Occasional articles

Costing of pathology services in the United Kingdom National Health Service

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Introduction

The definition of "cost" is the price to be paid for anything, which can reasonably be taken to apply to calculations of the price for the provision of laboratory services to the NHS, whether these services are derived from in-house laboratories or external contractors. The other part of the problem is the meaning of "funding": again, the dictionary definition is explicit—a stock of money set apart for a purpose. We need to examine these two concepts in some detail before we can determine where they fit into the rapidly changing NHS, with its purchaser-provider philosophy and the introduction of the "contract" system between Health Boards, hospitals, fund holding GPs and private facilities. What items, for example, should be included in calculations of costs? Salaries, obviously, and it is essential that those of all grades of staff involved in the provision of the service (medical, scientific, technical and ancillary) must be apportioned, as must the cost of consumables and reagents. What should be included in overheads? For example, do we calculate heating, lighting, waste disposal and cleaning costs? How is capital equipment cost to be reckoned? On the present NHS accounting basis, the total cost of new equipment is written off in the year of purchase, but this policy may be changed with the creation of the asset register. Where does the cost of replacing items, which may already be 10–20 years old, or which have become obsolete in terms of safety or efficiency, fit into the calculations? If we were to agree on the principle of depreciation (or, in transatlantic phraseology, amortisation), over how many years would it be, and for which items? What will be the time base for these calculations—a year, three years, 10 years? Additional considerations include inflation costs—how will these be calculated and incorporated? How would recognised savings be apportioned? Who is to meet the cost of billing and who gets the bills? What provision is to be included for research and development—essential if the service is to remain efficient and up to date?

How will the hardware and software needed to handle all this additional work, and which will require constant updating, be paid for and by whom? The tendency now is for the NHS to buy in commercial consultancy, as well as both hardware and software packages, from those firms who have recognised the opportunity that increased expenditure on information technology has created. The sums of money available to NHS managers, however,

are neither excessively large nor will they necessarily be available on a recurrent basis. In-house computing facilities are poor in the NHS: the scale of requirements is and always has been, very large, but the resources devoted to the problem have been small until the recent past, not least in the grading and salaries offered to systems analysts, programmers, and hardware engineers, compared with those attainable on the open market. The lack of experienced staff is particularly acute for dealing with ward and laboratory budgets. Hence there is management pressure to accept pre-packaged systems that are often adaptations of previously marketed business financial systems, which may cut development costs for the suppliers but which have disadvantages of inappropriate or inadequate design for hospital use. Delays in decision making within the NHS also occur, leading to the proliferation of "one off" systems on small scale funds in individual hospitals, units, clinical directorates and laboratories, with the end results of lack of compatibility between systems and uneven provision of facilities.

The method of funding laboratory services also needs to come under close scrutiny. Until recently, laboratory costs were generally directly funded by the hospital or health authority, sometimes on the basis of an agreed budget, but often without even more than a token attempt at cost control. The argument went thus: like radiology, laboratories do tests on identified specimens or patients. Tests can be counted, or so it seemed to NHS accountants and statisticians. It might seem an easy step to take total funding and divide it by the number of tests, and in the early days of cost cutting that was often the simplistic approach adopted, acknowledged to be unsatisfactory but used in finance offices for want of any decent workload measurement system, or indeed, any method of calculating the other items listed above as "costs". The other, equally misleading and simple minded approach was for some luckless chief MLSO to spend days calculating down to £0.00001 the exact cost of an assay for faecal helium—only to have to revise the figures whenever the manufacturers of the reagents or equipment imposed a price increase. Presented in such stark terms, neither approach has much obvious merit, and it is astonishing that these are the patterns of thinking on which some budgets have already been developed. It is clear that no one can expect to produce accurate budgets or cost effective tenders to provide services on the basis of such

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inadequate and misleading information, far less engage in forecasting future trends.

The provision of funding must obviously be related to costs, but the actual methods of deriving funds can be seen in a different light. The laboratory's funding budget may be either primary or secondary. Primary budget funds are transferred directly to the pathology services, either as a single unit or directorate or as separate laboratory specialties, and are derived directly from the hospital or unit revenue. Secondary budgets are recouped from the individual clinical units or directorates by a billing process, based on agreed test costs. This latter method has instant appeal for managers who see this as a way of making clinicians more directly accountable for how they spend their budgets. There are, however, some inherent disadvantages in secondary budgets, and laboratory consultants would be well advised to negotiate for a primary budget. Firstly, this method makes forward planning straightforward because the budget figure can be agreed on for periods of a year or more in advance, rather than by retrospective billing. Rates of use should be derived for each of the clinical directorates or units, based on past use and, if necessary, discussion with the clinician(s) concerned. The laboratory services are not liable to be starved of finance by one-sided decisions often made in a panic, when the clinician appreciates for the first time just how much laboratory services cost. There is not the same pressure to agree on different services or costs for individual clinicians' preferences. The disadvantage may be that some individual clinicians demand the cheapest possible service, perhaps based on hearsay evidence from other centres who are not using efficient costing procedures, using some cruder calculations to arrive at what they see as a competitive price and ignoring the core component. With the primary budget it is the manager who negotiates with the laboratory consultant on an agreed price for services and then allocates appropriate costs to the clinical services on whatever basis he or she determines, which can be quarterly or annual, obviating the necessity for expensive billing procedures to ward or consultant budgets. The provision of core facilities is ensured and the care of patients safeguarded. It is still necessary to have reasonably refined methods of calculating workload and costs of laboratory services but these are primarily the responsibility of the laboratory consultants.

In an attempt to derive some agreed basis for laboratory costs a system of workload measurement was developed in Canada some years ago, based on the number of minutes taken by technicians and clerical staff to process a specimen, recognising that the salaries of these staff formed a very substantial part of the costs of the laboratory services. The so-called Canadian Workload Measurement System was subsequently modified and introduced in the United States. In both countries it became the basis for the reimbursement of fees under the Medicare and Medicaid systems of state fund-

ing for those without necessary private insurance funding and was also used for calculations of agreed fees payable to laboratories by private insurance companies. In the United Kingdom, the farseeing Welsh Office decided to introduce a much modified and limited "Wel-Can" system of workload measurement in an attempt to find some basis for comparison of workloads and, ultimately, staffing.¹ The idea was also actively promoted by some laboratory consultants, anxious to have some measure of staff time if not of all aspects of expenditure. After long deliberations an extended Wel-Can manual was developed by the combined talents of a Joint Working Party, under the auspices of the Royal College of Pathologists. This volume was issued in late 1990 (Welcan UK, 1990),² and it has the full support of the Royal College of Pathologists, Association of Clinical Biochemists, the British Society of Haematology, the Institute of Medical Laboratory Scientists, and the Association of Clinical Cytogenetics, all of whom participated in the Joint Working Party. The Departments of Health in both England and Scotland have yet to give it official blessing, but it will doubtless be widely used, with or without official sanction.

It is essential that pathologists and managers fully understand the basis of the Wel-Can calculations, recognising the limitations of the system and not attempting to use Wel-Can values for purposes for which they are not suited or are insufficiently accurate. The misapplication of Wel-Can to capital costs, test costs, and to items never intended to be incorporated in the system can only lead to inaccuracies and misinterpretation.³ Because the workload unit accounts only for productive time in minutes of technical, clerical, and aide staff, it therefore ignores waiting time, annual leave, sickness, training, consultants' and scientists' time, etc. No area of the laboratory can therefore be accounted as 100% efficient in terms of Wel-Can units and, indeed, values of over 60% should be viewed with suspicion, because they suggest that the accounting system is inaccurate or that something is being overlooked in the calculations. In some laboratories additional activities such as media and reagent preparation, waste disposal, reagent procurement, and other peripheral activities may not be fully incorporated into the calculated unit values, depending on the work practices of a particular department—for example, processing material for other laboratory services or provision of bulk supplies of media to satellite laboratories. Some tests have no agreed unit value as yet, or only a provisional value.

The consultant pathologist should therefore be wary about using workload measurement units for calculations of costs, mainly because the system, valuable though it is when correctly applied, does not recognise core activities, except in terms of tests done, and may be a poor indicator of the true work involved in, for example, the necropsy service, infection control, and audit. What Wel-Can is useful for is in identifying methods which are out of line with generally agreed values, work areas which are

noticeably inefficient in terms of throughput, and the relative values of manual and automated methods. Dangers lurk if it is assumed that automation is cheaper than manual methods, on the grounds that it ought to need less staff—an agreed high cost item. But does it really work out more cheaply in the long run? Reagent costs are dictated by the manufacturer and may rise as well as fall, the down time for a machine and the technical expertise involved in maintenance may be considerable, and replacement equipment will be required, either because of improvements in new models or the sheer cost of repairing an elderly machine. All of these possibilities must be taken into the financial calculations.

What are the other principles on which the pathologist can base the calculations of the true economic cost of providing laboratory services and prepare tenders for so doing? Firstly, it is essential to determine the method of funding and to agree on this with the administration. The provision of laboratory services requires two separate but interdependent components. These are the core component, which relates to the role of the pathology services in the maintenance of standards of clinical care in both hospital and community based health care provision, and a direct investigation component concerned with requests for investigations specific to individual patient care. There is also a very important third strand to pathology services, namely direct clinical care. This involves consultants from most pathology services, but is particularly applicable to those specialties where the clinical and laboratory services are jointly provided—for example, in haematology, metabolic medicine, clinical immunology and microbiology. The concept of core and investigative components—with the principles of what should be included in each—has already been discussed.⁴

The core budget, which may vary in size, depending on factors such as patient throughput, specialties requiring acute (24 hour) services or dedicated services on site, outpatient attendances, day care facilities, and GP and environmental health access to services, should include full provision for necropsy services, hospital and community epidemiology for infection control purposes, provision of reference facilities or high levels of expertise—for example, trace element detection or special immunological assays—and other services relevant to particular clinical needs in the hospital or community which the laboratory serves. It is also important to make adequate provision in terms of staff time and resources for research and development relevant to clinical services, staff training, safety requirements, medical audit, and for undergraduate and postgraduate teaching when applicable. Without careful calculation of the costs of the core component, budget holders may well find themselves running out of funds for the provision of essential parts of a full laboratory service.

For those who are about to embark on the process of defining budgets and setting costs for contracts, etc, it may be helpful to identify

some of the points which should be considered in the preparation of specifications and pricing levels for the direct investigative component of the service. The practice of pricing individual tests, so beloved of accountants, is best avoided. There are several reasons why this is an unwise method of tackling the problem, not least being the necessity for frequent recalculations as prices or salaries change. If such an approach is adopted or agreed with managers, then the prices derived should parallel those quoted by private laboratories. The temptation to undercut must be avoided and stems from a failure to recognise the various components of a listed price. Private laboratories are probably more cost conscious than most NHS laboratories (at least at the present time), and it should not be assumed that their prices are inflated to derive large profits. Rather, they reflect the need to have a reasonable calculated profit margin, to meet salary costs, overheads, replacement of equipment, and purchase of new equipment for new tests—all of which the NHS laboratory will have taken account of in its own budget in the long term. There is great pressure on the private sector to be cost effective but this is balanced against the need to offer a customer oriented service—that is, to offer the test range sought by the customer, whether this be a private consultant, a private clinic or hospital, a group of general practitioners, or a health service hospital which has chosen to send material for testing, for whatever reason.

The NHS laboratory must aim to be just as cost effective, but managers must be conscious of the very different roles adopted by an outside, private laboratory service, with no commitment to those services which are an integral part of the NHS laboratory. In other words, if all the relatively cheap, automatable tests are contracted out, how will the relatively more expensive, labour intensive services be provided? Thus the NHS manager and laboratory heads of departments must budget for the whole service, including those parts which are not immediately relevant to a specific patient, but which are essential for the proper running of a hospital, whether teaching or non-teaching, and for the health of the community. In Scotland, for example, where there is no equivalent of the Public Health Laboratories in England and Wales, protection must be sought for the reference and public health epidemiological work so necessary for the control of infection, both in hospitals and in the community. These services are currently provided by NHS laboratories and by joint university/NHS departments, and must be included in budgetary calculations.

Furthermore, it has to be recognised that specialist laboratory services are often located in only a few sites—a rational approach to the problems of quality assurance, level of expertise, and optimal use of scarce reagents and sometimes, expensive equipment. Indeed, some private laboratories contract out tests to such specialist sites, when they have agreed to provide a package of tests to a private consultant or clinic, tacitly acknowledging the economic advantages of this practice, where they

can have access to facilities which would otherwise be too expensive to provide in the private sector, either in terms of manpower or capital resources. No doubt the NHS laboratories who accept such contracts can point to the fees charged as "gain" for the NHS, but only if the true costs are being charged, which may not always be the case, especially for capital equipment and overheads, not to mention the specialist expertise of the university or NHS laboratory staff.

For costing purposes, prices for individual tests are not as sensible as might seem at first. What most laboratories provide is not a test as such but rather a service—for example, blood cultures, full blood count, electrolyte assay, histopathology reports, lymphocyte subset identification, blood grouping and cross-matching. Each may seem to be a "test", but closer examination shows that each test incorporates a whole range of procedures and the additional factor of an interpretation of the results, often by a senior staff member with specialist expertise. Systems such as Wel-Can go a long way towards providing figures which give a measure of the value of the test procedures, but do not begin to tackle the add-on value of the consultant's or senior scientist's expertise involved in the service provided. It should be remembered that this service, although designed to meet the perceived needs of a very diverse group of clinical specialties, is based on the experience of those in the laboratories, as far as selection of methods, range of test, appropriateness of assay methods and quality assurance are concerned. The relevance, specificity, and sensitivity of the laboratory procedures offered are the responsibility of the laboratory staff and the consultant pathologists and senior scientists in particular, and their specialist qualifications reflect the high level of training necessary to reach senior posts. In other words, tests do not make a service: it is the whole range of activities within the laboratories, some of them not "visible" to those requesting or funding the service, which together lead to the provision of a timely and appropriate contribution to patient care.

Costing of the direct investigative component, based on the provision of a diagnostic service, rather than on individual test costs, is feasible for all but the most specialised assays (which generally form only a small fraction of the overall work of a laboratory). It is probably simplest to develop the costing system as a separate entity, using microcomputer(s) which can be networked if necessary at a later stage. The method adopted may be designed locally to suit particular arrangements for the scope of services offered, and although the initial collection of data may seem to be time consuming, the information acquired can have several uses. For example, changes of staff grade used for particular services, times of productive work and staffing levels for individual services are readily derived from such a database, using commercially available spreadsheet programmes. It is advisable to choose a package which permits simultaneous calculations on several items, otherwise it can become cumbersome,

switching from one database to another, inhibiting the ability to undertake modelling exercises. These are "what if?" calculations, designed to allow observation of the possible effects of changes in staff deployment, introduction of new procedures, abandonment of procedures deemed to have become inefficient or outdated, and major changes in the purchasing contracts for consumables or maintenance contracts. Salary changes can also be catered for, as can purchase of major equipment items and building and maintenance costs on an annual basis. Minor changes in reagent costs can be ignored or altered annually; constant updating is unnecessary, because the system will be relatively insensitive to small shifts in costs.

The database should also permit the preparation of contracts for tendering, either within the NHS or for outside work, including work designed for income generation. It should not be the primary purpose of the system to offer facilities for preparation of orders, stock control, or duty rosters, but such activities may be held on a separate database, accessible to technical staff who have budgetary responsibilities for sections of a large laboratory. Values from the Wel-Can system may be incorporated into the additional database, together with any values for productive time, paid time, sick leave, relative efficiency of sections, etc. Facilities for down-loading from the laboratory reporting system may also be useful, but one should be wary in the initial phase of development of trying to include too much information, which may never be fully utilised. The aim should be to design the files to answer the questions immediately necessary for the planning of budget allocations, staff deployment, reagent costs, purchasing decisions for contract items and changes in the services offered. It should also be possible to provide agreed details on workload, etc, for NHS managers and for any centralised information gathering system.

It cannot be emphasised too strongly that the setting up of a laboratory resource management system based on these principles is the responsibility of those in charge of the laboratories, not of hospital managers. Close cooperation is needed at all stages of the development and subsequent operation between laboratory staff and the person running the system. This is definitely not a part-time job for someone who likes working with a small desk top computer. During its initial development it requires someone with considerable computing skill, who is also willing to learn about the day to day details of how the laboratory is run, and who can communicate well with all types of staff and explain what is actually happening to those who will use the system. Additional programmes will have to be written to analyse the data in a form suited to the management requirements of the budget holder or head of department, senior technical staff with managerial responsibilities, and the hospital and Health Board managers. The funding of such a development must be sought from the NHS on the grounds that it is now an absolute pre-requisite for the management of laboratories in the new-look

health service, if we are to provide a cost-effective, efficient, and timely service for the clinical care of patients. Decisions on costing made in haste for reasons of expediency, using inadequate methods and incomplete information, will undoubtedly lead to financial and managerial problems and will not be the best way of managing the laboratory services over the next 10 years. Pathologists who shirk their responsibility for introducing efficient resource

management systems will do both themselves and pathology services great harm.

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- 2 Department of Health: Welsh Office. *Welcan UK. Workload measurement system for pathology*. Cardiff: HMSO, 1990.
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- 4 Royal College of Pathologists. Funding of Pathology Services. A discussion paper from the Royal College of Pathologists. *Bulletin of the Royal College of Pathologists* 1990;72:2-4.