

Research Report

Costs, care and rationing:

A comparative study of intensive care in the UK and Finland

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APACHE	Acute Physiology and Chronic Health Evaluation
CD	Clinical Director
HDU	High Dependency Unit
HRG	Health-related care groups (cost classification system)
ICU	Intensive Care Unit
TISS	Therapeutic Intervention Scoring System
WTE	Whole time equivalent

Executive summary

This report sets out the results of an investigation of the use of management accounting in health care, specifically in intensive care units. The particular focus of intensive care sets this study apart from other studies of management accounting in health care. Most previous studies have tended to examine general issues of accounting in the NHS. The method of investigation – a comparative study of two countries intensive care experiences, using case studies – has yielded interesting results. Within the UK, the knowledge and practices of health care professionals dominate decisions on the use of resources, with management accountants in a supportive role. In Finland, there is no well developed management accounting profession and health care professionals have absorbed management accounting expertise to inform their use of resources. These findings have major implications for the management of intensive care facilities, but also are of importance in wider settings and in health care management accounting generally. This research was inter-disciplinary and will be of interest to health care professionals, as well as to management accountants. This study underlines the importance of (1) interdisciplinary research in the investigation of complex issues such as the management of intensive care and (2) international comparative studies in any evaluation of management accounting practices.

1. Introduction

This project is a study of health care performance management in the UK and Finland, specifically in the context of budgeting in hospital intensive care units. The major objective of the study was to determine if there are benefits to be obtained for management accountants in the UK's NHS, given the contrasting styles and experiences of accounting for health care in these two countries. There has been considerable research on health care accounting, to date, which is discussed below. This literature suggests that clinicians have not attached great weight to accounting information. This circumstance may be exacerbated within the context of this study, i.e. intensive care, in which life or death decisions for patients occur more frequently than in many branches of medicine. Also, the distinctive, multi-disciplinary practice of intensive care raises the possibility of findings which differ from prior research.

We characterise this study as one in which the convergence of costs and options for care takes place in a situation of rationing. That there is a situation of rationing within the NHS and health care systems, generally, is well accepted (see, e.g. Merrison Report, 1979; Lapsley, 1996). There are a number of factors which exacerbate this situation of rationing. There is a limited capacity within existing hospitals. This has to be considered against an increased demand for health care. This increased demand for health care of hospitals is fuelled by greater life expectancy and the changing age structure of the population (with greater proportions of elderly). It is also affected by the twin pressures of medical innovations on both the supply of, (as hospitals seek to offer the latest treatments in the face of limited resources) and demand for, health care (as patients expect the latest treatment to be available). All of these pressures lead to rationing. This situation is unlikely to be resolved in the absence of a pricing system. In the UK the abandonment of the internal market as a mechanism for allocating resources makes the adoption of pricing unlikely for the foreseeable future. This rationing situation places great reliance on the professional judgement of key health care professionals and increases the potential for a greater reliance on accounting information in such judgements.

During the last twenty years there has been a significant effort on the part of accountants to develop more sophisticated management accounting information for NHS hospitals. Körner's initiative in speciality costing, the management budgeting and resource management initiatives of the 1980s, and the move to costing based on health related groups (HRGs) and, more recently, the construction of national reference costs are all examples of these efforts. There has also been some considerable research of such management accounting developments in health care settings. This commenced with the seminal study on the financial management of resources in the NHS for the Royal Commission, led by J.R. Perrin (Perrin et al, 1978). Subsequently, numerous studies have focused on NHS costing and budgetary control (Preston et al, 1992; Rea, 1994; Jones and Dewing, 1997). These studies have pointed to the ineffectiveness of such accounting systems, particularly because of their inability to mesh with key decisions made by hospital consultants who are the key triggers of resource consumption within hospitals. The inability of accounting systems to inform clinical decision making in UK hospitals can in part be seen as a consequence of the focus of many accounting developments on creating control devices for hospital financiers. To some extent, however, this can also be seen as a consequence of systems designers' lack of knowledge of decision-making processes of clinicians (Lapsley, 1996).

This project addressed the issue of making connections between the relevance of accounting information and decisions based in clinical practices by comparing the practices of hospital managers and accountants in the UK with those of their Finnish counterparts. This international comparison is of particular interest because of the differences in management accounting in these countries. In Finland there is no well developed management accounting profession. One consequence is that health care professionals in Finland have taken the initiative in designing and implementing information systems, with explicit consideration of cost information (Kurunmaki, 2000). This represents a significant departure from UK experience and offers the potential for novel solutions to a longstanding problem which has bedevilled health care accountants for many years.

This research is also novel because of the specific focus of the study, namely intensive care units. This is a contrast with previous studies, including those cited above, which have tended to focus on the general issues of costing and budgetary control, rather than specific areas of health care. The area of intensive care unit management is of interest, on a number of counts. In the first instance, as Miranda et al (1998) demonstrate, this is a part of health care which receives increasing resources. It is, nevertheless, an area of health care which is at the nexus of the need for rationing of health care in the face of spiralling demands for innovations in health care treatments. This increased expectation of the highest levels of care is illustrated in this area of clinical practice by the manner in which treatments which were once regarded as leading edge, are now much more commonplace and expected as 'normal' by those in need. Examples of this would include kidney transplants, heart bypass surgery, neonatal intensive care. These circumstances accentuate the need to balance medical considerations against resource availability.

This area of medical practice is also of interest, on the grounds that it presents some of the most challenging and difficult decisions which confront hospital doctors and other health care professionals. In this situation, health care professionals may be confronted by decisions over the provision or continuation or withdrawal of treatment. These decisions may be constrained by resource unavailability, and the so-called blocked beds phenomenon. They may be exacerbated by peaks and flows in resource availability, such as the phenomena of year end budget shortfalls or year end spending sprees in governmental organisations. In this regard, the difficulties of balancing costs, care and rationing are writ large in this area and the transferability of 'the Finnish solution' would present a breakthrough which would have the potential for extrapolation to other, less demanding and challenging areas of health care practice in hospitals.

Therefore, in this study, the research questions which we addressed were:

- Q1:** What is the potential for accounting to influence clinical behaviour?
- Q2:** To what extent do the disciplines of accounting and clinical practice inform one another?
- Q3:** Does accounting information operate differentially within health care professional groups?

All of these questions are addressed in the specific study setting of intensive care units. As noted above, this study setting is one in which there are major challenges in relating accounting information to ethical issues. Therefore, this study's focus provides a distinctive basis for examining the extent to which accounting can or does assist in the determination of priorities, or whether it displaces or distorts medical criteria. The overall approach adopted was case-study based, qualitative and interpretative. The study settings were major hospitals in Finland and the UK. This project is particularly timely for management accountants in the UK, given the demise of the internal market in health care and the re-emphasis of cost comparisons and benchmarking in the planned stakeholder accountabilities in the new NHS (DoH, 1997).

This research report examines the management accounting implications of intensive care in six stages: (1) we describe our research methods in chapter 2; (2) we explore the nature of intensive care, its distinctive features and resource issues associated with its provision; (3) then, in chapter 4, we examine different forms of accounting for intensive care, including non-financial scoring systems and costing studies to discuss how and where accounting is, or might be, used in this branch of medicine (4), the UK case study findings are presented in chapter 5, (5) in chapter 6 we discuss the results of the Finnish case studies and in (6) we draw our conclusions from the study and make recommendations for future practice.

2. Method of investigation

There are many possibilities for finance specialists and clinicians to interact – including service planning and investment appraisal. However, the focus of this study is in the use of budgets for short term planning and control in intensive care. The investigation of budgeting in intensive care units is conducted in three stages. First, we explore the nature of intensive care from the perspective of potential resource constraints to identify where budgets might bite. Second, we examine available attempts to measure and quantify the activity that is intensive care. Third, we have empirical data. In the gathering of empirical data for this topic, one approach would have been a survey of all intensive care units to gather information on their clinical and management accounting practices. However, when dealing with a subject as complex as intensive care and its interactions with accounting, the survey-based research technique may lead to simplistic answers. This research team therefore chose the case study method as the most appropriate means of investigation.

This research project's approach is qualitative, focusing on four intensive care units: two in the UK and two in Finland. The units studied in some depth through data obtained by means of informal interviews with those involved with the management of resources – management accountants, consultants, nursing managers and those in senior clinical nursing posts. The informal interviews, which were later transcribed, followed an agenda of topics to be covered rather than a structured set of questions. This approach allowed a full coverage of the issues involved and resulted in a detailed picture, or case study, of the practices and issues involved in the management of intensive care units.

This project therefore, comprises a series of case studies where the 'case' is the ICU and the focus of interest is upon the way in which health care professionals and finance managers bring about the management of budgets and the delivery of cost-contained care. Data were gathered by means of semi-structured interviews (see Appendix A for interview checklist). Each of these interviews lasted for around 1 hour and 30 minutes. In total, interviews with 30 individuals were held at the four study sites. These data were supplemented by an examination of the accounting details, budget profiles, staffing levels and other documentation and policies, adding a quantitative aspect to the study. We also examined reports and statistics concerning the costs of provision of intensive care and an analysis of the clinical outcomes of the service. The national figures on which these reports are based provided a context within which to understand the management of resources in the ICUs studied.

Background Data of Case Study Sites

1. UK Hospitals	2. Finnish Hospitals
1.1 Teaching	2.1 Teaching
10 bedded unit (to increase to 12)	12 bedded unit
part of Anaesthetics and Operating Theatres directorate	part of surgical division
£2M budget	£ 2.2 –2.7M budget*
8 consultants	11 consultants
70 intensive care nurses	49 intensive care nurses
1.2 General	2.2 General
4 bedded unit	9 bedded unit
part of Surgical directorate	part of a profit area which includes operating theatres and anaesthetics as well as intensive care
£800K budget	£ 1.29M budget*
5 consultants	3 consultants
28 intensive care nurses	30 intensive care nurses

*Finnish Marks expressed as £s @ 9.25 Finnish Marks to the £.

The rationale for our adoption of the qualitative method of data collection – the main method being the informal interview, backed by study of documentation and policies – is based on the interactionist's (Blumer, 1969) premise that when the aim of the research is to understand a complex process where those involved have different perspectives on the matter in question, it makes sense to adopt a research strategy which allows these perspectives to be understood in the same terms in which the participants understand them. In this study, this approach resulted in the production of a comprehensive analysis of the processes and thinking which lie behind the activities involved in the management of costs in intensive care.

Specifically, the research involved for each case, the interviewing of the management accountant, service managers, senior nurses and physicians in charge of the ICU. These were transcribed soon after the event and, importantly, the members of the research team who carried out the interviews, discussed the main issues raised, and were thus able to develop the starting point for some of the lines of analysis. The practices and concerns of the intensive care units began to emerge. As interviews with the members of the clinical team and the accountant were compared, it was possible, by virtue of the time and style of interviewing, to explore themes raised, for example by the anaesthetist, with the accountant. Where necessary, we made a second visit to confirm some of the information or to follow up on something which had arisen in another interview. Once all the interviews were complete – UK and Finland – the research team was in a position to make comparisons between the two settings and to examine the details of the cases in order to arrive at our analysis and conclusions concerning the differences in management accounting practices in the UK and Finland in intensive care.

3. The nature of intensive care

The nature of intensive care is discussed here on a number of levels. First, the nature of the patients who are eligible for intensive care and the status of the intensive care facility in the hospital are examined. Next, we discuss the various dimensions on which resources impact upon, and may influence, clinical decisions in intensive care. These include:

- The numbers of beds available for intensive care patients.
- Staffing requirements of intensive care units.
- Where intensive care unit budgets are located within hospital budgetary systems.
- The kinds of difficult decisions with resource implications which have to be taken within intensive care units.

Intensive care is essentially about supporting life whilst the vital organs and physiology recover normal function. There are distinct benefits in bringing together into one location those patients requiring intensive and specialised nursing care which entails close and often invasive monitoring and life support. The areas of the hospital which provided this kind of care prior to the development of intensive care were recovery areas and side wards in medical and surgical wards where very sick patients were placed. Developments in anaesthetics and pharmaceutical services all contributed to the possibilities which we now take for granted as intensive care provision.

One definition of intensive care states that 'an intensive care unit (ICU) is an area to which patients are admitted for treatment of acute or impending organ failure. Patients may require technological support (including mechanical ventilation) and/or invasive monitoring' (Scottish Health Statistics 1997). It further notes that an ICU is usually a separate ward, is usually available to all specialties but may be restricted to a single specialty, and the level of staffing is such that there is always a doctor present and the nurse:patient ratio is 1:1. Beyond these very clear guidelines lie several important factors which have some bearing on the running of an ICU, these have to do with staffing availability, training and skill mix. For some time there has been a discussion among consultants in intensive care calling for more recognition of intensive care as a distinct specialty in its own right.

Intensive care patients are by definition seriously ill. They usually have failure of one or more major organs, and invariably require ventilation. The service is for patients who have a possible chance of recovery and who require life support and intensive nursing care. Early referral enhances a patient's chances of recovery and the concept of 'potential benefit' plays an important part in the decision to admit. Potential benefit is first and foremost a clinical notion insofar as it is not in the patient's best interests to endure the aggressive treatment of ICU when the only possible outcome is the delaying of death. Equally, intensive care is no place for a patient who is not sufficiently sick to require that level of care. This can become an issue on discharge as it is undoubtedly the case that the level of attention that patients receive in the ICU is higher than it will be in other areas of the hospital to which the patient is to be discharged. As a consequence patients, or sometimes relatives, may feel that they are receiving an inferior service. One of the difficulties lies in the size of the units. The average unit size is 6 beds. This causes problems for the medical staffing of these units as the size does not warrant full time intensivists and so consultant cover is provided by anaesthetists who have theatre list responsibilities too. There are knock on effects from this state of affairs. These were expressed in a letter to the BMJ (Grant, 1995). This consultant in charge of an ICU wrote,

'Units are too small, so that full time intensivists cannot be justified, and consultant cover is generally provided by consultant anaesthetists working in the unit one day a week or possibly one week in four or five. Neither situation allows the development of clinical teaching or research expertise in the specialty.'

This call for more specific recognition of intensive care as a sub-specialty of medicine and anaesthetics has more far reaching implications beyond the sub-specialty of intensive care because 'one role of the new specialty will be to facilitate training in the management of the critically ill' (Soni and Wyncoll, 1999). It is therefore, not unreasonably, argued that the long term effect may be improved patient care in the wards.

3.1 Resource implications

3.1.1 Bed levels

In a discussion of rationing in intensive care, Miller (1994), identified the rationing of space and the determination of the number of beds necessary for the intensive care unit as important components of this. The bed has always had an important place in the resourcing of different units within a hospital. The number of beds has long been the main unit that is used to calculate staffing and resource needs of hospital services. In terms of the statistics, Armstrong reminds us that,

'traditional health care statistics had been dominated by beds – separate figures were provided for 'available beds', 'staffed beds', and 'occupied beds'- but the emphasis gradually shifted to activity ('discharges and deaths') to reflect the number passing through hospitals rather than those staying them. In 1977 the Department of Health began reporting the numbers of cases treated in the hospital and in 1991 changed the measurement currency to 'finished consultant episodes'. Beds were becoming an irrelevance in measuring and understanding the work of the hospital.' (Armstrong, 1998)

Notwithstanding Armstrong's astute analysis of the late twentieth century position on beds in hospitals, they remain a preoccupation when it comes to resourcing ICUs. This is because when beds are spoken of in the day to day sense of having them occupied and staffing them it is not so much beds that are really in question as nursing staff. Nursing takes up half of the budget for intensive care and is therefore a much debated item. It is noteworthy that when the seemingly simple question, 'how many intensive care beds are there in this unit?' is asked, there are routinely three different answers, there are established funded beds, actual funded beds and occupied beds. There is sometimes yet another figure: the amount of available space to create another funded bed. Also, these answers are not constant; bed occupation fluctuates according to season and the linked demands, and decisions to admit and discharge. These fluctuations of bed occupancy are matched by fluctuations in spending on nursing staff. The issue of staffing the ICU is taken up next.

3.1.2 Staffing the ICU

The Intensive Care Society (1997) recommends that the number of whole time equivalent (WTEs) nurses required per ICU bed is seven. This provides 24 hour cover and allows for holidays and anticipated sick leave. (This figure has risen. The recommended number was 5.5 in 1983 and 6.5 in 1990.) The staffing question is not so much how many ICU nurses should there be, rather it is the interplay between the recommended nursing WTE/ICU bed, the number of commissioned beds (i.e. how many the health authority will fund) and the number of beds actually occupied, which may be more than the established beds. This is possible because there are sometimes more physical beds than are being funded. The central question in relation to shortage or otherwise of nursing staff is therefore, how many beds are in use? When the unit admits more patients than the 'established' bed capacity there is overspend on the nursing budget. At a more general level this issue may be compounded by circumstances where there are a number of ICU nurses who are not working within the ICU areas.

So whilst there is an agreed ratio of nursing WTEs to an ICU bed, the usage of the beds tends to be in flux and so the notion of a shortage of nurses has to be seen in that light. Nursing staffing costs may be regarded as a flexible item in the units' budgets and they may seem to be the sole reason for overspends when more subtle forces are at play. It is understood that nursing staffing is a core and large cost of ICU but somehow the culture of nursing just being there, the 'clinical civil service of the hospital' (Thompson, Melia and Boyd, 2000) makes it difficult for people to see that nursing costs are high (intensive care means intensive staffing). The question of skill mix comes into this too. It is here that the opinions of staff may differ. 'A nurse is a nurse is a nurse' is a tacit, if unexpressed, sentiment. Taken together the questions of skill mix and levels of staffing (not to mention the transitory nature of agency staff) make the staffing of the ICU a contentious issue in more than fiscal terms. While numbers of available beds and the staffing of these beds are both difficulties for the management of the ICU, so may be its location as a multi-disciplinary unit which does not fit neatly within the budgetary framework of the hospital.

3.1.3 Budgetary matters

In terms of expenditure, intensive care is generally seen as part of the anaesthetic services in a hospital. Therefore, the intensive care budget frequently comes under anaesthetics or theatres and as Bennett and Bion point out (1999), 'the current contracting process has found it difficult to account for intensive care, partly because it does not have multidisciplinary specialty status and is therefore extremely difficult to isolate from the structure of the finished consultant episode'. These questions of potential benefit and appropriateness are clearly of interest to accountants because the admission of a patient with no potential for recovery has to be seen in hard financial terms as a waste of resource. Equally, keeping an ICU bed staffed for a patient who does not need that level of care is a misuse of the funding.

These basic features of intensive care working practices point out the areas where clinicians and accountants might be expected to share a common view on the unit budget. Where there is perhaps some difficulty is the time it takes to reach the end goal which both clinicians and accountants share, i.e. the appropriate admission of patients and the withdrawal of treatment should its continuation become futile. As a consequence, the questions which intensive care raises are clinical, organisational, ethical and fiscal. Whilst many, especially politicians, would prefer not to speak of rationing it is hard to deny that it goes on. As long as demand is 'bottomless', as one of our interviewees put it, there has to be some form of budgetary control. This should combine with a disciplined way of making clinical decisions which will produce a fair distribution of resources. When questions are asked about how cost is contained the answers demonstrate that the interpretation of clinical situations and test results is as much a part of medicine as are diagnostic skills. This issue of the difficult decisions which have to be made by intensive care teams is taken up, next.

3.1.4 Difficult decisions

It is well documented that the patients who take up the most ICU resource are those that do not do well, but who occupy an ICU bed for some time before they die (Cheng D C and Sherry K M, 1996). Jacobs et al (1989) demonstrated in a retrospective analysis that about 20 per cent of patients admitted to ICU had no chance of ultimate survival. Jacobs et al (1989) demonstrate that the seriously ill patients who are admitted to ICU with a poor chance of survival often die after a short stay and the ones who are predicted to do well, do so and are discharged. For very different reasons, then, these two groups of patients use less resource than does a third group of less seriously ill patients who have longer stays and so cost more overall. Wilson and Cook (1997) say that the most expensive patients to look after are 'those who were predicted to die who survived and those who were predicted to live who eventually died'.

Whilst at first reading this might seem counter intuitive, it is very much the nature of the judgements that have to be made in ICU. Medicine is not a precise science and the human element along with the clinical uncertainties means that decisions about admission are made on the side of caution. This is compounded by the fact that judgements often have to be made in a short space of time. Uncertainty is a feature of medicine, as to a lesser extent it is of management. When clinicians and accountants come together to manage budgets, they share the same main goal, that is quality patient care, but they bring different priorities to the everyday practice of their crafts. These considerations illustrate the difficulties of making connections between the practice of intensive care and accounting information.

Conclusion

This chapter has discussed the status of intensive care medicine. It is a new branch of medicine with a distinctive multi-disciplinary emphasis. There are particular resourcing issues around capacity (bed numbers) availability of skilled staff and budgetary location which make the management of intensive care units difficult. Most difficult of all however, is the nature of the decisions made within intensive care units. One of the lessons learnt from the polio epidemic of 1952 (Le Fanu, 1999) which has been imported into modern intensive care, is that efficient delivery of oxygen through ventilation, which is the central support that intensive care offers, may only be delaying death rather than preventing it. This being the case it is in everyone's interests that intensive care is only embarked upon when there is a good chance that the patient will survive. The uncertain factor here is, of course, what do we call a good chance and more difficult yet, how do we predict it. The major problem here is the measurement of health states with sufficient precision to have predictive ability. There have been attempts at devising such systems, which are discussed in the following chapter. The existence of a refined, robust measurement system for intensive care is a precursor for the development of meaningful accounting for activities in intensive care. The attempts at devising measuring systems for intensive care are also taken up in the next chapter. This further discussion of intensive care developments provides a context for the evidence presented in our case study settings.

4. Calculation, costs and intensive care

Intensive care is an area of health care which is expensive. It is also possible that it is over-used. It is also possible that it is under-resourced. It has attained a prominent place in health care debates over levels of resourcing. It is much in the public eye and the political arena, as a result intensive care acts as a totem for medicine's achievements. Insofar as the public likes to believe that medicine has the answers to all our ills and can reverse the tolls of modern living, intensive care represents the cutting edge of medicine. In a piece in the BMJ in 1995, the Director of a London teaching hospital intensive care unit wrote;

'In many ways intensive care flies in the face of the current philosophy of healthcare delivery. It provides expensive rescue care to a small number of people, of whom a substantial minority do not benefit, with minimal impact on the health of the communities; and evidence to support many of the treatments given is lacking. Every day those working in intensive care units face head on the results of the tension between changing demography, advancing technology and limited resources.'
(Baldock, 1995)

From the perspective of the present study, these circumstances raise major issues over the quantification of the nature and benefits of intensive care, and, indeed of its costs. These issues have been the matter of considerable research. Interestingly, on the accounting side, there has been little work on budgeting in and for ICUs (Miranda, et al, 1998). This is a matter which the present study seeks to redress. Before examining the evidence gathered by this research project, we map out the issues and difficulties around the use and development of techniques of quantification (financial and non-financial) in intensive care, to inform the discussion of our own research. These matters are explored in two sections, (1) scoring systems in intensive care units and (2) improving our knowledge of intensive care costs.

4.1 Scoring systems in intensive care

As the demand for intensive care is well able to exceed supply, clinicians have seen fit to find ways of identifying those patients for whom it is considered that intensive care will be beneficial. To this end scoring systems have been designed to give some indication of the success of intensive care and to attempt to predict those patients whose admission to ICU would not be useful. Bion et al (1995) notes that these scoring systems have tended to draw negative publicity leading to, as he so graphically puts it, 'emotive stories about doctors 'pulling the plug' on sick patients'. This has, he goes on to say, taken attention away from more important issues, first that probability and prediction are different. That is to say, 'scoring systems do not decide the outcome in individual patients, they provide information about the probability of outcomes' (Bion et al, 1995). This information production is facilitated by the scoring systems being run retrospectively on many more cases than one doctor or unit could see, and so the pooled experience of intensive care can be drawn upon to shed some light on this most difficult area of decision-making. The second issue Bion draws attention to also has implications for costs. He says that;

'attempts to avoid wrongly predicting death in patients who will in fact survive reduces the sensitivity of such systems. Consequently, the many patients who ultimately die are not identified early on and therefore consume resources that cannot be reclaimed.' (Bion et al, 1995)

Jacobs in a useful discussion of 'outcome scoring in intensive care' notes that;

'The use of scoring systems to predict outcome in critically ill patients is very recent. Severity of illness is the single most important factor that predicts outcome of patients receiving ICU treatment (Knaus et al, 1993). Scoring systems are essential if stratification of patients into severity of illness is required for audit and resource management, to compare institutions, to study different methods of treatment in clinical trials and eventually to predict individual outcomes.' (Jacobs, 1996, p.86)

Jacobs also notes that all scoring systems rely on meticulous data collection and that trained observers are required to collect these data.

Given these difficulties (both of construction and of use) of scoring systems in intensive care, it is not surprising to note that there are a number of such systems in existence. The principal alternatives were devised in 1974 (the Therapeutic Intervention Scoring System) and 1981 (Acute Physiology and Chronic Health Evaluation). The second of these has been refined and is currently in its third version. While there is a widespread knowledge and use of these in intensive care, this is not to say that these scoring systems are regarded as the finished article by intensive care specialists. We examine these, in turn.

4.1.1 Therapeutic Intervention Scoring System (TISS)

The first scoring system available to a broad mix of ICU patients was the therapeutic intervention scoring system (TISS) devised by Cullen (1974). This system was created as a response to concerns about the expensive nature of intensive care. It takes a quantitative approach to the scoring of therapeutic interventions, depending upon the time taken and the complexity of the care involved. It has been used to determine nursing work loads and to investigate costs of intensive care (Jacobs, 1996).

TISS can be seen as an example of an attempt to create a costing system, which would recognise how different costs relate to different therapeutic activities, patient characteristics, and outcomes of unit activity. The use of TISS as a basis of assigning costs to individual patients aims to provide a standardised way of evaluating the intensity of treatment and need for intensive care resources. The TISS consists of approximately 80 individual therapeutic interventions and monitoring tasks, which have been weighted from 1 to 4. The weights have been based on the relative intensity of nursing and physician efforts required to perform each of these tasks. Using TISS scores, therefore, all intensive care interventions can be accumulated into a single sum score. Cost per TISS point is calculated by dividing total costs of the department in a given period, including those assigned from the use of other services, by the total number of accumulated TISS points during that period. Cost of a patient may be calculated by multiplying the number of TISS points required by a specific patient with the unit cost of one TISS point. Alternatively, only some of the costs (most importantly the nursing costs) can be allocated to patients based on TISS points, while rest of the costs, such as cost of drugs, can be directly assigned to specific patients, and some other costs, such as 'hotel'-type fixed costs (bed linen, food, cleaning, hospital-wide overheads), can be allocated to patients based on their length of stay in the unit.

TISS may be used as a management tool in costing the processes of care and assisting in making resource allocation decisions (Miranda et al (1998)) at the individual patient level. However at the individual patient level, TISS cannot be used as a predictive tool as the individual circumstances of each case vary too widely.

4.1.2 Acute Physiology and Chronic Health Evaluation (APACHE)

Knaus et al (1981) working on the idea that an indication of the variation from the norm on several key physiological measures would provide an assessment of the severity of the illness, devised the APACHE severity of disease scoring system. APACHE II and a further modification III are tools which enable evaluation of performance of ICUs and of new and existing therapies. The APACHE III risk of death probability calculation was devised by Knaus (1985).

APACHE is not an individual case specific predictor. Attempts have been made to use what is known as a dynamic scoring system, that is using APACHE scores over time, in order to predict outcomes for individual patients. This was tried, initially in the question of whether patients would benefit from total parenteral nutrition (feeding directly into the main veins (Chang et al, 1986)). Jacob et al (1987) and Bion et al (1985) undertook similar work. Jacob and his colleagues demonstrated that using two APACHE scores over two days improved the sensitivity of the tool, while Bion et al showed that a score for day 4 improved the predictive power of the scoring system and that cases where the APACHE II score was not reduced (higher the score the greater the severity of the illness) were associated with an increased risk of death. In later work Chang et al (1988) used daily APACHE II scores to define patterns of change and found that these changes were associated with non-survival. It should be noted that scores and predictions were never used as the basis upon which decisions to withdraw treatment were made.

The essential point is that only one APACHE II score is inadequate for predictions – the reasons for this are various, one being that pathophysiological processes in ICU patients are evolving not static and often several organs fail. This poses problems for the predictive capacity of APACHE scoring as it depends on choices that have been made in diagnostic categories. Jacobs (1996) explains that:

'Although the APACHE II score, with the exception of the neurological score, is based on objective data, derivation of the risk of death depends on a subjective choice of a single specific diagnostic category or major organ system as the primary cause of admission. The exact choice can frequently be difficult to make, not only on the day of admission but also subsequently. An incorrect choice can lead to a wrong estimation of death and therefore a wrong prediction.' (Jacobs, 1996 p.97)

So whilst, theoretically, the dynamic use of APACHE II should allow predictions for survival and give reason to withdraw treatment, and so effect savings in terms of human suffering and resources, the shortcomings of the method and the fact that we are dealing with human life has to lead to the conclusion that the frailty of these scoring systems means that they cannot be used as a basis for the withdrawal of treatment.

Jacobs concludes that:

'At present, there is no system that has been devised to triage admissions into the intensive care unit for treatment. Specific admission policies for the ICU are inappropriate and require only very general guidelines. Once a patient is admitted it is important for humanitarian and economic reasons to recognise hopelessly ill patients rapidly so that they can be allowed to die with dignity and with freedom from pain as they approach the end of their lives. The introduction of economic considerations for individual patient outcome decisions is a difficult dilemma but one which will become increasingly necessary to confront as society is forced to debate on the most effective use of its limited health resources.' (Jacobs 1996:101-2)

APACHE is used for evaluating existing and new therapies and gives an indication of the successes of intensive care and allows comparison of results and mortality rates between different ICUs. But as a tool it cannot be used for individual decisions and so is of no day-to-day use to intensive care clinicians or accountants in the management of budgets. This point is most forcefully made by a senior member of an ICU writing to the BMJ concerning the misunderstandings surrounding APACHE. Pilkington (1995) wrote:

'Despite the contribution that APACHE scoring has made in clarifying severity of illness and to the concept of standardised mortality ratios it was not intended to be a method of predicting outcome in individual patients. Thus curtailing costs by limiting admission or continuing treatment according to scoring is invalid (Civetta Hudson-Civetta and Nelson, 1990). In addition, APACHE scores cannot be used to decide who is to be admitted to an intensive care unit and should not be used to decide on a patient's discharge from an intensive care unit to either a ward or a high dependency area, as frequently patients' scores are similar in each of these areas.' (Franklin et al, 1990)

Atkinson et al (1994) used modified APACHE II organ failure scores to make predictions of the outcomes of 3,600 patients. Of the 137 patients predicted to die, 131 (95.6%) did so within ninety days of discharge.

'Patients predicted to die stayed 1,492 days in intensive care and incurred 16.7% of the total intensive care expenditure.'

Their conclusions point up the difficulty of translating these accounting facts into managerial or clinical decisions. According to Atkinson and his colleagues:

'If used prospectively, this algorithm has the potential to indicate the futility of continued intensive care but at the cost of 1 in 20 patients who would survive if the intensive care were continued.' (Atkinson et al, 1994)

These are the kinds of complexities that come into the care and costing and management of budgets in intensive care.

4.2 Improving knowledge of intensive care costs

Just as non-financial indicators of intensive care may be problematic, so it proves with the costing of this particularly complex part of health care. It is important to note, again, that the focus of management accounting, to date, in intensive care has been on costing this particular service rather than on planning, resource allocation and budgetary control. We examine these various costing practices in 4 stages:

- costing difficulties
- cost pressures
- the quality of cost information
- developments in costing in intensive care.

This provides us with an overview of actual practice and the barriers to further developments.

4.2.1 Costing difficulties

Critical care medicine and intensive care units provide technically advanced treatment which is expensive. Annual intensive care cost increases in many hospitals consistently exceed the increases of the costs of other forms of inpatient hospital care. As a result, intensive care units in some countries, including US and Canada, currently incur highest cost per patient day of all hospital clinical care centres (Nosworthy et al, 1996; Doyle et al, 1996; Edbrooke et al, 1999).

The increasing allocation of resources to intensive care has been a matter of debate due to the increasing pressure to contain spiralling health care costs. We have noted above the difficulties of calculating the nature of intensive care, using measures such as TISS and APACHE. We have referred to attempts to combine these (notably TISS) with costing information. However, there are also problems with costs of intensive care which have been poorly understood by medical professionals, hospital management and health economists alike (Gyldmark, 1995; Miranda et al, 1998). Estimates of the total costs of running intensive care units have been provided based on hospital accounts, yet, in the absence of adequate cost recording systems within intensive care units, it has been difficult to relate these costs to specific activities, treatments, or patient groups. Further difficulties in analysing intensive care costs have been caused by the multidisciplinary nature of intensive care medicine. Intensive care includes a lot of exchange and sharing of services within a hospital – such as laboratory, radiology, pharmacy, housekeeping and laundry – making the accuracy of the costing of intensive care partially dependent on the sophistication of hospital wide cost assignment mechanisms (Takala and Ruokonen, 1997).

4.2.2 Cost pressures

These difficulties are exacerbated by pressures for more refined costing information, without the resources to obtain them. The health system reforms introduced during the past few decades as a response to cost containment needs added pressure on intensive care units not only to contain their expenditure, but also to measure and report their costs in order to price their services. The introduction of the internal market in the UK and Finland, and in a number of other Western societies, as well as the launch of prospective payment and managed care systems in the United States, were all designed to increase the awareness of health service providers of the need to cost their services in a manner which reflects the actual resource use foregone, rather than arbitrary cost allocation. In the UK and Finland, the internal market reforms were to make identification, measurement, and assignment of the full cost of service provision a prerequisite of hospitals' planning services in the new 'competitive' environment. Similarly, establishment of a prospective payment system in the US required more accurate costing of services as a result of the abolition of the fee-for-service payment system, which had historically allowed cost-shifting processes by passing 'hidden taxes' to the fee-for-service payers (Doyle et al, 1996). In the UK, the pressures for refined costs of services have continued since the abolition of the internal market with the introduction of national reference costs for specialties. Regardless of managerial strategy, these were pressures on the management of health institutions in the UK and Finland, as well as in the US, to have the best cost data of various health care activities to determine financial viability, and intensive care was no exception to this.

4.2.3 Quality of cost information

The traditional objectives of costing systems in intensive care units have been to determine the actual cost of operating an intensive care unit, to identify different components of the total cost, and to find out the changes of the relative contribution of different categories to the total cost over time (Durand-Zaleski, 1994). Over the years, cost comparison between different intensive care units and comparison of costs over time have become increasingly necessary exercises for those in charge of ICUs, who participate in the intensive care units' budget negotiations and who are expected to justify the increasing expenditure on intensive care services to hospital management and to the providers of health care funds.

Valid comparison of different units cannot be restricted to a mere cost comparison, however. The recognition and analysis of different unit characteristics such as size, staffing, treatment policies, research and training possibilities, technological possibilities for treatment and care, as well as evaluation of patient casemix and patient outcome are necessary. Increases in costs may be considered as legitimate if they are regarded as a result of an increase in patient turnover, increased patient severity, new available diagnostic or therapeutic procedures, prescription of new or more expensive drugs, or new practice patterns.

Most traditional costing systems in intensive care units, as well as in other hospital units, have been based on a calculation of an average bed day cost derived from the hospital ledger. The cost per patient is then found by multiplying the cost per day by the length of stay of the patient. The major flaw of this method is that it does not reflect patient-specific resource use, and it has assumed the resource use to be constant during the entire stay of an individual patient. However, resource consumption between different patients may vary substantially. Further, it is commonly found that a typical hospital stay will have a high initial cost, and that the cost decreases towards the end of the stay. In intensive care units, the first hours after admission may be very resource-intensive, as the patient is incubated and connected to various monitoring devices. After these initial activities, however, the resource use does not follow a uniform picture, as some patients quickly become stabilised while other patients require increasing resources. A constant cost per day is therefore an inappropriate assumption to make in intensive care units (Gyldmark, 1995).

Given the above difficulties, it is interesting to note the reported use of costing information for intensive care units. A 'snapshot' of the patient population in a typical intensive care unit includes a spectrum of diseases and disease severity. This diverse patient population requires an equally diverse profile of resource consumption (Doyle, 1996). Cost studies conducted in intensive care units confirm this view. Resource consumption by individual patients in the ICU has been reported to vary by as much as 1000-fold (Noseworthy et al, 1996). Despite substantial cost variation between individual patients, the cost per intensive care day per patient in a single intensive care unit has been reported as being remarkably constant across most intensive care diagnoses. Severity of illness causes cost variation e.g. patients with impending or established acute renal failure often require higher service intensity, and their treatments generate higher supply costs, more frequent laboratory testing, and higher physician costs than patients with some less severe diagnoses. But a high nurse per patient ratio is common to all intensive care patients. Also, the high relative proportion of staff costs in intensive care (with salaries for medical, nursing and support personnel being more than half of intensive care units' total costs) tends to reduce greatly the extent of the variation in the cost of a patient day between different patient groups.

The most significant cost variances at the patient level in a specified intensive care unit are therefore explained by substantial variation in the length of stay between patients (Durand-Zaleski, 1994). Highest costs per stay are accumulated by a relatively small number of patients who require prolonged intensive care. Commonly, these patients consume a disproportionately high share of intensive care resources (Durand-Zaleski, 1994; Noseworthy et al, 1996; Takala and Ruokonen, 1997). Between different intensive care units, the variation in the average cost per patient may be substantial, being influenced by variation in case mix, and by differences in admission and discharge policies, as well as by widely variable patterns of clinical practice (Noseworthy et al, 1996).

4.2.4 Developments in costing

To reveal the causes and components of intensive care costs and the impact of different patient characteristics or therapeutic choices on these costs, routine cost accounting should ideally be able to trace costs of different treatments and individual patients (Takala and Ruokonen, 1997). Cost studies which involve variable costs can be conducted prospectively, i.e. resource use is registered at a cost-object level, across the activities taking place, or retrospectively, by employing patient files or similar records (Gyldmark, 1995). Yet, registration of resource use for each individual patient at patient level, either prospectively or retrospectively, is time and personnel consuming (Durand-Zaleski, 1994).

A cost study which uses activity-based costing to address the question of resource use was undertaken by Doyle et al (1996) in five intensive care units. This demonstrates patient-specific intensive care costs with respect to specific cost drivers. In Doyle's study, patient-minute cost assessments were made at four distinct care levels, based on increased resource utilisation associated with artificial ventilation as well as neuromuscular blocking drugs (NMB) therapy, which is often required for ventilated patients to suppress their inherent drive to breathe naturally. The four care levels identified were as follows:

- Usual or normal care for patients breathing normally or without assistance.
- Care for patients receiving mechanical ventilation.
- Care for patients receiving mechanical ventilation and NMB therapy.
- Care for patients experiencing NMB-attributed prolonged neuromuscular blockade.

Patient's ventilator status was employed as one of the cost drivers, as this status determines the nurse:patient ratio of the care. While the ratio with normal care is 1:2, a patient with ventilation requires a 1:1 ratio. For level three patients there is an added cost of NMB therapy and concomitant medication, while level four patients require neurological evaluation and possibly extended intensive care stay as well as rehabilitation. In addition to identifying increased costs related to mechanical ventilation, the cost study of Doyle et al. can also be applied in the evaluation of cost-effectiveness

of different NMB therapies. The model not only takes into account the drug acquisition cost, but it also recognises different products' financial implications on labour and facility utilisation as well as the incidence and the cost of prolonged NMB.

However, despite the attractions of using the ABC-type costing systems, there is no actual or recognised uniform method of intensive care costing. Despite numerous studies focusing on intensive care costs (see for example, Edbrooke et al, 1999, who identified over 1000 articles concerning the measurement of cost or resource consumption on intensive care units), comparison of costs between intensive care units on the basis of existing cost studies has proven difficult. Different approaches to costing employed by different authors is the main source of difficulty. Gyldmark (1995), who examined 20 existing costing exercises to make a comparison of intensive care therapy across different units, found out how cost figures represented different cost components in different studies. For example, in studies conducted in the US, the cost of medical personnel had been typically excluded, as the physicians submit their bills directly to the third-party payer. Differences across studies were also found in the inclusion/non-inclusion of overheads, capital costs, and fixed costs. The different time period over which the costing studies had been conducted caused further problems for the cost comparison. Over the years, technological developments had affected costs of intensive care provision in both negative and positive ways.

Conclusion

This report has underlined the complexity of intensive care. At one level, the necessity for the measurement of both the need for intervention by intensive care units and the costs of providing this treatment are well recognised. However, despite the existence of non-financial indicators, or scoring systems, for the severity of illness as a guide to the provision of intensive care treatment, these are limited in their applicability. These scoring systems (TISS and APACHE, in its variants) are of most use at a higher level of aggregation than specific ICUs and for planning rather than immediate clinical intervention and action. In addition, while we have seen that there has been considerable effort expended on the derivation of costing systems for intensive care activities, on an international scale, there is no standard approach, save for the traditional cost per day per patient, with all its limitations. A major defect of existing knowledge in accounting for intensive care units is the way in which accounting information informs decisions, if at all, and how budgetary control operates. These matters are taken up in the case studies, below.

5. The UK case studies

In this study we examined the experiences and practices of two intensive care units: one which was located in a major teaching hospital and the other which was in a modern district general hospital. In this study we examine the accounting practices within these hospitals in the context of the wider setting of what constitutes intensive care and the rationing of health care, generally, and how this impacts on accounting. The research questions addressed in this study were (1) the potential for accounting to influence clinical behaviour, (2) the extent to which the disciplines of accounting and clinical practice inform one another and (3) whether accounting information operates differentially within health care groups.

As noted above, the fundamental nature of intensive care is that of being responsive in situations where patients have life-threatening medical conditions. There is an inescapable uncertainty in the provision of intensive care facilities: it is hard to predict, at one level, the reaction of a patient to a surgical procedure, or at another level, the likelihood of a major accident or disaster occurring, both of which place demands on intensive care units. Allied to this unpredictability, there is the moral dimension of intensive care: health care professionals may be confronted with life or death situations in which they have to decide whether to admit patients, to continue their treatment or to withdraw treatment. This places health care professionals in intensive care units at the nexus of the debate over rationing of health care. In this chapter we examine the manner in which accountants, accounting information, health care professionals and their practice, interact. We consider our findings at the teaching hospital first, followed by the district general hospital.

5.1 Teaching hospital

The intensive care unit at the teaching hospital had the following characteristics:

1. It has its own delegated budget (for payroll, consumables, medical supplies).
2. Its budget is part of a wider budget for a directorate which also includes anaesthetics and theatres.
3. The management accountant with responsibility for overseeing the budgets in (1.) and (2.) is located in a central finance unit.
4. The day to day management of the ICU and its budget is the responsibility of a service manager, who has a nursing background.
5. The overall responsibility for this intensive care unit is that of the clinical director who is in charge of this directorate.

The above scenario places the service manager in a central management role in this intensive care unit. However, the delivery of health care in intensive care units is characterised by very strong team relationships. The medical consultant in charge of a specific patient's treatment will work closely with nursing colleagues in caring for patients. This closeness of the members of the intensive care team is promoted by the need for ICUs to respond, collectively, to crises which bring patients for intensive care. One effect of the way in which these teams work is to shield them from accounting or financial information. This is not to say that these units do not face, or are unaware of financial constraints. As members of a health care team which cannot plan levels of activity, and which has to respond to the demands put upon them, these health care professionals can see the need for more resources when existing bed and staffing capacity comes under pressure.

However, this is an indirect exposure to accounting information or financial constraints: the accounting information prepared by the management accountant does not permeate the team. In effect, the activities and operation of the intensive care team is such that they are buffered from intrusions of a financial nature. In part, this can be explained by the nature of their service (responsive, demand-led); in part, by the highly integrated, highly-focussed nature of the clinical team's work; in part, the moral dimension of the activities of this unit can preclude the use of accounting information in decision-making; but also, in any event, the accounting information does not have the precision to be so intrusive. At the teaching hospital, the management accountant does not have the facility to offer routine costings for the different procedures undertaken within this unit. The typical financial and accounting information prepared for this unit is (a) a monthly return, which shows allocated monies, actual expenditure and the variance between the out-turn and the allocation and (b) similar financial returns for other units in this clinical directorate and (c) for the directorate, as a whole.

Given, the uncertainties of intensive care (see above), and the limitations of the precision and degree of refinement of the costing of procedures in intensive care, this hospital operates a two-tier system of coping with change, or adjusting capacity constraints. This system is based on the creation of buffers to insulate the intensive care unit from the uncertainties which this service faces. It involves (a) a physical constraint and (b) a financial structure. The physical constraint refers to the limits posed by bed capacity. This can be seen as the binding constraint on intensive care activity. (In this discussion, we assume these beds are fully staffed with specialist intensive care nurses). However, the health care professionals at this teaching hospital can relax this in two ways: (1) by the use of beds in a nearby high dependency unit or (2) by drawing on the resources of nearby hospitals which have intensive care units. As regards (1) and (2), there are nevertheless, limits to these options: for (1) the level of care in high dependency is different from that in intensive care so the condition of the patient is a critical factor in this option, also on (2) these neighbouring hospitals are close by (within a 15 mile radius), but a constraint is the patient's condition as a determinant of his/her fitness to travel. At this teaching hospital, the medical consultant in charge of the intensive care unit was adamant that he would not sanction the transfer of intensive care patients any great distance by ambulance, as this was counter to appropriate patient care.

This is the arena within which the intensive care teams operate, responding to unpredictable patient flow, with a fixed resource (bed numbers and staffing) and some flexibility to spill over into high dependency units or neighbouring hospitals. The notable aspect of this, from an accounting angle, is the absence of accounting information. The clinical teams work buffered from the potential intrusions of accounting information systems. Other forms of calculation (such as TISS or APACHE scores) are not used by this team on a day-to-day basis. The hospital consultant-in-charge was critical of the quality of information from TISS and APACHE scores, which he saw to be of use, at a distance from the operational management of intensive care. This places clinical judgement at the centre of the management of intensive care at this teaching hospital.

The second aspect of this 'buffering system', the financial structure, operates through the devolved budgetary system. This teaching hospital has eight clinical directorates, each of which has a devolved budget. Within each directorate there are a number of departments or specialties, which may have their own slice of the delegated budget. At the level of the hospital, the budget is essentially an allocation of funds from central government which is (a) basically historical, (b) with adjustments for growth and inflation (positive) and for efficiency gains (negative) and (c) taking account of central government policies on the distribution of resources (between teaching and general hospital, and between hospitals and community services). The net effect is a squeeze on this hospital's finances. This cascades down to the clinical directorate of which intensive care is a part. As part of this, the intensive care unit is also assigned a budget. Deliberations on the budget take place between the management accountant in the finance department, the service manager in the clinical directorate and the clinical director (a hospital consultant who carries out administrative duties on a half-time basis). The budget has been described to us by the management accountant as 'historical' and by the service manager as 'rolling-declining' – a description which captures the squeeze on this hospital's finances.

From the perspective of the intensive care unit, we have seen above that the health care professionals are shielded from the need to consider the costing dimension of their activities on a routine or one-off basis. We have also noted the clinical imperative to be responsive in the face of unpredictable demands. The outcome of these influences has been a financial deficit for the intensive care units budget. However, there is a system of budget overlays where ICU budgets nestle within this larger aggregation at clinical directorate level. The overspends of the intensive care unit are not challenged by the management accountant. The system of overlapping budgets within this directorate allows the flexibility of cross-subsidisation by other departments or services within this directorate which absorbs the ICU deficit. To date, this directorate has always managed to absorb the deficit from underspends on other budget heads. There remains the potential difficulty of what would happen if the entire directorate had a deficit, of course, which is a limit to this form of flexibility. Nevertheless, the management of this service by the finance department shows a sensitivity to what may be seen as market conditions (the unpredictable demand), the sensitivity required to meet them, and the limitations of the financial information, given the strong historical, allocation-based budgeting systems.

5.2 General hospital

The UK general hospital in this study has a smaller number of intensive care beds and no high dependency unit. It is a modern hospital, which was designed with the intensive care unit in close proximity to operating theatres for maximum effectiveness. The experiences of health care professionals and accountants in this general hospital mirror those of the teaching hospital, with one significant exception in the organisation of the finance function (see below). The provision of intensive care is by a multi-disciplinary unit, which has a strong team ethos. The urgency of the tasks which confront this team mean that any traditional hierarchical relationships between the different health care professionals comprising the team are dispensed with.

In terms of buffering this intensive care unit from the uncertainties and unpredictability of a demand-led service, the management of this hospital have provided one intensive care bed, in addition to the established level of 3 beds, which are funded by the local health authority. This is a recognition by the management of the need for additional flexibility in a service which is so sensitive to external pressures. This particular intensive care unit is in a hospital without a high dependency unit, so this additional bed is extremely important in giving the clinical team a margin of flexibility. As with the teaching hospital, the general hospital is able to send intensive care patients in excess of its bed capacity to nearby hospitals, three of which are in a 15 mile radius.

The intensive care unit at the general hospital also has a comparable situation to that of the teaching hospital, in terms of financial structure. The intensive care is part of a larger directorate, which has a devolved budget. The basis of budget setting is an allocation process similar to that at the teaching hospital, with a strong historical basis to patterns of budgets. Again, there is a situation where health care professionals are not exposed to the outputs of routine or ad hoc budgetary control exercises. They are largely insulated from this. The clinician in charge of this intensive care unit informed us that he was not trained in accountancy, was not interested in it – he just wanted to treat patients, as that was why he thought he was there. There was one major distinction in the organisation of the finance function at the General Hospital from that at the teaching hospital. At the general hospital, there were only four directorates and each had a management accountant located in the directorate, rather than as part of a central finance department.

Furthermore, as noted above, this was a modern district general hospital. It had moved from a nearby location at which its buildings were in poor condition. When the transfer was made, this was also seen as a convenient time for some reorganisation of directorates. At this time, the management accountant had persuaded the clinicians within his directorate that it would be useful to undertake a 'bottom-up' planning exercise, based on zero-based budgeting principles. They agreed, he undertook this task, and quantified their resource needs. Unfortunately, this budget was considerably in excess of the monies allocated to this directorate, with little or no prospect of the ZBB-budget coming to fruition. The clinicians were disappointed at this outcome. This had two particular consequences: (a) it had a reinforcing effect on buffering clinicians from budgetary systems (the 'system' could not account for the demands on them) and (b) the management undertook to investigate the causes of budgetary overspends and help to make a case for this to the hospital trust's executive.

Conclusion

It is evident from the above UK case studies that the potential of accounting to influence the activities of health care professionals is both indirect and limited: indirect, because intensive care units tend to work within a fixed set of committed resources, with some limited flexibility to transfer cases to other settings, and this is the most evident impact of accounting, or more accurately, funding constraints; limited, because management accounting information does not capture the complexity of the tasks undertaken and, as a consequence it has a low visibility within the discourses of the ICU teams. Also, within the activities of ICUs, the role of accounting tends to be reactive, rather than proactive, with the dominant thinking in these teams being clinical needs and priorities.

To this extent, we have observed a one way flow of one discipline informing the other, as clinical practices are interpreted, evaluated, costed and entered into the budget-setting framework for following periods. There is no comparable flow of accounting thought, expertise or practice penetrating the thinking of the health care professionals within these intensive care units. The specific setting of intensive care and their method of operation – the distinctive team ethos – also mean that, by and large, the health care professionals are shielded from accounting and financial information as they perform their routine tasks. Exceptions to this are a matter of degree, at some distance from the core team delivering health care in the intensive care unit are the service manager for the clinical directorate and the clinical director both having some involvement in budgetary matters. However, they are sufficiently distant from the direct provision of intensive care not to be considered part of the 'team'. Also this difference is more a matter of the administrative responsibilities of these individuals i.e. their location within the administrative framework, rather than their health care professional expertise.

6. The Finnish case studies

As in the case of the UK discussed above, accounting practices were studied within two intensive care units in Finland; one of which was in a teaching hospital, and one in a general hospital. The comparison of UK and Finnish case studies is facilitated by the similar health care arrangements in these two countries, both relying on a national health service system funded largely by tax revenues. Pressures for the development of financial management within hospitals in both countries during the past few decades have also been similar. An environment of escalating demands on limited resources has led in both cases to attempts to devise 'market solutions' to the organisation and delivery of health care.

The case study material from Finland will be presented in the same sequence as the UK material. Findings from the research conducted in the teaching hospital will be considered first, followed by those from the general hospital. In these case studies we address the research questions in this study viz (1) the potential for accounting to influence clinical behaviour, (2) the extent to which the disciplines of accounting and clinical practice inform one another and (3) whether accounting operates differentially within health care groups.

6.1 Teaching hospital

In Finland, the model prevalent during the 1970s for the organisation of intensive care units in teaching hospitals was that there should be a separate intensive care unit for each of the major clinical units. This model had been adopted by the teaching hospital studied, the intensive care unit in this hospital being part of the hospital's surgical division. By the 1990s, however, this model had been revised. The new trend was to centralise ICU services within hospitals, and to establish larger units that would provide services to a number of specialties. Accordingly, at the time of the interviews in the teaching hospital, a reform of intensive care provision was in progress. This reform was to merge the intensive care units that had been operating under the separate control of surgical and medical divisions. The new adult intensive care facility would accommodate 25 beds in total, bringing together 12 beds from the surgical division's intensive care, 10 beds from the medical division's intensive care, and 3 new intensive care beds. According to the revised organisational structure, this new unit was to be located under the control of the anaesthetics division.

Within the current arrangements the operational management of the intensive care unit studied had been delegated jointly to the physician in charge, and to a ward sister. The unit had not been given a separate budget allocation, but was financed through the budget of the surgical division. This arrangement was regarded as unsatisfactory by the health care staff interviewed. Since the unit had not been designated as a separate accounting entity, any cost savings achieved by intensive care unit staff were likely to be passed to the surgical division as a whole, rather than the intensive care unit. The idea of delegated budgetary ideology, although espoused widely, was still only beginning to take hold within the hospital in which the unit was located, and by the time of the research had reached only the major clinical units. These health care professionals made an unfavourable comparison of their situation with another teaching hospital, where the intensive care unit had been given wider financial autonomy and responsibility. The consequences of this with regard to a reduction in the use of ice plasma, was given as an example. Careful consideration of the necessity of prescribing this blood product for individual patients was reported as having led to annual cost savings of 500,000 (FMK). The reward for this cost saving was to return to the unit half of the amount saved for the development of the unit. A chief physician in the intensive care unit studied considered the budgetary allocation and demarcation of responsibility centres within the hospital studied as likely to discourage similar ideas for cost savings, 'If we did the same here, we would simply lose the money', he commented. His view was that if the intensive care unit were to be constructed as a separate responsibility centre, the staff would be motivated to 'keep their eye on what they consume, and how much they consume'.

Like the physicians, the ward sister of the intensive care unit in our study supported the idea of delegated budget responsibility. She described the possibility that the new adult intensive care unit might, as a part of the hospital's reorganisation process, be defined as its own budget centre as her 'dream'. Becoming defined as a separate financial responsibility centre would, according to this senior nurse, facilitate the preparation of ward level follow-up reports for the control of resource consumption and revenue accumulation.

Although the unit had not been defined as a separate responsibility centre, a number of accounting reports were provided. The physician in charge, as well as the ward sister, were informed on a monthly basis about the variances between budgeted and actual expenditure at the level of the surgical directorate. The unit also received reports on drug costs from the pharmacy, and supplies from the hospital's purchasing unit. Further, it had been made possible for staff members to access financial accounting data (such as the cost of materials ordered) on the computers within the unit. This accounting information was discussed in various meetings both at the level of the surgical directorate, as well as at the meetings within the intensive care unit. If actual spending was reported as having exceeded the accepted budget frame for the surgical division, the medical staff had to negotiate possible ways in which the budget target could be achieved. Numerous reports and improved data systems, combined with the prominence of the issues absorbed from these information systems and discussed in staff meetings, were seen as having contributed to the increasing cost consciousness amongst both doctors and nurses.

For several years, the intensive care unit studied was seen as having coped with diminishing resources. A significant reduction in its total expenditure was considered to have been achieved by careful staffing of the unit, by selection of the most cost-effective drugs, and by savings in the use of disposables. Evidence of the continuously improving value for money of intensive care provision within the hospital studied was provided by TISS reports. TISS points, which measured the nursing workload within the unit, were collected routinely on a daily basis by the unit's nursing staff. While substantial savings were seen to be achieved from staffing, as well as drugs and disposables, the volume of patient flow was regarded as the ultimate cost driver. The volume of patients in an intensive care unit serving mainly the surgical division was regarded as being largely driven by the level of activity in the operating theatres. Serious problems with achieving the overall expenditure budget could thus only be addressed by reducing the number of elective, non-urgent operations. A reduction of elective surgery by temporary lay-offs of surgeons was being considered in the face of a budget deficit of the surgical directorate at the time of the interviews. Reducing the volume of elective operations would not only reduce the cost of running operating theatres, but it would also reduce the cost pressures of intensive care provision.

As in the UK hospitals, the physical constraint, i.e. the limited number of beds in the intensive care unit, set an ultimate limit on the number of patients that could be treated simultaneously within the unit. The limited number of beds also set constraints on the volume of operations in operating theatres. Occasionally, elective operations had to be cancelled due to the shortage of intensive care beds. Prior to cancellation of any operation, however, it was ascertained as to whether a patient could be admitted either to the medical directorate's or children's intensive care unit within the same hospital. Also, the possibility of caring for a patient in the recovery room was investigated.

The volume of patients admitted to the surgical division's intensive care was thus controlled partially by restrictions on the number of patients who could be admitted for post-operative intensive care. More generally, however, patient numbers were controlled by careful admission and discharge policies of the unit, as well as its policies concerning the continuation of care. Careful assessment of the likelihood that a patient would benefit from intensive care was seen as necessary in the context of limited resources. Nonetheless a decision to deny a patient intensive care was regarded as difficult. A decision was often seen to require negotiation between the referring doctor and the intensive care physician. Decisions concerning the discontinuation of care were seen as equally difficult.

6.2 General hospital

The organisational structure of the general hospital studied had undergone a major reorganisation in the early 1990s, affecting all clinical and non-clinical units. The aim of this reform had been to reduce the total number of cost centres, 55 at the time. Management of this large number of cost centres had proven difficult, and the objective was to have a smaller number of responsibility centres, whose managers could be made directly accountable to the hospital management. At the time of the interviews, the hospital had six divisions, each consisting of several profit areas. The number of divisions was planned to be reduced to five during the following year. Throughout its history, the hospital had only had one intensive care unit which had served the needs of the entire hospital. In the existing organisational structure, the intensive care unit was located within the operating division. Within the organisational structure of the operating division, the intensive care unit was part of a profit area which also included operating theatres and an anaesthetics unit.

The annual budgeting cycle in the general hospital began with the determination of limits for total spending at the hospital level. This limit was set by the board of municipality representatives, who acted on behalf of the financiers of the hospital. This total budget was subsequently distributed by the hospital board between the six divisions. Within divisions, the budget was constructed in a bottom-up manner by the medical staff. As the first step, each unit prepared their own budget proposals, which were then collected together at the level of each profit area and at the level of the division. According to a chief physician, who acted as the manager of the profit area in which the intensive care unit was accommodated, this process revealed 'the difference between the hopes and reality'. It acted as a starting point for the process of negotiation of possible budget cuts between representatives of different profit areas as well as representatives of various units within each profit area. Budget negotiations were based on previous years' budgeted figures and actuals, any changes in the activity levels being taken into account in the negotiation process. Budgetary construction and revision was thus very much within the clinical domain. According to the chief physician interviewed: 'We have always, at least so far, reached some sort of an agreement'. While one of the roles of the financial manager was to attend various budgeting meetings, each profit area was told to 'sort out their own things quite independently.'

The position of the physician in charge of the general hospital's intensive care unit had not been assigned to a single person, but had been shared between 3 anaesthetists who had rotated the post for 4 month periods in turn. At the time of the interviews, however, things were in the process of being changed. Arrangements had been made to delegate the unit to the control of one of the anaesthetists. This physician was keen to become more involved not only in the operational management of the unit, but also in its financial management. So far, however, budget preparation and spending control within the ICU had been the responsibility of the ward sister of intensive care, and the chief physician of the profit area in which the unit had been located.

The unit had been part of a large nationwide study on Finnish intensive care, carried out during 1986 and 1987. A total of 25 ICUs had been involved in this study. Comparison between the observed and expected mortality rates between different units had been made based on information submitted by participating units. The study also provided information about the intensity of treatment compared to the severity of illness between different units (Miranda et al, 1998). At the time of the interviews, the unit was participating in a follow-up project to this study. This was a national quality control and benchmarking programme, shared with ten other intensive care units. The purpose of meetings arranged by the chief physicians of these units was to discuss, based on submitted TISS and APACHE reports, the means by which to improve and standardise ICU clinical practices and to improve patient selection. A commitment to an investment in a computerised patients' data management system, which was to be used for both clinical and administrative purposes, had been made by the operating division of the hospital. This data management system was to computerise the collection of TISS points, currently carried out manually.

Financial reports that were sent to various clinical and non-clinical units within the hospital included monthly follow-up reports of budgeted and actual expenditure. Numerous reports were provided, with different levels of accuracy: at the level of divisions, profit areas, as well as units, including intensive care. In addition to these printed reports, chief physicians and ward nurses had been given facilities to check reports on-line, by using their desktop computers. As stated by the ward sister of the intensive care unit: 'I get monthly reports of all expenditure, the finance unit distributes these, so I see how much money has been spent and how much is left...so I know exactly where we are going.' In her view the ward sister has to have an idea of the amounts of money that's available, and the expenditure; one (ward sister) must think in terms of economies'. According to her, the cost consciousness of all medical staff, both doctors and nurses, had improved significantly during the past decade.

While the consumption of resources as well as variances in budget reports were carefully followed at the clinical unit level, the ultimate responsibility for achieving budgeted targets was located at the divisional management level. According to the profit area manager, it was the chief physician managing the division who had to explain to the hospital management board if the division had not kept within its budget constraint. Explanations had to be given on why that had happened, and what action was going to be taken. According to this chief physician: 'The management board is very keen to monitor our expenditure, but not in a way that they would get involved with the details of expenditure at the level of a single profit area, as the money can be transferred from one profit area to another within a division.'

The chief physician's view of the operation of the budgetary system was mirrored in the comments made by the hospital's financial manager. The role of the finance unit was seen to be the overseeing of the budget of the hospital as an entire entity, particularly in initial discussions with the municipality representatives. The detailed operation of devolved budgets was subsequently delegated to the medical units, where senior medical personnel had accepted responsibility for budgetary control. The system of delegated budget responsibility had been in operation for some years, and it was regarded as a success by the hospital's financial manager, who commented: 'The ultimate responsibility is on the operational side (...). We have been operating this system for so many years now that the basic idea has been understood quite well.'

Conclusion

The evidence from these case studies reveals the impact of accounting on the activities of the Finnish intensive care units is very direct. In Finland, the intensive care unit health care teams are tightly knit groups, as in the UK. However, they are not buffered from the concepts, practices and information provided by management accountants as in the UK: in the absence of management accountants they absorb this information-generating process of management accounting. That is, they participate in budget construction and cost scrutinies and use this to influence their activities. These health care professionals also draw on their clinical expertise in the management of their facilities. However, it is evident that the potential for accounting to influence clinical actions in the Finnish context is of a different order from the UK situation. Furthermore, it is clear that there is some convergence of thinking from the different disciplines of, on the one side, accounting, and, on the other, clinical practice. This is most evident in the Finnish situation in the use of a points scoring system for severity of illness (TISS) in combination with cost information. In this situation, there is no single key health care professional group which absorbs and acts on accounting information in discharging its clinical practice function. Both physicians and nurses helped to construct and use management accounting to inform their activities.

7. Conclusion

This project has studied management accounting in intensive care. As an area of health care, intensive care units have profound implications for the successful practice of modern medicine. Any modern hospital with a range of facilities (particularly accident and emergency and surgical specialties) requires an intensive care facility. This is the expectation of patients and health care professionals. In the event of complications arising during surgical procedures, the availability of intensive care may determine the outcome of treatment for a given patient. In health services which are resource-constrained and in which there is pressure for greater patient throughput, the availability of intensive care facilities may determine whether health care treatments may be undertaken. This circumstance means that intensive care facilities are often seen as the critical factor in shaping the volume and quality of health care offered in hospitals. In addition, intensive care units are extremely costly: these facilities have above average proportions of highly qualified staff (particularly nursing staff), use expensive equipment and may make extensive use of laboratory services and hospital pharmacies. This relationship of costs to an essential service engaged in complicated decisions on the provision, continuation or withdrawal of care to patients is the particular focus of this study.

This study has demonstrated a number of phenomena in the context of management accounting for intensive care units: (1) the limitations of costing developments for intensive care, (2) specific issues of budget construction, (3) the potential for linking costing and non-financial information in resource allocation and (4) the limited impact of the problems of annuality in health care spending on a demand-led service, such as intensive care.

As regards (1), there is reported use of activity-based costing in one specific study of intensive care. This practice was not repeated in any of the four case study sites in this study. The most common practice in costing intensive care was the traditional average cost per bed day, which hides considerable differences in the resources consumed by individual patients and which is of limited use in the management of these facilities. **We recommend that more sophisticated costing studies are undertaken in the area of intensive care.**

However, while the costing methods for intensive care are not advanced, (2) the budgetary arrangements for intensive care, reveal a degree of sensitivity in budget construction. The demand-led nature of intensive care makes the estimation of future activity levels extremely difficult. The traditional, incremental process of budget construction in health care is inadequate for a service such as intensive care. The practice deployed by management accountants in the four case study sites was that of a series of overlapping budgets, in which intensive care units nestled within larger aggregations of clinical activity for administrative purposes. This has the effect of buffering the intensive care units from the variations in demand which may lead to deficits in their allocated monies. Existing budgetary mechanisms reflect the sensitivities of the nature of intensive care. **However, we recommend that more precise budget construction is undertaken within intensive care units.**

On (3), costing information and budgetary arrangements would be enhanced if they could be related to measures of clinical activity. We examined two of the most frequently cited measures of intensive care clinical activity – TISS and APACHE (which has three variants) scores. However, these scoring systems are perceived to be blunt instruments by clinical managers, in general. Their use is confined to the examination of broad patterns of care, at a strategic level, rather than for operational management. An exception to this was found at the teaching hospital in Finland, which related TISS points to costs of intensive care and this was reported to be typical of Finnish teaching hospitals. This use of TISS points and costs informed the budget-setting and monitoring in Finland. **We recommend that greater efforts are made to link developments in the measurement of clinical activity in intensive care with accounting measures.**

Finally, on (4), it was anticipated at the outset of this study that intensive care units would be affected, as other hospital services are, by the effects of annuality in health care expenditure. The two main impacts of annuality (see Perrin et al, 1978) are well known: (a) end of year spending sprees when there are underspends on allocated expenditure and (b) the imposition of arbitrary cut offs on clinical activity where allocated monies are exhausted before the financial year end. As regards intensive care units in this study, circumstance (a) did not occur: the typical situation was a slight (up to 10%) overspend and not of underspends. Also, while there were overspending situations before the year end, there were no reported instances of the arbitrary imposition of a complete or partial (e.g. closing a bed) cessation of activities.

Given the above scenario for the practice of management accounting in intensive care units, it is interesting to examine the specific research questions of this study. This project addressed three research questions:

- Q1** What is the potential for accounting to influence clinical behaviour?
- Q2** To what extent do the disciplines of accounting and clinical practice inform one another?
- Q3** Does accounting information operate differentially within health care professional groups?

As the previous paragraph has shown, this study revealed certain commonalities across the sites included in this project, but there were differences too. On Q1, for example, it was evident in the Finnish case studies that there was a far greater potential for accounting to impact directly on the behaviour of the clinical teams. This contrasted with the UK situation, where management accountants were sensitive to the ethical dilemmas confronting clinicians in a demand-led service. The major focus of the UK management accountants was *ex post*: in Finland clinical specialists actively worked with accounting information. **We recommend that greater efforts are made to link developments in the measurement of clinical activity in intensive care with accounting measures.**

Also, on Q2, it is evident that there was a more complete interplay between accounting and the clinical disciplines in Finland, because of the role of clinicians in budget construction monitoring and cost scrutiny. One of the most evident examples of this interplay is in the use of TISS points, to measure clinical activity in Finnish intensive care units and the relation of this scoring system to the costs of intensive care units. In the UK, it can be seen that clinical practice informed accounting practice to the extent that changes in clinical practices which triggered financial deficits then triggered investigations by management to quantify and cost the impact of changes in practices. However, in the UK, accounting information did not act as an explicit constraint to ration clinical activity. The introduction of national reference costs in the NHS offers a potential means of accountants having a stronger involvement in measuring and understanding the relationship between clinical activity and cost incurrence. **We recommend that accountants in the NHS seek to develop NHS national reference costs, in this way.**

Finally, on Q3 again there were differences between the UK and Finland. In the UK, those most closely involved with management accounting matters were at some remove from the clinical team in the intensive care unit. The people in the UK intensive care units who had most to do with financial matters were the service managers (often with a nursing background) who are the point of contact with the finance office and who scrutinised the budget in support of the clinical director with overall responsibility for the clinical activities comprising the directorate. This contrasted with the Finnish situation, where both physicians and nurses in intensive care worked with accounting information both to construct and negotiate for their budget and to monitor their expenditure. This is a significant departure from experience to date with attempts to introduce clinical budgets in the UK, which tend to have, at best, modest success. However, it is evident that the major factor in the 'Finnish solution' to the problem of how to make clinical staff interested in, and willing to act on management accounting information is in large part due to the absence of management accountants in the Finnish hospitals sector, where accountants are confined to more traditional stewardship and treasury roles. This raised major issues about the transferability and portability of management accounting systems and underlines the need to understand the local in the pursuit of 'global' solutions to management accounting problems. These developments also raise important issues about the education and training of hospital doctors in the UK. There is a case for extending the expected knowledge base of doctors to include expertise in accounting matters. The difficulty of making such recommendations is enactment. One possible means of advancing this development of clinical care pathways which provide a detailed picture of care patterns and a locus and means for attaching costs, to them. **We recommend a closer integration of the education of clinicians in the understanding and costing of clinical care within intensive care, specifically, but also more generally.**

This research has confirmed the benefits to be obtained from contextual studies in accounting research. The examination of accounting practices in these case study sites has been illuminated by focussing on these specific study settings and seeking an explanation for these practices in techniques used, possibilities for reform, professional relationships and the wider hospital context in which these units exist. This study has also shown that there is a great deal to be gained from studying the variety of disciplines which comprise clinical care. There has been a tendency for accounting researchers to study health care accounting, in general, by treating the hospital (or some other organisation unit, such as commissioning bodies) as a discrete activity. In the initial years of accounting research in health care, this approach was understandable. However, this study has shown that, by focussing on one specific part of health care, a greater understanding of the actual and potential impacts of accounting is possible. The subtleties of examining management accounting in practice have also benefited greatly from the comparative, international nature of this study. In an environment where global challenges and trends are the norm, this particular study has gained from the comparison of the practices of Finland and the UK. This has revealed, as noted above, distinct differences in the organisation and delivery of management accounting information. **We recommend that the future study of health care management accounting would benefit greatly from further studies which (a) explore specific branches of clinical activity, in depth and (b) make international comparisons.**

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Appendix A

Questionnaire

What is your role in this unit?

- How long have you worked in your current position?

What are your main challenges and problems?

How does this unit manage patient numbers?

- What are the range of cases?
- Do you have written admission and discharge policies outlining eligibility criteria and procedures for screening entry?
- What mechanisms do you have to help staff make rationing decisions?
- How important is patient triage as a mechanism for maximising care and efficiency?
- Is it feasible to categorise patients into those who would benefit from intensive care and those that wouldn't?
How does this work in practice?
- How important is severity of illness in prioritisation of patients?
What about ability to benefit? – Is priority given to patients already in the ICU?
- Can patients' chances of survival be assessed with accuracy?

How well resourced is this unit?

- How is the allocation of resources determined? Can you influence the allocation? How much input do you have?
How do you get your budget? How detailed are they? Who has responsibility?
- Are patients ever refused or deferred emergency admissions because of constraints on resources? Have there been cases of adverse medical consequences of rationing decisions made when ICU resources are scarce?
Can there be situations where you do not have enough beds for all incoming patients?
What do you do? Who decides?

What kinds of information are used in the management of this unit?

- What kind of financial information do you receive?
- How frequently do you receive it?
- Is this information relevant and useful?
- What role do ICU staff play in the gathering/preparation/interpretation of financial information?
- Are there pressures in the ICU to contain costs?
If so does this interfere with your ability to practice medicine as you see fit?

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