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COSTING SUBSTANCE MISUSE SERVICES

**By Douglas Coyle, Christine Godfrey
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YARTIC OCCASIONAL PAPER 5

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May 1994

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ACKNOWLEDGEMENTS

The authors would like to thank all the members of staff at the Leeds Addiction Unit who made this research possible. In particular, Ian Golton helped with preparing the data and with suggestions for analysis of the data. We would also like to thank Jack Astin who undertook a previous analysis of these data as part of his dissertation work for the Msc in Health Economics at the University of York. We are very grateful to Paul Payne of the Leeds Community and Mental Health Services Teaching NHS Trust for supplying data for the research. Participants of the Measuring Up conference held in Leeds in March 1994 and at the YARTIC event at the University of York in October 1993 also made valuable comments on earlier versions of this work. Finally we would like to thank Yorkshire Health who help to finance YARTIC activities and the research conducted for this paper.

YORKSHIRE ADDICTIONS RESEARCH, TRAINING AND INFORMATION CONSORTIUM (YARTIC)

The Leeds Addiction Unit and the Centre for Health Economics at York are collaborating to provide a number of services for activities relating to substance misuse in the Yorkshire area. The Consortium has three main areas of activities. The aim of the research brief is to disseminate knowledge from national and international researchers to practitioners, and stimulate research activities in the Yorkshire area. The training brief is to develop and implement Regional and district training strategies to ensure a high standard of practice amongst specialist agencies and primary care staff throughout the region. The Yorkshire Regional Substance Misuse Database, hosted by the Leeds Addiction Unit, provides basic

information required by the Department of Health.

This paper is the fifth in a series of YARTIC Occasional Papers. These papers will contain reviews of international, national and local issues in the substance misuse field.

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ABSTRACT

Reforms to the structure of health and social care have focused attention on the cost-effectiveness of different services. There are, however, few existing economic studies of substance misuse services. As a first step in applying economic techniques to actual services in the UK, research was undertaken to cost the services provided by the Leeds Addiction Unit. This unit, based in the statutory sector and part of a larger mental health services trust, provides a range of treatments for both alcohol and other drug users. The majority of treatment is given on an outpatient basis although there is access to inpatient beds in a local NHS facility.

This occasional paper contains a discussion of costing methodology and the results of the analysis of the activity of the Leeds Addiction Unit in the financial year 1992/3. Costs were allocated mainly on the basis of the time taken for each event. An event is defined as a direct contact with a patient or a contact appointment. A simple survey of the non face to face time of staff for different types of activity was undertaken. Management and overheads were apportioned for each event. Patient costs were calculated and costs by types of events and the cost over the year for individual patients were analysed. Variations in patient costs by age, sex, employment status and substance use were examined.

Client led services lead to a wide variation in individual patient costs. Also the most costly patients can account for a large proportion of the total. In this case study those with the highest ten per cent of individual costs accounted for 56 per cent of the total annual costs of the unit for the year. The use of such costing studies for auditing and evaluation are explored in this paper and the particular problems in analysing substance misuse services are considered. It is concluded that further understanding of both the costs and outcomes of different services and different groups of clients is needed if contracting for substance misuse interventions can be sensibly developed.

1. INTRODUCTION

Resources available to treat people with substance misuse problems have always been scarce. This situation is likely to continue as there are always competing demands from other client groups for health and social care. Ensuring that resources are used to give the greatest benefit is therefore one important aim of any provider of client services. Monitoring the use of resources and their cost is part of this process. Traditional funding arrangements in the UK, however, involved services obtaining block grants to provide a type of service. These arrangements have not provided an incentive to put recording systems in place that could be used to provide costs of different types of services and clients. Reforms to the health and social care services mean that there is more demand for cost information by both the providers of services and the health and social care purchasers and commissioners.

There are numerous problems facing anyone attempting to calculate costs (or prices) for substance misuse services. Unlike many other health or social care services, those dealing with alcohol and other drug problems generally try to involve clients in their care, and negotiate with the client over the most appropriate form of this care. Also, the client group have a wide range of different problems, come from many different social circumstances and range across all age groups. Providers have been innovative and there is a wide mix of voluntary, statutory and private services. The result of this combination of factors is that it is difficult to determine any standard packages of care. Costs are likely to vary both across the same types of treatment within one provider and across different providers for the same type of care package. In particular there is likely to be wide variations in total costs for each individual client.

This paper presents the results of an attempt to investigate the problems that arise in costing substance services. In the second section of the paper the general issues that arise in costing services and the different methodologies which can be adopted are explored. Data from a years operation of a statutory service, the Leeds Addiction Unit, were used to illustrate costing methodology which could be adopted elsewhere. In the third section of the paper some general features of the clinical activity and clients of the Leeds Addiction Unit are described. The costing methodology developed for this research is explained in the fourth section with the results of the analyses being reported in the fifth section. The data obtained are analysed by type of event, by patient and by patient characteristics. Finally, some conclusions are drawn about extensions to these analyses, their relevance for other providers and purchasers, and how costing analyses may be used in conjunction with outcome data to improve practice.

2. GENERAL COSTING ISSUES

Costing analysis requires the identification, measurement and valuation of the resources used in any services. While this may seem straightforward, costing can be undertaken for a number of different purposes and by different groups. It is important to distinguish between different types of cost study and how different perspectives may affect the results. The Department of Health (NHSME,1993) have distinguished various types of cost and how they can be apportioned to clinical activity. Some of these issues are considered in the second part of this section of the paper.

2.1 Perspectives and purposes of a costing study

There are four possible purposes for costing services:

- (i) to identify resource use;
- (ii) for the provider to compare costs to similar services as a means of cost control;
- (iii) for the purchasers to compare alternative providers of similar services;
- (iv) as part of a wider analysis of the costs and benefits of services.

Cost-effectiveness analysis provides the most rigorous framework for examining the costs of any intervention (Drummond, Stoddart and Torrance, 1987). The purpose of such analysis is to determine which intervention provides the greatest benefit at the least cost. Costs and benefit can be taken from a societal perspective and could include the costs to the patient or client, those falling on the service providing the intervention and any indirect costs. Indirect costs include those incurred by other agencies for the clients of a service. People with substance misuse problems may require a wide range of other health or welfare services. Some agencies have multi-disciplinary staff and provide both health and social care services while others may refer clients to different agencies. If a study is concerned with cost-effectiveness it is important that all relevant costs are included. An analysis which only took into account the direct costs of the service would always favour those agencies or interventions who were the most successful at shifting costs to others. Cost-effectiveness analyses require considerable amounts of data beyond those normally collected by services and are generally conducted as part of a research study.

Information about the cost-effectiveness of different interventions are very valuable for those

purchasing and providing substance misuse services. However, a health purchaser will also be concerned with other cost analyses, in particular in tracing those costs falling on the health service, or more particularly the budget under their control. This information can be required for both planning and administrative purposes. As the health and social care reforms progress in the UK, this cost information will be required so that prices for some volume of service can be appropriately measured. There are certain rules that have been issued by the Department of Health in setting prices, namely that prices should reflect average costs (NHSME, 1993). Such costs should include all the costs of the service including capital expenses. The validity of these rules and the amount of regulation that should be imposed in the new health care "market" in the UK is, however, under question (Dawson, 1994). It should also be noted that in setting prices for contracts it is necessary to "forecast" future expenditure that would be required to provide the stated quality of service. Such forecasts will be based on past data but the perspective and use of the figures is different from a straight analysis of costs.

A further use of costing analysis is to inform the auditing process for the provider. It is useful to trace how the units resources are being used over different periods of the year and what services clients use. Clearly for this type of analysis the focus is on the use of staff time and consumable items. Overheads, management expenses and capital expenditure are not of much interest for this form of analysis.

How items are valued may also vary between these different study types. For economic costing the concept of opportunity cost is used. The opportunity cost of any resource is the value of its best alternative use. For many items there will be a market price, for example

the salary and other costs of employing staff, and this can be taken as the opportunity cost. Other items such as volunteers' time do not have the same money equivalent value. Opportunity costs are also likely to vary from accountancy costs. One example would be the treatment of the capital costs of a care home run by a voluntary organisation. In accountancy terms the only cost would be an estimated depreciation allowance. However the social opportunity cost of the home is its use for other purposes, say as a hotel or an old people's home. For an economic costing, therefore, it would be appropriate to value this resource in terms of the rent the building would generate (see Knapp, 1993 for further examples). For NHS facilities, capital charging has been introduced which has resulted in greater unanimity in the calculation of prices to be charged by different units.

2.2 Types of cost

Some distinction has already been made across the different types of cost. For pricing the NHSME (1993) described three main types of cost for pricing purposes: fixed; semi-fixed; and variable. The division of particular items into these categories depends on the ability to change the amount used. Fixed costs are those that are difficult to change in the short term and will include items such as buildings and capital equipment. Variable costs cover those items whose use depends entirely on the level of activity, for example, toxicology tests, prescribing costs, or other consumables. Semi-fixed costs usually include staff costs. In the short term, staff levels may be fixed whatever the level of activity and adjustments are made in discrete jumps.

These differences are important when considering the difference between average and

marginal costs. Average costs are simply total cost divided by the unit of activity, i.e. per episode of care, or per person. At low levels of activity, therefore, the fixed costs will make up a larger proportion of the average cost than at high levels of activity. The need for extra staff (the semi-fixed part) will vary with activity levels. At the point where activity rises above the capacity of current staff the extra cost of employing more staff will increase the extra or marginal cost significantly but this marginal cost will steadily fall up to the point where another staff member is employed. These issues are obviously very important when providers are attempting to set prices based on average cost for the next years activity.

Another type of division of cost relevant for economic evaluation is between direct, indirect and intangible costs. Direct costs can be defined as the costs of the intervention which fall on the patient and the service. For health care services the direct cost to the client or patient will only involve travel costs, other expenses and possibly some prescription charge but for social care services some direct charge for the service may be levied. Intangible costs are the difficult to value items such as the pain or psychosocial costs involved by the client or their families in the intervention. Indirect costs involve all the other costs falling on the patient, their employers or other agencies.

2.3 Costing methodologies

For economic evaluations it is important to consider all types of cost. Identifying, measuring and valuing the costs to patients, the indirect cost of interventions and intangible elements of care involve a number of methodological issues (Drummond, Stoddart and Torrance, 1987; Netten and Beecham; 1993). There are few examples of cost effectiveness studies of

alcohol or other drug treatments (Godfrey, 1994; Cartwright and Kaple, 1991) and hence little guidance as to any special problems that may be faced in evaluating substance misuse interventions. The measurement of all costs and benefits to determine the cost-effectiveness of different interventions is essential but was not possible for this research. Instead it was decided to explore the direct costs of a service as a first step in this process of producing economic data. The limitations of this form of research are explored in the conclusions of this paper.

The first stage in examining the costs of a providing agency is to trace out the activities and the different elements of services provided. These elements may range over training activities, information provision as well as different types of client service or care. For any in-depth look at the cost of a service it is necessary to apportion costs to the different activities and calculate the unit cost for these different activities. The ability to produce reasonable breakdowns of cost in this way will depend upon data availability.

There are two basic methodologies that can be adopted in producing the direct cost of any intervention: "bottom up" and "top down". The top down approach involves examining all the costs of a unit, say over one year, and allocating the resource use to the activity levels of this unit for the year. This method does ensure all known costs are covered. For many services only broad totals are available and therefore this crude approach would be needed. Dividing by different activity would need some extra data collection to determine, for example, how staff time is broadly allocated across the different activities.

The bottom up approach involves identifying and measuring all interventions and directly

tracing all resource use. The normal means of obtaining such data would be by directly recording the resource use for each intervention. This resource tracing involves ensuring that a proportion of the capital cost and overheads are allocated to each unit of activity. With good resource management systems this approach can give very accurate costs for each individual event and patient. It should be noted that this methodology will not always result in a total figure for the unit which was the same as the accounting budget. Resources would only be valued if used and hence spare capacity would not be costed. It is possible to undertake more analysis of the factors influencing resource use than with a top down approach which only produces average figures. It can, however, involve extensive information systems which can in themselves be costly. Clearly the desirability of such detailed costs will vary with the type of intervention. Such detailed costing appears too elaborate for simple and brief interventions such as those provided by many information services, but is more appropriate for costing longer term care of patients who are more intensive users of resources.

In practice a mixture of methodologies are likely to be used with some costs being allocated to activities in a top-down approach while other resource use can be more accurately traced. For some activities, especially drop-in services or group treatments, it may be impossible to obtain accurate individual client based costs. This was not a problem in the case study described in this paper but further research with different types of agencies and interventions will explore these difficulties and offer some practical guidelines to produce adequate cost figures.

3. THE CASE STUDY - A DESCRIPTION OF THE LEEDS ADDICTION UNIT AND ITS CLINICAL WORK

The case study for this research was the clinical activity of the Leeds Addiction Unit during the financial year 1992/3. The unit is part of the larger Leeds Community and Mental Health Services Teaching NHS Trust. The Addiction Unit is housed in a separate building from the rest of the trust and managed from 1992 as a Clinical Directorate. The unit has three major areas of activity: clinical work; training activities; information and research services including the management of the Yorkshire Region Substance Misuse Database. The objective of the costing study was to provide more detailed analysis of the costs of the clinical work of the unit.

During 1992/3 the Leeds Addiction Unit (LAU) provided a wide range of clinical services to those with substantial substance misuse problems. The majority of services are delivered at the unit and on an outpatient basis. However, domiciliary and inpatient services are also provided. Inpatient detoxification and other care services are provided in six beds allocated to the LAU in a twenty eight bed psychiatric ward. A specialist nurse from the LAU is employed on the ward. The staff of the unit is multidisciplinary including psychiatrists, nurses, occupational therapists, social workers and youth and community workers.

The unit keeps a computerised record of every face to face contact, referred to as an event, which takes place with the main clinical team, including the specialist inpatient care. Outpatient events are recorded for each separate contact with minutes of contact time recorded for each event. Inpatient events are recorded for each stay, the length being the

number of days spent in hospital. A separate database contains information on the characteristics of each patient. These databases and financial information from several sources formed the basis of the research.

During 1992/3 the Unit recorded over 18,600 events, 121 events of which were inpatient stays. Over 1500 clients received appointments at the Unit during this year and about 1200 attended for some service. The problems of costing non attendance are explored more fully in the next section. The following characteristics of the patient group are for all those included in the costing analysis (1542), some of whom would not have received any care in this period. The referrals to the unit in this year were drawn from General Practitioners (35%), general psychiatrists (4.5%), social services (3%), probation (3%), friends and relatives (7%) and other sources (12.5%), but a substantial number were self referrals (35%). The majority (93%) were drawn from the Leeds area but the unit is referred a number of patients from other districts in the Yorkshire area and from further afield. The breakdown of patient by main drug use is given in Table 1. The Unit has been experiencing a growth in opiate users which continued into 1993/4. There was also a substantial minority with problems with more than one drug with 117 having a record of two drugs and 112 a record of three or more.

As may be expected from population surveys of illicit drug use and alcohol misuse, male clients make up 75 per cent of the total. The age range of patients was between 14 and 80, with over 80 per cent being between 20 and 49. Analysis of other characteristics have to be treated with some care because of the high levels of missing observations. Where recorded, the data show that the majority of patients are white but the proportion from ethnic

communities is in line with the population composition in Leeds. Cost figures are examined across other recorded characteristics in Section 5.

Table 1 : Main Substance Misuse by Patient

<u>Substance</u>	<u>No. of Patients</u>
Opioids	319
Alcohols	719
Stimulants	99
Benzodiazepines	18
Cannabinoids	27
Solvents	17
Entactogens	26
Other/Unknown	317
Total	1542

4. COSTING METHODOLOGY ADOPTED FOR THE CASE STUDY

4.1 Data availability and general approach

The main cost information for the study were the accounts for the unit for the financial year. This information covered the staff costs for the unit, drugs dispensed at the unit and some other expenditure such as postage, printing and stationary, and some furniture and computer costs. The total of these items compared to the total salary bill was in the ratio of approximately 1:6.5.

Other expenditure, including heating, lighting and drug costs prescribed at the unit but dispensed elsewhere, is covered by the Leeds Community and Mental Health Services

Teaching NHS Trust. The Trust also provides a number of central services including central administration of pay, finance and contracting. Several methods could be adopted to estimate these costs. One method would be to estimate heating, lighting costs etc from the physical size of the building and other costs from similar sized clinical units. Another less specific approach would be to add a general figure, say 40 per cent, to the total salary bill. This approach is often adopted in commercial contracting. The final approach is to explore the total expenditure of the Leeds Community and Mental Health Services Teaching Trust and determine from the overall expenditure the appropriate sums for the clinical services conducted at the LAU. Although the Trust is only at the beginning of the process of tracing their own costs they were able to provide some preliminary figures and these were used in this study. The figures provided related to: the overheads for the unit for the clinical activity, i.e. heating, lighting, finance service etc; and the costs of the drugs prescribed by members of staff at the unit but dispensed elsewhere.

The next step was to examine the work of the Unit and to determine the data available to allocate costs to the different activities. The work of the Unit could be divided into the three areas: clinical work; training; and information services. A clear staff allocation had been drawn up showing the members of staff and their broad allocation of time between these three areas. The time spent in central management tasks by certain members of staff was also clearly indicated. These staff time allocation figures provide a basis for determining the proportion of the total expenditure of the unit that should be determined by clinical activity and unit management activities.

The research on detailed costing by event and patient was made possible because the actual

time spent with the patient is recorded for each event. The records are kept on a standard form prepared for the clinical team and the forms collected and entered on the computer system at the unit. A number of checks are made in the programming system to avoid miscoding. For this analysis the data were scrutinised and checks made with patient records to correct obvious miscodes.

There was insufficient information on the use of other resources than staff time to use a pure bottom up approach. For example, no records were kept of prescriptions made up or toxicology tests undertaken by individual event. It was therefore decided to use time of event as the main basis of allocating costs but to ensure that all the costs of clinical activity were covered. This assumes that clinical staff are working at an efficient level, neither underworking or overworking, as is often the case in substance misuse units with rapidly rising demand. The importance of this assumption arises when attempting to use the finished results to explore the costs of expanding or contracting the service. Forecasts, and hence the prices set for contracts, could be difficult to sustain or the quality of care would fall if for example unacceptable levels of work are expected from clinical and support staff.

4.2 Methodology adopted to obtain detailed cost figures

The data were sufficiently detailed to attempt to devise a cost for each individual event. The cost estimates for each event were then summed to give an individual cost estimate for the resource use of individual patients in the year 1992/3. Further details of the way the costs were calculated and the problems that arose are described in turn below.

The first stage of the process was to determine the staff cost of the management of the whole Unit. The figure was devised by using the data on staff time allocation. This gave the proportion of time some individuals should spend on management tasks. The cost of these management activities was estimated by using the salary cost of this time. For this and other salary costs the figures used include National Insurance and employer pension contributions.

The next step was to consider, from the rest of the staff time allocation, the division of activity of the unit between the clinical, training and information work. The appropriate weighting factor was thought to be the time spent multiplied by the salary cost. This gives a figure of 73% of activity being apportioned to clinical work. This proportion can then be used to devise a total figure of management activities and the additional LAU expenses that should be apportioned to clinical work.

As mentioned, detailed data were available on the time spent in face to face contact with patients. The time spent in face to face client contact is, however, only part of the work of any of the practice team. Each event will require some additional administrative and follow-up work. This non contact time could be allocated in proportion to contact time. This would imply that any type of event of 30 minutes would have half as much non contact work as any event of one hour. Given that some events were even longer this method may have disproportionately weighted the non contact time costs to these events. The events are of a number of different types. The main divisions are between the assessment procedure for a new episode, core counselling and other treatment, detoxification and dispensing. Since the time of this research the event categories have been developed further and the coding scheme in use for 1994/5 is shown in Appendix 1. The non contact time for each type of event was

thought to differ and a simple staff survey was undertaken to seek views on the average time spent on non contact activity for the different types of event. Some work is undertaken outside the unit and so average travelling time was also sought. The average time in minutes was added to the average contact time for these events depending on type and whether the event took place outside the unit. The validity of these assumptions was cross checked by summing the work time allocated by these methods. It was found to account for a reasonable amount of available work time after allowing for holidays, staff training time etc.

A major problem arose in deciding how to account for those appointments made but not kept by the patients. Many outpatient services have this problem. When appointments are short the problem can be managed without over long waits by patients and hence with little opportunity cost. It was thought that the low average times shown for dispensing and detoxification events meant that the "no-shows" would not affect the work of these teams and, hence, no cost should be allocated to these events. "No-shows" for new episodes or core treatment are, however, substantially different. Counsellors have to assume that if patients turn up, sufficient time can be allocated to deal with problems. While there were large variations, the average time for these type of event was significant. If a patient fails to show the staff can undertake some administrative duties but there is still an opportunity cost of the missed appointment. It was decided after discussion with the clinical staff that a fair "price" for these no shows was the equivalent of 5 minutes of staff time. This is an aspect of the study that needs further testing and research in a number of different settings.

From these two steps, estimating non contact time and a time price for no-shows, it was possible to calculate an amended time for each event. To calculate a figure for the cost per

event it was necessary to calculate the cost of the staff input, management overhead, other expenses, and general trust overhead on a per minute basis.

The cost per minute of staff time for each member of staff was calculated on the basis of average working time per year. The minutes available for a year were calculated after allowing for holidays, staff training and general meetings. This means the calculated costs will allow for these factors. These calculations give a total time in minutes for clinical activity and for each member of staff. The management overheads and other expenses were divided by the total number of minutes to get the required per minute sum. The figure for the Trust overheads for clinical activity was treated in the same way. The assumption behind this approach is that it is appropriate to allocate the general overhead costs on an average basis varying only with the time of the event. A total cost per minute variable was then calculated by summing the staff cost and overhead items. Note, that while the overhead costs are the same the staff costs per minute will vary according to the cost of the staff.

The total cost of any event therefore is calculated by multiplying the amended time for the event by the cost per minute figure for the staff member involved in the event. Hence for the same type of event and time, the cost would be higher if the appointment was with a consultant than with a nurse. The costs of drugs dispensed at the unit were allocated per dispensing event at this stage. The final cost by outpatient event, therefore, varied according to the time taken, the cost of the staff member concerned, the non contact time for the type of event and for dispensing events the average drug cost.

Less detail was available for the detailed cost of inpatient care in the hospital used. These

costs are borne by the Trust and clearly for future planning it would be useful to cost more precisely the resources used by these patients. In the absence of specific resource use it was decided to use an average figure for psychiatric in-patient care. The figure of £52.32 per day was obtained from the Health Services Indicators (Department of Health, 1993). The cost for inpatient events was therefore calculated by multiplying this sum by the recorded number of days spent in the inpatient facility.

A further figure was provided from the Trust and this was the cost of drugs prescribed at the Unit but dispensed elsewhere. This was thought to relate only to opiate users. The event database does not contain information on substance use and therefore this cost was allocated for the patient data analysis only. Patient costs were calculated by summing the event costs for each of the 1500 individuals recorded as receiving an appointment in 1992/3. Some care has to be taken in examining cost per patient as individuals will be at different points in their treatment, some finishing a period of care and some having only just been referred to the unit. The steps taken to devise detailed cost figures are summarised in Figure 1.

The Leeds Community and Mental Health Services Teaching NHS Trust is only at the beginning of the process of accurately identifying the overhead and capital costs of each of its Clinical Directorates. The figures provided for this study must be considered as provisional. In some areas there may be less information and an alternative methodology would be to add a general percentage overhead say 40 per cent to salary costs. Calculating the costs in this way added £50,000 to the event cost data. However, £140,000 was added to the patient cost data which was the cost of drugs dispensed in the Unit. In future years more accurate data will be available for units like the LAU which are within larger trusts.

Figure 1 Steps in devising costs figures for LAU clinical activity, 1992/3

- * Calculate the proportion of total salary cost of the unit devoted to management activities from staff time allocations.
 - * Estimate the division between clinical activity and other LAU activities from staff time allocations and total salary costs.
 - * Using this calculation, i.e 73% of LAU is devoted to clinical work, estimate the amount of management costs and other LAU expenditure which should be apportioned over the clinical activity.
 - * Survey the staff to estimate an average of non client contact time for the different types of events (new episode, core, dispensing and detoxification)
 - * Use 5 minutes as the estimated time "cost" of a patient failing to attend for a new episode or core treatment appointment.
 - * Calculate an amended time for each event by adding the appropriate average non contact time for a completed event and the 5 minutes for the relevant no shows.
 - * Calculate the appropriate number of working minutes for staff over the year, i.e. after allowing for holidays, staff meeting and training time. Calculate the total across all staff and the per person figure.
 - * Calculate the cost per minute for each member of staff based on annual staff salary, including on costs such as National Insurance and employer pension contributions, divided by the per person working minutes figure.
 - * Divide the calculated total for management and other LAU expenses previously allocated to clinical activity by the total working minutes to obtain a cost per minute figure. Also obtain a cost per minute figure for the general Trust overhead figure for clinical activities.
 - * Add the cost per minute for overheads, other expenses and Trust overheads to individual staff cost per minute figures previous calculated.
 - * Calculate the cost per event by multiplying the new total cost per minute by the amended number of minutes of treatment. For dispensing events the costs of drugs dispensed at the Unit was averaged over all events of this type and added at this stage. The cost of each outpatient event will therefore vary according to the time taken, the cost of the staff seeing the patient and the non contact time for the type of event.
 - * Calculate the cost per inpatient event by multiplying the number of days by £52.32.
 - * Cost per patient is calculated by summing the costs of all the individual events of that person in the time period. The cost of drugs paid for by the Trust but dispensed outside the unit was allocated to opiate users using the average figure per dispensing event.
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5. RESULTS

The methodology described above yielded a cost figure for each event during the year 1992/3. The next step was to combine costs for the 1500 individual patients to give a total cost of their care which fell in that year. The results, in 1992/3 prices, are presented first by event and then the totals for patients. Finally some preliminary analysis of the costs by patient characteristics are discussed.

5.1 Cost per event

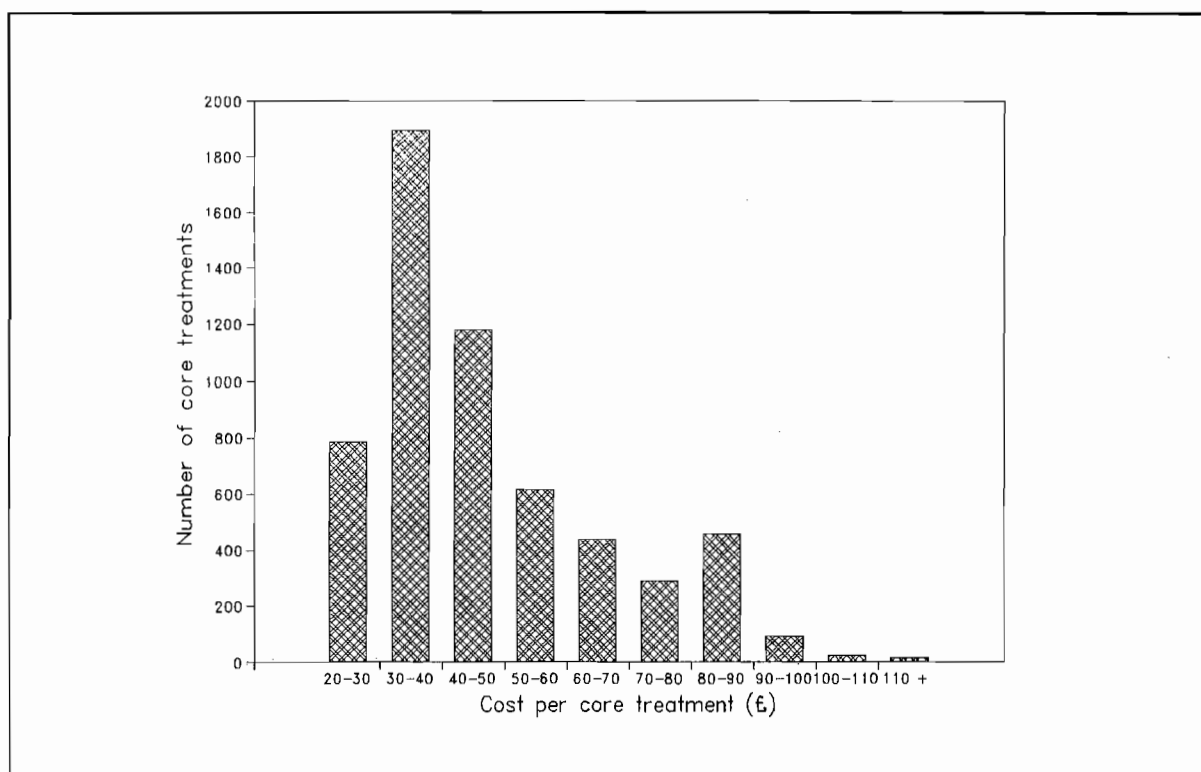
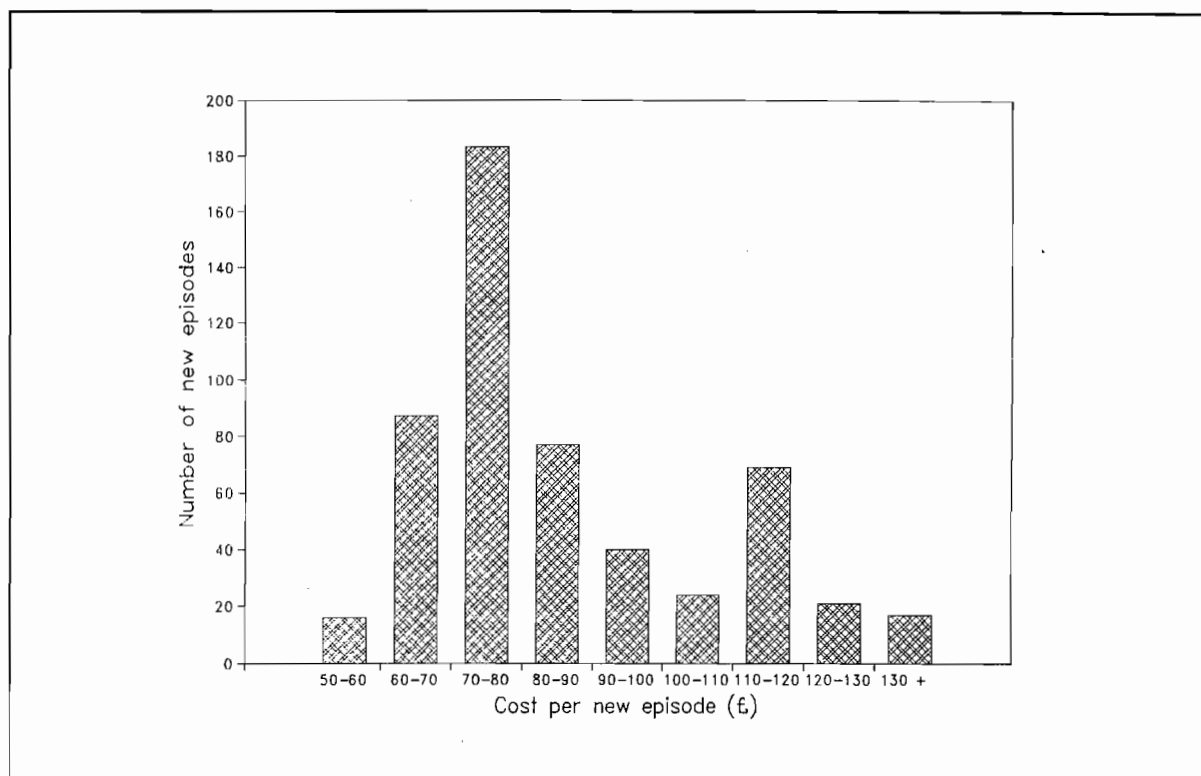
The summary figure for all events is that the average cost was £29 but this hides a wide variation in cost, the standard deviation being £96. The main difference is between outpatient and inpatient events as indicated in Table 2. While inpatient episodes are small in comparison with the number of outpatient events they contribute a significant cost to the NHS. Even though the costs were calculated using a single figure of £52.32 per day, there was a wide variation in costs indicating the variable lengths of stay for each inpatient episode. Within outpatient events, new episodes have the highest average cost at £87. Dispensing events have the lowest cost of the four main types of outpatient treatment at an average of £9 per event. It should be noted, however, that this sum does not include the costs of the drugs prescribed to the opiate users but dispensed outside the unit which could only be added in at the patient level of analysis. The number of no-shows are substantial, 219 events were no cost no shows, i.e. no shows for detoxification or dispensing events, and 2454 were costed no shows with an average allocated cost of £5.

Table 2 : Cost per Event

<u>Event Type</u>	<u>Number of Events</u>	<u>Cost per Event (£)</u>
New Episode	548	86.73 (20.74)
Core Treatment	5812	47.63 (19.36)
Dispensing	8361	9.27 (1.07)
Detoxification	1163	29.14 (8.27)
No show - new or core treatment	2454	4.84 (0.88)
No show - dispensing or detox.	219	0.00
Inpatient Stay	121	793.88 (875.03)
All events	18678	29.11 (96.49)
Note: Standard deviations given in parenthesis		

While the standard deviations for outpatient care are smaller than for the inpatient events they are still substantial. In Figure 2 the range of costs for new episodes and core treatment are shown. The costs for core treatment show a very skewed population. While the majority of events (60%) are in the range of £20 to £50, there is a significant minority with much higher costs. It is this variability in cost which could cause problems for providers attempting to set prices for their services. The distribution of the costs of new episodes has two distinct groups which may indicate a shorter and longer average time for assessment for different types of client. Despite this pattern there is still considerable variation.

Figure 2 : Distribution of Cost per New Episode and Core Treatment



For pricing purposes it is important to have knowledge about the most costly episodes. Analysis of the data may suggest some dual pricing may be required. For core treatment the median value of treatment is £41, i.e. 50 per cent of core treatment events cost this amount or less. This compares to the mean value of £47. In addition 70 per cent of core treatment events cost £51 or less, whereas the ten per cent of the highest cost events are £96 or more. For inpatient events the contrast between the median at £419 per episode and the highest 10 per cent at £2354 per episode or more is more extreme.

Little further analysis of the data by event can be performed at this point. The presentation of figures in this form may, however, help staff to consider their practice and devise some criteria for matching patients to more extensive therapy. This must be done, however, with some caution. Cost data on their own give no indication of the content of the intervention or the effects on outcomes. Nor could the severity of the problems facing different patients be obtained from the available data. This type of analysis does, however, indicate the importance of agencies monitoring the variability in both the type of intervention and its intensity before simple averages are taken as representing costs or prices.

5.2 Cost per patient

The next step was to analyse the costs summed across each patient. This is the type of analysis which would be needed as part of an economic evaluation. The basis for pricing or contract may vary and the total cost per person is only one way this may be approached. For example, services may offer different menus or packages of care to different types of patients. Practice is also constantly evolving and the pattern of care received by LAU

patients in 1993/4, see Appendix 1, may be quite different from the 1992/3 data.

Most services currently offer a patient led service with therapist and patient or client determining the appropriate level of care rather than there being set protocols. Changes to patient care should be fully evaluated including any changes to non attendance. The results from analysis of the care received by individuals during 1992/3 yielded the following results as shown in Table 3. Average cost per patient was over £400, but those with some inpatient care (87), as may be expected, had both more events and higher costs than those only in receipt of outpatient care.

Table 3 : Mean Cost per Patient 1992/93

	<u>Mean Cost per Patient (£)</u>	<u>Mean Number of Events per Patient</u>
Patient had outpatient appointments only (n=1455)	357.90 (726.48)	11.5 (26.6)
Patient had inpatient stay (n=87)	1856.67 (1856.67)	22.5 (24.8)
All patients (n=1542)	442.58 (979.51)	12.1 (26.6)

Note: standard deviations shown in parenthesis underneath average values

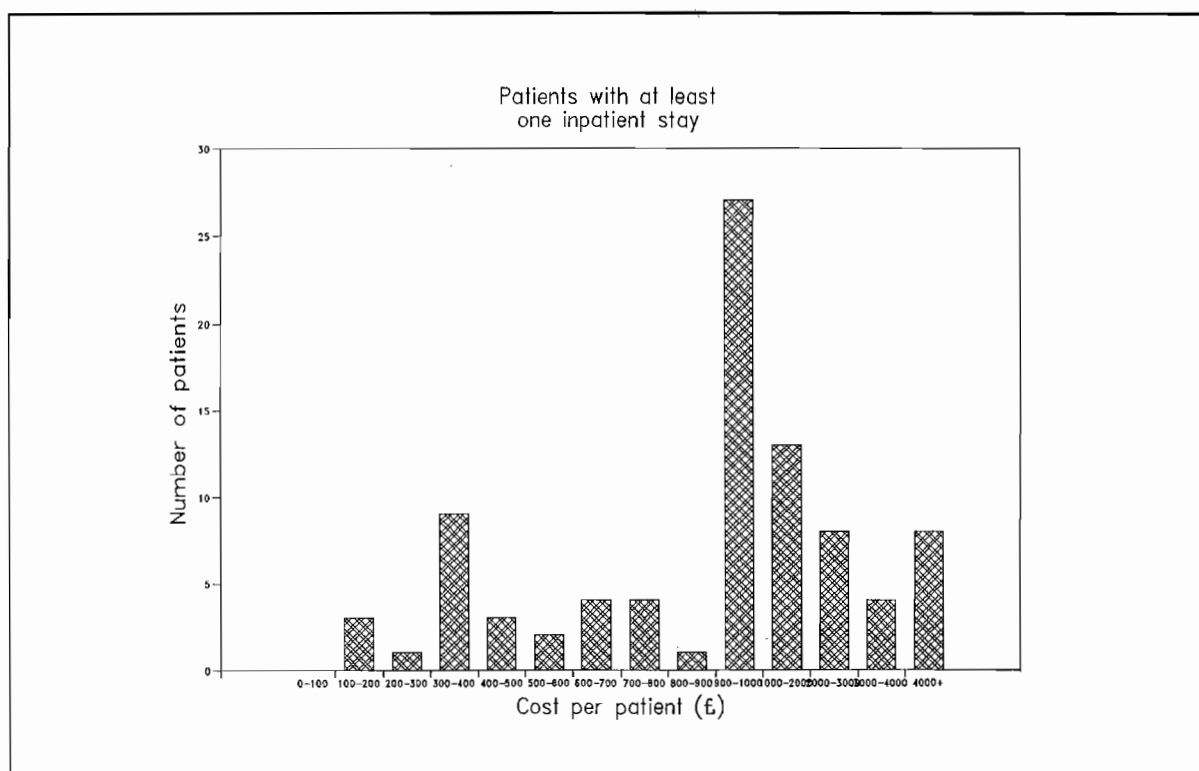
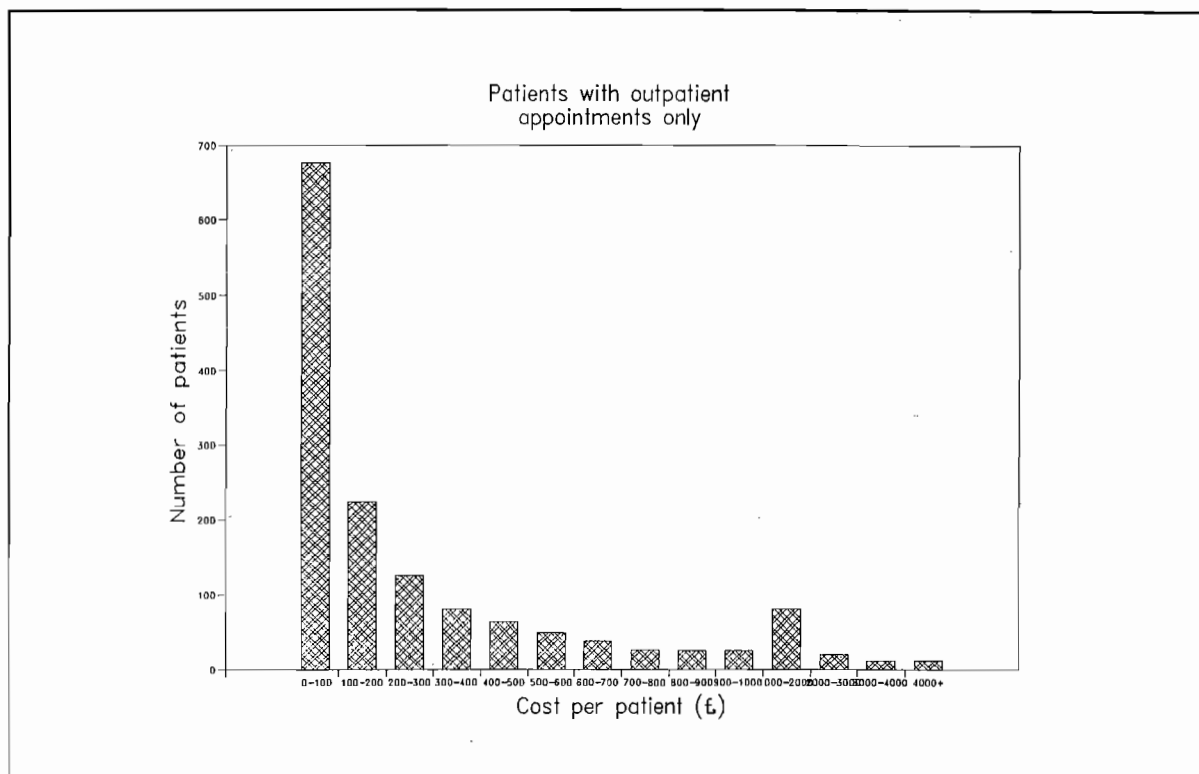
Further analyses were undertaken of the two groups, those with only outpatient care and those with some inpatient care. For some characteristics comparisons are difficult because of the small number of people with inpatient episodes. In general, however, there were few

differences in the breakdown of age, sex, main drug use, employment status, referral source, or marital status. A slighter higher percentage of those with inpatient episodes came from outside the Leeds area, 14 out of 87, i.e 16 per cent compared to only 7 per cent of the 1455 patients with only outpatient events.

The distribution of costs for these two groups is shown in Figure 3. Both distributions are skewed with a small number of both the outpatient only and those with inpatient episodes having very high costs when totalled over the year. Some 9 people were excluded from the analysis who had only "not costed no shows" in the year. A rather larger number, 337, were found not to have received any care but had missed appointments for new or core treatment. Of these, 55 had not shown up on two or more occasions for these types of events. These patients make up half the group with costs below £100, shown in Figure 3. Only limited data are available on this group, with more data being available on patients at the end of a period of care than those who have not commenced any care. Variables available such as referral source and age do not suggest that this group are any different from those receiving care, although a slightly higher proportion of this group had made their initial contact by telephone than in person or through correspondence. Further analysis of the following years data is needed to detect how many, because of non attendance, never receive care.

The number of no-shows was, however, high in all patients. All of those with some inpatient care had missed at least one appointment. Only 26 per cent of those receiving outpatient only care had never missed an appointment. The highest rate of non attendance by individual type of event was for core treatment and the lowest rate was for dispensing and detoxification, the two type of events which attracted no cost for non attendance.

Figure 3: Distribution of Costs per Patient by Type of Treatment



Some further analysis was undertaken to see if there was a relationship with non attendance and the number of events, the hypothesis being that the proportion of no shows may be expected to rise with more appointments, but no clear cut relationship was found.

Different events do attract different costs and a limited analysis was made of the costs by different combinations of event type. Given the fact that a snapshot was taken there were patients with limited combinations and therefore it is difficult to draw conclusions about any patterns in the package of care received by different patients. For example, those receiving appointments towards the end of the year may only have experienced a new episode, while those at the end of their treatment at the beginning of the year may only have received core treatment. There was, as may be expected, some relationship between the total cost and the number of different types of events received by the patients, with greater costs for the group with combinations of three or more event types.

A final analysis was made of the general distribution of the cost per patient. As explained above it is important for costing and pricing purposes to be aware of high cost events or patients. As a simple exercise those with the highest costs, defined as the top 10 per cent, were summed. This total for these 154 patients accounted for 56 per cent of the total cost of clinical care of the unit in 1992/3.

5.3. Costs by patient characteristics

The main purpose of this paper is to illustrate how costs of substance misuse services can be derived. However, additional analyses were undertaken to investigate the relationships

between costs and patient types which may be useful to explore in further research. Some characteristics like age and sex are complete but others have a significant number of missing cases and these should be taken into account when examining the results. Also only limited cross tabulation was possible. Further research will investigate the interrelationships between characteristics and cost using more sophisticated statistical techniques.

By Drug Use

The LAU takes clients with a variety of substance misuse problems. In Table 4 a breakdown of cost by the main substance of abuse is given. All standard deviations on these figures were large and the patient numbers in some groups are small. No attempt is made to explore statistical differences but it can be seen that on average outpatient opiate users were more than twice as expensive as those whose main problem was with alcohol. For those with inpatient stays the differences are still large between those whose main drug is an opiate and the other groups, with the exception of solvents. The inpatient stays are, however, subject to large variations and these figures could be caused by 1 or 2 extreme cases.

It could be expected that costs of those who have problems with more than one drug will be higher than those misusing one drug. In Table 5 the costs per patient over the year are shown by the number of substances recorded. Of known cases 20 per cent had problems with more than one drug and average costs were higher for both outpatient only and those with some inpatient episodes. Those with an inpatient stay had higher costs the higher the number of drugs, although there are only small numbers.

Table 4 : Cost per Patient by Main Substance Abuse

Substance	<u>Cost per Patient (£)</u>		
	Patients with outpatient appointments only	Patients with inpatient stays	All Patients
Opioids (n=319)	840.88 (1232.2)	2574.30 (2474.8)	944.12 (1681.9)
Alcohols (n=719)	234.67 (387.8)	1912.49 (1356.9)	335.00 (638.4)
Stimulants (n=99)	381.30 (893.8)	1705.76 (1390.7)	434.81 (945.6)
Benzodiazepines (n=18)	335.06 (562.2)	2009.10 (903.9)	707.07 (948.0)
Cannabinoids (n=27)	189.43 (390.8)	684.64 (0)	207.77 (394.9)
Solvents (n=17)	196.85 (306.5)	4578.88 (0)	454.61 (1103.5)
Entactogens (n=26)	334.74 (288.7)	-	324.74 (288.7)

Note: 317 patients were recorded with other drugs or unknown. The missing values in this and other tables will include those patients with one or more appointments in the year but who never attended.

Table 5 : Cost per Patient by Number of Substances Misused

Number of substances misused	<u>Cost per Patient (£)</u>		
	Patients with outpatient appointments only	Patients with inpatient stays	All Patients
1 (n=986)	345.04	1838.21	425.30
2 (n=126)	702.64	2037.71	798.00
3 or more (n=122)	582.42	3550.69	825.72

Another possibility is that costs of the multiple substance users will vary by the main drug of use. The figures in Table 6 suggest costs do vary in this way. Those who have alcohol as a main drug of use, but who also have problems with other drugs, have lower costs than those multiple drug users with other substances as their main drug.

Table 6 : Cost per Patient with Multiple Drug Misuse by Alcohol Abuse

<u>Cost per Patient (£)</u>	
Number of substances misused	Patients with outpatient appointments only
<i>Alcohol Abuse</i>	
2 (n=17)	282.84
3 or more (n=17)	329.63
<i>No Alcohol Abuse</i>	
2 (n=100)	774.00
3 or more (n=95)	627.66

By Age and Sex

One of the most robust relationships found in this preliminary analysis of the data was cost by sex. For those only using outpatient services, females were consistently more costly than males, see Table 7. This relationship remained even after controlling for drug use and a number of other characteristics. There are numerous reasons why females may have a higher cost, for example, that females were less likely to miss appointments. This was checked and no difference was found between men and women, although women did have 13 events on

average compared to 11 for men. These extra events appear to be for core treatments (4.5 compared to 3.1) and dispensing events (6.2 compared to 5.1). These factors may not fully explain the cost differences. Another reason may be that females are more likely to be seen by higher grade members of staff. Further research in this area will be conducted.

Table 7 : Cost per Patient by Sex

	<u>Cost per Patient (£)</u>		
	Patients with outpatient appointments only	Patients with inpatient stays	All Patients
Male (n=1530)	325.16 (611.21)	2020.75 (2918.74)	411.20 (958.34)
Female (n=387)	463.00 (999.25)	1528.50 (1140.91)	542.84 (1047.28)

Note: standard deviations are shown in parenthesis underneath the average values

For those with inpatient stays, males would seem on average to be more expensive than females although this was not confirmed in further analysis of the figures by drug type. The numbers in this group from one years data are, however, too small for meaningful analysis.

In Table 8 the average cost figures are presented by age groups. There are few differences by age in either the outpatient only or patients with an inpatient stay group. Only those under 20 seem on average to be of lower cost for both groups.

Table 8 : Cost per Patient by Age Group

Age Group	<u>Cost per Patient (£)</u>		
	Patients with outpatient appointments only	Patients with inpatient stays	All Patients
< 20 (n=113)	301.48 (337.3)	640.81 (375.2)	316.50 (382.0)
20 - 30 (n=488)	429.33 (781.6)	1606.47 (1295.7)	501.69 (868.0)
30 - 40 (n=431)	350.86 (789.3)	2338.05 (4449.2)	447.68 (1302.6)
40 - 50 (n=328)	326.85 (790.0)	2023.78 (1664.2)	440.67 (969.9)
50 - 60 (n=123)	284.57 (362.1)	1838.24 (1424.2)	347.72 (535.9)
60 - 70 (n=40)	267.25 (426.2)	1829.57 (418.6)	423.48 (633.9)
70 > (n=7)	326.41 (473.8)	-	326.41 (473.8)

By other characteristics

There were a large number of analyses which could be undertaken with these data. Ideally more sophisticated statistical techniques would be used to isolate the effects of different variables controlling for other influences. As an illustration of the potential use of these figures a breakdown of cost by sex and employment status are shown in Table 9. While there is some variation in the results across the groups no clear pattern emerges from this preliminary analysis.

Table 9 : Cost per Patient by Main Income Status and Sex

	<u>Cost per Patient (£)</u>	
	Male	Female
Unemployment Benefit/Income Support n=416)	636.25	746.70
Employed (Full-time) (n=217)	432.61	569.19
Employed (Part-time) (n=41)	358.79	480.64
Pensioned (n=25)	534.73	536.38
Partner's/Parent's/Guardian's Income (n=25)	422.32	982.32
Sickness Benefit/Invalidity Benefit (n=82)	333.62	1336.60
Education Grant (n=14)	271.68	768.94
Other (N=10)	584.58	203.13

Note: For 669 patients, main income source was unknown.

In Table 10 the cost figures are shown broken down by marital status and sex. Marital status may reflect the amount of social support of patients. The figures suggest that single people do seem to have higher average costs than other groups but those separated or divorced do not in this simple analysis appear more costly than the average.

Table 10 : Cost per Patient by Marital Status and Sex

	<u>Cost per Patient (£)</u>	
	Male	Female
Single (n=381)	567.24	773.66
Married/Cohabiting (n=355)	523.76	508.08
Widowed (n=19)	498.97	742.43
Separated/Divorced (n=138)	422.15	1107.22

Note: For 621 patients, marital status was unknown.

6. CONCLUSIONS

The research undertaken for this paper suggest that it is feasible to obtain useful figures from a costing study of a substance misuse service even with gaps in information. The detailed costing work reported in this paper was possible because of the activity data base kept at the Leeds Addiction Unit. Few units will have such full data recording systems but that should not prevent some costing analysis being undertaken. Surveys of the work patterns of staff over a limited time period could be taken to find a reasonable average or range of times for different face to face contact with clients, consequent non contact time and time spent in management or general administration duties. These figures can be used to obtain average costs. They would not, of course, give the richness of results which enable an analysis of the variations of cost for different types of interventions and for different characteristics of patients. The detailed work necessary for costing studies should be concentrated on the main resources used. For substance misuse services this is generally staff time and, where undertaken, drugs prescribed and inpatient care. Detailed monitoring of some other aspects of care may be unnecessary and place too high an administrative burden on staff for few gains in accuracy of the results.

There are numerous problems that arise in costing substance misuse services. As illustrated in the case study, there are wide variations in service use. This is partly as a result of the client led approach and counselling therapies. This means it would be difficult to obtain "prices" or costs for service from a simple resource costing of a set prescribed package of care. The result of obtaining costs of hypothetical programmes may not reflect actual practice and real costs. The results reported in this paper suggests that simple prices may

not be sufficient and it will be necessary to have a more complicated structure to reflect the needs for intensive therapy for some patients. More monitoring of costs and outcomes may help the process of identifying these patients and refining the contracting process.

A major factor in providing care for substance misusers is their high level of non attendance for services linked to their problems and lifestyles. The preliminary analysis of the "no shows" conducted in this research project suggest that this occurs over all types of events and patients and predictions of attendance would be hard to make. For some types of event these "no shows" have an opportunity cost for the staff concerned and it is appropriate to put a price or cost on these events. In this research it was assumed that the cost of 5 minutes of time was appropriate for a missed new episode appointment or core treatment event. This gave an average cost of about £5. The cost of such no shows does, however, require further research and debate between providers and purchasers.

It is important when costing services for either evaluation or contracting purposes to ensure that the costs reflect all resource use especially the management and general overheads of the service. Some services may have currently hidden costs and subsidies. For example, they may have staff on secondment from other agencies or have rent free rooms which do not formally enter into financial accounts. On the other hand, they may provide services such as telephone information or assessments which have not explicitly been contracted by the purchaser. Basing new services on costs derived without taking hidden costs into account may cause problems for the provider. A further important consideration is exploring how far average costs reflect the costs of expanding or reducing a service. For changes in service provision it is important to monitor capacity constraints.

Monitoring individual costs by event or by patient does indicate that there are a small number of cases with very high costs. It will be important to be able to identify those clients who may have very large resource costs. The purpose of this is not to exclude the patient from appropriate care but rather that from both a purchaser and the providers' perspective it is important to ensure cost-effective use of resources. For providers it is also important to monitor the contracting agreement. A shift in the mix of clients to include more serious cases could have major cost implications. Failure to monitor resource use could have a serious impact on all clients of a service.

To conclude, costing analysis can be useful as part of a package of monitoring and evaluation. Cost data on its own, however, can be misused. It is essential to combine cost data with outcome data if the type of analysis reported in this paper is to be fully used to improve the services to the client group, improve patients' quality of life and reduce the costs to family, friends and the wider society.

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Appendix 1 Event Codes 1994/5

Non specific activities:

- 10 Routine new episode
 (planned new patient assessment or old patient not seen for six months)
- 11 Urgent new episode
 (as above but unplanned)
- 12 Crisis intervention
 (usually DP attendances)
- 13 Supportive counselling
 (where there is no specific treatment goal)
- 14 Case review/assessment
- 15 Clinic Room
 (dispensing, dressings etc.)
- 16 Third parties
- 17 Clinical administration
 (writing prescriptions, sick notes etc.)

Specific strategies:

- 20 Harm reduction
- 21 Motivational
- 22 Change preparation
- 23 Detoxification
- 24 Behaviour change
- 30 Health care level - physical
- 31 Health care level - psychiatric
- 40 Social level
- 50 Intrapersonal level
- 60 Interpersonal level
- 80 Evaluation - clinical outcome
- 81 Evaluation - infectious diseases