"STUDY OF MANAGEMENT DECISION MAKING BY WARD SISTERS IN A HOSPITAL AND THE EFFECTS ON DECISION MAKING AFTER THE IMPLEMENTATION OF A DECISION SUPPORT SYSTEM"

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SUMMARY

This thesis considers management decision making at the ward level in hospitals especially by ward sisters, and the effectiveness of the intervention of a decision support system.

Nursing practice theories were related to organisation and management theories in order to conceptualise a decision making framework for nurse manpower planning and deployment at the ward level. Decision and systems theories were explored to understand the concepts of decision making and the realities of power in an organisation.

In essence, the hypothesis was concerned with changes in patterns of decision making that could occur with the intervention of a decision support system and that the degree of change would be governed by a set of 'difficulty' factors within wards in a hospital.

During the course of the study, a classification of ward management decision making was created, together with the development and validation of measuring instruments to test the research hypothesis. The decision support system used was rigorously evaluated to test whether benefits did accrue from its implementation.

Quantitative results from sample wards together with qualitative information collected, were used to test this hypothesis and the outcomes postulated were supported by these findings.

The main conclusion from this research is that a more rational approach to management decision making is feasible, using information from a decision support system. However, wards and ward sisters that need the most assistance, where the 'difficulty' factors in the organisation are highest, benefit the least from this type of system. Organisational reviews are needed on these identified wards, involving managers and doctors, to reduce the levels of un-coordinated activities and disruption.

The government has planned large expenditures on the provision of nursing decision support systems throughout the NHS. Unless these organisational factors are addressed, together with a training programme to select and train ward sisters to manage wards, this expenditure will be wasted and will not increase the efficiency of the Health Service, nor improve patient care.

Key words/phrases Decision support system
Ward management
Ward decision making
Hospital organisation

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CHAPTER 1 INTRODUCTION AND SUMMARY OF THESIS

1.1 INTRODUCTION

1.1.1 Planning issues in the National Health Service

Great uncertainty is now the only certainty of life in the public sector according to Hunter (1983). Planning and uncertainty together are often seen as incompatible and for sound planning it is claimed that stability and certainty are required. Mistakenly, planning has sought to eliminate uncertainty, although in fact planning can only claim to reduce it, not get rid of it altogether.

As far as NHS officers are concerned, the major source of uncertainty relates to resource expectations (Hunter 1979). At the national level, the dependence of the Health and Social Services vote on external economic and political factors renders the prediction of growth rates in the NHS allocation an extremely difficult and complex exercise. This is evident from a retrospective comparison of growth rates forecast in successive white papers on public expenditure. This problem is exacerbated at the District Health Authority level since resource assumptions forecast at each tier above are dependent on assumed changes in health care policy. Other major uncertainties are, firstly, those arising from development in medical practice and the clinical autonomy of doctors. This results in "budgetary drift" or "unplanned growth", the exact location or cause of which is difficult to pinpoint with current information systems.

The second major area of uncertainty is that involved in the forecasting of manpower, both on the supply and demand side. The NHS is the country's largest enterprise and within it 51% of all workers are nurses or midwives, around 510,000 people. The pay costs of these staff accounted for 34% of the total NHS budget, or approximately £3.5 billion (Gray 1986). Despite innumerable studies (e.g. Stevens and Goucher 1985, Mackley and Heslop 1979, Goldstone and Collier 1982), the links between patients' needs and nurse staff provision remains uncertain. In the present climate of "management budgeting", "performance review" and "value for money" (Prowle and Lister 1984, Barnes 1984), it is essential that Health Authorities have available a reliable method of assessing their nursing requirements. This concern is strengthened in a report by the Comptroller and Auditor General (1985) on the control of nursing manpower which stated that:

> "The absence of comprehensive and reliable information has inhibited Health Authorities to monitor and control nursing staff and makes it difficult to prove conclusively that the growth in nurse manpower since 1976 has been fully justified".

Despite the move of resources and staff to the community the overwhelming majority of nursing and midwifery staff, 89%, work in hospitals. Therefore, forecasting and controlling nursing manpower needs to be focused on hospitals and in particular at the ward level.

1.1.2 Nursing management at the ward level

The intention of this thesis is to consider the need for a decision support system and assess the effectiveness of this type of intervention (Financial Information Project 1986) to provide additional information to nursing officers and ward sisters, in identifying and planning nursing requirements related to acceptable standards of patient care, leading to measurable benefits.

As Runciman (1983) commented as a result of a research study on a small sample of ward sisters:

> "The sisters would have welcomed facts and feedback about changing trends in staffing, dependency, workload and bed occupancy, in addition to better short-term advice and help on how to deal with hour by hour staffing - workload imbalance".

1.1.3 The structure of the thesis

These introductory remarks relate to the commencement of the thesis in 1986 and one of the major issues at this time which was to justify the growth in nursing staff which had taken place since 1976. The research work undertaken between 1986 and the final publication of this thesis in 1994, covers a time when major organisational and managerial changes in the National Health Service have taken place. The literature review was conducted between 1986 and 1988 (Chapter 2) and the main study was completed between 1986 and 199Ø (chapters 4-6), using research methodology described in chapter 3. The researcher has updated these findings by undertaking a further study in 1993 (Chapter 7). In the concluding chapter (Chapter

8), the application of new knowledge gained is considered, related to the National Health Services of the 1990's. The following paragraphs provide a more detailed summary of these chapters.

1.2 SUMMARY OF THESIS

1.2.1 Literature review (Chapter 2)

The literature review conducted between 1986 and 1988 included a detailed understanding of decision making and the decision processes, as this thesis is concerned with the study of management decision making by ward sisters in a hospital. Systems theory and its relevance to organisation design and structure was also explored in the review.

The evolution of the National Health Service was reviewed, related to management structures and the use of information technology. Of particular interest were issues relating to the management of power, within such a political organisation as the NHS.

The role and characteristics of ward sisters were considered in the literature, especially in the context of the work organisation and the management activities at the ward level.

The main findings of the literature review were that research was required to evaluate formally a ward nursing system to determine whether benefits can accrue from its implementation. A classification of ward management decisions needed to be

undertaken, and these decisions should be measured to assess the nature of the decision processes on a ward. A measuring instrument was also required to gauge the levels of uncertainty in the decision making on a ward, and to validate the results of experimentation into ward management decision making.

1.2.2 Research methodology (Chapter 3)

Arising from the critique of the literature review both qualitative and quantitative methodology were developed to undertake research into the nature of decision making and the management decision processes at the ward level in hospitals.

An empirical experiment was constructed using the 'before-after' design. Measuring instruments were designed to collect data in order to conduct the experiment and validate the findings. In particular decision diaries were designed to classify and measure ward management decisions, and the 'difficulty factors' index was constructed to measure the levels of uncertainty and risk in making decisions on a particular ward in a hospital.

Qualitative measures derived from semi structured interviews were used to gain insights into interactions, views and values concerning the key issues.

An evaluation methodology was developed for the assessment of the decision support system. The methodology used covered both summative (related to outcome) and formative (related to process) approaches, which were measured by objective and

subjective means. The main approaches identified were cost benefit analysis (summative), performance measures (summative) and a user attitude survey (summative and formative).

1.2.3 Evaluation of the decision support system (Chapter 4)

An evaluation study was undertaken of the Financial Information Project's ward nursing system in two hospitals. Three wards (surgical, medical and gynaecology) were included in this trial within each hospital.

The results of the performance measures indicated that there were significant changes during the trial period, which were probably due to the additional information which was made available from the decision support system. From an analysis of the questionnaire completed by the participating nurses, the majority of these nurses supported the continuation of the system, although the utility of the system was seen in terms of potential benefits on completion of its implementation throughout the hospital.

The reports from the 'expert' panels of the trial hospitals also considered the potential value of the system, especially in providing information to support a multi-disciplinary approach in the planning of ward staff requirements.

1.2.4 Calculation and validation of the 'difficulty factors' index (Chapter 5)

A study was undertaken in hospitals in a Northern Authority to

calculate and validate the 'difficulty factors' index on the hospitals' wards. Information was obtained from the patient administration system and the Financial Information Project's ward nursing system to calculate the index and rank the wards in order of magnitude of their calculated indexes.

A panel of three judges, comprising senior nurse managers who had experience of managing the wards in the hospitals studied, ranked these wards in order of difficulty of managing them. There was significant agreement between two of the judges and the results of the index calculations. After the judges discussed their individual findings they then agreed a group ranking order, and there was significant agreement with the calculated ranking order. The 'difficulty factors' index was therefore internally validated for a medium sized general hospital over a range of specialties.

1.2.5 Investigation of the decision making processes on wards using decision diaries and testing the research hypothesis (Chapter 6)

An investigation was undertaken in the general and elderly patients hospitals of a Northern Authority to provide results and analysis to test the research hypothesis of the empirical experiment (described in Chapter 3). As this investigation took over 12 months to complete, to cover the 'before' and 'after' stages of the study, only a limited number of wards met the identified criteria for validity. The study concentrated on an elderly rehabilitation ward in the geriatrics hospital and a paediatrics ward in the general hospital. An initial

sample was also completed in a surgical ward in a London Teaching hospital to provide additional validation of the decision diary as a measuring instrument.

The results of the study indicated a significant increase in the number of planned decisions on the elderly patients ward between the 'before' and 'after' stages of the experiment. However, no significant changes occurred in decision making on the paediatrics ward. Using the results obtained from the 'difficulty factors' index for the study wards, together with the qualitative information obtained from the ward sisters, the view was corroborated that significant agreement had been obtained with the research hypothesis.

The main conclusion from the investigation was that the involvement of the doctors is of critical importance in planning the ward's patient workload with the ward sisters. Where doctors are not involved in this planning process, information from the decision support system cannot be used to promote a higher degree of rationality (or planning) in the decision making processes.

1.2.6 Further validation of the 'difficulty factors' index and investigation of decision processes on wards at a teaching hospital using the decision support system (Chapter 7)

Another study was undertaken in 1993 at a Midland's teaching hospital to validate further the 'difficulty factors' index, in particular to test the generalizability and stability of the index. It was also an opportunity to bring the research

'up-to-date' to reflect the organisational changes which have occurred in the NHS since 1991.

Two sample periods were taken in February and July 1993 to test the stability of the index, covering the majority of wards in the teaching hospital. The analysis indicated that 78% of the wards varied by one interval unit or less between the sample results. A consistent top six wards were identified from both sample periods, representing the upper quartile of the samples taken.

From interviews with the project nurse and 6 ward sisters, the 'difficulty factors' index identified those wards which were most difficult to manage. However, there are limitations in the use of this index. It should be used to provide a relative indicative measure, relating to a particular hospital, rather than to identify absolute values between hospitals.

This recent study showed ward sisters still undertaking a key co-ordinating role, but incurring more stress from the purchaser/provider funding arrangements. The role of the ward sister appears to be unclear and inconsistent within the changed management structures in this teaching hospital.

1.2.7 Review of research undertaken and its application in the Health Services of the 199Øs (Chapter 8)

The purpose of this chapter is to provide a synthesis of the research undertaken in this thesis.

Omissions in the research literature were identified, particularly the lack of rigorously evaluated evidence that benefits do accrue as a result of implementing decision support systems in the National Health Service. There has also been little research into the classification of management decisions taken by ward sisters.

The research methodology used was reviewed. The evaluation approach utilised would be sufficiently robust to provide a methodology to complete other decision support systems' evaluations. The empirical study design can be used for further experimentation, although the necessary criteria for sample wards could restrict the extent of this type of experimentation. The measuring instruments developed were validated and could be used in further research into ward management decision making. Using qualitative measures, such as semi-structured interviews, provided the researcher with greater understanding and insights into the management and organisational issues within a hospital.

The evaluation study supported the view that nurse resources could be used more effectively, using information from the decision support system. Potential benefits were identified as the system had not been implemented throughout the trial hospitals. From the results of the main study these potential benefits had not been fully realised. Benefits were realised where both clinical and unit management support were obtained. However in the majority of wards studied, this support was not in evidence, and ward sisters alone cannot gain benefits from the system unless their roles are radically changed to assume

managerial responsibility of their wards.

New knowledge was gained in developing a proven evaluation approach to assess the utility of decision support systems. The development of a taxonomy of management decisions and the decision diary enables researchers to explore further, decision processes on wards in a hospital. New knowledge has also been acquired in developing a validated index which delineates a relationship between organisational structure and the effects of the intervention of information technology.

Profound changes have occurred within the NHS in the 199Øs. The research findings in this thesis are pertinent to problems recognised by the Audit Commission and the NHS Executive; the need for evaluation of the effects of decision support systems on the delivery of patient care, the management role of the ward sisters and the crucial role of clinicians in the implementation of information systems. Unless these issues are addressed, planned expenditure on information technology in the Health Service will be ineffectively used and will not lead to improvements in patient care.

CHAPTER 2 LITERATURE REVIEW

2.1 INTRODUCTION

The literature review undertaken in this chapter needs to include a detailed understanding of decision making and the decision processes, as this thesis is concerned with the study of management decision making by ward sisters in a hospital.

As the effects of the installation of information systems within an organisation is also a central theme of the thesis, systems theory and its relevance to organisational design and structure needs to be explored in the research literature.

The organisation to be studied is the National Health Service (NHS) and therefore the evolution of this organisation, related to management structures and the use of information technology, needs to be reviewed from the literature. Of particular interest is the management of the power and behavioural issues within such a political organisation as the NHS.

The role and characteristics of ward sisters in a hospital organisation should be considered, especially in the context of the work organisations and planning processes at the ward level and in relation to their perceived management activities.

Finally, this chapter will provide a critique of the literature received, identifying omissions in the research which are relevant to the aims of this thesis.

2.2 DECISION MAKING THEORY

2.2.1 Understanding Decision Making

The concept of decisions and the study of decision making is the central theme of this thesis. Therefore a comprehensive understanding of the literature relating to the theory and understanding of decision making is an essential prerequisite in the study of management decision making by ward sisters in a hospital.

Decision making is such a common activity that little thought is given to what a decision is. Perhaps a decision implies a conscious act of choice between alternatives. But it is not as static as this everyday conception of decision implies. In fact a decision is the end state of a much more dynamic process which is labelled "decision making". (McGrew and Wilson 1982)

The concept of a decision appears to retain a certain fixed meaning whether it is referring to individual or organisational decisions. This is most simply reduced to the notion of a final definitive solution in a problem solving process. Yet the most important element in real decision making is that of uncertainty (Jabes 1978). If the decision maker operated in a totally certain world where the costs of employing any means and the benefits of every goal could be known completely then problems could be programmed. The best solution to any problem would be a matter of calculation - there would be no choices to make except in terms of real values, for example guns or butter. But the real world is not certain and there are always

constraints on resources. It is therefore the elements of uncertainty and constrained choice which gives the problem of decision and decision making its particular nature.

Decisions can be viewed as ranging on a discontinuity of uncertainty. Decisions for which most of the information is known are at one end of this continuum and details for which no knowledge exists are placed at the other. Most decisions made in an organisation are of a routine nature, for example the re-ordering of stock levels to an agreed formula. Some decisions are more important and fundamental for example, manufacture a new line of products. Routine decisions more often involve certainty or risk, where the outcome of alternative actions can be specified and a probability assigned to the likelihood of the occurrence of each. On the other hand, important decisions involve uncertainty, where the outcomes of actions can be foreseen, but the probability for their occurrence cannot be assigned.

Simon (196Ø) distinguishes two types of decision: programmed and non programmed. Programmed decisions are routine in nature. A procedure for handling programmed decisions exists in the organisation and the problem solving process involves referring to past experience. The expected value for a programmable decision can be computed. New and unstructured decisions are called non programmed, because the problem has never arisen before. It must be understood that decision types are not always this clear cut. They range on a continuum of programmability. Most programmable decisions are made under conditions of risk or uncertainty. It follows that decision

types are at least single or dual dimensional with axes relating to risk or uncertainty.

Jaques (1956) in his explanation of job responsibilities devised the notion of time span of control - the longer the time span until the decision becomes effective, the more responsibilities are attached to the decision maker. Moore and Thomas (1988) consider decision analysis from the concept of time horizons - the planning period over which a decision problem is structured. The shorter the time horizon the less planning takes place. Taking the argument to its logical conclusion, a zero time horizon, would imply a reactive or 'crisis led' decision'. The dimension of time would appear to be a legitimate third dimension or axis in the classification of decision types.

2.2.2 Conceptual Models of the Decision Maker

Economists conceptualise the person who makes decisions as a rational being who weighs each alternative. Behavioural scientists, on the other hand, have observed a decision making man who simplifies the world and distorts it in accordance with his values (Jabes 1978).

Simon (1957) criticised the rationality and maximisation aspects of economic man by suggesting a model of decision making man that matches reality. Rationality in economics implies a complete knowledge of the environment and the maximisation of the expected value based on this information. He argued that an individual has only limited information - it

is impossible to know what each choice an alternative may lead to in the future and there is limited time for analysis. Therefore in organisations, individuals have bounded rationality and Simon proposed the administrative man who 'satisfices' rather than maximises. Administrative man searches through available choice alternatives until he hits upon one that is 'good enough'. A choice (or decision) is made when an alternative meets the minimum standard of satisfaction that the individual expects. This choice rarely coincides with an optimal decision, such as suggested by the model in economics. The interest is in feasible solutions that meet a minimal standard of satisfaction.

In systems analysis, decision theory or game theory, to be rational is to select a course of action, from a group of possible actions, which has a given set of predicted consequences in terms of some welfare function which, in turn, ranks each set of consequences in order of preference. (Carley 1981).

In almost every case, working definitions of rationality can be expressed by five sequential activities undertaken by the idealised 'rational man'.

1. A problem which requires action is identified and goals, values and objectives related to the problem are classified and organised.

2. All important possible ways of solving the problem or achieving goals and objectives are listed.

3. The important consequences which would follow from each alternative strategy are predicted and the probability of those consequences occurring is estimated.

4. The consequences of each strategy are then compared to the goals and objectives identified above.

5. Finally a policy or strategy is selected in which consequences most closely match goals and objectives or the problem is most nearly solved or most benefit is obtained from equal cost or equal benefit at least cost.

These steps constitute an ideal, or a model which is explained as:

> "an abstraction from reality that is intended to order and simplify our view of that reality while still capturing its essential characteristics". (Forcese and Richer 1973)

A model, therefore is not reality. In so far as this rational model diverges from reality in its attempts at simplification it is bound to be open to criticism, and there is indeed a considerable body of critical literature.

Gershung (1978) identifies two main threads in these criticisms. The first area of criticism stems from the assumption that to be rational one also has to be comprehensive i.e. collect all data relevant to a problem and to be aware of the consequence of all alternative strategies. If the reality is accepted that the first task for anyone is to define the

problem in a manageable form or draw a line around the influences and effects considered relevant (otherwise known as the decision space), then comprehensiveness is not possible. Lindblom (1968) uses this impossibility as the basis for arguing that the rational model (as proposed by Simon) is too divergent from reality and that:

> "a concept of rationality appropriate for judging a complex political system cannot be defined".

Lindblom proposes instead incrementalism or the 'science of muddling through', which emphasises only marginal changes in policy, thus drastically reducing the number and complexity of policy alternatives, but also severely limiting the decision space.

It is clear, however, that no one is arguing for full blown comprehensive rationality and that which is described is a limited or partial rationality - decision makers pursue sufficient satisfactory goals rather than 'one best' goal (Simon 1957). From their research Soelberg (1966) and Myers and Fort (1963) found that the search ends when a satisfying alternative is found.

From the non-economically rational model, the decision is made in a subjective environment constructed by the perceptions and value judgements of the individual decision maker. Hence the idea of subjectivity rationality becomes important when describing decision making. Therefore the decision maker's bounded subjective rationality, in an organisational context is determined by his limited knowledge of the world and the

organisational environment in which he works (March and Simon 1968).

The second common criticism of the rational model is of the assumption that it is possible to develop a social welfare function which can be defined as a preference ranking by society on some set of alternative strategies. In other words, if steps (4) and (5) of the rational man's tasks are to be applied by some group of people then they must prefer one strategy or policy over another based on the greater good (or social welfare) which is obtained from choosing that alternative. It may not be the case that individual preferences can be added up to some overall social ranking. There may also be situations where the result of actions taken by a group of rational individuals may lead to a non-rational outcome (Arrow 1954).

Do these logical dilemmas preclude a role for rationality in the policy analysis process? In practice social welfare functions emerge, not as a result of aggregating individual self interest, but from some wider public interest, which is the result of a process of political negotiation which tries to produce agreement, establish consensus and minimise instability. In this model political decisions are not reached simply by adding up preferences but by a dynamic process which involves changing preferences towards a sufficient coalescence of opinion for action to take place. If a social welfare function emerges, it is as a result of this dynamic process. (Brent 1979).

The incremental model (Lindblom 1968) has already been set out as an alternative to the rational model to explain observed facts. But it can be claimed that this view is over simplistic. It ignores the fact that social change and innovation comes about through incorporation of new social values (welfare function). Consequently, it has been claimed by Etzioni (1967) the right mode of analysis is a kind of mixed scanning, which distinguishes fundamental contextual decisions from individual item decisions. Contextual decisions are made through a fundamental exploration of the main alternatives in the light of goals and objectives of the individual; at this stage, details are properly omitted. Then piecemeal, incremental decisions are made within the context of the fundamental ones.

But what other alternative views to decision making are there than derivations of the economist - rational method of explanation?

In his study of decision making during the Cuban missile crisis of 1962, Allison (1971) looked at the same piece of historical reality in three ways. His model 1, the 'rational actor paradigm' corresponds closely to the rational model just considered. However Allison shows that the model 1 paradigm fails to account for a great deal of observed behaviour.

Model 2, the 'organisational process paradigm' assumes that most decision making behaviour results from established routines within organisations. Problems are factored into sub-problems and are then acted upon by individuals with

constrained powers. Goals are dominated by the need to maintain the health of the organisation and to avoid threats to it. Problems are tackled one by one as they arise using standard procedures; uncertainty is avoided as much as possible. Dramatic change will occur only in an organisational crisis, involving personal changes, or perhaps collapse of the entire organisation. Yet even this approach, Allison argues, still fails to explain the whole reality.

Therefore he uses another mode of analysis: Model 3 the 'governmental (bureaucratic) politics' paradigm.This assumes that decision making by government (large organisation) is a political resultant from conflict, compromise and confusion among individuals, whose behaviour must be understood in terms of game playing. The 'players' have parochial perceptions and interests, especially organisational ones (a throwback to Model 2). Their interests are represented as stakes on which they make stands; forced by deadlines, set by routines, by crisis or by political actions. Each player will affect results depending on his power, which in turn will stem from a combination of bargaining advantages, skill and will in using them. Action then becomes a political resultant; politics is the mechanism of choice as each player struggles for outcomes that advance his perception of his natural, organisational, group or personal interests. Perceptions and expectations differ; communication is often poor and decisions can be obtained through vagueness, with different actors understanding different meanings.

A term for uncertainty in decision making, due to vagueness and

imprecision in meaning and values, as described in Allison's model 3, is fuzziness. Attempts have been made in the design of decision support systems to represent this fuzzy logic, by transforming verbal descriptions by using mathematical optimising techniques (Hruschka 1988), (Basu and Dutta 1986).

None of these models described by Allison in themselves, will provide a process to adequate understanding. But each of them can contribute to an eclectic theory still to be developed (Hall 1980).

2.2.3 Power and Politics in Decision Making

A debate within social sciences is over the "correct" approach to the study of decision making. The debate is itself contingent on the broader arguments of 'who' has the power to make decisions in society. The core of the argument is the conflict between 'pluralist theory' and 'elite theory'. Pluralist theory suggests that power is dispersed between many groups in society and in consequence decisions are the result of group conflict in which the government arbitrates. 'Elite theory' stresses the underlying concentration of power within a minority which tends to shape decisions to meet its own interests (Parry and Morris 1974).

In order to validate the respective arguments, different approaches are used; the 'pluralist' focuses upon case studies of decision making on key issues since this displays observable conflicts of interests which require resolution. On the other hand 'elite theorists' focus upon the nature of the decisional

agenda, the politics of the agenda setting, and then on non-decisions. They argue that the power of the elite resides in its ability to control the agenda of decision, suppressing conflicts of interest and real choices. Non decisions are therefore the issues which elites are able to keep off the agenda. For Parry and Morris (1974) non decisions are essentially what organisational theorists would regard as programmed or routine decisions. As all such routinised decisions contain an inherent bias in favour of the status quo, in consequence certain interests are favoured by the exclusion of issues from the agenda.

Decison making is thus to be considered an activity in which there are conflicting interests at stake, as well as conflicting perceptions of the substance of the problem which requires decision, be they individuals, groups, organisations or governments. In resolving this conflict of interests, the participants will bring to bear their relative resources, of power, influence, and negotiating skill and in consequence the outcome, or decision is the result of a complex bargaining process.

Richardson and Jordan (1979) argue that certain rules structure this complex bargaining process; that this process has particular behavioural rules. In this bargaining process, decisions tend to be reached through a process of negotiation, which emphasises the accommodation of conflicting interests, the achievement of consensus and the maintenance of the existing form of relations between interest groups and government departments. In their view, therefore, changes are

always marginal and decision making becomes essentially incremental in character.

The intellectual difficulties impeding rational behaviour fit more easily with the pluralists' model of politics in which group competition within a broad consensus of goals serves to make marginal adjustments to the status quo. Using this 'political model', the organisational and political requirements of comprehensive, synoptic planning are rejected in favour of dispersed and decentralised decison making powers.

Lindblom's model of incrementalism (1968) supports the 'pluralists' camp by the term partisan mutual adjustment. It is found in varying degrees in all political systems and takes the form of fragmented or greatly decentralised political decision making in which the various participants mutually affect one another with the result that policy making is the resultant of these adjustments. As Self (1973) said;

> "A spontaneous form of partisan material adjustment among the various decision actors or centres is much to be preferred to the vain (but perhaps vainglorious) intellectual labours of central planners".

'Partisan mutual adjustment' is virtually another label for the pluralist political system in which consensus is maintained by a process of 'successive limited comparisons' in policy-making.

Cyert and March (1963) analyse decision making in a background of shifting coalitions within an organisation. They consider the quasi-resolution of conflict which describes the internal condition of most organisations most of the time. An

organisation is a coalition of conflicting interests and even if there is consensus of vague overall goals, when it comes to the statement of objectives to be acted upon, there is no consensus. The devices for "quasi-resolution" of these conflicts do not arrive at consensus, they enable organisations to thrive despite unresolved divergencies. Uncertainty is also something with which all organisations must live. But the decision processes in organisations act to avoid uncertainty. They avoid having to act on long-term forecasts by actually reacting to information here and now, and solving pressing problems rather than develop long-run strategies.

Therefore, organisational goals change in response to the sub-goals or interests of those who form the coalition, to a minimal level of what will be accepted all round, after restricted examinations of a limited and selective range of information. In this way the full complexity of decision making is reduced to what is practicable and uncertainty is absorbed. Cyert and Marchs' research suggests a 'conflict oriented' view of power which is revealed in process rather than structure which should be linked, according to Walsh et al (1981) to the notions of "values" and "interests". Values are defined here as "commitments to key sets of ideas which act as yardsticks or criteria for the operation of an organisation", whilst interests are expressed through "a motivation to enhance or defend the particular distribution of organisational resources". It can be seen that the exercise of power may be revealed in organisational conflict over matters of value and interest.

2.3 SYSTEMS THEORY AND ITS RELEVANCE TO ORGANISATIONS

2.3.1 General Model of a System

A general model of a physical system is input, process and output. The features which define and delineate a system form its boundary. The system is inside its boundary; the environment is outside the boundary. Each system is composed of sub-systems, each sub-system being delineated by its boundaries. According to Davies and Olson (1974), there are several ways of classifying systems, such as deterministic versus probabilistic and closed versus open systems. A deterministic system operates in a predictable manner - the interaction among the parts is known with certainty; whereas the probabilistic system can be described in terms of probable behaviour, but a certain degree of error is always attached to the prediction of what the system will do.

A closed system is defined in physics as a system which is self-contained. There is no exchange of material, information or energy with its environment. Such closed systems will finally run down or become disorganised. On the other hand, open systems exchange material, information or energy with the environment. Open systems tend to have form and structure to allow them to adapt to changes in their environment in such a way as to continue their existence.

Systems change because they undergo stress. A stress is a force transmitted by a system's suprasystem (management) that causes a system to change, so that the suprasystem can better

achieve its goals - this change may impose stress on its subsystem (Davis and Weber 1983). Systems accommodate stress through a change in form; there can be structural or behavioural changes. It is unlikely that overall changes will occur, rather the adjustment processes will be confined to one or two subsystems. Davis and Weber (1983) consider that complex systems which survive have relatively independent subsystems, enabling one subsystem to remain stable even though another subsystem may be undergoing change.

2.3.2 Organisations as Open Systems

Organisations are open systems, since they receive unplanned and unscheduled inputs from the environment and adapt in such a way as to continue in existence. Katz and Kahn (1978) have identified nine common characteristics of open systems which are particularly applicable to organisations.

1. The importance of energy - People and material are brought into the organisations.

2. Throughput - Inputs are altered as materials are processed or people are served.

3. Output - The organisation produces something which interacts with the environment.

4. Systems as cycles of events - Products sent into the environment are the basis for the source of energy for the repeating of the event.

5. Negative entropy - An organisation attempts to import more energy than it expends in the process, in order to maintain itself.

6. Information input, negative feedback and the coding process - Inputs to the organisation are coded to ensure that information 'overload' does not occur and this selected information provides feedback from the environment to correct for deviations from demand.

7. The steady state, and dynamic homeostasis - Systems tend to maintain their basic character, attempting to control external change. As growth and expansion occur, basic system characteristics tend to remain constant.

8. Differentiation - There is a tendency towards elaboration of roles.

9. Equifinality - The organisation has more than one way of accomplishing objectives, but at different costs.

Checkland (1981) refines the view of an organisation as an open system to that of a human activity system and defines it as:

> "the basis of a language in which to describe the human activity associated with management".

Wilson (1984) in his consideration of systems concepts takes the definition further:

> "A system in which the main components are people, and their actions. Because they are bound to involve subjective perceptions, these systems are almost always best treated as soft systems".

His definition (Wilson 1984) of a soft system is:

> "A system depending largely on non-routinised human actions so that human capacity or free choice and the agents limited access to the subjective values, beliefs and wishes of the participants means that wholly objective descriptions or quantitative modelling are not appropriate".

The principle of applying systems theory to organisations populated by people is explored with soft systems theory. The concepts of social functional values and organisational power have already been considered previously in this review. Both Checkland and Wilson are critical of 'pure' systems theory to describe the activities of an organisation, and that describing what is happening in a quantitative manner will not provide the whole reality. In fact, they believe that the complex relationships between people within and outside the boundaries of the system can be drawn using the Venn convention. Venn diagrams are a simple way of representing the logical relationships of inclusion, exclusion, overlap and membership in a human activity system.

2.3.3 Information Systems in an Organisation

The systems approach is especially relevant to information systems which can be viewed as systems in the environment of the organisation. Information systems provide support for management at all levels in an organisation; operational control, management control and strategic planning. Each of these classes of management activity includes elements of planning, control and decision making.

The term decision support systems refers to a class of systems which supports the process of making decisions. The emphasis is on "support" rather than on automation of decisions (Alter & Steven 198Ø). Decision support systems allow the decision maker to retrieve data and test alternative solutions during the process of problem solving. When information systems were first developed for semi-structured and unstructured decisions (Gurry & Scott Morton 1971) emphasis was placed on finding the structure, and programming as much of the decision as possible. The results were often inefficient, inflexible systems that were ignored or sabotaged by decision makers because of their ineffectiveness.

Decision support systems represent a different approach to information system support, for semi-structured and unstructured decisions. The approach is not to find the structure and automate it; rather it is to support a variety of unstructured decision processes (Davies & Olson 1974).

In an extensive investigation of 56 decision support systems in use in organisations Alter (1977) developed a taxonomy of decision support systems according to the degree to which the system outputs directly determine the decision. Within this taxonomy the "suggestion models" appear to represent the day to day workload/manpower information required for nurse deployment between wards in a hospital. These compute a specific suggested decision for a fairly structured and repetitive decision. Their purpose is to bypass other (less effective) procedures for generating the suggestion.

According to Alter (1977), the critical factor in whether decision support systems improve decision-making effectiveness may be responsiveness, which is defined as a combination of the following characteristics:

1.) Power - the degree to which the system (including its human elements) can answer the most important questions.

2.) Accessibility - the degree to which the system can provide these answers in a timely and consistent manner.

3.) Flexibility - the degree to which the system can adapt to changing needs and situations.

From the literature review undertaken, it would appear that decision support systems are classified within the 'rational' paradigm of decision making; to solve problems by generating alternative courses of action.

De Maio (198Ø) considers that when information systems are being designed, only variables relevant to the technical-economic "subsystem" are usually included, while those relevant to the social subsystem are omitted, with a resulting focus on a limited objective, namely the optimisation of the technical-economic subsystem. The approach traditionally taken is non-systemic because it gives inadequate consideration of the process dynamics. Subsystems regarded as "isolated", when considered from a static point of view, in many cases are highly interactive and related. Also, the

behaviour of the various elements making up the system under consideration is probably non-linear and transformation techniques cannot be used. Analysis is based on a "purely rational" or "mechanistic" abstract organisational model, such that all problems are only considered in the light of the logical consistency between different procedures, data and information. De Maio views the organisation as a socio-technical system as illustrated below:

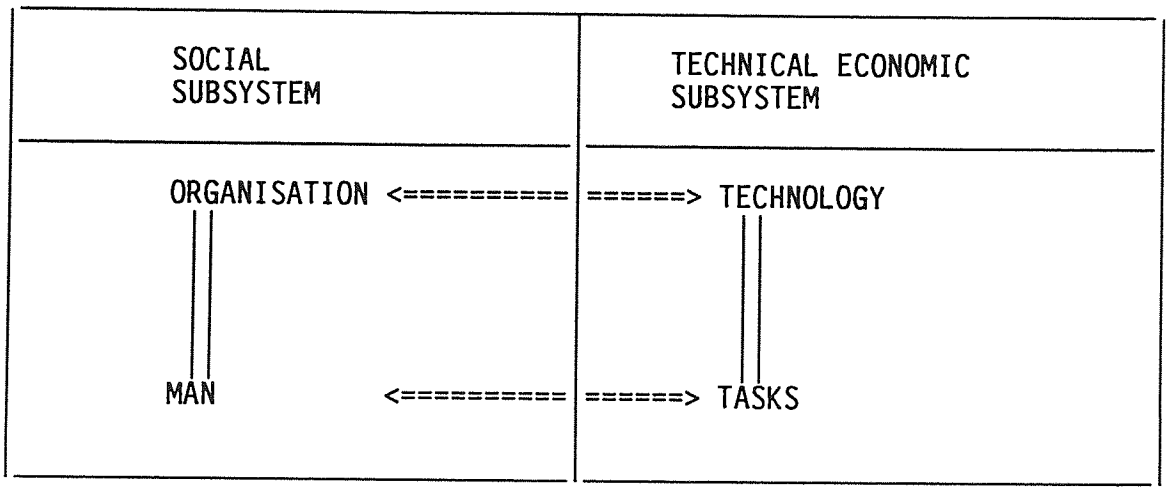


Fig. 1 - Socio-Technical System Variables

A model which only considers the technical-economic subsystem could yield poor results because:

i.) it entirely neglects the elements making up the social subsystem;

ii.) it does not consider that these elements interact with technical-economic variables in both directions, i.e. as influenced and also as influencing elements;

iii.) even more, it does not consider the dynamics of the complex relations intercurring between all the diagram

variables.

Methods based on the socio-technical approach (DeMaio 198Ø) for the analysis and design of information systems rely heavily on participation in which the future users of the systems, at all organisational levels, play a major-role in the design of these systems. Tangible (directly accountable) and intangible (not directly accountable) values are treated compatibly by replacing money values as a yardstick for decision taking by utility values and all those affected are permitted to declare their own appraisals of the different goals.

Therefore, participating groups are persuaded to set specific job satisfaction objectives in addition to the usual technical and operational objectives. This approach, in effect then allows the use of subjective as well as objective methods.

This theme of considerations of social systems and subjective values is also considered by Gault (1982):

> "It appears that when dealing with problems which are located in social systems (i.e. ones which include people) a participative approach is needed if the nature of purposeful behaviour is to be properly recognised and subjective values exposed, examined and developed".

He goes further in arguing that through measurement and experimentation (and other processes) scientists strive to produce objective, true accounts (models) of reality. Such accounts are descriptions of how things are. A development is to use this knowledge to construct predictive models of how things might be if ....! What scientists alone cannot do is to produce accounts of how things <u>should</u> be, for such accounts

must of necessity be based on value judgements.

These subjective judgements are needed to provide the criteria against which possible states of affairs can be compared. In essence Gault is postulating that studies involving social systems (in the case that he is considering; nurses in the health service) are generally founded on an inappropriate mechanistic view of human behaviour and mistaken beliefs in the objectivity and suitability of the conventional scientific method for determining what should be. The purposeful nature of human behaviour should be recognised and the fundamental role of subjectivity which would lead to a different approach in the design of information systems.

Kronenberg and Howard (1987) consider that computer based decision support in the form of expert systems and decision support systems constitutes a promising source of help for crisis managers. Factors that constrain the efforts of such managers to respond strategically to crises at the policy level are:

1. the political context;
2. the pressures of information overload, 'routine uncertainty' and an environment of risk and;
3. the potential for error of human and computer systems.

Therefore designers of decision support systems have the responsibility to use simple descriptive data about resources, events and, political information to improve the quality of

strategic choice.

Cooper (1988) has undertaken a review of the research undertaken into management information systems. The results of this review shows that more progress has been made in identifying appropriate research questions than in answering these questions. In the future, a shift from more speculative-conceptual to more theory based/theory-generating empirical methodology may result in generating answers, but any progress in developing a global theory of management information systems appears to be slow. This lack of progress appears to result from:

1.) lack of progress in defining the product of management information systems (MIS).

2.) too much research focus on what relationships exist instead of focusing on why relationships exist.

3.) underlying problems in the natural sciences paradigm currently associated with MIS research.

The lack of an appropriate theory based methodology related to management and information systems is a critical omission in research literature.

2.4 POWER AND POLITICS IN THE NATIONAL HEALTH SERVICE (NHS)

2.4.1 The Creation and Evolution of the NHS

The hospital and specialist services that existed in England and Wales in 1948 were the product of private charity, municipal endeavour and war-time emergency. Private charity had produced the voluntary hospitals, which ranged from the large teaching hospitals, having the benefit of modern equipment and a full complement of consultant staff, to the small cottage hospitals, usually staffed by general practitioners and lacking all but the most essential facilities. In all, the NHS took control of 1145 voluntary hospitals with 90,000 beds in 1948 and 1545 General hospitals set up by local authorities with 390,000 beds. In addition some 52,000 beds were added to the country's hospital resources as a legacy of the war-time requirements (Lindsey 1962).

The purpose of the National Health Service Act (1946) was to promote the establishment in England and Wales of a comprehensive health service designed to secure improvement in the physical and mental health of the people of England and Wales and the prevention, diagnosis and treatment of illness (preamble to Act).

However a number of concessions were made, particularly to consultants, to gain their support for the Act. Teaching hospitals were to be separately administered by boards of governers. These boards were to be allowed, unlike the

Regional Hospital Boards, to retain control of the endowments of their hospitals. Other concessions included the decision to allow pay beds in NHS hospitals; to permit consultants to opt for a part time NHS contract, leaving time for private work; and to create a system of distinction awards for consultants of exceptional ability. These were the moves that led Bevan (the Minister responsible) to say of consultants that he had: (Hart 1973):

"stuffed their mouths with gold".

This patchwork of hospitals left much to be desired. Some sections of the population had much better access to hospital beds than others. This applied equally with regard to staffing, since the shortage and maldistribution of specialists had been the second major deficiency of the pre-war hospital system. (Eason et al 1945).

The management structure set for the NHS was the establishment of Regional Hospital Boards, which was not opposed by the doctors. Management Committees appointed by the Boards themselves, would be responsible for the day to day administration of a hospital or group of hospitals in accordance with the regional plan. The main functions of the Regional Boards were in planning and administration on behalf of the Minister of Health.

But how was planning achieved with the backdrop of an almost permanent state of financial crisis in the years after 1948, and the power and dominance of the consultants with their

vested interests almost entirely protected and enshrined in the NHS Act 1946?

Abel-Smith captured the dominant philosophy of planning in the early years of the NHS as:

> "The purpose of planning, in a word, is to 'rationalise' the activities on which planning is imposed; to make subject to calculation what was previously left to chance to organise what was previously unorganised, and replace spontaneous adjustments with deliberate control". (Abel-Smith 1964).

The history of hospital planning between 1948 and 1974 can be seen as the regional board planners, trying to challenge the established interests of the medical profession with the community hardly involved in the debate. Ham (1981) in his case study of the planning processes of the Leeds Regional Hospital Board, considered that Alford's typology (Alford 1975) fitted the data collected in his study:

> "The picture which has been painted here has a high level of descriptive validity. What our data show is that, while the corporate rationalisers made some impact into medical hegemony their progress was slow and incremental".

Alford (1975) in a study of Health Planning in New York identified what he called three sets of "structural interests", these are the professional monopolisers, who are the dominant interests; the corporate rationalisers, who are the challenging interests; and the community population, who are the repressed interests.

The absence of overt conflict helped to sustain the position of the medical profession for as Alford (1975) commented:

"dominant interests are served by existing social, economic and political institutions".

Schattschneider (1960) considered that there is in all political systems, a 'mobilisation of bias' in favour of some interests, which means that unless they are challenged these interests continue to dominate. This implies that simply by virtue of their known or anticipated power, dominant interests will rule some issues off the agenda and control others by non decision making. Ham (1981) argues that this is why the only radical challenge to the medical profession's interests in the Leeds Board - the major bed reallocation plan put forward in the 1950's - was rejected. From this study, it was apparent that one of the interest groups had the power to impose its will on all the others, that consequently decision making took the form of bargaining in a system of bureaucratic politics, and that the resultant was a small change in the status quo. In many cases, it was easier to prevent change rather than to achieve it. According to Ham (1981), the dominant incrementalist mode was sometimes departed from, there were aspects of rationality and comprehensiveness in the planning activities undertaken by the Leeds Board, as well as occasional radical shifts in service provision.

Alford (1975) argues that the conflicts between the three sets of interests are not best seen as a struggle between pressure groups in a pluralist system. Rather that the dominant interests - the professional monopolisers - are systematically benefited by the status quo. This is much closer to elite theory's explanation of power than that of pluralists' theory.

As Alford goes on to argue, the fact there is a broad consensus about health services and health policy reinforces the position of the medical profession and:

> "the existence of a network of political, legal and economic institutions which guarantees that certain dominant interests will be served comes to be taken for granted, as legitimate, as the only possible way in which these health services can be provided".

The evidence suggested by Ham (1981) is that the main beneficiaries of this medical dominance were those in acute specialties, and senior medical staff rather than junior. By 1974 there were some signs that this was beginning to change. As a result, initially, of the Porritt report (1962) the tripartite structure was seen as unworkable particularly because of the lack of co-ordination between the different branches of the service. The rising cost of the NHS in the 196Ø's was another element in the reorganisation debate. Of great concern was the effectiveness of management in the hospital service, which accounted for two thirds of the NHS budget. Of particular note were the Farquharson-Lang report on the administration practices of Scottish Hospital Boards, the Cogwheel report on the organisation of medical work, and the Salmon report on the nursing staffing structure (HMSO 1966). The message from all three was that more effective management structures were required. A unified system of administration in the shape of regional and area health authorities with the emphasis placed on more effective management was established as the basis of the NHS Act 1973. The new Planning System which was brought into effect 'on the back of' this Act strengthened the role of the corporate rationalisers, and the voice of the community was bolstered by the voice of the newly formed

community health councils.

Equally significantly, a series of strikes in 1973 by Health Service ancillary workers, became a factor to be reckoned with for the first time. Subsequent union involvement in, and industrial action on, other issues like pay beds and hospital closures was a further reminder that the corporate rationalisers and the community population were not the only interests to challenge the professional monopolisers. Indeed the growth of union activity suggests the need to add a fourth category perhaps labelled worker organisation - to the other three suggested by Alford (1975).

2.4.2 Towards General Management and Information Technology in the 198Øs

Consciousness of the importance of formal organisational structures and attempts to introduce to the NHS analytic techniques and practices normally associated with commercial organisations, date back at least to the 196Øs (Harrison 1986). The requirement to secure formal involvement of hospital consultants in management was the subject of the three "Cogwheel" reports commencing in 1967. There was a growth of so-called "functional" managers of these services with the creation of specialist finance, personnel and planning posts. Comprehensiveness was further emphasised through the introduction in 1976 of a "rational" planning system. This basic philosophy seems to have been underpinned by the assumption that, by improving inputs with management, improved outputs would occur (Harrison 1986). Therefore, all the

changes which were made were of benefit to managers in that they provided greater status and promotion opportunities and indeed some of the changes were explicitly directed towards this purpose.

The NHS has a pluralistic organisation - it can be seen that the pattern of development of health services during the 197Øs, owed less to the plans and priorities of government and managers than to the aggregate of individual clinical decisions (Klein 1984). Another aspect of this pluralism is the relatively poor ability of central government to ensure local agreement with service(s) (as opposed to capital) priorities, either before or after the 1974 reorganisation of the NHS, a finding attributed to the power of professions, esepcially doctors. This pluralism was also evident within management, leading to the avoidance of solutions which might threaten personal relationships between team members.

In the early 198Ø's, disillusionment felt within the NHS as well as by government ministers with the consensus team approach, as a fast mode of decision making, made the managerial proposals of the 1983 Griffiths Inquiry more acceptable.

The Griffiths report accepted a managerial viewpoint defining general management as:

> "responsibility for planning, implementation and control of performance". (DHSS 1984).

Of most importance was the underlying issue of leadership in

the Health Service. The rapid pace demanded by Central Government to implement general management underlined the political will to increase this pace of change.

Weaknesses in the available information systems were already highlighted in the 1979 Royal Commission Report on the NHS and the 1981 'Care in Action' government policy document (DHSS 1981). The 1981 policy document considered that it could not be assumed that increasing amounts of money will always be spent on health care, and underlined the efficiency objective of the government.

In response to these precipitating factors, the Steering Group on Health Service Information, chaired by Edith Korner was set up to agree, implement and keep under review principles and procedures guiding the future development of Health Service Information Systems.

In hindsight, the Korner initiative may be seen as a natural first step in preparing for managerial changes which would be instigated by Griffiths. Perhaps, this policy direction for management had already been conceived, when developing NHS information requirements in the early 198Ø's. In fact the general thrust of the reports and data sets produced by Korner reflected managerial requirements not clinically based measures of activity. Wright and Rhodes (1985) suggested that elements of line authority (proposed in Griffiths) would be required to promote the radical changes proposed on information systems.

The products of the Korner steering group have been variously

criticised (Winston 1986), under the following headings:

1.) No IT specialists served on any of the Korner based committees.

2.) Concentrated upon a management information system model which necessarily predated the Griffiths Inquiry.

3.) Excluded other systems, such as clinical and epidemiology information systems which were relevant to core NHS activities.

4.) No review was undertaken of existing systems.

There was an assumption that the data sets identified could be collected manually, but it became apparent that there were insufficient staff resources to complete the exercise, and together with tight timetables for most reports to be produced; a difficult information challenge transpired. Computerisation emerged as a potential short cut through these problems and became an important objective for the newly appointed general managers.

But as these managers came to realise, there was no 'quick fix' solution to achieving information objectives. The major problems in implementing information technology (IT) projects are the under-estimation of the time taken to get a new installation off the ground, the difficulties of getting the original definition right for the software required and of recruiting and retraining high quality staff (Strassman 1985).

By the late 198Ø's, there were inevitable problems as Bown (1987) argued, not all interested parties identified with the

achievement of specifically management type objectives and collection of data for management purposes. Inevitably there would be political problems surrounding implementation and subsequent operation of computer based information systems and there was a divergence of requirements between the Korner data sets and the post Griffith's management and organisation structures.

As Simon predicted (Simon 1973) on the consequences of misapplying information technology to organisational design, a vast data collection exercise was undertaken which could not be assimilated into the new management requirements or be seen, particularly by the clinicians, as relevant to patient care.

The newly appointed general managers had to work within the existing power structures, whether these were of a central versus local level or other powerful grouping or professional monopolisers. It follows that the needs of these groups, like clinicians, inevitably will be embodied in those systems that have been successfully implemented, in fact far from disrupting power structures in organisations, IT automates bias (Dutton and Kraemer 1982).

A major weakness of the Korner initiative, therefore could be seen as political - the role of clinicians and their power to resist management information systems, whose output could prove critical of clinical activity. Resistance could take the form of simply not filling out Korner returns and then questioning their credibility. The political structure of the NHS must be understood as a first step in planning and implementing

computer-based systems as Mangham (1979) described:

> "In circumstances in which people share power, differ about what must be done and where these differences are of some consequence, decision and actions will be the result of a political process".

Thomas (1988) argues that decision making in the NHS is characterised by uncertainty and by questions of power. A model of decision-making and change is needed which recognises not only people's attempt to behave 'rationally' but also the reality of power both at the micro level (e.g. in negotiations between individuals and groups) and the macro level where the political, social and economic contexts impose limits on what is likely to be negotiable. Managers need to develop the necessary political power to ensure that changes are implemented effectively. In Thomas's view the rational model is weak at the descriptive level, but it is probably the best prescriptive model available.

Plant (1985) identified circumstances when changes were effected through co-operation between medical and nursing staff whilst undertaking a review of the role of ward sisters. Due to overspending on budgets, particularly drugs and medical surgical equipment, management proposed a ward closure to force down the level of patient activity and so overall control expenditure. Alternative proposals were put foward by nursing sisters and their managers, including selective bed closures on all wards, an agreed number of patients who could be 'specialled' at any one time, and the designation of a number of beds for 'day care' activity only. This ended the practice of 'hot bedding' for day patients. (Hot bedding occurs when a

day care patient is admitted to the bed of a longer stay patients whilst the latter receives ambulatory care elsewhere in the ward). This scheme was successfully implemented and the rate of spending was eventually reduced to the agreed level. This case study tends to support Thomas's view of the reality of power and the need to develop political skills to bring effective change to fruition.

Markus and Pfeffer (1983) were concerned with the clash between cultures and the need for cultural change in order to address issues of organisational implementation. The authors described an attempt to implement a computerised information system in the cardiology division of a major teaching hospital. This analysis showed that it was the symbolic aspects which led to system failure. The system design was structured using statistical epidemiology, which was sharply at odds with the ethics of clinical care among its potential users. Markus and Pfeffer concluded that unless design and implementation efforts addressed the structural features of organisations, including power distribution and cultures, they will not be successful.

In a political system like the NHS, collaboration between change agents and users and the support of senior management must be encouraged to reduce resistance to change, particularly with the implementation of information systems. The management of the politics and behavioural aspects of information technology and computerisation, needs much more attention to provide technically proficient systems which are used in practice.

2.5 THE ROLE AND CHARACTERISTICS OF WARD SISTERS IN A HOSPITAL ORGANISATION

2.5.1 Organisational Changes in Hospitals Affecting Nurse Managers and Ward Sisters, Related to Organisational Research

Since 1965, major changes in the work roles and relationships of health professionals in hospital and community have directly and indirectly affected ward sisters. The implementation of the Salmon Committee's recommendations (MOH/SHHD 1966) on senior nursing staff structure directly influenced sisters. The structure was a vertical mechanistic structure with three levels of line management between the ward sister and chief nurse. The committee did not analyse the nature of managerial work undertaken by ward sisters, thus the possibility that decisions taken by ward sisters were not less important than those of senior nurse managers but of a different order and therefore not possible to incorporate in a hierarchial relationship, was not examined (Pembrey 198Ø).

Internal changes to structure have occurred as a result of the Farrer report (DHSS, 1968) recommending that nurses should be relieved of non-nursing duties. Another area of change has been the removal from nurses of control over 'hotel' services such as catering, domestic cleaning, linen and laundry (Tolliday 1972). Supervisors, nursing officers, clerks, receptionists and house keepers have all become involved in helping to get service problems resolved; however, the loss of direct control has created the unsatisfactory situation where the sister retains co-ordinating, monitoring and management

control at ward level for services but can be divorced from involvement in planning and setting objectives for their change and improvements.

Mauksch (1966) examined strains which have accumulated for the ward sister. Two systems operate independently within the hospital; the cure process of medicine and the care process which includes the provision of hotel services and nursing. The strain is increased by the different ways in which medicine and nursing are organised. The nurse is placed within, and represents at the ward level, the bureaucratic hospital structure whereas the doctor is a free agent - a "free wheeling artist" as Mauksch calls him - not bound by the managerial authority and rules of the hospital (Jaques 1971). Therefore, any number of doctors, each independent of the other, can come to one sister and give medical prescriptions which the sister than has to sort into some order and integrate with the nursing and maintenance systems of the wards.

A comparative study by Burns and Stalker (1961) examined management systems in relation to their environment. They found that successful adaptation to environmental instability was characterised by "organic" management systems in contrast to "mechanistic" forms of management which were more appropriate for stable conditions. The appropriateness of the form of nursing management instituted as a result of the Salmon report, in the light of the work of Burns and Stalker and the known environmental instability of hospitals (Goddard 1953), needs to be questioned. Organic forms of management are non-hierarchial with a network structure of control and

communication which consists of information rather than instruction. This form of management is associated with the emergence of more autonomous roles at different points within the organisation, which fits most closely with the patient allocation system of nursing (Kratz 1974). Organic forms of work organisation, which achieve decisions being taken at the point of action, have been shown to be the most effective form in disrupted work conditions (Trist et al, 1963), which are found in a hospital ward.

However, the structures of nursing management as a hierarchial model based on specialisation has the characteristics of a mechanistic system. Therefore tensions and potential conflict between nursing officers and ward sisters are "built in" to the hospital 'human activity system'.

The differing organisation cultures or sets of norms (Harrison 1972) have been identified as four types - power, role, task and person (Handy 1985). Role and task culture exemplifies the dichotomy between the nursing management hierarchy and the patient centred organisation at the ward level. In the role culture, formal procedures are laid down for roles, communications and settlement of disputes. The efficiency of this culture depends on the rationality of the allocation of work and responsibility rather than on the individual personalities. The task culture is project or in the case of a ward organisation patient orientated. The culture seeks to bring together the appropriate resources, the right people at the right level of the organisation and to let them get on with it. Influence is based more on expert power than on position

or personal power. This culture is extremely adaptable and seems to be a suitable culture in an organic ward environment, whereas the role organisation will only succeed as long as it can operate in a 'steady state' and this type of organisation will be unable to perceive the need for change in an adapting environment.

The nature of the relationship between nurse and doctor has changed during the past century from that of "handmaiden" to partner. (Runciman 1983). However, despite talk of partnership, tensions still exist at the boundaries between medicine and nursing. Redfern (1981) summarised the dissatisfaction with the present management structure as follows:

> "Much of this dissatisfaction seems to be related to three interrelated factors: to the nature of the sister's relationship with her immediate supervisor, the nursing officer; to tensions between clinical and managerial components of nursing; and to difficulties dealing with the multiple authority relationship of sister with consultant and nursing officer".

It is clear that doctors and nursing officers cannot be excluded from considerations of the decision making process at the ward management level.

Within the nursing profession, better management of patient care is synonymous with the nursing process and individualised patient care. However, it is doubtful whether these nursing concepts will work in practice until the ward is recognised as an organic organisation and the recognition by doctors and other professional groups that this conceptual approach is the way forward (de la Cuesta 1979). Pembrey (1980) argues that

without individualised patient care, 'manager-type' sisters will not emerge, and 'non-manager type' sisters who rely on ward routines will continue to be predominant.

These fundamental changes in nursing practice and nursing management decision making are not likely to take place without explicit recognition of the profound organisational changes which are required and the professional implications of these changes.

2.5.2 Work Organisation and Planning Processes at the Ward Level

During the past 2Ø years, a number of studies have shown that non-individualised nursing is linked to the failure to meet patients' needs, (e.g. Lelean 1973, Kratz 1974). The issue of individualised or non-individualised nursing is important enough for nurses to have developed terms to distinguish between them. Nursing which recognises the patient as an individual is described as total patient care, patient-centred care or patient allocation, whilst nursing where the patient is not recognised as an individual is termed routine care, job-centred nursing or task allocation. Task allocation depends on central co-ordination and intervention by the ward sister, whenever changes in the environment of work occur, whereas with patient allocation the nurse is responsible for regulating her work according to the patients' changing needs. Patient allocation is a more autonomous form of work organisation requiring minimal intervention by the ward sister once the work boundaries have been set.

Work on the Nursing Process (Hargreaves 1975) is also potentially relevant to the problem of ward management. The assumptions of the Nursing Process include that a nursing diagnosis and care plan can be made independent of the medical diagnosis, and that individual nurses can be accountable for carrying out and reviewing care plans and evaluating their outcomes. These assumptions have profound implications both for the management of nursing and for the management of wards (Evers 1982). For example, the diagnosis/care plan idea implies that nursing can or should be an activity which is not subordinated to medicine. This is a challenge to the current state of inter occupational relationships in the hospital, and potentially, changes all the rules about management of patient care, and, thereby of wards (de la Cuesto 1979).

One of the most influential studies of recent years is that of Pembrey (198Ø), who looked at the role of the ward sister in the management of nursing. She assumed that team work was important, with the ward sister as leader of the team, and that patient allocation and individualised patient care were likely to result in better quality care for patients. As a result she looked at the way that ward sisters managed nurses. Drawing on systems theory and some of the concepts developed by researchers at Brunel (Newman and Rowbottom 1968), Pembrey set up a model of the management cycle which included work planning; work prescription, delegation of authority, monitoring progress and exacting accountability from the nurses to whom authority was delegated. She noted the complexity of the ward sister's role and argued for a strengthening of her managerial role, given particularly the "unstable" nature of

the ward's environment. In conclusion, Pembrey identified that those sisters who exercised a managerial role and behaviour (9 sisters out of a sample of 50), gave explicit work prescriptions to every patient and nurse.

These sisters were found to be the most highly qualified academically and professionally of the sample. They considered that their management training had been inappropriate. They had learned how to manage the nurses from watching and working with other sisters; in other words from the experience of role models rather than from formal management courses. However, the predominant number of sisters in the study sample relied on ward routines and an incremental approach to ward management. As Pembrey commented about the majority of the sisters in the sample:

> "The sister who does not assess or organise the nursing at the beginning of the shift is likely to spend the day working alone on unplanned fragmented activity much of which could be done by others in the team".

Runciman (1983) undertook in depth interviews of nine medical and surgical ward sisters in two teaching hospitals in Scotland. The sisters remarks confirmed that acting as co-ordinator at the centre of a wide network of people, services and communications is a complex and demanding job. This study also supported the findings of Pembrey in the way that the majority of sisters manage:

> "Many sisters were not accustomed to using their own initiative and did not understand their role as potential change agents ... well tried routines remained preferable as the safe response; changes which upset routine were threatening and avoided".

Research studies (Pembrey 1980, Runciman 1983, Ogier 1982, Slack 1981, Farnish 1985) tend to confirm that the majority of ward sisters manage with an incremental approach (Lindblom 1959), but a small number of sisters make decisions using a systematic and planned approach (Simon 1957).

2.5.3 Ward Sisters' Characteristics and the Activities they Undertake

Current ward sisters are relatively young and inexperienced when compared with the pre-Salmon era (DHSS 1982). There is a relationship between age and severity of felt pressure; pressure in general diminishing with increasing age and experience. Workload was identified as the most important 'cause' of pressure (Mulligan 1972). Wards chosen by student nurses as 'best for learning' were significantly more likely to have a sister who had at least six years experience since completion of training (Pearson 1978).

From the studies undertaken (Hill 1977, Pearson 1978, Fretwell 1980) ward sisters perceived that they were inadequately prepared for their present post. 'First line management' courses, plus clinical experience prior to a sisters post, were considered by many of the sisters and researchers to be inadequate preparation for a ward sister post (this was especially emphasised in relation to the managerial and teaching functions).

Researchers (Davis 1972, Pembrey 1980) also found that ward sisters lacked conceptual learning experience and problem solving skills. Pembrey considers that a relationship exists

between lack of advanced education and professional qualifications and the ability to 'manage' the nursing team. Sisters identified as 'non-managers' were learning from role models rather than from formal management training.

The overall impression from these studies is that current ward sisters are young, inexperienced and inadequately prepared for their role; these factors are perceived by ward sisters and researchers to effect the ward sister's performance (Choppin 1983).

Fretwell (198Ø) completed a thesis about teaching and lecturing in hospital wards. Three types of leadership style were identified during the study. The autocratic leader gave instructions about the work using rules, a more rigid routine and set tasks and comparisons. The democratic leader gave learners more choice in the work that they did inviting rather than commanding - but specified that the trained should work with the untrained. The laissez-faire leader prescribed the care patients needed but left learners to organise the work. Three types of sister orientation were identified according to the way the sister spent her time and her perceived order of priorities. These types were, doctor-orientated, patient-orientated and administration-orientated. Two types of teaching role were identified according to the way the sister fulfilled her teaching role. In conclusion, the most effective sister (in terms of ward teaching and learning) was democratic, patient orientated and fulfilled an active teaching role. The least effective was autocratic, doctor orientated and fulfilled a passive teaching role.

Whelan (1988) also examined the management styles of sisters on 16 oncology wards at the Royal Marsden Hospital, by undertaking structured interviews from each ward. Management styles were classed as high, medium and low on three dimensions, namely socio-emotional orientation, task orientation and pattern of decision making. Quality of patient care was assessed on the wards and correlation of management style and perception of quality of care, indicated that management style influenced quality of care carried out.

Farnish (1985) undertook an assessment on how adequately prepared nurses were for the ward sister's role by identifying the following areas of responsibility:

Management of Patient Care

- organisation and management of clinical care within a ward
- prevention of accidents and incidents
- identifying the particular needs of the dying
- supporting friends and relatives of the terminally ill
- mobilising community resources

Teaching and Assessment

- methods of teaching for various groups
- setting appropriate objectives for individual needs of ward staff; learners; trained staff - assessment
- writing reports

Ward Management

- establishing and maintaining good relationships with other members of the health care team
- planning off duty rotas and allocation of nurses
- implementing hospital policies and procedures

Personnel Management

- issues concerned with industrial action
- dealing with complaints from patients, relatives, visitors
- counselling members of the ward team
- understanding the role of the nursing officer.

Fretwell (1980) identified the following activities undertaken by ward sisters, during activity sampling:

Rounds or talking to Doctors
Working on Kardex, files, case notes or office work
Medicine round
Instructions to others, talk to nurses and other staff
Talking to patients
Talking on telephone
Talking to visitors
Time spent teaching and in teaching situations
Other (meal break, unit meeting, off ward)

Pembrey (1980) in her study of the ward sisters discovered the sisters' stated daily work priorities. The 50 sisters in the sample were asked to allocate points to an activity according to the importance they attached to it. The following table shows the overall importance attached to them:

Activity	(No. of points (poss. points = 100)
Do a ward round of the patients	80
Give the nurses a report on the patients	77
Check that the student/pupil nurses are managing their work	76
Give some nursing care to the patient	69
Accompany the consultant on his round	61
Ask the nurses to report on their work	60
See that the medical tests are copied out	44
Write up the nursing Kardex	40
Supervise the patients meals	38
Attend a unit meeting	29
Get X-rays and test results for a ward round	22
Accompany the nursing officer on her round	19

Table 1 Weighting of ward activities according to importance

It is interesting to note the low priority accorded time spent with the nursing officer, the sisters' immediate manager. On most of the wards in the study, each sister was observed to spend in contact with the nursing officer less than 1% (less than 5 minutes), excluding attendance at unit meetings. Pembrey also asked the sisters in the study sample to identify which activities on a check list were perceived as work problems. A work problem was defined as "something which makes your job more difficult or stops you from doing it as you would like". The 30 sisters of the checklist comprised five categories:

1. Ward services and maintenance
2. Interruptions
3. Admission and discharge policy
4. Medical staff
5. Nursing resources.

The relative importance of the individualised items as presenting a perceived problem to the ward sister is shown in the following table:

Category Number	Problem	Sisters %
2.	Interruptions from the telephone	86
1.	Getting enough linen	72
3.	Admissions arriving before their beds are ready	58
1.	Getting the ward cleaned properly	56
1.	Getting ward furniture repaired or replaced	52
1.	Getting patients' notes and X-rays	46
2.	Being able to complete one job at a time	42
4.	Getting doctors to keep to the hospital drug rules	38
1.	The design of the ward	
5.	Arranging the off duty to give adequate ward cover	36
5.	Nurses going off sick for the odd day or so	34
4.	Doctors not giving patients enough explanation	
2.	People always coming to the ward sister	32
3.	Number of patients transferred to or from the ward	28
3.	Patients who should really be in other wards	
2.	Interruptions from the doctors	26
5.	Not enough nurses who can supervise or teach	24
5.	Student/pupil nurses allocated for too short a time	
5.	Getting extra help when the ward is very busy	
5.	The number of dependent/handicapped patients	22
3.	Patients being discharged at too short a notice	2Ø
4.	Conflicting orders from different doctors	18
5.	Having to lend nurses to other wards	
4.	The number of separate medical rounds in the day	16
5.	Being given, or having to keep unsatisfactory staff nurses	1Ø
5.	Trained staff moving frequently	8
3.	Having to have extra beds in the ward	
4.	The number of tests the doctors order	
2.	Interruptions from the nurses	6
5.	The feeling that you have no one really to turn to for help	2

Table 2 Perceived Work Problems by Sisters (n = 5Ø)

Runciman (1983) undertook in-depth interviews of nine ward sisters. As a part of this study, she asked these sisters about which problems were most worrying in running a ward. The following table identifies the problems in rank order.

Problem Statements	Rank order	Range of rank positions
Having enough contact with the patients	1	1-14
Finding time to talk with patients in a leisurely way	2	2-1Ø
Being interrupted so often	3.5	1-23
Teaching the student nurses	3.5	2-16
Having enough contact with the student nurses	5	1-17
Meeting the demands of so many people	6	3-17
Being available to everyone while on duty	7	4-2Ø
Having too much to do each day	8.5	3-2Ø
Doing basic nursing care	1Ø	1-25
Getting the nursing officer to understand the ward	11	1-2Ø
Feeling tired	12	2-25
Keeping up to date with new trends	13.5	3.24
Disagreeing with a doctor's instructions for a patient	13.5	2-23
Friction between staff	15	6-25
Doing things that are not part of my job	16	2-23
Considering myself as a manager	17.5	7-24
Getting the staff nurses to understand the ward sister's role	17.5	8-23
Not having enough time to myself while on duty	19	9-25
Finding someone to turn to when I need help	2Ø	9-24
Making changes in the ward	21	1Ø-22
Getting the doctors to listen to my point of view		
Feeling isolated from other ward sisters	23	1Ø-25
Doing ward work in off-duty time	24	1Ø-25
Understanding my job responsibilities	25	14-25

Table 3 Problem Statements: range of rank positions and the overall rank order of each statement

A statistically significant result, using Kendall's coefficient of concordance (Siegel 1956), indicated a strong possibility ($P<Ø.ØØ1$) that the agreement found between the ward sisters was greater than could have been expected to have occurred by chance.

In summary the research studied indicates that ward sisters who could become good ward managers will have the following characteristics:

1. At least six years experience since completion of training (Pearson 1978)
2. At least formal management training to middle-management level (Fretwell 1978)
3. Advanced educational qualifications e.g. Diploma of Nursing (Pembrey 198Ø)

4. Democratic type leader)
5. Patient orientated) (Fretwell 1978)
6. Active teaching role)

From the research literature reviewed there is no generalised proposal for a classification of management decisions made by ward sisters, rather a consideration of problems that may occur (Pembrey 198Ø, Runciman 1983).

Akinsanya (1991) considers that there is a need for a distinctive theoretical development in nursing and this need has become increasingly important and urgent. From the Royal College of Nursing Steinberg collection of theses and dissertations (1983) out of 246 studies only 2Ø (8.1%) related to management and staffing. The majority of studies related to nursing education and in the main were based on quantitive research.

2.5.4 Management Information for Ward Sisters

Nursing research has produced a vast literature on patient nurse dependency, deployment of nurses and staffing levels (Scottish Home and Health Department (1969), Barr (1967) and Mulligan

(1974)). This type of research rests on the formulation of "nursing" as a set of observable and countable activities, the quantity of which required by different patients can be specified. However, limitations have been identified with this approach with respect to nurse manager's problems of service planning and organisation of care delivery in the ward.

Rhys Hearn and Howard (1979) reported a trial of an information system to determine appropriate staffing levels in geriatric wards. When wards were staffed to the level as defined by the 'package' and care actually given was monitored, it was found that what had been defined as a priori as 'ideal' care for the patients was still not delivered. This was despite the fact that the ward was provided with 'ideal' staffing levels and the staff themselves believed they were fulfilling the 'ideal' care plans they had prescribed for their patients. Rhys Hearn concluded that staffing level research can advance only if the outcomes of nursing activity - quality of patient care - are evaluated.

Patterns of work organisation in wards may be crucial both to the definition and to the implementation of care plans based on the attainment of particular standards of care which can be monitored and controlled. Wilson Barnett (1979) in a review of patient-nurse dependency studies noted the general neglect of work organisation issues by such studies.

Goldstone and Collier (1982) are critical of many patient dependency approaches. They consider the Aberdeen Formula (Scottish Home and Health Department 1969) is extremely limited

because it deals with frequency of various procedures or treatments for one class of patient only - the most highly dependent. The Barr-Mulligan approach (Barr 1969) does not specifically treat quality of care and the Rhys Hearn approach (Rhys-Hearn 1979) is very oriented towards counting frequencies. In their view, this task approach is out of step with modern approaches to nursing via the nursing process, and is difficult to operate because none can agree what the desirable frequencies should be.

Staffing levels should relate not only to the number of patients and their dependency mix, but also to the environment within which care is delivered and to the service level that a health authority chooses to provide. Goldstone and Collier proposed that targets of care should be set, based on a number of measures obtained from activity sampling and ward records, such as time on direct care, staff hours per bed, and dependency mix of patients. Model wards can be chosen, whose staffing is a target for others of similar type. In effect managers would be provided with a framework for making the decision of how many nurses are needed. There is no absolute answer, because it depends for a given mix of patients on what percentage of direct care should be allocated to patients, how many minutes for each category of patient and what quality score is aimed at.

One of the more recent ward management systems to be installed in a number of hospitals (Financial Information Project 1986) incorporated in its design the issues of work organisation such as off duty rota planning and management of bank nurses (standby nurses). This comprehensive system's approach provides a

'suggestion model' solution to daily nurse manpower deployment. Nurse hours required are derived from individual patient care plans which are based on explicit standards of care. A description of this system is included in Appendix 1.

This system was developed with the active commitment of the users - the nurses. Outputs that provided clinical benefits were incorporated into the design of the system to ensure ownership of the system. It is important that those affected by and involved in its operation perceived the information systems as concerned with:

> "real activity at the point where the organisation does its job and cares for patients" (Wright and Rhodes 1985, 2).

Successful implementation of nursing systems depends on crisis conditions creating an atmosphere conducive to the acceptance of change and the authority is required according to Wright and Rhodes (1985, 2) particularly for the introduction of integrated systems that cut across a number of interest groups. They described a successful integrated system implementation which involved the nursing profession with its well-defined bureaucratic authority structure. This case suggested that a leader or agent of change was needed to push through and maintain the momentum of change in a political system like the NHS.

Therefore the designers of a system to be of use to ward sisters and other nursing staff, need their active co-operation in operationalising the system to become an integrated part of their daily activities. In Keen's (1984) view:

"Implementation is not just the installation of a technical system in an organisation, but the institutionalisation of its use in the ongoing context of jobs, formal and informal structures, and personal and group processes. Installation does not guarantee institutionalisation".

2.6 CRITIQUE OF THE LITERATURE REVIEW

2.6.1 Explanations of Reality in Decision Making

An essentially rationalistic approach to decision making has predominated in the study of organisations, purporting to offer a framework which is both explanatory and normative. The rationalistic approach has been widely criticised - the approach is seen to be utopian, it neglects the range of political variables and it is biased; rationality is equated with the smooth running of the organisation.

An alternative approach has been termed 'disjointed incrementalism', where decision making entails only incremental change, or changes at the margins. This approach has also been criticised. It is accused of being conservative in that it only copes with remedial and short term change and reinforces inertia, (Dror 1964). A policy of 'no effort' is justified leading to little innovation on the organisation.

The third approach of 'mixed-scanning' by Etzioni (1967) entails a decision making process in two phases. Initially a broad sweep is made of policy options and these are assessed against stated values in general terms. Then within this framework, decision making proceeds incrementally in matters of detail.

The central weakness of mixed scanning lies in the importance attached to differentiate fundamental decisions from incremental ones. But just as the distinction between means and ends is flexible, particularly with incrementalism, so fundamental decisions in one context are incremental in another and vice versa.

It is at least possible that decision makers would define decisions in different ways either identifying or ignoring detail and either exploring or neglecting alternatives to suit their purposes in particular situations.

But is this an artificial debate? Both camps consider that their respective models serve both descriptive and normative purposes. It is generally accepted that rationalistic models tend to provide a picture about ideal decision making procedures, but this picture does not portray the way things are in practice. On the other hand, the incrementalist approach has much validity on how decisions are made but not in the way things should be. Perhaps the problem is not to reconcile the approaches or construct some third approach, but to accept that each approach describes a different facet of organisational life.

Allison (1971) defined three models to describe the decision making realities of the Cuban missile crisis, but none of these models in itself provided a complete understanding of the decision making processes. Hall (198Ø) considered that an 'all-embracing' theory is still to be developed.

From this literature review, it can be concluded that many views and models of decision making reality have been expounded. Further research work should be expended not in developing a priori 'models' of decision making, but in detailed research on the policy makers' ideologies, about the nature of decision making and upon the conduct and outcomes of the various stages of the decision process. These stages should be described not just in a quantitative manner (Wilson 1984) but to explore the manner people interact and to take account the social subsystem i.e. organisations relationship with man, together with the technical economic subsystem i.e. technology in relation to tasks (De Maio 1981).

2.6.2 The Design and Installation of Management Information Systems

Many researchers (Cooper 1988, De Maio 198Ø, Gault 1982) have been critical of the basic lack of understanding of a theoretical base in defining the product of management information systems, leading to inadequate systems design and installation of these systems.

Because of this underlying problem with an appropriate paradigm, a mechanistic approach traditionally has been taken, identifying factors and variables which are relevant only to a technical economic subsystem. The social subsystem (according to De Maio 198Ø) is ignored and the interactions between these subsystems. Methods based on the socio-technical approach should be adopted (Gault 1982), where subjective values are incorporated into the design of the system, as well as the more tangible elements. This view is endorsed by Checkland (1981) and Wilson (1984) who

regard organisations as human activity systems, and information systems in organisations necessarily must reflect subjective values, beliefs and wishes. In their view wholly quantitative descriptions are not appropriate in these circumstances.

Another major dilemma is the apparent paradox that decision support systems are 'rational' in intent providing a prescription of what ought to be , within an organisation which will tend to be incremental by nature and description (Cyert and March 1963, Self 1973). If a mechanistic and quantitative approach is taken, both in the design and installation of the information system, then the system will not become an integral and valid part of an organisational subsystem.

From the recent experiences in the NHS (Thomas 1988, Dutton and Kraemer 1982), the realities of power must be recognised in successfully installing information systems involving collaboration at all levels in the organisation from the senior manager to the users. The design of the system must reflect the requirements of the users in an operational sense in order that over a period of time the system becomes institutionalised or, in other words, subsumed into the organisation's daily activities.

2.6.3 The Power of the Professional Monopolisers

Using Alford's (1975) definition of the professional monopoliser's, who are the dominant interest, Ham (1981) identified the medical consultants as this preponderant interest in the National Health Service (NHS).

The inevitability of their position of power was sealed in the National Health Service Act 1946, when consultants, 'mouths suitably stuffed with gold', retained the status quo they enjoyed before the establishment of the NHS.

A number of initiatives have taken place, instigated by the corporate rationalisers, to control the agenda of decision making and to 'tie in' the doctors into the decision making process by consensus management in the 197Øs and general management in the 198Øs, underpinned by comprehensive planning procedures from the centre.

As Schattschneider (196Ø) identified there is a 'mobilisation of bias', which means that unless they are seriously challenged dominant interests continue in the ascendency. From the literature review, the NHS is perceived as a pluralist organisation, reflecting many interest groups, who arrive at decisions, through an ill-defined political bargaining process.

But is this a reflection of the reality of decision making? The main purpose of the NHS is to treat patients. Only doctors can provide that treatment within the umbrella of clinical autonomy. Clinical autonomy allows the practitioner to use his judgement without being subject to scrutiny, or management. Of even more importance is that the profession has prime responsibility for patients' treatment, and so far only doctors have this primacy in the NHS. Therefore doctors make the NHS what it is. They are sanctioned to determine who shall be patients and who shall receive the services of the NHS, and are further empowered to

determine what skills other than doctors skills are appropriate to the care of those defined as patients.

In reality the elite theory is more appropriate to describe the professional monopolisers' position of power and authority in the NHS. Many examples from the literature support this view. Ham's study (1981) of the planning processes in Leeds Regional Hospital Board, Klein's view (1984) that the development of health services in the 197Øs resulted from the aggregate of individual clinical decisions, and the disruption of the Korner led management system's initiative, particularly where it could prove critical of clinical activity.

The power and authority of doctors must be recognised and understood in developing an appropriate research methodology, in determining the nature of decisions and the steps in the decision process in managing ward resources in hospitals.

2.6.4 Making Management Decisions at the Ward Level

Little research has been undertaken into the nature of decision making in managing wards in a hospital. Evers (1982) in her critique of Pembrey's study (198Ø) of the management of the ward including the integration of non-nursing inputs to patient care was not examined in any depth. Therefore, there is a danger that the management of nursing comes to be seen as a partly closed system, which can and does go on to some extent independently of whatever other activities the ward sister and her nurses may be involved in. From the nursing research reviewed, only a partial account is given of the purposes of

ward management, what it is that has to be managed, the range of work that managers actually do, and who actually does or should do the managing.

Many stresses and strains have been identified in the coordinating role of the ward sister in respect to the imposed bureaucratic hospital structure and the 'free wheeling' role of the doctors, in frequently disturbed conditions on the ward. The ward management role of the ward sister has been ill-defined and Pembrey (198Ø) and Runcimann (1983) show that the majority of ward sisters relied on ward routines and made incremental decisions. Because of their pivotal roles in a hospital organisation it may be that sisters are becoming ward managers by default. Research studies do not indicate a strong desire on behalf of ward sisters to undertake this role, rather the opposite.

From the literature reviewed, the implied descriptive model of ward level decision making is incremental by nature, using professional judgements based on experience gained from past role models. Nursing systems are now being installed in hospitals to provide ward sisters with management information to support the decision processes relating to the deployment of nurses based on skill mix and care needs of patients. These systems represent a rational model of decision making underpinning a prescriptive paradigm on how things ought to be.

A further relevant issue is the degree of uncertainty in the decision making on a ward. These decisions are likely to be programmed i.e. routine in nature (Simon 196Ø), but ranging on

a continuum of programmability, based on risk or uncertainty. The degree of rationality (or planning) that takes place could be related to the level of uncertainty prevalent in the wards. Kronenberg and Howard (1987) consider that factors that constrain managers to respond strategically can be conceptualised and aggregated within an 'environment of risk'. A number of these factors, perhaps directly or indirectly controlled by doctors could effect the utility of the decision support system within an environment of risk - the ward.

Therefore the key areas of research which need to be undertaken are:

1. An evaluation of a nursing system which is installed into a ward environment, which determines whether benefits can accrue by using evaluation criteria, based on the effectiveness of the system.

2. Decision types need to be defined for ward management and these decisions should be measured, to identify the rational or incremental nature of the decision processes.

3. A measuring instrument is required to gauge the levels of uncertainty on a ward and to validate the results of experimentation into ward management decision making.

4. Dialogue can then take place with the professional monopolisers based on these research results, to explain the impact of their professional practices, on the management of wards.

CHAPTER 3 RESEARCH METHODOLOGY

3.1 INTRODUCTION

Arising from the critique of the literature review, research should be undertaken upon the nature of decision making and the management decision processes at the ward level in hospitals.

The methodology used will be based on qualitative (subjective) research, in addition to quantitative methods, in order to record the human interaction and political processes within the organisation.

In particular, measuring instruments need to be designed and validated for the classification and management of decision types relevant to ward management (decision diaries); together with the identification and classification of factors on a ward which reflect the levels of uncertainty in the decision making process (difficulty factors index).

The decision support system (as discussed in Chapter 2) should be formally evaluated using accepted evaluation techniques, before studies are undertaken to determine if there are statistically valid changes in the decision processes as a result of information being available to the decision maker.

3.2 QUANTITIVE AND QUALITATIVE RESEARCH

Leininger (1985) defines quantitative research as:

> "Quantitative research focuses upon the empirical and objective analysis of discrete and preselected variables that have been derived a priori as theoretical statements in order to determine causal and measurable relationships among the variables under study".

Therefore carefully controlled experiments and precise measurement of data are generally the major factors of quantitive research.

She (Leininger, 1985) defines qualitative research as:

> "The qualitative type of research refers to the methods and techniques of observing, documenting, analysing and interpreting attributes, patterns, characteristics and meanings of specific, contextual or gestaltic features of phenomena under study".

Essentially the goal of qualitative research is to document and interpret as fully as possible the totality of whatever is being studied.

Qualitative researchers (Cook and Reichardt 1979) believe that there is more to knowing people than what can be seen, sensed and measured. They believe it is equally important to study and document what people know and experience. These researchers consider that:

> "Evaluators would be wise to use whatever methods are best suited to their research needs, regardless of the methods' traditional affiliation. If that should call for a combination of qualitative and quantitive methods, then so be it".

Qualitative research findings can be of considerable benefit to quantitative studies in that the findings "put the flesh on" and give meaning to statistical or numerical findings.

These research paradigms can also be defined as;

1. 'Phenomenology' - the view is of a social world that has an intrinsic meaning system, which is qualitatively different from the natural world. The emphasis with this approach, is on subjectivity rather than objectivity.

2. 'Positivism' on the other hand, follows natural science methodology using objective techniques which are verifiable and open to examination.

This thesis will be utilising both approaches - a methodological pluralism.

3.3 QUANTITATIVE METHODS - CONSTRUCTION OF THE EXPERIMENT

Quantitative methods are based on a structured and deductive approach involving measurement of defined variables. Measuring instruments can be designed as 'tools' to collect data in order to conduct the experiment which has been constructed. Every aspect of the experiment should be capable of verification or validation - for example whether the measuring instrument measures what it is intended to do.

The decision maker - in this case the ward sister, has to make value judgements based on professional knowledge and experience in undertaking the management activities on her ward. The experiment should be constructed to determine whether there is a causal effect on her decision making processes, when she receives information from a decision support system after this system is installed on her ward.

The decision support system could be treated as a 'black box', wherein a system can be seen as input, process and output; the inputs and outputs are known but not the actual transformation from one to the another. However, the validity of the experiment could not be determined, unless the processes of the system are understood and evaluated. The design of this evaluation study is considered later in this chapter.

Moser and Kalton (1977) generalise the experimental design so as to investigate whether a variable X, the independent or predictor variable has any effect on variable Y, the dependent or predictand variable. In other words the level of association between these variables needs to be measured.

Campbell and Stanley (1966) consider internal and external validity with a study design, in terms of the following threats to validity:

History (Internal) - change over time, explain change in Y

Maturation (Internal) - effects of time, age, time of day, tiredness

Testing (Internal) - design involving testing whether experience gained improved scores.

Instrumentation (Internal) - use of judges to mark different studies; subjective measurement could lead to wishful thinking for improvement.

Reactive effect of testing (External) - in before - after design, there is the danger that pre-test may affect the responsiveness of the experimental group to the interventions. Subjects became sensitised and more receptive to the information given.

Reactive effect of experimental arrangements (External) - often necessary to make special arrangements, resulting in a risk that these arrangements may interact with X to produce an effect (as studied in the Hawthorne experiment).

According to Campbell and Stanley (1966) experiments tend to be stronger on internal validity and weaker on external validity, i.e. the generalisability of the findings to some wider population.

The constraints and limitations to be placed on the experimental design must be understood in the context of potential threats to validity. In order to measure association between the variables, a comparable control group with which to compare the experimental group is required. This construction could imply that different ward sisters would populate the experimental and control groups. As these sisters would have different value judgements and experiences, differences in results could be due to these factors. The sisters could be required to complete two sets of measuring instruments (the decision diaries) at the same time, indicating how she would have made decisions without the intervention of the decision

support system in the "after" phase of the study, as well as recording her actual decisions made in this phase. This design would be impractical, because of the reactive effect of testing and the day to day pressures that sisters already experience.

There are three main types of experimental design (Moser and Kalton 1971):

1.) After - only design. The effect on Y is assessed by measuring its incidence in both the experimental and control group which are composed of different individuals.

2.) Before - after design. Uses the same individuals for the experimental and control group.

3.) Before - after design with control group. In this design both the experimental and control groups are measured before and after the experimental group is exposed to X. The effect of X is then measured by comparing the changes in Y in the two groups.

The 'after-only' design would involve the comparison of decision making of two or more ward sisters on different wards. For the reason already discussed, the main cause of invalidity is the professional individuality of the sisters. The third design method would be less likely to arrive at false conclusions. However, the practicality of conducting this type of experiment leads to the conclusion that the 'before-after' design is best suited for the purposes of this experiment.

Following from this conclusion, the same ward sister will form the experimental and control groups, recording decisions taken (variable Y) on the measuring instrument (decision diary), for a sample period both 'before' and 'after' the decision support system is installed and the ward sister is exposed to X variable - information from the system.

According to decision theory, decisions can be viewed as ranging on a discontinuity of uncertainty. With additional information from the ward system, uncertainty levels should be reduced and in a prescriptive sense more rational (or planned) decisions should be taken by the ward sister. However, the literature review indicates clearly the major impact that doctors have on the hospital and ward organisation, which in itself can be seen as disrupted and 'organic' by nature. Therefore to provide a measure of these organisational factors and to validate the findings of the experiment, an index needs to be constructed (difficulty factors index), which is ward based and can be related to the results of the decision diary analysis.

The rationale of hypothesis testing is a presumption of innocence until proven guilty or the null hypothesis (Ho) that no significant changes will be obtained from the experiment (Hamburg 1974). The likely outcomes from testing an hypothesis are:

Action Concerning Hypothesis (Ho)	Outcomes	
	Ho is true	Ho is false
Accept Ho	Correct decision	Type II error
Reject Ho	Type I error	Correct decision

Figure 2 Likely Outcomes from Hypothesis Testing

The probability of committing type I error can be controlled by setting a low level of significance to judge the hypothesis (5% level of significance). The risk of type II error can be reduced by increasing the size of the sample.

Hamburg (1974) also considers errors from a different perspective in terms of "systematic errors" and "random errors". As the term implies, systematic errors cause a measurement to be inaccurate in some systematic way. Systematic errors persist even when sample size increases. Therefore these errors arise primarily from inaccuracies or deficiencies in the measuring instrument. Random errors come from the operation of a large number of uncontrolled factors and tend to decrease as the sample size is increased.

The null hypothesis to be tested in the empirical research is that; "*patterns of ward decision making will not change significantly as additional information becomes available from a decision support system.*"

From the literature review, it is apparent that a number of factors could effect ward management decision making. Therefore, an additional statement to the hypothesis is required that; "*the degree of change in patterns of ward*

decision making will be governed by a set of factors already in existence within wards in a hospital".

The design and construction of the measuring instruments required to test the null hypothesis are described in the next section.

3.4 DESIGN AND CONSTRUCTION OF THE MEASURING INSTRUMENTS

3.4.1 Decision Diaries and the Classification of Decisions

Decision theory indicates at least three dimensions to decision making, relating to uncertainty, risk and time horizons. The concept of time horizons is particularly important in this research, as nurse researchers conclude that many sisters make decisions in a reactive manner i.e. with little or no time horizon. This view fits the descriptive model of disjointed incrementalism. However, decision support systems promote the rational model of decision making. Therefore the concept of time horizons in decision making 'bridges the gap' between these paradigms; the longer the time horizon in decision making, the more planning (and hence rationality) takes place. A zero time horizon would represent a reactive or incremental decision. It would be expected that time horizons in decision making would increase, as a result of installing a ward nursing system.

The initial task in identifying a taxonomy of ward management decision making was to set the boundaries to these decision classifications. Farnish (1985) considered that ward

management consisted of planning off duty rotas and the allocation of nurses, together with the implementation of hospital policies and procedures. Within these management areas, Pembrey (1980) identified admission and discharge and nursing resources problems. From the recent research undertaken including (Fretwell 1980, Runciman 1983), conclusions can be drawn that ward management consists of:

- planning off duty rotas
- implementing hospital policies and procedures
- patient admissions and discharges
- balancing nursing resources to patients needs.

For the purposes of the taxonomy, the management of clinical care and personal issues have been excluded as they have not been defined by recent research as ward management decision areas, although these decision types were identified and analysed in the evaluation study (described in Chapter 4).

The taxonomy of ward management decision making can be stated as follows, based on the literature review and the results of the evaluation trial;

Decision Category	Objectives
Staff Allocation	To ensure that adequate staffing at the appropriate skill level is available to meet the planned nursing requirements of patients
Ward Administration	To manage the ward within the hospital's policies and procedures to provide adequate care to patients.
Patients Admissions/ Discharges	To admit patients to those wards which can provide adequate standards of care to meet individual patients' nursing needs.
Workload Prioritising	To provide the best possible standard of care to patients within the constraints of the staffing resources available.

Figure 3 Classification of Ward Management Decision Making

For the purposes of this research, decisions are considered to be 'planned' for time horizons of 'tomorrow' and longer. Decisions within a '24 hour' time horizon are considered 'unplanned'. The rationale for this division is that ward planning cycles are 24 hours or longer, for example patients for theatre lists are prepared for the next day, elective admissions are planned at least 24 hours in advance of the admissions date, and bank and agency nurse allocations are planned for next day or longer ward shifts.

These decision categories are described in the following paragraphs:

Staff Allocation

This decision category primarily relates to the planning function of ward management. 'Planned' decisions are identified within time scales 'tomorrow', 'this week', 'next

week' and 'longer'. Sub categories of this decision area are:

1. Off duty rota changes.
2. Learner nurse allocation changes.
3. Reallocation of nurses from ward to ward on planned basis.
4. Employ bank nurses/agency nurses on planned basis.

Decisions in this category could be taken by the nurse in charge of the ward alone or with the unit manager. The School of Nursing Allocation's Officer will probably be involved in decisions taken with sub category 2. (learner nurse allocation changes).

Ward Administration

This category of ward administration relates to policies and procedures formulated on a planned basis. The sub categories identified are:

1. Change policies/procedures relating to support services i.e. domestic, catering, linen, stores.
2. Change policies/procedures relating to issue of medication.
3. Change policies/procedures relating to administration/clerical protocols e.g. collection of patient details for hospital information.

Decisions within this category will probably be taken jointly by the nurse in charge and the unit manager.

Patient Admissions/Discharges

The patient admissions/discharges categories are divided into 'planned' and incremental or 'unplanned' decision sub categories. 'Unplanned' decisions are classified with timescales; 'this shift', 'next shift', 'next 24 hours'. The identified sub categories are:

'Planned' decision sub categories

1. Planned admissions - changes.
2. Planned discharges - changes.
3. Planned list cases - changes.

'Unplanned' decision sub categories

4. Reallocation of patients between wards.
5. Emergency admissions.
6. List cases - unplanned changes.

The degree of involvement in decision making of the nurse in charge on the ward, the unit manager and the clinicians will be dependent on the hospitals' admissions policy and organisation, and the balance of power between these players.

Workload Prioritising

This category relates to 'unplanned' decisions to obtain the best balance in the circumstances between nursing availability and the patients' nursing needs. The breakdown of

sub-categories are:

1. Deploy staff between wards.
2. Employ bank nurses/agency nurses.
3. Defer administrative procedures, which do not effect care standards.
4. Reduce care standards due to inadequate staffing levels.

Decisions relating to this category will be undertaken mainly by the nurse in charge, although the unit manager could be involved in the decisions to employ bank or agency nurses.

Diaries have long been used by researchers as a useful source of data (Field & Morse, 1985), (Polit & Hungler, 1987) especially in a semi- structured format. Using the taxonomy of ward management decisions, a daily diary will be maintained of the decisions taken by the nurse in charge within these categories. It is apparent that the department manager and/or the clinician will be involved in the decision making. Therefore codes will need to be devised and used as follows:

Decision Code	Description
1	Nurse in Charge
2	with department manager
3	with clinician
4	with department manager and clinician

Table 4 Decision Diary Codes

The semi-structured design of the decision diary is shown below.

DECISION DIARY Nurse in Charge ..... Date ..... Ward ..... Shift .....

STAFF ALLOCATION	WARD ADMINISTRATION	PATIENT ADMISSIONS/DISCHARGES	WORKLOAD PRIORITISING
1. OFF DUTY ROTA - CHANGES Tomorrow This Week Next Week Longer [ ] [ ] [ ] [ ]	1. CHANGE POLICIES/PROCEDURES RELATING TO SUPPORT SERVICES Tomorrow This Week Next Week Longer [ ] [ ] [ ] [ ]	1. PLANNED ADMISSIONS - CHANGES Tomorrow This Week Next Week Longer [ ] [ ] [ ] [ ]	1. DEPLOY STAFF BETWEEN WARDS This Shift Next Shift Next 24 Hours [ ] [ ] [ ]
2. LEARNER NURSE ALLOCATION - CHANGES Tomorrow This Week Next Week Longer [ ] [ ] [ ] [ ]	2. CHANGE POLICIES/PROCEDURES RELATING TO ISSUE OF MEDICATIONS Tomorrow This Week Next Week Longer [ ] [ ] [ ] [ ]	2. PLANNED DISCHARGES - CHANGES Tomorrow This Week Next Week Longer [ ] [ ] [ ] [ ]	2. EMPLOY BANK NURSES/AGENCY NURSES This Shift Next Shift Next 24 Hours [ ] [ ] [ ]
3. REALLOCATION OF NURSES FROM WARD TO WARD ON PLANNED BASIS Tomorrow This Week Next Week Longer [ ] [ ] [ ] [ ]	3. CHANGE POLICIES/PROCEDURES RELATING ADMINISTRATION/CLERICAL PROCEDURES Tomorrow This Week Next Week Longer [ ] [ ] [ ] [ ]	3. PLANNED LIST CASES - CHANGES Tomorrow This Week Next Week Longer [ ] [ ] [ ] [ ]	3. DEFER ADMINISTRATIVE PROCEDURES ETC WHICH DO NOT EFFECT CARE STANDARDS This Shift Next Shift Next 24 Hours [ ] [ ] [ ]
4. EMPLOY BANK NURSES/AGENCY NURSES ON PLANNED BASIS Tomorrow This Week Next Week Longer [ ] [ ] [ ] [ ]	OTHER DECISIONS _____ [ ]	4. REALLOCATION OF PATIENTS BETWEEN WARDS This Shift Next Shift Next 24 Hours [ ] [ ] [ ]	4. REDUCE CARE STANDARDS DUE TO INADEQUATE STAFFING LEVELS This Shift Next Shift Next 24 Hours [ ] [ ] [ ]
OTHER DECISIONS _____ [ ] _____ _____ [ ] _____	_____ _____ [ ] _____ _____ [ ] _____ _____ [ ]	5. EMERGENCY ADMISSIONS This Shift Next Shift Next 24 Hours [ ] [ ] [ ] 6. LIST CASES - UNPLANNED CHANGES This Shift Next Shift Next 24 Hours [ ] [ ] [ ]	OTHER DECISIONS _____ [ ] _____ _____ [ ] _____

Figure 4 Decision Diary

Space has been made available within each decision category in order that descriptions can be added for those decisions that cannot be readily identified within the existing decision sub categories.

To meet the requirements of the research hypothesis, a statistical technique is required to test whether the two samples taken, 'before' and 'after' the system's intervention originated from the same population. If there are no statistically valid differences, then the null hypothesis is accepted. As the results of the sample will be collected as counts or frequencies of occurrence of decision types, the most appropriate statistical technique is the Chi-square test (Hamburg 1974). This test calculates the frequencies which would be expected if no relationship is present between the samples, and comparing these frequencies with the actual values which were observed. The greater the discrepancies between the expected and actual frequencies, the larger the chi-square value becomes. The probability of this value occurring can be determined from statistical tables. If the value for chi-squared was higher than the 5% probability level, then there are considered to be significant differences between the samples.

3.4.2 Difficulty Factors Index

The purpose of this index is to provide a measure of the level of uncertainty and risk in making decisions in a particular ward, in order to explain the results of the decision diary and gain insights into those factors which reduce the effectiveness

of the decision support system.

From the literature review, factors likely to effect ward management decision making are as follows:

Category	Factor
Ward Statistics	throughput of patient turnover interval bed occupancy rate of emergency admissions
Workload/Manpower Information	magnitude of difference between required and actual staff hours overall dependency of patients incidence of trained staff to learners
Staffing Arrangements	flexibility of staffing arrangements e.g. employment of bank nurses; flexibility of staff between wards
Department Manager/ Sister Relationship	department manager, span of control, years of experience sister type - years of experience - educational qualifications - formal management training
Clinician Relationships	number of clinicians allocated beds age range of clinicians number of specialties allocated beds number of registrar/house officers undertaking rounds number of theatre patients
Environmental Factors	design of ward nightingale/cubicle level of support services provision of ward clerk

Figure 5 Factors Likely to Effect Decision Making

These factors need to be corroborated and validated by consensus of opinion of a sample of ward sisters. Appropriate statistical techniques need to be used, to weight systematically these valid factors to enable an index to be constructed.

Weights could be developed by using the Delphi technique (Carley 198Ø). The technique is basically an iterative polling approach with a feedback mechanism. This approach involves a group of experts who are interviewed in 2 or more rounds and the experts are presented with the cumulative results of the previous rounds and asked if they would alter their projections accordingly. From these results will emerge a consensus of expert opinions. This technique was used successfully at the Rand Corporation in the 196Øs by Holme and Dalkey (Helmer 1977) although the technique is not without its critics. Sackman (1976) has been critical of the theoretical base of the technique. However, Goodman (1987) concludes that the technique as a research method has much to offer as a means of structuring a group's communication and decision making processes.

Henney et al (1982) used the Delphi technique to arrive at a consensus of opinion regarding the workload ratings of over 2ØØ nursing procedures including tests and specimen collections. This Delphi study was conducted with a panel consisting of 115 medical ward sisters from 33 Scottish hospitals. The study was conducted for two rounds and many sisters changed some of their ratings in the light of their colleagues opinion and a much closer agreement was achieved. From this survey, ratings were derived for each nursing procedure based on the mode (majority rating) after ascertaining that their indices based on mean and median values showed no statistically significant differences.

The index derived from the study undertaken by Henney et al (1982) was based on the ordinal Ø-5 point scale. Ordinal scales can support comparison of the type A is greater than or equal to or less than B, but cannot quantify the difference between these two scalar points. The problem was overcome by Henney by processing further the data gathered by the Delphi survey so that the ordinal points can be transformed to ratings based on an interval scale, which can quantify differences between two items. The method used for that transformation is based on the law of categorical judgement developed by Thurstone (Torgerson 1958). This method assumes that although people do not always react in the same way and therefore neither rate an object with the same value on a given scale, nor perceive the categories into which that scale is divided in a similar manner, their responses form a statistical distribution (normal) whose mean value is the required rating of the object on an interval scale. Henney determined that the ratings resulting from the application of the law of categorical judgement represented the opinion of the participating sisters with acceptable accuracy, using the Kolmogorov-Smirnov statistical tests.

The approach taken by Henney (1982) will be used in this study to determine an interval scale 'difficulty' index. A representative sample of nurses in charge is required to determine expert opinion on those factors which effect decision making at the ward level. At least two rounds are required to consolidate this consensus opinion. After the first round, those factors which have little or no bearing on decision making can be eliminated, allowing the 'experts' to concentrate

on the factors which significantly effect ward management decisions. Using the law of categorical judgement an interval scale based 'difficulty' index can be established.

Using the Delphi technique a questionnaire was devised and circulated to a sample of ward sisters (n=24) within a number of hospitals in March 1988. The specialties covered in the sample were:

Specialty	Number of ward sisters	%
Surgical	7	3Ø
Medical	4	15
Paediatrics	4	15
Oncology	1	5
Elderly Care	6	25
Cardiothoracic	1	5
Gynaecology	1	5
TOTAL	24	1ØØ

Table 5. Sample of Ward Sisters Using the Delphi Technique.

The ward sisters were requested to apply a rating to a Likert scale, Ø (low) to 5 (high), (Moser and Kalton, 1977) in terms of the difficulty in making management decisions relating to the particular factor.

An analysis was completed (Appendix 2) of the results received from the questionnaires circulated, with the following factors scoring the highest index values:

FACTOR	TYPE	INDEX
1. Overall dependency of patients	Workload	78
2. Imbalance between actual/required staff hours	Workload/Manpower	74
3. Bed occupancy	Workload	73
4. Throughput of patients	Workload	69
5. Rate of emergency admissions	Workload	64
6. Number of registrars/house officers undertaking rounds	Relationships	60
7. Provision of ward clerk	Workload/Manpower	58
8. Level of support services	Workload/Manpower	57
9= Ward being 'on-call'	Workload	54
9= Incidence of escorting patients	Workload	54
10. Rates of trained staff to learners	Manpower	50
11= Staff sickness rates	Manpower	49
11= Number theatre patients on single day	Workload	49
11= Admission procedures	Workload	49
14. Patient meals by bulk trolley	Workload	47
15= Number operating sessions per week	Workload	46
15= Staff turnover rates	Manpower	46
17= Employment of agency nurses	Manpower	45
17= Movement of staff between wards	Manpower	45
17= Availability of equipment	Other	45
20= Number of consultants allocated beds on ward	Relationships	43
20= Relationship with department manager	Relationships	43

Table 6. Difficulty Factors in Order of Index Value (Round 1)

'Workload' was the predominant type of factor, whereas 'relationships' were not perceived to be such a critical type of factor.

The design of the questionnaire was amended to include a column for factors which were 'not applicable' for example, medical ward would not 'send patients to theatre'. Two additional factors were included on the questionnaire as a result of feedback from round one - 'transfer from intensive care' and 'bed blocking by long stay patients'.

The second questionnaire was circulated in July 1988 and an analysis completed of the results received. The sample size (n=20) was reduced due to staff leaving and long term sickness.

A comparison was undertaken between rounds one and two (Appendix 3 describes this comparison). In the majority of factors the modal value remained consistent between the two samples.

Factors that were relevant to only a proportion of the ward sisters could now be identified as indicated in the following table:

Weighted Index	'ALL SAMPLE' FACTORS	
3.25	Overall dependency of patients	
3.2Ø	Bed occupancy on ward	
2.8Ø	Throughput of patients on ward	
2.7Ø	Imbalance of actual and required staff hours	
2.63	Rate of emergency admissions	
2.2Ø	Dealing with admission/discharge documentation	
2.2Ø	Level of support services	
2.1Ø	Number of registrars/house officers undertaking rounds	
2.Ø5	Incidence of escorting patients	
2.ØØ	Staff sickness rates	
	'PART SAMPLE' FACTORS	**Sample Size**
3.64	Number of first year learners to ward	55%
3.31	Number of theatre patients on single day	65%
3.21	Ward being on-call	7Ø%
2.85	Number of operating sessions per week	65%
2.76	Patient meals distributed by bulk trolley	85%
2.45	Employment of agency nurses	55%
2.19	Rates of trained staff to learners	8Ø%
2.ØØ	Transfer from intensive care	6Ø%

Table 7. Summary of Difficulty Factor Results (Round 2)

The results in round two were analysed to calculate a weighted index for each factor by aggregating the ratings and dividing by number of ratings, as shown in the above table.

To determine the significant factors, seventeen factors were considered further, whose weighted indexes were 2.Ø and above. These factors were examined in terms of applicability and ease of measurement. From this examination, factors to be incorporated into the difficulty index were reduced from eighteen as indicated in the above table to eleven with the following methods of measurement:

Factor	Included in index	Measure	Comment
1. Overall dependency of patient	No	-	Requires information system to calculate. Reflected in 'bed occupancy' and throughput.
2. Bed occupancy on ward	Yes	% beds occupied	Reflects ward workload
3. Imbalance of actual and required staff hours	No	-	This factor is "effect" rather than "cause".
4. Rate of emergency admissions	Yes	% admissions	Relates to factor ward 'on-call'
5. Throughput of patients on ward	Yes	(Longest - Av.LOS) (average for) (Length ward) (of stay (LOS)) ---------- Longest av. LOS	Relate to longest Length of stay (LOS) in hospital study.
6. Dealing with admissions/ discharge documentation	No	- -	Relates to 'throughput' factor
7. Level of support staff	Yes	WTE support staff / WTE ward establish -ment	Support staff available during reference period (WTE = whole time equivalent)
8. Number of ad hoc doctors rounds	Yes	Hours on ad hoc rounds / Total available staff hours	Hours accompanying doctors on rounds
9. Incidence of escorting patients	Yes	Hours absent from ward / Total available hours	Hours absent excludes sickness
1Ø. Staff sickness	Yes	Staff hours sick / Total available hours	
11. Number of 1st year learners	No	-	Include in factors 'trained staff to learners'

12. Number of theatre patients in same day 13. Number of operating sessions per week	Yes	Total no. of patients to theatre / Total no. of patients on ward	Factors combined
14. Ward being on call	No	-	Reflected in factor "emergency admissions"
15. Patient meals distributed by bulk trolley	Yes	Yes = 100% No = 0%	
16. Employment of agency nurses	Yes	WTE agency nurses / WTE ward establishment	
17. Rate of learners to trained staff	Yes	(WTE weighted learner establishment) / (WTE trained + learner establishment)	Learner weighting to reflect 1st year learners
18. Transfer from intensive care	No	-	Reflected in factors 'bed occupancy' and 'throughput'

Table 8. Factors Incorporated into Difficulty Factors Index

The next stage was the standardisation of the measures to a common and consistent scale. An interval scale is a numerical scale to which the distances between any two points are of known and equal size. The scale required needed to reflect 'least difficult' state, 0 to 'most difficult' state, 1. The identified scales for the 'difficulty' factors were:

Factor	Scale
1. Bed occupancy, including day cases	Ø - no beds occupied 1 - ward fully occupied
2. Rate of emergency admissions	Ø - no emergencies 1 - ward full with emergencies
3. Throughput of patients	Ø - Hospital longest length of stay 1 - 1 day length of stay
4. Level of support staff	Ø - 1ØØ% support staff on ward 1 - No support staff on ward
5. Number of ad hoc doctors rounds	Ø - No ad hoc rounds 1 - All available time on ad hoc rounds
6. Incidence of escorting patients	Ø - No escorting patients 1 - All available time on escort duties
7. Staff sickness	Ø - No sickness 1 - All absence hours on sickness
8. Patients to theatre	Ø - No patients to theatre 1 - All patients to theatre
9. Meals distributed by bulk trolley	Ø - No meals distributed 1 - All meals distributed
1Ø. Employment of agency nurses	Ø - No agency nurses employed 1 - All agency nurses employed
11. Rate of learners to trained staff	Ø - No learners 1 - All learners on ward (weighted for 1st year learners)

Table 9. Standardisation of Difficulty Factors

The elements of the Difficulty Index (DI) have now been determined and they can be expressed in the following formula:

$$DI = \frac{W \times Sc(M)}{f}$$

Where f = defined factors

W = weighting of relative importance derived from a Likert rating in a Delphi process to determine each factor (f).

M = measure from the original data for each factor.

Sc(M) = scale, or standardisation of the measure.

DI = difficulty index for a defined ward

This formula provides the transformation from an ordinal to interval measure.

The validation of this interval measure would be undertaken during the main study. A panel of judges comprising senior nurse managers who had expert knowledge concerning the management of wards in the study hospital would rank the wards in order of 'difficulty' using their expert judgement which would then be compared against the ranking list that the index would calculate. The appropriate non-parametric test to compare these rankings is Spearman's Rank Correlation Coefficient (Hamburg 1974). A rank correlation coefficient can be computed which is a measure of the degree of correlation that exists between the two sets of ranks.

3.5 QUALITATIVE MEASURES

A developing theme in the research literature is the need to collect data by qualitative measures as well as the prevailing quantitative methodology to gain a full and complete set of insights into the human activity system (Wilson 1984) and the social subsystem (De Maio 198Ø). Leininger (1985) believes that these alternative methods should allow health researchers to get close to people, their life ways and their human conditions.

The most appropriate approach to assimilate a qualitative picture of interactions, views and values in an organisation is through interviews. Leininger (1985) identifies three main types of interviews:

- open ended interviews. Reveals informants views rather than researchers. The approach encourages talk about clarifying and giving examples.

- structured and closed interviews. These interviews are phased in order to elicit specific responses for specific questions. There is a limit on what the interviewee may wish to share with the interviewer.

- semi-structured interviews. This interview technique is designed to elicit both definitive and unexpected kinds of information.

Time would be limited for interviews as ward sisters and their managers are inevitably 'busy' people, therefore open ended interviews were discounted. However it was important to allow interviewees to raise issues they felt were relevant to the research and therefore semi structured interviews were planned with headings composed for each interview. Note taking would be used to record interviews necessarily involving a degree of paraphrasing, as from previous experience, using a tape recorder would prove prohibitive because of the time needed to transcribe tapes. The only exception to this approach would be the interview with the expert panel to validate the difficulty index, which would be conducted using a tape recorder.

Quotations could be important to substantiate the findings. As well as providing evidence of validation for the difficulty index, the results of the decision diary would also be validated using interviews with ward sisters and their managers, to provide professional judgement.

3.6 EVALUATION METHODOLOGY FOR THE DECISION SUPPORT SYSTEM

3.6.1 Definition of Systems Effectiveness

Two general views can be taken concerning what system effectiveness means and how it should be measured, the goal-centred view, and the system resource view. (Hamilton and Chervay 1981) as follows:

1.) In the goal-centred view, the way to assess system effectiveness is first to determine the task objectives of the system and then to develop measures to assess how well the objectives are being achieved. Effectiveness is determined by comparing performance to objectives.

2.) In the system-resource view, system effectiveness is determined by attainment of a normative state e.g. standards for good practice.

The distinction between the two views is similar to the distinction drawn between "summative" and "formative" evaluation approaches in the evaluation research literature (Schriven 1972).

Summative evaluation determines the degree to which the system has accomplished its objectives. Formative evaluation assesses the quality of the system and user support. The distinction between summative and formative evaluation approaches is analogous to the evaluation of ends versus means, or outcomes versus process. Both formative and summative evaluation approaches are typically used in providing evaluation information on system effectiveness.

The means for measuring system effectiveness can be characterised as subjective or objective. Measurement of organisational effects can be based on subjective data (e.g. perceptions of individuals) or objective data (e.g. observable behaviour).

3.6.2 Evaluation Approaches

Using the distinction between 1.) summative and formative evaluation approaches, and 2.) objective and subjective measures, various evaluation approaches can be generally classified as shown below.

Means to measure accomplishment of objectives	Evaluation Approach	
	Summative Focus on outcome or ends	Formative Focus on process or means
Objective	Cost/benefit analysis Information economics Performance measures	Quality Audits Technical Reviews Computer performance evaluation
Subjective	User Attitude Survey Perception of System benefits	User Attitude Survey Perception of System effectiveness

Fig. 6 Classification of Evaluation Approaches

Briefly the evaluation approaches can be described as follows:

Cost/benefit analysis quantifies the system's effect on organisational performance in terms of monetary or assumed monetary values.

Information economics provides a technique to quantify the utility associated with system use (O'Brien 1977).

Performance measures are calculated at the user and organisational level which relate directly to the system's objectives.

Technical reviews concentrate on assessing the information system's technical quality.

Quality audit focuses on the quality of service given.

Computer performance evaluation typically assesses the performance efficiencies of the computer hardware.

User attitude survey is a formal approach to quantify subjective perceptions of system effectiveness. Many researchers consider that satisfaction of users with their information system is a potentially measurable and generally acceptable surrogate for utility in decision making (Seward 1975) (Ivesetal, 1983).

3.6.3 Implications in the Design of the Ward Nursing Evaluation

In terms of the classification of evaluation approaches identified in the previous paragraphs, the following approaches were considered to be appropriate for the ward nursing evaluation:

Approach	Type
Cost benefit analysis - summative	Objective
Performance measures - summative	
User attitude survey - summative and formative	Subjective

Fig. 7 Appropriate Evaluation Approaches

3.6.4 Objective Criteria

Performance Measures

Objective criteria to determine system effectiveness, which can be related to performance measures both 'before' and 'after' the ward nursing system has been implemented, need to be identified. It was considered that at least 6 months data was required for each of the experimental periods. From discussions with the nurse managers at the trial sites, criteria were identified which could be measured, especially from existing manual records. The incidence of pressure sores, hospital acquired infection levels and patient complaints were considered as suitable measures to identify improved patient care but it was found that records were not in sufficient detail to provide reasonable performance measures. The criteria which were finally used to assess the system are described in the following table, together with the appropriate

performance measures.

Criteria	Performance Measures	Null Hypotheses
1. Improved balance of nurses to patients' dependency at ward level.	1. Dependency information to determine workload in the 'after' situation. Bed occupancy figures will be weighted in the 'before' situation to reflect workload. 2. Staffing hours adjusted for absence and deployment.	Difference between workload and staffing figures have occurred by chance. Information will be analysed and tested at the 95% confidence limit.
2. Improved planning of the "off duty" rotas.	1. Dependency information analysed by particular day of the week. 2. Planned staffing hours particular day of the week.	Difference between workload and planned staffing figures by day of the week have occurred by chance; statistical tests at the 95% confidence limit.
3. Improved staff morale.	1. Sickness rate by ward.	Differences in rates between before-and-after situations have occurred by chance, using statistical tests at the 95% confidence limit.
4. Reduction of unplanned decisions for resource allocation.	1. Resource allocation decisions made (categorised as "planned" and "unplanned" decisions) by nursing officers and ward sisters, obtained from a sample period both before-and-after the system intervention	Any change in types of decisions made is due to chance using statistical tests at the 95% confidence limit.

Fig. 8 Objective Criteria on which to Determine Systems Effectiveness

Cost Benefit Analysis

The costs of the system operations can be identified under the following headings:

Capital costs	- hardware (central processing unit)
	- disc storage
	- archiving routines
	- terminal/printers
Running costs	- computer paper etc.
Data input costs	- ward staff
	- management

3.6.5 Subjective Assessment

User Attitude Survey

A user survey was undertaken at the end of the experimental period to consider not only the outputs but also the quality characteristics of the system, including the following:

Confidence in the system
Timeliness of output information
Perceived utility (worth versus cost)
Users understanding of the system
Currency (up to dateness) of information
Reliability of output information
Format of output
Response/turnround time
Convenience of access (to utilise the computer capability)
Relevance of the output information (to intended function)
Documentation
Flexibility of the system

An independent assessment of the system's effectiveness was also undertaken at each of the pilot districts by an expert panel. The composition of this panel included a senior nurse manager, a clinician and a senior nurse in the education field. These people were selected for their eminence and professional standing in the District.

3.6.6 Study Design

The essential features of the study were to collect the following data items by each pilot ward for six months before and after the implementation of the computerised ward nursing system:

Bed occupancy figures	)
Required staff hours	) collected on a
Planned staff hours	) daily basis
Worked staff hours	)
Sick hours	)

These data items were readily obtained from the ward nursing system after its implementation. However, before this implementation, the data needed to be collected from a number of manual records. With regard to the "required staff hours" figures, this information was not available from existing information systems in either of the pilot districts. It was proposed to identify the required staff hours from the ward nursing system, and undertake a regression analysis, to calculate estimated 'required staff hours' related to bed occupancy figures collected for six months previous to the

implementation of the ward nursing system.

CHAPTER 4 EVALUATION OF THE DECISION SUPPORT SYSTEM

4.1 INTRODUCTION

An evaluation study was undertaken of a ward nursing system to determine whether benefits accrue from its use. The research methodology used has been described in Chapter 3.

A number of different ward nursing systems could have been used to undertake the research experiment, but the researcher had access to the Financial Information Project's ward nursing system (Financial Information Project 1986) as described in Appendix 1, which had been installed in many hospital sites throughout the NHS. Because of the number of sites that had or were in the process of implementing the system, all the stages of the main study, could be undertaken where this system was or would be in operational use.

Two districts agreed to undertake the evaluation trial. Three wards (surgical, medical and gynaecology) were included in this trial within a general hospital from each District, which will be called hospitals A and B.

The evaluation period for the ward nursing system covered the time that the system was operational on the pilot wards. Data was collected for six months before the trial commenced as a reference period to enable results to be compared.

In hospital A, the six month trial started in May 1986, whereas hospital B commenced this trial period in July 1986. Steering

groups were set up in both of the pilot districts to agree and monitor the evaluation programme. A research nurse was identified for each District who received the initial training and she then proceeded to train ward staff, using the computer terminal on their ward. Approximately one hour was undertaken with each nurse to complete this training.

This system's activity profiles were set up in conjunction with the ward sisters to reflect the care standards relevant to their specialty and ward. The research nurses in both sites co-ordinated and monitored this standard setting exercise and ad hoc timing studies, which were required for certain nursing activities. Adjustments were made to the activity profiles after the system had been running for a period of time - Hospital A increased the allowance for unpredictable events in their calculations, whereas Hospital B reduced times within their profiles.

Information about the pilot wards for the six month period before the system was implemented, was obtained manually from a number of sources e.g. Patient Administration System, bed state figures and ward sick returns to payroll. After the system was implemented, these data items were available automatically from the ward nursing system.

On implementation of the system, patients' nursing care requirements were assessed each day of the trial period on the pilot wards and input to the system. All nurses working on these wards were registered to the system, to enable off duty rotas to be input in order to provide planned staff hours which

could be compared with the daily required nurse hours.

4.2 RESULTS OF THE EVALUATION TRIAL

4.2.1 Objective Criteria

Analysis of Required and Available Staff Hours

The following paragraphs describe the approaches adopted, the limitations on using the results obtained and the analysis undertaken to determine performance measures which assessed, on an objective basis, the effectiveness of the system. The costs and benefits (or potential benefits) of the ward nursing system have also been considered to provide an additional objective assessment.

Data was collected on a daily basis for the following time periods:

Site	Period	Dates
Hospital A	Prior to implementation	1/10/85-31/3/86
	After implementation	1/4/86-30/9/86
Hospital B	Prior to implementation	1/11/85-30/4/86
	After implementation	1/7/86-31/12/86

Fig. 9 Time Periods for Data Collection

Using regression analysis, regression equations were calculated for each day of the week for the pilot wards, where the independent variable (x) was occupied beds and the dependent variable (y) was the required hours. This analysis relates to the period before implementation as shown in the following tables:

Ward	Day of Week	Regression Equation	Correlation Coefficient
Surgical	Monday	Y = 1.21X + 36.81	Ø.592
	Tuesday	Y = 2.23X + 16.37	Ø.72Ø
	Wednesday	Y = 1.8X + 26.36	Ø.551
	Thursday	Y = 2.ØX + 24.Ø	Ø.681
	Friday	Y = 1.22X + 4Ø.Ø	Ø.328
	Saturday	Y = 1.99X + 15.75	Ø.795
	Sunday	Y = 1.75X + 21.82	Ø.8Ø3
Medical	Monday	Y = 1.6ØX + 3Ø.35	Ø.5Ø9
	Tuesday	Y = 2.49X + 9.34	Ø.7Ø4
	Wednesday	Y = 1.17X + 39.99	Ø.478
	Thursday	Y = 2.72X + 6.Ø	Ø.638
	Friday	Y = 1.83X + 24.23	Ø.698
	Saturday	Y = 1.88X + 21.92	Ø.817
	Sunday	Y = 1.38X + 33.36	Ø.457
Gynaecology	Monday	Y = 2.37X + 16.29	Ø.8Ø2
	Tuesday	Y = 2.5ØX + 12.72	Ø.82Ø
	Wednesday	Y = 2.15X + 26.17	Ø.715
	Thursday	Y = 2.64X + 25.Ø9	Ø.569
	Friday	Y = 2.22X + 25.Ø8	Ø.42Ø
	Saturday	Y = 2.24X + 12.26	Ø.764
	Sunday	Y = 1.78X + 2Ø.25	Ø.7ØØ

Table 1Ø. Hospital A's Regression Analysis

Ward	Day of Week	Regression Equation	Correlation Coefficient
Surgical	Monday	Y = 4.Ø9X + 9.85	Ø.829
	Tuesday	Y = 5.59X + 16.1	Ø.836
	Wednesday	Y = 5.79X + 21.68	Ø.785
	Thursday	Y = 4.44X + 1Ø.53	Ø.79Ø
	Friday	Y = 4.87X + 2.Ø9	Ø.84Ø
	Saturday	Y = 4.54X + 1.99	Ø.799
	Sunday	Y = 4.35X + 1.3	Ø.91Ø
Medical	Monday	Y = 3.32X + 12.88	Ø.776
	Tuesday	Y = 2.72X + 25.6	Ø.739
	Wednesday	Y = 2.22X + 34.2	Ø.755
	Thursday	Y = 2.77X + 22.4	Ø.846
	Friday	Y = 2.64X + 27.32	Ø.732
	Saturday	Y = 1.37X + 54.7	Ø.496
	Sunday	Y = 3.34X + 9.Ø	Ø.798
Gynaecology	Monday	Y = 2.ØX + 35.73	Ø.389
	Tuesday	Y = 1.5X + 26.23	Ø.56Ø
	Wednesday	Y = 1.68X + 17.49	Ø.7Ø5
	Thursday	Y = 1.31X + 45.45	Ø.314
	Friday	Y = 1.76X + 16.6	Ø.725
	Saturday	Y = 1.67X + 17.59	Ø.743
	Sunday	Y = 2.9X + 3.37	Ø.567

Table 11. Hospital B's Regression Analysis

The regression equations shown in the above tables indicate the 'straight line' relationship between required hours and number of occupied beds. The coefficient of correlation represents the strength of this relationship. This coefficient is measured on a scale that varies from +1 through Ø to -1. Complete correlation between two variables is expressed by 1 or -1, depending on the direction of the regression line, whereas complete absence of correlation is represented by Ø.

Using these equations, and the bed figures already obtained during the period prior to implementation, the required hours were estimated for this time period for each of the pilot wards. However, it can be seen from the coefficients of correlation shown in tables 1Ø and 11, that there is a low correlation, for certain days of the week on the pilot wards. Therefore, it would not be valid to base further statistical analysis on these results.

The required null hypotheses stated that the differences between the required and available staff hours occurred by chance and the 'before' and 'after' periods would be compared using this hypothesis. As the analysis relating to the 'before' period would provide an unreliable basis for further analysis, it was decided to examine the trial period, after the system was implemented in more detail. Four 2 week samples were identified at regular intervals during this 'after' period, as a way of testing the original null hypothesis, which would now be modified to state that differences in the means (calculated from differences between required and available staff hours in the sample periods) occurred by chance. The

appropriate statistical technique to test the differences between the means of a number of samples is the one-way analysis of variance (ANOVA) (Hamburg 1974).

The following results were obtained from the ANOVA calculation (at 95% confidence limits).

Hospital	F Statistic	Critical Value	Significant (S) Not Significant (NS)
Hospital A			
Surgical	3.644	4.Ø4	NS
Medical	7.4Ø8	4.Ø4	S
Gynaecology	1Ø.473	4.Ø4	S
Hospital B			
Surgical	7.637	4.184	S
Medical	5.557	4.184	S
Gynaecology	4.757	4.184	S

Table 12. Results of ANOVA Calculation

The critical value in the above table indicates the point above which the chances of occurrence of values are 5% or less. The F statistic is the value calculated for each ward. It can be seen that these F statistics are higher than the critical value on all wards except the surgical ward at Hospital A, i.e. there are significant differences between the sample means on these wards and the null hypothesis is rejected, that these differences have occurred by chance. From inspection of the analysis, the means are reducing in size, rather than increasing which would support the premise that there is an improved balance of nurses to patients' dependency on these wards.

Comparison of Sick Rates

The total sick hours recorded in both the periods 'before' and 'after' implementation of the ward nursing system are shown in the following table.

Hospital	'Before' reference period, sick hours	'After' trial period, sick hours	Difference Hours
Hospital A	(1/10/85-31/3/86)	(1/4/86-30/9/86)	
Surgical	156	276	+120
Medical	661	275	-386
Gynaecology	943	650	-293
Total	1760	1201	-559
Hospital B	(1/11/85-30/4/86)	(1/7/86-31/12/86)	
Surgical	605	534	-71
Medical	515	269	-246
Gynaecology	289	238	-61
Total	1409	1041	-378

Table 13. Comparison of Sick Rates

The nurse managers at both trial hospitals were not aware of any extraneous factors, such as an epidemic of influenza, which could have effected the sickness rates identified in table 13. There would appear to be a considerable reduction (on average, approximately 30%) in sick rates between the sample periods, although the surgical ward at Hospital A showed an increase in the sick rate relating to the ward.

Use of Decision Diaries to Identify Decision Making on the Pilot Wards

To obtain a better understanding of the type of decisions made

on staff deployment within a department in a hospital, daily diaries were kept, of the problems encountered and the solutions chosen in the surgical unit at Hospital A. During a 40 day sample period (10/5/86 - 17/6/86), a total of 65 decisions were taken on staff deployment within this unit. A breakdown of the problems which occurred and the chosen solution is contained in the following table.

Problem	Solution	% (no.) of Decisions	
Staff Sickness	Redeployment of staff	(26) 40%	61.5%
	Employment of bank nurse	(11) 16.9%	
	No action taken	(2) 3.1%	
	Split duties	(1) 1.5%	
Staff Absence	No action taken	(1) 1.5%	
Escort Duties	Redeployment of staff	(2) 3.1%	
Ward Suddenly Busy	Redeployment of staff	(2) 3.1%	4.6%
	Employment of agency nurses	(1) 1.5%	
Insufficient Staff due to poorly designed rota	Redeployment of staff	(2) 3.1%	
Insufficient Staff due to heavy workload	Redeployment of staff	(12) 18.5%	26.4%
	Employment of bank nurses	(5) 7.7%	
	TOTAL	(65) 100%	

Table 14. Breakdown of Decisions Made for Staff Deployment in the Surgical Unit at Hospital A

The majority of the staffing problems which arose on this unit were due to unforeseen staff sickness. Redeployment of staff between wards in the unit was the chosen solution for 68% of the problems which occurred. These results reinforce the need for a system which can analyse the incidence of sickness on their wards. The system also needs to provide information to support the manager in deciding which wards require additional

staff as opposed to those wards which can manage with their available staff.

Although the decision diaries collected at Hospital A were helpful in obtaining an overall picture of management decision making, a more detailed exercise was required at the ward sister level to classify all decisions relating to the management of her ward, both 'before' and 'after' the intervention of the ward nursing system. The ward sister responsible for the pilot surgical ward at Hospital B agreed to complete a more detailed daily diary in order to obtain descriptions of management decisions taken and also to determine whether significant changes were observed in the distribution of decisions made 'before' and 'after' the implementation of the system. The decisions would be classified into time periods (time horizons) within which the resulting actions would be completed. It would be expected that more planned decisions would be taken with the advantage of additional information from the ward nursing system. More decisions therefore would be classified into the longer time periods.

A daily diary was designed for the ward sister with the following headings:

- Date
- Time
- Problems requiring action
- Objective resources consideration
- Subjective resources consideration

- Decision

- Rationale (if any)

No classifications were provided and the sister was asked to complete textual descriptions under each of the above headings.

The sister completed this daily diary in March 1986 (n=24 days) and the second sample period in November 1986 (n=2Ø days), after the ward nursing system had been installed for a period of six months.

From an analysis of these decision diaries, the following classification of decisions was identified (see Fig. 1Ø).

Decision Area	Descriptions
Workload	Workload priorities due to imbalance between staff hours and dependency of patients.
Staff Allocation	Relating to planning, making changes to the ward off-duty rotas and deployment of staff between wards.
Bed Allocation	Relating to patient admissions and beds allocated on the ward.
Personal - Staff	Personal problems, relating to ward staff (including those officers, auxiliary staff etc.) which effect staff arrangements and standards of care.
Staff Appointment	Nursing appointments which effect the staffing levels on the ward.
Administration	Problems relating to the effective management of the ward.

Fig. 1Ø Classification of Management Decisions Taken by a Ward Sister

A statistical analysis using the Chi-squared distribution was undertaken to test the null hypothesis that there were no significant differences between the two sample periods within which the decision diaries were completed. (Sample 1 represents the 'before' period in March 1986 and sample 2 shows the results for November 1986 which is the 'after' period - as shown in Appendix 4).

On completion of this statistical test, it was found that the results were significant at the 5% probability level, i.e. the value had 1 in 2Ø chance of occurring, and the null hypothesis was rejected that any differences between the samples occurred by chance. Appendix 4 shows this calculation in detail.

A major change which occurred in the pattern of decision making between the sample periods, occurred in the Decision Area - bed allocation. Nearly 1Ø% of the sister's decisions were in this area during March 1986, whereas in the second sample period no decisions were made relating to bed allocation. The sister has subsequently commented that negotiations had taken place with the consultant on her ward, to reduce bed allocations and therefore alleviate the problems which were occurring, when beds were not available for planned admissions.

Therefore the statistical test was repeated excluding these decisions and the results were not significant. In both of the samples, 'workload prioritising' took up the major time in decision making. There was no evidence to suggest that more 'planned' decisions had been taken as a result of improved information being available from the ward nursing system during

the sample period. Both the ward sister and her nursing officer considered that crisis management was inevitable, due to the levels of available staff during the sample periods and the high dependency of patients on the ward. As the system was implemented only in three wards within the hospital, the nurse manager found it difficult to justify redeploying the staff just to the surgical ward, especially as other ward sisters were making similar comments that they had understaffing problems, using their professional judgement. It appears from this study, that information from the system can only be used effectively when it has been implemented on all the wards in a hospital.

Costs and Benefits - Ward Nursing System

The identified costs of setting up and running the system are detailed as follows (where staff time has been identified, this has been used as a proxy for the costs involved):

Capital Costs

Hardware - In the trial hospitals, the system's software was loaded to an existing computer which was installed to run the patient administration system (PAS), PDP 11/84 mini computer operating under Digital Standard Mumps (DSM). Although there were terminals (VT2ØØ) already on the trial wards, printers (LA2ØØ) were attached to these terminals on each of these wards as a result of undertaking the trial. In addition, a terminal and printer were subsequently located in the central nursing office at Hospital A.

Disk Storage - It has been identified that 1 megabyte of disk storage per ward per 12 months is required to store data from the system.

Setting up the system - An implementation service can be obtained from regional management services departments or a commercial company which has obtained the appropriate commercial licence to implement the ward nursing system. A local projects nurse should be appointed on a full time basis for at least six months to support the implementation and train the nurses in using the system.

In Total - Capital costs would be approximately £5Ø,ØØØ for a 1Ø ward/3ØØ bed hospital, where no suitable hardware is currently available. (At 1986 prices).

Running Costs

Software Maintenance and Support - This service can be obtained from an approved commercial company or the management services department.

Data Input - It is estimated that approximately one minute of nurse time is required to input daily each patient assessment. Up to 15 minutes per week is required by the ward sister to input the off duty rota to the computer and approximately 45 minutes per week is needed by the nursing officer to input adjustments for sickness and deployment of her staff to the system. Other sites have employed 15 hours per week clerical

time to input these adjustments.

Continuing Staff Training - A senior nurse needs to be responsible for the co-ordination of training new staff to the wards and ensuring that the system is updated to reflect changes in care standards and nursing policies. Up to 1Ø hours per week could be required to undertake these duties in a medium sized hospital.

In Total - Revenue costs should be approximately £9,ØØØ per annum for a 1Ø ward/3ØØ bed hospital. (At 1986 prices).

Benefits from the System

The benefits realised from the system are more difficult to quantify especially as the system was not implemented in all wards within a hospital unit. From this evaluation trial the following benefits or potential benefits have been identified.

Improved Staff Morale - more effective day to day deployment of staff to the areas of greatest need.

Nursing Administration - provision of sick returns etc. should provide a net saving of time in undertaking these administrative duties.

Care Plans - if plans produced from the system are used time could be saved compared to completing the plans manually.

Improved Off Duty Rota - a better balance has been achieved in 5 of the trial wards between staffing and the dependency of patients.

Identification of non-essential technical procedures - results from Hospital B indicated that up to 50% of routine observations were not essential to provide adequate standards of care.

Costing Reports - a range of costing reports can be obtained as a by-product from the system.

The expert panel from Hospital B has considered the potential value of each report from the system and this detailed evaluation is contained in Appendix 5.

4.2.2 Using Subjective Measures

These measures attempt to evaluate the subjective perceptions of the system's effectiveness. A questionnaire was designed to consider the effectiveness of the system from both the 'outcome' and 'process' perspectives. The results of the questionaire are detailed in the following paragraphs, together with reports from expert panels to provide independent subjective assessments of the ward nursing systems.

Ward Nursing Evaluation Questionnaire

At the end of the trial period for the ward nursing system, at both trial hospitals, qualified and unqualified nurses who

worked on the trial wards during this period were requested to complete a questionnaire concerning their involvement and views about the ward nursing system. In addition, nurse managers who were responsible for implementing and running the system were also requested to answer this questionnaire. The sample size of nurses completing this questionnaire totalled 45 nurses (25 in Hospital A and 2Ø in Hospital B).

The questions asked and results together with comments, where appropriate, are shown in the following paragraphs. (A summary of the questionnaire results in shown in Appendix 6).

1. *Did you receive any training in how to use the ward nursing computer system?*

Hospital	Yes (%)	No (%)
Hospital A	96	4
Hospital B	1ØØ	-
Total	99	1

2. *Did the system's documentation help you to understand how it works?*

Hospital	Yes (%)	No (%)
Hospital A	8Ø	2Ø
Hospital B	7Ø	3Ø
Total	76	24

3. *Did you find it easy or difficult to use the computer terminal?*

Hospital	Yes (%)	No (%)
Hospital A	8Ø	2Ø
Hospital B	8Ø	2Ø
Total	8Ø	2Ø

Comment - The high proportion of nursing staff who felt they could operate the computer terminal was probably due to the training already received in transferring and discharging patients on the PAS using ward based terminals.

4. *Did you find it easy or difficult to get the part of the ward nursing computer system, which you wished to use, e.g. to assess the patient?*

Hospital	Yes (%)	No (%)
Hospital A	84	16
Hospital B	8Ø	2Ø
Total	82	18

Comment - a similar percentage of staff to the previous question had little difficulty in accessing the relevant part of the system.

5. *On reflection, do you think that more training would have helped you in using the ward nursing computer system?*

Hospital	Yes (%)	No (%)
Hospital A	6Ø	4Ø
Hospital B	95	5
Total	71	29

6. *Have you seen any outputs from the system?*

Hospital	Yes (%)	No (%)
Hospital A	96	4
Hospital B	7Ø	3Ø
Total	85	15

Comment - Within the sample, 37% of staff nurses and 57% of SEN's at Hospital B on the pilot wards had not seen any outputs from the system.

7. *If your answer is yes to question 6, were you able to understand what these outputs meant?*

Hospital	Yes (%)	No (%)
Hospital A	8Ø	2Ø
Hospital B	75	25
Total	77	23

Comment - On average, between the hospitals, over 25% of the staff nurses and 5Ø% of the SEN's, did not understand the outputs they had seen. Further training is required in the understanding and interpretation of information from the system.

8. *If your answer is yes to question 6, tick one or more of the following boxes to describe how this information could be useful in your opinion.*

	Hospital A (%)	Hospital B (%)	Total (%)
Day to day staffing problems	8Ø	76	79
Better planning of the off duty rota	76	Ø	43
Helpful in longer term planning of numbers of nurses required	58	76	65
Useful to plan patient care	54	54	54
of numbers of nurses required	58	76	65

Comment - The majority of staff considered that the main benefits of the system related to the day to day staffing problems. Although Hospital A's staff considered that information from the system could be useful in planning the off duty rota, not one nurse in the Hospital B's sample agreed. The perception could be due to the apparent shortage of staff in the hospital resulting in no

flexibility in the staff available to support reliable planning of the off duty rota, irrespective of the available information. It was also noticeable that the nursing officers and ward sisters in both hospitals could see the benefits of the system for longer term planning whereas staff nurses and SEN's were less convinced about these particular benefits.

9. *Do you think that your hospital should continue to use the ward nursing computer system?*

Hospital	Yes (%)	No (%)
Hospital A	83	17
Hospital B	85	15
Total	84	16

Comment - The majority of staff who answered 'no' to this question were staff nurses. Of these 5 staff, one was night staff and two nurses commented that they "didn't understand the outputs".

Nurses were then invited to make comments about their replies to question 9. For those who considered that the hospital should continue to use the system, the following comments were typical:

"A very valuable information system that helps in manpower planning" (Nursing Officer).

"It will be more useful when a whole unit i.e. all of surgery or medical wards are using it for it to be of more value to each ward" (Sister).

"I think it has enormous potential and would serve as both a useful tool at both management and ward level" (Sister).

"In the end, it will be a fairer way of staff deployment"

(SRN).

> "If only to prove how poorly staffed we are, and to prove how much pressure we have, to the people concerned, who need to prove it in black and white" (SEN Hospital B).

In general the comments were different from the two sites; Hospital A's staff considered that at least a unit and preferably the whole hospital should be on the system before the full benefits of the system could be realised. Hospital B's staff, however, felt that the system proved that the wards were inadequately staffed but that no-one was taking action to remedy the situation and the system was therefore not helping to change the situation.

Typical comments received from those staff who replied "no" to question 9 were:

> "It seems a waste of time because it will never be accepted, nurses just haven't got time to play with computers". (SRN, Night duty).
>
> "Takes too much time". (SRN)
>
> "I feel that the time we spent feeding information into the computer was very time-consuming and didn't really improve conditions for the patients or nursing staff. We have gained no more staff, although personally I feel we should because of our staffing levels, especially with the high dependency of our patients". (SRN)

In addition the following comment was received from a night sister, Hospital B.

> "Cannot answer questions 4-9. It is totally irrelevant to me as I have had no information re assessing patients etc.".

Questions 1Ø-14 were only answered by Nursing Officers and Ward Sisters.

1Ø. *Did you participate in setting up the system?*

Hospital	Yes (%)	No (%)
Hospital A	100	0
Hospital B	50	50
Total	78	22

Comment - It would be expected that all nursing officers and ward sisters responsible for the pilot wards would be involved in setting up the system.

11. Does the information from the system effect the standards of care on your ward/unit?

Hospital	Yes (%)	No (%)
Hospital A	50	50
Hospital B	25	75
Total	40	60

Comment - As the system is based on the standards of care identified on ech pilot ward; care plans and patient care audits can be obtained as outputs from the system, the responses may indicate a lack of understanding of the clinical benefits which are available.

12. *Do you believe that the "required staff hours" figures on the Daily Workload print were accurate for your ward/unit?*

Hospital	Yes (%)	No (%)
Hospital A	57	43
Hospital B	100	-
Total	73	27

Comment - The success of the system depends on credible information being obtained. There was a lack of credibility with the Daily Workload print especially with 2 of the ward sisters at Hospital A, even though the required staff hours had increased as a result of studies undertaken partway though the trial at this hospital.

Hospital B's staff considered that the system substantiated their own view that they were significantly understaffed.

13. *Which type of output did you prefer from the system?*

Type of Outputs	Hospital A (%)	Hospital B (%)	Total (%)
Tabular outputs	5Ø	6Ø	55
Graphical outputs	5Ø	4Ø	45

Comment - It was expected, from previous studies, that a preference would be shown for graphical outputs.

14. *The following objectives were set for the ward nursing system. Can you tick the objectives, that you think have been met during the total period?*

	Hospital A (%)	Hospital B (%)	Total (%)
To identify the daily workload variation within each ward/ unit	7Ø	1ØØ	82
To estimate the staffing levels required to manage the workload on each ward/unit	7Ø	1ØØ	82
To develop a flexible system which can enable the local manager to react to manpower demand and changes in local circumstances	57	75	64
To provide information and analysis of workload which can be used to forecast likely demands upon nursing time on ward/unit	7Ø	75	64
To provide a system which can be developed to monitor standards of nursing care	43	1ØØ	64

Comment - The majority of staff considered that the initial two objectives had been met relating to staff deployment and establishment calculations. Views were mixed on the remaining three objectives, the largest difference of opinion being expressed on the clinical benefits of the system identified in the last objective.

Report from the Panel of Experts - Hospital A

In summary, the expert panel considered that they could only usefully comment about the potential value of the system, which will not be fully realised until this system is operating at least in one department within the hospital. The departmental manager would then be able to consider the ward manpower reports at the commencement of the day shifts and adjust staffing levels as necessary throughout the department.

The panel considered that further work should be undertaken to enable an off duty rota to be created according to agreed rules. The necessity for staffing adjustments could then be reduced, but not eliminated, due to the incidence of emergency admissions.

Useful information could be obtained from the system with regard to manpower absence reports. By analysing this information, better planning should be possible, as annual leave and bank holidays can be adjusted to ensure improved cover.

Care plans produced by the system could be used as a basis for

identifying the care required by individual patients. The panel felt that these plans could be used, in addition, as a quality assurance tool to audit the level and quality of care given and by whom.

The report summarises the panel's opinion as follows:

> "The system will give useful information in order to plan ahead in a more realistic way and ensure that the workload is spread as evenly as possible. Consultants may learn a great deal about dependency and the amount of basic and technical care generated by individual patients. The goal should be to achieve a high standard of care which is as cost effective as possible. The system should help the formulation of a multi-disciplinary operational policy for the ward, which can deal with unpredictable as well as predictable activities within the ward".

The complete report from Hospital A's panel of experts is contained in Appendix 7.

Report from the panel of experts - Hospital B

The overall conclusion of the expert panel from Hospital B was that although the ward nursing system was timeconsuming to set up and implement it was a worthwhile venture which allowed an accurate estimation of nursing hours required in relation to patient care - the original reason for participating in the study.

The system has also been useful as an aid to teaching learners, making available manpower absence reports and provides an explicit means of identifying standards of patient care and optimising these care standards.

The report recommends that the ward nursing system is implemented throughout the hospital to take advantage of the total potential of the system. The complete report is detailed in Appendix 5 and contains a useful evaluation of each output from the system.

4.3 DISCUSSION AND CONCLUSIONS

4.3.1 Standards of Care

The ward nursing system provides a framework within which patients' nursing care requirements can be defined together with the nursing time taken, the skill levels of nurses who can complete these activities and the prescribed frequencies that they should be undertaken. Therefore, nurses can input their professional judgements and values to the system to reflect the appropriate standards of care for their wards and hospital.

There were significant differences between Hospitals A and B in the standards of care prescribed for the same specialties, especially for technical procedures. Even when the standards of care had been adjusted after the system had been running for a period of time - Hospital A increased the required hours per patient by identifying unpredictable activities, Hospital B reduced their required hours figures - these significant differences remained.

Staff hours were not available to deliver the prescribed standards of care at Hospital B whereas Hospital A had more than adequate staffing levels to meet the standards of care

that they had identified. The analysis from the decision diary completed at Hospital B supports the premise that available staffing hours were inadequate and that crisis management would inevitably result. Consideration of the care received by patients as a result of the differing care standards between the trial hospitals was not feasible and reinforces the need for properly researched and validated outcome measures.

The underlying questions which result from this evaluation study are "Who sets the care standards?", and "irrespective of the points of access to the health service, should patients with similar conditions expect the same standards of care?".

4.3.2 Setting up the System and Training of Staff

From the previous discussion, it can be seen that the crucial step in setting up the system is the identification of realistic care standards and to make these professional judgements and values explicit within the system. From the evaluation, both the pilot hospitals had difficulty in this process and made significant changes after the system had been operational for a couple of months.

Both pilot sites underestimated the training requirements of the ward staff. Training was required, not just in understanding which keys to press on the computer terminal, but how the system produced the nursing hours required for different types of patients on their wards. A majority of nurses in the questionnaire survey considered that they required more training in using and understanding the system.

In evaluating the system from a 'process' or 'means' viewpoint, standards of care were identified within the system for the three major specialties - general surgery, medical and gynaecology, and the system was flexible enough to allow changes to be made and assessment information to be recalculated, to reflect more accurately prescribed care standards in each hospital.

4.3.3 Role of Nurse Managers

In discussing results and analyses from the system with managers from both hospital sites, a common view expressed was the requirement for "a change in the management thinking". With this system, an opportunity arises to review the role of managers in order to reduce the routine administration duties and concentrate more on monitoring care standards and longer term planning of patient care in conjunction with clinicians (expert panel's report from Hospital A).

It became evident, after the system had been operational for six months, that a valuable data base of patient information was available, which could provide the managers with useful information. At this stage, further training was required to assist these managers in the interpretation process,as they expressed concern in undertaking the necessary further analysis of this information.

From this evaluation study, it can be seen that a cultural change is needed in the use of this type of detailed patient information, by managers, to enable the data to be used to

provide a sound base for planning and setting objectives within the management review process.

4.3.4 Systems Integration

To reduce the duplication of inputting the same data to different computerised systems, it is essential that the ward nursing system is integrated with the local Patient Administration System (PAS) if such a system has been installed. Patient registration details can be input to the ward nursing system if it is used as a 'stand alone' system. Both trial hospitals had implemented the Trent PAS, which allowed access of patient registration and location details to be down loaded to the nursing system. If the system is to be successfully integrated in the longer term, linkages need to be established with the District personnel/manpower system and payroll. At present, absence reports and manpower reports can be obtained as print outs from the system.

The system must also integrate in an operational sense, otherwise this system will be seen as a peripheral part of the real business of running a ward. Until the system is used automatically as an important daily procedure to provide patient care, its usefulness will decay and it will eventually not be used. From the evaluation trial, staff expectations as well as their managers should be met, where possible, by using the system. Nurse managers should be seen to respond to the information collected by the staff to reinforce the credibility of the system.

4.3.5 Using the System

The evaluation trial also focused on 'outcome' or 'ends' and attempted to delineate between objective and subjective criteria in considering the effectiveness of the system.

From a subjective viewpoint, 84% of the nursing staff who completed the evaluation questionnaire, considered that their hospital should continue to use the ward nursing system. To evaluate fully the benefits that would accrue from the system, these staff felt that at least a complete unit, within a hospital should be using it. On reflection, this point is a valid criticism of the study design, which places certain limitations on the management decisions that can be made when only one ward is using the system within a unit. The expert panel from Hospital A endorsed this view, that the departmental manager would then be able to deploy staff, using the system, throughout the unit.

In discussions with nurse managers from the trial hospitals, the following information which can be obtained from the system, offers potential benefits;

1. *Facility to undertake clinical audits*

   Individual patient audit forms allow both the ward staff and an independent assessor if required, to audit the care received by patients in comparison with the care prescribed. The audit report shows the basic and

technical care prescribed as a result of the standards of care set within the system. Both hospitals have used these care audits to monitor care standards on the pilot wards, on an ad hoc basis.

2. *Manpower reports - daily and monthly summaries*

Daily manpower reports are used by ward sisters and their managers to identify surpluses or deficiencies in staff on their ward and assist in making decisions on deploying staff. Within the constraint that comparable information is not available for other wards, a better understanding has been obtained of the day-to-day staffing problems and deployment has taken place as a result of these reports being available. From the monthly reports, an overall requirement can be assessed of the wards' staffing requirements. This information should assist in improved planning of the off-duty rotas with reduced surpluses and deficiencies of staffing in comparison with the dependency of the patients.

3. *Absence Reports*

As a result of inputting data concerning planned and unplanned absences to the system, to provide the manpower reports, sick returns (to payroll) and absence analyses, can be obtained as by-products from the system. Administration time should be saved in the production of these sick returns, together with payroll documentation. Improved planning to provide adequate sickness cover

should result in using the absence analyses to identify absence trends across staff grades.

4. *Provision of individual patient's data base*

This data base has already proved useful in identifying that approximately 3Ø% of technical procedures prescribed are routine TPRs and BPs. Hospital B's nursing manager considers that significant savings in staff time can be effected by examining more critically individual patients' requirements for these routine technical activities. This patient information can also be aggregated by clinician, to plan future ward staffing requirements, especially if there is a significant change in consultant workloads. The system provides a mechanism for nurses and clinicians to plan together to ensure that patients receive adequate standards of care.

From the evidence of the performance measures, the difference between 'required hours' and 'staff hours worked' has significantly reduced on 5 of the pilot wards, during the trial period. In discussions with nurse managers and sisters, there were no extraneous factors that could explain these changes, other than these managers had an improved day to day knowledge of the ward's staffing requirements from the system which assisted them in the deployment of staff on these wards.

There was a considerable reduction in the rates of sickness during the trial period on 5 of the pilot wards. The nurse managers also commented that no factors, such as influenza

epidemics, had influenced these rates. A reasonable conclusion to draw is that staff's morale has improved as better balances have been achieved between staff availability and patient dependency.

Another aspect of the objective criteria was to identify types of decisions that were made by nursing officers and ward sisters in the management of the wards. An increase in 'planned' decisions may result from an improved data base of manpower information. The initial diary exercise undertaken in Hospital A indicated that the majority of day-to-day staffing problems arose from unplanned staff sickness. Improved planning to provide adequate staffing cover for absences should reduce these problems. However, the more detailed decision diary study carried out at Hospital B showed that when staffing levels reach a critical level it is not possible to increase the number of 'planned' decisions and the ward sister and her manager have to react to daily problems as they occur.

4.3.6 Conclusions

In determining the effectiveness of the ward nursing system, this study has evaluated the system in terms of process (or means) and outcome (or ends). With regard to the former criteria, it has been shown that this system can be used to define explicitly care standards based on nurses' professional judgements. The flexibility of the system has been demonstrated, due to the changes which were made to the care profiles, by both the trial hospitals. The important lesson which has been learnt from this study is that nurses have not

had to identify in detail, in the past, the procedures and activities that they normally undertake as a part of their professional duties. Realistic standards of care need to be carefully defined by ward sisters with their nurse managers, within the framework of any existing District policies. This exercise could then form the basis of detailed discussions on comprehensive policies regarding standards of care.

The criteria for the effectiveness of the system, relating to outcome (or ends), relied on objective and subjective measures. The results from the questionnaire, completed by the participating nurses indicated that the majority of these nurses supported the continuation of the system, although the usefulness of the system was perceived in terms of potential benefits which could be realised when this system was implemented throughout the hospital. The reports from the 'expert' panels also considered the potential value of the system, especially in providing information to support a multi-disciplinary approach in the planning of ward staffing requirements. Performance measures were identified to provide the objective criteria. The results from the statistical analyses completed, using these measures, indicated that there were significant changes during the trial period. These changes probably occurred as a result of the additional information which was available to the nurse manager responsible for the trial periods.

CHAPTER 5 CALCULATION AND VALIDATION OF THE 'DIFFICULTY FACTORS' INDEX

5.1 INTRODUCTION

A study was undertaken in hospitals in a Northern Authority to calculate and validate the 'difficulty factors' index on the hospitals' wards, particularly in the district general hospital. The design and construction of the index has been discussed in chapter 3. The purpose of this study was to provide a valid measuring instrument to be used in the research experiment described in Chapter 6.

Information was obtained from the patient administration system and the ward nursing system (Financial Information Project 1986) during April/May 1989 to calculate the index and rank the wards in the hospitals in order of magnitude of the calculated indexes. The ward system has been subjected to a formal evaluation which has been detailed in Chapter 4. A panel of judges comprising senior nurse managers, who had expert knowledge, concerning the management of the wards, ranked these wards using their professional judgement. Statistical techniques were then used to test the null hypothesis that there were no significant differences between the lists of rankings.

5.2 CALCULATION AND VALIDATIION OF THE INDEX

5.2.1 Calculation of Index

The index was calculated for the following wards in the District General hospital and an elderly patient's hospital in a Northern Authority:

Hospital	Specialty	Number of Wards	Total Beds	Ward Code	Wards sampled using decision diary
District General	Orthopaedics	3	34 beds/ward	A,B,C	(as described in Chapter 6)
	Surgical	4	34 beds/ward	D,E,F,G	
	Medical	3	34 beds/ward	H,I,J	
	Paediatrics	2	30 beds/ward	K,L	L ward in sample B
Elderly Patients	Elderly	4	30 beds/ward	M,N,O,P	N ward in sample A

Table 15 Types of Wards in North Authority

Data was collected from the local information systems for April 1989 for the wards in the study. The results of the calculations to determine the indexes for the sample are shown in the following tables.

WARD	DIFFICULTY FACTORS (W x Sc(M)) STANDARDISED MEASURES (as detailed in table 9)											DIFFICULTY INDEX (WxSc (M))	RANK
	1	2	3	4	5	6	7	8	9	10	11		
A	2.56	0.03	1.65	1.89	0.02	0.02	0.26	0.40	2.80	0.00	0.90	10.53	12
B	2.56	2.67	1.23	1.87	0.02	0.02	0.24	0.29	2.80	0.00	0.90	12.60	7
C	2.40	2.18	1.37	1.87	0.02	0.00	0.22	0.17	2.80	0.00	0.77	11.80	11
D	2.24	1.45	1.90	1.96	0.02	0.02	0.00	0.34	2.80	0.00	1.53	12.26	9
E	2.53	1.16	1.82	1.96	0.02	0.00	0.00	0.37	2.80	0.00	1.62	12.28	8
F	2.43	1.22	1.71	1.98	0.00	0.04	0.12	0.46	2.80	0.00	1.40	12.16	10
G	2.62	1.53	1.74	1.96	0.00	0.00	0.00	0.43	2.80	0.00	1.62	12.70	6
H	2.21	2.09	1.90	1.65	0.00	0.02	0.04	0.03	2.80	0.00	1.97	12.71	4
I	2.34	2.86	1.90	1.78	0.02	0.00	0.02	0.00	2.80	0.00	1.93	13.65	1
J	2.43	2.54	1.88	1.76	0.02	0.00	0.06	0.03	2.80	0.00	1.93	13.45	2
K	1.25	3.21	2.32	1.89	0.06	0.00	0.08	0.00	2.80	0.00	1.49	13.10	3
L	1.86	1.80	2.35	1.87	0.04	0.00	0.16	0.34	2.80	0.00	1.49	12.71	4
M	2.75	2.73	0.00	1.72	0.00	0.02	0.32	0.00	2.80	0.00	0.70	11.04	
N	2.82	1.73	0.14	1.72	0.00	0.02	0.02	0.00	2.80	0.00	0.59	9.84	
O	2.53	0.13	0.36	1.69	0.00	0.00	0.06	0.00	2.80	0.00	0.68	8.25	
P	2.82	2.99	1.26	1.69	0.02	0.02	0.14	0.00	2.80	0.00	0.66	12.40	

Table 16. Calculation of Difficulty Indices

The detailed calculations to derive the decision indices are available as working papers from the researcher. The ranking lists of the judges in comparison with the ranking list based on the difficulty index calculation are shown below:

WARD	SPECIALTY	JUDGE 1	JUDGE 2	JUDGE 3	DIFFICULTY INDICES
A	Orthopaedic	12	12	12	12
B	Orthopaedic	10	8	6	7
C	Orthopaedic	10	7	7	11
D	Surgical	6	10	11	9
E	Surgical	7	6	9	8
F	Surgical	9	5	5	10
G	Surgical	8	9	10	6
H	Medical	1	2	4	4
I	Medical	5	11	8	1
J	Medical	2	4	2	2
K	Paediatric	3	3	3	3
L	Paediatric	4	1	1	4

Table 17. Comparison of Ranking Lists Between Judges and Difficulty Indices

The statistical test of significance used to test the level of agreement between judges and then between judges and the difficulty index is Spearman's Rank Correlation Coefficient (Hamburg 1974). The formula used:

$$R = 1 - \frac{6\,[r(1) - r(2)]^2}{n(n^2 - 1)}$$

Where R is Spearmans coefficient
r(1) is first ranking
r(2) is second ranking
n is number of wards

The formula can be transposed, with

$$S = [r(1) - r(2)]^2$$

and $N = n(n^2 - 1)$

therefore $R = 1 - 6\,\frac{S}{N}$

Agreement between judges

Judges 1 and 2

Ward (n=12)	Judge 1 r(1)	Judge 2 r(2)	r(1) - r(2)	$[r(1) - r(2)]^2$
A	12	12	Ø	Ø
B	1Ø	8	-2	4
C	1Ø	7	-3	9
D	6	1Ø	4	16
E	7	6	-1	1
F	9	5	-4	16
G	8	9	1	1
H	1	2	1	1
I	5	11	6	36
J	2	4	2	4
K	3	3	Ø	Ø
L	4	1	-3	9
				S = 97

$N = n(n^2 - 1) = 1716$

$R = 1 - 6 \times \frac{S}{N} = \underline{Ø.66}$

For n = 12, Spearman test statistic is
Ø.58, p = Ø.975
Ø.67, p = Ø.99Ø
Ø.81, p = Ø.999

The agreement between judges 1 and 2 is significant at p = Ø.975.

Judges 1 and 3

Ward	Judge 1 r(1)	Judge 3 r(2)	r(1) - r(2)	[r(1) - r(2)]
A	12	12	Ø	Ø
B	1Ø	6	4	16
C	1Ø	7	3	9
D	6	11	-5	25
E	7	9	-2	4
F	9	5	4	16
G	8	1Ø	-2	4
H	1	4	-3	9
I	5	8	-3	9
J	2	2	Ø	Ø
K	3	3	Ø	Ø
L	4	1	3	9
				S = 1Ø1

$R = 1 - 6 \times \frac{S}{N} = \underline{Ø.65}$

The agreement between judges 1 and 3 is significant at p = Ø.975.

Judges 2 and 3

Ward	Judge 2 r(1)	Judge 3 r(2)	r(1) - r(2)	$[r1 - r2]^2$
A	12	12	Ø	Ø
B	8	6	2	4
C	7	7	Ø	Ø
D	1Ø	11	-1	1
E	6	9	-3	9
F	5	5	Ø	Ø
G	9	1Ø	-1	1
H	2	4	-2	4
I	11	8	3	9
J	4	2	2	4
K	3	3	Ø	Ø
L	1	1	Ø	Ø
				S = 32

$R = 1 - 6 \times \frac{S}{N} = \underline{Ø.89}$

The agreement between judges 2 and 3 is significant at p = Ø.999.

From the results of these tests, there is a significant level of agreement between the judges on the rankings of the wards.

Agreement between judges and the difficulty index

The Spearmans test of correlation was also used to calculate the level of agreement between the judges and the rankings derived from the difficulty index.

Judge 1 and difficulty index

Ward	Judge 1 r(1)	DI r(2)	r(1) - r(2)	$[r(1) - r(2)]^2$
A	12	12	Ø	Ø
B	1Ø	7	3	9
C	1Ø	11	-1	1
D	6	9	-3	9
E	7	8	-1	1
F	9	1Ø	-1	1
G	8	6	2	4
H	1	4	-3	9
I	5	1	4	16
J	2	2	Ø	Ø
K	3	3	Ø	Ø
L	4	4	Ø	Ø
				S = 5Ø

$$R = 1 - 6 \times \frac{S}{N}$$

$$= 1 - \frac{(6 \times 5Ø)}{1716} = Ø.83$$

The agreement between judge 1 and difficulty index is significant at p = Ø.999.

Judge 2 and difficulty index

Ward	Judge 2 r(1)	DI r(2)	r(1) - r(2)	$[r(1) - r(2)]^2$
A	12	12	Ø	Ø
B	8	7	1	1
C	7	11	-4	16
D	1Ø	9	1	1
E	6	8	-2	4
F	5	1Ø	-5	25
G	9	6	3	9
H	2	4	-2	4
I	11	1	1Ø	1ØØ
J	4	2	2	4
K	3	3	Ø	Ø
L	1	4	-3	9
				S = 173

$$R = 1 - 6 \times \frac{S}{N}$$

$$= 1 - \frac{(6 \times 173)}{1716} = \underline{\emptyset.4\emptyset}$$

There is no significant agreement between judge 2 and the difficulty index.

Judge 3 and difficulty index

Ward	Judge 3 r(1)	DI r(2)	r(1) - r(2)	$[r(1) - r(2)]^2$
A	12	12	Ø	Ø
B	6	7	-1	1
C	7	11	-4	16
D	11	9	2	4
E	9	8	1	1
F	5	1Ø	-5	25
G	1Ø	6	4	16
H	4	4	Ø	Ø
I	8	1	7	49
J	2	2	Ø	Ø
K	3	3	Ø	Ø
L	1	4	-3	9
				S = 121

$$R = 1 - 6 \times \frac{S}{N}$$

$$= 1 - \frac{(6 \times 121)}{N} = \underline{\emptyset.58}$$

The agreement between judge 3 and the difficulty index was significant at p=Ø.975.

From the results of the ranking statistical test, there is significant agreement between judges 1 and 3, with the difficulty index. However, there was no significant agreement between judge 2 and the index. The main explanation for this non-agreement was the widely different rank of ward I; judge 2 ranked the ward = 11, and the index ranked the ward at 1.

5.2.2 Review of ranking exercise with the judges

A review of the results of the ranking exercise took place with the judges. The judges had not seen the others' rankings before this meeting. Unfortunately, judge 3 was called away to an emergency and did not participate in the review although

joining the remaining judges later to agree a 'group' ranking list of wards. The meeting was tape recorded and a complete transcript made. Quotations have been used from this transcript to emphasise the key points discussed. A semi-structured interview was conducted to allow judges to expand and elucidate their views.

The ranking order was reviewed by the judges especially those wards which came top and bottom in the ranking lists. There was clear agreement that ward A should be bottom of the list (in terms of difficulty in management).

Judge 2 "We both put ward A last .... because it was all planned and there were no emergencies, it was easier to plan".

There was considerable discussion on which ward should be ranked first in the list. There was disagreement as to whether wards H or L should be ranked first.

Judge 1 "I put ward H first because of the mixed specialties ... The type of patients admitted are a very mixed bag. I was recently actually up on ward H and saw the amount of work that was needed, and just the sheer fact of the drug rounds, the transfusions, infusions..".

Judge 2 "I found the sheer volume of consultants for a start on ward L was definitely more than ward H ... You see ward L has got every surgeon in the hospital admitting to it".

The discussion was widened to consider the top four ranked in comparison with their own views and the results from the difficulty index calculations. Ward K was ranked 3 or 4 by the judges and the difficulty index. As judge 2 commented:

"the ward has a high mix of consultants with a high

> mix of patients, all emergencies and they have the diabetic patients ... and the young acutely ill, they cause a lot of anxiety and a lot of problems".

The results of the difficulty index identified three of the top four rankings of the judges. The major difference between the judges and the difficulty index (DI) results was the placement of ward I, which was ranked at one by the DI and eleven by judge 2. As a result of this difference, there was no significant agreement between judge 2 and the DI ranking using the Spearmans statistical test. Judge 2 was asked to comment about her rating of ward I:

Judge 2 "Well I scored ward I much lower than you did (Judge 1). I am obviously quite willing to adjust that ... I have since learnt that ward I takes a much wider range of patients than I thought".

Judge 2 also considered that she was influenced by the calibre of ward sister on ward I as she commented:

> "The reason I made it (ward I) low was because I was looking at personalities and I think that although there are various people coming in breathless (chest patients) the actual influence of the staff makes it very easy. If you took out the staff on ward I well it would become as difficult as the other medical wards".

The personalities of the ward staff were a recurrent theme in the discussion, but it was agreed that particular staff issues such as, "Sally doesn't get on with Jo" would be disregarded, as personalities can change quickly, but the ward management issues remain.

The factors that most affect ward management decision making were then considered. Earlier in the interview, emergency admissions was seen as an important factor together with the

mix of patients, the number of consultants and the degree of technical care. The question was asked, if wards were harder to manage where there was a high degree of technical care.

Judge 1 "No, not if you have got the right kind of people doing it. If you have got keen, interested people who you have trained and developed".

The number of patients (reflected in bed occupancy) can make management difficult; the "sheer number" as judge 2 describes the throughput on the medical wards. However, day cases cause problems, because they occupy beds, up to two day cases per bed and these patients do not reflect in bed occupancy figures. (Day cases have been included in DI calculations).

Relatives were identified as a particular problem especially on the paediatric wards as Judge 2 commented:

> "The childrens wards have got the added problem of parents and grandparents, there is also a predominance these days of social problems as well so you have got this entire issue with social workers etc.".

Length of stay was also seen as an important factor with a longer length of stay making the workload and management decisions more predictable.

Staff sickness was a further factor that was considered. It was debated whether there was "cause and effect" i.e. if there were management and organisational problems these would reflect in high sick rates. Judge 2's comments on sickness were that:

> "Sickness relates to a lot of things. It can relate if you don't value your own worth, no job satisfaction, and I think that certain grades of staff it can be just a case that you are absolutely worn

out. It often comes from the top in motivation and how valuable she makes you feel".

There was a general view that high sickness reflected in the motivation of the staff, especially for those grades with no promotion prospects, the high dependency of the patients particularly where a great deal of physical work was required and those wards where volumes of patients were highest.

The final stage of the review, which was joined by Judge 3, was to rank the wards by group decision.

Further statistical tests were undertaken on these results to test for levels of agreement with the difficulty index.

Ward	Group Judges r(1)	DI r(2)	r(1) - r(2)	$[r(1) - r(2)]^2$
A	12	12	Ø	Ø
B	1Ø	7	3	9
C	11	11	Ø	Ø
D	6	9	-3	9
E	7	8	-1	1
F	8	1Ø	-2	4
G	9	6	3	9
H	1	4	-3	9
I	5	1	4	16
J	4	2	2	4
K	3	3	Ø	Ø
L	2	4	-2	4
				S = 65

$$R = 1 - 6 \times \frac{S}{N}$$

$$= 1 - \frac{(6 \times 65)}{1716} = \underline{Ø.77}$$

The agreement is significant between the group of judges and the difficulty index at p = Ø.99Ø.

5.3 DISCUSSION AND CONCLUSIONS

Overall, the factors comprising the difficulty index were substantiated by the panel of judges. Bed occupancy and

throughput of patients (length of stay) were perceived as the important factors and this importance was reflected in the weightings applied within the difficulty index. However clinicians rounds, although considered to impact significantly on wards, did not have the same effect on the results of the difficulty index.

The range of results in the study of the general hospital (where n = 12) was from 1Ø.53 (ward A) to 13.65 (ward I); 3.12 (or 3Ø% of the lowest figure). This narrow range implies that the index is sensitive to small changes in the calculation. If the results of the difficulty index from the elderly unit are included, the range widens significantly from 8.25 to 13.65; 5.4 (or 65% above the lowest index). It could be argued that the 12 wards in the sample are a relatively narrow band within the total population, although this premise would have to be externally validated.

All the factors could be measured along a scale Ø to one except for the factor 'meals distributed by bulk trolley'. The calculation in this case is either the full weighting (scale 1) i.e. meals distributed by bulk trolley or nil i.e. meals distributed by other means. As the difficulty index is sensitive to small changes, this factor could have an undue effect on the results. The factor needs to be broken down with degrees along the scale e.g. number of meals delivered in this manner each day.

The abilities of the ward sister, her relationship with senior nurse managers and clinicians, together with the personalities

of the ward staff must be factors in the effective management of wards. However, from the results of the Delphi sample, factors relating to 'relationships' scored low and the panel of judges accepted that the fundamental issues in ward management remained when staff had changed.

The initial statistical testing of the levels of the agreement between the individual judges and the difficulty index indicated significant agreement between the judges and significant agreement between two of the judges and the difficulty index. During the subsequent review by the panel of judges a group ranking was determined, and statistical tests showed a significant agreement with the difficulty index. The difficulty index has therefore been internally validated within a medium sized general hospital over a range of specialties.

CHAPTER 6 INVESTIGATION OF THE DECISION MAKING PROCESSES ON WARDS USING DECISION DIARIES AND TEST THE RESEARCH HYPOTHESIS

6.1 INTRODUCTION

The purpose of this investigation was to provide results and analysis to test the research hypothesis, to validate the decision diary as a measuring instrument and through interviews with the ward sisters gain understanding of the decision processes on their wards.

As the investigation would take over 12 months to complete, the number of wards that could be studied, in both the 'before' and 'after' stages were limited. The criteria identified (mainly from the evaluation trial) which sample wards had to meet within the 'before-after' experiment (as explained in Chapter 3) were as follows:

1. All wards were implemented in the hospital with the decision support system at least six months before the 'after' sample commenced.

2. Unit managers and ward sisters were fully trained in the use of the decision support system.

3. Ward sisters had at least 3 years experience and were unlikely to move during the course of the study.

4. No major organisational changes were planned on the study wards.

A district general hospital and elderly patient hospital in a Northern Health Authority were implementing the Financial Information Project's ward nursing system (Financial Information Project 1986) but only two wards met the defined criteria in these hospitals as shown below.

Sample	Ward Type	Hospital	Before Sample	After Sample
B	Elderly	Geriatric hospital Northern Authority	April/June 1988	November 1989
C	Paediatric	District hospital Northern Authority	March/May 1988	May/July 1989

Table 18 Sample Wards for 'before-after' Study

The senior managers in this Northern Authority also agreed to provide information to calculate the "difficulty factors" index for all the wards in the District hospital and to provide a validation and explanation of the decision diary results on the sample wards. This study is detailed in Chapter 5.

Semi-structured interviews (Leininger 1985) were arranged on completion of the 'before' and 'after' phases of the sampling with the ward sisters who undertook the sampling exercise. The intention was to examine critically the measuring instrument, ensuring that if new decision types were identified then the measuring instrument was updated.

Agreement was reached in a London Teaching Hospital to use the decision diary on a surgical ward to provide additional validation of the measuring instrument. Unfortunately the system had not been installed throughout the hospital and major

changes were planned in the hospital; therefore only the initial sample was completed, which is described in the next section of this chapter.

6.2 **Results of the Sampling Exercise Undertaken in the London Teaching hospital** (Sample A)

6.2.1 Interview Results

Although only a partial study could be undertaken in this hospital, this study was still necessary to provide a validation of the decision making in a teaching hospital environment. The following information was obtained from the ward sister and other senior nursing staff in the hospital.

Organisational and Environmental Factors The hospital has adopted a clinical directorate approach. Each unit has a clinical director responsible for its management, together with a business manager. The surgical ward is part of a surgical unit, together with four other wards. This ward has 3Ø beds and is on-call every day of the week; its design is open plan 'Nightingale' type ward.

Admission/Discharge Arrangement Cold case patients are admitted directly to the ward. Weekly lists are arranged by the consultants after consultation with the ward sister. Decisions to make changes to these lists are usually undertaken the day before planned admission. There is no central admissions unit and the patients contact the ward about admission times. However, casualty patients are admitted to the ward on-take

through the casualty unit.

Ward Specialty and Consultants Although the ward is classified under general surgical, it specialises in Ear Nose and Throat (ENT) and vascular procedures. There are 6 consultants who have regular rounds, together with 3 registrars and 2 house officers. These latter clinicians have at least one round per day.

Incidence of Escorting Patients Nurses can be away from the ward between 10 minutes and an hour. This delay is mainly due to waiting in the anaesthetic room until a theatre nurse can take over the supervision of the patient.

Cover for staff sickness Cover with the current staffing is low and is managed through deployments of existing staff. Agency nurses are used as a last resort.

Learner Allocation There are no first and second year learners allocated to the ward. However, third year learners are allocated to this ward.

Operating Theatre Sessions Patients go to theatre every day except Wednesday. There can be two operating sessions on certain days during the week.

Other Workload Considerations

Bulk trolley delivery - meals are served three times/day when most of the nurses on duty are

involved.

Ward Clerk - a full time ward clerk has been appointed but holiday and sickness relief is not provided.

Transfer from intensive care - A number of patients are transferred from ITU whose jaws have been wired.

6.2.2 Validation of Decision Diary Results in the London Teaching Hospital

The results of the 'before' sample are shown as Appendix 8. The total number of decisions made were 179, averaging 7 decisions per shift, during the sample period. Of the 179 decisions, 125 (70%) were planned decisions i.e. the 'time horizon' related to 'this week' or longer.

Staff Allocation. The majority of decisions made in this category were changes due to staff sickness. As a result nurses were reallocated from ward to ward on a planned basis and on one occasion an agency nurse was employed.

Ward Administration. Procedures were changed related to support services, in particular to the Central Sterile Supplies Department (CSSD) top up system.

Patient Admissions/Discharge. The majority of decisions identified in the sample period were made in this category. This is understandable due to the admissions/discharge

arrangements which directly admits patients to the wards in this hospital. A high incidence of planned admissions/discharge changes occur the day before admission or discharge takes place, which is compatible with the adopted procedures at the unit level.

Workload Prioritising. The incidence of deploying staff between wards was due to the lack of sickness cover. There were no decisions made with regard to reduction in care standards. It must be assumed that care standards were not affected even though overall staffing levels fell during staff sickness.

Conclusions. From discussions with the ward sister and other senior nursing staff the decision diary analysis is a valid sample of the management decisions, being made on a surgical ward at the teaching hospital.

6.3 RESULTS OF THE STUDY UNDERTAKEN IN THE NORTHERN AUTHORITY

6.3.1 Study and analysis of elderly patients ward (N)

Sample B - the 'before' sample of elderly patients ward (N)

Initial interview with the ward sister

From an initial interview with the ward sister on the elderly patients ward the following information was obtained.

Organisation. The ward is a mixed rehabilitation unit of four

elderly wards each of which has thirty beds. The ward is a 'nightingale' open-plan type ward, incorporating a day room where the majority of patients are able to sit during the day. Although the main specialty is rehabilitation, the ward also has medical patients, but there are no operating sessions for patients on this ward.

Admissions/Discharges Arrangement Admissions come from various sources: transfers from other hospitals or districts; residential homes; out patient clinics; domiciliary visits; transfers from other wards (mainly acute elderly); or from a waiting list. List cases are admitted according to the patient's need and when beds are available. Emergency admissions are occasionally taken onto the ward usually when the normal ward for emergency admissions is full. The consultant has overall control over the waiting list and decides when a patient is ready to be discharged, often through consultation with an occupational therapist or physiotherapist. There are no day cases on the ward.

The admission documentation is dealt with by the nurses, helped by the ward clerk when available. Discharge documentation is mainly handled by the ward clerk, but nurses are involved when necessary.

Ward Specialty and Consultants As previously stated, the ward is an elderly rehabilitation ward, with some medical patients also. There is only one consultant responsible for the patients on this ward who has a 2.5 hour ward round every Wednesday afternoon. This is the only official round which

takes place and involves two trained nurses and one student nurse accompanying the consultant. Ad-hoc rounds by Senior House Officers occur fairly frequently, usually in the morning and last between half an hour to an hour.

Incidence of Escorting Patients Nurses are involved in escorting patients up to five times a week for various reasons which can entail being off the ward for up to four hours at a time, usually whilst waiting for transport. Nurses have to escort patients transferred to and from other hospitals as well as to and from other departments such as X-ray, Chiropody and the dentist. Nurses are also involved in the collection of drugs, specimens etc., which again means they may be absent from the ward.

Cover for Staff Absence In the event of staff absence the first option is to redeploy staff from other wards which are better staffed. However, if necessary, part time nurses, of which there are about nine, are brought in to cover. When possible the ward sister will try to plan this in advance in order to secure enough staff to run the ward at an acceptable level of care at all times.

Learner Allocation Learners on the ward are mainly first and second years and usually two from each year are assigned to the ward at any one time. The ward also takes day release students from schools and colleges for a period of three months or a year and also allows people interested in doing nursing to come onto the ward for short periods. Also, one week in a year a Youth Opportunities Scheme trainee comes to work on the ward.

Operating Theatre Sessions There are no patients for theatre on this ward.

Level of Support Staff The ward has a clerk who works part time and is shared with one of the other elderly rehabilitation wards. The ward clerk is not part of the nursing establishment and cover is not provided in her absence. On the other hand, relief is always provided in the absence of the ward orderly of which there are one or two per shift. This level is always maintained and they are responsible for various tasks of cleaning, serving beverages and washing-up. Porters are also used on the ward.

Bulk Trolley Delivery The ward has bulk trolley delivery for breakfast and tea, but lunch is plated. As far as possible, all nurses are involved in the serving and distribution of the meals to the patients so that the task is completed as quickly and efficiently as possible.

Decision Diary Results for Sample B - 'before' sample

The results of the before sample are shown as Appendix 9. The total number of decisions made were 76, averaging 3.Ø decisions per shift. Of the 76 decisions, 26 (34%) were planned (time horizon of this week, or longer).

Staff Allocation. A total of thirteen decisions were made in this category, the majority being planned decisions relating to off duty rota changes. Several decisions were also taken

regarding the reallocation of nurses from ward to ward, again on a planned basis. No changes were made to the learner nurse allocation but this is to be expected as this tends to remain constant for a period as decided by the school of nursing. Bank/agency nurses are not used, so decisions in this area did not apply.

Ward Administration. Only one decision was made in relation to this category and it came under the area of changes in policies relating to administration procedures.

Patient Admissions/Discharges. The majority of decisions were in this category; a total of forty-nine were made and these varied between planned and unplanned, 29 of which were made in conjunction with the consultant. Most of the planned decisions related to changes in planned discharges which is to be expected on an elderly rehabilitation ward where various factors determine when a patient can leave hospital. Fewer decisions were made to changes in planned admissions, probably because of the type of patients coming onto the ward and the way admissions are handled. In the area of unplanned decisions, a majority related to emergency admissions. The remainder of decisions in this area were associated with the reallocation of patients between wards. No changes were made in relation to list cases, either planned or unplanned; these remained the same.

Workload Prioritising. Thirteen decisions were made in this category. As expected, due to other changes previously stated, certain unplanned decisions had to be made regarding the

deployment of staff between wards; it is likely these changes arose as a result of staff absence and the high level of emergency patients coming onto the ward. Again, the employment of bank/agency nurses does not apply on this ward. No decisions were made to defer administrative procedures, but nine decisions were taken to reduce care standards due to inadequate staffing levels. The ward experienced problems in the provision of care primarily because the staffing levels were inadequate. It is likely that the dominant cause was the unusually high number of emergency admissions which affected the running of the ward at its normal level and because the emergencies were unplanned; there was insufficient time to alter staffing levels accordingly.

Conclusion

From discussion with the sister and her unit manager it can be concluded that the results of the sample reflected the decisions taken by the ward sister during the sampling period.

Sample B - results of 'after' sample

Follow-up interview with ward sister

The results of the 'after' sample are shown as Appendix 1Ø. The total number of decisions made were 72 averaging 2.9 decisions per shift. Of the 72 decisions, 43 (59%) were planned.

A semi structured interview was conducted with the sister under the following headings.

1. The results of the 'after' sample (sample B) were discussed with the ward sister by category;

2. she was then asked to comment on those factors which affected decision making, from a prepared list;

3. finally her views on the utility of the decision support system were obtained.

1. *Decision Diary Categories*

Staff Allocation Similar decisions were made regarding off duty rota changes as in the first sample, although a higher incidence of staff reallocation took place especially on an unplanned basis due to staff sickness.

Ward Administration More decisions were made under this category as administrative policies relating to discharge procedures were being formulated.

Patient Admissions/Discharges Planned admissions had increased due to reorganisation of acute wards and improved availability of information. Discussions had taken place with the consultants resulting in improved planning of admissions. A few emergency admissions had been received due to domiciliary visits. Planned discharges were more difficult to predict due to the

changing condition of the patients.

Workload Prioritising Due to the busy nature of the ward, staff deployment took place between wards, although an improved balance of staff to planned workload had been achieved, reducing the occasions when standards of care were reduced.

2. *Difficulty Factors*

The ward sister identified the following factors which affected decision making:

High bed occupancy
Incidence of escorting patients
Staff sickness rate
Number of learners on ward
Meals distributed by bulk trolley

She could not rank these factors, but considered they had an equal impact on decision making.

3. *Decision Support System*

The ward sister considered that some benefit was obtained from the system in providing information on nurse dependency of patients across the rehabilitation unit allowing a fairer allocation of staff to wards most needing the staff, rather than the sister "who shouts loudest" gaining scarce resources. The system also

provided care plans which facilitated the more effective planning of patient care although time was required at the computer to set up each care plan.

Her strongly held view was that patient care should take preference over the use of the computers on the ward. Her main aim was to administer care to her patients, rather than as a manager delegating nursing duties to her staff.

Statistical Analysis of Sample B

A statistical analysis was undertaken using the chi-squared distribution to test the null hypothesis that there were no significant differences between the 'before' and 'after' sample periods. (As described in Chapter 3). Comparison of the results from the sample are shown in the following table.

DECISION CATEGORY	TIME SPAN	THIS SHIFT		NEXT SHIFT		NEXT 24 HRS		THIS WEEK		NEXT WEEK		LONGER		TOTAL	
	SAMPLE	1	2	1	2	1	2	1	2	1	2	1	2	1	2
STAFF ALLOCATION						3	2	4	3	3	7	3	6	13	18
WARD ADMINISTRATION											4	1		1	4
PATIENT ADMISSIONS/ DISCHARGES		37	19			2	6	6	1Ø	4	5			49	4Ø
WORKLOAD PRIORITISING		12	4			1	6							13	1Ø
TOTALS		49	23			6	14	1Ø	13	7	16	4	6	76	72
%		64	32			8	19	13	18	9	22	5	8	1ØØ	1ØØ

Table 19 Decision Diary Results - Sample B

The results of the chi squared test indicated that X^2 was significant at the 5% probability level (Appendix 11 details the calculation). Therefore the null hypothesis was rejected. 35 decisions were made in the time horizons 'this week', or longer in the 'after' sample an increase of 40% on the 'before' sample results for the same time horizon.

Analysis of the 'difficulty factors' on elderly patient's ward (N)

From the results of the study described in Chapter 5, the elderly rehabilitation ward (N) was ranked 14th out of 16 wards, with a 'difficulty factor' index of 9.84.

This ward ranked the highest for bed occupancy at 87.7%; however the turnover of patients was low with 24 admissions (11 from another ward) and 26 discharges (20 transferred to another ward) from 1st April to 30th April 1989, a number of months after the implementation of the ward system. During this period the average length of stay was 15.5 days the second longest 'length of stay' in the wards sampled. The overall picture, therefore, is of a relatively static high patient population with treatments which can be planned during a relatively long length of stay, although according to the ward nursing system the patient dependency levels are high (39% of patients were classified in care group 4). Another pressure on nurse staffing requirements was the high level of ward attenders - 100 were recorded during the reference period.

The ward sister commented in her initial interview that the main reason for the workload prioritising leading to a fall in care standards on a number of occasions was due to the high level of emergency admissions for which she was not adequately staffed. From the analysis of the results of the 'difficulty factors' index, the ward was ranked 10th out of 16 wards regarding emergency admissions. As this sample took place a number of months after the 'before' sample was completed, further data was collected for emergency admissions on this ward during the time of this initial sample. The emergency admissions were significantly higher during this period. Further information was collected concerning the remaining difficulty factors and higher levels of sickness were also identified. In absolute terms, the index would have been greater than the calculated index but the relative ranking position cannot be deduced unless the exercise is undertaken for all the wards in the hospitals for this time period.

Conclusions

From interviews with the ward sister and her unit manager the results from the decision diary reflected the decisions taken during the sample periods.

The results from these decision diaries indicate that more planned decisions were taken (an increase of 40%) after the decision support system was implemented. The statistical tests undertaken confirmed that the results from the two sample periods were significantly different.

The difficulty factors index ranked the ward low compared to other wards in the hospitals studied. However, in the sister's initial interview she commented that both emergency admissions and staff sickness was high resulting in high numbers of incremental or unplanned decisions being made relating to workload prioritising. As the index was calculated from information collected between the sample periods, further investigation showed that both emergency admissions and staff sickness were significantly higher at the time of the 'before' sample which would have resulted in an index of greater absolute magnitude. Therefore the value of the index has reduced during the course of the study.

The sister commented in her second interview that due to information being available from the nursing system, covering all wards in the elderly unit, more planned admissions were made with improved staff balance related to patient workloads. The involvement of the consultant in the planning process had significantly reduced the ward management problems. The evidence would suggest that information from the decision support system has assisted in improved staff allocation. As a result, staff sickness reduced and care standards have improved.

6.3.2 Study and Analysis of Paediatric Ward (L)

Sample C - the 'before' sample of paediatric ward (L)

Initial interview with ward sister

From an initial interview with the ward sister the following information was obtained.

Organisation of Unit The ward studied is a paediatric, twinned with another paediatric ward. Each of the two wards has twenty beds and is on-take everyday. Due to the nature of the wards, a wide range of specialties is covered. Whenever possible the two wards merge at weekends; all patients and staff are transferred to the active ward on Saturday afternoon, allowing the inactive ward to be cleaned and fewer staff to be needed over the weekend period when there are no clinics.

Admissions/Discharges Arrangement Day cases, which are not assessed are admitted onto wards for 4 hours. Planned admissions are taken directly onto the ward, the consultant having liaised with the ward sister to arrange a day. If the sister feels that the ward is unable to accept a new patient, the other paediatric ward will take the patient instead. An emergency is only refused if there is no suitable isolation bed or if it is an older child who needs a longer stay bed. Children are only transferred to other hospitals if there are no isolation units available. Beds are not closed and if children have to be admitted onto a full ward, extra beds may be brought in.

Ward Specialty and Consultants The ward does not specialise in any particular field, but caters for a wide range of specialties. **To cover these specialties there are nineteen consultants on the ward and 1Ø registrars.** All consultants have a house officer and there are also a number of

anaesthetists. Ad-hoc rounds by registrars and house officers occur quite frequently and can be disruptive on the ward.

Incidence of Escorting Patients Nurses can be absent from the ward for varying lengths of time ranging from a few minutes to an hour. These periods away from the ward are mainly due to the escorting of patients to theatre and x-ray and occur quite frequently.

Cover for Staff Absence Staffing levels are usually adequate and the sickness level low, occurring most commonly amongst learners and auxiliaries. If the staffing level is low, staff on leave are called in and bank nurses may be used.

Learner Allocation There are usually five or six learners on the ward, these being third year learners only.

Operating Theatre Sessions Patients go to theatre every day and the number can vary from between six and twelve.

Level of Support Staff A ward clerk is employed on a part-time basis, working until 2.ØØ p.m. each day from Monday to Friday. There is no cover for sickness and weekends. A domestic works on the ward from 8.ØØ a.m. to 4.ØØ p.m. and then a domestic is shared for the evening period of 5.3Ø p.m. to 9.3Ø p.m.

Bulk Trolley Delivery Meals are served in this way, except for patients who still receive prepared milk. Usually the play leader plus a couple of nurses help to serve the meals.

Decision diary results for sample C

The results of the before sample are shown as Appendix 12. The total number of decisions made were 35, averaging 1.8 per shift. Of the 35 decisions, 13 (37%) were planned.

Staff Allocation. Nine decisions were made, most of which were planned changes to the off duty rota due to staff absence. One change was made to the learner nurse allocation and on one occasion nurses were reallocated from another ward. Agency nurses are not employed but occasionally bank nurses are used although over the period of recording decisions none were taken to use bank nurses.

Ward Administration. Four decisions were taken in this area; three changes came under policies and procedures relating to support services and only one change occurred relating to administration and clerical procedures.

Patient Admissions/Discharges. Twenty decisions were made in this area which is to be expected as changes will occur in response to circumstances as they arise. Decisions to make changes were confined to the unplanned list case changes and to emergency admissions or discharges. As a result of these changes, decisions were also taken on the reallocation of patients between wards. However, planned admissions, discharges and list cases remained unchanged and no decisions were taken in these areas.

Workload Prioritising. Only two decisions were made in this

category relating to the deployment of staff between wards. These decisions were effected in the same shift and it is likely they arose in response to staff sickness. No other changes were made indicating that this redeployment of staff did not result in either the deferment of administrative procedures or a lowering of care standards, but instead the absence of staff was alleviated by a decision to redeploy staff.

Conclusions

In discussion with the sister and the unit officer, the results reflected the management decisions taken during the sample period.

Sample C - Results of 'after' sample

Follow-up interview with ward sister

The results of the 'after' sample are shown as Appendix 13. The total number of decisions made were 42, averaging 2.1 decisions per shift. Of the 42 decisions, 7 (19%) were planned.

The same structure to the follow-up interview with the ward sister was followed as Sample B.

1. *Decision Diary Categories*

Staff Allocation There were no significant differences

from the first sample.

Ward Administration A change was made to the procedure relating to the delivery of linen to the ward.

Patient Admissions/Discharges Decisions relating to emergency admissions were increased, and in many cases patients were reallocated to medical wards. The sister commented that consultants do not account for emergency admissions in their elective lists. On many occasions consultants were informed that there were no available beds, but the patients were admitted anyway, involving major disruption to ward L and other wards as well.

Workload Prioritising Deployment of staff between wards was increased partly due to sickness and holidays, but in the main because of the movement of patients between wards which required constant changes to the balance of nurse staff to the dependencies of the patients.

2. *Difficulty Factors*

The following factors were selected by the ward sister:

Throughput of patients
Number of admissions/discharges
Number of registrars/house officers undertaking rounds
Number of patients to theatre
Rate of emergency admissions

Incidence of escorting patients

These six factors are listed in order of difficulty, according to the ward sister. The length of stay on the ward averages 2.5 days. The number of patients to theatre can be significant including a number of day cases, requiring operation and occupying a bed for up to 12 hours.

3. *Decision Support System*

Due to the identified factors on the ward, the sister considered that only a reactive approach was possible to dealing with the hourly problems that occurred. She doubted whether the decision support system could assist her in these circumstances. In particular, she considered more weighting should be given to day cases in the workload calculation, within the system.

Similar comments, as before (Sample A), were expressed that her primary role was treating patients not spending time with computers.

Statistical Analysis of Sample C

A statistical analysis was undertaken using the chi-squared distribution to test the null hypothesis that there were no significant differences between the 'before' and 'after' sample periods. The following table shows the results:

DECISION CATEGORY	TIME SPAN	THIS SHIFT		NEXT SHIFT		NEXT 24 HRS		THIS WEEK		NEXT WEEK		LONGER		TOTAL	
	SAMPLE	1	2	1	2	1	2	1	2	1	2	1	2	1	2
STAFF ALLOCATION						2	1	2	2	5	3		1	9	7
WARD ADMINISTRATION						1		2				1	1	4	1
PATIENT ADMISSIONS/ DISCHARGES		9	13	4	2	7	4						1	2Ø	2Ø
WORKLOAD PRIORITISING		2	1Ø		1		3							2	14
TOTALS		11	23	4	3	1Ø	8	4	2	5	3	1	3	35	42
%		31	55	11	7	29	19	11	5	14	7	3	7	1ØØ	1ØØ

Table 2Ø Decision Diary Results - Sample C

$$\chi^2$$

The results of the chi squared test indicates that X was not significant at the 5% probability level and therefore the null hypothesis was not rejected. (The calculation of the statistical test is shown in Appendix 14).

8 decisions were made in the time horizons 'this week' or longer, in the 'after' sample a reduction of 25% on the 'before' sample for the same time horizons.

Analysis of the difficulty factors on paediatric ward (L)

According to the study results described in Chapter 5, the paediatric ward (L) was ranked 4th out of the wards (with a difficulty factor index of 12.71). However, both judges 2 and 3 ranked the ward 1st in their derived ranking lists.

The average length of stay was 2.5 days for this ward; the lowest length of stay of the wards studied and therefore ranked highest in terms of difficulty. During the reference period (April 1989), the turnover of patients was high with 123 admissions (11 transfers from another ward). Over half of the admissions were emergency patients. There were 53 day cases and 3 ward attenders during this period. The dependency of the patients was relatively low with 61% of the patients classified in care groups 1 and 2, a result that would be expected from a low average length of stay.

A further sample period was taken of this ward to investigate changes in throughput, and no significant differences were found. (Numbers of admissions and discharges varied less than 5%).

From the information collected from the ward nursing system, the time that nurses were absent from the ward was low. The allocation of time for registrars and house officers undertaking ward rounds was also low. However, these factors were considered significant by the ward sister. Actual time taken may not be accurately recorded in the system. The number of rounds of doctors may be significant rather than total time because of the decisions taken to admit, discharge or transfer patients on each of these occasions.

A 'thumbnail sketch' of the ward is of many doctors admitting patients in an unco-ordinated manner, leading to a high number of internal transfers of patients to other wards, resulting in constant disruption of planned admissions and staff allocation.

Conclusions

According to the interviews with the ward sister, her professional opinion is that the decision diary results reflect the decisions she took during the sample periods.

Planned decisions decreased by 25% in comparison of the 'after' with the 'before' samples, although the absolute difference was small - two decisions less 'planned'. There were no statistical differences between the two sample periods, based on the statistical tests completed.

The ward was ranked in the upper quartile, of the index results, of the wards studied. From further sampling, the key factors were identified with no significant changes from the initial reference period. The disruptive factors such as high throughput and low length of stay with many doctors admitting patients on a 'piecemeal' basis continued through the 'before' and 'after' 'sample' periods.

As the sister commented in her second interview, only a reactive or incremental approach was possible in dealing with the hourly problems that occurred. Information was not being used to balance the patient throughput and workload with the availability of staff within a planning framework. Whilst the doctors continue to admit patients on an ad hoc and unplanned basis, these circumstances will persist and the decision support system will not provide tangible benefits.

6.4 TEST THE RESEARCH HYPOTHESIS

6.4.1 The null hypothesis

In Chapter 3, the null hypothesis to be tested was formulated and can be stated as follows:

1.) *Patterns of ward management decision making will not change significantly as additional information becomes available from a decision support system, and that*

2.) *the degree of change will be governed by a set of factors already in existence within wards in a hospital.*

The research hypothesis can be dissected into its component parts:

"*Patterns of ward management decision making*" -

A taxonomy of decision making was identified for ward management from the literature review (described in Chapter 2) and constructed in the research methodology chapter (Chapter 3). From these studies a measuring instrument has been designed and validated, to describe management decisions made by ward sisters.

"*Will not change significantly*" -

From results obtained the main study (Chapter 6), statistical testing was undertaken using the chi-squared distribution to

test the null hypothesis that there were no significant differences between the 'before' and 'after' sample periods (at the 95% confidence limits) within which the decision diaries were completed. The 'before' sample was taken before the implementation of the decision support system, and the 'after' sample at least six months after its implementation.

"*Additional information will become available*" -

Information was received by ward sisters and unit managers from the decision support system (described in Appendix 1) on a daily basis, relating to the dependency of the patients on the ward which indicated the demand on nurses time. The nurses that were available could then be compared with this demand to identify surpluses or deficiencies, by skill type.

"*The degree of change*" -

The decision diaries assessed each decision made in relation to the time horizon within which the decision was effected. The degree of change could be judged by the increase or otherwise of planned decisions.

"*Governed by a set of factors already in existence*" -

Chapter 5 describes the design, development and validation of the "Difficulty Factors" index. This index comprised factors identified by ward sisters which materially effected their management decision making. These factors were weighted in order of their significance and aggregated to calculate the

index. A high index indicated a ward where "planned" decision making would be difficult to undertake, even with information from a decision support system.

6.4.2 Possible Outcomes from the Research Undertaken

The possible outcomes from the research undertaken, assuming a dichotomy rather than degree are:

		the degree of change will be constrained by a set of factors	
		Yes	No
Ward management decision making will change	Yes	1	2
	No	3	4

Fig. 11. Possible outcomes from the research undertaken

Outcome 1

Decision making does change significantly and it is affected by the set of factors.

- Null hypothesis rejected
- Low rating on difficulty factors index
- Significant increase in decision indices

Outcome 2

Decision making does change significantly but is not affected by the set of factors.

- Null hypothesis rejected

- High rating on difficulty factors index
- Significant change either more or less planned decisions.

Outcome 3

Decision making does not change significantly and the reason it does not change is due to the set of factors.

- Null hypothesis accepted
- High rating on difficulty factors index
- No difference in levels of planned decisions

Outcome 4

Decision making does not change significantly and the reason it does not change is not due to the set of factors; hence it must be due to some other reason.

- Null hypothesis accepted
- Low rating on difficulty factors index
- No difference in levels of planned decisions

The research hypothesis postulates that only outcomes 1, or 3 will be observed from the study. If outcomes 2 or 4 were observed, these results would reject the hypothesis.

6.4.3 Comparison of results obtained with the hypothesis

The hypothesis has been tested using both qualitative and quantitative measures.

- Quantitative information based on sampling and analysis using the measuring instruments to determine the decisions taken and difficulty indexes.

- Qualitative information from structured and semi-structured interviews with ward sisters, nurse managers and expert judges.

The main study concentrated on two wards - ward N (elderly rehabilitation) and ward L (paediatric). A description of these wards is contained within this chapter.

The quantitative and qualitative results obtained on these wards are summarised in the following table:

Results	Ward N (elderly rehabilitation)	Ward L (paediatric)
Quantitative measures		
Chi-squared test (to test significant changes in patterns of decision making)	$X^2 = 16.64$ significant difference at 5% probability	$X^2 = 5.55$ no significant difference at 5% probability
Changes in planned decisions between 'before' and 'after' samples (to test the degree of change)	Increase of 14 planned decisions (40% increase)	Reduction of planned decisions by two (25% less)
Value of difficulty index (to identify set of factors already in existence)	9.84 (2nd lowest index from sample of 16 wards)	12.71 (4th highest index)
Qualitative information		
Ward sisters structured interviews (extract from interviews)	Improved balance of staff to planned work-load had been achieved. Planned admissions had increased due to improved availability of information	Only a reactive approach was possible due to the identified factors on the ward and she doubted whether the decision support system could assist her in these circumstances
Panel of judges expert views from semi-structured interviews (extract from interviews)	Although not specifically reviewed by the judges, a general view was held that elderly rehabilitation wards would have low difficulty factors as admissions could be planned to a large extent and patients conditions remained constant	The ward was identified as high difficulty as every consultant in the hospital admits to the ward. Relatives were identified as a particular problem on paediatric wards adding to social problems

Table 21. Summary of Quantitative and Qualitative results from the sample wards

6.5 OVERALL CONCLUSIONS

6.5.1 Testing the research hypothesis

The results from the quantitative and qualitative measures obtained for Ward N, support outcome 1 to the research

hypothesis. Significant changes in the patterns of decision making were identified after the decision support system was implemented and substantiated by the results of the chi-squared test. The difficulty factors were relatively low according to the difficulty index, representing a ward where a significant proportion of planned decisions could be made. The judges considered that the difficulty factors would be low in the elderly rehabilitation unit compared to wards in the general hospital.

Outcome 3 of the research hypothesis is supported by the results from the quantitative and qualitative measures obtained for ward L. No significant changes in ward decision making were identified from the results of the chi-square test. A low proportion of planned decisions were made on this ward. The ward sister considered that only reactive or 'crisis' decisions could be made due to the 'difficulty' factors which were prevalent. According to the sample of wards, the difficulty index for this ward is high, reflecting a ward which is disrupted by unplanned and incremental activities. Judges 2 and 3 ranked ward L as the most difficult ward to manage in the hospital.

From the results and analysis of the quantitative and qualitative measures, the research hypothesis has been tested and significant agreement has been obtained, on the sample wards.

6.5.2 Design of Measuring Instrument

The ward sisters undertaking the sampling could understand and use the decision diaries, after initial training by the researcher.

The sister at the teaching hospital identified a sub category that was required under the category 'workload prioritising'. As patients were admitted directly to her ward, she was given additional responsibility for admissions, and could temporarily close beds due to inadequate staffing on her ward, after consulting with the consultant. This sub category has now been added to the decision diary. No other new sub category was identified during the course of the sampling exercise.

A criticism of the design was the imprecise meaning of 'this week' and 'next week' and that a continuum of time would provide a clearer means of measurement. The original design also divided categories into 'planned' and 'unplanned' time horizons, whereas the results showed no distinction for certain sub-categories e.g. 'Reallocation of nurses between wards' (staff allocation) and 'Deploy staff between wards' (workload prioritising). These sub categories have now been amalgamated into the category 'staff allocation', with each sub category a time span as follows:

'This shift', 'Next shift', 'Next 24 hours', 'Next 48 hours', 'Longer'.

The revised decision diary is shown as Appendix 15.

6.5.3 Validation of the Measuring Instrument

In simple terms, the question to be addressed is did the decision diary measure "what it was supposed to". The purpose of this diary was to record management decisions made by ward sisters. Firstly, the diary covered the likely management decisions to be made except for the temporary closure of beds actioned by the ward sister, which was identified at the teaching hospital. Secondly, in the professional judgement of the ward sisters and other nurse managers, the results of the sample reflected the types of decisions made. However, the accuracy in recording all decisions that were made cannot be validated within the design of the sampling study.

The criteria for internal validation has been met, based on the professional judgement of the ward sisters and their managers. External validation considers whether the results reflect those that would be found in a wider population. The purpose of sampling decisions made in a teaching hospital was to provide a wider view of the instrument's applicability. More sampling would be required before conclusive evidence of external validation could be obtained.

6.5.4 Utility of Decision Support System

The views of the ward sisters were obtained during the interviews, concerning the utility of the ward nursing system. They considered that the system takes too much nursing time to input data to the computer. They perceived their main role as

providing care to patients rather than managing staff and resources on the ward using information from the decision support system. Pembrey's findings (1980) supports this role perception, for the majority of ward sisters in her study.

The ward sister who undertook sample A, acknowledged that some benefit was derived from the system, especially in providing an equitable method of staff deployment within wards in a unit. However, sample B's ward sister considered that due to the disruptive problems on her ward, she doubted whether the system could assist in these circumstances.

The evidence collected and the conclusions from testing the research hypothesis suggest that certain factors do effect the usefulness of the decision support system to the ward sisters. Of critical importance is the involvement of the admitting doctors in planning the ward's patient workload with the ward sister. This research shows an example where one consultant admitted to an elderly patient ward and through improved communications, using information from the ward nursing system a better balance of nurses to patients' workload was effected with improved care standards. On the other hand, nineteen doctors admitting to a paediatric ward resulted in an unco-ordinated and disrupted environment. Although efforts had been made to inform the consultants of the impact of their admissions policies on the ward's workload, no changes had taken place. As a result, information from the system could not be used to promote a higher degree of rationality (or planning) in the decision making processes. As a consequence the system was not being utilised and the ward sister was

disillusioned as to its effectiveness. It is likely, as this disillusionment increases, the accuracy of the data input to the system will decrease. The inaccurate recording of ward absences would support this view.

CHAPTER 7 FURTHER VALIDATION OF THE "DIFFICULTY FACTORS" INDEX AND INVESTIGATION OF DECISION PROCESSES ON WARDS AT A TEACHING HOSPITAL

7.1 INTRODUCTION

Although there was evidence of internal validation of the 'difficulty factors' index, at a Northern District General Hospital, (as described in Chapter 5) the generalizability and stability of the index could be indicated by further validation, particularly at a teaching hospital which provided a complete range of specialties, including intra-regional specialties and has implemented the Financial Information Project's ward nursing system. (Financial Information Project 1986).

The senior management of a teaching hospital in the Midlands which met this criteria agreed to the research study. In correspondence to these managers, the researcher considered the useful outcomes of this study would be:

1.) To make use of information from the ward system in a constructive manner to review the hospital organisation.

2.) To identify those wards which need assistance in reducing the likelihood of 'crisis' management.

On receipt of the research findings, the senior managers could undertake the following actions:

1.) Instigate a multi-disciplinary review of these identified wards including ward sisters, and their managers, together with their clinicians on the review team. The results of the study would be used to decide the agenda for the review.

2.) Implement periodic auditing to highlight wards where the 'difficulty factors' indexes are increasing rather than reducing.

It would also be an opportunity to bring the research "up-to-date" to reflect the organisational changes that have occurred since 1991, in particular the purchaser/provider contracting and clinical directorate management structures and assess the impact of these changes, by interviewing ward sisters in this hospital.

The project nurse at this teaching hospital provided considerable assistance in collating information from the Patient Administration System and the ward system to enable the researcher to calculate the indexes for the wards in the hospital. She also agreed to be interviewed to provide validation of the results of the index as she had extensive knowledge of the management issues relating to the wards in the hospital. Finally she arranged interviews with a number of ward sisters on behalf of the researcher for the purpose of validating the index, and assessing the effects of the decision support system and the organisational changes on the wards.

7.2 ORGANISATIONAL STRUCTURES AND FINANCIAL POSITION OF THE TEACHING HOSPITAL

The hospital is currently a directly managed acute services unit and provides services to a number of purchasing authorities. The unit is preparing capital and revenue plans to ensure that the unit is in an income and expenditure balance for 5th wave Trust status on 1st April 1995. These Trusts allow hospitals to gain self governing status within the NHS.

However, the unit is greatly overspent during the financial year 1993/94, amounting to over four million pounds. As a result there is a need to reduce staff in the unit by approximately 600 staff - 200 of these will be achieved by the reduction in agency and temporary staff. It is intended that the remaining 400 will be attained by a redundancy exercise across the unit.

At the same time, there are increasing pressures on beds. For the year end March 31st 1993, activity reached 103% against target, with all the waiting list targets having been reached.

Major changes are constantly occurring with service planning in the District, which as a purchasing authority is considerably overspent. These changes are having a significant effect on the Unit. Transfers of services are occurring regularly, including the transfer of neurosciences from another hospital in the District and the centralisation of ophthalmology services for the District in this Unit. On the advice of the project nurse, a number of wards have been excluded from this

study as there are constant changes occurring on these wards including numbers of beds allocated and the specialties to which they are allocated. However, the majority of wards in this unit have been included in the study and details of the wards are shown as Appendix 16.

The management structures in the hospital have also changed radically from a hierarchial based structure to a 'clinically-devolved' structure. Specialties are managed in clusters - each cluster has a senior manager and head of nursing. Within these clusters a clinical director has been appointed, together with a business manager for each specialty. In some cases, a deputy business manager has also been appointed. Nurse managers have not been appointed to each specialty. Appendix 17 outlines the management structure of the Unit.

7.3 CALCULATION OF THE 'DIFFICULTY FACTORS' INDEXES AND ANALYSIS OF THE RESULTS

Data was collected from the local information systems for the periods February and July 1993, for the wards in the study. Two samples were taken to test the stability of the index and determine if there were significant seasonal variations for the months of February and July 1993.

The results of the calculations to determine the indexes for the sample periods are:

WARD	DIFFICULTY FACTORS (W x Sc(M)) STANDARDISED MEASURES (as detailed in table 9)											DIFF. INDEX (WxSc(M))
	1	2	3	4	5	6	7	8	9	10	11	
A1	3.26	1.88	0.14	1.91	0.02	0.00	0.14	1.37	0.00	0.41	0.46	8.9
B1	2.14	1.60	0.75	1.91	0.02	0.00	0.02	0.88	0.00	0.51	0.61	8.4
C1	1.92	1.15	0.72	1.67	0.06	0.00	0.18	2.33	0.00	0.12	0.00	8.1
D1	3.23	0.48	1.17	1.76	0.08	0.00	0.04	1.05	0.00	0.00	0.00	7.8
E1	3.13	0.61	1.06	1.73	0.04	0.00	0.12	1.93	0.00	0.27	0.72	9.6
F1	2.78	0.93	0.92	1.82	0.02	0.02	0.06	1.88	0.00	0.07	0.67	9.2
G1	3.13	1.25	0.70	1.84	0.02	0.00	0.04	1.48	0.00	0.29	1.24	10
H1	2.59	0.99	1.03	1.87	0.02	0.00	0.16	1.68	0.00	0.19	0.72	9.2
J1	2.68	1.09	1.17	1.76	0.02	0.00	0.06	1.56	0.00	0.29	0.76	9.4
K1	3.39	0.99	1.12	1.32	0.02	0.00	0.06	0.94	0.00	0.24	0.39	8.4
L1	2.56	0.19	1.84	1.07	0.04	0.00	0.08	2.39	0.00	0.00	1.64	9.8
M1	2.14	0.00	1.90	1.58	0.02	0.00	0.00	2.22	0.00	0.00	0.00	7.8
N1	2.46	1.60	0.00	1.89	0.04	0.00	0.14	0.22	0.00	0.31	1.05	7.7
O1	2.14	0.54	1.28	1.49	0.04	0.00	0.26	1.96	0.00	0.68	0.00	8.4
P1	2.84	0.28	1.40	1.89	0.02	0.00	0.04	0.99	0.00	0.34	0.52	8.3
Q1	2.20	0.19	0.75	1.51	0.04	0.00	0.08	2.16	0.00	0.34	0.19	7.5
R1	2.75	0.44	1.09	1.89	0.02	0.00	0.04	1.59	0.00	0.44	0.39	8.6

Table 22 Results of Index Calculation for February 1993

WARD	DIFFICULTY FACTORS (W x Sc(M)) STANDARDISED MEASURES (as detailed in table 9)											DIFF. INDEX (WxSc(M))
	1	2	3	4	5	6	7	8	9	10	11	
A1	3.26	1.70	0.70	1.93	0.02	0.00	0.06	1.19	0.00	0.58	0.30	9.7
B1	2.30	1.86	1.17	1.76	0.02	0.00	0.06	0.37	0.00	0.51	0.61	8.6
C1	1.92	0.44	1.26	1.78	0.08	0.00	0.02	0.91	0.00	0.04	0.00	6.4
D1	2.14	0.70	1.00	1.69	0.10	0.02	0.30	2.22	0.00	0.24	0.00	8.4
E1	3.07	0.89	1.28	1.80	0.02	0.00	0.06	1.56	0.00	0.31	0.63	9.6
F1	2.46	0.61	1.03	1.84	0.02	0.00	0.00	1.53	0.00	0.19	0.46	8.1
G1	2.84	1.05	0.72	1.84	0.02	0.00	0.00	1.31	0.00	0.66	1.85	9.3
H1	2.56	0.54	1.95	1.93	0.02	0.00	0.04	2.22	0.00	0.36	0.61	9.2
J1	3.07	0.83	1.37	1.78	0.02	0.00	0.06	2.17	0.00	0.44	0.48	10
K1	2.46	0.70	1.34	1.49	0.02	0.00	0.10	1.16	0.00	0.31	0.00	8.8
L1	2.84	0.16	1.96	1.39	0.04	0.00	0.48	2.65	0.00	0.17	0.26	7.7
M1	2.56	0.09	1.84	1.47	0.10	0.00	0.16	1.82	0.00	0.07	0.59	7.1
N1	3.07	0.99	0.00	1.93	0.04	0.00	0.08	0.00	0.00	0.14	0.48	6.7
O1	2.14	0.28	1.51	1.65	0.04	0.00	0.06	1.82	0.00	0.27	0.00	7.7
P1	2.88	0.16	1.54	1.91	0.02	0.00	0.12	1.08	0.00	0.04	0.26	8.0
Q1	2.97	0.77	0.06	1.69	0.02	0.00	0.06	1.99	0.00	0.12	0.26	8.9
R1	2.36	0.99	1.31	1.89	0.02	0.00	0.02	1.45	0.00	0.49	0.59	9.1

Table 23 Results of Index Calculation for July 1993

The results obtained from the calculations were further analysed comparing the sample periods by absolute differences and ranking, as follows.

WARD CODE	SPECIALTY	DIFFICULTY INDEX RESULTS			DIFFICULTY INDEX RANKINGS		
		Feb.	July	Diff.	Feb.	July	Diff.
A1	Renal Medicine	8.9	9.7	+Ø.8	7	2	+5
B1	General Medicine	8.4	8.6	+Ø.2	9	9	Ø
C1	Liver ITU	8.1	6.4	-1.7	13	17	-4
D1	Liver Unit	7.8	8.4	+Ø.6	14	1Ø	+4
E1	Urology	9.6	9.6	Ø	3	3	Ø
F1	Vascular/Surgical	9.2	8.1	-1.1	5	11	-6
G1	Renal/Surgical	1Ø.Ø	9.3	-Ø.7	1	4	-3
H1	Surgical	9.2	9.2	Ø	5	5	Ø
J1	Surgical	9.4	1Ø.Ø	+Ø.6	4	1	-3
K1	Surgical	8.4	8.8	+Ø.4	9	8	+1
L1	Day Unit	9.8	7.7	-2.1	2	13	-11
M1	Paediatric ENT	7.8	7.1	-Ø.7	14	15	-1
N1	Elderly Care	7.7	6.7	-1.Ø	16	16	Ø
O1	Multi Specialty	8.4	7.7	-Ø.7	9	13	-4
P1	Cardiac Surgery	8.3	8.Ø	-Ø.3	12	12	Ø
Q1	Cardiology	7.5	8.9	+1.4	17	7	+1Ø
R1	General Medicine	8.6	9.1	+Ø.5	8	6	+2

Table 24. Analysis of Results of Index Calculations

In terms of absolute differences, fourteen out of the eighteen wards varied by 1.Ø or less between the sample periods. A similar analysis was obtained in comparing ranking numbers. Four from the eighteen wards varied by more than four ranking numbers. Allowing for a reasonable degree of variation, 78% of the samples' results varied between these limits. The wards that varied significantly outside these limits were:

Ward	Specialty	Varying Factors
C1	Liver ITU	Reduction in emergency admissions and agency nurses
F1	Vascular Surgery	Reduction in bed occupancy and emergency admissions
L1	Day Unit	Reduction in bed occupancy and emergency admissions and increase in support staff
Q1	Cardiology	Increase in bed occupancy and emergency admissions

Table 25 Analysis of Wards with Significant Variations

On further investigation into the reasons for these variations, the main reason for the reduction of patients being admitted is consultants taking holidays during July. This change was particularly significant on the day unit (L1) with high patient throughput in February. The cardiology ward (Q1) had increased throughput of patients in July as a part of an overall increasing level of admissions to a service which started within the last twelve months.

If the Day Unit (L1) is excluded from the rankings due to the wide variation between the samples a consistent top six wards can be identified from both sample periods, which are:

Ward	Specialty	Ranking	
		February	July
A1	Renal Medicine	6	2
E1	Urology	3	3
G1	Renal/Surgery	1	4
H1	Surgery	5	5
J1	Surgery	4	1
R1	General Medicine	7	6

Table 26. Upper Quartile of Wards in Sample Taken

These wards represent the upper quartile of the samples taken and should be the wards which are most disrupted and difficult

to manage.

In comparison with the results from the Northern Authority study (described in Chapter 5), there are a number of organisational differences. The methods for the delivery and plating of meals are different - the Northern Authority delivers food in bulk to the wards and nursing staff portion and serve the food to plates for the patients. In the Midlands teaching hospital, the food is pre-plated, reducing the work for the nursing staff at the ward level. No agency nurses are employed in the Northern district general hospital whereas these agency staff are used extensively in the Midlands teaching hospital. There were significant numbers of 1st and 2nd year learners on the wards at the Northern hospital but, due to the teaching hospital role that the unit undertakes, only third year learners were seconded to wards in the teaching hospital. The emergency admissions were also significantly higher in the Northern hospital wards implying that elective admissions were the usual admissions policy at the teaching hospital, particularly for regional specialties with carefully monitored waiting lists.

From a sensitivity analysis undertaken on both studies, to indicate these factors which produce the greatest differences and therefore most influence the ward rankings, 'bed occupancy', 'emergency admissions' and 'average stay' were common denominators. However 'learners on ward' was a significant factor in the Northern study and 'theatre patients' and 'support staff' were important factors in the Midlands study. From this analysis, six of the eleven factors most

influenced the rankings (Appendix 18 details the results of the sensitivity analysis).

From the analysis undertaken and because of the organisational differences in the two study sites, it can be concluded that absolute comparisons cannot be supported between these hospitals. Ranking lists of wards are relative, indicative measures for a particular hospital unit. The upper quartile ranked wards have shown to be stable over two sample periods in the Midlands study and are indicative of those wards where ward management could be difficult because of the prevailing organisational factors.

7.4 RESULTS OBTAINED FROM THE SEMI STRUCTURED INTERVIEWS

7.4.1 Purpose of interviews

Interviews were conducted with the project nurse and ward sisters to validate the results of the index calculation and gain insights into the management decision processes on the wards.

7.4.2 Project Nurse Interview

The project nurse is responsible for the operation and maintenance of the decision support system in the hospital and has been in post for 4 years since 1989. During that time she has gained a detailed knowledge of the organisational and management issues relating to each ward in the hospital. Before she became the project nurse she had gained a wide

nursing experience, including ITU and midwifery and was a ward sister for nine years.

She considered that the following wards were the most difficult to manage:

A1 - Renal 26 beds

These adult patients are in the main chronically sick who tend to be transferred in and out of the ward at short notice. The ward is physically cramped and there is not adequate space between beds for the dialysis machines.

G1 - Mix of general surgical/renal/liver 26 beds

A number of consultants from different specialties are competing for bed allocation on the ward. Staffing levels are inadequate and not funded for the level of renal transplants and liver work undertaken. A high proportion of the patients are emergency admissions adding to the problem of managing the ward.

H1 - General surgical concentrating on lower bowel area - colostomy and stoma, 34 beds

There are many consultants admitting to the ward, currently eight, resulting in a high pressure on available beds. Admissions are cancelled at short notice, resulting in patients being phoned 3 or 4 times before they are finally admitted. There can be up to 3 theatre lists a day. Theatres used by

this ward are not in one suite, resulting in extra time on escorting patients and absence from ward.

The project nurse identified the following wards as least difficult to manage:

F1 - Vascular surgery, 28 beds

She considered that this ward was the least difficult surgical ward to manage. The type of surgery was specific with little variety. There was good co-operation between the 3 consultants and the nursing staff. Bed occupancy was relatively low compared to other surgical wards. Staffing levels were reasonable, although they were deteriorating during the last few months.

Q1 - Cardiology, 16 beds

There was a small number of consultants on this ward.

The project nurse identified readily the most difficult wards with substantive reasons. She was less certain about the least difficult wards, needing some prompting. In her mind every ward was difficult. One of the reasons she gave for this attitude was the constantly changing organisation structure as staff and wards were decanted between hospitals in the Trust. Senior management responsibilities were also regularly changing.

She was then shown the results of the difficulty index

calculations. She agreed with the top ranked wards as the results supported her professional judgement.

Specific comments were made concerning certain wards;

- liver unit (D1) was correctly ranked in the lower half as there were no students, specific conditions and reasonable staffing. However, the liver I.T.U. (C1) should be considered in conjunction with this unit.

  Day unit (L1). There was a significant difference in the rankings between February and July. In her opinion the consultants had little regard for staffing levels, therefore there were high numbers of day cases in February whilst the lists were much lower in July when the consultants were on holiday.

- N1 was agreed as the least difficult ward to manage.

At the end of this part of the interview she considered that, generally the results compared closely with her professional views.

The project nurse was invited to make any further comments which were that:

1. Ward sisters were very parochial and not aware of other wards' problems. They would perceive their own ward as the most difficult to manage.

2. Immediate managers have not been acting on information from the decision support system which was generally showing that wards were understaffed particularly for qualified staff. This response was probably a reflection of the cash crisis in the hospital.

3. In her view, the consultants were the major problem, tending to be isolationists not team players; simply stated, more consultants meant more problems for the ward sister.

7.4.3 Ward Sister Interviews

Interviews were arranged with six sisters representing a range of wards from within and outside the upper quartile rankings of the 'difficulty factors' index. A semi structured interview was conducted, lasting in duration between one hour and one and a half hours each. The aim of the interviews was to provide further evidence of validation for the index results and an understanding of the management and organisational issues in the hospitals. Each of the sisters' interviews are contained in Appendix 19. A summary of these interviews is detailed in the following paragraphs.

How many years have you been a ward sister?

The experience of the sister's interviewed ranged from 3 years to 8 years with a mean value of 5.5 years. The sisters have tended to specialise at an early stage in their careers, with little movement between specialties or hospitals.

Have you any qualifications other than RGN?

Half the number of sisters had not obtained or were not attempting to obtain further qualifications. However, one sister had been awarded the Diploma in Nursing and another sister, BSc in nursing studies. Another sister was studying for a diploma in management.

Have you attended management courses?

Three sisters had completed ENB courses (923 and 998) for clinical development and teaching assessments. A majority of the sisters are currently attending a local management course for 'G' grade nurses. Concerns were expressed by a number of the sisters regarding the type of management course they should attend in the future which would best equip them for their perceived ward management role.

Do you see yourself as the ward manager? If not, how would you describe your main role? Could you describe your reporting relationships?

Only two ward sisters considered themselves as ward managers, per se. In the main, the ward sisters interviewed were unclear as to their main role. They perceived that the role was changing to becoming more management orientated but they were still a "pair of hands" undertaking clinical nursing activities.

Many of the sisters commented that time was not available to undertake these 'administrative' duties, especially as all the sisters considered that staffing levels were low, for the level of activity on their wards.

The ambiguity in their roles is reflected in the reporting arrangements. In fact, there was no consistent reporting structure with the wards studied. The ward sisters reported to a business manager or deputy business manager, who tended to be non-nurses. Professional clinical accountability varied. In the minority of cases they reported to a senior nurse manager, but the remainder of the sisters felt 'cut off' from a peer group. In one instance, as the sister is 'acting up' in the nurse manager post (the post has not been filled) she is responsible for the financial budgets and she can authorise the booking of agency nurses. However, the other sisters studied were not responsible for the budgets and needed authorisation from the business managers to book agency nurses. According to the sisters, these budgets were historically based and did not reflect the current requirements for staffing. Inevitably, therefore, a high level of agency nurses was booked every week.

How would you describe your ward in terms of difficulty of managing compared to other wards in the hospital?

(The responses of the sisters have been summarised individually to provide professional validation against the results of the difficulty index).

G1 - The ward is extremely difficult to manage mainly because

it encompasses two difficult specialties; liver and renal. (Difficulty index results - upper quartile ranked 1st in February sample).

H1 - The ward had a high workload, but the staff were very experienced, and used to working at a fast pace. (Difficulty index results - upper quartile).

F1 - The sister considered that all surgical wards are on a par of difficulty. However, the situation had been made more difficult recently by the transfer of eight urology beds from another hospital. (Difficulty index results - mid range, ranked lowest of surgical wards).

Q1 - The ward was recognised as not the most difficult to manage and certainly was not as difficult as A1 or B1 wards for which the sister had some knowledge. (Difficulty index results - lower quartile, ranked below A1 and B1).

A1 - A1 is the busiest ward in the hospital with 100% bed occupancy and therefore must be one of the most difficult wards to manage in the hospital. (Difficulty index results - Upper quartile, ranked 2nd in July sample).

O1 - From the sisters knowledge of other wards, she considered the ward would lie in the middle of the hospital rankings. (Difficulty Index results - mid range).

What factors do you find makes managing a ward difficult?

The number of doctors admitting patients to the wards was a major factor identified. There appeared to be a strong relationship between numbers of doctors and increased requirement for co-ordination, worsening communications with and between consultants and junior doctors and more unpredictability with patients' admissions.

Other factors identified were high bed occupancy, shortage of trained staff leading to higher levels of sickness, increasing use of agency nurses and supervision required of student nurses.

All the sisters commented about the poor morale of the staff, because there was a high degree of uncertainty with a constantly changing organisation structure. The sisters felt there were no aims and objectives, just a message that, "they must cut back!".

What information do you need to manage your ward effectively?

From the responses of the sisters a number of information categories can be identified:

Patient dependency and staffing information is required to plan staffing levels to provide patients with agreed standards of care.

Forward planning of beds with consultants is needed to underpin the staff planning process, although it was generally stated,

that consultants tended to be parochial, booking at short notice, ensuring that their own patients were admitted.

Financial budgets need to be set in consultation with the ward sister, reflecting the up-to-date ward requirements. Regular information should be provided to sisters of actual usage of resources against budgets.

Care planning information was collected in an inconsistent manner in the wards studied. As a rule these plans did not reflect individualised care, rather core profiles for a type of treatment.

Administrative/management policies needed to be communicated effectively from senior management to the ward level. One sister commented, it was not clear how nursing is represented at senior management meetings. There is no nursing representative at co-ordinator level which restricts information concerning strategy and future direction reaching the ward level.

What benefits do you obtain from the ward nursing system? Could you manage as or more effectively without the system?

All the ward sisters interviewed had used information from the ward nursing system, with the support of the project nurse to make a case to their business managers' for increased establishment of nurse staffing.

In one instance, action had been taken by introducing internal rotation. Reduction of untrained staff on night shifts was achieved with increased numbers of trained staff on day shifts. However, this action was the exception rather than the rule, and the majority of sisters had met with at best a delay in making a decision and at worst an outright rejection of the results derived from the system.

Even so, five out of the six sisters interviewed still believed that the system was necessary to 'back up' their professional judgement and store information about workload and staffing.

The general view was that senior managers would not "take on" more staff until the future of the hospital had been decided. An important observation made by one sister was the need to input data accurately as it had become clear in making the case for more staff, that, for example, ward absence had not been recorded properly.

Would you describe your management decision making mainly as "planned" or mainly as "crisis management"?

The responses of the sisters varied; more emphasis on crisis management being made by those sisters whose wards were identified as extremely difficult to manage. The reasons given for crisis management were short notice staff sickness, ineffective communication between consultants and their junior doctors and the unpredictable nature of their patients' conditions. The main areas for planned decisions related to planning off duty rotas and elective admissions.

What decisions do you make involving your immediate manager?

The sisters interviewed all reported to business or deputy business managers. Decisions involving these managers are mainly financially related; authorisation of employment of agency nurses and staffing within spending limits. The role of the business manager was not wholly supported by the sisters; there appeared to be resentment that they could not authorise the booking of agency staff. The cases for increased nursing establishments were made to the business managers who were perceived to "hold the purse strings".

The majority of sisters did not report professionally to a nurse manager and these sisters expressed a grave concern that they needed this professional support to "back them up" with the doctors.

The role of the clinical co-ordinator was raised by one sister, who discussed policy issues such as agency staffing levels with this person.

What decisions do you make involving consultants?

The general comments by the sisters were that communications with their consultants were good, albeit informal. In the main there were no regular meetings with these consultants to forward plan admissions of patients related to staff availability. Regular ward rounds took place when decisions relating to admissions and discharges took place. As a rule,

the consultants' secretaries book patients for admissions. One sister expressed a view, that she could refuse the admission of a patient if the ward was not adequately staffed.

What actions would you take to improve the management of your ward?

1. The foremost action that the sisters proposed was to provide an adequate number of nurses, particularly qualified staff, to meet the needs of their patients and reduce the reliance on agency nurses. Agency nurses were generally seen as reducing the overall effectiveness of the ward staff. Bearing in mind, the obvious financial constraints, short term contract staff could provide an interim solution.

2. Improved communication with the doctors was of paramount importance to the sisters. Regular meetings should be instigated with consultants and junior doctors to improve the planning of admissions and discharges, patient investigations and changes to treatments.

3. Management organisation and structure would be changed by all the sisters interviewed. The role of the sister would be more clearly defined as the ward manager, who would have the authority to hold budgets. The business manager role would no longer be required as the sisters would become part of the management structure. Clinically based senior nurses would be appointed in units where nurse managers are no longer in post, to provide professional

support to the sister. There would be improved access to clinical co-ordinators to clarify and communicate the aims and objectives of the specialty. Some ward sisters would appoint the 'G' grade nurse as supernumary to the ward establishment - no longer a 'pair of hands' to undertake patient activities.

4. A number of sisters considered that their wards needed to be redecorated, rewired and structural alterations were required to provide adequate day room and general office facilities.

5. One sister identified the need for emergency call bells, in order that patients did not have 'to shout for help!'.

6. Essential equipment such as syringe pumps and monitoring equipment should be purchased.

7. Car parking should be provided which was 'well-lit' at night and regularly patrolled.

8. Study leave should be planned for ward staff to develop these nurses professionally.

7.5 CONCLUSIONS

According to discussions with experienced senior nursing staff the 'difficulty factors' index has measured what it was intended to and identified those wards which were most difficult to manage. There are limitations in the use of this

index and it should not be used to identify absolute values between wards or hospitals, but rather provide a relative indicative measure pertinent to a particular hospital and set of organisational circumstances.

There is a temptation to reduce the number of factors in the calculation, as the sensitivity analysis shows that some of the factors do not materially effect the end results. However, there is evidence to suggest that data is not input to the ward system concerning at least one of these factors. It is doubtful whether ward absences and escorting patients are recorded comprehensively, as one sister agreed when interviewed. Therefore these factors may become more significant in the future simply when data is recorded accurately.

Of equal interest, was the degree of control influenced by the professional monopolisers (Alford 1975), the doctors, on the magnitude of those factors deemed significant by the sensitivity analysis. 'Bed occupancy', 'emergency admissions', 'average length of stay' and 'patients to theatre' are all factors largely controlled by doctors. 'Learners on wards' and 'support staff' were the only significant factors not controlled by the doctors.

This controlling influence pervaded the interviews with the nursing staff when a senior nurse commented that, "more consultants meant more problems for the ward sister". There were no formal meeting arrangements to plan admissions and discharges, rather informal relationships which appeared to

operate well on a 'one-to-one' basis. The comment that doctors were individuals not 'team players' supports this view. This arrangement tends to support the 'elite' theory particularly in the control of agendas.

The major financial problems in the Unit with constant organisational changes has effected the morale of the nurses and highlighted the degree of uncertainty as to the future direction of the organisation. This loss of morale has been exacerbated by the lack of acceptance of clear evidence from the decision support system that more staff, especially skilled nurses, are required to meet the patients workload. Targets for waiting lists are being exceeded against a backdrop of nurses stretched to their professional limits with many of them likely to be made redundant in the future.

The rational intervention of the decision support system is not effecting the status quo of the doctors who are continuing to admit patients, in the face of rational and comprehensive reports that staff should be increased or workload should be reduced.

The role of the ward sister is unclear and inconsistent. It appears that management structures have been imposed on these staff without consultation and consequently they are incorporating more management activities on an incremental basis, whilst still fulfilling a clinical nurse function. There are overlaps in terms of authority and responsibility between the ward sister and the business manager, especially with budgetary authority and control of agency nurses.

This recent study shows ward sisters still undertaking a key co-ordinating role but incurring ever increasing stress from organisational problems arising from the purchaser/provider funding arrangements and management structures which underline budgetary prudence to the detriment of acceptable clinical nursing standards. It appears, therefore that the purchaser contracts do not reflect essential patient care quality measures, which could be analysed from the results of the information system.

The results of the research have been made available to the senior managers at the teaching hospital. The recommended next research study is to instigate a multi-disciplinary review on those wards identified in the upper quartile of the index rankings, following agreement with the specialty directors and the consultants.

CHAPTER 8 - REVIEW OF RESEARCH UNDERTAKEN AND ITS APPLICATION IN THE HEALTH SERVICE OF THE 1990s

8.1 INTRODUCTION

This chapter provides a synthesis of the research undertaken in this thesis. Firstly the critique of the research literature is assessed, concentrating on omissions in this literature relating to decision theory and its relevance to decision processes using decision support systems.

The research methodology used is critically reviewed, examining the validity and relevance of the methodology and measuring instruments developed. The implications for future research are examined.

The performance of the decision support system is also critically appraised in terms of its utility in improving decision making at the ward level in hospitals.

The new knowledge gained as a result of undertaking the research detailed in this thesis is highlighted and related to the critique of the literature reviewed.

The application of this new knowledge gained is considered in the context of the organisational changes and information management and technology strategies now being promulgated in the National Health Service.

8.2 OMISSIONS IN THE RESEARCH LITERATURE

From the literature review conducted up to 1988, many views and models of decision making have been expounded (Simon 1957, Etzioni 1967, Allison 1971). Hall (1980) considers that an 'all embracing' synoptic theory to explain the decision processes in an organisation is still to be developed. A particular contradiction is the attempts to follow a rational approach within an environment which is incremental by nature, in its decision processes. Thomas (1988) postulates that a model of decision making and change is needed which recognises not only people's attempts to behave rationally but also the reality of power in the organisation. The literature reviewed does not provide evidence of which theory is appropriate in these circumstances. In Thomas's view, the rational model is weak at the descriptive level, but it is probably the best prescriptive model available.

Although Simon (1973) identified a relationship between appropriate information technology and organisational design, a direct causal relationship has not been developed between the utility of decision support systems and organisational structure. A partial explanation of measures that could be applied to categorise decisions such as 'risk', 'uncertainty' and 'time horizons' have been developed, but these categories are not sufficient to explain the impact of organisational design in conjunction with information technology.

Formal evaluation of decision support systems regarding the system's effectiveness is an omission in the literature,

particularly related to use of these types of systems in the National Health Service. There is no rigorously evaluated evidence to suggest that benefits do accrue as a result of implementing these systems. An important omission within evaluation studies is that the impact of the power and authority of doctors on the utility of decision support systems has not been considered.

According to Akinsanya (1991) only a minority of nursing research undertaken, when the literature review was conducted, related to management and staffing. In the main, this research used quantitative measures. Although research has been undertaken into the role of ward sisters as managers (Pembrey 198Ø, Runciman 1983) only a partial account of ward management has been given according to Evers (1982). There has been little research into the decisions taken by ward sisters as managers of staff resources, and no classification of these management decisions has been developed.

The conclusion from the literature review conducted between 1986 and 1988 was that research which explored the effects of a decision support system on hospital wards within the National Health Service, and which constructed a valid theoretical framework to explain the results of this research, would make an original contribution to knowledge. The research would need to provide evidence of the validity of measuring instruments used and their applicability for further experimentation.

8.3 REVIEW OF RESEARCH METHODOLOGY USED

8.3.1 Evaluation Study

A classification was constructed distinguishing evaluation approaches which used objective and subjective measures and related them to summative and formative approaches. Specific approaches were identified within this taxonomy which were considered appropriate to evaluate a decision support system to determine system effectiveness.

The approaches identified were used in an evaluation trial (described in Chapter 4). The evaluation methods used provided a comprehensive analysis of the effectiveness and efficiency of the ward system studied. Nevertheless there were limitations in the conclusions of the evaluation, as benefits identified were perceived as potential rather than actual, because only the pilot wards in the hospital had installed the decision support system. Significant changes were identified from analysis of the performance measures, and it is probable, but cannot be proven conclusively, that these changes occurred as a result of the intervention of the decision support system.

The research design and methodology used met the objectives of the evaluation study in providing an evaluation framework to test the system's effectiveness. This approach has proved sufficiently robust to provide a methodology for the conduct of other systems' evaluations.

8.3.2 Empirical Study

The empirical study was based on the 'before-after' design as defined by Moser and Kalton (1971). This design was the most practically suited to the type of experiment which was conducted. However, due to the limitations and constraints which necessarily defined the criteria for sample wards to meet, and because of issues of internal and external validity, the sample size of the experiment was small and took a long time to complete (Chapter 6 details this investigation).

Due to this sample size, it was critically important to examine these limited number of wards in depth, using the results of the measuring instruments, undertaking semi-structured interviews with unit managers and ward sisters and collecting additional information concerning the changing nature of the 'difficulty' factors.

A research hypothesis was formulated and successfully tested using results from both the quantitative and qualitative measures. Although the results obtained strongly corroborated the research hypothesis, the small sample population indicates probable rather than conclusive proof to support the postulated hypothesis.

The study design provided a methodology to undertake an investigation into decision processes and can be used for further experimentation, although the strictly defined criteria for sample wards will probably restrict the extent of this type of experimentation in the future.

8.3.3 Measuring Instruments

Decision Diaries

This research has developed a classification of nurse management decisions. The decision diary categorised these decisions by 'time horizon' to provide a measuring instrument for the empirical study. The results of the sampling studies supported the internal validation of the instrument in a medium sized general hospital, and further sampling in a teaching hospital supported the applicability of the instrument in a wider population.

The initial design of the decision diary was criticised by ward sisters because of imprecision in the definitions of the 'time horizons' used and the inappropriate division of certain decision categories into 'planned' and 'unplanned' time horizons. The decision diary has been revised (shown in Appendix 15) to take account of these criticisms.

This measuring instrument has proven valid for the purpose it was intended, to record management decisions made by ward sisters. The instrument could be used in further research into the decision processes related to ward management.

'Difficulty Factors' Index

This index is based on a conceptual framework for the 'uncertainty' factors in decision making within an 'environment

of risk' - the ward in a hospital. The design encapsulates these factors for a particular environment (or subsystem of an organisation), within an interval index.

The factors were identified by obtaining a consensus of opinion of a sample of ward sisters using the Delphi technique, which is an iterative polling approach.

The index was validated both in a general hospital and a teaching hospital, using a panel of experts and the professional judgement of ward sisters.

In the teaching hospital study, the index was tested for its stability and the extent of seasonal variations in the results. There was a consistency in the results between the sample periods which supported the robustness of the index. However the results of the sensitivity analysis indicated that some of the factors do not materially effect the end results. There were also different factors which were significant between the hospital samples.

Therefore the index provides a relative indicative measure, related to a particular hospital and set of organisational circumstances. This index can calculate the upper quartile of wards in a hospital, where ward management is most difficult due to the prevailing organisational factors.

8.3.4 Qualitative Measures

Semi-structured interviews were constructed and conducted with ward sisters to provide validation for the measuring instruments and further understanding of the decision processes in a ward environment.

The interviews were conducted for periods lasting between forty minutes and one and a half hours. On two occasions the interviews were suspended due to patient crises on the wards and these interviews were then concluded on another day. A structure was necessary for these interviews as the ward sisters had little 'spare' time in managing the wards and carrying out direct patient care. The ward sisters interviewed 'welcomed' the opportunity to discuss issues for which they held strong views, but considered they did not have an appropriate forum or communication channel to express their feelings.

Using this qualitative approach provided the researcher with an improved understanding of the decision processes and greater insights into the management and organisational issues within a hospital.

8.4 UTILITY OF DECISION SUPPORT SYSTEMS

The evaluation trial results supported the premise that information from the ward system could improve the effectiveness of using nurse resources to meet the standards of care required by patients. However a number of issues need to

be addressed before the utility of the system can be realised.

De Maio (1980) and Gault (1982) considered that subjective values should be incorporated into the design of systems to reflect a socio-technical approach. The evaluated system was designed to incorporate professional standards of care into the system, but nurses at both hospitals had difficulty in explicitly defining these care standards (or values). In fact, these care standards were significantly different between the hospitals studied, and raised questions concerning the setting of 'base-line' standards, irrespective of the point of access to the health service.

Although every nurse on the pilot wards received an initial period of training, the majority view of the nurses from the questionnaire results indicated they required further training not only in operationally using the system but understanding how the system functions.

The evaluation study also identified a need to review the role of the nurse managers. The ward system could provide reports which would reduce the involvement of these managers in routine administration duties, to enable them to concentrate more on longer term planning of patient care and monitoring of care standards, in conjunction with clinicians. Further training would also be required for these managers to interpret the data base of management information which was available from the system. However, it is important that these managers respond to the information received from the system otherwise staff expectations will not be realised and support for the system

will decline.

The system should also be integrated both in a systems (or computerised) sense as well as in an operational sense. The system needs to be linked to a patient administration system to gain access to the patient registration and location details, to reduce duplication of data input and the risk of inaccurate data being registered. In the longer term, linkages need to be established with the personnel and payroll systems. The underlying principle of the system should be to provide operational benefits to the nurses who input the data, and management information is gained as a 'by-product' from the system. Therefore, the system should be used regularly as an important daily procedure to provide daily care, and timely and accurate information should result.

Potential benefits were identified in the following information areas:

1. Better planning of nursing off duty rotas by improving the balance of nurses in comparison with the dependency of patients using daily and monthly manpower reports.

2. Administration time can be saved by the automatic production of sick returns. Improved planning should result in the provision of sickness cover, by identifying absence trends by staff grade.

3. Care standards should be improved through the use of patient audits available from the system, to monitor

actual care received compared with the prescribed care defined in the system.

4. Careful analysis of the patient data base contained within the system can lead to review and reduction of routinised procedures which are not necessary for many patients, such as routine 'Temperature, pulse and respiration' and 'blood pressure'. Patient information can be aggregated by clinician to plan future nurse requirements, especially if significant changes in consultants' workload are planned.

From the results of the main study, the potential benefits of the ward system have not been fully realised.

In the Northern hospitals, staff sickness was reduced and care standards improved when the consultant on the elderly rehabilitation ward became involved in the planning process and when the unit manager planned the nursing resources for all the wards in the unit based on information from the ward system. In contrast no multi-disciplinary planning took place on the paediatric ward and information from the system was not utilised to improve the staff balance with patient's care needs on this ward. (The results of this study are detailed in Chapter 6). This was probably due to the large numbers of consultants admitting to the ward.

In the study of the decision processes at a Midlands teaching hospital (Chapter 7), the decision support system was not realising the benefits that had been envisaged from the evaluation study. Due to the constant organisational changes

and a breakdown in the nurse management hierarchy, there appeared to be inadequate management support for the ward system. Evidence for this view was obtained from interviews with the project nurse and a number of ward sisters.

All the ward sisters interviewed at the Teaching hospital had produced comprehensive reports, using information from the decision support system. Their reports concluded that additional staff were required, particularly trained staff, to meet the patient workload on their wards. However, in all but one case, no action had been taken by the business managers or clinical co-ordinators to provide additional staff resources. Surprisingly, the majority of sisters interviewed still supported the continuation of the system to 'back up' their professional judgement and provide a database of information for further management analysis. There was evidence that data was not input accurately to the system and it is likely that, over a period of time, the inaccuracy of the data will increase if the information from the system is not utilised by senior management. In this study, there was no evidence that doctors were involved in formal arrangements to plan admissions and discharges, and relate patients' care requirements to nursing staff's availability.

The results of this research show that where both clinical and unit management support are obtained, then benefits can be realised from the decision support system. However, in the majority of wards studied, this support was not in evidence and ward sisters alone cannot gain benefits from the system, unless their roles are radically changed in order to assume managerial

responsibility for their wards, including financial budgetary control.

8.5 NEW KNOWLEDGE GAINED AS A RESULT OF UNDERTAKING THE RESEARCH

A formalised evaluation structure has been designed and used to assess the utility of the ward nursing system. This structure provides a basis for further evaluation studies into the effectiveness of decision support systems, particularly in the National Health Service.

As well as the development of a proven evaluation design, new knowledge was gained in understanding the intrinsic difficulty in articulating professional values such as care standards and the underlying issues of differing care standards between hospitals. The required changes in the management role were also identified, which should occur as a direct result of the implementation of the system. If the organisational structure does not respond to the system's intervention, roles become dysfunctional between the hierarchial levels in the management structure. This role conflict between the ward sisters and business managers was observed in the study at a Midlands teaching hospital, in relation to the management of nursing resources. Information from the ward system was utilised by the ward sisters to support nursing requirements, but not accepted by the business managers as a basis for recruitment of permanent staff.

A major omission which was identified in the literature review is the study of management decision making at the ward level in

a hospital. Research undertaken in the main study of this thesis classified management decisions taken by ward sisters and developed a measuring instrument to record the extent that these decisions are taken. This taxonomy of decisions and the decision diary were validated and provide new knowledge to enable researchers to explore these decision processes further.

An interval scale index was also developed to provide a comparative ranking tool to determine the effects of the organisational structure, related to wards in a hospital. The effects of these structures on the utility of a decision support system could then be assessed. New knowledge has been acquired in developing a validated index which defines a relationship between the organisational design and the intervention of information technology. This index can be used in further studies to explore the effects of systems intervention with particular organisation structures in a hospital.

The new knowledge that this thesis contributes in understanding the process that should be followed to realise benefits from decision support systems for the health service, can be stated as:

1. The utility of decision support systems is dependent on the organisation structure. This structure should be analysed in terms of key factors, which are relevant and specific to an organisation (a hospital).

These key factors which have been identified should be weighted according to the consensus view of the co-ordinating manager (the ward sister) in the organisation, in the form of an interval scale index. The factors can measure and reflect the levels of disruption and uncoordinated activity in this particular organisation.

3. A multi-disciplinary review should be instigated to consider the involvement of all disciplines and managers in a corporate planning process. A review of management roles between the coordinating manager and senior managers should also be undertaken in order to clarify these roles and devolve resource budgetary control and accountability. Ownership of the decision support system needs to be accepted by all management levels and the 'professional monopolisers' (the doctors) in the organisation.

4. Organisation structures can also be reviewed using this multi-disciplinary process. When the principles of organisational change are accepted the 'difficulty factors' index can focus effort on those subsystems (the wards) in the organisation that need the most change; those wards in the upper quartile of the rankings.

5. The installation of the decision support system should not proceed until organisational changes have been agreed to reduce the levels of uncoordinated activity and disruption on wards identified in the upper quartile of the index results.

6. Formal evaluation of the system should follow its installation in order to monitor the system's effectiveness and efficiency.

7. Periodic audits of the key factors in the organisation should be maintained to assess the ongoing utility of the decision support systems Regular reviews between the major players in the organisation are required to ensure that the corporate planning process is sustained and common value judgements are discussed and agreed.

If 'common ground' cannot be determined between the interested parties because of overriding issues of power, particularly with the professional monopolisers in the organisation, then it is unlikely that the full benefits will be realised from the information technology. (Willcocks and Mark, 1988).

8.6 APPLICATION OF NEW KNOWLEDGE TO THE NHS OF THE 1990S

The NHS has altered profoundly during the period the research was undertaken described in this thesis. A major change has recently taken place in the funding arrangements of the NHS, dividing power and responsibility at the local level between purchaser and provider units. Provider units, such as hospitals and community service units, can apply for self governing status. Large General Practices can apply for their own budgets to obtain services direct from hospitals, in the form of purchaser contracts. The money required to treat patients will be able to cross administrative boundaries,

promoting an internal market for the provision of patient treatments.

The effects of this purchaser/provider contracting arrangement was observed in a Midlands teaching hospital (Chapter 7). The ward sisters were still undertaking a key co-ordinating role, but incurring ever-increasing stress from organisation and management structures which reflect the new funding arrangements. These arrangements appear to support contracting targets and historical budgetary provisions, which are not related to acceptable clinical nursing standards. Qualitative targets derived from ward systems need to be negotiated within the provisions of a contract to reflect adequate standards of nursing care for patients.

The NHS Information Management and Technology Strategy was launched in 1993. According to Rogers and Smith (1994) the strategy heralded a shift in focus from administrative and managerial data to tackling the problems at the heart of NHS computing - supporting the clinician at the point of delivery of care and allowing management information to be generated as a by-product. These writers recognise the importance of a multi-disciplinary approach as follows:

> "Crucially 'all sides' means a team approach by IM and T staff, clinicians and managers".

Capital monies have been made available to purchase person-based operational systems within the strategy. The Audit Commission (1992) has expressed concern about the implementation of ward nursing systems and whether benefits are

realised from expenditure on these systems.

> "Broad evaluation of the effects of the system on delivery of patient care appear to be rare".

The management role of the ward sister is also questioned within this Audit Commission report which considers that:

> "Proper management training for ward sisters and devolution of pay and budgets for employment of bank nurses and agency staff to wards is essential if such decisions are to be taken on a rational but sensitive basis".

This view supports the premise of this thesis, that the ward sister should be the key co-ordinating manager and should control the budgets for nursing resources at the ward level.

A critical issue will be the formulation of suitable management training for ward sisters, and a recognition that many sisters have no aspirations to become managers per se, as they could become divorced from direct patient care. However, the nursing profession has to decide whether nurses should take a full role in the management process within a hospital or there is a distinct danger that they will be 'sidelined', with a commensurate loss of power and influence over the professional care standards that patients receive. The types of management decisions ward sisters take have been identified by this research and case study material could be developed, providing 'good practice' examples in the development of management training courses for ward sisters.

A case study has recently been published on the development of resource management at Glan Clwyd (Cross 1993). The study

provides an indication of the lessons to be learnt in procuring a 'high cost' computer system within the new contracting arrangements. From the beginning clinical staff were involved. A consensus of clinician support emerged behind the project. Order Entry and Results Communications (OERC) was installed first and was the 'glue' that joined the information systems together. Information coming from an OERC is only as accurate as the proportion of doctors placing orders through the system, but according to the case study usage is high for inpatients, although gaps remain.

The Glan Clwyd study indicates that with the active involvement of the clinicians, information technology can be utilised to improve patient care. However, a more fundamental involvement is required of clinicians leading to changes in work practices and accepting a formalised role in resource planning at the ward level, for nursing systems to be successfully installed and to provide real benefits. The research undertaken in this thesis provides a framework and identified steps to review the organisation structure and ensure that a ward system is operationalised and supports a rational decision process to balance nurse resources with the dependency needs of patients.

The present government has planned large expenditure for information technology including the provision of nursing decision support systems in every hospital throughout the NHS during the next five years. Unless issues relating to organisational structures in hospitals are addressed, together with a training programme to select and train ward sisters to manage wards, that planned expenditure will be wasted and will

not increase the efficiency of the Health Service nor improve patient care.

REFERENCES

Abel-Smith B (1964) "The Hospitals 1800-1948" London Heinemann

Akinsanya J A (1991) "The usefulness of research to the surgical nurse - a critique". Surgical Nurse pp 4-8, The Medicine Group (UK) Ltd.

Alderfer C P (1987) "An intergroup perspective on group dynamics", Handbook of Organisational Behaviour, Jay Lorsch editor, Harvard University.

Alford R (1975) "Health Care Politics" Chicago, University of Chicago.

Allison G.T. (1971) "'Essence of Decisions', Explaining the Cuban Missile Crisis", Little, Brown, Boston.

Alter S, Steven L (1980) "Decision support systems, current practice and challenges", Addison-Wesley, Reading, MA.

Alter S (1977) "A taxonomy of decision support systems", Sloan Management Review, Autumn 19:1, pp 39-86.

Arrow K.J. (1954) "Social Choice and Individual Values" 2nd Edition John Wiley New York

Audit Commission (1992) "Caring Systems;A Handbook for Managers of Nursing and Project Managers". HMSO

Barnes K.S (1984) "Health Authority Performance Indicators". Hosp. and Health Services Review, May, pp 118-119.

Barr A (1967) "Measurement of Nursing Care" Oxford Regional Hospital Board OR Unit Report No.9

Basu A and Dutta A (1986) "Computer based support of reasoning in the presence of fuzziness" Decision support system (Netherlands) Vol 2 n3 pp235-256 September

Bourn A (1987) "Fighting Truth Decay in the NHS" Accountancy. September

Brent R.J. (1979) "Inputting Weights behind past Railway Closure Decisions with a cost Benefit Framework". Applied Economics,11,pp157-170

Burns T & Stalker G.M (1961) "The management of information", Tavistock.

Campbell D & Stanley J (1966) "Experimental and quasi-experimental designs for research", Rand McNally, Chicago.

Carley M (1980) "Rational techniques in policy analysis", Policy Studies Institute, Heinemann, London.

Carley M (1981) "Rational Techniques in Policy Analysis" Heinemann Educational

Checkland P B (1981) "Systems thinking, systems practice", J. Wiley and Sons Chichester.

Choppin R G (1983) "The role of the ward sister. A review of the British research literature since 1967". Kings Fund, London.

Cooper R B (1988) "Review of Management Information Systems Research: A Management Support Emphasis". Information Processing and Mgmt (UK), Vol. 1, V24n1, pp73-1Ø2.

Cook T & Reichardt C (eds) (1979) "Qualitative and quantitative methods in evaluation research", Vol. 1. Sage Research Progress Series in Evaluation. Beverly Hills Calif. Sage Publications.

Cross M (1993) "Resource Management - different by tradition" Health Services Journal Dec 9th pp31-36

Cummings K M, Becket M H & Maile M C (198Ø) "Bringing the models together", Journal of Behavioural Medicine, Vol. 3, No. 2, pp 123-145.

Cyert R.M. & March J.G. (1963) "A Behaviourial Theory of the Firm" Prentice Hall New Jersey

Davies G B & Olson M H (1974) "Management Information Systems", McGraw Hill.

Davies J (1972) "A study of hospital management training in its organisational context", Centre for Business Research, University of Manchester.

Davies G B & Weber R (1983) "Auditing advanced EDP Systems: A survey of Practice and Development of a Theory" pp2Ø-22 MIS Research Centre Minneapolis

De La Cuesto C (1979) "Nursing Process: from theory to implementation", MSc Thesis, Cranfield.

De Maio A (198Ø) "Socio-Technical Methods for Information Systems Design" Paper

DHSS (1968) "Report of a Committee of the Central Health Services Council: Relieving nurses of non-nursing duties in general and maternity hospitals". (Farrer report), HMSO, London.

DHSS (1972) "Report of the Committee on Nursing" (Chairman A. Briggs), Cmnd 5115, HMSO.

DHSS (1981) "Care In Action" A Handbook of Policies and priorities for Health and Personal Services HMSO

DHSS (1984) Department of Health and Social Security Health Circular HC(84) 13

Dror Y (1964) "Muddling Through-Science or Inertia"

Public Administration Review 24, pp153-7

Dutton W & Kramer K (1982) "The Automation of Bias" in Danziger J and Dutton W (Eds) "High Technology in American Local Governments". Columbia University Press.

Eason H, Clarke R.V. Harper W.H. (1945) " Hospital Survey" The Hospital Services of the Yorkshire Area, London HMSO.

Etzioni A (1967) "Mixed Scanning: A 'third' approach to decision making", Public Administration Review, Dec.

Evers H (1982) "Key issues in nursing practice: ward management", Nursing Times, March 3, pp 25,26.

Fabray C E (1988) "An evaluation of the FIP Ward Nursing System and the Telford Method", London MW Publicity Ltd.

Farnish S (1985) "How are sisters prepared", Nursing Times occasional paper, August 7, pp 47-5Ø.

Field P.A & Morse J.M. (1985) "Nursing Research, the application of qualitative approaches". Chapman & Hall.

Financial Information Project (1986) "Development of a ward management information system", West Midlands RHA.

Forcese D.P. and Richer S (1973) "Social Research Methods" Prentice Hall, Eaglewood Cliffs N.J.

Fretwell J E (198Ø) "An enquiry into the ward learning environment", Nursing Times Occasional Papers 76(26): pp 69-75.

Gault A.R.(1982) "The Aberdeen Formula as an illustration of the difficulty of determining Nursing Requirements" Inst. Journal Nursing Studies. Vol 19 No.2 pp61-72

Gershung J.I. (1978) "Policy Making Rationality: A Reformulation" Policy Sciences,9,pp295-316

Goddard H.A (1953) "The work of nurses in hospital wards: report of a job analysis". Nuffield Provincial Hospitals Trust.

Goldstone L & Collier M (1982) "Targets for Quality", Health and Social Services Journal, March 25, pp 362-365.

Goodman C M (1987) "The Delphi technique: a critique", Journal of Advanced Nursing 12, pp 729-734.

Gray A (1986) "Anatomy of a profession". Nursing Times, March 26 pp 24-26.

Griffiths R (1983) "National Health Service Management Inquiry", DHSS, London.

Gurry G A & Scott Morton M S (1971) "A framework for management information systems", Sloan Management Review, 13.1, pp 55-7Ø.

Hall P (198Ø) "Great Planning Disasters" Weidenfeld &

Nicholson

Ham C. (1981) "Policy Making in the National Health Service" A case study of the Leeds Regional Hospital Board. Macmillan Press Ltd., London.

Hamburg M (1974) "Basic Statistics - a modern approach". Harcourt Brace Jovanovich Publishers.

Hamilton S & Chervoy N L (1981) "Evaluating Information System Effectiveness - Part I, Comparing Evaluation Approach". MIS Quarterly/September.

Handy C B (1985) "Understanding Organisations", Penguin Books Ltd., Harmandsworth, pp 185-195.

Hargreaves I (1975) "The nursing process the key to individualised care". (Occasional papers), Nursing Times, 71, pp 89-92.

Harrison R (1972) "How to describe your organisation", Harvard Business Review, September - October.

Harrison S (1986) "Management Culture and Management Budgets", Hospital and Health Services Review, Jan, pp 6-9.

Hart J.T. (1973) " Bevan and the Doctors" Lancet Vol2 pp1196-1197

Helmer D (1977) "Problems on future research", Delphi and Cross Impact Analysis Futures, Vol. 9, pp 17-31.

Henney C, McFarlane J, & Crooks J (1982) "A method of estimating nursing workload", Journal of Advanced Nursing No. 7, pp 319-325.

Hill J E (1977) "To assess through this semi-structured interview the ward sisters' view of the teaching function in nurses education", (MSc - taught), Manchester University.

HMSO (1966) "Administrative Practice of Hospital Boards in Scotland" First report of the Joint Working Party on the organisation of Medical Works in Hospitals. Report of the Committee on Senior Nursing Staff Structure.

HMSO (1985) Report by the Comptroller and Auditor General, "National Health Service, Control of Nursing Manpower", HMSO 24.

Hunter D (1983) "Planning in an age of uncertainty", Health and Social Services Journal, Aug 25, pp 1030-1031.

Hunter D (1979) "Coping with uncertainty: decisions and resources within health authorities", Soc. of Health and Illness, Vol 1. No. 1.

Hunter D J (1986) "Managing the NHS in Scotland: Review and Assessment of Research Issues", Scottish Health Service Studies

SHHD, Edinburgh.

Hruschka H (1988) "Use of fuzzy relationships in rule-based decision support systems for Business Planning problems". European Journal of Operational Research, Vol V34 n3 pp 326-335 March.

Ives B, Olson M & Barvudi J (1983) "The Measurement of user information satisfaction Communication of the ACM Vol 26 No.1Ø Oct.

Jabes J. (1978) "Individual processes in Organisational Behaviour" Harlam Davidson Inc,

Jaques E (1956) "Measurement of Responsibility", London, Tavistock Press.

Jaques E (1971) "Organisational structure and role relationships", Nursing Times 67, pp 154-157.

Klein R (1984) "Who makes decisions in the NHS?", British Medical Journal, 288 (2).

Kratz C.R (1974) "Problems in the care of the long term sick in the community". Unpublished PHD Thesis, University of Manchester.

Kronenberg P.S. & Howard M.M. (1987) "Crisis Management and Computer Support" Bureaucrat Vol 15 n4 pp49-54 Winter.

Leininger M (ed) (1985) "Ethnography and ethnonursing: models and modes of qualitative data analysis". Qualitative research methods in nursing. Grune & Stratton Inc.

Lelean S.R (1973) "Ready for report, nurse?". The Study of Nursing Care Series 2, No. 2, Royal College of Nursing.

Lindblom C.E (1959) "The Science of Muddling Through". Public Administrative Review, Vol. 19, No. 2, pp 79-88.

Lindblom C.E. (1968) "The Policy Making Process" Prentice Hall Eaglewood Cliffs, N.J.

Lindsey A (1962) "Socialised Medicine in England and Wales" Chapel Hill, University of North Carolina Press

McGrew A.G. and Wilson M.J. (1982) "Decision making Approaches and Analysis" Manchester University Press

Mackley B & Heslop T (1979) "The Aberdeen Formula: Evaluation on the larger scale", Nursing Times, 15 March, pp 29-4Ø.

Manghan I (1979) "The Politics of Organisational Change" Greenwood

March J G and Simon H (1958) "Organisations" John Wiley, New York.

Markus M L & Pfeffer J (1983)	"Power and the Design and Implementation of Accounting and Control Systems" Accountancy, Organisations and Society, 8, No.2/3 pp2Ø5-218
Mauksch H (1966)	"The organisational context of nursing practice in the nursing profession: five sociological essays", Davis F(ed), Wiley.
Ministry of Health (1966)	"Report of the Committee on Senior Nursing Staff Structure", (Chairman B. Salmon), HMSO.
Moore P.G. & Thomas H (1988)	"The Anatomy of Decisions" Penguin Books
Moser C A & Kalton G (1977)	"Survey methods in social investigation", Heinemann, London, Chpt. 9 pp 211-237.
Mulligan M B (1972)	"An attempt to identify organisational factors which may adversely effect the performance of nursing staff both within and above ward level", PHD Surrey University.
Mulligan B (1974)	"Patients Nursing Needs; prediction of Staffing". Nursing Times Occasional Paper 19 September to 1Øth October
Myers J L & Forte J G (1963)	"A Sequential Analysis of Gambling Behaviour" Journal of General Psychology,69,pp299-3Ø9
Newman & Rowbottom (1968)	"Organisation Analysis", Heinemann.
O'Brien J E (1977)	"Methodology for Assessing the impact of computing and information systems on users". Technical report APR - 2Ø546/77/TR6 Westinghouse R and D Centre, Pittsburgh, Pensylvania, August.
Ogier M E (1982)	"An Ideal Sister? A study of the leadership style and verbal interaction of ward sisters with nurse learners in general hospitals", London RCN.
Parry G & Morris P (1974)	"When is a Decision not a Decision" British Political Sociology Yearbook Vol I Croom Helm Ltd.
Pearson J (1978)	"To look at effective training in the ward", MPh, CNAA.
Pembrey S (198Ø)	"The ward sister - key to nursing". Royal College of Nursing.
Plant J (1985)	"In sole charge of the ward", Health and Social Services Journal, Sept 26, pp 1198-1199.
Polit D.F & Hungler B.P. (1987)	"Nursing Research, principles and methods" third edition J.B. Lippincott Co. Philadelphia.
Porritt A (1962)	"A review of the Medical Services in Great Britain" London; Social Assay.

Prowle M J & Lister E.G (1984) "Management Budgets after Griffiths: Impact on the Management Process". Hosp and Health Services Review, May, pp 13Ø-132.

Redfern S J (1981) "Hospital sisters - their job attitudes and occupational stability", RCN, London.

Rhys Hearn C & Howard J (1979) "The relationship of nursing needs, resources and standards in geriatric wards", West Midlands RHA.

Richardson J.J. & Jordan A.G. (1979) "Governing Under Pressure" Martin Robertson & Co.

Rogers R & Smith I (1994) "Beware of Alligators" The British Journal of Healthcare Computing and Information Management. February Vol 11 No.1 pp2Ø-22

Runciman P J (1983) "Ward sister at work", Churchill Livingstone, London.

Schattschneider (196Ø) "The semi-sovereign people". New York and Holt, Rinehart and Winston.

Schriven M (1972) "The Methodology of Evaluations". Formative and Summative Evaluation". Evaluating Action programme. C.H. Weiss (eds) Allyn and Bacon Boston, Massacheusetts.

Scottish Home & Health Dept. (1969) "Nursing Workload per patient as a basis for staffing". Scottish Health Services Studies No.9

Self P (1973) "Is Comprehensive Planning Possible and Rational" Conference on the study of Public Policy, University of Birmingham

Seward H H (1975) "Evaluating Information Systems" Chapter 7 The Information System Handbook. McFarland F and Nolan R.L. (eds) Dow Jones Irwin, Homewood, Illinois.

Siegel S (1956) "Non parametric statistics for the behavioural sciences", McGraw Hill, New York.

Simon H (1957) "Administrative Behaviour", New York Free Press.

Simon H A (196Ø) "The New Science of Management Decision" Harper and Row, New York

Slack P (1981) "Ward sister training", Nursing Times 77(2): 53.

Soelberg P (1966) "Unprogrammed decision making" Papers and Proceedings, 26th Annual Meeting, Academy of Management December 27-29

Stevens J & Goucher J (1985) "Measurement of patient dependency". Nursing Times, 23 Jan, pp 54-55.

Strassman P (1985) "Information Payoff - The Transformation of work

in the Electronic Age" Macmillan

Thomas P (1988) "Decision making and the management of change in the NHS", Health Services Management, June pp 28-31.

Tolliday H (1972) "Defining the Nurse's role", Occasional paper, Nursing Times, 68(14) pp 53-56.

Torgerson (1958) "Theory and methods of scaling", Wiley, New York.

Trist E L, Higgins G W, Murray H & Pollock A B (1963) "Organisational choice: capabilities of groups at the coalface under changing technologies", Tavistock.

Walsh K,Hinnings R Greenwood R and Ranson S (1981) "Power and Advantage in Organisation" Organisation Studies pp 131-152

Whelan J (1988) "Ward sisters' management styles and their effects on nurses' perceptions of quality of care". Journal of Advanced Nursing, 13, pp 125-138.

White D J (1975) "Decision methodology - a formalisation of the OR process". Wiley, London.

Willcocks L P & Mark A L (1988) "Information for Management" A review of progress on Information Technology and general management in the UK National Health Service. Working Paper no.92. The City University Business School, Barbican Centre, London.

Wilson B (1984) "Systems: Concepts, Methodologies and Applications", J. Wiley and Sons, Chichester.

Wilson Barnett J (1979) "A review of patient nurse dependency studies", DHSS.

Winston P (1986) "Introducing Korner" British Journal of Healthcare Computing Publications.

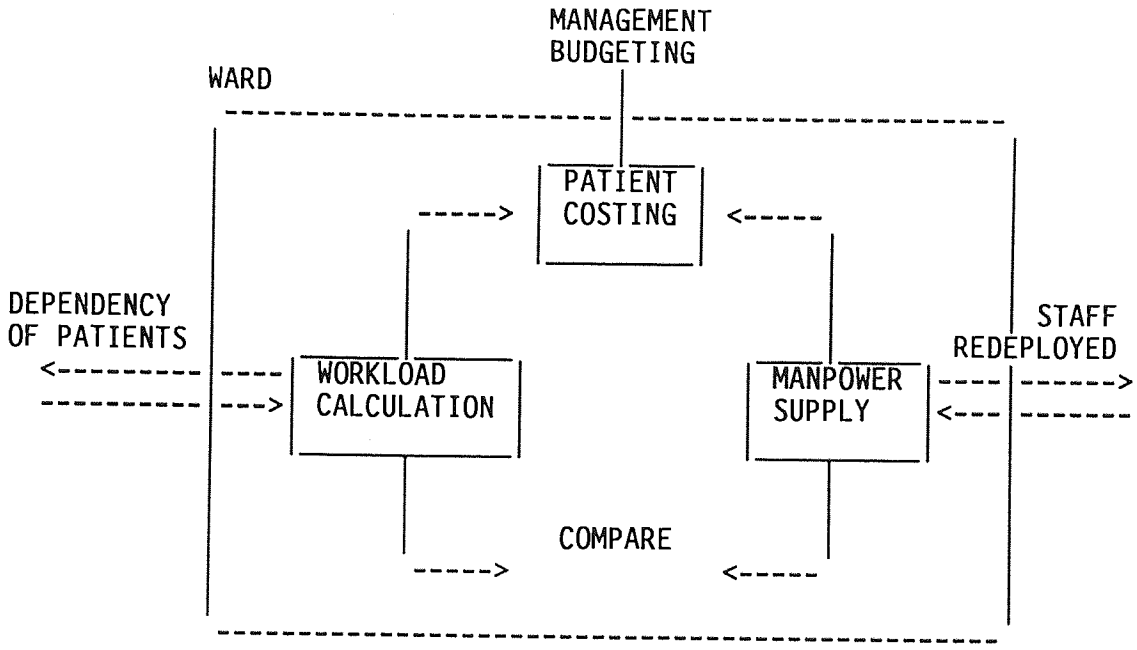
Wright M & Rhodes D L (1985) "Managing the Introduction of IT in a not-for-profit Service Organisation". International Journal of Operations and Production Management Vo.5 No.3

Wright M and Rhodes D (1985,2) "Managing IT, Exploiting Information Systems for Effective Management". Frances Pinter Publishers, London

Decision Support System

1. *Overall Design*

The overall design of the system is outlined in the following diagram:



The workload calculation is based on a prospective assessment of the requirements of individual patients and calculates, daily, the nursing hours required for the next 24 hour period.

The manpower module maintains a nursing staff file for each member of staff on the ward, which includes national insurance number, name, grade, seniority within grade, contracted hours, fixed shift (if appropriate) and start date on ward (including finish date for students) and also meets the central requirements for manpower. Annual leave and sick days are also kept for all staff on the ward. The off-duty rota is input to the system every week to provide actual staff hours information.

Actual hours worked, by grade, are obtained from the manpower module and are related to individual patient information to calculate patient costs.

2. *Using the System*

Every day on the ward, each patient is assessed according to their needs using a VDU situated on the ward. The names of patients on the ward the previous day are automatically displayed. The system will either stand alone, or link to the Trent Patient Administration System (PAS). The latter means that patients registered using the PAS are automatically displayed each day for assessment. The patients are assessed for their basic care requirements by entering codes relating to

their dependency on nursing staff for the assessment factors Mobility, Hygiene, Meals, Psychological Need and Incontinence. The patients actual technical care requirements are also entered onto the screen (with their previous days technical care displayed for amendment). There is a different screen for each specialty reflecting the different technical care procedures between specialties. The screen displayed will depend on the patients main specialty.

If students are working on the ward, from a skill levels calculation their effective hours are shown, to allow time (dependent on the work required on the ward each day) for them to observe and learn on the ward.

At the bottom of the print any alterations made during the 24 hour period can be noted whether it is sickness or the allocation of bank nurses. This information can be entered straight into the computer or batched weekly whichever suits local circumstances. From this data a monthly summary of hours required and available is produced, together with a required establishment calculation.

The studies have shown that the assessment can be completed very quickly if the patients needs are known by the nurse.

From this information, patients can be assigned to a care group to indicate their dependency on nurse time i.e. care group 1 patient - mobile with minimal nurse care, to care group 5 patient - requires 24 hours specialling. These dependency figures can be used as performance indicators in management review exercises.

When all the patients have been assessed the nurse is asked for the likely day cases, ward attenders, admissions and discharges over the next 24 hours. It is then possible to obtain a printout indicating the nursing workload and manpower required for the next 24 hours.

3. *Outputs from the System*

As well as day to day manpower requirements, many outputs can be obtained, using the workload information which is available from the system. Graphical outputs can also be produced.

Sickness records for staff on the ward, records of their annual leave, study days etc. are also available so that absence analysis can be carried out. It is intended to produce programs that will be deployed to help nurses create an off duty rota. Any requests from staff will be entered and specific days when there is a heavy workload (e.g. Theatre days) as calculated over a period of time from the daily nursing workload will be biased towards receiving extra nurse hours. This off duty could also be linked to the payroll system, providing monthly returns to initiate staff payment.

Other types of outputs from the system, range from individual patient care activities (for example, the technical care prescribed by various consultants to indicate the technical workload on the ward) and costs to give aggregated information

by patient dependency and diagnostic groups. This information can also be aggregated by clinician to provide nursing information for management budgeting.

4. *Care Plans/Care Audits*

Because individual patient information is being collected on a daily basis it is possible to produce individual patient care plans. It is also possible to obtain a report of all the activities a patient is assessed as requiring for a given day together with the skill level of staff which can carry out each activity. This audit facility has been used to undertake clinical audits of care received by patients.

APPENDIX 2

Results of questionnaire to identify those factors which would increase the difficulties involved in allocating staff to meet the planned nursing requirements of patients on a ward

SAMPLE SIZE = 24

FACTORS	RATING LOW ----------> HIGH						WEIGHTED INDEX
	Ø	1	2	3	4	5	
WORKLOAD							
1. Throughput of patients on the ward	3	2	3	8	3	5	69
2. Bed occupancy on the ward	2	4	2	4	7	5	73
3. Rate of emergency admissions	2	4	3	9	3	3	64
4. Ward being 'On-call'	7	3	2	5	3	4	54
5. Imbalance between actual and required staff hours	2	2	4	7	2	7	74
6. Overall dependency of patients	Ø	3	3	7	7	4	78
7. Number of theatre patients on a single day	9	2	2	4	4	3	49
8. Number of operating sessions/ week	12	1	Ø	3	4	4	46
9. Patient meals distributed by nurses using bulk trolley	7	3	6	3	2	3	47
1Ø. Waiting list procedures	13	6	Ø	2	2	1	25
11. Admission procedures	4	6	4	6	3	1	49
12. Number of day cases/ward attenders	6	9	1	2	5	1	42
13. Dealing with admissions/ discharge documentation	2	7	5	4	6	Ø	53
14. Incidence of escorting patients to departments/other hospitals	3	5	3	1Ø	2	1	54
MANPOWER							
15. Employment of bank nurses	11	3	2	5	3	Ø	34
16. Employment of agency nurses	1Ø	1	1	7	4	1	45
17. Movement of staff between wards/departments	6	4	6	4	3	1	45

FACTORS	RATING LOW ----------> HIGH						WEIGHTED INDEX
	Ø	1	2	3	4	5	
18. Rates of trained staff to learners	7	3	3	4	6	1	5Ø
19. Number of first year learners allocated to ward	12	1	3	1	2	5	43
2Ø. Staff sickness rates	3	5	8	4	4	Ø	49
21. Staff turnover rates	6	4	7	3	4	Ø	46
RELATIONSHIPS							
22. Relationship with consultants	7	9	4	1	1	2	34
23. Relationship with department manager	9	5	1	2	5	2	43
24. Number of consultants allocated beds on ward	6	8	2	4	1	3	43
25. Ages of these consultants	16	4	2	Ø	1	1	17
26. Number of specialties allocated beds	8	7	3	2	3	1	36
27. Number of registrars/house officers undertaking rounds	3	8	1	3	4	5	6Ø
OTHER							
28. Design of ward	8	4	5	5	Ø	2	39
29. Availability of equipment	2	7	1Ø	3	1	1	45
3Ø. Level of support services	4	4	7	6	4	1	57
31. Provision of ward clerk	6	4	3	2	3	6	58

Questionnaire to identify those factors which would increase the difficulties involved in allocating staff to meet the planned nursing requirements of patients on a ward

KEY * = MODAL VALUES

FACTORS	Not Applicable		RATING LOW ----------> HIGH									
			Ø	1		2		3		4		5	
WORKLOAD ROUND (%)	1	2		1	2	1	2	1	2	1	2	1	2
1. Throughput of patients on the ward	12%	15%		8	5	12	5	36*	3Ø*	12	3Ø	2Ø	15
2. Bed occupancy on the ward	8	5		16	5	8	3Ø	16	1Ø	32*	4Ø*	2Ø	15
3. Rate of emergency admissions	8	2Ø		16	1Ø	12	1Ø	4Ø*	3Ø*	12	2Ø	12	1Ø
4. Ward being 'On-call'	32	35		12	5	8	15*	2Ø*	5	12	25	16	15
5. Imbalance between actual and required staff hours	8	Ø		8	25	16	3Ø*	32*	15	8	1Ø	28	2Ø
6. Overall dependency of patients	Ø	5		12	1Ø	12	15	28*	2Ø	32*	25	16	25
7. Number of theatre patients on a single day	4Ø	35		8	15	8	Ø	16	1Ø	16*	3Ø*	12	1Ø
8. Number of operating sessions/ week	52	4Ø		4	1Ø	Ø	5	12	25*	16*	1Ø	16	1Ø
9. Patient meals distributed by nurses using bulk trolley	32	25		12	1Ø	24	15	12	2Ø	8	Ø	4	Ø
1Ø. Waiting list procedures	52	6Ø		24	2Ø	Ø	15	8	5	8	Ø	4	Ø
11. Admission procedures	24	3Ø		24	25	16	25	28	2Ø	12	1Ø	4	Ø
12. Number of day cases/ward attenders	24	5Ø		4Ø	2Ø	4	Ø	8	1Ø	2Ø	15	4	5
13. Dealing with admissions/ discharge documentation	8	15		32	3Ø	2Ø	5	16	25	24	2Ø	Ø	5
14. Incidence of escorting patients to departments/other hospitals	12	15		2Ø	25	12	25	44	15	8	15	4	5
MANPOWER													
15. Employment of bank nurses	48	55		12	5	8	15	2Ø	2Ø	12	5	Ø	Ø
16. Employment of agency nurses	44	55		4	Ø	4	15	28	2Ø	16	5	4	5
17. Movement of staff between wards/departments	28	35		16	15	24	25	16	2Ø	12	Ø	4	5

FACTORS	Not Applicable		RATING LOW ----------> HIGH									
			Ø	1		2		3		4		5	
WORKLOAD ROUND (%)	1	2		1	2	1	2	1	2	1	2	1	2
18. Rates of trained staff to learners	28	3Ø		12	1Ø	12	2Ø	16	35	24	5	4	Ø
19. Number of first year learners allocated to ward	52	45%		4	5	12	1Ø	4	1Ø	8	5	2Ø	2Ø
2Ø. Staff sickness rates	15	5		2Ø	4Ø	4Ø	1Ø	16	4Ø	16	5	Ø	Ø
21. Staff turnover rates	24	1Ø		16	45	32	2Ø	12	2Ø	16	5	Ø	Ø
RELATIONSHIPS													
22. Relationship with consultants	28	3Ø		4Ø	2Ø	16	3Ø	4	5	4	Ø	8	15
23. Relationship with department manager	4Ø	4Ø		2Ø	25	4	5	8	Ø	2Ø	1Ø	1Ø	2Ø
24. Number of consultants allocated beds on ward	24	3Ø		36	35	8	5	1 6	1Ø	4	5	12	15
25. Ages of these consultants	68	8Ø		16	1Ø	8	1Ø	Ø	Ø	4	Ø	4	Ø
26. Number of specialties allocated beds	36	5Ø		28	2Ø	12	15	8	5	12	5	4	5
27. Number of registrars/house officers undertaking rounds	12	15		32	35	4	2Ø	12	5	16	5	2Ø	2Ø
OTHER													
28. Design of ward	36	35		16	5	2Ø	3Ø	2Ø	15	Ø	5	1Ø	1Ø
29. Availability of equipment	1Ø	15		26	2Ø	44	35	12	2Ø	4	5	4	Ø
3Ø. Level of support services	16	1Ø		16	2Ø	32	3Ø	24	2Ø	16	2Ø	4	Ø
31. Provision of ward clerk	28	3Ø		16	3Ø	12	2Ø	8	5	12	1Ø	24	5
Additional Factors													
32. Transfer from intensive care		6Ø			1Ø		1Ø		15		1Ø		5
33. Bed blocking by long stay patients		45			2Ø		1Ø		1Ø		5		1Ø

Chi-squared Calculation for Pilot Study

Contingency Tables

OBSERVED (oi)	Ø-4 hours	4-8 hours	8-24 hours	This Week	Next Week	Longer	
1st Sample	46	8	1Ø	1Ø	14	4	(92)
2nd Sample	4Ø	8	Ø	1Ø	5	8	(71)
	(86)	(16)	(1Ø)	(2Ø)	(19)	(12)	(163)

EXPECTED (ei) 1st sample $\frac{(86x92)}{163}=49$ $\frac{(16x92)}{163}=9$ $\frac{(1Øx92)}{163}=6$ $\frac{(2Øx92)}{163}=11$ $\frac{(19x92)}{163}=11$ $\frac{(12x92)}{163}=7$

2nd sample $\frac{(86x71)}{163}=37$ $\frac{(16x71)}{163}=7$ $\frac{(1Øx71)}{163}=4$ $\frac{(2Øx71)}{163}=9$ $\frac{(19x71)}{163}=8$ $\frac{(12x71)}{163}=5$

$$X^2 = \sum_{i=1}^{i=h} \frac{(oi - ei)^2}{ei}$$

$$= \frac{(46-49)^2}{49} + \frac{(8-9)^2}{9} + \frac{(1Ø-6)^2}{6} + \frac{(1Ø-11)^2}{11} + \frac{(14-11)^2}{11} + \frac{(4-7)^2}{7}$$
$$+ \frac{(4Ø-37)^2}{49} + \frac{(8-7)^2}{9} + \frac{(Ø-4)^2}{6} + \frac{(1Ø-9)^2}{11} + \frac{(5-8)^2}{11} + \frac{(8-5)^2}{7}$$

$$= \frac{9}{49} + \frac{1}{9} + \frac{16}{6} + \frac{1}{11} + \frac{9}{11} + \frac{9}{7} + \frac{9}{49} + \frac{1}{9} + \frac{16}{6} + \frac{1}{11} + \frac{9}{11} + \frac{9}{7}$$

$$= Ø.184 + Ø.111 + 2.667 + Ø.Ø91 + Ø.818 + 1.286 + 1.184 + Ø.111 + 2.67 + Ø.Ø91 + 1.286 + Ø.818$$

$$X^2 = 1Ø.32$$

Degrees of Freedom $V = \frac{(r - 1)(c - 1)}{2} = 5$

From statistical tables at 5%, $X^2 = 11.1$, therefore X^2 is not significant at this probability level.

HOSPITAL B

WARD NURSING SYSTEM - FIP PILOT STUDY

REPORT BY HOSPITAL B's EXPERT PANEL

In January 1986 the Health Authority agreed that Hospital B should participate in dependency studies using the Ward Nursing System developed by the Financial Information Project (FIP) team.

The main reason for our participation was to enable accurate assessment of staffing needs rather than calculation based on bed occupancy, throughput and norms.

As part of the monitoring system within this pilot study a panel of "Three Wise Men" was set up comprising:-

Consultant Physician
Director of Nursing Services
Senior Tutor, School of Nursing

We were all aware of the nurse staffing difficulties within Hospital B and recognised that any attempt to prove the level of deficiency of nurses was not very scientific.

Estimates of nursing staff levels required could only be achieved by national norms or using total numbers of patients admitted to wards over a period of years. However, whilst these methods could be used as a crude measure on surgical wards they were not valid on medical wards where throughput of patients had not altered very much but the patient dependency had certainly increased.

Therefore, we welcomed the proposal that a pilot study using the FIP ward based nursing system could be undertaken which could accurately and scientifically measure patient dependency as well as ward activities and throughput.

WARD NURSING OUTPUTS

Daily Workload Print (DWP) - Summary of number of patients in each care group, nurse hours required for that day/night period and compared with nurse hours available as calculated from the duty rota.

> Currently the sisters and section managers assess the patients needs related to nursing hours by experience, and so the potential of this print out is high.

Monthly Workload Print (MWP) - Provides the manpower requirements, expected staff available, actual staff available and resulting surplus or deficiency by day for specified ward. Also provides breakdown of staff hours lost and the number of bank nurse hours needed.

> A valuable aid to assess past work load and assist in planning.

Unit Workload Print - Summary of information in DWP and MWP for all wards within a hospital unit.

Hospital Workload Print - Summary of information in DWP and MWP for all units within the hospital.

Both valuable printouts to give an overall picture to Senior Managers of deficiencies of staff, use of staff and trends to enable forecasting/planning.

Nurses Working on Ward - List of all nursing staff registered as working on the ward on a specific date.

Night Staff on Duty - List of night staff working on each ward on a particular date.

Could be of help in confirming staff attendance and ward allocation.

Manpower Returns - Nursing services manpower returns for a specific unit and month.

A useful printout especially if it could be used to replace current manual returns.

Individual Nurse Absence - Provides summary of absences and also a detailed list of absences by type and date - up to the end of the previous month.

This printout would enable managers to discard combined sickness/holiday cards.

Ward Absence Print - Provides list of absences which have occurred on a specific ward for a given period by grade of nurse and type of absence, in hours and W.T.E.

A valuable tool for proving all the reasons for absences from a ward.

Redeployment Analysis - Management information providing analysis of all redeployment into and out of wards within a unit for a specified time period.

Again evidence of need/reason for redeployment and useful for planning.

Nurse in Charge - Provides for each ward within a sub-unit e.g. medical, the name of the most senior nurse on duty for the morning, afternoon, evening, and night shift together with the number of nurses by grade, supporting the nurse in charge, and a total number of nurses on duty per shift.

A very quick and useful method for confirming level/quality of staff per shift when checking duty rotas.

Duty Rota Print - Produces as many copies as required of the nurse duty rota for a specified week.

Reduces the clerical workload in preparation of the duty rota and gives a legible copy if needed for reference purposes later.

This could also replace the salary returns currently completed by

every member of staff and having to be checked by either the ward sister or the manager. A very onerous task.

Bank Nurse Standby - List of all bank nurses on standby for a particular day, displaying the time "from" and "to" available and telephone number of the nurse.

Saves manual completion of nurse bank book.

Bank Nurses by Ward - Provides a list of bank nurses used on a specified ward together with the hours worked by day and night for a given period of time.

Bank Nurse Hours by Unit - Provides the total nurse hours used by grade on each ward on the unit over a specified time period.

A method of advising the Treasurers' Department of hours worked in place of the manually completed list - for budget purposes.

Nurse Costing Calculation)
Planned and Actual Costs) Could all be of value in the new
Patient Episode Cost) management and planning
Care Group Cost) arrangements

Patients Basic Care Programme - Lists all the appropriate care activities required by the patient, based on the assessment codes entered by the nurse and related to the standard of care set by the ward sister.

This printout could be valuable both as an individual patient care profile and one means of measuring quality of care.

Patients on Ward Print - Lists the inpatients by name, hospital, number, specialty, code, Consultant, previous care group and today's group.

Number of Patients in each Care Group - For a given period of time, by day.

A means of assessing trends, workloads etc.

Assessment of Patients on Ward - Lists patients name, basic care subfactors and the technical care requirements.

Potentially a very useful printout for monitoring output.

Activity Summary - Provides details of patient number, clinician code, specialty, length of stay, sex, date of birth, nurse hours each patient required under the headings of basic care, technical care and administration, by day and by night.

Could prove valuable in looking at bed usage, as well as for producing costing information.

Analysis of Technical Care Activities - Lists the number of times each technical activity was undertaken and the resulting nurse time required.

Already used to rationalise and adjust some nursing activities.

CONCLUSIONS

1. Setting up and implementing the system was time consuming and staff gave a lot of their own time to achieve it.

2. Difficulties were experienced in keeping the system running because of:-

   i. limited hours when computer could be used due to heavy usage with PAS system;
   ii. shortage of staff with knowledge and ability to use the system.

3. Staff enthusiasm was hard to maintain because the system was only on three very different wards and therefore output could not be used effectively to give staff incentive to continue.

4. The pilot study was worthwhile because it can give:

   Ward Staff

   i. an accurate and visible means of planning patient care;

   ii. a method of self assessment of their standards of care;

   iii. a versatile model for teaching;

   iv. an insight into their activities which allows staff criticism which can stimulate ideas for improved patient care/efficiency savings.

   Managers - numerous outputs for planning; assessing staff needs, assessing standards/quality of care; maintaining holiday/sickness records; compiling personnel data/records; monitoring ward activities and efficient utilisations of beds etc.

5. The pilot study allowed accurate estimation of nursing hours required in relation to patient care - the original reason for participating in the study.

6. This system has the potential as a valuable tool for teaching, personnel activities, and above all an accurate and visible means of ensuring the highest standard of patient care together with the most effective use of resources.

RECOMMENDATIONS

1. Implement the ward nursing system throughout the hospital to take advantage of the total potential of the system.

   Appoint a co-ordinator to:

   i. update/modify the system as required (a time consuming exercise);

   ii. maintain the level of staff with training to use the system and update training as required;

iii. liaise with managers to produce required printouts.

We would like to commend all staff who participated in this pilot study for the amount of time they willingly gave, both at work and in their own time, to ensure that the pilot study was effective.

SUMMARY OF QUESTIONNAIRE RESULTS

	NURSING OFFICER				SISTER				STAFF NURSE				SEN				TOTAL					
	A (4)		B (1)		A (4)		B (5)		A (12)		B (11)		A (5)		B (3)		A (25)		B (20)		(45)	
Q	Yes (%)	No (%)	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1	100		100		100		100		100		100		80	20	100		96	4	100		99	1
2	100		100		60	40	60	40	83	17	73	27	60	40	67	33	80	20	70	30	76	24
3	100		100		100		100		83	17	63	37	60	40	100		80	20	80	20	80	20
4	100		100		100		100		83	17	63	37	60	40	100		84	16	80	20	82	18
5	25	75	100		75	25	100		50	50	90	10	60	40	100		60	40	95	5	71	29
6	100		100		100		100		92	8	63	37	100		33	67	96	4	70	30	85	15
7	100		100		100		100		75	25	73	27	60	40	33	67	80	20	75	25	77	23
8a	100		100		75		100		75		50		67		33		80		76		79	
b	100				75		Nil		50		Nil		67				70		Nil		43	
c	100		100		50		50		50		55		67		33		58		76		65	
d	100		100		25		75		50		27		67				54		54		54	
9	75	25	100		100		100		83	17	73	27	80	20	100		83	17	85	15	84	16
10	100			100	100		75	25									100		50	50	78	22
11	75	25		100	50	50	33	67									50	50	25	75	40	60
12	75	25	100		50	50	100										57	43	100		73	27
13T	67		100		80		67										57		57		64	
13G	67		100		50		73										57		57		54	
14a	67		100		75		100										70		100		82	
b	67		100		75		100										70		100		82	
c	67		100		50		67										57		75		64	
d	67		100		75		67										70		75		64	
e	67		100		25		100										43		100		64	

A = Hospital A
B = Hospital B

APPENDIX 7

HOSPITAL A

THE WARD ADMINISTRATION SYSTEM

COMMENTS BY THE NOMINATED 'PANEL OF EXPERTS'

Introduction

A panel consisting of the Director of Nursing Services Unit 1, a Consultant in Geriatric Medicine, and the (Acting) Director of Nurse Education, was briefed to consider the data supplied by the system, to attempt to evaluate its usefulness, and make predictions about potential future uses. The system is still being adjusted to take account of the particular features of the acute services in Hospital A. We are therefore able only to comment on its potential. We welcome the proposed extension of the trial to the medical department wards, which should in due course enable a proper evaluation of its validity to be undertaken.

All results depend on the baseline information used being accurate and complete. We have been impressed by the motivation and willingness of the ward staffs involved to play their part in the trial, even though at this stage there are few direct benefits to them.

Day to Day Nurse Staffing Levels

The system predicts the nurse staffing required in whole time equivalents, and grades (skill mix) for each day. The large and unpredictable number of patients admitted as emergencies, together with the often rapid changes in the dependency of individual patients in many wards at Hospital A requires a system which is sensitive to such changes. We would wish to see a modification whereby this is an activity input to the system on a second occasion each day. We would suggest at about 3.30 p.m., in order to update the workload and better assess the staff required for the evening. We appreciate the imposition on time that this will have, but feel strongly the advantages will outweigh the extra input time involved.

Basic timings must cover all activities and give sufficient weighting to any particular features of activity e.g. the amount of time taken in supporting and counselling relatives of seriously ill patients and those who have been bereaved.

An advantage of all the wards in a Department being incorporated in the system is that the Departmental Manager is then able to take an overview of the data at the commencement of each shift, and adjust staffing levels as necessary.

Nurse Reserve

At this stage it would be difficult to see whether it would be beneficial to manage the Nurse Reserve through the system - it may be. A large percentage of the requests are made at short notice and the present system is time consuming. When all wards are using the system, the Manager will be able to identify areas of overstaffing, and adjust accordingly, without the need in some cases to bring in

members of the Nurse Reserve.

Duty Rotas

A time saving would be detected if duty rotas could be produced by the system, to previously agreed rules. Printouts produced by the system would be available for ward staff and managers. It should be possible to deal with contingencies e.g. staff sickness, and e.g. enter leave requests in advance.

Review of workload predictions over a period of time should reveal seasonal trends, variances by day of week and time of day, and the technical care required. It is possible then to move towards the development of an ideal duty rota which should nearly match the workload. However, in a District General Hospital to which a large number of patients are admitted as emergencies, it may not be possible to match the pattern very closely.

Nursing Establishments

It should be possible to define the establishment of nurses for each ward by building up the staff required by grade and whole time equivalent from the prescribed levels of care and all other activities needing to be carried out. It will give a more specific factual basis on which nurse establishments can be justified. Pure professional judgement, however accurate, is insufficient in modern management terms. The establishment should be sufficient to cover the ward's needs within an agreed range of workload. It will give the correct skill mix of nursing staff.

Establishments identified in different specialties can be used when planning new wards, providing due consideration is given to the particular individual features of each working situation.

Manpower/Absence Sickness

There is very useful information provided by the system concerning hours lost from the ward. Specific absences, predicted and unpredicted, are input. Patterns in the predictable, by day of week and time of day, are apparent which should ensure better planning in the future as annual leave and bank holidays can be adjusted to ensure better cover.

Managers can use the information as a monitoring tool. Absences e.g. sickness - by ward, department and sub unit; the amount of time spent on Inservice Training per month, per annum, by grades of staff; escorting of patients fromt he ward. The latter can be a significant loss of man hours from the ward. The data also indicates which grades of staff are commonly allocated this task.

Learner nurse sickness/absence per ward is available, divisible into 1st year, 2nd year etc. This provides helpful information to compare with the average expected allocation for the ward provided by the Allocation Officer.

Individualised Planned Patient Care

Care plans produced by the Ward Administration System could be printed and used as a basis for identifying the care required to be

given by the individual nurse. Each plan should be a working document to include evaluation of care given. Care plans could be used in addition as a quality assurance monitoring tool to audit the level of care given, and by whom.

Patterns of Clinical Activity in a Ward

The increasing amount of information about the nature of activity in each ward will be very helpful in giving a good picture of the basic patterns of work of each Clinician. The data should demonstrate exactly what each Consultant prescribes in terms of basic and technical care. It should also indicate that there may be, probably are, several philosophies of care in one ward. They may not be compatible in terms of nursing workloads, complexity etc.

The continued refinements of this information will enable doctors and nurses to look at the activity in a ward in a completely different but realistic way. They will be encouraged to work together towards a common goal to use such information as a management tool.

Having identified the pattern of activity over a period of time, adjustments can be agreed to make the most efficient and effective use of resources e.g. to ensure that nurses do not have more work than they can cope with; the feasibility of altering the time of a ward round or operating list. The forum in each Department i.e. Departmental Manager and Board of Management seems an ideal focus for this type of discussion to be encouraged.

There is increasing pressure on the staff in acute wards through increased patient activity, shorter patient stay, shorter turnover interval, and often younger consultants developing their particular interests. Experienced ward sisters find management difficult and newly qualified nurses need much greater support. This system will give useful information in order to plan ahead in a more realistic way and ensure that the workload is spread as evenly as possible. Consultants may learn a great deal about the dependency and amount of basic and technical care generated by individual patients. The goal should be to achieve a high standard of care which is as cost effective as possible. The system should help with the formulation of a multidisciplinary operational policy for the ward, which can deal with unpredictable as well as predictable activities within the ward.

Research Nurse

Ward staff and Manager's roles are becoming more complex. It will be difficult to allocate sufficient time to collate and interpret all the information the system will produce. Priority consideration should be given to provision of the post as a Research Nurse, who as well as doing other work, could:

- interpret the information in an understandable and meaningful way, and write commentaries identifying important areas;

- train new staff in the use of the system;

- continue to validate, keep up to date, modify and/or expand the system as deemed necessary.

The detail of the system must be reliable and accurate. Each ward/department will have its own particular features and the system must be able to take account of these.

SAMPLE A - RESULTS OF THE 'BEFORE SAMPLE' **SUMMARY SHEET** **6/7/88 - 6/8/88**

DECISION DIARY Nurse in Charge ..... Date ..... Ward ..... Shift .....

STAFF ALLOCATION

1. OFF DUTY ROTA - CHANGES

11 7 2
Tomorrow This Week Next Week Longer
[| | |] [| | |] [| | |] [| | |]

2. LEARNER NURSE ALLOCATION - CHANGES

2 1
Tomorrow This Week Next Week Longer
[| | |] [| | |] [| | |] [| | |]

3. REALLOCATION OF NURSES FROM WARD TO WARD ON PLANNED BASIS

2 1
Tomorrow This Week Next Week Longer
[| | |] [| | |] [| | |] [| | |]

4. EMPLOY BANK NURSES/AGENCY NURSES ON PLANNED BASIS

1
Tomorrow This Week Next Week Longer
[| | |] [| | |] [| | |] [| | |]

OTHER DECISIONS

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WARD ADMINISTRATION

1. CHANGE POLICIES/PROCEDURES RELATING TO SUPPORT SERVICES

4 1
Tomorrow This Week Next Week Longer
[| | |] [| | |] [| | |] [| | |]

2. CHANGE POLICIES/PROCEDURES RELATING TO ISSUE OF MEDICATIONS

Tomorrow This Week Next Week Longer
[| | |] [| | |] [| | |] [| | |]

3. CHANGE POLICIES/PROCEDURES RELATING ADMINISTRATION/CLERICAL PROCEDURES

Tomorrow This Week Next Week Longer
[| | |] [| | |] [| | |] [| | |]

OTHER DECISIONS

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PATIENT ADMISSIONS/DISCHARGES

1. PLANNED ADMISSIONS - CHANGES

33 3 1
Tomorrow This Week Next Week Longer
[| | |] [| | |] [| | |] [| | |]

2. PLANNED DISCHARGES - CHANGES

41 8 4
Tomorrow This Week Next Week Longer
[| | |] [| | |] [| | |] [| | |]

3. PLANNED LIST CASES - CHANGES

6 1
Tomorrow This Week Next Week Longer
[| | |] [| | |] [| | |] [| | |]

4. REALLOCATION OF PATIENTS BETWEEN WARDS

17 6
This Shift Next Shift Next 24 Hours
[| | |] [| | |] [| | |]

5. EMERGENCY ADMISSIONS

13 1
This Shift Next Shift Next 24 Hours
[| | |] [| | |] [| | |]

6. LIST CASES - UNPLANNED CHANGES

6
This Shift Next Shift Next 24 Hours
[| | |] [| | |] [| | |]

OTHER DECISIONS

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WORKLOAD PRIORITISING

1. DEPLOY STAFF BETWEEN WARDS

6 1
This Shift Next Shift Next 24 Hours
[| | |] [| | |] [| | |]

2. EMPLOY BANK NURSES/AGENCY NURSES

This Shift Next Shift Next 24 Hours
[| | |] [| | |] [| | |]

3. DEFER ADMINISTRATIVE PROCEDURES ETC WHICH DO NOT EFFECT CARE STANDARDS

This Shift Next Shift Next 24 Hours
[| | |] [| | |] [| | |]

4. REDUCE CARE STANDARDS DUE TO INADEQUATE STAFFING LEVELS

This Shift Next Shift Next 24 Hours
[| | |] [| | |] [| | |]

OTHER DECISIONS

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_____ [| | |]

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SUMMARY
Total decisions = 179
No. Shifts = 25
Av. no. decisions = 7.2

SUMMARY SHEET

30/4/88 - 26/6/88

DECISION DIARY Nurse in Charge ..... Date ..... Ward ..... Shift .....

STAFF ALLOCATION

1. OFF DUTY ROTA - CHANGES
   2 1 3 3
   Tomorrow This Week Next Week Longer
   [ ] [ ] [ ] [ ]

2. LEARNER NURSE ALLOCATION - CHANGES
   Tomorrow This Week Next Week Longer
   [ ] [ ] [ ] [ ]

3. REALLOCATION OF NURSES FROM WARD TO WARD ON PLANNED BASIS
   1 3
   Tomorrow This Week Next Week Longer
   [ ] [ ] [ ] [ ]

4. EMPLOY BANK NURSES/AGENCY NURSES ON PLANNED BASIS
   Tomorrow This Week Next Week Longer
   [ ] [ ] [ ] [ ]

OTHER DECISIONS

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WARD ADMINISTRATION

1. CHANGE POLICIES/PROCEDURES RELATING TO SUPPORT SERVICES
   Tomorrow This Week Next Week Longer
   [ ] [ ] [ ] [ ]

2. CHANGE POLICIES/PROCEDURES RELATING TO ISSUE OF MEDICATIONS
   Tomorrow This Week Next Week Longer
   [ ] [ ] [ ] [ ]

3. CHANGE POLICIES/PROCEDURES RELATING ADMINISTRATION/CLERICAL PROCEDURES
   1
   Tomorrow This Week Next Week Longer
   [ ] [ ] [ ] [ ]

OTHER DECISIONS

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PATIENT ADMISSIONS/DISCHARGES

1. PLANNED ADMISSIONS - CHANGES
   3=2
   Tomorrow This Week Next Week Longer
   [ ] [ ] [ ] [ ]

2. PLANNED DISCHARGES - CHANGES
   3=3
   3=2 1=1 3=4
   Tomorrow This Week Next Week Longer
   [ ] [ ] [ ] [ ]

3. PLANNED LIST CASES - CHANGES
   Tomorrow This Week Next Week Longer
   [ ] [ ] [ ] [ ]

4. REALLOCATION OF PATIENTS BETWEEN WARDS
   3=4
   1=6
   This Shift Next Shift Next 24 Hours
   [ ] [ ] [ ]

5. EMERGENCY ADMISSIONS
   3=18
   1=3
   This Shift Next Shift Next 24 Hours
   [ ] [ ] [ ]

6. LIST CASES - UNPLANNED CHANGES
   6
   This Shift Next Shift Next 24 Hours
   [ ] [ ] [ ]

OTHER DECISIONS

_____ [ ]

WORKLOAD PRIORITISING

1. DEPLOY STAFF BETWEEN WARDS
   3 1
   This Shift Next Shift Next 24 Hours
   [ ] [ ] [ ]

2. EMPLOY BANK NURSES/AGENCY NURSES
   This Shift Next Shift Next 24 Hours
   [ ] [ ] [ ]

3. DEFER ADMINISTRATIVE PROCEDURES ETC WHICH DO NOT EFFECT CARE STANDARDS
   This Shift Next Shift Next 24 Hours
   [ ] [ ] [ ]

4. REDUCE CARE STANDARDS DUE TO INADEQUATE STAFFING LEVELS
   9
   This Shift Next Shift Next 24 Hours
   [ ] [ ] [ ]

OTHER DECISIONS

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SUMMARY

Total decisions = 76

No. Shifts = 25

Av. no. decisions = 3.0

SAMPLE B - RESULTS OF THE 'AFTER' SAMPLE

SUMMARY SHEET

2/10/89 - 23/11/89

DECISION DIARY Nurse in Charge ..... Date ..... Ward ..... Shift .....

STAFF ALLOCATION

1. OFF DUTY ROTA - CHANGES
   3 4 6
   Tomorrow This Week Next Week Longer
   [ ] [ ] [ ] [ ]

2. LEARNER NURSE ALLOCATION - CHANGES
   Tomorrow This Week Next Week Longer
   [ ] [ ] [ ] [ ]

3. REALLOCATION OF NURSES FROM WARD TO WARD ON PLANNED BASIS
   2 3
   Tomorrow This Week Next Week Longer
   [ ] [ ] [ ] [ ]

4. EMPLOY BANK NURSES/AGENCY NURSES ON PLANNED BASIS
   Tomorrow This Week Next Week Longer
   [ ] [ ] [ ] [ ]

OTHER DECISIONS

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WARD ADMINISTRATION

1. CHANGE POLICIES/PROCEDURES RELATING TO SUPPORT SERVICES
   Tomorrow This Week Next Week Longer
   [ ] [ ] [ ] [ ]

2. CHANGE POLICIES/PROCEDURES RELATING TO ISSUE OF MEDICATIONS
   Tomorrow This Week Next Week Longer
   [ ] [ ] [ ] [ ]

3. CHANGE POLICIES/PROCEDURES RELATING ADMINISTRATION/CLERICAL PROCEDURES
   4
   Tomorrow This Week Next Week Longer
   [ ] [ ] [ ] [ ]

OTHER DECISIONS

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PATIENT ADMISSIONS/DISCHARGES

1. PLANNED ADMISSIONS - CHANGES
   3-5 3-6 3-3
   Tomorrow This Week Next Week Longer
   [ ] [ ] [ ] [ ]

2. PLANNED DISCHARGES - CHANGES
   3-3
   3-1 1-1 3-2
   Tomorrow This Week Next Week Longer
   [ ] [ ] [ ] [ ]

3. PLANNED LIST CASES - CHANGES
   Tomorrow This Week Next Week Longer
   [ ] [ ] [ ] [ ]

4 REALLOCATION OF PATIENTS BETWEEN WARDS
   3-3
   1-5
   This Shift Next Shift Next 24 Hours
   [ ] [ ] [ ]

5. EMERGENCY ADMISSIONS
   3-7
   1-4
   This Shift Next Shift Next 24 Hours
   [ ] [ ] [ ]

6. LIST CASES - UNPLANNED CHANGES
   This Shift Next Shift Next 24 Hours
   [ ] [ ] [ ]

OTHER DECISIONS

_____ [ ]

WORKLOAD PRIORITISING

1. DEPLOY STAFF BETWEEN WARDS
   6
   This Shift Next Shift Next 24 Hours
   [ ] [ ] [ ]

2. EMPLOY BANK NURSES/AGENCY NURSES
   This Shift Next Shift Next 24 Hours
   [ ] [ ] [ ]

3. DEFER ADMINISTRATIVE PROCEDURES ETC WHICH DO NOT EFFECT CARE STANDARDS
   1
   This Shift Next Shift Next 24 Hours
   [ ] [ ] [ ]

4. REDUCE CARE STANDARDS DUE TO INADEQUATE STAFFING LEVELS
   3
   This Shift Next Shift Next 24 Hours
   [ ] [ ] [ ]

OTHER DECISIONS

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SUMMARY
Total decisions = 72
No. Shifts = 25
Av. no. decisions = 2.9

Chi-squared Calculations for Sample B

Contingency Tables

Observed (oi)	This Shift	Next Shift	Next 24 Hrs	This Week	Next Week	Longer	
'Before' sample (1)	49	Ø	6	1Ø	7	4	(76)
'After' sample (2)	23	Ø	14	13	16	6	(72)
	(72)	(Ø)	(2Ø)	(23)	(23)	(1Ø)	(148)

Expected (ei)

1st sample $\frac{(72x76)}{148} = 37$ $\frac{(Ø)}{148} = Ø$ $\frac{(2Øx72)}{148} = 1Ø$ $\frac{(23x76)}{148} = 12$

$\frac{(23x72)}{148} = 12$ $\frac{(1Øx76)}{148} = 5$

2nd sample $\frac{(72x72)}{148} = 35$ $\frac{(Ø)}{148} = Ø$ $\frac{(2Øx72)}{148} = 1Ø$ $\frac{(23x72)}{148} = 11$

$\frac{(23x72)}{148} = 11$ $\frac{(1Øx72)}{148} = 5$

$$X^2 = \sum_{i=1}^{i=n} \frac{(oi-ei)^2}{ei}$$

$$= \frac{(49-37)^2}{37} + \frac{Ø}{Ø} + \frac{(6-1Ø)^2}{1Ø} + \frac{(1Ø-12)^2}{12} + \frac{(7-12)^2}{12} + \frac{(4-5)^2}{5} +$$
$$\frac{(23-35)^2}{35} + \frac{Ø}{Ø} + \frac{(14-1Ø)^2}{1Ø} + \frac{(13-11)^2}{11} + \frac{(16-11)^2}{11} + \frac{(6-5)^2}{5}$$

$$= 3.89 + 1.6 + Ø.33 + 2.Ø8 + Ø.2Ø + 4.11 + 1.6 + Ø.36 + 2.27 + Ø.2Ø$$

$$X^2 = 16.64$$

Degrees of freedom (df) = (r - 1) (c - 1) = 5

From statistical tables at 5%, X^2 - 11.1, therefore X^2 is significant at this probability level.

SUMMARY SHEET

26/3/88 - 20/5/88

DECISION DIARY Nurse in Charge ..... Date ..... Ward ..... Shift .....

STAFF ALLOCATION

1. OFF DUTY ROTA - CHANGES

1	2	4	
Tomorrow	This Week	Next Week	Longer
[ ]	[ ]	[ ]	[ ]

2. LEARNER NURSE ALLOCATION - CHANGES

		1	
Tomorrow	This Week	Next Week	Longer
[ ]	[ ]	[ ]	[ ]

3. REALLOCATION OF NURSES FROM WARD TO WARD ON PLANNED BASIS

	1		
Tomorrow	This Week	Next Week	Longer
[ ]	[ ]	[ ]	[ ]

4. EMPLOY BANK NURSES/AGENCY NURSES ON PLANNED BASIS

Tomorrow	This Week	Next Week	Longer
[ ]	[ ]	[ ]	[ ]

OTHER DECISIONS

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WARD ADMINISTRATION

1. CHANGE POLICIES/PROCEDURES RELATING TO SUPPORT SERVICES

1	1	1	
Tomorrow	This Week	Next Week	Longer
[ ]	[ ]	[ ]	[ ]

2. CHANGE POLICIES/PROCEDURES RELATING TO ISSUE OF MEDICATIONS

Tomorrow	This Week	Next Week	Longer
[ ]	[ ]	[ ]	[ ]

3. CHANGE POLICIES/PROCEDURES RELATING ADMINISTRATION/CLERICAL PROCEDURES

	1		
Tomorrow	This Week	Next Week	Longer
[ ]	[ ]	[ ]	[ ]

OTHER DECISIONS

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PATIENT ADMISSIONS/DISCHARGES

1. PLANNED ADMISSIONS - CHANGES

Tomorrow	This Week	Next Week	Longer
[ ]	[ ]	[ ]	[ ]

2. PLANNED DISCHARGES - CHANGES

Tomorrow	This Week	Next Week	Longer
[ ]	[ ]	[ ]	[ ]

3. PLANNED LIST CASES - CHANGES

Tomorrow	This Week	Next Week	Longer
[ ]	[ ]	[ ]	[ ]

4. REALLOCATION OF PATIENTS BETWEEN WARDS

4	1	1	
This Shift	Next Shift	Next 24 Hours	
[ ]	[ ]	[ ]	

5. EMERGENCY ADMISSIONS

4		2	
This Shift	Next Shift	Next 24 Hours	
[ ]	[ ]	[ ]	

6. LIST CASES - UNPLANNED CHANGES

1	3	1	
This Shift	Next Shift	Next 24 Hours	
[ ]	[ ]	[ ]	

OTHER DECISIONS 3

EMERGENCY Next 24 Hours

DISCHARGE_____ [ ]

WORKLOAD PRIORITISING

1. DEPLOY STAFF BETWEEN WARDS

	2	
This Shift	Next Shift	Next 24 Hours
[ ]	[ ]	[ ]

2. EMPLOY BANK NURSES/AGENCY NURSES

This Shift	Next Shift	Next 24 Hours
[ ]	[ ]	[ ]

3. DEFER ADMINISTRATIVE PROCEDURES ETC WHICH DO NOT EFFECT CARE STANDARDS

This Shift	Next Shift	Next 24 Hours
[ ]	[ ]	[ ]

4. REDUCE CARE STANDARDS DUE TO INADEQUATE STAFFING LEVELS

This Shift	Next Shift	Next 24 Hours
[ ]	[ ]	[ ]

OTHER DECISIONS

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SUMMARY

Total decisions = 35

No. Shifts = 20

Av. no. decisions = 1.8

SAMPLE C - RESULTS OF THE 'AFTER' SAMPLE

SUMMARY SHEET

28/4/89 - 4/7/89

DECISION DIARY Nurse In Charge ..... Date ..... Ward ..... Shift .....

STAFF ALLOCATION

1. OFF DUTY ROTA - CHANGES

1 2 3

Tomorrow This Week Next Week Longer

[ ] [ ] [ ] [ ]

2. LEARNER NURSE ALLOCATION - CHANGES

1

Tomorrow This Week Next Week Longer

[ ] [ ] [ ] [ ]

3. REALLOCATION OF NURSES FROM WARD TO WARD ON PLANNED BASIS

Tomorrow This Week Next Week Longer

[ ] [ ] [ ] [ ]

4. EMPLOY BANK NURSES/AGENCY NURSES ON PLANNED BASIS

Tomorrow This Week Next Week Longer

[ ] [ ] [ ] [ ]

OTHER DECISIONS

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WARD ADMINISTRATION

1. CHANGE POLICIES/PROCEDURES RELATING TO SUPPORT SERVICES 2=1

Tomorrow This Week Next Week Longer

[ ] [ ] [ ] [ ]

2. CHANGE POLICIES/PROCEDURES RELATING TO ISSUE OF MEDICATIONS

Tomorrow This Week Next Week Longer

[ ] [ ] [ ] [ ]

3. CHANGE POLICIES/PROCEDURES RELATING ADMINISTRATION/CLERICAL PROCEDURES

Tomorrow This Week Next Week Longer

[ ] [ ] [ ] [ ]

OTHER DECISIONS

_____ [ ]

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_____ [ ]

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_____ [ ]

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PATIENT ADMISSIONS/DISCHARGES

1. PLANNED ADMISSIONS - CHANGES

3=1

Tomorrow This Week Next Week Longer

[ ] [ ] [ ] [ ]

2. PLANNED DISCHARGES - CHANGES

Tomorrow This Week Next Week Longer

[ ] [ ] [ ] [ ]

3. PLANNED LIST CASES - CHANGES

3=2

Tomorrow This Week Next Week Longer

[ ] [ ] [ ] [ ]

4. REALLOCATION OF PATIENTS BETWEEN WARDS

4 2 2

This Shift Next Shift Next 24 Hours

[ ] [ ] [ ]

5. EMERGENCY ADMISSIONS

9

This Shift Next Shift Next 24 Hours

[ ] [ ] [ ]

6. LIST CASES - UNPLANNED CHANGES

This Shift Next Shift Next 24 Hours

[ ] [ ] [ ]

OTHER DECISIONS

_____ [ ]

WORKLOAD PRIORITISING

1. DEPLOY STAFF BETWEEN WARDS

7 1 2

This Shift Next Shift Next 24 Hours

[ ] [ ] [ ]

2. EMPLOY BANK NURSES/AGENCY NURSES

1

This Shift Next Shift Next 24 Hours

[ ] [ ] [ ]

3. DEFER ADMINISTRATIVE PROCEDURES ETC WHICH DO NOT EFFECT CARE STANDARDS

2 1

This Shift Next Shift Next 24 Hours

[ ] [ ] [ ]

4. REDUCE CARE STANDARDS DUE TO INADEQUATE STAFFING LEVELS

This Shift Next Shift Next 24 Hours

[ ] [ ] [ ]

OTHER DECISIONS

_____ [ ]

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_____ [ ]

_____

SUMMARY

Total decisions = 42

No. Shifts = 20

Av. no. decisions = 2.1

Chi-squared Calculation for Sample C

Contingency Tables

Observed (oi)	This Shift	Next Shift	Next 24 Hrs	This Week	Next Week	Longer	
'Before' sample (1)	11	4	1Ø	4	5	1	(35)
'After' sample (2)	23	3	8	2	3	3	(42)
	(34)	(7)	(18)	(6)	(8)	(4)	(77)

EXPECTED (ei)

1st sample $\frac{(34x35)}{77} = 15$ $\frac{(7x35)}{77} = 3$ $\frac{(18x35)}{77} = 8$ $\frac{(6x35)}{77} = 3$

$\frac{(8x35)}{77} = 4$ $\frac{(4x35)}{77} = 2$

2nd sample $\frac{(34x42)}{77} = 19$ $\frac{(7x42)}{77} = 4$ $\frac{(18x42)}{77} = 1Ø$ $\frac{(6x42)}{77} = 3$

$\frac{(8x42)}{77} = 4$ $\frac{(4x42)}{77} = 2$

$$X^2 = \sum_{i=1}^{i=n} \frac{(oi - ei)^2}{ei}$$

$$= \frac{(11-15)^2}{15} + \frac{(4-3)^2}{3} + \frac{(1Ø-8)^2}{8} + \frac{(4-3)^2}{3} + \frac{(5-4)^2}{4} + \frac{(1-2)^2}{2}$$

$$\frac{(23-19)^2}{19} + \frac{(3-4)^2}{4} + \frac{(8-1Ø)^2}{1Ø} + \frac{(2-3)^2}{3} + \frac{(3-4)^2}{4} + \frac{(3-2)^2}{2}$$

$$= 1.Ø7 + Ø.33 + Ø.5Ø + Ø.33 + Ø.25 + Ø.5Ø + Ø.84 + Ø.25 + Ø.4Ø + Ø.33 + Ø.25 + Ø.5Ø$$

$$X^2 = 5.55$$

Degrees of Freedom (df) = (r - 1) (c - 1) = 5

From statistical tables at 5%, $X^2 = 11.1$, therefore X^2 is not significant at this probability level.

DECISION DIARY

Nurse In Charge ..... Date ..... Ward ..... Shift .....

WORKLOAD PRIORITISING	WARD ADMINISTRATION	STAFF ALLOCATION	PATIENT ADMISSIONS/DISCHARGES
1. DEFER ADMIN PROCEDURES/INDIRECT PATIENT CARE This Shift Next Shift Next 24 hrs Next 48 hrs Longer [ ] [ ] [ ] [ ] [ ]	1. CHANGE POLICIES/PROCEDURES RELATING TO SUPPORT SERVICES This Shift Next Shift Next 24 hrs Next 48 hrs Longer [ ] [ ] [ ] [ ] [ ]	1. OFF DUTY ROTA - CHANGES This Shift Next Shift Next 24 hrs Next 48 hrs Longer [ ] [ ] [ ] [ ] [ ]	1. PLANNED ADMISSIONS - CHANGES This Shift Next Shift Next 24 hrs Next 48 hrs Longer [ ] [ ] [ ] [ ] [ ]
2. REDUCE DIRECT PATIENT CARE DUE TO INADEQUATE STAFFING LEVELS This Shift Next Shift Next 24 hrs Next 48 hrs Longer [ ] [ ] [ ] [ ] [ ]	2. CHANGE POLICIES/PROCEDURES RELATING TO ISSUE OF MEDICATIONS This Shift Next Shift Next 24 hrs Next 48 hrs Longer [ ] [ ] [ ] [ ] [ ]	2. LEARNER NURSE ALLOCATION CHANGES This Shift Next Shift Next 24 hrs Next 48 hrs Longer [ ] [ ] [ ] [ ] [ ]	2. EMERGENCY ADMISSIONS This Shift Next Shift Next 24 hrs Next 48 hrs Longer [ ] [ ] [ ] [ ] [ ]
3. TEMPORARY CLOSURE OF BEDS DUE TO INADEQUATE STAFFING LEVELS This Shift Next Shift Next 24 hrs Next 48 hrs Longer [ ] [ ] [ ] [ ] [ ]	3. CHANGE POLICIES/PROCEDURES RELATING TO ADMINISTRATION/ CLERICAL PROCEDURES This Shift Next Shift Next 24 hrs Next 48 hrs Longer [ ] [ ] [ ] [ ] [ ]	3. REALLOCATE NURSES FROM WARD TO WARD This Shift Next Shift Next 24 hrs Next 48 hrs Longer [ ] [ ] [ ] [ ] [ ]	3. THEATRE LIST CASES - CHANGES This Shift Next Shift Next 24 hrs Next 48 hrs Longer [ ] [ ] [ ] [ ] [ ]
		4. EMPLOY BANK NURSES/AGENCY NURSES This Shift Next Shift Next 24 hrs Next 48 hrs Longer [ ] [ ] [ ] [ ] [ ]	4. REALLOCATION OF PATIENTS BETWEEN WARDS This Shift Next Shift Next 24 hrs Next 48 hrs Longer [ ] [ ] [ ] [ ] [ ]
			5. DISCHARGES - CHANGES This Shift Next Shift Next 24 hrs Next 48 hrs Longer [ ] [ ] [ ] [ ] [ ]

DECISION CODE

1. Nurse In Charge 2 With Department Managers 3. With Clinicians 4 With Department Managers and Clinicians

WARD DESCRIPTIONS FOR MIDLANDS TEACHING HOSPITAL

WARD A1

Specialities:

Renal Medicine

Number of Regular Consultants

3

Maximum Number of Beds

26

Ward Layout

1 x 2 bed bay, 2 x 4 bed bay, 16 bed nightingale

Additional Information

Renal medicine has consistently doubled the number of patients in the hospital than there are beds for. The result is A1 is in constant negotiation with other wards for beds, and high number of inter ward transfers in and out of A1.

High percentage of patients are receiving dialysis and are critically ill on admission to ward.

WARD B1

Specialities:

Supposed to be General Medicine, in reality every type of medicine and surgery.

Number of Regular Consultants

3/4 In July 2Ø different consultants recorded.

Maximum Number of Beds

28

Ward Layout

3 x 4 beds, 16 bed nightingale

Additional Information

B1 consistently takes high number of renal medical "outlyers" and everything else.

WARD DI LIVER UNIT WARD

Specialities

Supra-Regional specialty liver diseases.

Number of Regular Consultants

5

Maximum Number of Beds

21

Ward Layout

2 side rooms and 19 bed nightingale.

Additional Information

No Students are ever allocated.
Being a supra-regional specialty, patients and relatives come from all over the UK and abroad.

WARD E1

Specialities

Urology

Number of Regular Consultants

3

Maximum Number of Beds

32

Ward Layout

4 x 4 bays and 16 bedded nightingale ward

Additional Information

Operate 5 days week. Ontake everyday for urological emergencies.

WARD F1

Specialities

Vascular Surgery

Number of Regular Consultants

3

Maximum Number of Beds

28

Ward Layout

3 x 4 bays and 16 bed nightingale

Additional Information

Operate 4 days week.
Ontake everyday for vascular emergencies.

WARD G LIVER INTENSIVE THERAPY UNIT (LITU)

Specialities

Liver patients requiring intensive therapy

Number of Regular Consultants

5

Maximum Number of Beds

5

Ward Layout

Bay of 5

Additional Information

LITU functions as part of the liver unit whole. The duty rota is separate from the ward, but they work closely together, not always reflected in the FIP reports.
No students are ever allocated.

WARD G1

Specialities

Renal/Hepatobiliary/General Surgery

Number of Regular Consultants

4

Maximum Number of Beds

26

Ward Layout

1 x 2 bed bay, 2 x 4 bed bay, and 16 bed Nightingale

Additional Information

They operate 5 days a week, and are always ontake for surgical admissions.

WARD H1

Specialities

Abdominal and bowel and general surgery

Number of Regular Consultants

7

Maximum Number of Beds

34

Ward Layout

1 x 2 bed bay, 4 x 4 bed bay, and 16 bed Nightingale

Additional Information

From March 1993, H1 was amalgamated with a ward from the General Hospital. No. of beds and consultants increased then.
They operate everyday of the week, and are ontake for surgical emergencies, 7 days per week.

WARD J1

Specialities

Upper Gastro-intestinal and general surgery

Number of Regular Consultants

8

Maximum Number of Beds

18

Ward Layout

1 x 2 bed bay, 4 x 4 bed bay

Additional Information

March 1993, ward was also amalgamated with a ward from the General Hospital. No. of consultants increased.
They operate 7 days a week and are always ontake for surgical emergencies.

WARD K1

Specialities

Major head and neck surgery

Number of Regular Consultants

7

Maximum Number of Beds

14

Ward Layout

2 x bed bays, 2 x 4 bed bays

Additional Information

Situated between the 2 E5DU bays.
Works closely with E5DU especially at night, K1, L1 and M1 wards, work as one unit/floor.

WARD L1

Specialities

ENT and Dental

Number of Regular Consultants

7

Maximum Number of Beds

22

Ward Layout

1 x 1Ø bed bay, 1 x 12 bed bay opposite ends of floor.

Additional Information

Supposed to be 5 day unit, in fact is 6 day unit for ENT and dental surgery.

WARD M1

Specialities

Paediatric ENT ages 3-12

Number of Regular Consultants

2/3

Maximum Number of Beds

6

Ward Layout

1 x 2 beds, 1 x 4 beds

Additional Information

Open 4 days/nights week Mon-Thurs.
Staffed by 2 qualified nurses (and play therapist) during the day and by L1 staff at night.
Parents usually stay day and night.
No students are ever allowed.

WARD N1

Specialities

Rheumatology, Elderly Care and General Medicine

Number of Regular Consultants

3

Maximum Number of Beds

28

Ward Layout

4 x 4 bed bays, 2 x 2 bed bays, 1 x 8 bed bays.

Additional Information

May 1993, N1 was amalgamated with elderly care ward from the general hospital.

WARD Ø1

Specialities

Everything

Number of Regular Consultants

All consultants

Maximum Number of Beds

6

Ward Layout

6 private rooms with bathrooms.

Additional Information

Used predominantly for private patients occasionally NHS patients. No students are ever allowed.

WARD P1

Specialities

Cardiac Surgery

Number of Regular Consultants

3/4

Maximum Number of Beds

26

Ward Layout

1 x 2 bed bay, 2 x 4 bays, 16 bed nightingale.

Additional Information

Ward is divided into a high dependency area where immediate post-operative patients are and a general area where less dependent patients are.

WARD Q1

Specialities

Cardiology

Number of Regular Consultants

3/4

Maximum Number of Beds

2Ø

Ward Layout

2 x 4 bays, 1 bay of 12 beds.

Additonal Information

Q1 has only been open 12 months, due to expansion of cardiac services.

WARD R1

Specialities

General and liver medicine

Number of Regular Consultants

4

Maximum Number of Beds

26

Ward Layout

1 x 2 bay, 2 x 4 bay, 16 bed nightingale.

Additional Information

R1 has increased its liver beds and is supported by Liver Unit nursing staff.

MANAGEMENT STRUCTURE OF TEACHING HOSPITAL

	Clinical Directors	Senior Manager / Head of Nursing	Business Managers	Deputy Business Managers
SURGERY CLUSTER		x		
		x		
			x	
General Surgery	x		x	
Vascular	x		x	
Anaesthetics	x		x	
ENT	x		x	
Urology	x		x	
Maxillofacial	x		x	
QED	x		x	
Theatres				
MEDICAL CLUSTER		x		
		x		
			x	x
General Medicine / Rheumatology	x		x	
Geriatric	x		x	
Clinical Haematology	x			
GU Medicine	x		x	
Dermatology	x		x	
OPD			x	
Admissions			x	
Opthalmology				
TRAUMA / ORTHOPAEDIC CLUSTER		x		
		x		
Trauma	x		x	x
Burns & Plastics	x		x	
A&E	x		x	x
Orthopaedics	x	x	x	
SPECIALITY SERVICES CLUSTER		x		
		x		
Cardiac	x		x	x
Liver	x		x	x
Renal	x		x	
Neurosciences	x		x	
Oncology	x		x	
DTU	x		x	
CLINICAL SUPPORT SERVICES		x		
Haematology	x		x	
Microbiology	x		x	
Clinical Chemistry	x		x	
Histology - Univ	x		x	
- NHS				
X-ray	x		x	
Pharmacy				
Medical Physics				
THERAPEUTIC SERVICES		x		
Physiotherapy				
Speech Therapy				
Occupational Therapy				
Dietetics				
Chaplaincy				
Chiropody				
Psychology				

KEY : IN POST x

SENSITIVITY ANALYSIS - DIFFICULTY INDEX FOR WARDS IN THE NORTHERN AUTHORITY HOSPITAL

Ward	BED OCC	EMER ADM	AV STAY	SUPPT STAFF	ADHOC ROUND	HRS ABS	SICK RATE	THR PATS	MEAL TRLL	AGCY	LRNS WARD	TOTAL INDEX
A	2.56	0.03	1.65	1.89	0.02	0.02	0.26	0.40	2.80	0.00	0.90	10.53
B	2.56	2.66	1.23	1.87	0.02	0.02	0.24	0.29	2.80	0.00	0.90	12.59
C	2.40	2.18	1.37	1.87	0.02	0.00	0.22	0.17	2.80	0.00	0.77	11.80
D	2.24	1.45	1.90	1.96	0.02	0.02	0.00	0.34	2.80	0.00	1.53	12.26
E	2.53	1.16	1.82	1.96	0.02	0.00	0.00	0.37	2.80	0.00	1.62	12.28
F	2.46	1.22	1.71	1.98	0.00	0.04	0.12	0.46	2.80	0.00	1.40	12.19
G	2.62	1.54	1.74	1.96	0.00	0.00	0.00	0.43	2.80	0.00	1.62	12.71
H	2.21	2.09	1.90	1.65	0.00	0.02	0.04	0.03	2.80	0.00	1.97	12.71
I	2.34	2.86	1.90	1.78	0.02	0.00	0.02	0.00	2.80	0.00	1.93	13.65
J	2.43	2.54	1.88	1.76	0.02	0.00	0.06	0.03	2.80	0.00	1.93	13.44
K	1.25	3.21	2.32	1.89	0.06	0.00	0.08	0.00	2.80	0.00	1.49	13.11
L	1.86	1.80	2.35	1.87	0.04	0.00	0.16	0.34	2.80	0.00	1.49	12.71
M	2.75	2.73	0.00	1.72	0.00	0.02	0.32	0.00	2.80	0.00	0.70	11.04
N	2.82	1.73	0.14	1.72	0.00	0.02	0.02	0.00	2.80	0.00	0.57	9.81
O	2.53	0.13	0.36	1.69	0.00	0.00	0.06	0.00	2.80	0.00	0.68	8.25
P	2.82	2.99	1.26	1.69	0.02	0.04	0.14	0.00	2.80	0.00	0.66	12.41
MAX	2.82	3.21	2.35	1.98	0.06	0.04	0.32	0.46	2.80	0.00	1.97	13.65
MIN	1.25	0.03	0.00	1.65	0.00	0.00	0.00	0.00	2.80	0.00	0.57	8.25
DIFF	1.57	3.18	2.35	0.33	0.06	0.04	0.32	0.46	0.00	0.00	1.40	5.39

APPENDIX 18

SENSITIVITY ANALYSIS - DIFFICULTY INDEX FOR WARDS IN THE MIDLANDS TEACHING HOSPITAL

Ward	BED OCC	EMER ADM	AV STAY	SUPPT STAFF	ADHOC ROUND	HRS ABS	SICK RATE	THR PATS	MEAL TRLL	AGCY	LRNS WARD	TOTAL INDEX
A/	3.26	1.70	0.70	1.94	0.02	0.00	0.06	1.20	0.00	0.59	0.24	9.71
B/	2.30	1.86	1.18	1.76	0.02	0.00	0.06	0.37	0.00	0.52	0.39	8.46
C/	1.92	0.45	1.26	1.78	0.08	0.00	0.02	0.91	0.00	0.05	0.00	6.48
D/	2.14	0.71	1.01	1.69	0.11	0.00	0.30	2.22	0.00	0.25	0.00	8.43
E/	3.07	0.90	1.29	1.80	0.02	0.00	0.06	1.57	0.00	0.32	0.37	9.40
F/	2.46	0.61	1.04	1.85	0.02	0.00	0.00	1.54	0.00	0.20	0.33	8.04
G/	2.85	1.06	0.73	1.85	0.02	0.00	0.00	1.31	0.00	0.66	0.55	9.02
H/	2.56	0.55	0.95	1.94	0.02	0.00	0.04	2.22	0.00	0.37	0.42	9.06
I/	3.07	0.84	1.37	1.78	0.02	0.00	0.06	2.17	0.00	0.44	0.53	10.28
J/	3.14	0.71	1.34	1.50	0.02	0.00	0.10	1.17	0.00	0.32	0.42	8.71
K/	1.92	0.16	1.96	0.40	0.42	0.00	0.48	2.65	0.00	0.17	0.00	8.16
L/	1.60	0.10	1.85	1.47	0.11	0.00	0.16	1.82	0.00	0.07	0.00	7.18
M/	3.07	1.00	0.00	1.94	0.04	0.00	0.08	0.00	0.00	0.15	0.35	6.62
N/	2.14	0.29	1.51	1.65	0.04	0.00	0.06	1.82	0.00	0.27	0.00	7.79
O/	3.26	1.83	1.90	1.45	0.04	0.00	0.02	1.03	0.00	0.25	0.07	9.85
P/	2.88	0.16	1.54	1.91	0.02	0.00	0.12	1.08	0.00	0.05	0.13	7.90
Q/	2.98	0.77	1.06	1.69	0.02	0.00	0.06	2.00	0.00	0.12	0.20	8.90
R/	2.37	1.00	1.32	1.89	0.02	0.00	0.02	1.45	0.00	0.49	0.44	8.99
MAX	3.26	1.86	1.96	1.94	0.42	0.00	0.48	2.65	0.00	0.66	0.55	10.28
MIN	1.60	0.10	0.00	0.40	0.02	0.00	0.00	0.00	0.00	0.05	0.00	6.48
DIFF	1.66	1.77	1.96	1.54	0.40	0.00	0.48	2.65	0.00	0.61	0.55	3.80

Ward Sister Interview **Ward - A1**

Q1 *How many years have you been a ward sister?*

She has specialised in renal nursing being a ward sister for 6 years on the ward.

Q2/3 *Have you any qualifications other than RGN?*

She has attended a renal course (ENB) and obtained a certificate in counselling. She is currently studying for a diploma in management.

Q4 *Do you see yourself as thw ward manager? If not, how would you describe your main role? Could you describe your reporting relationships?*

Her main role is the ward manager. Because the nurse manager has left and the post is not being filled, she reports directly to the business manager (a non-nurse) in renal services co-ordinate. She is responsible for financial budgets. In this acting up role she can authorise the booking of agency nurses.

Q5 *How would you describe your ward in terms of difficulty of managing compared to other wards in the hospital?*

A1 is the busiest ward in the hospital with 1ØØ% occupancy and therefore must be one of the most difficult wards to manage in the hospital.

Q6 *What factors do you find makes managing a ward difficult?*

There is poor communication with and between the consultants which makes planning the workload difficult. This difficulty is exacerbated by the acute nature of the work. Because of a shortage of skilled nurses, agency nurses are always required but there are no guarantees that they will turn up. There is an absence of leadership in the strategy and policies of the unit which has seriously affected the morale of the staff.

Q7 *What information do you need to manage your ward effectively?*

Better budgetting information is required based on agreed levels of service. Improved bed planning is also required but the ward receives acute referrals as the regional specialty and therefore plans agreed in a weekly multi-disciplinary meeting are generally altered daily. Care plans are not developed as such but a summary of the 'activities of living' model are maintained at the end of the patients bed.

Q8 *What benefits do you obtain from the ward nursing system? Could you manage as or more effectively without the system?*

The system backs up your own professional judgement. The system has been used recently to make a case to the business manager for increased staffed based on an analysis of skill mix

of staff and dependency of the patients.

The system allows data about the workload and staffing of the ward to be stored. It would be a retrograde step to return to completing manual forms on nurse dependency.

Q9 *Would you describe your management decision making mainly as "planned" or mainly as "crisis management"?*

In the main 'planned' decisions are made regarding staff deployment, although the staff are very pressurised due to 100% bed occupancy. However, there is a great deal of reactive decision making due to the high level of acute referrals and the unpredictable nature of the patients.

Q10 *What decision do you make involving your immediate manager?*

As she is 'acting up' she deals directly with the business manager. As the budgets are overspent this issue is a continuous point of discussion. Even when staffing levels are inadequate beds can't be closed as there is an open-ended contract with the Region to provide renal services. Staffing services are discussed on a weekly basis with the business manager.

Q11 *What decisions do you make involving consultants?*

Joint decisions are made on bed allocation and admission, although there is no forward planning with the consultants.

Q12 *What actions would you take to improve the management of your ward?*

The structure of the co-ordinate should be reviewed to change or reduce the business management element and appoint senior nurses (clinical) within the unit.

The skill mix of the staff in post should be reviewed and the correct numbers and grades appointed reducing the dependence on agency nurses.

More beds should be allocated to the unit to stop the transfer in and out to other wards in the hospital.

Communication should be improved between consultants and their junior doctors, with senior nurses in attendance, on a daily basis.

A programme of study leave should be agreed to develop professionally the ward staff.

Ward Sister Interview Ward - F1

Q1 *How many years have you been a ward sister?*

She has been a ward sister for 3 years on Ward F1.

Q2/3 *Have you any qualifications other than RGN?/Have you attended management courses?*

The ward sister has completed ENB courses (923 and 998) for development in nursing and teaching assessment. She is currently attending a local management course for 'G' grade nurses. In the longer term she would like to complete a higher management course which would be of more benefit than diploma of nursing.

Q4 *Do you see yourself as the ward manager? If not, how would you describe your main role? Could you describe your reporting relationships?*

She considered that the role was changing to more management and less clinical, although she is still a 'pair of hands' and cannot put aside days for management. She is responsible to the business manager who is a non-nurse in the vascular co-ordinate within the surgical cluster. She is also accountable to a nurse manager who is based a number of miles off site. She does not set budgets and has limited budgetary control. Agency nurses are booked through the business manager for authorising. However if agency nurses are not provided she can close beds.

Q5 *How would you describe your ward in terms of difficulty of managing compared to other wards in the hospital?*

She considers that all surgical wards are on a par of difficulty. However the situation has been exacerbated by the transfer of 8 neurology beds from another hospital.

Q6 *What factors do you find make managing a ward difficult?*

The ward is running on historical establishment and she is now short of trained staff; recommendations to increase staffing levels have not been accepted. As a result 2Ø/3Ø agency nurse shifts are booked each week, with resulting questionable standards of care. There is low sick rate apart from those staff who were transferred with the urology beds, whose sickness rate is high. There is a large degree of uncertainty with a constantly changing organisation structure. There are no aims, just a message that 'she must cut back'.

Q7 *What information do you need to manage your ward effectively?*

Information is required about workload, admissions, theatre lists and available beds. Budgets should be set realistically with up to date information provided regularly. A forward plan of the students that will be allocated to the wards. Formal written care plans are not used, rather a daily assessment of patients requirements.

Q8 What benefits do you obtain from the ward nursing system? Could you manage as or more effectively without the system?

She felt that little benefit was gained from using the ward system as management took no notice of the results from the system. There was a clear case made for additional staffing which has been ignored. The ward sister strongly considers that professional judgement should be sufficient in arguing a case.

Q9 Would you describe your management decision making mainly as "planned" or mainly as "crisis management"?

Because staffing levels are abysmal and overuse is made of agency nurses, it is becoming crisis management. Management has lacked foresight and made the problem worse by closing beds in another hospital, without thinking of the consequences on this ward.

Q10 What decision do you make involving your immediate manager?

There are professional problems with the urology nurses who are most unhappy in being relocated. She is dealing with these problems with the nurse manager. The Business Manager 'holds the purse strings'; and she has to gain agreement from her to book agency nurses. She is also responsible to the urology business manager.

Q11 What decisions do you make involving consultants?

Even though there are a number of consultants, communication is good, they are very accessible and realistic. There are regular ward rounds, when joint decisions are made regarding admission and discharge of patients.

Q12 What actions would you take to improve the management of your ward?

The ward sister would like to set aside at least 1 day/month for management and administrative purposes.

Long term goals should be set for vascular surgery with 28 beds allocated and the urology beds and staff reallocated.

The manpower plans should be accepted and staff carefully selected with the same ideals and standards as the ward sister.

The ward should be redecorated and rewired, providing for improved bathroom and dayroom facilities.

Emergency call beds should be provided so that the patients do not have to 'shout' for help.

The ward sister would like to finish on time and take her designated breaks.

Car parks should be well lit and patrolled as nurses have to walk a long way from their cars to get to duty.

An ENB course needs to be developed covering vascular nursing to provide a stable and forward thinking ward environment.

She was adamant that the Business manager needs to have nursing experience and finally she would like the authority as well as the responsibility to manage the ward within agreed budgetary limits.

Q1 *How Many years have you been a Ward Sister?*

The ward sister has been a junior sister in a renal medical ward and subsequently 3.5 years as a senior sister on Ward G1. She has always worked in the hospital but in several specialties.

Q2/3 *Have you any Qualifications other then RGN?*

She gained a diploma in professional studies for nursing (DPSN) and latterly was awarded BSc nursing studies - 2 year course, 1 day per week.

Q4 *Have you attended Management Courses? Do you see yourself as the Ward Manager? If not, how would you describe your main role? Could you describe your reporting relationships?*

Her role is not entirely clear. She would like to be the clinical manager, but she spends at least 2 days per month on administrative duties. This ambiguity is reflected in the reporting arrangements, she is responsible to the business manager and the clinical co-ordinator - renal services. She is professionally responsible to the Head of Nursing. She is not responsible for budgets and does not receive monthly reports. She attempts to maintain staffing levels in line with the perceived budget. However, it is always overspent and the ward understaffed. Therefore agency nurses are booked each week.

Q5 *How would you describe your ward in terms of difficulty of managing compared to other wards in the hospital?*

The ward is extremely difficult to manage, as it encompasses two difficult specialties, liver and renal. There are two teams of doctors, including surgeons and physicians who admit patients to the ward.

Q6 *What factors do you find makes managing a ward difficult?*

The major problem is unpredictability - it is difficult to assess the dependency of renal transplants. It is difficult to co-ordinate the doctors as they have joint management of the patients. There is a high bed occupancy, although at the weekend, 4 beds are closed. A range of learners from 1st years attend the ward. The morale of the staff is low because of the uncertainties surrounding the future of the hospital and in particular the future of the unit.

Q7 *What information do you need to manage your ward effectively?*

It is important to know what is in the budget and how it is derived. It is not clear how nursing is represented at higher management meetings. There is no nursing representative at co-ordinator level, which restricts information concerning strategy and future direction reaching the ward level.

Q8 What benefits do you obtain from the ward Nursing system? Could you manage as or more effectively without the system?

With help from the project nurse, information was used from the ward system to make a case for an increased staffing establishment. This analysis was presented to the clinical co-ordinator, who did not accept this increased requirement for nurses. He questionned the reliability of the system. The ward sister's view is that he will not take on more permanent staff until senior management decide on the future of the ward; the liver and renal specialties will probably be split.

Q9 Would you describe your management decision making mainly as "planned" or mainly as "crisis management"?

Because of the unpredictable nature of the patients especially transplant patients, the decisions tend to be crisis management. However, on admission, for major cases there is a period of assessment of up to 2 weeks. If consultants are on leave, there is no major surgery and off duty rotas are planned accordingly.

Q10 What decision do you make involving your immediate manager?

Decisions involving the business manager are mainly financially related; employment of agency nurses and staffing within spending limits. Policy issues are discussed with the clinical co-ordinator such as agency staffing levels.

Q11 What decisions do you make involving consultants?

Nurses manage the ward clinically on a day to day basis. There are no formal regular management meetings with consultants, although they are accessible on an ad hoc basis if there are problems.

Q12 What actions would you take to improve the management of your ward?

The establishment should be increased to the right levels. There has been a problem professionally since the nurse manager left the co-ordinate. The ward sister needs a nurse manager to relate to professionally and carry out appraisals on her. There should be improved access to the clinical co-ordinator with regular meetings to gain insights into the running of the unit as a whole. Morale would be improved generally, if the hospital's financial problems were resolved. The ward needs to be redecorated to make it a more comfortable place for patients.

The ward is desperately short of equipment and Trust funds should be used to fund this requirement. Staff should have adequate study leave to allow them to develop professionally.

Q1 *How many years have you been a Ward Sister?*

She has been a night sister for one year and then a further six years on a vascular surgical ward.

Q2/3 *Have you any further qualifications other than RGN?*

She has attended a training course and is part way through a multi disciplinary NVQ management course, including assertive training.

Q4 *Have you attended Management courses? Do you see yourself as the Ward Manager? If not, how would you describe your main role? Could you describe your reporting relationships?*

She commented that the 'buck stops with her', therefore she sees that her main role is the ward manager. Her leadership style is democratic through a team based approach. Teamwork and loyalty of staff was heavily stressed. She is indirectly responsible for budgets, but final decisions rested with the business manager.

Q5 *How would you describe your ward in terms of difficulty of managing compared to other wards in the hospital?*

Because she had managed to retain a loyal and highly experienced team, particularly at 'D' grade level, the difficulties could be overcome in managing the ward. However the staff were used to working at a very fast pace and as a result there was no time to talk to the patients.

Q6 *What factors do you find makes managing a ward difficult?*

8 consultants admit to the ward making the day to day management very difficult. 4 teams of doctors can descend on the ward between 8-8.3Ø a.m. Due to the poor staffing levels, staff sickness creates immediate problems as there is no cover. Agency nurses have to be used, which reduces the effectiveness of the nurse teams. Student nurses are supernumary but have to be properly supervised.

Q7 *What information do you need to manage your ward effectively?*

There is a need for information regarding workload and staffing so that these factors can be balanced, and patients get the service they are planned to get and standards are met. Information is also crucial from the consultants concerning the planned workload for the week. They book at short notice and they don't seem to care as long as they get their own patients admitted. Care plans were not developed as such but information based on the 'Roper' model maintained on a Kardex at the bottom of the bed.

Q8 *What benefits do you obtain from the ward nursing system? Could you manage as or more effectively without the system?*

The nursing system was used to prepare a case for additional staffing which was presented to the business manager. The outcome from these discussions was still awaited. She accepted that the system was required but she wished that senior managers took action on the information from the system.

Q9 *Would you describe your management decision making mainly as "planned" or mainly as "crisis management"?*

She felt that decision making was 'a bit of both'. Because there were no margins for variables outside her control, such as staff sickness or change of condition of patients, there is no I.T.U., agency nurses had to be booked in these crisis situations.

Q10 *What decision do you make involving your immediate manager?*

The business manager has the budget, and therefore she authorises the booking of agency nurses. The ward sister felt that she needed a manager to back her up with the doctors and be patient-orientated.

Q11 *What decision do you make involving consultants?*

Her relationship with the consultants was difficult, but she considered that she could refuse the admission of patients, if the ward was not adequately staffed. She decides wound care and when patients are discharged. New consultants think they are managing the ward, but the nurse is the patients' advocate.

Q12 *What actions would you take to improve the management of your ward?*

Communication is everything especially with the doctors - they need to spell out their intentions and any changes to treatment.

The ward needs to be staffed to its proper quota, and selection of these nurses that will 'gel' as a team is all important. More time can then be spent talking and interacting with the patients.

As a consequence of staffing levels and lack of communication, patients can be discharged too early. This should be remedied with the preceding actions.

The ward sister wants to build up a loyal and competent group of staff - teamwork is the key word to provide good patient care.

Q1 *How many years have you been a ward sister?*

She has been a ward sister for 8 years specialising in cardiology and coronary care.

Q2/3 *Have you any qualifications other than RGN?*

She has obtained the diploma in nursing and attended a coronary care course and completed a teaching assessment course (998 ENB). She attended a first line management course some time ago.

Q4 *Have you attended management courses? Do you see yourself as the Ward Manager? If not, how would you describe your main role? Could you describe your reporting relationships?*

She perceived that she was responsible for the day to day running of the ward, but she considered that 'g' grades (ward sister) should take over more management functions. She reports to the nurse manager and the deputy business manager for the cardiac services directorate, within the specialties cluster.

Q5 *How would you describe your ward in terms of difficulty of managing compared to other wards in the hospital?*

The ward sister recognised that Q1 was not the most difficult ward to manage in the hospital, and certainly not as difficult as A1 or Ø1 wards for which she had a degree of knowledge.

Q6 *What factors do you find makes managing a ward difficult?*

There had been an increased number of beds on the ward, with no commensurate increase of staffing levels. There was only one 'F' grade nurse on duty during the week. There was inadequate equipment, no dayroom, which made the ward extremely claustrophobic and there was no ward office to take ward reports or speak with relatives in private. There were no regular meetings held with consultants; admission lists were obtained from their secretaries. However, relationships were good with the consultants and they were prepared to listen and be responsive to issues raised by the ward sister. A high level of agency nurses were employed; in fact, the day case unit was entirely run by these nurses initially although these arrangements were changed, because of the lack of continuity of care standards.

Q7 *What information do you need to manage your ward effectively?*

The information required would include patient dependency, staff availablility, planned admissions and budgetary information, relating to agreed funding and actual usage on a monthly basis. Of key importance is information concerning strategy and direction from senior management in the direction. The information is lacking at the moment leading to poor morale. Care planning is undertaken using 18 pre-printed profiles of cardiac surgery. These profiles are not

individualised due to the fast turnover of the patients.

Q8 What benefits do you obtain from the ward nursing system? Could you manage as or more effectively without the system?

She had worked with the project nurse to analyse information from the ward system to make a case to the business manager for an increased establishment of staff. It became clear during this exercise that staff had been inputting data inaccurately to the system for example, ward absences had not been recorded properly. As a result, junior staff in particular were instructed on the benefits that could be obtained from the system if information is recorded properly. In conclusion, cases for improved resources could only be made by using information from the system as long as it was reasonably accurate, but the days were gone when ward sisters could rely on obtaining increased staffing only using professional judgement.

Q9 Would you describe your management decision making mainly as "planned" or mainly as "crisis management"?

Decision making on the ward was mainly planned particularly in planning off duty rotas and admissions. The main crises occurred with short notice sickness which was resolved by borrowing from other areas or by booking agency nurses.

Q10 What decision do you make involving your immediate manager?

As the ward sister has two managers to whom she reports this creates ambiguities in the management roles. The ward sister decides to book agency nurses but the nurse manager has to authorise this booking. The case for more staff was made to the deputy business manager with the professional support of the nurse manager.

Q11 What decisions do you make involving consultants?

The relationships with the consultants are longstanding and to an extent informal. Patient care and admissions policy tend to be undertaken by mutual agreement.

Q12 What actions would you take to improve the management of your ward?

The ward sister was concerned about the calibre of agency nurses and wanted to reduce the reliance of these staff by increasing the qualified establishment level to a satisfactory level and only use staff that understand the ward and required standards e.g. by setting up a bank nurse system.

There was a need to make the 'G' grade ward sister supernumary to enable her to manage the ward effectively, the structure above the ward sister should then be reviewed.

There should be structural improvements to the ward, to provide adequate facilities for a dayroom and a private office.

Q1 How many years have you been a ward sister?

She has been a sister for 3 years on 01. she has experience in gynaecology, medical and geriatrics.

Q2/3 Have you any qualifications other than RGN?

She has completed ENB courses (923 and 998) for clinical development and teaching assessment. She commented that she felt underqualified compared to other ward sisters. She is now attending a pilot scheme in the hospital - on NVQ management course for sister grade 'G'.

Q4 Have you attended management course?

The ward sister said that she was a 'hands on' nurse but administration is an ever increasing part of her role. The staffing levels do not allow her to be 'just a manager'. As East 3B is a private patients ward it is not part of a cluster of co-ordinates at present. She reports to a business manager responsible for income generation. There are no budgets, only based on historical usage for supplies. She does not report professionally to a nurse manager.

Q5 How would you describe your ward in terms of difficulty of managing compared to other wards in the hospital?

She accepted that the ward was not one of the most difficult to manage, lying in the middle of the hospital ranking.

Q6 What factors do you find makes managing a ward difficult?

There are a large number of doctors to deal with, all requiring different treatments for their patients. There is no ward clerk and therefore a great deal of time is spent on the phone. The ward comprises six single rooms, containing high dependency patients. Obviously these patients can be extremely difficult.

Q7 What information do you need to manage your ward effectively?

The nurses need to know the type of patients to be admitted in order that appropriate investigations can be prepared in advance. Administration policies are not communicated effectively from senior management. This poor communication is probably because the ward is not part of a cluster. There is a need for financial budget which is based on the requirements. The business manager is the budget holder and does not provide reports to the ward sister. Care planning profiles are developed freom other wards and individualised from these core plans.

Q8 What benefits do you obtain from the ward nursing system? Could you manage as or more effectively without the system?

An exercise was undertaken with the project nurse to examine patient dependencies. The analysis indicated that the skill mix was out of balance - less untrained staff and more

qualified staff were required. A case was made to the business manager, for 2 trained staff every shift with a reduction in untrained staff, which was accepted.

Q9 Would you describe your management decision making mainly as "planned" or as "crisis management"?

The work on the ward is mainly planned, although sickness is high because only 1 trained staff per shift which increases stress levels. There is not an effective communication between consultants and their doctors, leading to crisis management on occasion.

Q10 What decisions do you make involving your immediate manager?

She has been working with the business manager to introduce new rostas with internal rotation between days and nights. This new shift system gives 2 trained staff/shift with no part time untrained staff at night. The business manager signs the agency nurse booking form not the ward sister. The ward sister is not clear whether the business manager role is justified. She has no senior nurse to whom she can be professionally accountable.

Q11 What decisions do you make involving consultants?

Consultants will ask advice on patient discharge, fluid levels and eating requirements of patients. There are no regular meetings with the consultants. The consultants secretary books the patients for admission.

Q12 What actions would you take to improve the management of your ward?

The ward should be expanded geographically to provide a 4 bed high dependency unit with 1 nurse allocated to observe these patients. There is a requirement for monitoring equipment and syringe pumps which should be funded. A means of providing funds to the ward is to charge a levy against private monies obtained. There should be a weekly meeting with consultants to plan for admissions and prepare for investigations. The ward sister should be part of the management structure not hand over to the business manager who has not obtained the appropriate experience.