⅓ - ⅓ - ⅓ approach, whereby ⅓ of the charge covers the salary cost, ⅓ covers overhead and ⅓ is profit or surplus, and (2) the 1.25% of salary cost per day approach (10). On the ⅓ - ⅓ - ⅓ approach basis, the appropriate charge out rate for OH provision per client would be three times the calculated salary cost plus direct expenses. From table 6, dividing the total apportioned clinical salaries by 1000 and multiplying by 3 suggests that the charge out rate on this basis would be £104 per client (this excludes the non-staff costs, which would normally be passed on to the client, which were estimated above for NHS staff at £12.48 per client). If the 1.25% of salary per day approach is used, then assuming 250 working days per year a similar answer is obtained since 1.25% x 250 = 3.125, ie the charge out rate is just over the multiple of three times the annual salary used above. This is highly consistent with the ⅓ - ⅓ - ⅓ approach, the conclusion being that were this a service provided by a professional firm operating in an open external market then the fee would be around £108 per client per year plus additional costs of £12 - £13 per client per year.

Conclusions

This paper has used data on the internal provision of OH in the NHS as a framework for analysing the resource requirements and hence the cost of this provision. This cost estimate has then been used as a basis for assessing viability of the charge out rates in the NHSPlus illustrations ('case studies') of charges to employers published by the NHS and available as indicated on the web. These comparisons suggest that the NHSPlus provision will almost certainly incur losses based on current charging

policy, except where OHPs and OHNs are working below capacity where the opportunity cost of their time would approximate to zero. In the current underfunded state of the NHS it is difficult to make a persuasive argument as to why this should be the case, except perhaps on a marginal basis at infrequent intervals – not the type of situation that is suited to servicing a substantial client base. It is recommended that the charge basis for OH should be formalised to reflect more closely the fee models of other professional organisations, and should aim to generate enough surplus to allow for investment and development of the service.

In essence this study is indicative of the conflation of politics, budget problems and lack of internal versus external market appreciation discussed at length elsewhere (e.g. 11,12, 13). For NHSPlus to be self-funding requires enough of a surplus to be generated to provide the necessary investment and development of the service. It may be that the professional cost-plus approaches are too aggressive for the NHS for which market forces are moderated by the need to be seen to provide a public service. However, if NHSPlus is to continue it will need to be able to fund its own development and survival, which requires a more business oriented approach to negotiating and setting fee rates.

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