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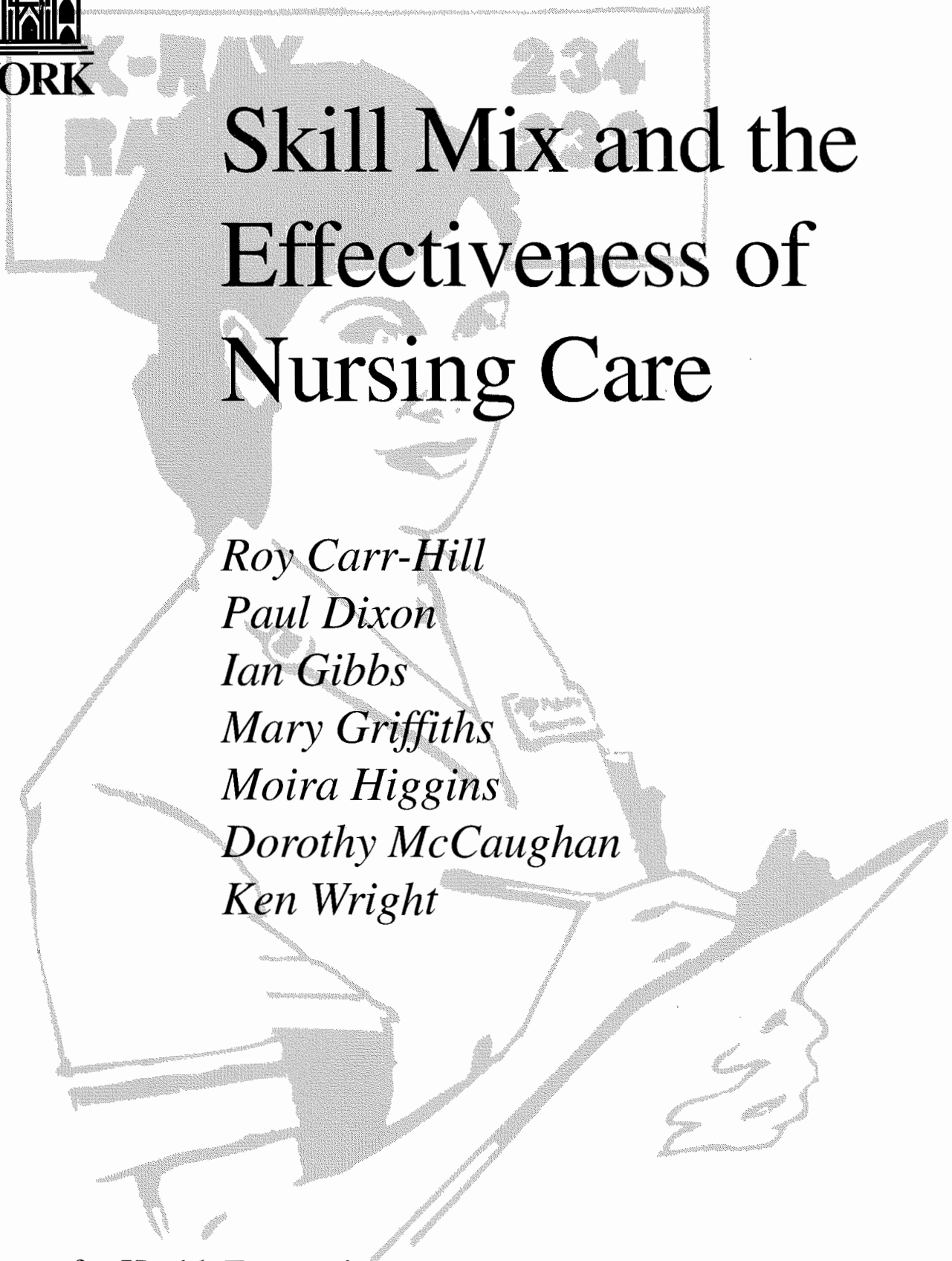
Skill Mix and the Effectiveness of Nursing Care



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SUMMARY

The objective of the study was to examine the links between inputs into the process of nursing, in particular, the skill mix of nursing staff and the outputs of nursing in terms of the quality and outcome of care. The review of literature revealed several ambiguities and conceptual problems at the measurement level which needed to be clarified prior to data collection itself. The overall objectives of the project were:

- To develop and field test measures for monitoring the quality and outcome of nursing care.

- To identify the major input and process variables which need to be taken into account in monitoring the impact of nursing skill mix.

- To investigate the links between different skill mixes and the quality and outcome of the care provided.

- To relate the full costs of different skill mixes to both the quality of care and to the outcomes for patients of that care.

The research design was discussed extensively with senior nurse managers and research nurses. It was decided to focus extensively on a professional assessment of the delivery of nursing care: the patients' perceptions, although acknowledged to be very important, were therefore excluded. The design focused on those aspects of care which were almost totally within the control of nurses.

A case study approach was adopted, data being collected in 15 acute medical or surgical wards at seven hospital sites by qualified nurses trained as observers by the research teams. The sample of hospitals and wards was chosen within the constraints of gaining permitted access but, while not being statistically representative of all hospital wards in England and Wales, ensured that a wide variation in contrasting styles of ward structures and nursing organisation was covered. Thus both Nightingale and nuclear wards were selected, some with primary nursing, some with patient allocation and some with team nursing; the choice of hospitals included both district general and teaching hospitals in both rural and urban areas throughout the country. Instruments were devised and field tested by the research team before the main study. In particular, a set of event-based outcome measures were devised to complement the measure of process quality.

The data were analysed at three levels. Firstly, at the level of patient/nurse interaction; secondly, at the level of the observation session (the two-hour observation of interactions between nurses and patients) and thirdly, at the ward level. The measurement of skill mix followed two main approaches. One was by grade predominance - where the ratings recorded at the interaction level referred to one grade (the predominant grade) more than any other grade. Secondly, a grade mix index was developed by allotting scores of 1-6 to each grade (Learner = 1, F/G Grade = 6) involved in an interaction and weighting the score by the number of grades involved.

In general, the main results of several analyses can be summarised by saying that grade mix had an effect on the quality of care in so far as the quality of care was better the higher the grade (and skill) of the nurses who provided it, but that the variation in the quality of care between different grades of staff was reduced when higher graded staff worked in

combination with lower graded staff. These results were robust as far as this study was concerned, they occurred in different approaches to measuring skill mix and from analysing the data at different levels of aggregation. At the ward level better outcomes were also associated with greater proportions of staff in Grade D and above independently of the effect of quality.

Several methodological improvements are suggested as a result of the study both in terms of the criteria for choosing and designing instruments and in terms of augmenting the usefulness of both the Qualpacs instrument and the event-based outcome measures.

Finally, the results have been related to current debates about staff and skill substitution and the use of support staff. The variations in both quality and outcome with higher grade staff suggest that investment in employing qualified staff, providing post-qualification training and developing effective methods of organising nursing care appeared to pay dividends in the delivery of good quality patient care.

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PART A BACKGROUND

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND AND OBJECTIVES

The current agenda for changes within the National Health Service (NHS) as well as the changes taking place within nursing as a result of Project 2000, make the effective and efficient use of human resources an important goal at all levels of management. Given that managers in the NHS are accountable for both the efficient and effective use of staff and for guaranteeing high quality care, there has to be some means of ensuring that all these objectives are met. The complex relationship between different levels of skill mix in nursing (that is, the proportion of qualified to unqualified staff on a ward, their qualifications, level of competence, knowledge and experience, and so on) and the quality of patient care represents a crucial if emotive issue in health service management.

An increased interest in nursing skill mix was generated by the publication of the report 'Mix and Match: A Review of Nursing Skill Mix' (DHSS, 1986). The introduction of the purchaser-provider relationship has been accompanied by greater emphasis on unit labour costs and hence on the potential for substituting cheaper, less qualified, care assistants for highly qualified nurses. This study was commissioned by the Department of Health to specifically examine the relationship between skill mix and the quality of nursing care. The

overall objectives of the project were:

- To develop and field test measures for monitoring the quality and outcome of nursing care.

- To identify the major input and process variables which need to be taken into account in monitoring the impact of nursing skill mix.

- To investigate the links between different skill mixes and the quality and outcome of the care provided.

- To relate the full costs of different skill mixes to both the quality of care and to the outcomes for patients of that care.

The research brief and, consequently, the research design was concerned with the effects of skill mix on the quality and outcomes of nursing care and therefore focused on those factors which were under the direct control of nursing staff. In particular, it was seen as crucial to observe the quality of the nursing process in order to identify any actual differences in practice between different groups of staff. In turn, this posed the problem of developing or identifying appropriate measures of outcome and quality. However, patients' perceptions of the quality of nursing care were not solicited and the measurement of outcomes in terms of changes in patients' states of health was not included. Although such perceptions and outcomes are clearly very important aspects of nursing care, their incorporation into this project would have called forth not only a quite different research design, but also a

considerable increase in the time or resources allocated to it.

Initially, it had been thought that it might be possible, on the basis of a few pilot studies, to identify a small number of crucial variables for which data could be collected on a large scale by interview or by questionnaire. It became evident however that, because of the lack of clear evidence linking qualifications and skill mix with quality and outcome of care in general, and given the large number of variables and the complex inter-relationships involved, it would be better to continue the study of a further small number of sites in detail.

The project also had to face the complexities involved in measuring "skill mix". Unfortunately, a review of relevant literature (as set out in Chapter Two) did not yield any useful "off the peg" methods. In practice, for a considerable part of the analysis of the effects of skill mix on the quality of nursing care, this concept was converted to one of "grade mix". Two reasons lay behind this choice. Firstly, not only does grading reflect job content and responsibility, but staff on higher grades have more qualifications, experience and skills than those on lower grades, so that grade mix is a good approximation to skill mix. Secondly, even the measurement of grade mix is complicated and several different approaches were used to test the sensitivity of the results to alternative methods. Both these issues are examined further in Chapter 4.

Generally, then, the use of grade mix has been used for the nurse-patient interaction. However, where the analysis was used to describe and analyse the quality of nursing care at the ward level it was possible to supplement the grade mix data with additional relevant skill mix information on nursing qualifications, experience, post-qualification and on-the-ward

training as well as the nurses' perceptions of the use of their basic, educational, rehabilitative and technical skills.

1.2 STRUCTURE OF THIS REPORT

The literature review which was undertaken in the early stages of the project is contained in Chapter Two. The main methodological background to the project is described in Chapters Three and Four. More detailed descriptions of the methodology and copies of the main research instruments are given in various Appendices to this Report. The results of the project are of two main kinds. Firstly, the results of the analysis of the effects of grade or skill mix on the quality and outcomes of nursing care are set out in Chapters Five and Six. Secondly, the lessons learned and implications arising from the use of the instruments designed to collect information on the quality and outcomes of nursing care are set out in Chapter Seven. The report concludes with a discussion of the resource implications of improving the effectiveness of nursing care.

CHAPTER TWO

A SELECTIVE REVIEW OF THE LITERATURE ON SKILL MIX[1]

2.1 INTRODUCTION

Nursing in the United Kingdom has arrived at a major crossroads. Projected demographic changes, the changing demands of health care services and the need for the cost-effective use of resources have mapped a new course for the development of the profession. The main existing guides for this development are to be derived from the Strategy for Nursing (Department of Health, 1989) and the documents relating to the implementation of Project 2000 (UKCC, 1986).

The publication of Mix and Match: A Review of Nursing Skill Mix (DHSS, 1986) reflected increasing interest by senior nurse managers and policy makers in the potential for providing nursing services through different combinations of nursing skills. Five years later, skill mix continues to be an important debate in nursing and the subject of several research studies. The purpose of the present review is to highlight those issues which have a bearing on skill mix.

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[1] Much of the material in this chapter and Chapter 8 was originally published as an article in the Journal of Advanced Nursing in 1991 (Vol 16 p. 242-249) and is reproduced here with kind permission of the Editor.

2.1.1 Areas Considered

The main areas chosen for consideration are: the likely response of different groups within nursing to the debate over skill mix; nursing manpower and resource management; and standards of care and quality of care.

Before considering each of these areas it is perhaps helpful to make a distinction between 'grade mix' and 'skill mix' in nursing. Grade mix refers to the number of sisters, staff nurses, enrolled nurses and auxiliaries required - that is, the number of staff of each grade. Skill mix on the other hand refers more to the skills and experience of staff within those grades - for example, how many years experience does a staff nurse have in her present specialty and does she have a post-basic qualification in that specialty?

However, while years of experience and post-basic qualifications are important, the implication that skills increase with length of service is not necessarily true. The relationship may well be curvilinear with skills increasing with experience to begin with but then declining once a certain level has been reached.

2.2 INTEREST GROUPS WITHIN NURSING AND SKILL MIX

While topical as an issue, it would be wrong to assume that skill mix is desirable or that a unified view prevails in nursing. On the contrary, skill mix has always been a thorny issue. Reviewing the literature in 'Mix and Match' (DHSS, 1986), MacGuire also came to the conclusion that it represented the battle line between the nursing profession and the employing

authority: the former strongly committed to the view that all aspects of nursing should be carried out by qualified staff; the latter believing that this consideration has to be set against the need to provide a cost-effective service.

Given the heterogeneity within nursing it is inevitable that different groups will represent different interests and alternative points of view. White (1985) identifies a form of pluralism within nursing composed of three main interest or subgroups, which she labels 'generalists', or 'professionalists' and 'nurse managers'.

In spite of attempts in this country to introduce such innovations as the 'nursing process' and 'primary nursing', with their emphasis on greater autonomy for nurses and systematic, individualised care for patients, task allocation has by no means completely disappeared as a method of organising patient care. Staffing the task system requires a hierarchy of skills provided by those with specialist training and a formal qualification (registered and enrolled nurses); those in the process of obtaining those qualifications (learner nurses); and those not seeking or in possession of nursing qualifications (auxiliaries). Organising work in this way reflects the earlier influences of division of labour and scientific management theories. Insofar as nursing can be separated into elements some of which are simpler than others, and each of which is simpler to perform than the whole process, certain labour market principles then have relevance.

However, Pearson (1986) presents the views of those nurses who would take issue with the assumption that 'basic' nursing tasks are simpler than 'technical' tasks. Indeed, the issue of skill mix is seen by many 'specialists' and 'professionalists' as the antithesis of a professional

service.

2.2.1 Professionalisation

'Professionalisation' and 'professionalism' are terms associated with the process in which organised occupations like nursing attempt to make exclusive claim to perform a particular kind of work, control training and access to it, and retain the right of terminating and evaluating the way the work is performed. The presence of untrained or unqualified staff inhibits the achievement of those objectives.

However, the goal of professional status is not supported by every group in nursing. While accepting that a number of highly qualified staff would be better paid and have more prestigious and satisfying jobs, Salvage (1985), reflecting the 'generalist' point of view, examines the likely effects of professionalism on junior and unqualified staff and, most importantly, on patients. She concludes that professionalism encourages divisiveness; imposes a uniform view on nurses; denies the needs of its workers; emphasises an individual rather than a collective approach; fails to challenge the *status quo*; and offers weak support to the NHS.

Nurse managers, the third interest group identified by White (1985), do not share the same value systems or goals as the 'professionalists'. Like the 'generalists', but for different reasons, they accept the inevitability, and support the desirability, of skill mix in nursing. Given their responsibility for managing resources and responding to present and future needs, managers, of necessity, become less involved in the day-to-day care of patients and more

preoccupied with the control of budgets and cost-effectiveness. The substitution of less expensive for more expensive resources, less qualified for more qualified staff, are among the options for achieving these managerial objectives.

In two recent publications Robinson (1989; 1990) examines in detail the relationship between power, politics and policy in nursing. One theme is the marginalisation of nursing and its invisibility in the policy arena. In this context she highlights the process whereby senior nurses were side-stepped and stripped of their power during the structural changes in the NHS following the Griffiths report (DHSS, 1983). In the new milieu dominated by management values and ideology it is general managers, few of whom are nurses, who now take the important decisions which determine the composition and skills of the nursing workforce. While agreeing with part of White's analysis, Robinson (1990) believes the system described by White is elitist rather than pluralist because the emergence of consensus where the majority view prevails, implicit in pluralism, rarely happens in nursing.

For the general manager, control over resources, especially the grade and skill mix, represents an essential means for achieving policy goals. The analysis presented by Robinson is broadly in line with Carpenter's (1978) assertion that once a particular interest group, such as general managers, gains dominance it then has the power to determine the value of different tasks. Depending on circumstances, it may be judged no longer efficient or expedient to allow basic nursing care to remain the sole preserve of the professionally qualified nurse. While general managers remain in the ascendancy, grade and skill mix will continue as a major policy issue with manpower, costs and quality key elements in the debate.

2.3 NURSING MANPOWER AND RESOURCE MANAGEMENT

Much of the work on manpower planning has been an attempt to determine the number, but rarely the mix, of nurses required to provide the necessary care for patients. In the past 'establishment', that is, the number of nurses required to staff a ward or hospital, has been based on estimates of bed occupancy. In most hospitals, however, the number of beds occupied seldom reflected the true nursing workload. In an attempt to derive more accurate predictions, other studies have calculated the amount of nursing time required by patients in different dependency groups. Gault (1982) is also highly critical of the technical, methodological and philosophical basis of many of the dependency formulae.

A subsequent survey (DHSS, 1984) indicated that while many authorities were using some systematic approach for the supply, demand and control of nursing resources, it was also evident that some districts and regions had yet to implement such systems to facilitate nurse manpower planning. In spite of the huge number of studies on nursing manpower, and official encouragement from the Department of Health for regional and district health authorities to implement reliable and agreed systems for determining nurse staffing requirement, the National Audit Office (1985) was critical of the inefficient use of nursing resources in the NHS.

2.3.1 Resource Management Initiative

One part of the Resource Management Initiative (RMI), launched in 1986 (see Norman et al, 1988) to promote efficiency and effectiveness in the NHS, focused on the development of

computerised nursing management information systems. Many of the systems (details of which are contained in the manual 'Nurse Management Systems' by Greenhalgh, 1989) claim to generate information which can be used to determine the mix of grades required on a shift and, with some systems, the number of trained and untrained nurse hours required.

Much development work has therefore taken place since the critical remarks of the National Audit Office in 1985. While welcoming much of this work, Norman et al (1988) warn against the dangers of greater complexity and detail which do not necessarily imply greater accuracy or rigour. Clay (1987) has also remained particularly critical of the new climate of general management which, in his view, has spawned increasingly intricate ratios and formulae to replace the skill, experience and professional knowledge of nurse managers in making crucial decisions about the deployment of staff.

Despite the different points of view on this issue, the main trend has been the gradual acceptance that systematic approaches to the control of nursing resources are essential if the present inconsistencies in staffing levels, both within and between health authorities, are to be reduced. The potential of current approaches has been studied in a comparison study (Clarke and Carr-Hill, 1992).

2.4 NURSING STAFF TURNOVER

On the question of staff turnover, analyses undertaken for the Briggs Report (DHSS, 1972) suggested that wastage and turnover rates among trainee and trained nurses were not too dissimilar to other occupations that contained a large proportion of women.

Reflecting the continued interest in this important aspect of manpower planning the last five years have yielded a further batch of studies - for example, Bosanquet and Gerard (1985), United Kingdom Central Council (1986). The recent survey commissioned by the Royal College of Nursing (Waite and Hutt, 1987) provides evidence that regional health authorities in the south of England, most notably Oxford, the four Thames Regions and Wessex, have experienced the greatest instability in their nursing workforce.

Another recent study of the movement of nurses and nursing skills (Thomas et al, 1988) found that 42 per cent of the nurses joining private acute hospitals, and 28 per cent of those joining long stay private nursing homes, came directly from the NHS.

2.5 STAFF AND SKILL SUBSTITUTION AND COSTS

While important cost containment is not the only reason for examining the extent to which nursing staff and skills can be substituted. There are at least two other considerations which, in combination with cost containment, make substitution such an important issue. The first concerns the links between manpower planning, recruitment and demography. For many years, nursing had been able to rely on an abundant crop of suitably qualified school leavers who, without too much encouragement, would present themselves for training. However, forecasts of the number of suitably qualified young people entering the labour market during the 1990s are alarmingly low (Poulton 1988), an outcome sometimes referred to as the 'black hole'. Challenging this view, Grocott (1989) suggests that the overall 'wastage rate' is in fact going down as fewer qualified nurses leave the NHS. He concedes, however, that the position at district, and to a lesser extent at regional level, can deviate significantly from the

national picture.

A second consideration in relation to substitution is prompted by the UKCC's proposals for nurse training. In addition to the cessation of enrolled nurse training, the introduction of a new single level of nurse has important implications for student nurses who will become largely supernumerary to NHS establishments during the 3 years of their professional preparation.

These factors, separately or combined, will have an important influence on the future shape and structure of nursing and, of course, the composition of the skills available.

The substitution of less expensive staff for more expensive categories of health service staff has been the focus of a growing number of British studies on nursing. Gray and Smail (1982), for example, found that a three-fold increase in the number of unqualified nurses in Scottish hospitals over the period 1950 to 1979 was associated with savings of less than 5% in the total pay-bill, in large part because of narrow pay differentials.

2.5.1 Mix and Match

The Mix and Match review (DHSS, 1986) also noted the influence of narrow pay differentials unable to establish a direct relationship between nursing skill mix, as reflected in the ratio of qualified to unqualified staff, and the cost-effectiveness of the service.

Gray (1987), however, questioned the conclusion from Mix and Match that variations in skill

mix are not related to variations in nursing costs per patient. By recalculating the data, he was able to show that by focusing on nursing costs per nursing hour, rather than total nursing costing per patient, wards with a high proportion of unqualfied nurses had lower costs per nursing hour, and vice versa.

2.6 SUPPORT WORKERS AND ASSISTANTS

Given that one form of substitution will no longer be available once student nurses become supernumerary, who will fill the gap they leave? One proposal from Project 2000 is for a new grade of helper to undertake specific tasks in support of, and under the supervision of, qualified nurses.

The precise role of the new support worker or health care assistant remains uncertain and the response of the nursing profession has been at best equivocal. Dickson and Cole (1987) suggest, for example, that the profession, in an attempt to create a clear separation between nurses and assistants, has distanced itself from them and their training.

In a recently completed study, Robinson et al (1989) suggest that the degree of attention given to the support worker is disproportionate to the small contribution they currently make on the ward. Despite this observation, they still find evidence to substantiate the claim that support workers release qualified nursing staff to deliver more direct and indirect nursing care. Moreover, support workers make possible a small reduction in unit labour costs but there appeared little scope for further major savings.

2.6.1 Costs

In their study of nurse staffing and support worker requirements for acute hospitals, Ball et al (1989) found that a large amount of time was spent by trained and student nurses on work which could be undertaken by support staff. Taking account of the varied patterns of work between specialties, the study put forward a flexible framework for staffing which would involve nurses, care assistants, hotel workers and clerical staff. The study claims that such an approach, while not necessarily resulting in cost savings, would provide greater job satisfaction for all staff and good quality of care for patients.

While much attention has focused on the cost-effectiveness of substituting less qualified for more qualified staff, few studies have considered whether a greater proportion of qualified staff necessarily implies greater costs. Among the exceptions, Binnie (1987) reports that, by recruiting young staff, costs were not increased when one hospital introduced primary nursing with proportionally fewer auxiliaries and enrolled nurses than usual in the new team. Moreover, the staffing level dropped by only one whole-time equivalent (WTE). MacGuire (1988) also reports that within a 'no extra costs' constraint, it was still possible to reduce the proportion of unqualified staff in the workforce from one third in 1981 to just under a quarter in 1988, with no loss of WTE staff working with patients.

2.7 SKILL MIX, QUALITY AND STANDARDS OF CARE

Quality of care has been defined as the degree of success achieved in reaching the standards set for solving or preventing patients' problems and satisfying their needs (Wilson-Barnett

1981). Such a definition assumes an evaluation of care, an essential prerequisite of which is the specification of objectives and standards.

A standard, in turn, can be seen as a baseline of good practice. The Working committee on Standards (RCN, 1980) came to the conclusion that unplanned, uncoordinated care was wasteful of scarce resources and itself an example of poor standards.

An important development in the United Kingdom over recent years has been the attempt by the nursing profession to find an effective method by which the level of care can be measured so that poor practice can be identified and corrected. Several organisations in nursing and health care are responding to the challenge. The King's Fund, for example, has launched a project to stimulate the assessment and promotion of quality assurance in the health care field. In addition, the Royal College of Nursing has just issued its first publication on 'standards of care' (Kitson 1989).

While cost containment and efficiency are important considerations in nursing, they can not be divorced from quality-of-care issues. In determining the costs of nursing care, it is essential to discover what this expenditure obtains.

2.8 DISCUSSION

The skills and experience possessed by nurses represent a valuable resource within nursing. For these reasons, the "Mix and Match" review (DHSS, 1986) was asked to identify various aspects of quality of care so that those features most influenced by the nursing staff could be

identified. The review found no clear relationship in long-stay wards between a higher proportion of qualified nurses and the practice of individualised patient care. However, in wards where the overall staffing level and the proportion of qualified nurses was low in relation to the workload, it appeared that only the basic physical needs of the patients were being met. The review went on to say that the quality and cost-effectiveness of care depended crucially on the leader of the ward nursing team.

MacGuire (1988) cautions that reviews and studies like "Mix and Match" are too often carried out at ward and unit level rather than at the patient level where it really counts. Instead of the establishment ratio, or the ratio of trained to untrained staff, MacGuire believes there is a strong case for investigating skill mix in terms of the contact time between nurse and patient (direct patient care) and examining whether that contact is with a trained or an untrained nurse. Luker (1981) also believes that the evaluation of nursing care should move away from the volume and intensity-of-service approach of so many workload and dependency studies.

Nurses have frequently adopted Donabedian's (1980) definition of care evaluation as involving three interdependent elements: 'structure', 'process' and 'outcome'. The three are inseparable to the extent that, to assess quality effectively, information about the resources available (structure), how they are organised and used (process) and the eventual effects (outcomes), needs to be collected before a judgement of quality can be made (Pearson, 1987a). It should, however, be emphasised that any categorisation of variables as structural, processual or outcome depends entirely on the context considered (eg, the hospital budget provides a structure for discussions of resource allocation between units; staffing on a ward -

the consequence of such a resource allocation process - provides the structure for a study of this kind, and so on).

2.8.1 Skill Mix

As yet, there is very little research in the United Kingdom which specifically looks at skill mix in relation to Donabedian's (1980) three broad areas of structure, process and outcome. Indeed the paucity of published literature on skill mix generally led the authors of "Mix and Match" (DHSS, 1986) to conclude that few studies treated this subject as a topic in its own right. The studies which are available invariably treat it as a secondary issue and seldom directly address the central issue of whether patient outcomes are affected by the skill mix of the nursing team, or whether the same patient outcomes can be achieved by varying skill-mix combinations.

Despite the relative absence of published material, the increasing concern in the 1980's for quality assurance in nursing has led many nurse managers to address the relationship between staffing numbers, skill mix, workload and standards of care. However, as noted earlier, progress in implementing reliable and agreed staffing systems has been slow. For this reason, the NHS Management Board commissioned a study to examine service quality in relation to how nursing time was actually spent. The study (DHSS, 1988) undertook secondary analysis of a number of previous local studies which had employed the 'criteria for care' methodology to monitor nursing activity. Results from the secondary analysis indicated considerable variations between hospitals; between wards in the same hospital; between wards of the same speciality; and between and among grades of nursing staff. The study concluded that the key

components of the efficient and effective use of nursing resources included: valid and reliable patient dependency/workload measures; agreed and measurable standards of care; and a mix of nursing skills related to patient care.

While a number of studies have been mounted since the publication of "Mix and Match" (DHSS, 1986) many of the existing findings are at best equivocal. At a very basic level, improved measures of skill mix are required in order to avoid the limitations of indicators which reflect little more than grade and qualification mix. In a similar vein, existing measures of quality of care require careful scrutiny and, if found wanting, more robust measures need to be developed.

Skill mix is a highly complex issue in nursing which cannot be resolved on the basis of one study. In an ideal world, the work on measurement should precede those studies which would examine the implications of skill mix in nursing for quality of care and costs.

In reality, despite the limitations of existing measures, the different strands of work will need to proceed hand in hand. Although existing studies provide the foundations on which a body of knowledge can be developed, future work on skill mix will need to address a number of other pressing issues. Of particular relevance is the challenge to the tradition of a 'hands-on' nursing culture in Great Britain, and its implications for patient care and the number of trained nurses needed. Given that nurses are an expensive commodity, the issue at the heart of skill mix from a managerial or pragmatist point of view is the need to identify those nursing tasks which require a professional qualification (usually for the more technical aspects of nursing) and to allow less or unqualified people to undertake other more basic tasks. From

this point of view, both substitution and an extended role are legitimate, provided that the tasks are within the capabilities of the performer.

A recent example of an extended role is the appointment of a trained nurse to strip and prepare veins for use in heart by-pass surgery. Critics argue that such appointments diminish the unique role of the nurse and propel task allocation to a worrying extreme (Dimond, 1990).

2.8.2 Primary Nursing

"Professionalists" on the other hand view nursing as a self-contained caring profession, complementary to, but independent of, medicine. As a result, they reject the neo-medical model of nursing and are highly suspicious of developments which take nurses away from the bedside. With the advent of Project 2000, and the introduction of health care assistants, they fear that qualified nurses, in their new role involving greater supervision of others, will relinquish much of their previous contribution to 'hands-on' nursing. Faced with this challenge, many professionalists have expressed a growing interest in primary nursing, which seems to offer greater opportunities to plan, implement and evaluate the care of patients: in short, a chance to retain those links with the bedside and, more importantly, to develop 'hands-on' nursing.

The attitude and policy of the national boards, vis-á-vis trained nurse ratios in training areas, is also an important issue. The English National Board has no fixed formula at the moment and in the absence of precise specifications a view has emerged that one staff nurse is required for every two learners. Not surprisingly, such a general 'rule of thumb' has major

limitations. Whereas a trained nurse might manage two learners in a relatively undemanding environment, this would not be possible where the workload was especially heavy due to such factors as a large proportion of very dependent patients or high patient turnover. Indeed, the heavier the physical workload, the lower the quality of the ward as a learning environment (Smith, 1987). Moreover, while a third-year student should be more accomplished than a first-year one, her need to acquire more 'difficult' skills, for example, coping with the anxious parents of a child, will require more rather than less supervision.

Given that Project 2000 will place even greater demands on RGNs in training areas, and the stipulation that enrolled nurses cannot supervise learners, obtaining the correct skill mix to fulfil the needs of students and patients will place increasing pressure on the national boards to develop stronger guidelines so that the various and complex goals of training can be met.

2.8.3 Patient Outcomes

It has been noted above that whilst costs are an important aspect of skill mix, quality of patient care is an equal if not greater consideration. Although the process of care is now better understood, patient outcomes, that is, the results of care in terms of changes in the physical and psychological well-being of the recipient of that care, has only just begun to receive the attention it deserves in the United Kingdom.

Patient outcomes alone, however, are too simple a measure by which to judge the quality of nursing. Very often, a successful outcome may arise in spite of the care given rather than because of it (Pearson 1987b). In addition, it cannot always be assumed that outcomes are

the direct result of the nursing care that is provided. Isolating the contribution of nursing to patient outcomes from that of other groups, for example, doctors and physiotherapists, is a difficult task.

It is clear that, in order to show how the actions of different combinations of qualified and unqualified staff relate to changes in those who receive the care provided, a set of measurable outcome criteria, specific to nursing, and reliable and valid methods for measuring these outcomes will have to be developed. Although notable progress has been made, further work on process criteria and measures are also needed for a fuller understanding of the relationship between skill mix, quality of care and patient outcomes.

PART B STUDY DESIGN

CHAPTER THREE

RESEARCH METHODS

3.1 INTRODUCTION

The initial proposal involved a set of detailed studies in eight wards at four sites carried out in the first year which would enable the identification of a small number of crucial variables for which data could be collected by interview or questionnaire over a large sample of wards in the second year. It became evident, however, that because of the lack of clear evidence linking qualifications and skill mix with quality and outcome of care and given the large number of variables and complex inter-relationships involved, it would be better to continue with further detailed studies in the second year so as to include other types of hospital and a slightly wider range of specialties.

In particular, it was seen as crucial to actually observe the quality of the nursing process in order to identify any actual differences in practice between different groups of staff. In turn, this produced the problem of developing or identifying appropriate measures.

The research design was greatly assisted by consultation with Senior Nurse Managers from Health Authorities, interested researchers and members of the project's Research Advisory Group. The instrumentation, sampling and the general approach for the project were

developed through a series of consultations including:

- Interviews and workshops with Senior Nurse Managers

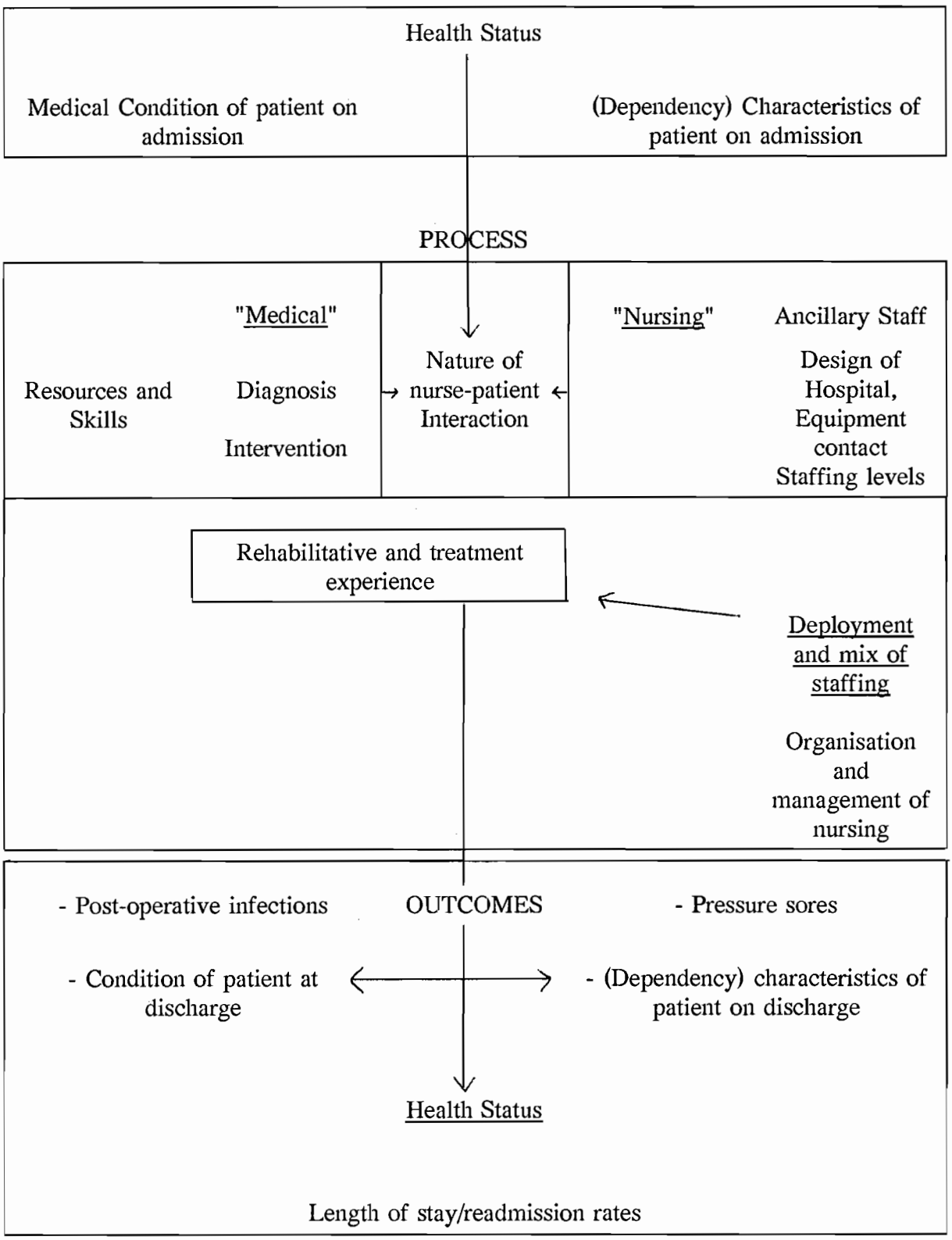
- A seminar with Senior Nurse Managers and academics in nursing studies

- Pilot observation studies in wards.

On the basis of these discussions, the schematic model shown in Figure 3.1 was taken as the point of departure. Given that the focus of this research was on the nursing process, the main effort is concentrated on factors on the right hand side of the diagram and these are the factors which are to be discussed in this chapter.

There are two main sets of factors: those concerned with the 'structure' and 'process' variables relating to patients, nursing staff and ward organisation and management, and those with the quality and outcome of nursing care. The structure and process variables are described in Section 3.2. A full discussion of the quality and outcome variables follows in Section 3.3.

Figure 3.1 Schematic Model of the Research Project



3.2 STRUCTURE AND PROCESS

The contextual specificity of the distinction between structural and processual variables has already been discussed. The distinction here is between those variables which can be treated as invariant over the case-study duration, and those in which there are significant variations.

3.2.1 Structural Variables

These included:

- bed occupancy;

- staff satisfaction/morale and the effect of the ward sister's philosophy and attitude to care;

- nursing skills, including the measurement of length of experience and of presence on the ward, as well as qualifications;

- ward organisation, including factors such as the organisation of nursing (eg, team nursing, patient allocation) as well as ward layout;

- establishment levels and the provision of holiday/sickness relief.

Information on staffing levels, staff/patient ratios, bed occupancy and ward organisation was

collected on a ward profile form adapted from Criteria for Care (Ball et al, 1984). In addition a self-completion Staff Questionnaire was designed to capture descriptive and demographic data on all nursing staff, except learners (see Appendix One).

Finally, information on the effects of a ward sister's attitudes and philosophies to care and quality on the ward were collected using the Therapeutic Nursing Function Indicator (TNFI) designed by Kitson (1984) and redesigned by Redfern (1990). However, after consultation with researchers working on this Indicator, it was decided not to proceed any further with the analysis of these data.

During the analyses, these variables have been captured in two ways: either by the use of dummy variables for the wards in the multivariate analysis (reported in Chapter 5) or by relating the variations attributable to wards to variables reflecting their structural characteristics (see Chapter 6).

3.2.2 Process Variables

In principle, a direct comparison of the nursing inputs and characteristics of the wards with outcomes in a variety of settings would be sufficient to establish whether or not there was a substantive relationship between the two. However, there are many factors which can intervene between an established pattern of nursing inputs and the immediate outcome or quality of that care. These factors, encompassing a wide range of possible inputs, are grouped together under the rubric 'pattern of nursing care'. This rubric includes:

- Patient characteristics ie, the dependency levels of patients on a ward; the numbers of admissions, discharges, theatre cases, day cases, and unforeseen emergencies occurring on the ward.

- Staffing levels and the deployment of staffing mix (the clinical grades of the nursing staff) on a ward.

- Hours worked and ward clerk services

- Activities including those actions and 'tasks' carried out by the nurse to meet patients' needs.

Instruments were designed for collecting data on all these variables. Use was made of existing instruments wherever possible, but new ones were developed and tested in pilot studies.

Ward staffing levels, the deployment of staff on the ward and nursing activity in the ward were measured by activity analysis adopted on similar lines to one advocated, again, in Criteria for Care (Ball et al, 1984). In this approach, nursing activities are categorised and grouped under the major headings of: Direct Care; Indirect Care; Associated Work and Non-productive Time (see Appendix One). The activity sampling form was also amended to allow the recording of the clinical grade of individual members of staff.

The South East Nursing System (SENS) (Asset Management Consultants, 1986) was selected

as the best method to measure fluctuating workload. This instrument allows users to record not only the various patient dependency levels but also incorporates other factors such as admissions, discharges, surgical operations, day case and unforeseen emergencies into the calculation of overall workload (see Appendix One). Apart from actual patient dependency, this information was collected retrospectively rather than prospectively as is conventional with SENS.

3.3 MEASURING EFFECTIVENESS

Assessing the effectiveness of nursing care is complicated. For although nursing care accounts for nearly 50% of the salaries and wages bill of the NHS and about 60% of staff employed (DoH, 1990), there are a wide range of circumstances and factors which contribute to the process of ward based interventions (see Figure 3.1 above). In particular, whilst the clinical/medical intervention would be pointless on its own without nursing support, because that intervention involves a discrete action it appears to be easier to identify the contribution of the clinicians than the more diffuse nursing role of caring, education, maintenance, rehabilitation and support.

It is for this reason that the majority of previous work done in this area has focussed on 'process' measures of 'quality' and the choice of an instrument is discussed in section 3.3.1 below. At the same time, an attempt has been made in this study to devise measures which look more like outcomes in the sense that they are event (or omission) based and these are discussed in section 3.3.2 below.

3.3.1 Quality of Care

Experience from an initial pilot study, as well as from knowledge gained from the interviews, workshops and seminars held at the start of the project, allowed for the evaluation of various approaches to measuring quality of care and for the identification of a tool which could be used for the main study. It was also decided to use an existing, previously tried set of measurements rather than to devise a new one. There was in effect very little choice available and in the end a decision had to be made between "Monitor" (Ball et al, 1984) and "Qualpacs" (Wandelt and Ager, 1974). The latter was chosen because:

- It allows for the process of nursing to be rated on a 5-point scale, whereas Monitor is limited to a 'yes/no/sometimes' approach.

- Monitor relies very heavily on documentation, whereas Qualpacs allows for more direct observation of the process of nursing.

- Monitor also has some questions directed to the patient and questions of reliability have been raised on this count.

- Qualpacs also allows for the recording of the grade of staff giving care which was crucial to this project.

The Qualpacs form is included in Appendix Two (section A2.1). A detailed analysis of the working of Qualpacs and the results it produced are set out in Chapter Four.

3.3.2 Outcome Measurement

Since the measurement of the quality of the process of nursing care provides only a limited indication of effectiveness, it was considered necessary to attempt some form of outcome measurement, one that is based on events or outcomes rather than on process. Prior to the formulation of these outcome measures, a number of issues had to be addressed, the most prominent of which was the fact that patients' knowledge, feelings, behaviours and health states are influenced by many factors besides nursing. Chief among these is the care they receive from other health providers, especially doctors.

The task, therefore, was to design a set of measurable outcomes specific to nursing that would be both reliable and valid. After consulting with Senior Nurse Managers and academics in nursing studies, a decision was taken to formulate outcomes which related to only those areas of care over which nurses have major control.

The following broad areas of care were thought to meet this criterion:

- Patient hygiene

- Patient nutrition and hydration

- Pressure sores/skin integrity

- Intravenous therapy

- Planning for patient discharge

- Pain control

- Education/rehabilitation

- Elimination.

Subsequently, it was felt that a focus on the above aspects of care would also allow for linkages of outcome scores with those from the Qualpacs observations, as some of the aspects overlap with one or more of the five dimensions of Qualpacs. This would permit a more detailed analysis of the relation between the two proposed measures of effectiveness (see Chapter 7).

The basic principles adopted for determining the desired outcomes to be achieved in each category were broadly those advocated by Bloch (1980), who suggests that 'an outcome criterion/standard' is valid if it is an accurate statement of:

- something that should occur in the status of the patient;

- the level at which it should occur;

- the point in time at which it should occur; and

- something that is expected to occur in good measure as a result of the care which is to be assessed.

A "criteria-referenced" (depending on external standards) rather than a "norm-referenced" (one that is relative to the performance of other staff) approach to developing standards was chosen. Each item encompasses the outcome each patient should achieve and the element of care, or the criteria that should be met to achieve this specific outcome.

In developing indices for the chosen eight areas, the following guidelines were used:

- Each criterion included must be capable of an unambiguous 'Yes/No' assessment if observed (categories to record 'not observed' and 'not applicable' were included).

- A minimum of four criteria for each index in order to 'wash out' some of the random variation in response to each item.

- A maximum of nine criteria for each index, for practical reasons.

The decision as to what the criteria within each Outcome Measurement should be was reached through a process of discussions with: (1) members of the research team; (2) members of the Project's Advisory group, and (3) Senior Nurse Managers and academics in nursing studies. To complement these discussions, the research team also undertook an extensive review of the literature (Bloch (1975 and 1977); Coons et al (1988); Gettrust et al (1985); Gallant et al (1979); Kitson (1989); Mason (1984); Patterson et al (1984 and 1986); Pearson (1987); and,

St Bernadine Medical Centre (1988)). Finally, the outcome measures (and the criteria within each dimension) were re-evaluated (again through discussion with the above sources) and re-tested, in a second pilot study.

It should be emphasised that although there is considerable overlap in terms of the criteria included, the two sets of measures are very different. The items ratings on the dimensions of the Qualpacs instrument reflect aspects of the complete process as observed throughout the two-hour sessions but do not refer to external criteria. On the other hand, the ratings on the eight outcome scales are eventually negative summary evaluations of what has or has not happened by the end of the two-hour sessions.

For example, if a patient needed food during the two-hour session but was not given any, then the outcome would be negative but the first three Qualpacs dimensions may have no reference because no relevant interaction took place[1]. Essentially, the Qualpacs instrument rates aspects of a process; the outcome measures score whether or not the end point of the process was adequate and appropriate.

The two sets of measures are treated in the body of the report as alternative measures of effectiveness. Nevertheless, the extent to which the outcome measures can be taken as substantially distinct from the process measures of quality, even though they are differently constructed, remains an empirical matter which is dealt with in Chapter 7 (7.3).

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1 Whilst there may be an 'Indirect Observation' this cannot, of course, be attached to any grade.

Full details of the outcome measurement forms and instructions for their completion are set out in Appendix Two (A2.2 and A2.3).

3.4 SAMPLE SELECTION

Sampling decisions were needed on the number of hospitals and wards to include in the study, and on the number of patients to be included from each ward.

3.4.1 Hospitals and Wards

Regional Nursing Officers and District General Managers in all 14 Regional Health Authorities in England had been informed, either formally by letter or through informal contacts, about the study. Although the seven sites selected for the case studies were located in very different geographical areas of Britain they were not chosen at random. They were chosen instead on the basis of their interest in the issues of skill mix in nursing and their willingness to participate in the case studies and work closely with the research team. Two sites were specifically selected because they use primary nursing.

Access to the hospitals was negotiated through District Nursing Officers and/or the Directors of Nursing Services. Ethical clearance was given by the Nursing Research Committees and Medical Ethics Committees at the various sites.

The decision to use seven sites was determined by the need to collect sufficient information from a wide range of different contacts and by the time available.

Overall, the seven hospitals participating in the study had similar characteristics in that all acted as training centres for nurses and all had over 550 'acute sector' beds. Three (out of these seven hospitals) were also medical teaching centres. Four hospitals were situated in large cities, including one in London whilst the other three were located in smaller cities.

Other than the initial limitation (in the first year) to requesting access to acute medical and surgical wards only, the actual wards used for the data collection process were chosen by nurse managers at the sites. Whilst this lack of experimental 'control' has obvious disadvantages (possible bias etc) there were some advantages - for the managers, using inside knowledge we did not have, appeared to be choosing wards which were 'special' along one or more dimensions which gave us a wider range of data than otherwise. Indeed, there were substantial variations in patient population and ward structure.

Three "Nightingale" and twelve "nuclear" wards were included in the study. Total bed capacity varied from 18 to 32. Some wards had more single rooms than others and these were, on the whole, used for high dependency patients.

The wards covered a range of medical and surgical specialties and two orthopaedic wards[2].

The wards also covered three main types of nursing organisation:

Patient Allocation	-	7 wards
Team Nursing	-	4 wards
Primary Nursing	-	4 wards

3.4.2 Patients

While Qualpacs allows for up to four randomly chosen patients to be observed simultaneously, a balance had to be achieved between obtaining sufficient information and ensuring accuracy of the interaction rated. For this reason a maximum of two patients only were observed for the two hour session. Although Qualpacs also allows for patients to be selected at random, in order to obtain an adequate number of interactions, it was decided to focus mainly on high dependency patients, since they require more care and generate more

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[2]

3	Acute, mixed, general surgical wards.
1	Acute, mixed medical ward specialising in Endoscopy.
1	Acute, mixed, medical ward with Renal and Dermatology specialties.
1	Acute surgical ward specialising in Orthopaedics, Plastic surgery and Vascular surgery.
1	Acute, mixed, general medical ward specialising in Cardiology.
1	Acute Neurosurgical ward.
1	Acute Neuromedical ward.
2	Orthopaedic (Trauma) wards.
1	Acute medical ward specialising in Endocrinology and Haematology.
1	Actue medical ward specialising in care of the elderly.
1	Acute medical ward with Endocrinology, Gastroenterology, Cardiology and Neurology Specialties.
1	Acute surgical ward specialising in Vascular and Arterial Surgery.

nurse/patient interactions than low dependency patients.

3.5 OBSERVATION

At the pilot stage, the inter-observer reliability between the members of the research team was established as a first step so that they could be used as the constant elements in testing inter-observer reliability between each of the research team and the observers recruited at each site during the training period for each ward in the sample. During the first week at each site, selected nurses were trained as Qualpacs observers. Details of the training procedures are set out in Appendix Three. Data collected during training in this way at each site were analysed to ensure there was consistency in the number of interactions recorded by each observer, and to determine whether or not there were inconsistencies in the ratings made by each observer. Average scores obtained for the different ratings were tested and few significant differences emerged.

The data for the analysis in the study were recorded from the second week's observation on the ward. Each day was divided into four sessions of three hours which comprised two periods of two hours for direct observation of nurse/patient interactions and one hour of indirect observation which included listening to and evaluating verbal reports from nurses or studying and assessing nursing records. Observers were allowed to take a break of one hour between periods of observation. No observations were made between midnight and 5.30 am because the pilot studies had shown that there were not enough nurse/patient interactions to justify employing observers. The inclusion of weekend days in the observation period ensured that there was sufficient coverage of periods of both high and low activity.

This coverage meant that typically 8 patients could be observed for each day on each ward and 48 patients were observed in each ward during the week. The data collection procedures are detailed in Appendix 3.

The study produced:

359	Completed Qualpacs forms
720	Completed outcome measurement forms
90	Dependency and workload measures
15	Ward profiles
360	Activity sample forms
248	Completed staff questionnaires

3.6 LIMITATIONS OF THE APPROACH

The case studies offered a framework for evaluating nursing skill mix in relationship to the quality of care delivered to the patient. Although an effort was made to make the studies as broad-based as possible, some limitations are acknowledged. These include the following:

- The choice of settings was opportunistic and constrained by time and resources and had to focus on whatever skill mix of nurses happened to be on the ward. However, it was possible to make comparisons with diverse skill mix compositions, for example, primary nursing.

- Owing to severe time constraints it was necessary to use an existing instrument to measure quality of care. Like all existing instruments for measuring the quality of the process, Qualpacs proved to have some drawbacks. On the one hand, it recorded the quality of care actually delivered, but, on the other hand it was unable to say whether this met the individual patient's needs and why any deficiencies occurred. For example, owing to certain constraints a ward sister may have had to prioritise patients' care needs, thereby achieving some care needs at the expense of others. However, some limitation is compensated for, to a certain extent, by other methods of collecting information. For example, activity analysis and/or workload measurement gives a picture of the "busy-ness" or workload on the ward and the "outcome" measure introduces some external criteria in judging the extent of the care provided.

Although studies of this nature will inevitably have some limitations, every effort was made to control as many variables as possible in the case studies. Other extraneous variables, such as the input of other disciplines to patient care, or patients' lengths of stay, were beyond the control of these case studies.

CHAPTER FOUR

OPERATING CHARACTERISTICS OF THE INSTRUMENTS CHOSEN

4.1 INTRODUCTION

The two central concepts in this research are 'skill mix' and 'effectiveness'. The instruments proposed to measure these were introduced in the last chapter; the purpose of this chapter is to document their operating characteristics and the types of analyses the instruments can support. The issues involved are rather different.

For 'skill mix', the major issue is how good a proxy is a grade mix index for the other possibilities. This is an exercise in establishing external validity of the grade mix index. For 'effectiveness', the issue is how the measures that have been chosen behave empirically.

4.2 MEASURING SKILL MIX

The term 'skill mix' is often used in an undifferentiated fashion. In fact there are several issues involved in measuring skill mix and the way in which skill mix influences the quality of care is usually unexplained.

4.2.1 Measurement Problems

The first measurement problem is what is the appropriate indicator of skill. Should one be concerned only with (paper) qualifications, or only with grades, or only with the nurses'

experiences, or only with competencies, or with some mixture of all four (and possible others). The discussion in the literature is not very helpful in this respect (see Chapter Two). Given that is was not possible, within the confines of this project, to carry out a full scale analysis of competencies, the choice is between experience, grades and qualifications. The managerial problem focuses on the mixture of grades, so the analysis in this study has concentrated on the problem of representing a mixture of two or more clinical grades in an indicator.

There are also pragmatic reasons for using grades as the other types of measure are harder to observe and require much more cooperation from ward staff. Use of grade is further vindicated by its highly significant associations with measures of training and previous experience derived from the staff questionnaire (Table 4.1).

Table 4.1 Proportion of Each Grade with Other Qualifications

Current Grade	N	Any ENB Qualifications	Any ENB or Additional Qualifications	Any ENB, additional qualifications or in-service training
Learner	9	0	6	23
A/B	33	3	17	79
C	53	9	23	37
D	69	27	33	54
E	12	50	50	50
F	15	65	71	76
F test of linear component (all significant at >.01%)		59.4	35.5	24.1

At the same time, while years of experience and post-basic qualifications are important, the

implication that skills increase with length of service is not necessarily true. The relationship may well be curvilinear with skills increasing with experience to begin with but then declining once a certain level has been reached.

The second major problem is the level at which skill mix is to be measured. From the patient's point of view, she or he receives care from a mix of staff both in any given procedure and over different finite periods up to their total length of stay. From the staff's point of view, care is delivered to the patient by a certain skill mix of staff both at the level of the procedure and during fixed finite periods such as a (nursing) shift, a day, a week or a year. From the point of view of a ward manager, the staff skill mix is instantiated in the pattern of staff on a shift or over a given working week or as defined in the ward establishment. Finally, from the point of view of the hospital, the staff skill mix is instantiated in the patterns of staff on duty in the hospital or during a day or as defined in the hospital establishment.

Once again, the discussion in the literature is not very helpful. It is often unclear which scale is being considered when skill mix is discussed; indeed, sometimes, it seems to be presumed that if the establishment mix is set then that is what the patients will receive. The focus in this study on skill mix and the effectiveness of nursing care, however, requires the analysis to be at a level where the quality of nursing care can be measured. In the context of the present project that means that the focus has to be on the actual patterns of nursing staff observed on the ward rather than on the establishment. However, given the data that have been collected, this can be at the level of an interaction or a Qualpacs session.

The third issue is the problem of measuring mixtures themselves. That is, assuming that skill is appropriately indexed by clinical grade and that the focus should be on actual staff on duty rather than on the establishment, then the problem is to find ways of summarising varying numbers of different grades in an overall index. Several avenues have been explored.

1 Predominance: When the ratings at an interaction or a Qualpacs session level mostly refer to one grade, then that grade "predominates". The minimum cut-off point - what minimum proportion should count as 'mostly' - can be chosen at will and then all other observations are instances of non-predominance. For simplicity, in this analysis, a simple majority (one grade accounting for more than 50% of the ratings observed) has been taken as the criterion. Obviously this has the disadvantage that several cases are defined as 'missing' (because no grade meets the criterion) and so analyses have also been carried out with no minimum cut-off point, choosing the grade which occurs most often (even if it is not in the majority).

2 Indexation: An index of grade mix can be calculated by weighting the clinical grades involved in any given interaction or session. As there are no good priors, the simplest possible approach has been adopted by giving 1 point to the lowest grade (learners), up to 6 points to the highest grades (F or G) and then weighting the observed pattern[1]. For example, the grade mix index for 2 grade D nurses and 3 grade A or B nurses would be defined as: (2x4+3x2)/5 = 2.8.

---

[1] The full scale is F or G = 6; E = 5; D = 4; C = 3; A or B = 2; Learners = 1.

3 The combinatorial approach. This is based on examining the effectiveness of actual occurring combinations of grades. For example, compare equal numbers of nurses of grades F and A or B working together with equal numbers of nurses of grades C and D working together. In neither case is there a predominant grade and the value of the grade mix index is, in both cases, 3.5, yet one combination might be more effective than another.

Once again, there are no sensible priors from the literature to choose between these options. Each avenue has been pursued in this project but for pragmatic reasons, which are examined further in Chapter 7, the combinatorial approach was not used as extensively.

Regardless of the form in which skill/grade mix is reported, there is the more fundamental problem of external validity - does the data on grade mix actually measure the relative inputs of the different grades? Throughout the research, the contribution of each grade to the total process of direct care has been measured by the number of times that grade occurs in the Qualpacs ratings. There are several potential problems with this form of activity analysis, principally that Qualpacs was not designed for such use. The basic unit of data in Qualpacs is not defined as each grade's contribution to the total care process, but rather the number of times that items in the Qualpacs form are judged to be relevant to what a nurse is doing. Several sorts of bias might result. The most serious is if the items in the Qualpacs were biased towards the behaviour of a particular grade - eg, if the ways in which learners and grade Fs perform the same type of interaction cause the higher grade to get the more ratings. A similar problem arises if the interactions themselves attract different numbers of ratings and certain types of interactions tend to be performed by particular grades. The contributions of

those grades may then be consistently under or over-rated. The theoretical and Herculean solution to both of these is to develop a new and very detailed type of activity measure which divides nursing procedures and interactions into constituent parts and observes which of these are performed by each grade.

The presumption that numbers of ratings reflect levels of activity can be tested empirically by comparisons with other types of activity analysis. Table 4.2 compares estimates of the direct care provided by grade Ds and above based on their frequency in the ratings with two other activity measures: one based on independent activity analysis carried out during the second week (see Section 3.2.2 above and Appendix 4), the other on ward staffing records. The intercorrelations are sufficiently near to 1 to endorse the use of Qualpacs grade data as a proxy for the contribution of a grade to the care process.

Table 4.2 Comparing Activity Analysis, Qualpacs Sessions and Shift Hours in Terms of Presence of Grade D and Above

Ward	Proportion of Direct Care Provided According to Activity Analysis (Grade D and above)	Proportion of Qualpacs Ratings Involving Grade D and Above	Shift Hours by Grade D and Above
1	43	45	58
2	56	66	63
3	37	46	49
4	52	48	50
5	55	61	50
6	34	51	45
7	55	41	36
8	42	57	47
14	35	46	39
15	33	39	39
16	70	68	78
17	62	60	59
18	44	44	40
19	58	53	56
20	64	75	74

Correlations - Proportion of Qualpacs ratings working Grade D and above with:

- proportion of direct care provided by Grade D and above, $r=.72$, $p<0.001$.
- proportion of shift hours worked by Grade D and above, $r=.85$, $p<.0000$.

4.3 QUALPACS - MEASURING THE QUALITY OF THE NURSING PROCESS

4.3.1 The Qualpacs Instrument

The Qualpacs is an established instrument for measuring the quality of the process of nursing and is first described by its authors in Wandelt and Ager (1974). There are many subsequent descriptions of its use (see eg Ventura and Crosby (1975)) and it comes with voluminous documentation and manuals.

The basic principle of Qualpacs is simple: an observer watches nurses caring for selected patients and rates the nurse-patient interactions on 68 criteria in the instrument. At the end of the session, the ratings are averaged to provide a single measure of overall quality. The exercise is repeated sufficient times to give a representative sample of patients and results from all the sessions are averaged to give an overall estimate for the quality of care on the ward. Typically, a ward's performance would be monitored at six monthly intervals with observations of one or two 2 hour sessions. Whether this is sufficient to provide reliable estimates is debatable. This research used much more intensive sampling to achieve a representative sample of staff and patients and each ward was observed for twenty four two-hour periods.

Observation is as follows. The observer selects two patients in adjoining or nearby beds and for two hours records all their interactions with nurses; these could be anything from a casual greeting to a more elaborate procedure such as a bed-bath or assisting with movement in/out of bed. A further hour is also required in each session for assessing nursing records and/or evaluating verbal reports. Data for both patients are entered on a single Qualpacs form, which also has space for patient details such as age, sex and dependency level (the version used in the research is shown in Figures 4.1 and 4.2A and Appendix 2). For the purposes of this project, the form was restructured and the cues anglicised. The total number of items was reduced from 68 to 60, by omitting items 16-23 referring to psychosocial aspects of care which are rarely appropriate to acute medical/surgical wards. The layout was changed (compare Figures 4.2A and 4.2B) to make it possible to identify data on individual interactions and to provide space for nursing grades to be recorded. The quality of care is now recorded in columns, as in Figure 4.2A, with each column referring to a distinct nurse-patient interaction. The observer notes which of the items are relevant and marks the appropriate rating box with the grade of nurse concerned. In the standard Qualpacs procedure, recording of grades is optional; here it was essential, since it was to be the basis for the skill mix analyses.

Even with this modified procedure there are some obvious weaknesses. There is no indication of which individual patient is concerned, nor of what the interaction was; though some of our observers made brief notes of the activities on one of the cover sheets (Figure 4.1).

QUALITY PATIENT CARE SCALE
STAFF / INFORMATION FACE SHEET

STAFF ON DUTY

Grade of staff	Numnber	Clinical grades by number							
Sister/charge nurse	1	F	1	G		H		Other	
RGN	1	D	1	E		F		Other	
EN	1	C		D	1	E		Other	
Auxiliary		A		B				Other	
Learner	1								
Orderly		A		B					

Non-nursing staff by number — Ward clerk: | Domestic: 1 | Other (state who):

Other information:

.... 15' ... 16

ICD - 723.9 - neck pain
174.0 - arthritis

ICD - 729.5

PATIENT INFORMATION

Patient A (5)	Patient B (9)
AGE: 79 SEX: F	AGE: 80 SEX: F
Room (type) 6 bed bay	Room (type) 6 bed bay
Date of admission: 17/7/90	Date of admission: 16.9.90
Diagnosis on admission: Investigations of neck pain. ? ↓ of C2	Diagnosis on admission: painful (R) leg
Current diagnosis: Craig. biopsy through mouth of C2	Current diagnosis:
Condition of patient: Posterior Cervical fusion C1-C3 & bone graft 17/8/90	Condition of patient:
arthritis up l/c frame	Diabetic - drug control
Dysphagia at times	constipation & Stress incontinence
Soft collar worn	up l/c Frame
Radiotherapy given	vulva red
Superficial pressure sore on buttock	

QUALITY PATIENT CARE SCALE
INFORMATION FACE SHEET

Fill in for each session

WARD .....

Name _____ Type orthopaedic

Number of rooms 4x6 beds + 4 Singles Number of beds 28

Number of patients 25

Dependency level of patients being assessed

Number of patients 2

Dependency levels II

II

Date: _____ Rater _____

Time of day 16.00 am/pm

Day of week Monday

Additional notes or questions:

Figure 4.1 Cover Sheet of Re-designed Qualpacs Form

SYCHOSOCIAL : INDIVIDUAL

Actions directed towards meeting psychosocial needs of individual patients.

		1	2	3	4	5	6	7	8	9	10	11
1. Patient receives nurse's full attention. #D	Best care											
	Between	ED		ED								
	Average care		SF/ED		SF							
	Between					L	SF					
	Poorest care											
	Not applicable											
	Not observed											
2. Patient is given opportunity to explain his feelings. #D	Best care											
	Between	ED										
	Average care			ED								
	Between					L	SF					
	Poorest care											
	Not applicable				SF							
	Not observed											
3. Patient is approached in a kind, gentle, and friendly manner. #D	Best care											
	Between	ED		ED	SF							
	Average care				S							
	Between		SF/ED			L						
	Poorest care						SF					
	Not applicable											
	Not observed											
4. Patient's inappropriate behaviour is responded to in a therapeutic manner. #D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											X
	Not observed											
5. Appropriate action is taken in response to anticipated or manifest patient anxiety or distress. #D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											X
	Not observed											

Figure 4.2A Extract from Re-designed Qualpacs Form

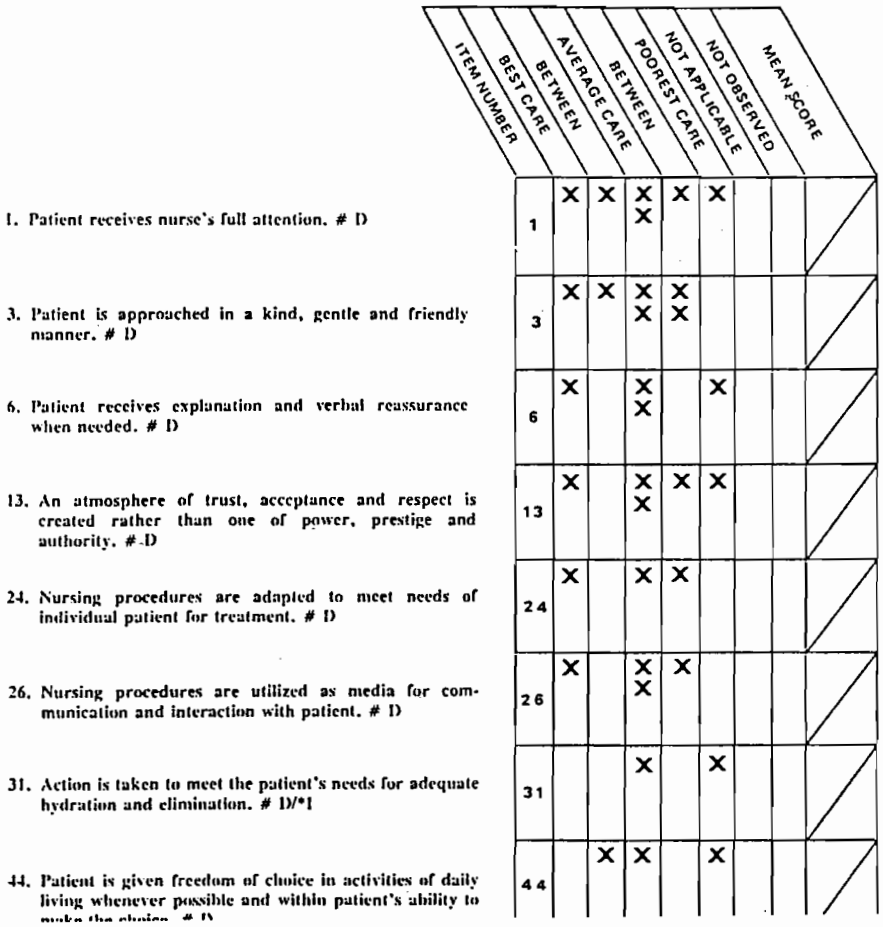


Figure 4.2B Extract from Standard Qualpacs Form

4.3.2 Basic Operating Characteristics

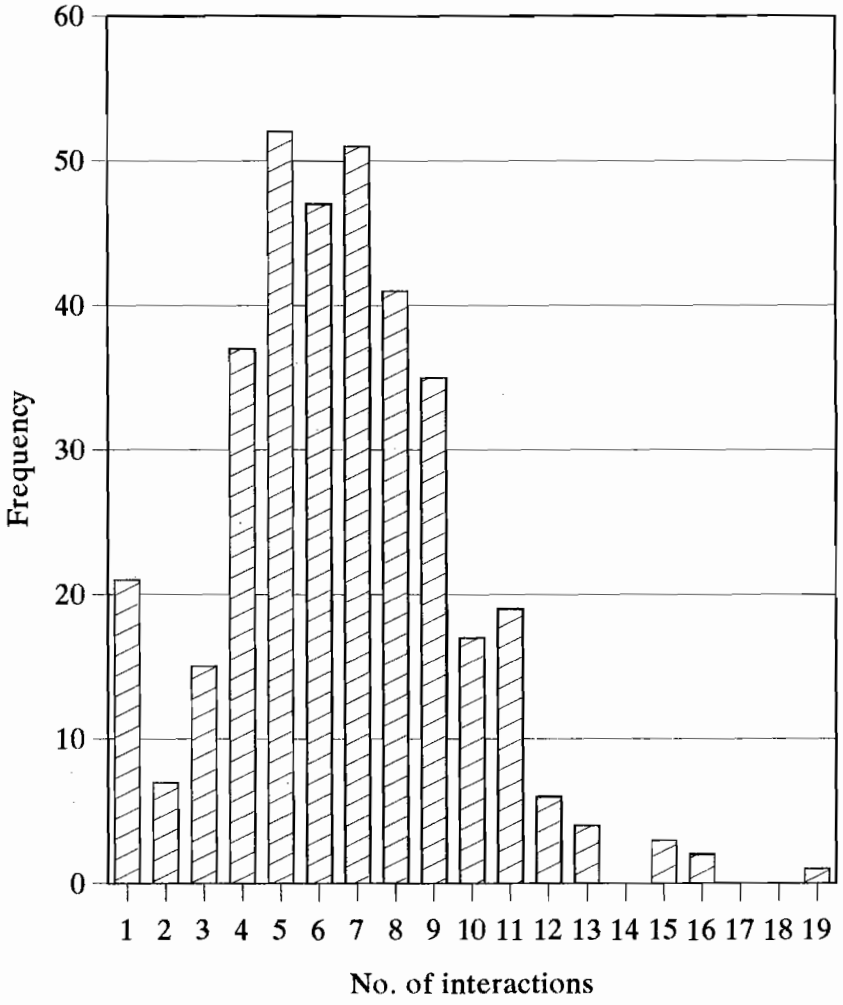
Observers need to make three sorts of judgement to complete the form: when does an interaction begin and end, what are the relevant criteria items, and what ratings to give.

Despite the apparently amorphous definition of "an interaction", observers apparently had little difficulty deciding when interactions started and finished, but the quantity of data collected is very dependent on the level of ward activity. In this study, the 360 recording sessions ranged from the very quiet - in 21 sessions there was only one interaction - to the relatively hectic, in one case there were 19 interactions. On average, the two hour sessions contained seven interactions - ie, an event every 17 minutes (Figure 4.3). Other information was collected for one half-hour both before and after each Qualpacs session.

In our modified version, observers were able to use up to 60 items, grouped into 5 sections, to assess each interaction. Obviously not all of these will be relevant in all interactions and in some instances complete sections would be judged irrelevant. Following standard Qualpacs procedure, observers were required to record not just direct care given to the two study patients, but any relevant indirect care such as staff discussing patient care or talking to relatives. Each item on the form is flagged D, I or D/I depending on the type of observation which applies. Only two items refer exclusively to indirect observations of care.

Collecting both types of information and having to record them on the same form, presented both practical and analytical problems. At the very least, having to stay near the patients beds makes it difficult for observers to keep track of all the relevant indirect care activities. Much

Figure 4.3 Number of Interactions
per Qualpacs Session



of the indirect observation of care is also not so easily rated with the types of criteria found on the Qualpacs form. There is a major problem if interactions are to be emphasised on the form and in the analysis - essential in our view to make full use of the Qualpacs data - since some of the indirect observation of care is not structured in this way. Furthermore, it is often impossible to identify the grades of nurses involved in the indirect observations of care so these observations have to be omitted from any analyses of skill mix or grade performance. Essentially, the Qualpacs form and recording procedures are best suited to the evaluation of the direct observation of care; indirect observations would be better dealt with by a separate instrument with different recording methods. Although the project's observers collected both types of data and both are included in the main report, the following discussion and analyses are concerned only with ratings of the direct observations of care. These account for approximately 89% of all observations.

When directly observing care, items in the first two sections of the Qualpacs (1) "psychosocial" and (2) "physical" items, are cited in over 85% of cases. Items in sections such as (4) "Communication on behalf of patients", which predominately relate to the indirect observation of care, were used much less often, in this case for only 28% of direct interactions (Table 4.3).

There is bound to be a good deal of redundancy in an instrument of this length and several items were used in less than 1% of interactions. If the instrument was to be developed for the measurement of the direct observation of care there must be an argument for their omission. A few of the most and least used items are listed in Table 4.4. A full set of frequencies at the ratings level is given in an Annex to this chapter.

Table 4.3 Frequency of Use of Main Qualpacs Sections in Observing Direct Care

		No. of ratings	% of all ratings of direct care	Used for this no. of interac-tions
QP1	Psychosocial Care*	19074	49.5	2408
QP2	Physical Care	9110	23.6	2195
QP3	General Care	6513	16.9	1754
QP4	Communication on behalf of patient	899	2.3	719
QP5	Professional Implications	2927	17.6	1260

* American for communication between patient and carer

The number of items selected by the rater during an interaction will depend on three factors: the length of the interaction and the number of its components, the number of nurses/grades involved and the sensitivity of the rater. A basic test was conducted on whether the number of ratings increases with the length of interaction and the number of its components by asking nurse-researchers to rate 20 common types of interaction on these characteristics. Their ranking was compared with the average number of Qualpacs ratings and a strong correlation was found between the two (Table 4.5).

Table 4.4 The Most and Least Used Qualpacs Items (when directly observing care)

Item Number	Description	Used in this Per Cent of Interactions*
	Most Used	
1	Patient receives nurses full attention	97
2	Patient is given opportunity to explain his feelings	84
3	Patient is approached in a kind, gentle and friendly manner	97
11	Patient receives care that communicates worth and dignity of man	83
	Least Used	
9	Patient receives attention for his spiritual needs	0.3
53	Response to the patient is appropriate in emergency situations	0.9
61	Patient's needs are met through the use of referrals, both to departments in the hospital and to other community agencies	0.6

* Total N = 2246

Figure 4.4 Average number of Ratings per Rater

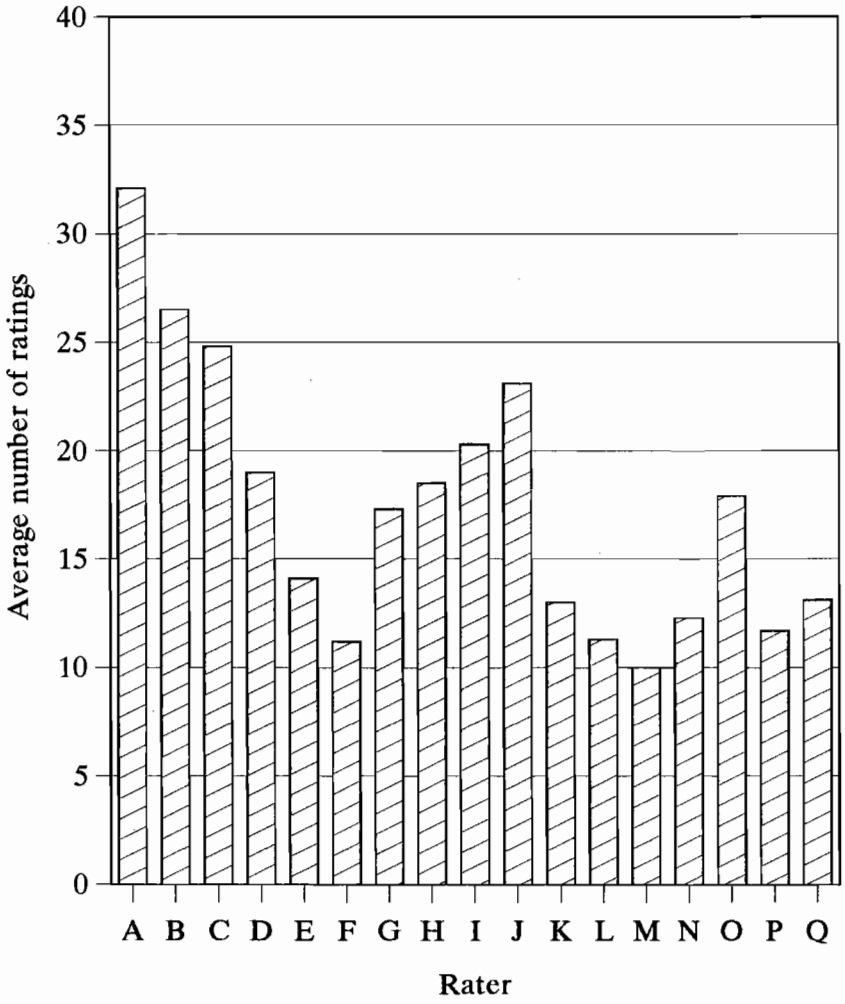


Table 4.5 Number of Qualpacs Ratings versus Estimated Length and Complexity (Likely Number of Constituents) of Interactions

Ranking of estimated length and no. of constituents (Longest/most elements=1)	Description of Interaction	Number of Ratings
Longest/most number of components		
1	Bed bath	29.9
2	Washing/bowl	24.4
3	Wound dressing	18.7
4	With patient/relatives	14.1
5	Assisting/encouraging eating	14.2
6	Assisting into bed/chair	25.6
7	Assisting out of bed/chair	29.1
8	Turning patient	24.4
9	Helping onto commode	29.1
10	Repositioning	25.3
11	Giving medication	15.9
12	Giving/encouraging fluid taking	14.9
13	Injections	20.0
14	Escorting to/from toilet	22.2
15	Monitoring pain	19.0
16	Answering call bell, etc	19.8
17	Checking general condition	17.6
18	Checking vital signs	17.8
19	Drug rounds	16.6
20	Distributing/checking food	12.5
21	Checking IVT flow rate	14.0
22	Emptying catheter bag	15.4
Shortest/least number of components		

Interactions of some length with multiple constituents which normally need more than one nurse are, on average, ranked on just under 30 items. Shorter, and less elaborate interactions done by one nurse may be rated on 15 items or less.

Finally, rater sensitivity seems to be a major factor in determining the number of items used.

Even after careful training and monitoring, there are considerable differences between raters (Figure 4.4), but because of the method of averaging this will not usually affect the estimates of overall quality.

4.3.3 Scoring Qualpacs

The recommended method of analysing Qualpacs data is to estimate the overall quality in each session by averaging all the ratings on a form and then to average the results for all forms of each ward. The quality of different aspects of care can be similarly calculated by separately averaging the ratings in each of the 5 (or 6) item sections. Typical results are presented in Figure 4.5A-H and confirm that, when used in the standard way, Qualpacs will identify basic differences between wards and pinpoint variations in different aspects of care.

Figure 4.5A shows the range of variations in the overall quality of care between the 15 wards in the study. Wards 2, 17 and 20 rate highest, but even these have scores only just above the "average care" value of 3.0. All others rate below this average and one, ward 4, records a value of less than 2.5. Whilst the variation is small (the standard deviation of overall quality is 1) this pattern of differences between the wards is also reflected in the scores for the two most used item sections - psychosocial and physical care (Figures 4.5B and 4.5C). The standard Qualpacs procedure give some sense of which are the best, and worst aspects of care in each ward. Figures 4.5D-4.5H are representative examples. Two of the wards, 15 and 2 (Figures 4.5D and 4.5H) have one outstanding feature: communications in 2 and psychosocial in 15. In the other three wards, there are less striking differences between the different components of care.

Figure 4.5A Overall Qualpacs Ratings - all wards

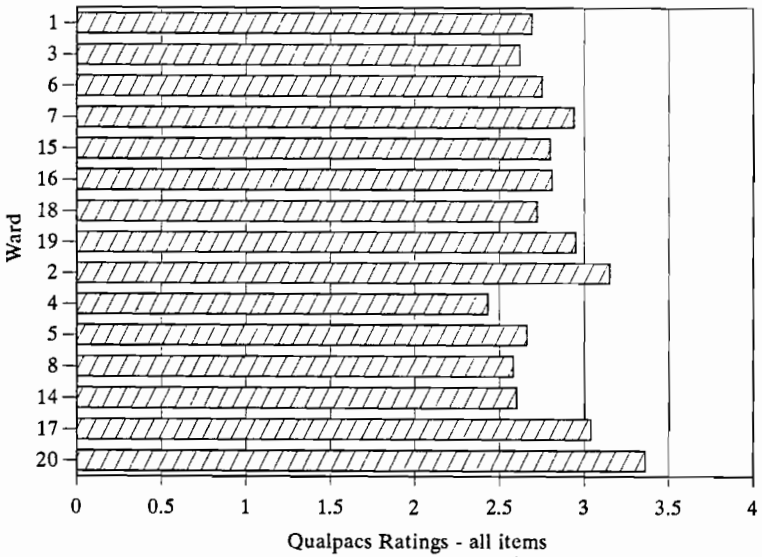


Figure 4.5B Qualpacs Physical Care Ratings - all wards

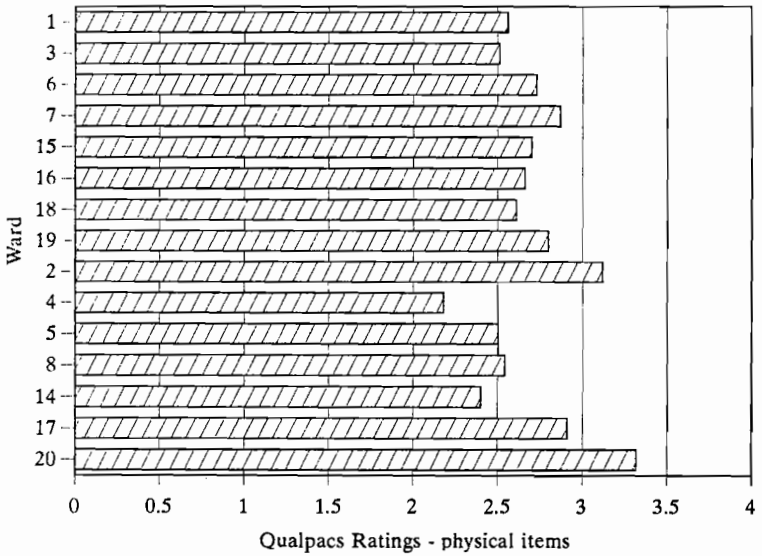


Figure 4.5C Qualpacs Psychosocial Care Ratings - all wards

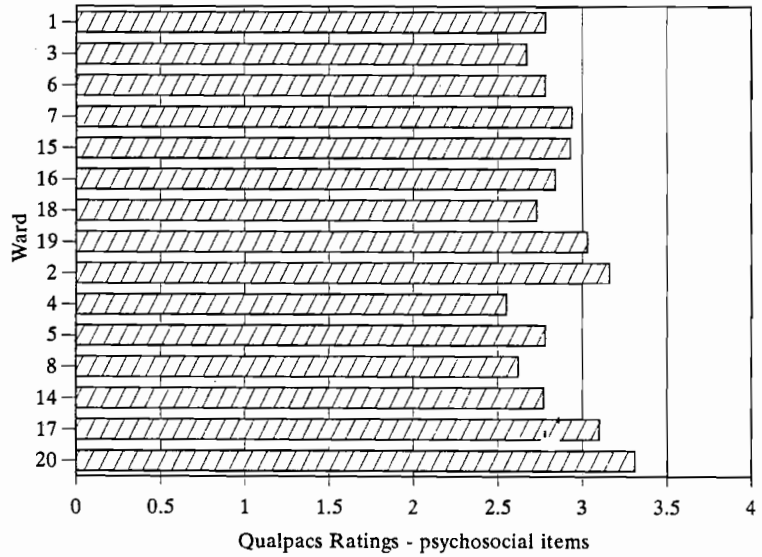


Figure 4.5D Qualpacs Section Ratings - Ward 15

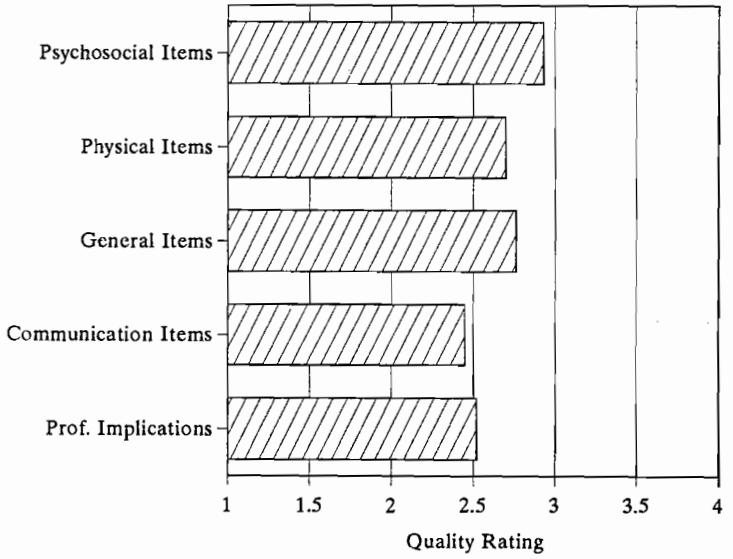


Figure 4.5E Qualpacs Section Ratings - Ward 4

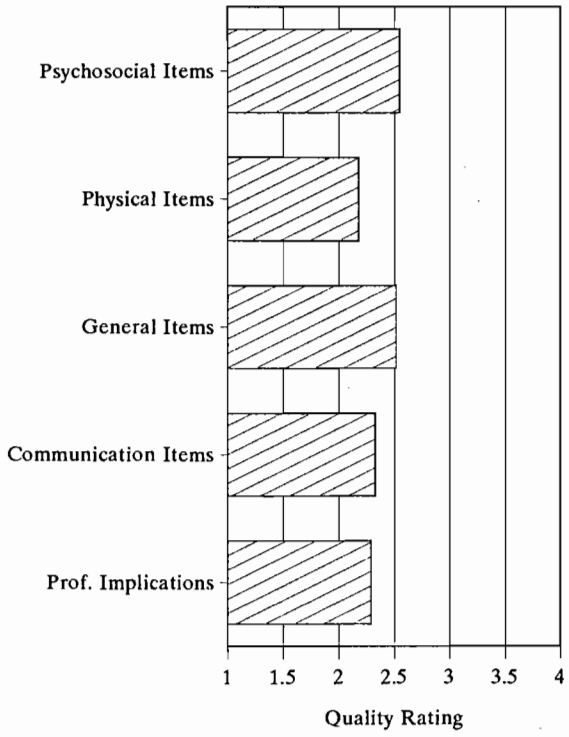


Figure 4.5F Qualpacs Section Ratings - Ward 5

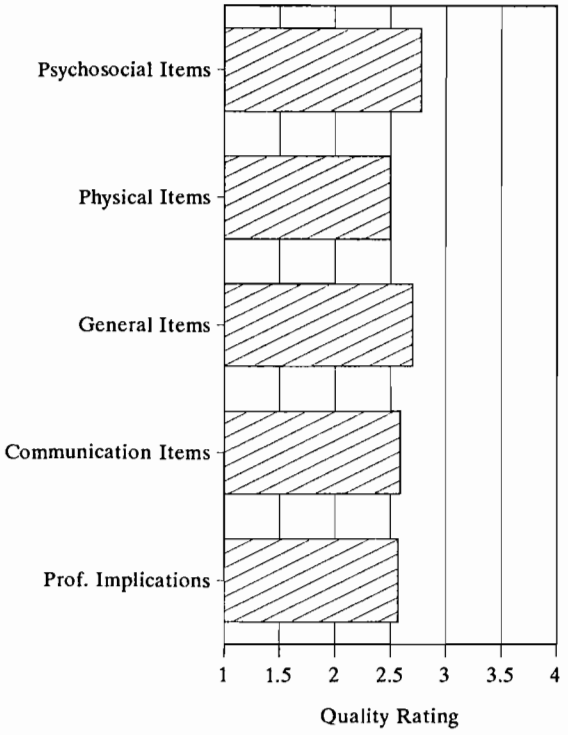


Figure 4.5G Qualpacs Section Ratings - Ward 8

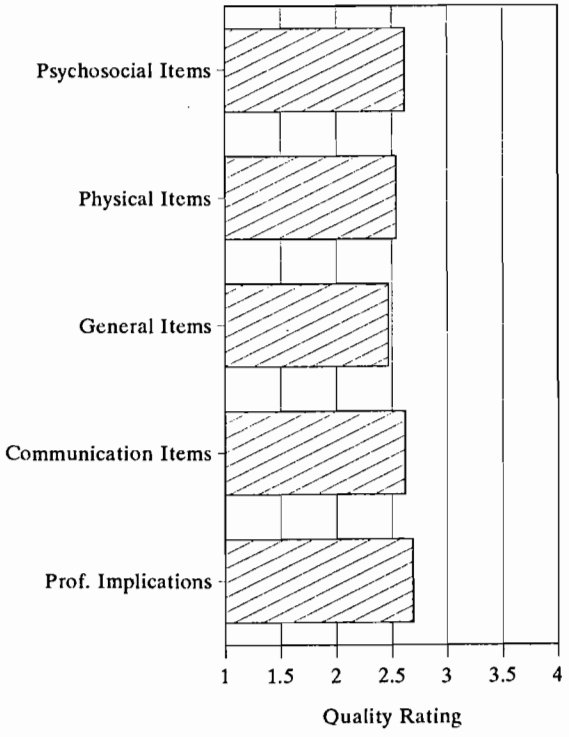
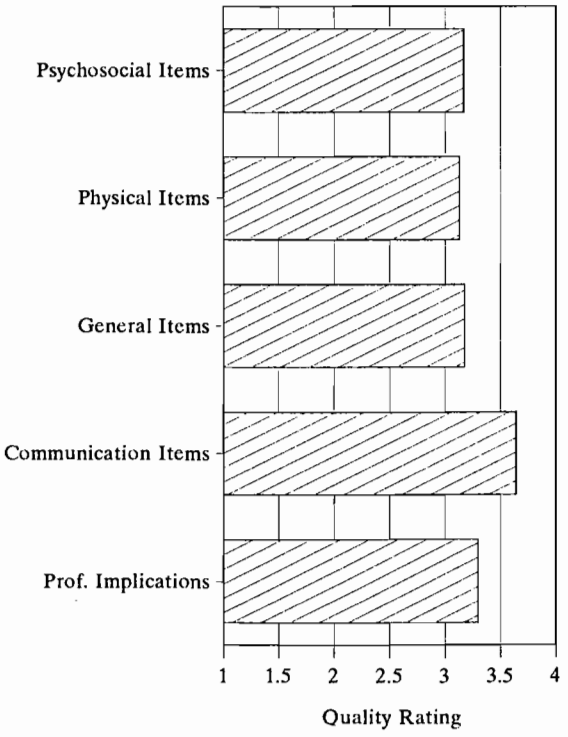


Figure 4.5H Qualpacs Section Ratings - Ward 2



Correlations between the different section scores (Table 4.6) are typical for this type of instrument and suggest that performance on the items in section 4 (communication on behalf of the patient and section 5 (Professional implications) are relatively independent of the items in the three more general characteristics (Psychosocial, Physical and General).

Table 4.6 Inter-correlation Between Different Qualpacs Sections when Rating Directly Observed Care Given During 2 hr Qualpacs Sessions

Qualpacs Sections		QP1	QP2	QP3	QP4	QP5
Psycho-social	(QP1)	-				
Physical	(QP2)	.76	-			
General	(QP3)	.70	.71	-		
Communication	(QP4)	.46	.54	.51	-	
Professional Implications	(QP5)	.49	.61	.50	.57	-

4.4 OUTCOME MEASURES

4.4.1 Scoring Outcomes

The procedure adopted for designing the outcome measures was described in the previous chapter. Like Qualpacs, the outcome measure can provide more than just a crude overall estimate of quality. Each section can be scored separately, enabling wards to be compared on their capacity to deliver particular types of outcome, such as the standards reached in patient nutrition or hygiene. The recommended approach to scoring is to compute the

proportion of items in each section which were not satisfactory. Table 4.7 gives the percentage of patients for whom none, one or two items were unsatisfactory in each of these sections. The clustering of values in columns 3 and 4 near 100 implies that to produce a measure which adequately discriminates between outcomes at this level, each section should be taken as achieved if, and only if, all the applicable criterial items have been ticked.

The separate scores for each section could be combined in several different ways, but a simple overall performance measure is defined as the number of items achieved as a proportion of all relevant items. On this measure, ward scores ranged from 66% to 95% (Figure 4.6A) giving a discrimination which is at least as good as the standard method of Qualpacs scoring.

Comparing overall quality and outcomes (Figures 4.6a and 4.6b) shows a parallelism in all wards except 1, 8 and 18. In these three wards, the outcomes are better than would be expected from the Qualpacs results. The relationship between Qualpacs scores and the achievement of outcomes is discussed in Chapter 7.

Figure 4.6A Outcome Measures - all wards

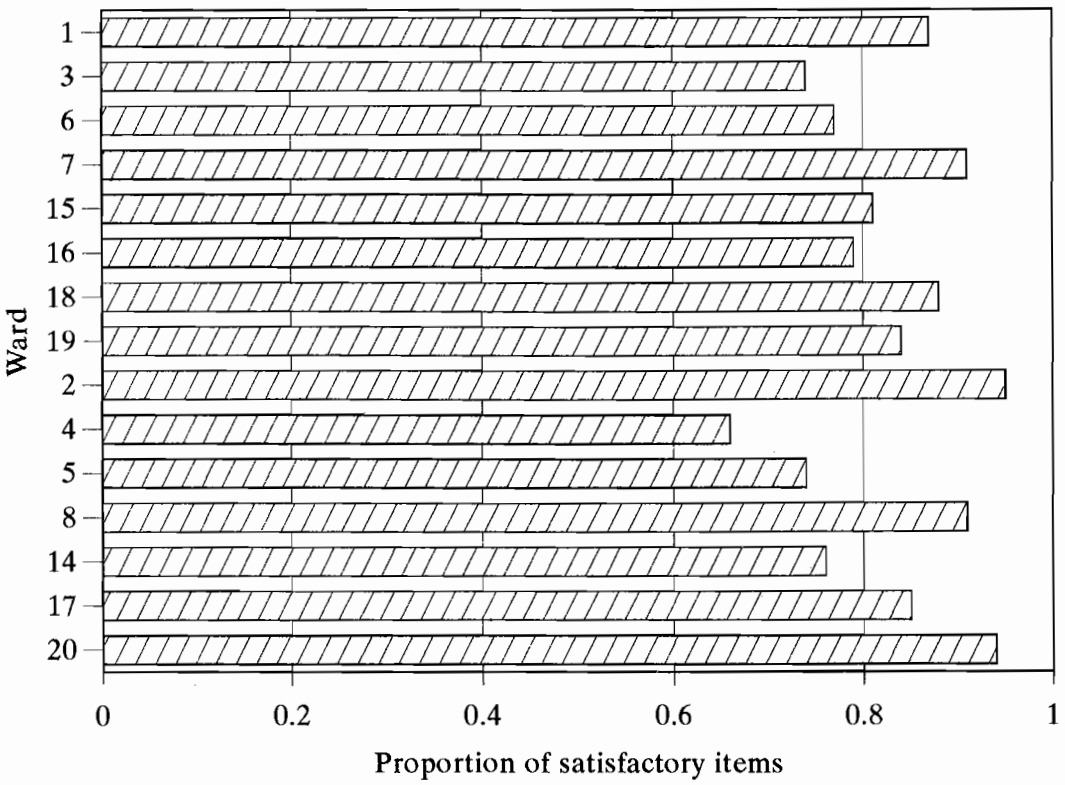


Figure 4.6B Overall Qualpacs Ratings - all wards

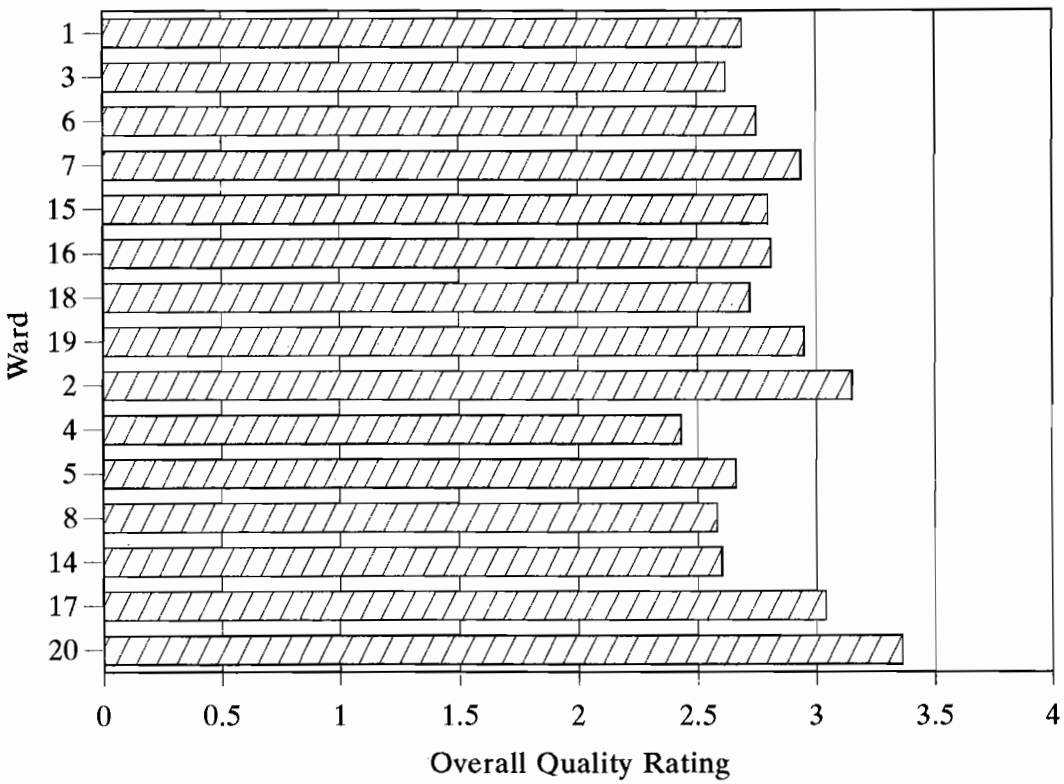


Table 4.7 Proportion of Outcome Measures Achieved

	Percentage of patients for whom the following no. of relevant items were achieved in each section			
	No. of items in section	All Criteria (Items) met	All but One Met	All but Two Met
Patient hygiene	7	55.4	85.0	96.0
Patient nutrition	6	47.4	78.3	92.8
Pressure sore/skin integrity	6	59.2	83.5	96.2
Intravenous therapy	5	46.0	70.9	90.2
Planning patient discharge	7	73.5	85.5	91.1
Pain control	6	61.3	82.4	92.8
Education/rehabilitation	6	61.8	76.7	87.8
Elimination	9	57.2	73.2	89.4

The inter-correlations between the eight different outcome scales are given in Table 4.8. Only one of the 28 correlations coefficients between the different scales is greater than 0.32 (equivalent to 10% common variance) whilst all 10 of the inter-correlations between the Qualpacs dimensions were above 0.45 (equivalent to 20% common variance) - and three were above 0.7 (equivalent to 50% common variance). The difference between the two instruments arises because the different outcome measures refer to distinct and specific kinds of care activity (eg, nutrition) whereas different sections of the Qualpacs instrument refer to different aspects of the totality of the care process.

Table 4.8 Correlation Coefficients of Outcome Sections

Outcome Sections		2	3	4	5	6	7	8
Patient Hygiene	1	.22	.21	.15	.11	.19	.19	.19
Patient Nutrition	2		.16	.10	.09	.08	.08	.25
Pressure Sores/Skin Integrity	3			.15	.09	.20	.22	.25
IVT	4				.12	.16	.22	.22
Planning Patient Discharge	5					.12	.41	.08
Pain Control	6						.25	.16
Education/rehabilitation	7							.24
Elimination	8							

4.5 THE WAY FORWARD

This review has demonstrated the value of examining the operating characteristics of the instruments used in analysis. Thus, the small variations in Qualpacs means that the analysis must be very detailed, and that, given the cost of collecting Qualpac data, it is worth investigating the possibility of augmenting the content and increasing the sensitivity of the instrument. Also, whilst the items in Qualpacs and the criteria used in the outcomes scales are similar, the instruments clearly behave differently. Both these issues are explored further in Chapter 7.

ANNEX

FREQUENCY OF USE OF QUALPACS ITEMS AT THE RATINGS LEVEL

tem:	Indirect Care n	%	Direct Care n	%	All Types of Care n	%
. Patient receives full attention	14	.3	2743	7.1	2757	6.4
. Patient can explain feelings	11	.2	2295	6.0	2306	5.3
. Patient approached well	12	.2	2729	7.1	2741	6.3
. Patient behaviour responded to well	19	.4	190	.5	209	0.5
5. Patient anxiety acted upon	24	.5	542	1.4	566	1.3
6. Patient receives explanation	9	.2	1717	4.5	1726	4.0
7. Patient receives therapeutic attention	18	.4	1777	4.6	1795	4.2
8. Patient considered as family	87	1.8	366	1.0	453	1.0
9. Patient receives spiritual attention	159	3.3	6	.0	165	0.4
10. Rejecting patient receives attention	28	.6	122	.3	150	0.3
11. Patient receives care communicating dignity	11	.2	2334	6.1	2345	5.4
12. Healthy aspects utilised	36	.7	639	1.7	675	1.6
13. Trusting atmosphere created	16	.3	1857	4.8	1873	4.3
14. Appropriate conversation chosen	14	.3	1474	3.8	1488	3.4
15. The unconcious patient respected as concious	11	.2	380	1.0	391	0.9
24. Nurses adapt	12	.2	873	2.3	885	2.0
25. Patient hygiene acceptable	68	1.4	452	1.2	520	1.2
26. Nursing procedures used as media	16	.3	1584	4.1	1600	3.7
27. Changes in patient acted upon	32	.7	421	1.1	453	1.0
28. Physical distress acted upon	26	.5	488	1.3	514	1.2
29. Patent encouraged to rest/exercise	87	1.8	501	1.3	588	1.4
30. Patient encouraged to take good diet	64	1.3	366	1.0	430	1.0
31. Patient hydration needs met	79	1.6	991	2.6	1070	2.5
32. Patient changes due to medication observed	53	1.1	94	.2	147	0.3
33. Expectations of patient altered due to medication	42	.9	105	.3	147	0.3
34. Medical asepsis carried out re hygiene	15	.3	943	2.5	958	2.2
35. Medical/surgcal asepsis carried out in treatments	32	.7	212	.6	244	0.6
36. Safe environment maintained	46	.9	992	2.6	1038	2.4
37. Safety measures preventing injury met	28	.6	421	1.1	449	1.0
38. Techniques for safe admin of medication	17	.4	675	1.8	692	1.6
39. Patient receives instruction	16	.3	954	2.5	970	2.2
40. Patient/family involved in planning care	127	2.6	142	.4	269	0.6
41. Patient privacy protected	16	.3	911	2.4	927	2.1
42. Patient helped to accept dependence/ independence	37	.8	593	1.5	630	1.5
43. Resources utilised to give patient opportunity for problem solving	27	.6	160	0.4	187	0.4
44. Patient given freedom of choice	32	.7	505	1.3	537	1.2
45. Patient encouraged to take part in activity	63	1.3	339	0.9	402	0.9
46. Activities adapted to needs	66	1.4	454	1.2	520	1.2
47. Nursing care adapted to needs	41	.8	570	1.5	611	1.4
48. Diversional activities made available	65	1.3	100	.3	165	0.4
49. Slow patients accepted	17	.4	571	1.5	588	1.4
50. Care goals established	151	3.1	238	.6	389	0.9

51. Patient interaction within therapeutic plan	39	.8	503	1.3	542	1.3
52. Close observation made with minimal disturbance	41	.8	440	1.1	481	1.1
53. Emergency responses appropriate	27	.6	28	.1	55	0.1
54. Ideas/facts communicated well	97	2.0	166	.4	263	0.6
55. Family provided with communication opportunities	223	4.6	119	.3	342	0.8
56. Charts well communicated	321	6.6	87	.2	408	0.9
57. Nursing care plans established	359	7.4	38	.1	397	0.9
58. Patient incidents accurately reported	134	2.8	36	.1	170	0.4
59. Staff participate in patient care conferences	144	3.0	253	.7	397	0.9
60. Good communication with other disciplines	264	5.4	67	.2	331	0.8
61. Patient needs met through referrals	257	5.3	27	.1	282	0.7
62. Decisions made by staff reflect facts	130	2.7	602	1.6	732	1.7
63. Staff evidence given in support of needs	161	3.3	356	.9	517	1.2
64. Care changes reflect evaluation	317	6.5	88	.2	405	0.9
65. Staff are reliable	145	3.0	833	2.2	978	2.3
66. Assigned staff keep informed	139	2.9	369	1.0	508	1.2
67. Care reflects rules flexibility	126	2.6	148	.4	274	0.6
68. Organisation reflects patient needs	183	3.8	403	1.0	586	1.4
Totals	4851	11.2	38391	88.8	43242	100.0

CHAPTER FIVE

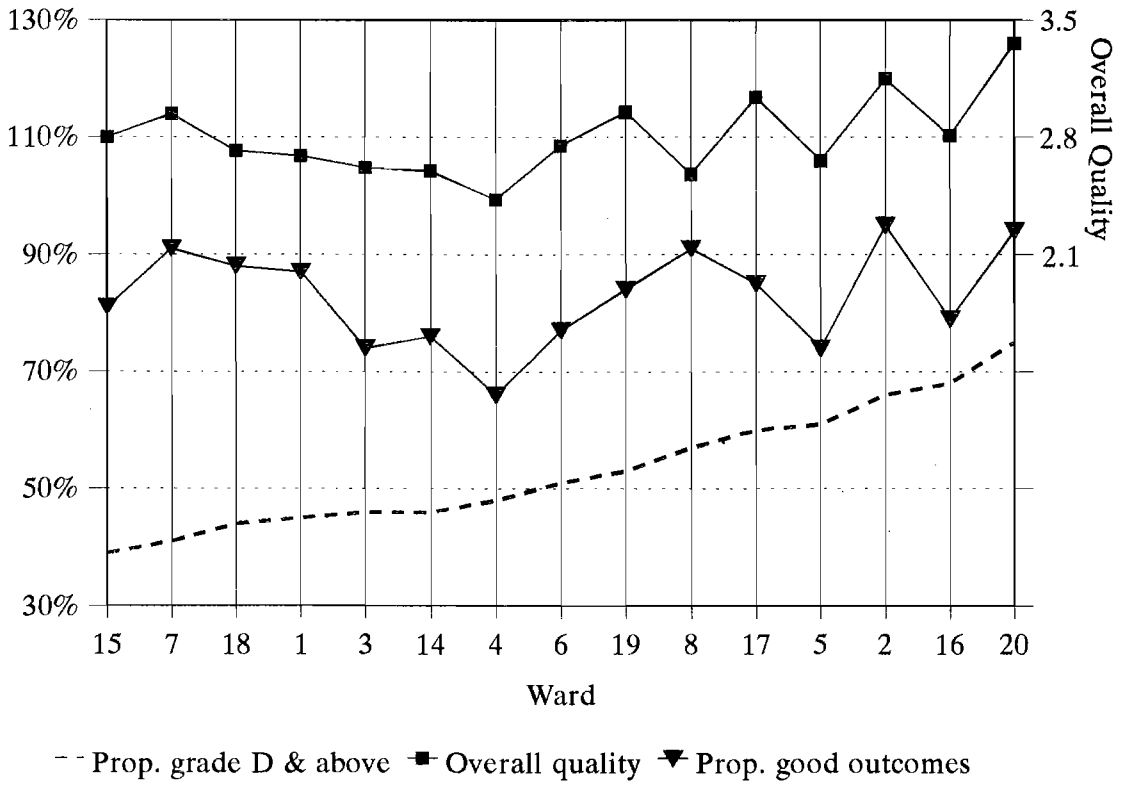
DATA ANALYSIS AND FINDINGS

5.1 INTRODUCTION

There are substantial variations in quality and outcome of care between wards which, on a superficial level, are related to the qualifications of staff (see Figure 5.1). The purpose of this and the following chapter is to examine the relationships between the immediate 'inputs' (skill mix) and the 'outputs' (quality and outcome) at several different levels.

Since the analysis is quite complex it is approached gradually. The starting point is the average quality of care provided by different clinical grades of staff as assessed by the single ratings given to different aspects of their interactions with the patient. The next section then examines the impact of skill mix - measured in terms of the effect of grades on quality of care at two different levels of detail: first the single interaction between the nurse(s) and the patient which may last for between a few seconds and several minutes; and second the Qualpacs session lasting two hours. Over the Qualpacs session, the impact of skill mix on outcomes can also be assessed.

Figure 5.1 Care Quality and Outcomes by Proportion of Staff at Grade D and Above

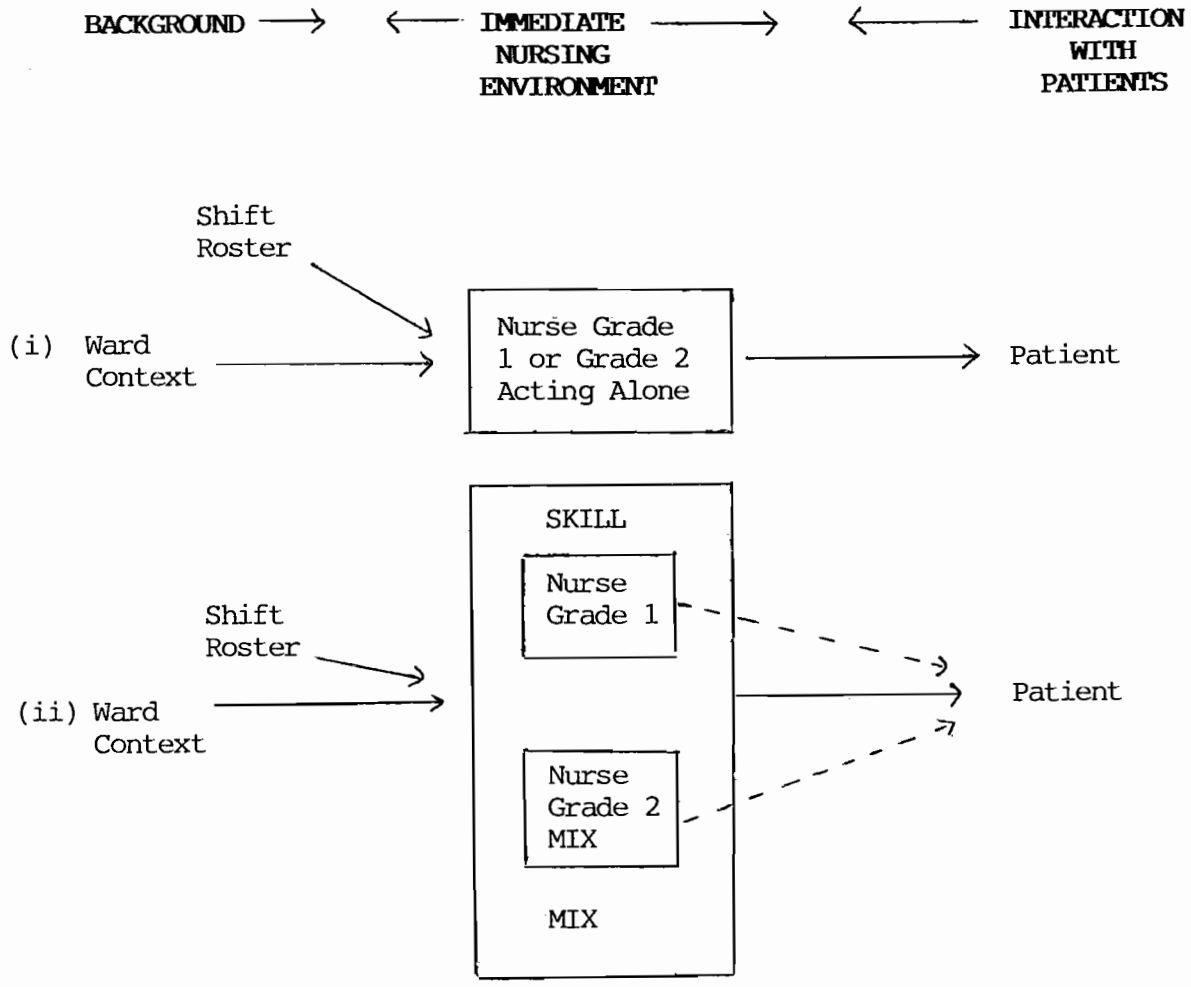


5.1.1 How Skill Mix Influences Care

When assessing the effects of skill mix, it is critical to distinguish between the two ways in which it might influence the quality of care delivered in any given interaction (or in any given Qualpacs session, or at the level of the ward): first, the way in which the overall skill mix involved in any given interaction (Qualpacs session or ward) is related to the quality of care is of interest; second, the quality of the care delivered by a given grade of nurse may be influenced by the combination of grades involved.

Thus, in Figure 5.2(i), Nurse Grade 1 (or Grade 2) is the only nurse to interact with the patient on Interaction One, and so the 'skill mix' of that interaction is entirely represented by her grade. In Figure 5.2(ii), however, the quality of care delivered by Nurses Grade 1 and Grade 2 which can be attributed to them individually in that particular skill mix combination may be different than when they act entirely on their own. The issue is not just how different combinations of grades perform as a team (the continuous arrow), but how the performance of individual grades of staff (the dotted arrows) is influenced by working in particular combinations (the box). Therefore, the analyses below assesses both the effectiveness of a particular grade working in a variety of combinations and also the effectiveness of the combinations themselves.

Figure 5.2 Skill Mix and Patient Care



5.2 THE AVERAGE QUALITY OF CARE BY CLINICAL GRADE

As set out in Chapter Four the measuring instrument for the quality of care (Qualpacs) is based on ratings by independent observers of the different aspects of the 'quality' of interactions between nurses and patients over a two hour session (hereafter the 'Qualpacs Session'). It should be emphasised that most of the data in Qualpacs sections 4 and 5 were obtained from indirect sources such as care plans. Grades as such, therefore, only appeared infrequently and so the numbers involved are always quite small.

Table 5.1 Number of Ratings and Quality of Care Delivered by Different Clinical Grade

	No of ratings	%	Overall Quality	Quality in each of Qualpacs sections				
				1 (Psycho-Soc)	2 (Physical)	3 (General)	4 (Communic.)	5 (Prof. Imps.)
F & G	4192	9.7	2.96	3.04	2.78	2.87	3.07	3.05
E	6903	16.0	2.83	2.90	2.69	2.79	2.89	2.86
D	8881	20.5	2.86	2.95	2.74	2.77	2.86	2.80
C	5072	11.7	2.73	2.77	2.62	2.70	2.74	2.82
A & B	5108	11.8	2.68	2.74	2.60	2.66	2.42	2.56
Learners	8426	19.5	2.74	2.78	2.61	2.76	2.63	2.85
All Grades		100.0	2.80	2.86	2.66	2.73	2.76	2.80
Test for Linear trend F =			362	277	38.9	15.7	32.1	28.1
Probability value =			.0000	.0000	.0000	.0001	.0000	.0000

The basic data element is the rating of one or more aspects of the care given by individual members of staff to the patients. There are usually many such ratings in each interaction ranging from 12 to 30 according to the complexity of the procedure (see Table 4.5).

The average quality of care given by each grade in each section according to their ratings are shown in Table 5.1. The care given by higher grades (D and above) was rated higher (with F and G grades rated highest in all sections) than the care given by lower grades (with A and B grades rated lowest in all sections). This general result - the higher grades give better quality care - is reproduced at any other level of analysis (see below). However, the result tends to be 'diluted' at levels of aggregation higher than this ratings level, in the sense that the range of variations between grades was reduced precisely because staff act in groups with varied skill mix. The purpose of the subsequent analysis, therefore, is to examine whether this was due to the relative skills of the different grades acting on their own or whether it was affected by the combination of nurses observed.

The focus is on the effectiveness of different grades and combinations of grades at the levels of interaction (i.e. a particular instance of care such as giving an injection) and of the Qualpacs session (the combination of staff caring for two patients over two hours). At both levels, effectiveness is measured in terms of data from the Qualpacs instrument. The relation between skill mix and the outcome of care can also be examined at the Qualpacs session level. However, it is important to note that other nursing staff may also have been involved in the outcomes besides those observed in the Qualpacs session.

5.3 INTERACTION LEVEL

In each interaction, and at the level of the Qualpacs session, there will be several ratings. Since staff were identified by grade only and not individually, some of these ratings may refer to the same nurse and some may refer to other nurses of the same grade. At both levels, effectiveness is measured in terms of data from the Qualpacs instrument. At the session level, the relation between skill mix and the outcome scores can also be examined. (However, as indicated previously, other nursing staff may also have been involved in 'producing' the outcome besides those observed in the Qualpacs session.)

The distribution of different grades of staff at the interaction level is shown in Table 5.2. Of the 2,369 interactions observed, the ratings in 1,542 interactions referred to only one grade of staff. In 787 interactions of the remaining 827, the ratings for one of the grades constituted more than 50% of all the ratings involved; and in 40 of these multi-grade interactions, no grade predominated in terms of this 50% criterion. Typically, D grades were the most frequently observed followed closely by E grades and learners, and there was little variation according to the number of interactions. There was, therefore, no apparent tendency for any particular grade to work alone or to work with other grades.

Table 5.2 Number of Interactions by Different Grades of Staff

Number of Grades In Interaction	Percentage of Interactions Involving these Grades						Number of Interactions
	F/G	E	D	C	A/B	L	
1	11.4	19.3	21.9	11.5	14.0	21.9	1542
2	24.0	41.1	49.9	24.0	27.5	33.6	684
3	52.5	63.6	55.9	48.3	40.7	39.0	118
4 and over	60.0	72.0	92.0	72.0	48.0	76.0	25
All Interactions	17.6	28.4	32.4	17.6	19.6	26.7	2369

It should be noted that, both in Table 5.1 and in the following section, Learners have been treated as the least skilled and specifically less skilled than the auxiliary staff graded A and B. It would be equally, perhaps more, plausible to treat them as more skilled because they will have had some and possibly a substantial amount of training compared to auxiliaries who are drawing mainly on experience. In Table 5.1, if their positions were reversed, the linear trend would be almost perfect; in the subsequent analyses the argument would be nearly always strengthened. In this sense, the following analysis provides a minimum estimate of the importance of trained staff to the delivery of good quality care.

The analysis proceeds as follows. First, the relation between quality of care and skill mix (using either the predominant grade indicator or the grademix index) is analysed, and then the possible influence of a given skill mix (or combination of grades) upon the quality of care delivered by a particular grade is examined.

5.3.1 Effectiveness of a Particular Skill Mix

The key data on quality of care delivered by different combinations of staff at the interaction level are set out in Table 5.3, using predominant grade (> 50%) as the index of skill mix. This analysis shows a direct relationship between better overall quality of care provided by higher grades of staff and this result is also found in the Psychosocial (Q1), Physical (Q2) and Professional Implications (Q5) sections. Clearly, if learners were put 'above' grades A and B, the result would be stronger for all sections except Physical.

It will be recalled (Table 5.2) that many of the interactions involved only one grade of nurse (65% of all interactions). However, for those interactions involving more than one grade of staff, the association shown in Table 5.4 between the predominant grade and quality is equally clear for overall Quality and for sections Q1, Q2 and Q4 (using the same F test, the values are highly statistically significant). However, it is not quite so strong. Note that, if learners were put 'above' A and B grades the results for overall quality, Q1, Q4 and Q5 would be stronger.

This finding is confirmed by looking at a similar analysis with the illustrative weighted index of skill mix, devised as in section 4.2.1 above, instead of the predominant grade. Although once again it is relatively small, there is a statistically significant effect among interactions involving more than one grade as well as among all interactions (Table 5.5); as the grademix index increases, implying higher grade staff on average, then the quality of care delivered is better.

Table 5.3 Quality of Care by Predominant Grade of Staff for all Interactions

		Qualpacs Sections				
Predominant Grade (> 50% of all ratings in the interaction)	Overall Quality	Q1 (Psycho Soc.)	Q2 (Physical)	Q3 (General)	Q4 (Communic.)	Q5 (Prof. Imp.)
None	2.86	2.88	2.62	2.83	2.93	3.01
F & G	2.95	3.03	2.82	2.86	2.78	2.88
E	2.85	2.90	2.73	2.81	2.78	2.81
D	2.87	2.95	2.74	2.86	2.87	2.82
C	2.71	2.76	2.62	2.75	2.70	2.79
A & B	2.68	2.72	2.63	2.72	2.39	2.53
L	2.69	2.74	2.54	2.72	2.68	2.75
Average	2.79	2.85	2.67	2.79	2.76	2.78
N's	(2369)	(2280)	(2074)	(1605)	(504)	(1066)
Test for Linear Trend F	62.8	66.3	33.2	10.6	3.6	7.59
Significance Level P	0.00	0.00	0.00	0.00	0.06	0.01

Table 5.4 Quality of Care by Grade (Interactions with More than One Grade)

		Qualpacs Sections				
Predom Grade (>0.50)	Overall Quality	Q1 (Psycho Soc.)	Q2 (Physical)	Q3 (General)	Q4 (Communic.)	Q5 (Prof. Impl.)
None	2.86	2.88	2.62	2.83	2.93	3.00
F & G	2.85	2.91	2.69	2.77	2.82	2.85
E	2.88	2.93	2.76	2.83	2.84	2.77
D	2.85	2.92	2.72	2.81	2.93	2.84
C	2.72	2.79	2.60	2.72	2.61	2.79
A & B	2.67	2.71	2.59	2.79	2.35	2.52
L	2.71	2.75	2.54	2.71	2.67	2.83
Average	2.79	2.84	2.65	2.77	2.77	2.79
N's	(827)	(789)	(745)	(635)	(247)	(454)
Test for Linear Trend F	13.8	13.5	7.99	1.54	5.47	1.12
Significance level P	.00	.00	.00	.22	.02	.29

Table 5.5 Overall Quality of Care by Weighted Index

Values of Weighted Index	All Interactions		One Grade Only		More than One Grade	
	Quality	N	Quality	N	Quality	N
1 - 1	2.68	431	2.69	338	2.69	93
1.01 - 2	2.78	371	2.68	216	2.66	155
2.01 - 3	2.87	447	2.70	177	2.82	270
3.01 - 4	2.87	560	2.89	337	2.86	223
4.01 - 5	2.84	384	2.83	298	2.85	86
5.01 - 6	3.00	176	3.00	176	-	-
Average	2.78	2369	2.80	1542	2.79	827
Standard Deviation	69.0		.56		.53	
Test for linear trend F	.55		49.6		13.3	
Significance level P	.000		.0000		.0003	

Overall, therefore, quality varied with skill mix in the expected direction. The range between the mean values was approximately one standard deviation of the range of quality ratings observed. Whilst this is not a very large variation, it is certainly of interest to management, given that values 'naturally' cluster quite closely around 3.00. Moreover, the analysis has shown that skill mix can be measured equally satisfactorily at this level by the predominant grade in any given combination of grades, as by a more complicated index.

5.3.2 The Effectiveness of a Nurse of a Particular Grade

As explained above, the quality of care delivered by a particular grade of nurse may vary according to the combination of nurses with whom they are working. The overall quality of care delivered by a particular grade (see column 1 of Table 5.6) is affected by whether or not they are acting on their own or in combination with others (compare the second column of Table 5.6 with the first column of Table 5.7). In particular, there is an 'averaging' effect on the quality of care delivered by the top and lower grades.

Thus taking the gap between the ratings for F and G grades and for learners as the central measure of the effect of higher grades on nursing quality, the gap for grades acting on their own is 0.35 (3.03-2.68) and for grades acting in combination is 0.25 (2.95-2.70). The difference between these two is statistically significant at the 10% level on a one-tailed 't' test.

Table 5.6 Average Quality of Care Delivered by Nurses at Different Grades at the Interaction Level (all interactions)

Grade	Quality from Grades (All interactions)		Overall Quality from One Grade Acting on its own		Overall Quality from Grade when it Predominates (50% or more)	
	Score	No.	Score	No.	Score	No.
F or G	2.98	417	3.03	176	2.99	259
E	2.87	674	2.85	298	2.87	438
D	2.85	767	2.90	337	2.88	537
C	2.70	416	2.72	177	2.72	278
A or B	2.66	464	2.69	216	2.68	327
Learners	2.69	632	2.68	338	2.69	490

The effect upon the quality of care delivered by a particular grade due to the mixture of grades, can best be examined by looking only at those cases where there is more than one grade involved (Table 5.7). It can be seen that the extreme grades did worse when they predominated in a skill mix situation, and the middle grades did better. Taking all interactions involving more than one grade (first column), there will be many different mixes of staff which dilutes the relationship; when only those interactions where the grade predominates are considered, the association between main grade and quality is smoother.

Table 5.7 Average Overall Quality of Care Delivered by Different Grades (Only cases where more than 1 grade involved)

	Average Quality Delivered by Grade		Quality from Grades When it Predoms (ie, 50% or more)	
	Score	No.	Score	No.
F & G	2.95	241	2.92	83
E	2.88	374	2.90	140
D	2.82	430	2.86	200
C	2.68	239	2.71	101
A & B	2.64	248	2.67	111
Learners	2.70	294	2.69	152

Taken together the data in Table 5.6 and 5.7 suggest clearly that:

1 The quality of care delivered by nurses in grades F and G was highest when they were the only grades involved. Where other lower grade staff were involved, F and G grades delivered poorer quality of care.

2 The quality of care delivered by nurses in grades E, D, C or A/B in skill mix situations was better when they were the dominant grade.

3 Learners delivered the best quality care when working with others and worst when acting on their own.

It is also important to assess the extent to which staff are involved in different kinds of

interaction. Thus, if each grade is genuinely carrying out a full range of activities then the distribution of staff involved in different types of interaction should be roughly similar to the overall distribution (Table 5.2 above). In fact, as one can see from Table 5.8 there is clear evidence that this is not the case. Thus F & G grades are involved in administration 21% more often (and learners 13% less often) than their overall average citation; learners are involved in helping with toileting 12% more often (and F & G grade 4% less often) than their average number of citations.

Overall, therefore, the skill mix context had three main effects: an averaging effect on the quality of care delivered by highest and lowest grades; a reinforcing effect on the quality of care delivered by intermediate grades; and the differentation of the kinds of tasks performed by each grade.

Table 5.8 Who Did What (Differences from mean prop. of each grade (x100))

		Grade-mix+ involved in task	F&G	E	D	C	A&B	L
1	Admin	4.24	20.9	6.7	-3.1	0.2	-11.7	-12.9
2	Medication	4.01	7.2	14.0	3.6	0.4	-12.3	-12.8
3	IVT	3.79	4.9	9.1	6.6	0.5	-12.5	-8.5
4	Communication with patient	3.16	5.2	-1.4	-4.4	-1.3	-4.7	6.8
5	Nursing procedures	3.13	-4.2	-2.1	7.4	4.9	-6.2	.25
6	Assist with gen. hygiene	2.92	-.6	-2.9	-5.1	4.4	1.4	2.9
7	Elimination	2.79	-7.6	-5.5	-1.2	-8.2	35.2	-16.9
8	Misc.	2.71	-7.5	-1.2	-.3	-4.1	9.8	3.4
9	Mobilisation	2.69	-4.2	-6.3	1.1	-3.6	10.2	2.9
10	Meals	2.68	-3.8	-4.4	-3.8	-3.1	7.5	7.7
11	Care on bed rest	2.67	-6.0	-2.3	.5	-0.0	4.5	3.5
12	Maintaining fluid balance	2.66	-3.7	-4.9	-6.8	-2.5	14.0	4.1
13	Toileting	2.40	-3.9	-12.3	-5.8	2.7	7.9	11.6
14	Special procedures	2.19	-6.6	-4.7	-12.3	-8.2	17.8	14.3
		3.13						

\+ Index of Grademix = prop (F & G) * 6
+ prop (E) * 5 etc

5.4 QUALPACS SESSION LEVEL

Over a two hour Qualpacs session, a number of different interactions varying between one and 20, with an average of seven, were rated. The mix of grades observed at each interaction can be averaged over these interactions to produce an estimate of the skill mix in the session as a whole. This is different from the method recommended by the Qualpacs manual (see Chapter Four). It should also be emphasised that the results below are not directly comparable to those obtained at the interaction level. In particular, the notion of grade dominance - our preferred index of skill mix - is different at the interaction level, where it refers to the mix of staff involved in any particular interaction and is therefore directly relevant to the practice of nursing; whereas at the Qualpacs session level, grade dominance refers to the total range of staff on that shift who dealt with the two patients whose nursing care was observed in the session.

The distribution of the number of grades involved in any Qualpacs session was as follows:

	1	2	3	4	5	6	N
N	8	73	135	104	32	6	358
%	2.2	20.4	37.7	29.1	8.9	1.7	

As one might expect, it is rare for only one grade to be observed in a session and it is therefore not possible to analyse the effects of grades working alone. Typically the performance of three or four grades have been observed over a Qualpacs session. However, the outcome measures which were developed for the study can now be used as an extra assessment for measuring the quality of care.

5.4.1 The Effectiveness of Skill Mix

As before, the first index of skill mix examined is the predominant grade. With the cut-off point at 50%, the pattern of grade predominance among these 358 sessions was:

	No predominance	F & G	E	D	C	A & B	Learners	Total
N	146	16	38	52	29	18	59	358
%	41	5	11	15	8	5	16	

The basic data on the relation between grade predominance and the quality and outcome of care at the level of the Qualpacs session are shown in Table 5.9a and 5.9b.

Table 5.9a Quality and Grade Predominance

Grade Predom-inance (>.5)	Qualpacs assessment of quality of care received by patients when these grades predominate							% of outcomes[1] achieved
	Overall Quality		1 Psycho Soc.	2 Physic-al	3 Gener-al	4 Com-munic.	5 Prof. Imp.	
Average	2.81	358	2.86	2.69	2.80	2.83	2.81	82.7
No predom.	2.77	146	2.83	2.66	2.78	2.80	2.74	81.5
F & G	2.98	16	3.09	2.89	2.79	3.09	2.85	88.3
E	2.87	38	2.91	2.73	2.91	3.02	2.73	84.8
D	2.88	52	2.94	2.77	2.92	2.88	3.01	85.3
C	2.81	29	2.86	2.77	2.77	2.72	2.85	84.0
A & B	2.71	18	2.74	2.61	2.57	2.66	2.58	79.1
Learners	2.76	59	2.83	2.62	2.78	2.76	2.84	81.9
F test for linear trend	5.56		5.80	3.99	2.55	5.15	.15	6.82
Probability	0.019		.017	.047	.112	.025	.70	0.09

[1] The achievement of outcomes may at times have been affected by staff other than those who participated in the Qualpacs session.

Table 5.9b Percentage of Successful Outcomes

Predominant Grade	Patient hygiene (1)	Patient nutrition (2)	Pressure sores/skin integrity (3)	IVT (4)	Planning patient discharge (5)	Pain Control (6)	Education/ rehabilit-ation (7)	Elimination (8)	% Overall
F/G	65	50	84	50+	72	78	80	68	88.3
E	62	50	73	35	75	57	59	67	84.8
D	62	53	65	58	83	58	69	66	85.3
C	56	45	60	44	77	62	59	64	84.0
A/B	45	33	32	75+	60	55	50	50	79.1
L	55	51	64	29	76	58	65	53	81.9
F	2.0	.11	5.3	1.7	.14	.76	.42	5.1	
Sig	.15	.74	.02	.20	.71	.38	.52	.03	

N < 10 typical N 25 - 100

The first point to emphasise is, that the numbers where different grades predominate are relatively small. The maximum number of Qualpacs sessions where one grade predominated is 212, as shown in the second column. The numbers for the other Qualpacs sections, especially Q4 and Q5 are particularly small. Even so, based on the F test for linear trend, it can be seen that:

i) the average overall quality of care and the percentage of outcomes achieved, decreased with the clinical grades (except for learners).

ii) the average quality of care given for ratings on Psychosocial (Q1), Physical (Q2) and Communication Skills (Q4), were also associated with clinical grade.

iii) there was no association between clinical grade and the ratings on General (Q3) and Professional Implications (Q5), the latter being due to small numbers.

iv) the percentage of outcomes achieved in respect of Pressure Sores/Skin Integrity (03) and Elimination (08) were associated with clinical grade.

For the quality of care variables a very similar result was obtained when the grade mix index was used. There did not appear to be such a clear result with the outcome variable, which was probably a reflection of either the inadequacies of the constructed grade mix index or the problem of linking outcomes to grades at the Qualpacs session level.

5.4.2 The Effectiveness of Particular Grades of Nurse

As at the previous level, the quality of care delivered by each grade depends on the surrounding skill mix including whether it, or any other grade, is predominant. Table 5.10 presents the basic data. The overall quality of care delivered decreased from F and G grades to A and B grades, and it is noticeable that each grade performed better during the Qualpacs session when its own grade predominated. This can be seen by comparing columns two, three and four of the table.

Indeed, the six fold comparison of quality delivered by a grade when that grade is dominant with the quality delivered when that grade is not dominant (the weighted average of columns 4 and 5) using the sign test yields a statistically significant difference ($p<0.02$).

Table 5.10 Quality of Care Delivered by Nursing Grades vs Grade Performance

Quality delivered by these grades	Average quality (all cases)	Quality when grade is dominant	Quality when no grade is dominant	Quality when some other grade is dominant
F and G	2.99	3.09	3.01	2.95
E	2.86	2.86	2.79	2.96
D	2.84	2.89	2.83	2.82
C	2.74	2.84	2.72	2.72
A and B	2.66	2.72	2.58	2.77
Learners	2.73	2.75	2.69	2.72

Because of the greater aggregation, there is not such a clear relation between quality and average skill mix as there was at the interaction level, though the associations with overall

quality, psychosocial and general characteristics are all at, or approaching, statistical significance. There is still some evidence of an averaging effect, in that the gap between the quality of care delivered by F/G and learners is greatest when they are the predominant grade and least when some other grade is in the majority. The 't' value for this difference is only .82 which is not significant even in a one-tailed test. The major effect observed therefore appears to be that grades performed best when working shifts dominated by their peers.

In general, the main results of several analyses can be summarised by saying that skill mix had an effect on quality of care in so far as the quality of care was better, the higher the grades of the nurses who provide it, but that the variation in this quality between different grades of staff was reduced when higher grade staff work in combination with lower grade staff. The results in this study are robust; they occur in different approaches to measuring skill mix and from analysing the data at different levels of aggregation.

From the management point of view, whilst these associations are important, the crucial issue is whether the staffing complement on a ward is likely to affect quality. The focus of the next chapter therefore returns to the ward level: can the variations in quality and outcome of care between wards shown in Figure 5.1 above be attributed to variations in skill mix or are they due to other 'serendipitous' variations?

CHAPTER 6

THE CULTURE OF THE WARD

6.1 THE OVERALL RESULTS

The overall levels of effectiveness vary substantially at the ward level (Table 6.1 and Figure 6.1). There is also an association between these variations and variations in the proportion of Qualpacs ratings which is statistically significant for 'quality' (r=0.53) but not for outcome (r=0.30). At the same time, there are also substantial unaccounted for variations between wards.

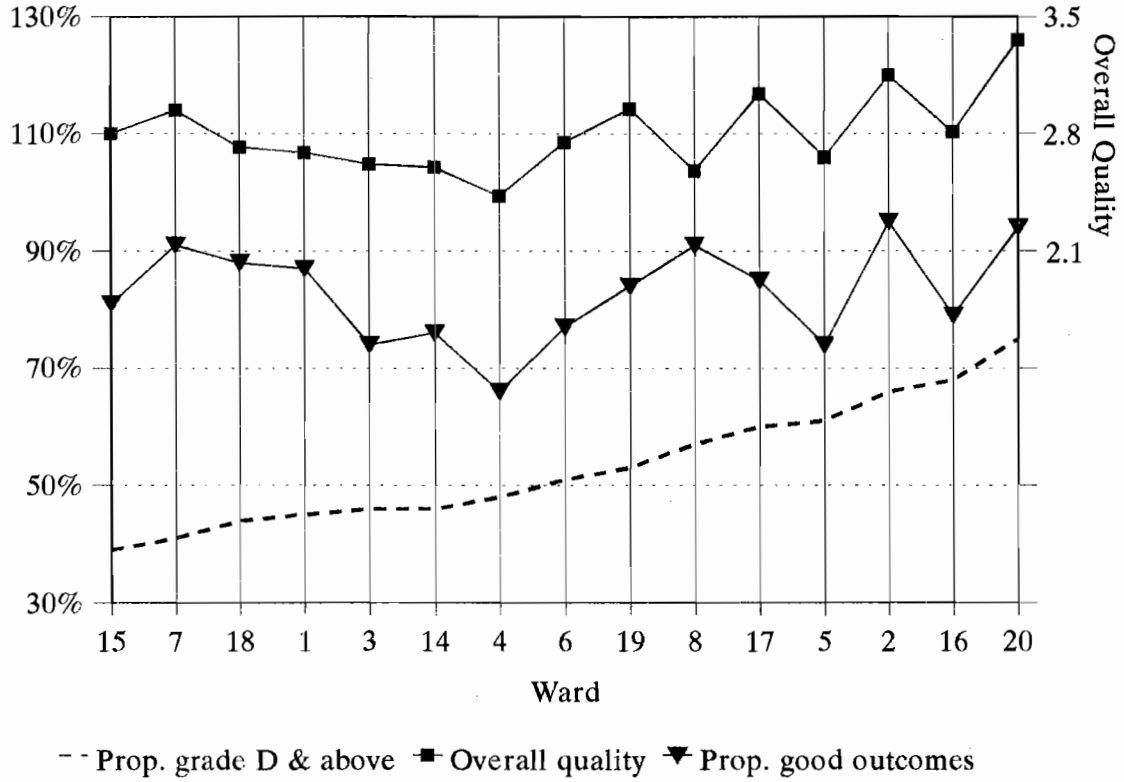
Table 6.1 Proportion of Ratings Involving Grade D and Above, Overall Quality and Proportion of Outcomes Achieved

Ward Number	Proportion of Staff Grade D and above	Overall Quality	Proportion with Good Outcomes
15	39	2.80	81
7	41	2.94	91
18	44	2.72	88
1	45	2.69	87
3	46	2.62	74
14	46	2.60	76
4	48	2.43	66
6	51	2.75	77
19	53	2.95	84
8	57	2.58	91
17	60	3.04	85
5	61	2.66	74
2	66	3.15	95
16	68	2.81	79
20	75	3.36	94

Pearson correlations proportion of staff grade D and above with:

Quality = 0.53; p=0.02
Outcome = 0.30; (not significant)

Figure 6.1 Care Quality and Outcomes by Proportion of Staff at Grade D and Above



6.1.1 The Qualpacs Ratings Reflect Ward Level Activities

Moreover, data were also collected, contemporaneously with the Qualpacs sessions, on the activities throughout the whole ward. Activities were classified into 31 categories which were then grouped into 4 types: direct care, indirect care, associated work and non-productive time (see Chapter Three).

These data are presented in detail in Appendix Four and are only summarised here. First, it is important to note the proportions of direct care provided by each grade as measured in the activity analysis follow very closely both the proportions observed in the Qualpacs sessions and in the shift hours worked over the period but not the proportions in the ward establishment (Table 6.2). Unsurprisingly, therefore, the correlations of quality and outcome of care with the proportion of all direct care delivered by the higher grades (0.52 and 0.26) are very close to those with the proportion of Qualpacs ratings involving Grade D and above (0.53 and 0.30).

Table 6.2 Presence of Grade D and Above According to Proportion of Ratings in Qualpacs Session, Shift Hours and Ward Establishment

Ward	Proportion of Direct Care Provided According to Activity Analysis (Grade D and Above) (1)	Proportion of Qualpacs Ratings Involving Grade D and Above (2)	Shift Hours by Grade D and Above (3)	Ward Establish-ment (4)
01	43	45	58	69
02	56	66	63	67
03	37	46	49	62
04	52	48	50	52
05	55	61	50	62
06	34	51	45	37
07	55	41	36	58
08	42	57	47	64
14	35	46	39	58
15	33	39	39	69
16	70	68	78	77
17	62	60	59	69
18	44	44	40	60
19	58	53	56	78
20	64	75	74	78

Notes: 1 See Appendix Four
2 Calculated by aggregating from the ratings level
3 These were recorded over the six day period
4 These figures are calculated from ward establishment figures (see Annex to this chapter).

Correlations: Proportion of Qualpacs Ratings involving Grade D and above with:

- Proportion of Direct Care provided by Grade D and above $r = .72$, $p = .001$
- Proportion of Shift Hours worked by Grade D and above $r = .85$, $p = .000$
- Proportion of grade D and above in Ward Establishment $r = .45$, not significant

6.1.2 Independence of Ward and Grade Mix

In order to assess the importance of these effects a multivariate analysis partitioning the variance in quality and outcome between ward and grade effects was carried out (full details are given in Appendix Five); the main conclusions are illustrated in Table 6.3.

i) There was a strong grade effect at ratings level which is 'diluted' at each succeeding level of aggregation (interaction, qualpac session and ward);

ii) There was also a strong ward effect at each of the lower levels of aggregation (qualpac session, interaction and rating);

iii) At the (basic) ratings level of analysis there was a statistical interaction such that the overall 'grade effect' varied between wards.

Table 6.3 Summary of Multivariate Analysis at Each Level: Mean Square Attributable to Grade and Ward Compared to Within and Residual

	Mean Squares Attributable to			
	Grade	Ward	Grade by Ward	Within and Residual
QUALPACS				
Ratings Level	92.3++	57.9++	17.2++	0.49
Interactions Level	1.0+	9.6++	-	0.25
Qualpacs Session Level	0.44+	2.33++	-	0.08
OUTCOMES			-	
Session Level	0.07+	0.27++	-	0.01
(After Adjusting for Quality	0.05++	0.18	-	0.01)

6.1.3 Other Factors

The purpose of this chapter is to examine the extent to which this separate and strong association of the skill mix variable with the effectiveness variable can be explained in terms of specific characteristics at the ward level, viz, patient characteristics, staffing (and workload), training and expertise of nurses, and the organisation of nursing care.

Several different types of data were collected on the organisation of the ward and nursing care, on the use of ancillary and clerical staff, and on patient characteristics and nursing workload. The relationships between these variables, quality and outcome, of care and grade mix is examined in detail below. However, it needs to be recognised that, at the ward level, quality and skill mix are averages observed over 96 patient-hours, and are more akin to general descriptors than direct measures of events; and, of course, with this size of sample (N of wards = 15) it is possible to give only general pointers to their size and direction.

The analysis proceeds by demonstrating the relationship between each set of these other factors and the quality and outcome of care before assessing whether or not they have any extra influence acting as additional to the effect of skillmix.

6.2 PATIENT CHARACTERISTICS

Only a small amount of data was systematically collected on the type of patients in the ward: average dependency, bed occupancy and average length of stay. These data are shown in Table 6.4a and the correlation in Table 6.4b.

Table 6.4a Average Patient Characteristics on Each Ward

Ward	Type of Ward	Length of Stay	Bed Occupancy
01	M	6.4	84
02	S	11.5	88
03	M	17.5	100
04	S	6.0	100
05	S	7.5	75
06	M	9.8	89
07	M	7.0	100
08	S	5.5	79
14	S	5.5	69
15	S	11.0	80
16	M	8.8	84
17	S	7.2	85
18	M	6.3	88
19	M	8.1	94
20	S	17.5	93

Table 6.4b Correlated with Quality and Outcome

	Quality	Outcome
Average dependency	-.27	-.19
Bed occupancy	0.15	.11
Average length of stay	0.48	.12
Proportion of Qualpacs Ratings attributed to Grade D and above	0.53	0.30
Controlling for bed occupancy rate	0.55	0.30
Average Length of stay	0.44	0.27
Average dependency	0.58	0.33
Bed occupancy and length	0.44	0.28

It can be seen that the average length of stay has a substantial association with quality of care (r=0.48, p=.03). One of the contributory factors influencing the quality of care in wards was, therefore, the length of stay: not unsurprisingly, when patients stay longer, staff can get to know them better and interactions (in the ordinary sense) can become easier. However, the proportion of staff at grade D or above was also correlated with length of stay (r=0.34;

p=0.11); despite these strong associations, the association between the proportion of Qualpacs ratings involving grade D or above and quality of care is only slightly affected by the average length of stay (correlation reduced from 0.55 to 0.44).

It is also important to note that the length of stay varied from an average of 7.8 days when patient allocation is the rule to 10.4 days in team nursing wards and 9.8 days in primary nursing wards. Nevertheless, despite the complex inter-relations, the association between length of stay and quality remains quite high and statistically significant even when controlling for type of nursing and type of ward (r=0.57; p=0.04). The effect is however reduced (although not nullified), when an additional control for the proportion of higher grade staff is introduced (r=0.50).

6.3 STAFFING AND WORKLOAD

The data on staffing and workload are given in Table 6.5(a). They also vary substantially between the wards. The issue is whether the associations between the percentages of higher grade (and/or of trained staff) and quality and outcome of care are affected by these kinds of factors. The data here, moreover, provide some more clues as to the ways in which the ward 'culture' might affect the relative performance of staff of different grades in different wards.

It should first be noted that there are 'obvious' differences between medical (M) and surgical (S) wards and between the pattern of nursing adopted on the ward whether Team Nursing, Patient Allocation or Primary Nursing. In particular it should be noted that in the latter two groups of wards there tended to be a higher proportion of higher grades. These associations

are considered in Section 6.4 (below).

The raw and partial correlations with the quality of care are given in Table 6.5(b). In principle, if a ward is over- (under-) staffed then quality of care should be better (worse) because nurses have more (less) time. The overall relationship is in the right direction (extra staff, better care) but not statistically significant. Moreover, it seems clear that the proportion at Grade D and above is the more important variable (compare the single partial correlations with type of nursing, type of ward and the proportion at Grade D and above).

Table 6.5a Staffing and Workload on the Wards

		Generated by SENS				
Ward Type	Average Daily Census of Patients	Estimate of Workload on the Ward (1)	Effective Staff Hrs Available (2)	Staff Whole Time Equiv-alents over or under (3)	% of Higher Grades (D, E, F & G) (4)	% of Trained Staff Grade C & Above
01 PA	24	480	577	+ 2.6	60	73
02 PA	25	604	639	+ 0.9	67	73
03 T	30	811	666	- 3.9	51	61
04 PA	28	671	598	- 1.9	52	62
05 PA	23	588	552	- 0.9	51	76
06 T	27	634	594	- 1.1	54	54
07 PA	22	519	602	+ 2.2	38	59
08 PA	25	743	738	- 0.1	49	76
14 T	19	521	549	+ 0.7	41	52
15 PA	22	471	535	+ 1.7	42	62
16 T	15	313	500	+ 5.0	66	75
17 PN	26	674	552	- 3.3	64	69
18 PN	26	754	585	- 4.5	44	65
19 PN	20	535	530	- 0.1	56	73
20 PN	22	618	617	0	72	75

Footnotes:

1) Estimate of Workload on the ward is calculated over 6 days from patient dependencies with allowance for admissions etc (see SENS Manual)

2) Effective Staff Hours (As opposed to paid staff hours) Shift hours weighted as follows: Trained staff C - G are weighted 1.005, A & B - 0.90; Agency/Relief grades C-E - 0.95, Learners 1st year: 0.50, 2nd year - 0.75 and 3rd year - 0.90 (see SENS Manual 1986)

3) Staff Whole Time equivalent over or under calculated from difference between Effective Staff Hours Available and Estimated Workload

4) Calculated from Adjusted staff presence.

Table 6.5b Correlated with Quality and Outcome

	Quality	Outcome
Average workload	-.33	-.20
SENS estimate of hours	-.10	.31
Under or over	.15	.11
Proportion Grade D and above	.53	.30
Controlling for average workload	.50	.27
Controlling for SENS estimate of hours	.53	.30
Controlling for under and over staffing	.57	.29

6.4 TRAINING AND EXPERIENCE

Since this study's main focus is on skill mix, an important element of the analysis has been to assess evidence of 'further training' for staff. These data come from the staff questionnaires (see Chapter Three) and the hypothesis is that the acquisition of 'new skills', or further training, enhances quality output.

Apart from Primary Nursing wards (Number 17, 18, 19 and 20), only a minority of the higher grades of staff (D, E, F & G) have had any further training (Table 6.6) and even fewer of the C and A grades. At the same time, there was a wide variation between the wards and those wards which have a high percentage of trained nurses tending to be associated with better care ($r = .57$ with overall quality; $r = 0.48$ with overall outcome). This was especially evident in wards 2, 17, 19 and 20.

The nursing staff's perceived use of their nursing skills was also associated with the quality and outcome of care on the ward. Whilst there were not enough cases to analyse perceived use of skills by grade, when perceptions of each skill area is assessed by ward there was a

positive relationship between staff perceiving 'very good use' as opposed to 'good use', of basic nursing skills, of rehabilitation skills and, to a lesser extent, of technical and management skills and better Qualpacs ratings. There was also a positive relationship between staff perceiving 'very good use' of basic skills, and, to a lesser extent, technical, rehabilitation and communication skills and outcome (Table 6.7a). This was particularly evident in the primary nursing wards (17, 18, 19 and 20), where staff perceived 'very good use' of basic skills. This, combined with the increased focus on inservice training for the lower grades of staff (see Table 6.6), could be a factor in their demonstrating a consistently better performance on the Qualpacs indicator.

Table 6.6 Evidence of Further Training
(as a percentage of all staff on wards who completed questionnaire)

Ward	% for D, E, F & G Grades	% for C and A Grades	Cases
1	11	17	18
2	48	21	22
3	25	0	12
4	20	0	15
5	10	0	21
6	7	7	13
#7	10	0	21
8	22	4	23
14	19	0	16
15	21	21	19
16	46	0	14
*17	69	19	16
*18	55	18	11
*19	64	29	14
*20	50	21	14

* Primary Nursing Care ward - most of this 'further training' was inservice training or study days.

\# Only two staff filled in this section of the questionnaire.

The relation between quality and outcome of care and the perceived use of technical skills was less clear, although the correlations with 'very good use' were higher. However, there was a big difference in the proportions reporting not very good use of technical skills in the surgical (27%) and medical (46%) wards. Finally, there was little evidence to suggest that the perceived use of other skills in communication or teaching had any effect on quality.

The only other results of interest contained in the staff questionnaires were those concerned with staff satisfaction levels. Apart from wards 3, 4 and 16, a high proportion of staff on all wards claimed to be satisfied with their jobs. Nevertheless, there were positive correlations of 0.47 ($p = 0.038$) and 0.56 ($p = 0.015$) between staff satisfaction and the quality and outcome of care delivered on the ward (see Table 6.7b).

Table 6.7a Proportion of Staff Stating Good/Very Good use of Various Skills and Staff Satisfaction - by ward (Data from Staff Questionnaire)

Ward	Ward Type	Basic Skill		Technical Skills		Rehabilitation Skills		Management Skills		Teaching Skills		Communicat-ion Skills		Staff Satisfaction	% Staff Reporting Further Training
		Good Use	Very Good Use	Good Use	Very Good Use	Good Use	Very Good Use	Good Use	Very Good Use	Good Use	Very Good Use	Good Use	Very Good Use	Positive Responses	
1	M	56	39	25	-	21	-	15	23	-	-	60	26	69	28
2	S	25	75	42	32	22	50	28	33	28	17	61	22	100	69
3	M	44	44	13	13	13	13	20	-	33	-	27	27	40	25
4	S	61	23	27	7	31	15	39	8	15	8	62	23	25	20
5	S	50	44	67	13	53	7	33	13	21	7	56	36	100	10
6	M	23	54	9	36	33	42	45	18	73	9	33	58	67	14
7	M	35	45	41	24	44	17	24	29	28	17	33	56	90	10
8	S	52	44	63	24	38	13	33	17	25	12	61	28	93	28
14	S	47	47	36	36	23	8	31	31	25	42	20	67	100	19
15	S	29	53	14	29	13	40	15	31	14	36	21	50	60	42
16	M	25	50	36	9	25	8	64	18	46	-	50	33	54	46
17*	S	33	67	50	29	36	36	57	14	36	14	47	47	100	88
18*	M	9	64	27	-	40	-	20	-	11	0	55	18	75	73
19*	M	33	67	53	-	47	13	20	40	47	-	60	33	94	93
20*	S	29	64	39	31	14	50	31	23	23	15	43	36	77	71

* Primary Nursing

M = Medical S = Surgical

Table 6.7b Correlations with Quality and Outcome

	Quality		Outcome	
	Good use	Very good use	Good use	Very good use
Basic skills	-50 (2)	+75 (3)	-42	+63
Technical skills	+22 (1)	+48 (1)	+29	+53
Rehabilitation skills	-13 (3)	+65 (1)	-03	+51
Management skills	-04 (1)	+47 (3)	-23	+46
Teaching skills	11 (4)	01 (5)	-09	+01
Communication skills	-2 (3)	10 (1)	-14	+56

Note: Qualpacs Section with Highest Negative/Positive Correlation in parentheses.

6.5 THE ORGANISATION OF NURSING

Two types of indicators can be derived from the activity data:

a) the relative proportions of any given type of care delivered by a particular grade of staff

b) the distribution of the time of any particular grades of staff between the various types of care.

The former data have already been used in Section 6.1: the latter data, presented in Table 6.8,

are a good indicator of the level of effort rather than, necessarily, of quality. Ward 8 is a perfect illustration of this difference between the two measures of effectiveness: field notes commented on how staff were working extremely hard - with the second highest proportion of time spent on direct care and the third highest outcome score - but that quality of interaction between nurses and patients was poor with the second lowest Qualpacs score.

Table 6.8a Time Spent on Direct Care and Non-Productive Time by Grades D and Above: as Proportion of all their Time Spent on the Ward

Wards	Proportion of Time Spent by Grades D and Above	
	Direct Care	Non Productive Time
1	45	9
2	52	11
3	47	12
4	46	24
5	44	8
6	53	11
7	55	15
8	56	11
14	44	10
15	46	11
16	33	17
17	42	-
18	54	8
19	40	-
20	59	8

This throws light on the recommendation by Ball et al (1984) that staff should spend at least 52% of their time on direct care. Both the average quality of care given and the outcomes achieved by wards when the higher grade staff spend at least 52% of their time on direct care (Wards 2, 6, 7, 8, 18 and 20) were higher (average Qualpacs rating 2.92 compared to 2.73; and overall outcomes 89% compared to 78%); but whilst three of these six wards delivered

above average quality and three below, five out of six of these wards achieved above average outcomes.

At the same time, it should be noted that the proportion of their time F/G grades themselves spent on direct care was inversely related to overall ward quality. Field notes suggest that this apparently perverse result can be explained by the fact that F/G grades spending less time on direct care were, on the whole, spending more time on the organisation of care by others (there were insufficient data at the level of detail required to carry out a precise statistical test).

Thus, although there is a weak association between the proportion of time spent by higher grades on direct care and the average quality of care ($r=0.23$, not significant), there is a substantial and statistically significant association between this proportion and the overall outcomes ($r=0.57$; $p=.02$). Equally, the associations between the proportion of time spent by all grades on direct care and the quality and outcome of care are very different (Table 6.8b). When this extra variation of the amount of effort is introduced, the correlations between the proportion of Qualpacs ratings attributed to grade D and above (the proportion of direct care provided by higher grades) and overall outcomes achieved becomes statistically significant and remains so even when controlling for type of nursing (see Table 6.8b).

Table 6.8b Correlations with Quality and Outcome

	Quality	Outcome
Proportion of time spent on average on direct care		
by Grade D and above	.23	.51++
by All grades	-.15	+.16
Proportion of Qualpac Ratings involving Grade D and above	.53++	.30
Controlling for proportion of time spent on direct care		
by Grades D and above	.55++	.36
by All grades	.56++	.57++
Additionally controlling for type of nursing		
by Grades D and above	.50++	.32
by All grades	.54++	.42+

Finally, since primary nursing has its own philosophy and endorses a different approach to the organisation of nursing care on the ward, a direct comparison of these wards and the non-primary nursing wards is useful. Whilst an experimental design was not feasible, there are two quite closely matched pairs of wards which provide a useful comparison.

Ward 1 is a medical ward, with an average workload of 96 hours, an average patient census of 24 and a grade mix of 60% D, E, F, G grades to 40% C, A

and Learner grades. Ward 19 is a medical ward, with an average workload of 92 hours, an average patient census of 20 and a grade mix of 56% D, E, F G grades to 44% C, A and Learner grades. Ward 1 practised patient allocation and Ward 19 primary nursing. The quality of care delivered was consistently high over all grades of staff on Ward 19 whereas on Ward 1 there was a distinct difference between the quality of care delivered by the higher and lower grades (Table A3.1).

A similar comparison can be made between Ward 4, a surgical ward which practises patient allocation, and Ward 17, a Primary Nursing Surgical ward. Apart from some variation in grade mix and bed occupancy rates both these wards have similar characteristics and case mix. However, the quality of care delivered was consistently high over all grades of staff on Ward 17, the primary care ward.

These differences in outcomes, the overall quality of care and the performance of individual grades, are graphically demonstrated when data from all the interactions on primary nursing wards are aggregated and compared with similar data from non primary nursing wards (Table 6.9). Although the average grade mix was higher in the primary nursing wards than in Team Nursing Wards, this was clearly insufficient to explain the very considerable differences in the quality of the interactions and grade performance, as the grademix value is identical in Patient Allocation Wards.

This effect may be the result of primary nursing's organisational philosophy or alternatively, it could be due to their obvious emphasis on further training for all grades of staff. The extent to which staff of a given grade are more highly qualified in primary nursing wards is shown clearly in Table 6.10.

Table 6.9 Quality of Interactions and Grade Performance in Three Types of Ward

	Team Nursing	Patient Allocation	Primary Nursing Wards	Significance of Test for Trend
Quality	2.69	2.77	2.97	.08
Q1 (Psycho-Soc)	2.73	2.83	3.02	.06
Q2 (Physical)	2.55	2.66	2.86	.12
Q3 (General)	2.70	2.77	3.01	.06
Q4 (Communic.)	2.84	2.64	3.10	.16
Q5 (Prof. Imp.)	2.73	2.7	2.96	.32
Quality Delivered by These Grades				
F and G	2.90	2.99	3.35	.08
E	2.66	2.82	3.05	.06
D	2.80	2.75	3.03	.25
C	2.68	2.68	2.99	.17
A and B	2.56	2.58	2.83	.18
Learners	2.71	2.76	2.69	.96
Proportion of Outcomes Achieved	76.5	83.6	87.8	.06
Grademix Value	3.19	3.47	3.47	.30

Table 6.10 Proportion With Any Qualification by Grade

	All	N	Primary	N	Others	
G	76	17	100	3	71	14
F	50	12	100	1	45	11
E	54	70	100	21	35	49
D	37	57	75	12	27	44
C	29	35	57	7	21	28
A	0	4	-	-	0	4
L	23	48	86	7	12	41
All Grades	41	243	86	51	29	192

6.6 CONCLUSIONS

Length of stay appeared to be the most important factor associated with quality of care rather than bed occupancy, relative over- or under-staffing, the proportion of staff with further training, staff satisfaction and the type of nursing practised on the ward. The proportion of staff on Grade D or above was weakly associated with length of stay ($r = 0.34$), further training ($r = 0.39$), staff satisfaction ($r = 0.25$) and the type of nursing on the ward. Nevertheless the positive correlation between the proportion of staff on Grade D or above and the quality of care was robust. This relationship held when controlling for any one or all four variables.

ANNEXE

ACTUAL STAFF ESTABLISHMENTS (WITH LEARNERS PRESENT DURING STUDY)

Wards	1	2	3	4	5	6	7	8	14	15	16	17	18	19	20
Grades															
G	1	1	2	1	1	1	1	1	1	1	1	0	1	1	1
F	1	1	1	2	0	0	1.5	2.2	1	1	0	1	0	0	1
E	2	5	1.8	4.5	5.5	5	3	7.5	5	3	4.5	6	5	5.5	5.5
D	7.5	6.5	5.6	4.5	5	4	2	2.8	3.5	4.5	6	4.5	4.5	4	6.5
C	2	1	2.5	3	4	0	3	3	2.5	4	0.5	1	2.3	3.5	1.5
A & B	3	3	1.5	2	3	3	4.5	4.5	4.6	3	1.5	1.5	2.6	2	3
Learners	3	4	7	12	0	14	3	0	5	3	2	4	6	2	0

CHAPTER SEVEN

METHODOLOGICAL IMPLICATIONS

As a consequence of our experience with carrying out this research, a number of lessons have been learnt about the methodological problems of studying skillmix and the effectiveness of nursing care which might perhaps be helpful to others. Three of these are taken-up in this chapter. Section 7.1 reports on the difficulties of using a combinational approach to measuring and presenting skill mix; Sections 7.2 and 7.3 provide an assessment of Qualpacs with some suggested improvements; and Section 7.4 discusses the relation between the two measures of nursing effectiveness used throughout this study, Qualpacs and the locally devised outcome measure.

7.1 MEASURING AND PRESENTING SKILL MIX

Chapter 4 introduced three ways of representing skill mix: as the predominant grade; as an index; and as a list or combination of the participating grades. Only the first two of these have been extensively used in the analysis. Various attempts were made to develop the third, but, as this section shows, its use seems likely to be restricted to small-scale descriptive case-studies.

Intuitively, a list of the participating grades (eg, A and B and F/G, E and L, etc) seems a more straightforward representation of skill mix than indices or other derived measures. There are 57 possible combinations of the 6 grade groups (G/F, E,D,C,A/B,L) and what is described as the "combinatorial approach" tries to treat these as values of a single skill mix

variable.

Any nominal variable with 57 levels obviously needs simplifying; though this would be unnecessary if only a small subset of values occured naturally, or certain combinations predominate. Neither applied here and 55 combinations were in fact observed. Whatever method is used to reduce this number will inevitably lead to some loss of information and it has to be remembered that simple combinations may already convey insufficient information for an analysis of the relation between grade and quality. They only indicate the presence of a grade, not the extent of each grade's involvement and as the following example shows, taking this into account may be crucial to identifying any relation between grade and quality.

The example considers all interactions involving 2 different grade groups. 684 cases were observed covering all 15 possible combinations of the 6 grades (Table 7.1). These data produce both expected and unexpected results. Quality of care improves on average as the grade mix of staff increases (as per Chapter 5, Section 5.2 above) with one noticeable and unexpected exception, those grade pairs which contain E or F/G grades in combination with lower grades, especially learners and C grade staff. Thus, learners working in combination with A/B, C and D grade staff show improving quality scores, but these quality scores decline when learners work with E grade and even more so with F/G grade staff. This trend is less marked for A/B Grade staff where quality of care improves as the other grade of staff increases with a slight reduction for F/G grade staff. However, the quality of care provided by C grade staff improves as they work in combination with learners, and D grade staff, but declines when they are working E or F/G grade staff. The work of D grade staff has the lowest quality rating when working with F/G grade staff. The highest pair of grades, E and

F/G, produce the best scores.

The problem is that this completely ignores the relative proportions of ratings recorded for each grade of staff which, of course, is crucial to an understanding of skill mix. Taking one of the larger pair combinations, A/Bs and E grades, the combination of more ratings from learners than from E grades is obviously different from the combination of more ratings from E grades than from learner and, gratifyingly, the two combinations deliver significantly different levels of care (see Table 7.2).

Table 7.1 Grade Pairs and the Quality of Care

Grade Pair	Average Qualpacs Score	No. of Interactions
Learners & A/B Grade	2.70	28
Learners & C Grade	2.74	21
Learners & D Grades	2.82	85
Learners & E Grades	2.76	54
Learners & F/G Grades	2.64	42
A/B & C Grades	2.60	29
A/B and D Grades	2.81	57
A/B & E Grades	2.81	54
A/B & F/G Grades	2.80	20
C & D Grades	2.82	50
C & E Grades	2.75	39
C & F/G Grades	2.58	25
D & E Grades	2.89	103
D & F/G Grades	2.81	46
E & F/G Grades	3.14	31
All grades pairs	2.80	684

Table 7.2 Quality Delivered by the A/B and E Combinations when the Balance Varies

	E more than A/B	Equal	A/B more than E
Overall Quality	3.0	2.86	2.45
Significance of F test for Linear trend		0.005	

The implication is that combinations of the same grades, but with different proportions of ratings recorded for each grade, have to be treated differently.

Having to include information on the relative contribution of each grade increases the total number of combinations. For example, there are 999999 possible combinations in a scheme which replaces the grade letter with a single digit representing that grade's contributution to the nearest 10% (e.g. 003241 represents a 30% input from grade D, 20% from C etc.). Interaction level data contained 310 of these combinations. Several such methods were tried in the hope of discovering naturally occurring clusters amongst these and thus a variable with a manageable number of levels. However, none succeeded and all further attempts at simplification grouped combinations by predominant grade or average grade levels. Since both of these are more easily tackled by numerical grade equivalents and indexing, the combinatorial approach was abandoned as a means of developing a grade mix variable suitable for detecting analytical generalisations.

Nevertheless, the method may be worth pursuing as a way of examining the effectiveness of local work patterns. The following illustration shows grade combinations being used to

compare two wards on the ways in which their staff work together.

In ward 18 single grade working in interactions is the norm (Figure 7.1); 82% of direct care is performed by nurses on their own or with others of the same grade. This propensity to single grade working extends to learners (Figures 7.2 and 7.3); almost a quarter of all interactions (23%) were conducted by learners without any other grades. In the 24 instances involving more than one grade, there were no dominant combinations, although learners with grade C's, learners and D's, and D's with E's occurred more than any others. The dependency on learners is also apparent from the distribution of grade dominance - cases in which a single grade accounts for at least 50% of the care. Learners are most often in this role (29% of all cases) followed by grades D (33%) and C (19%). Figure 7.4 shows that these learners were not delivering a very high standard of care; in this ward, the average quality of care increased steadily with grade, the effect being highly significant statistically.

From the same Figures, ward 17 shows a very different pattern of working. Here, grades involved in interactions on their own account for only 55% of all interactions. Learners were still the grade most likely to be involved on their own (17% of cases), but they were not the most frequently dominant grade (Figure 7.2). In this ward too, the quality of care is positively associated with grade, but the effect is far less pronounced. Here, all grades are providing care which is close to or above the average on the Qualpacs scale (Figure 7.4).

This simple illustration has identified clear and important diferences between wards. Although combinatorial representation is unsuited to developing analytical generalisations, it may have considerable value in this sort of small scale descriptive account.

Figure7.1 The Numbers of Grades Involved in Interactions - 2 ward example

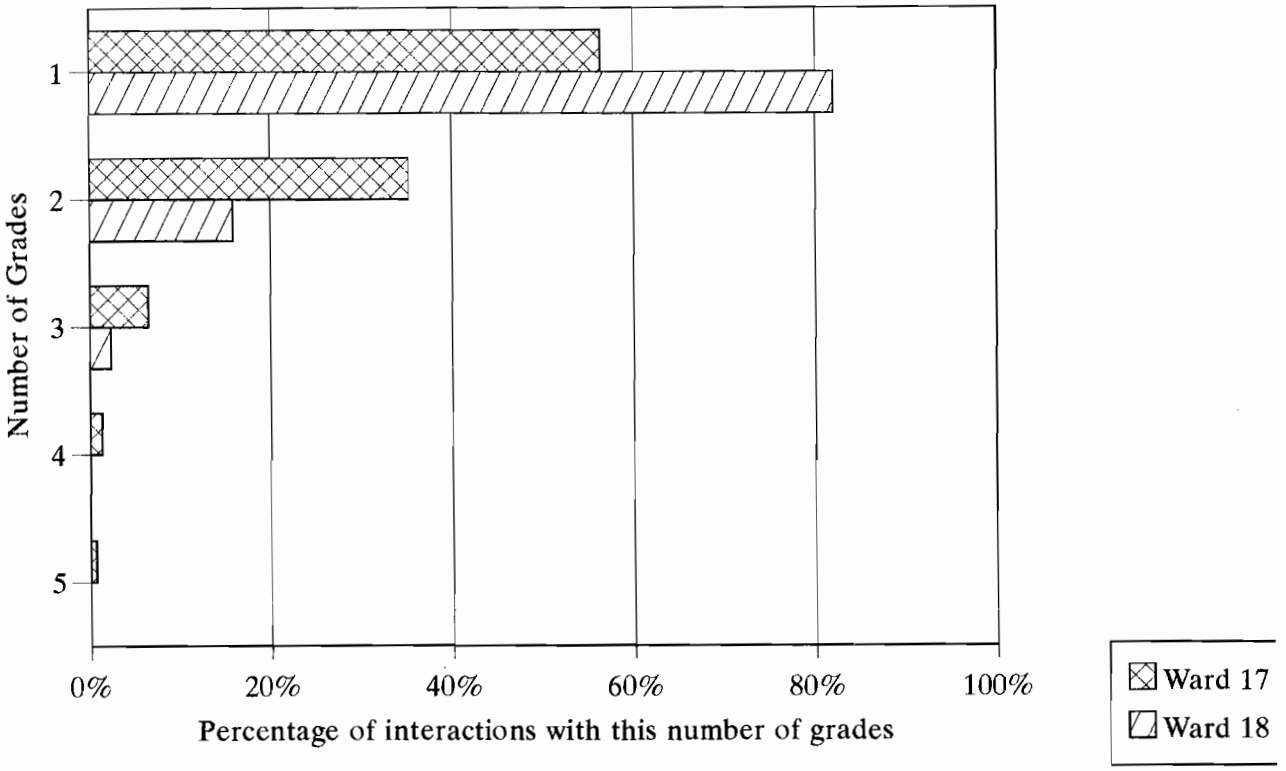


Figure 7.2 Dominant Grades in Interactions 2 ward example

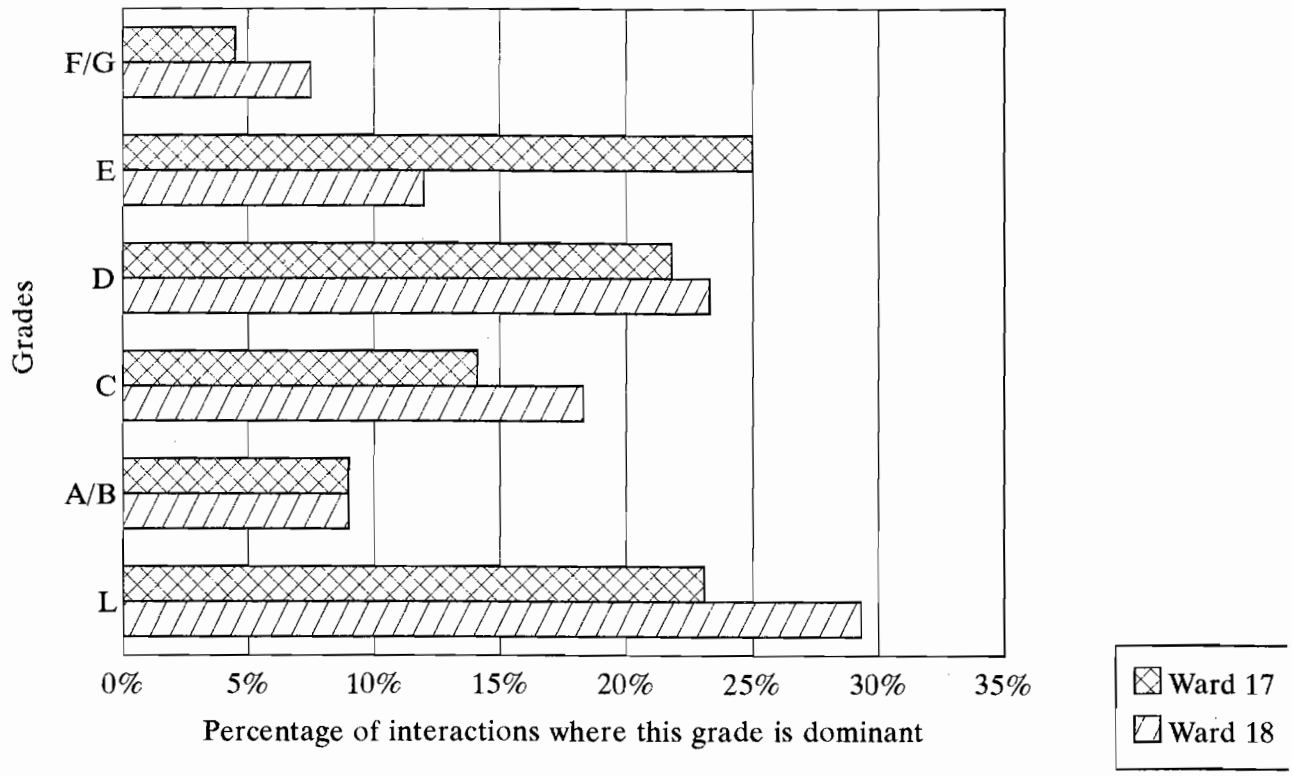


Figure 7.3 Grade Combinations in 2 Wards

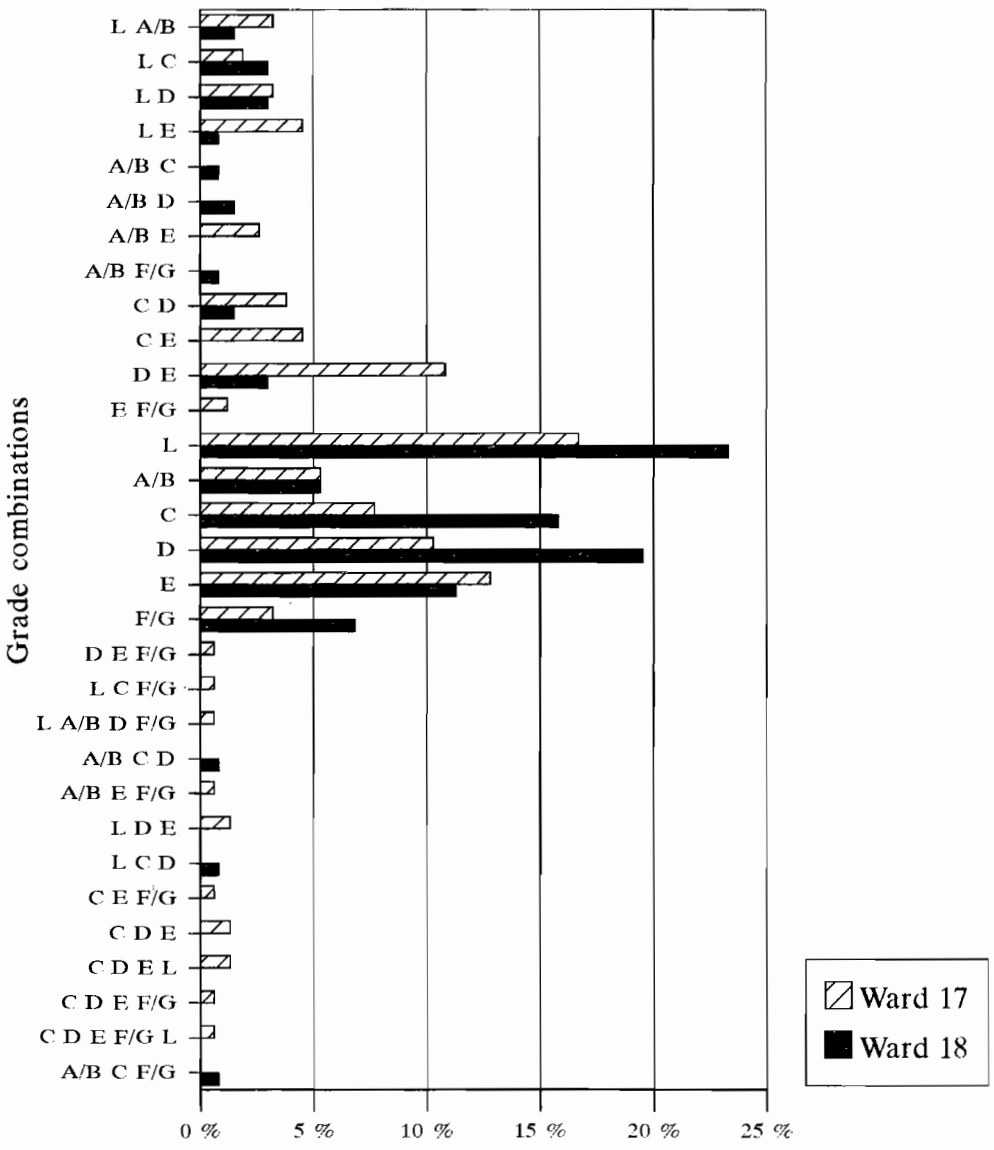
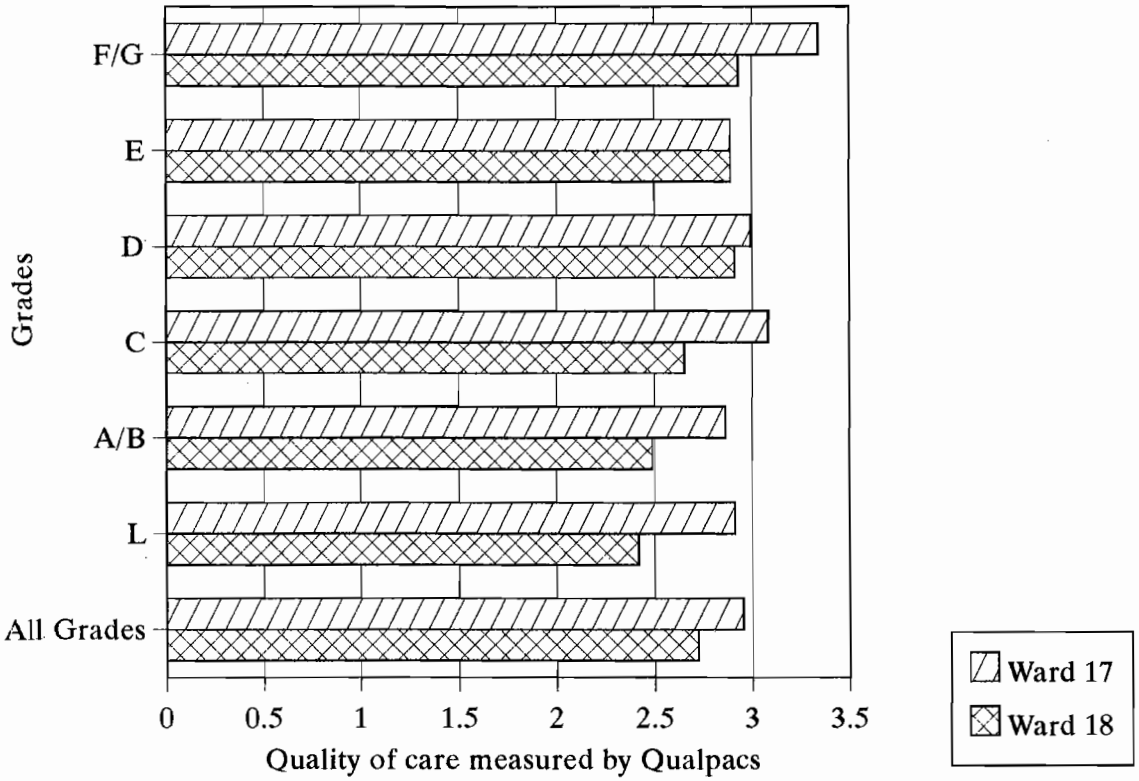


Figure 7.4 Quality of Care Delivered by Each Grade of Staff - 2 ward example



7.2 EVALUATING AND MODIFYING QUALPACS

When assessing the operating characteristics of the various data collection instruments (Chapter 3 above), the research aims were paramount but many of the criteria used are likely to coincide with the interests of nursing management, namely:

- *Cost and ease of use* Many of the observational instruments can be difficult and expensive to administer

- *Reliability* Most ready-made instruments will have passed controlled reliability tests under 'experimental' conditions, but will they survive the rigours of everyday use?

- *Ease of computation* Almost all of these instruments provide quantitative performance measures, but there are vast differences in the ease of scoring and amount of computational effort. Instruments which are difficult to score and compute can delay the production of results, increase the possibility of embarrassing mistakes and will cost more to administer.

- *Ease of interpretation/policy relevance* Ideally the instrument directly measures performance in terms which can be immediately translated into policy. For management purposes, such instruments are to be preferred to those which use much more abstract dimensions.

- *Effective discrimination and clear standards* Instruments should be designed to clearly discriminate between different levels of performance and compare these with

known standards. Instruments which fail in these respects can often be improved without wholesale redesign simply by changing the methods of scoring or computation.

- *Acceptability to nursing staff* Policy changes will be most acceptable when staff have understood and participated in the process of data collection, and have been involved in the process of local standard setting. Most ready-made instruments are grounded in a "top-down" philosophy and rule out this sort of local involvement.

Judged against this list, the Qualpacs clearly has several practical and methodological limitations.

* It is relatively expensive for the volume of data generated, although it is still cheaper to administer than instruments such as MONITOR (Ball et al, 1984). The main costs are in training and employing (redeploying) observers - who must be qualified nurses.

* Observation is intrusive and may influence or unsettle staff. Senior nurses from the same institution are unsurprisingly the most disruptive.

* Relatively little data are collected in each session because in our experience the detail required limits the number of patients who can be simultaneously observed. The research limited its observations to two patients per session though the Qualpacs guidelines suggest that rather more should be possible.

* Qualpacs provide a maximum of only seven parameters of ward performance when

analysed in the conventional way, ie. the overall quality rating, plus the scores on each of the five or six item sections.

* The discriminatory power is small because of the narrow range of values. This is partly due to the large number of ratings being averaged, but also to the extensive use of the "average care" category. The problem may be definitional, "average" may be too vague and open to a variety of interpretations, such as "satisfactory", "acceptable" and "up to standard"; though the Qualpacs guidelines go to some length to try and specify a meaning. Whatever the cause, it is clearly a major failing of an instrument which is designed to discriminate between levels of care that one of its gradings is used in nearly two-thirds of all cases (Table 7.3).

* Qualpacs scores do not easily convert to specific policy recommendations, since good or bad scores on individual sections are only a pointer to aspects of general performance, not a measure of how well particular tasks are being performed. For example, a low or high rating for the physical section does not directly measure performance on physical procedures, but reflects performance on these aspects of all types of procedures. So despite the long periods of observation in generating the basic data, it will normally require further work to identify the cause of good/or poor Qualpacs scores.

* There is a technical objection to the method of overall averaging. Since it weights each rating equally, the interactions with the most ratings will be over-represented in the final analysis.

Table 7.3 Frequency of Use of Qualpacs Ratings

Rating			
Value	Meaning	N	%
5	Best care	464	1.1
4	Between	3824	9.0
3	Average care	27498	64.6
2	Between	7511	1.6
1	Poorest care	3297	7.7
All ratings		42594	100

Some of these difficulties can be remedied by simple modifications to the standard procedures for data collection and analysis. The three which were most widely explored by the project are:

1 to compute the overall averages in ways which give interactions equal weight;

2 to use alternative scoring methods to give greater sensitivity;

3 to increase the range of data collected, extend the types of analysis and get better value from the fixed cost of employing or redeploying and training observers.

7.2.1 Computing the Overall Averages in Ways Which Give Interactions Equal Weight

There is a bias in the standard method of computation which over-represents those interactions with most ratings, but this can be avoided by using the averages for each

interaction (rather than the raw rankings) to compute the overall session score. There is some additional computation which is best done by computer, but the process is quite straightforward. A comparison between results calculated in this and the standard way is shown in Table 7.4.

Because these are the averages of many similar values, the differences are predictably small (never more than 3%) and it is debatable whether the extra computational effort can be justified. It can also be argued that simple averaging is the more valid because, by using the raw numbers of ratings, it takes account of differences in, for example, the nursing effort and number of components rather than treating all interactions as equal.

Table 7.4 A Comparison of Two Different Methods of Computing Overall Quality

(1) Quality based on a simple average of all ratings
(2) Quality based on an average of the interaction averages

Ward	Overall Quality (1)	Overall Quality (2)	% Difference (2) - (1) (1)
4	2.43	2.39	-1.57
8	2.58	2.60	.74
14	2.60	2.61	.36
3	2.62	2.63	.49
5	2.66	2.73	2.69
1	2.69	2.74	1.35
18	2.72	2.68	-1.53
6	2.75	2.72	-0.07
15	2.30	2.84	1.32
16	2.81	2.78	-1.17
7	2.94	2.97	.95
19	2.95	2.95	-.14
17	3.04	2.96	-2.56
2	3.15	3.11	-1.37
20	3.36	3.28	-2.33

7.2.2 Increasing Sensitivity

In using the Qualpacs instrument we have been able to demonstrate statistically signficant differences in the quality of care at all levels of analysis, but there remain three related problems with the standard use of the instrument. The central, "average", category is overused; extreme scores are rarely given; and the overall quality ratings fall in a very narrow range and are therefore difficult to interpret.

There are several ways to increase its sensitivity. Most radical is to change the criterial items to force more use of the extremes; modifying the instructions to raters might have a similar effect. The method of scoring could also be changed and in certain cases will alter the meaning of the instrument.

A relatively modest change in the method of scoring was explored by adopting a method of calculations which highlights the exceptional (non-average) cases. The forms are completed in the conventional way, but a new measure of quality is defined as the difference between the proportion of "good" (ranked 4 & 5) and "poor" (ranked 1 & 2) ratings (+100 = best, 0 = average, -100 = worst). Ward results are shown in Figure 7.5. The procedure can be applied to section scores as well as to overall quality (Figures 7.6A-7.6D). This has several presentational advantages over the standard method of scoring - notably a wider numerical range and easier interpretation. However, it is fundamentally the same measure, an estimate of overall quality, with the same basic distributional characteristics. It is equally affected by the high proportion of average scores and, at the interaction or session levels, there will frequently be insufficient 'exceptional' cases for reliable estimates. It may have some merit

Figure 7.5 Proportion of Good-Bad Qualpacs Ratings
Number of good ratings minus number of bad ratings
as percentage of all ratings

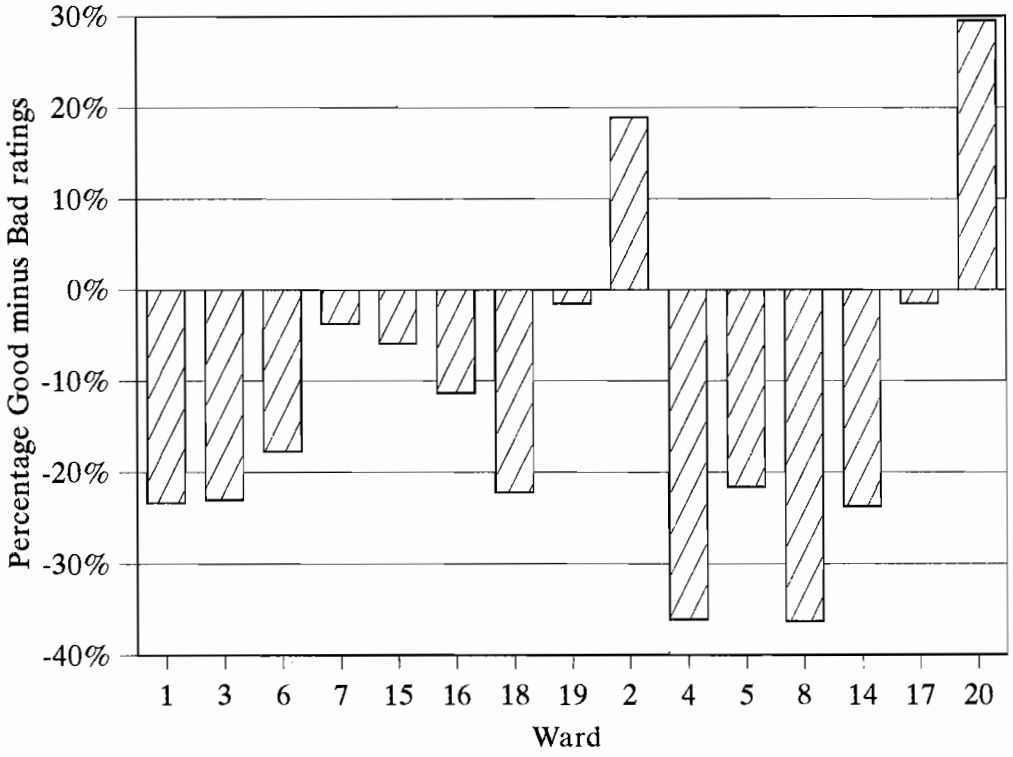


Figure7.6A Proportion of Good - Bad Ratings in Each Qualpacs Section - Ward 4

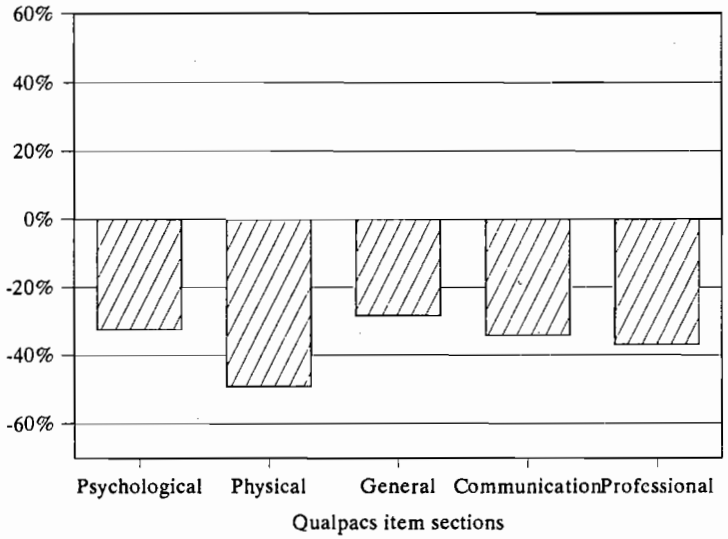


Figure 7.6B Proportion of Good - Bad Ratings in Each Qualpacs section - ward 5

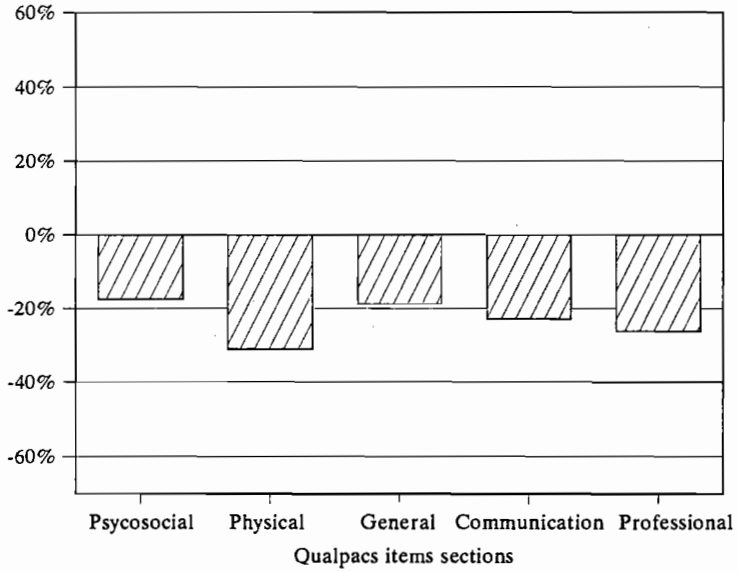


Figure 7.6C Proportion of Good - Bad Ratings in Each Qualpacs Section - ward 8

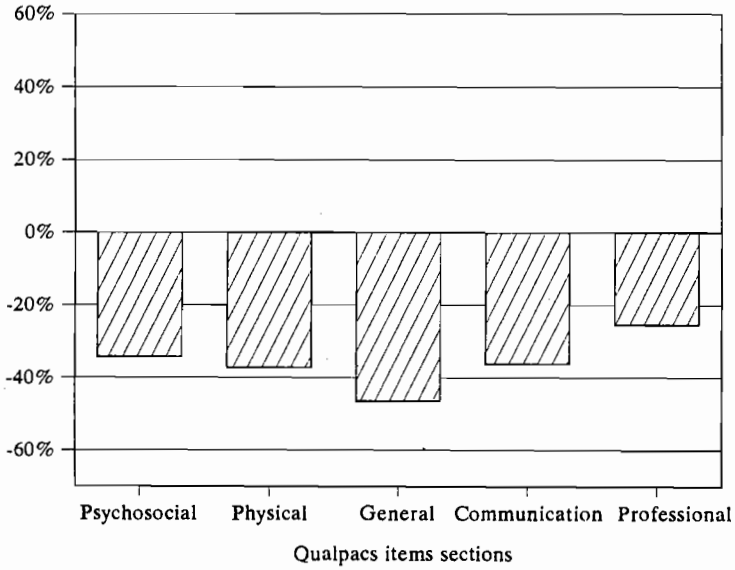
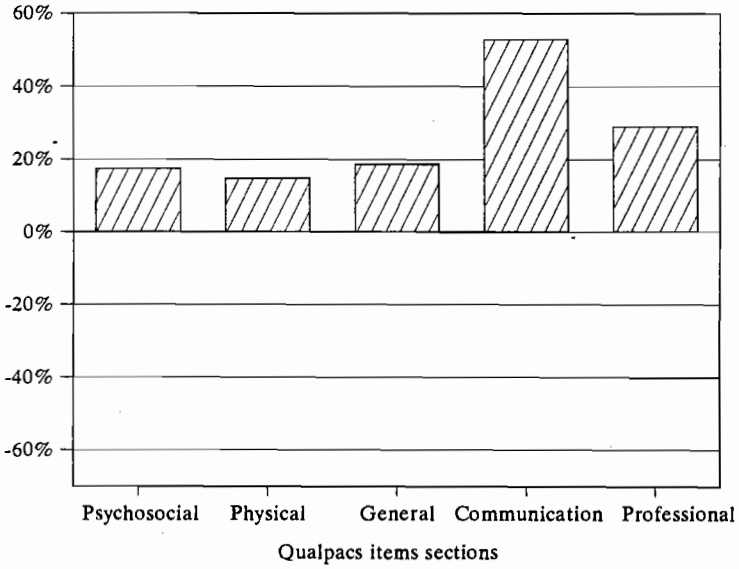


Figure 7.6D Proportion of Good - Bad Ratings in Each Qualpacs Section - ward 2



as a heuristic tool for management, but for general analytical purposes it has few advantages and some disadvantages when compared with the standard method which was therefore used in the vast majority of the analyses.

7.3 ADDING TO THE BASIC QUALPACS DATA

There is very considerable potential for getting better value from the Qualpacs by making slight changes to the recording sheet. One change has already been described, using columns to record each interaction separately. Three further changes are recommended.

Adding a Patient Identifier

Adding a patient identifier to the top of each interaction column enables the performance and interaction data to be linked to the characteristics of individual patients and not just to an average of two. Admittedly there will be very few observations on any one patient, but in a large Qualpacs exercise there will be sufficient patients to carry out analyses on the effects of the Qualpacs face-sheet variables such as age, sex, dependency level, length of stay and ICD groups - or derived measures such as DRGs. If these analyses are not of intrinsic interest, the linkage is nevertheless useful in permitting these variables to be controlled for when explaining variations in quality.

Recording Grade Data

Noting the grade for each rating provides a rich source of data for analysing the performance of both individual grades and combinations of grades (skill mixes).

Recording the Type of Interaction

It is relatively easy to circumvent one of the more serious problems with Qualpacs - the lack of information on the type of interaction. To aid their own recall, some of our observers were using space on the form to note the activities corresponding to the numbered interactions. Apparently, these were easy to record. Having this additional information opens up many possibilities, but of particular interest to ward management is the ability to ask if, contrary to most policy, particular types of interaction tend to be carried out by certain grades (see Table 5.8 above).

7.4 OUTCOME MEASURES AND THEIR RELATION TO THE QUALPACS

7.4.1 Strengths and Weaknesses of the Outcome Measure

More details of the development of the outcome measurement and instructions for its use have been published separately (Higgins et al, 1992) but, in brief, it seems to have the following strengths and weaknesses.

Strengths

- Fast, easy and cheap to administer
- Easily computed scores
- Effective discrimination between wards and different aspects of care
- Results are simple to interpret

Weaknesses

- May be oversensitive to variations at a patient level and therefore need a large sample for statistically reliable estimates

- Criterial items are too easily satisfied. Having to adopt a 'no negative' approach to scoring undervalues all the positive observations.

7.4.2 Relations Between Outcome and Quality

The differences between wards on the 'no negative' outcome measures diverged in several crucial respects from that produced by the Qualpacs. A comparison of the outcome and Qualpacs section ratings (Figure 7.7) shows that for most wards there is much more variation between the eight outcome sections than between the five Qualpacs section ratings. The outcomes measure is not only the better discriminator, but produces more easily interpretable results.

Correlations between the eight outcome sections and the five Qualpacs sections (Table 7.5) show similarly low levels of inter-relatedness, once again indicating that the two instruments are either measuring different phenomena, or the same phenomena in different ways.

Figure 7.7A Outcome Measures - all wards

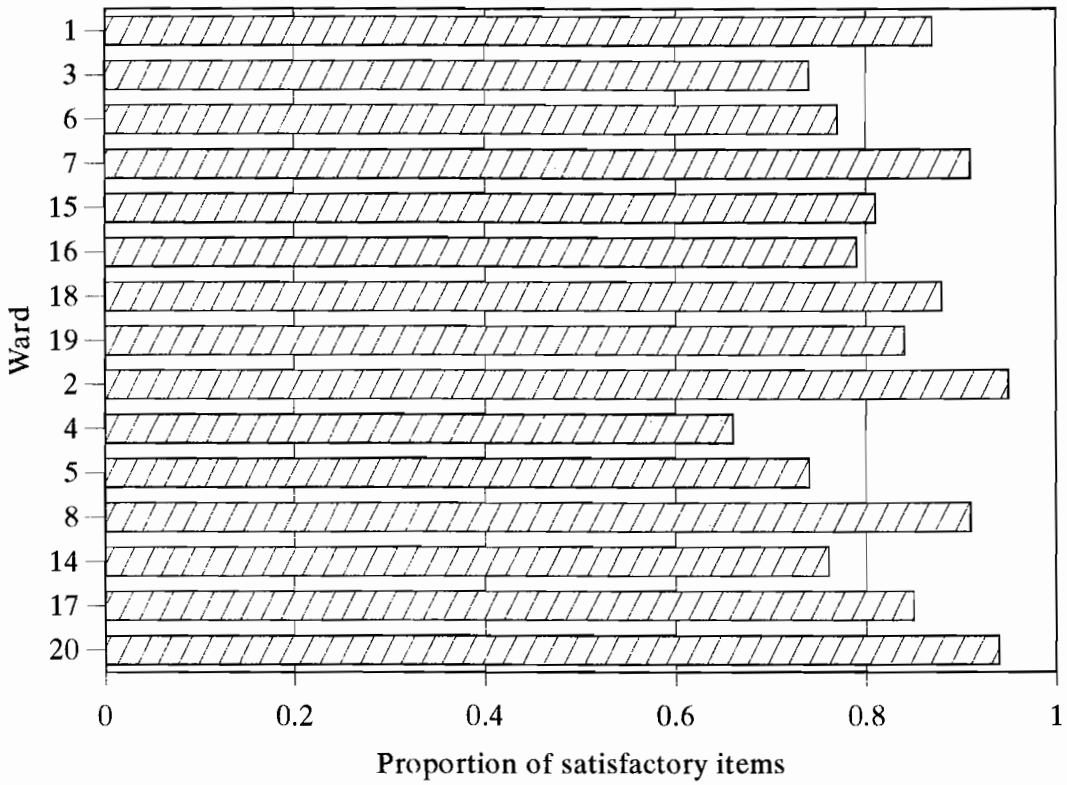


Figure 7.7B Overall Qualpacs Ratings - all wards

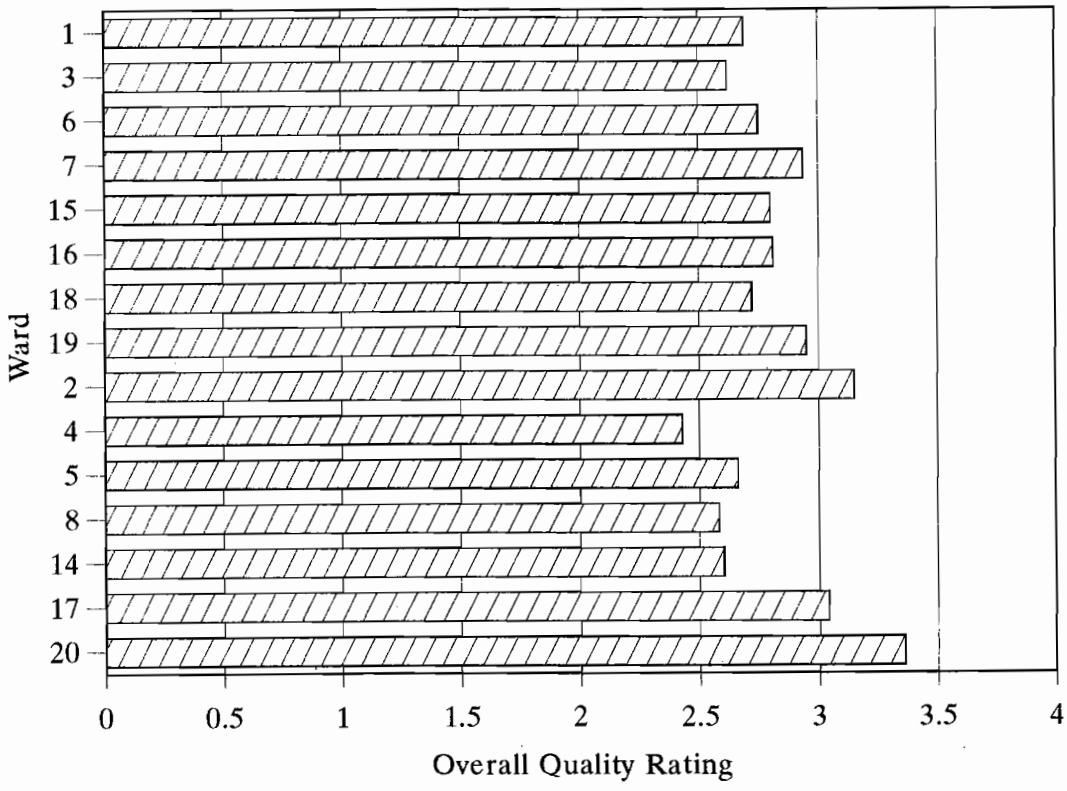


Table 7.5a Correlations Between the Eight Outcome Sections and Five Qualpacs Sections

	Qualpacs Sections				
Outcome Sections	Psycho-social (QP1)	Physical (QP2)	General (QP3)	Commun-ications (QP4)	Professional Implications (QP5)
Hygiene (1)	+.16	+.20	+.15	+.25	+.22
Nutrition (2)	+.08	+.13	+.11	+.14	+.24
Pressure sores (3)	+.11	+.08	+.07	+.10	+.05
Intravenous Therapy (4)	+.13	+.19	+.11	+.05	+.16
Discharge arrangement (5)	+.06	+.14	+.07	+.08	+.18
Pain Control (6)	+.24	+.25	+.17	+.21	+.25
Educ/rehab (7)	+.21	+.27	+.17	+.15	+.28
Elimination (8)	+.14	+.21	+.16	+.23	+.25

Significance Levels

The average correlations between each of the outcome measures and the five Qualpac sections are shown below.

Table 7.5b Average Correlations of Qualpacs Sections for Each Outcome Scale and of Outcome Scales for Each Qualpacs Section

OUTCOMES	1	2	3	4	5	6	7	88
Average Correlation	20	14	8	13	11	22	22	20
QUALPACS	1	2	3	4	5			
Average correlations	14	18	13	15	20			

The average correlations in Table 7.5a are highest for pain control, education/rehabilitation

(which also have seven of the 13 highest individual correlations) than for the areas which are fundamental to nursing. The low value for pressure sores probably occurs because the required action is not always likely to take place in the two hours of observations. Equally the high value for professional implications contrasts with the low value for "general". However, the main overall finding is the low values of the inter-correlations. The outcome scales and the Qualpac sections are clearly measuring different phenomena.

Moreover, there is a suggestion in the multivariate analysis that outcome can be treated as dependent on quality in a way which cannot be sustained for the reverse. This confirms the distinction drawn in Chapter 3 between the measurement of the quality of a process by Qualpac and the measurement of the end results of that process.

7.5 CONCLUSIONS

The two instruments used in the project are both capable of performing their basic function of discriminating between the quality of care on different wards. Both, however, need some refinement.

As far as the Qualpacs is concerned, quite simple changes to the layout of the form and the method of computation improve both the ease of data collection and the discriminatory power of the results. In particular, we recommend that the standard method of averaging is at the very least supplemented, if not replaced, by the percentage good-bad method described in Section 7.2.2.

A number of more radical modifications to the Qualpacs have been suggested within this Report but before embarking on these the user needs to be clear on the intended function of the instrument. Two possibilities have been considered. Firstly that Qualpacs should be used, as its devisers intended, as a general indicator of ward performance covering both direct observation and indirect observation of care. If so, there is a strong argument for improving the recording procedures and rating criteria for the indirectly observed items. However, there is the second possibility of treating Qualpacs as an instrument predominately or exclusively concerned with the direct observation of care. This can be done post hoc, by simply excluding all the indirect observations from the analysis, or by design which would include revising the instructions to observers. If taking this route, it is worthwhile adding to the range of data being collected, in particular, recording details of the types of interactions and the grades involved. This converts the Qualpacs into a powerful multipurpose instrument for skill mix and activity analysis. The data can be used to address questions such as: which grades perform different types of interaction; how well do individual grades perform; and what is the effect on both individual and overall performance of working in particular grade combinations.

The question of effectiveness is, however, wider than just the efficiency with which different grades perform. It also requires an assessment of whether what ought to be done has been done. The analysis in this report suggests that the 'outcome' measures are monitoring that aspect of nursing. Although the locally devised outcome measure was in part developed as just another measure of quality, the comparisons with Qualpacs ratings suggest that the attempt to develop something different from a process measure has succeeded. It was shown in Chapter 6 that variations in outcomes are dependent on a number of ward level variables

of which nursing quality was just one. By using the two measures simultaneously, it should therefore be possible to both isolate the specific effects of nursing and identify those factors which intervene between nursing and outcomes.

Potential users of this outcome measure can either adopt it in its present form (see Higgins et al (1992) for further details), or consider making minor modifications. Two types of change are worth considering. The first would strengthen its role as an outcome measure by removing the few remaining procedural elements or items which are based on observing nurses at work. For the same reason it would be desirable to minimise the use of nursing/patient records as a data source, since these are constructed as part of the nursing process. The second modification would be to make the criterial items more difficult to satisfy. Although 12 out of the 15 study wards rated below "satisfactory" on Qualpacs, in scoring the outcome instrument it was necessary to adopt an extreme form of "no-negative" procedure to get adequate discrimination. This makes a very strong argument for using stricter criterial items.

Finally, both of these instruments are standardised "top-down" methods, ie, they use externally generated criteria and are "imposed" by management. In some circumstances, they may be insufficiently sensitive to local conditions and staff attitudes. Obviously, if this type of monitoring is to be the basis for effective policy change it will need to be fully explained at all stages to the staff concerned.

CHAPTER 8

FINANCIAL IMPLICATIONS

The review in Chapter 2 showed that complex and often political issues are associated with the investigation of skill mix. However, the analysis in this study, focusing on the empirical relation between grade mix and effectiveness has established that there is an association which is robust at several different levels of analysis. The purpose of this chapter is to examine the financial implications of that result.

8.1 RELATING COSTS AND EFFECTIVENESS

The first step is to analyse the staffing costs of the wards. There are a number of ways of computing ward costs depending on whether one focuses on actual shift hours or the ward establishment, and on whether or not one includes learners in the calculation. The following analysis is based on annualised costs of the shift hours actually worked by all nursing staff, including learners using salaries and related employment overheads at April 1st 1990, but without enhancement for overtime, weekend working or London weighting. Further, in order to allow for the number of patients and their average dependency these costs have been standardised by workload (see Table 8.1).

Table 8.1 Ward Costs for Nursing Staff (1990 salaries)

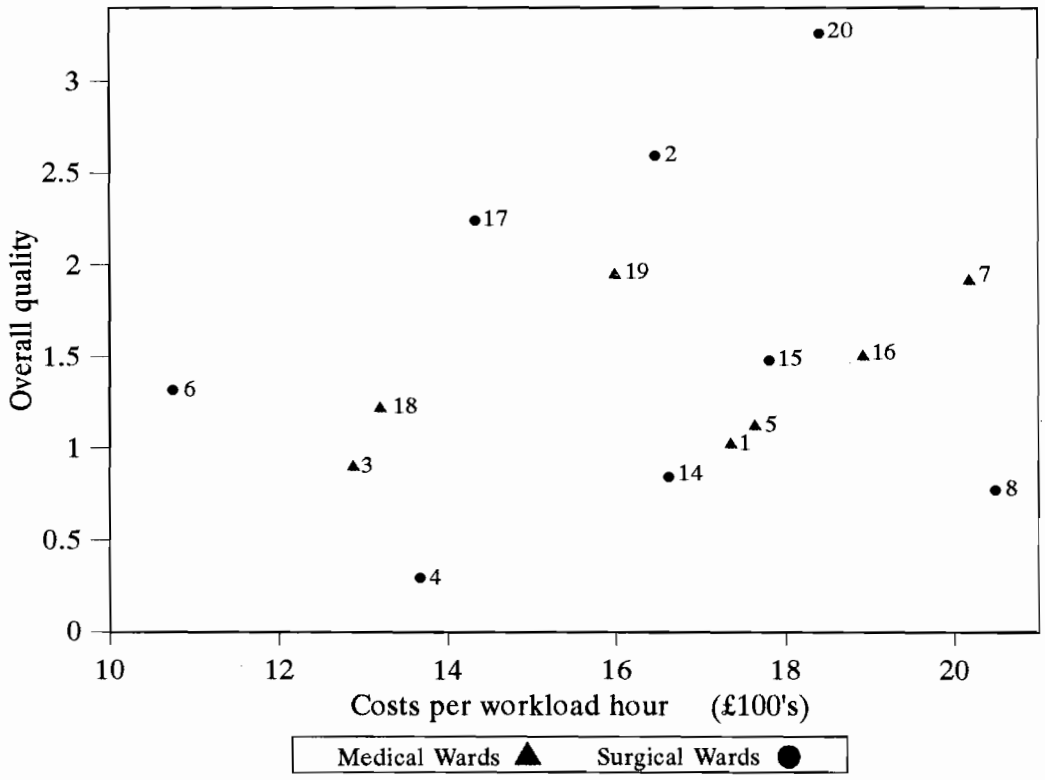
Ward	Annual Cost £	Average Workload Hours	Annual "Cost" per Workload Hour £
1	167,810	95	1,766
2	183,170	111	1,650
3	185,648	144	1,289
4	168,329	123	1,369
5	158,151	91	1,737
6	124,909	116	1,077
7	165,680	82	2,020
8	213,249	104	2,050
14	148,180	89	1,665
15	149,788	84	1,783
16	126,902	67	1,894
17	167,980	112	1,437
18	167,836	127	1,322
19	147,219	92	1,600
20	173,366	94	1,844

8.2.1 Relating Costs to Quality

The relationship between costs and the average overall quality of care is shown in Figure 8.1 Several interesting points can be made.

Three of the seven medical wards and one of the eight surgical wards had below average unit costs and quality of care for this sample. These four wards are the ones with the highest establishment of learners. The quality of care in Ward 18 was thought to be adversely affected by the high rate of sickness absence during the observation period. The performance of three of the surgical wards, 14, 8 and 5, and one of the medical wards might give cause for concern because higher quality might have been expected from the expenditure on staff.

Figure 8.1 "Costs" per Workload Hour v's Quality of Care



Two of the four primary nursing wards performed particularly well (17 and 19) and a third (Ward 20) produced the highest quality service with a relatively high expenditure on staff.

Two of the wards with near average scores for quality and for unit costs (15 and 16), were considered to be slightly over-staffed in relation to their workloads.

These costs per workload hour were correlated with overall Qualpacs Scores, bed occupancy and length of stay. Although the correlation coefficients were in the expected direction, they were not significant for a sample of 15 wards. The relationship for costs and overall quality of care was positive ($r = 0.32$), for bed occupancy it was negative ($r = -0.28$) because the staffing is usually set to total capacity; for length of stay it was again negative ($r = -0.14$) which is the expected cost relationship because higher costs are usually associated with the earlier stages of diagnosis and treatment.

As previously indicated, the unit costs on surgical wards were significantly higher than in medical wards corresponding to a higher proportion of staff on Grade D or above as shown in Table 8.2. At the same time we know that overall quality of care is positively correlated with length of stay ($r = 0.48$) as well as with the proportion of staff on Grade D or above, and is also related to the organisation of nursing care in the ward (i.e. primary nursing, team nursing or patient allocation).

Table 8.2 Differences in Costs Between Medical and Surgical Wards

	Medical	Surgical
Proportion Grade D or above	48%	59%
Cost per Workload hours (£'s)	1593	1682

When these complex interrelationships are taken into account, there is a clearer relation between cost and quality. First the partial correlation of cost with quality controlling for length of stay over all wards is 0.44. Second, the correlation between cost and quality in medical wards only is 0.67 (with 7 degrees of freedom, $p = 0.035$). In surgical wards, however, probably because the proportion of Grade D and above is already so high, correlation drops to 0.20.

Moreover, detailed examination of the surgical wards involved show that in those surgical wards performing poorly (wards 4, 8 and 14), there were low levels of further training and use of nurses skills. Thus a low percentage of staff reported further training (at most 28% compared to 42% or more in wards 2, 15, 17 and 20), and they were dissatisfied with their use of rehabilitative skills (15% or less reporting very good use compared to 36% or more in wards 2, 15, 17 and 20).

8.1.2 Relating Costs and Outcome

In contrast to the above results, costs per workload hour were related significantly with the proportion of outcomes achieved ($r=.48$, $p=.03$)). The main reason for the different behaviour

of the two effectiveness variables - the significant positive correlation between costs and outcomes, but the insignificant relationship between costs and quality - is the different nature of the two instruments.

Thus, the outcomes scores are dependent not only on the proportion of high grade staff but also on the amount of effort. An illustration of the difference between the quality and outcome measures is provided by ward 8, a relatively high cost surgical ward with the highest average dependency observed (3.25) and where field notes suggested that the nurses were working very hard but without feeling. Good outcomes can be achieved even if the process of care is not very satisfactory.

Of the five wards with the highest costs (wards 7, 8, 15, 16 and 20) three were among the top third in terms of outcomes (wards 7, 8 and 20) and the other two were in the middle third; of the five wards with the lowest costs (wards 3, 4, 6, 17 and 18), three were among the bottom third in terms of outcomes (wards 3, 4 and 6) and the other two were in the middle third.

The three wards furthest apart in ranking (ward 16 was third highest in costs, tenth in outcomes and sixth in quality; ward 2 was ninth in costs but top in outcomes and second in quality; and ward 18 was thirteenth in costs, fifth in outcomes and ninth in quality) were among the lowest third in terms of average dependency.

Table 8.3 Costs and Outcomes

Cost Per Workload Hour	Ward Number	Type	Average Dependency	Overall Outcomes
1077	6	M	2.74	77
1289	3	M	3.23	74
1322	18	M	2.56	88
1369	4	S	3.12	66
1437	17	S	2.68	85
1600	19	S	2.79	84
1650	2	S	2.44	95
1665	14	S	2.72	76
1737	5	S	2.63	74
1766	1	M	2.19	87
1783	15	S	2.04	81
1844	20	M	2.91	94
1894	16	M	2.41	79
2020	7	M	2.80	91
2050	8	S	3.25	91

8.1.3 Average Costs and Average Effectiveness

Another approach is to relate the cost implications of manpower changes to likely changes in effectiveness. The previous section has shown how the issue of costs refers to both the mix between qualified and unqualified staff and to the number of WTE nursing resources available. In terms of the mix between staff, the cost differences between grades can be related to the difference in quality of care achieved by them. Thus, the 1990 mid-point salary for learners was £6,920 whereas for grade F/G it was £15,462 (ie, a difference of £8,542 pa). This yields an average increment across grades of £1,705. This can then be compared with the estimated gain of 0.053 of a Qualpacs rating (see Appendix 5) obtained at the ratings level and 1.3% of outcomes at the session level. Given the small range of both Qualpacs and outcome scores this is quite substantial. A 15% increase in nursing costs (the average

increment of £1705 is approximately 15% of the mid point across the grades) can be compared with a change of 6% in the effective range of Qualpacs ratings. However, interpreting the outcome measures as more responsive to effort than to quality and given that £1705 is also approximately the average cost of an additional nursing hour, a 1% increase in nursing costs measured by adding on an extra hour can be compared with a change of 4% in the effective range of outcome ratings.

8.2 CONCLUSIONS

The review in Chapter 2 indicated that the issues associated with skill mix are complex and often highly political. As a result, great care is required when determining the combination of scarce, expensive skills which provide, at least cost, both high-quality care and the desired outcomes for patients. The exhaustive analysis in this study has shown that there is an association between grade and quality of care which is robust at several levels. Further, the analysis in Chapter 6 has demonstrated that a number of factors are related to the overall quality and outcome of care in addition to the proportion of staff in grades D or above. Moreover, the discussion in Chapter 7 has shown how the quality and outcome instruments are measuring different aspects of effectiveness so that one would expect the quality instruments to be more directly sensitive to skill mix variables whilst the outcome instruments should be more sensitive to the overall level of effort.

The overall conclusions therefore of this study are simple: investment in employing qualified staff, providing post qualification training and developing effective methods of organising nursing care appeared to pay dividends in the delivery of good quality patient care.

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Appendices

APPENDIX ONE

INSTRUMENTS FOR COLLECTING WARD DATA

APPENDIX ONE

INSTRUMENTS FOR COLLECTING WARD DATA

A wide range of other data has been collected in order to assess dependency levels (A1.1), activity levels (A1.2) and nursing experience and qualifications (A1.3).

DEPENDENCY FORM

TODAY'S DATE -

HOSPITAL NAME _____ WARD NAME _____

TIME:

Bed	Dependency	Extra mins	Operation	Return time	Bed	Dependency	Extra mins	Operation	Return time	Bed	Dependency	Extra mins	Operation	Return time
1					11					21				
2					12					22				
3					13					23				
4					14					24				
5					15					25				
6					16					26				
7					17					27				
8					18					28				
9					19					29				
10					20					30				
Day cases (extra time)										SICKNESS (in hours)				
Miscellaneous										ANNUAL LEAVE (in hours)				
Total extra time										STUDY LEAVE (in hours)				

Admission			
Discharge			
Pre op prep			
Pre med			
Transfers in			
Transfers out			
Escorts			

TOTAL DEPENDENCY: 1 =

2 = 3 = 4 =

TOTAL PATIENTS:

STAFF ON DUTY				
G	D	A	1st Y	A J
F	C	Clerk	2nd Y	Flexi
E	B	1st W	3rd Y	Bank

ACTIVITY ANALSYSIS FORM

HOSPITAL: DATE: RATER:

WARD: TIME: DAY OF WEEK:

Code	Grade	Clinical grade
SH SG SF	Sister	H G F
RF RE RD	R.G.N.	F E D
EE ED EC	ENS	E D C
L	Learner	
AB AA	Auxiliary	B A
OB OA	Orderly	B A
WC	Ward Clerk	

DIRECT CARE

01- Communication with patient or family
02- Nutrition
03- Patient hygeine
04- Elimination
05- Medication
06- Patient movement (non-therapeutic)
07- Positioning exercises (therapeutic)
08- Vital signs
09- Nursing procedures
10- Specimens
11- Patient escort
12- Admission/ discharge
13- Group tuition
14- Assist doctor
15- Assist non-nurse

INDIRECT CARE

16- Charting/ care plans
17- Ward report
18- Communication (specific PT)
19- Communication (relative)
20- Nurse tuition

ASSOCIATED WORK

21- Cleaning/ housekeeping
22- Clerical
23- Communicate-Unit
24- Errands off ward
25- Supplies-restock
26- Inservice training
27 Supervision AUX/Orderly

NON PRODUCTIVE

28- Personal
29- Unoccupied
30- Meal break
31- Private study

TIME	DAY	Obs. No.	Gr	Act	Gr	Act	Gr	Act	Gr	Act	Gr	Act	Gr	Act	Gr	Act	Gr	Act	Gr	Act	Gr	Act	Gr	Act	Gr	Act	Gr	Act	Gr	Act
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ACTIVITY ANALYSIS

DIRECT CARE

01 COMMUNICATION WITH PATIENT OR FAMILY

Giving support and reassurance to a patient

Teaching a patient

Explaining procedures and treatment to a patient

Demonstrations, for example, using a wheelchair

Showing a patient round the ward

Preparing a nursing care plan with a patient

02 NUTRITION

Cutting up food for a patient

Feeding a helpless patient

Encouraging a patient to drink

Feeding a patient via a gastric tube

Preparing special diets

Distributing food and drinks

Collecting and clearing meals

Distributing and collecting water jugs

03 PATIENT HYGIENE

Help a patient wash, bath or shower

Bed-bathing a patient

Caring for a patient's pressure areas

Supervising patients in the bathroom

Washing a patient

Shaving (facial) male patients

Cleaning an incontinent patient

Cleaning a patient's hair, nails and mouth

Stripping and making an occupied bed

Making a patient comfortable in bed

Tidying an occupied bed

04 ELIMINATION

Recording urinary output

Recording bowel function

Giving and removing bedpans

Recording drainage from a wound

Giving and removing vomit bowls

05 MEDICATION

Administering medication by mouth or injection

Administering medication by intra-venous route

Checking drugs

06 PATIENT MOVEMENT (non-therapeutic)

Escorting patient to another area of ward

Escorting ambulatory patient to toilet

07 POSITIONING EXERCISES (therapeutic)

Turning and re-positioning a patient

Placing a patient on an orthopaedic frame or bed

Helping porters to lift patients onto a trolley

Helping patients to exercise

Assisting a patient with active/passive movements

Assisting a patient to walk

Helping the patient to sit on the edge of the bed

Adjusting traction or other bed equipment

Moving a patient between bed and chair etc

Assisting a patient with breathing exercises

08 VITAL SIGNS

Weighing a patient

Measuring and recording a patient's blood pressure

Measuring and recording a patient's tpr

Measuring and recording neurological signs

Measuring and recording central venous pressure

Cardiac monitoring

09 NURSING PROCEDURES

Catheterising patients

Starting, maintaining and discontinuing oxygen

Starting, maintaining and discontinuing suction

Setting up or taking down traction

Application of braces

Padding casts

Treating pressure sores

Giving evacuant enemas

Irrigating the bladder, ostomies or douching

Re-dressing a wound using an aseptic technique

Re-dressing a wound

Inserting or removing a naso-gastric tube

Sterilising equipment

Preparing trolleys for nursing/medical procedures

Applying or removing anti-embolism stockings

Applying hot or cold packs

Assisting patient with an inhaler

Scrubbing-up for technical problems

Removing an intravenous cannula

10 SPECIMENS

Gathering and labelling specimens for the lab

Gathering specimens for testing on the ward

11 PATIENT ESCORT

Supervising patients moving wards

Escorting patients to theatre

Transferring a patient to another ward

Escorting patients to another area on the ward

12 ADMISSION/DISCHARGE

Admitting a patient to the ward

Discharging a patient from the ward

13 GROUP TUITION

14 ASSIST DOCTOR

Assisting doctors on a ward round

Assisting doctors with technical procedures

15 ASSIST NON-NURSE

Assisting other staff with procedures

INDIRECT CARE

16 CHARTING/CARE PLANS

Completing kardex or nursing records

Maintaining kardex or nursing records

17 WARD REPORT

Handing over to nurses on the next shift

18 COMMUNICATION (specific PT)

Contributing to team conferences about patients

Dealing with telephone messages about the patient

19 COMMUNICATION (relative)

Care conferences involving relatives

Meetings, individual members of family

20 NURSE TUITION

Teaching learners

Completing learners' reports

ASSOCIATED WORK

21 CLEANING/HOUSEKEEPING

Stripping, cleaning and making an empty bed

Cleaning equipment not in use

Cleaning and tidying store cupboards

Light cleaning and dusting

Tidying the ward

Changing curtains

Washing crockery and tidying the kitchen

Cleaning the bathroom or sluice

Sterilising crockery

Sluicing soiled items

Washing bandages and sheepskins

Disposing of soiled linen

Emptying bins and disposing rubbish

Moving beds, lockers and chairs

Care of flowers

Setting up for meals

22 CLERICAL

Making out duty rotas

Preparing menu lists

Completing daily bed returns

Delivering mail and flowers

Making out patients' identification bracelets

Dealing with deceased patient's belongings

General clerical duties

23 COMMUNICATE - UNIT

Dealing with administrative telephone calls

Borrowing or lending equipment or stores

24 ERRANDS OFF WARD

Delivering or collecting patient's notes/reports

Collecting drugs from pharmacy

Collecting blood from blood bank

25 SUPPLIES - RESTOCK

Checking and re-ordering routine ward supplies

Restocking emergency trolleys or trays

26 INSERVICE TRAINING

Showing new members of staff around the ward

Training new staff members

Staff development

27 SUPERVISION AUX/ORDERLY

Supervising the work of nursing auxilaries

NON PRODUCTIVE

28 PERSONAL

29 UNOCCUPIED

30 MEAL BREAK

31 PRIVATE STUDY

UNIVERSITY OF YORK
SKILL MIX AND NURSING CARE
QUESTIONNAIRE FOR NURSES

HOSPITAL:

SPECIALITY:

WARD:

We would be grateful if you could spare a few minutes to complete the following questionnaire. This will help us to identify the full range of nursing skills employed on your ward. We do not ask you to identify yourself by name, but of course any information that you do give will be treated confidentially.

PLEASE TICK THE APPROPRIATE RESPONSE

CURRENT POSITION
- ❑ SISTER/CHARGE NURSE
- ❑ DEPUTY SISTER/CHARGE NURSE
- ❑ SENIOR STAFF NURSE
- ❑ STAFF NURSE
- ❑ SENIOR ENROLLED NURSE
- ❑ ENROLLED NURSE
- ❑ AUXILIARY

YEAR 1st NURSING QUALIFICATION OBTAINED [ ]

DO YOU WORK: PART TIME FULL TIME

CURRENT GRADE HELD

A	B	C	D	E	F	G	H
❑	❑	❑	❑	❑	❑	❑	❑

If you are working as a Bank or Agency nurse on this ward, please indicate if you are also employed in a permanent post.

❑ YES ❑ NO

Please state your job title and grade:

NURSING QUALIFICATIONS HELD:

❑ EN ❑ RMN ❑ RGN ❑ RMHN ❑ RM ❑ HV Cert.
❑ DN Cert. ❑ Dip.N. ❑ O.N.C. ❑ R.S.C.N.

ENB COURSE (s) NO.(s) .....
.....
.....

OTHER:

STUDY DAYS/IN SERVICE TRAINING

Do you have the opportunity to attend study days regularly? ❑ YES ❑ NO

Please state the number of study days you have attended this year. [ ]

Have you attended study days on "the nursing process" ❑ YES ❑ NO

For nursing auxiliaries/assistants/health care assistants only:

Have you received any training at this hospital: ❑ YES ❑ NO

If yes, please say what form this training has taken.

HAVE YOU HAD A BREAK IN YOUR CAREER?

(a) to have children	❑ Yes	❑ No
(b) other reason	❑ Yes	❑ No
Did you undergo any formal training to help you update your skills and return to nursing?	❑ Yes	❑ No

WHAT WOULD YOU LIKE TO BE DOING IN A YEAR'S TIME?

Work in same speciality, same post/grade	❑ Yes	❑ No
Work in different speciality, same post/grade	❑ Yes	❑ No
Work in same speciality, higher post/grade	❑ Yes	❑ No
Work in different speciality, higher post/grade	❑ Yes	❑ No
Move into community nursing	❑ Yes	❑ No
Move into psychiatric nursing	❑ Yes	❑ No
Move into midwifery	❑ Yes	❑ No
Leave nursing	❑ Yes	❑ No
Stay at home	❑ Yes	❑ No
Other (please specify)	❑ Yes	❑ No

HAVE YOU ANY FUTURE CAREER PLANS?

Conversion course for Enrolled Nurses	❑ Yes	❑ No
RGN training	❑ Yes	❑ No
Promotion within clinical practice	❑ Yes	❑ No
Training for a particular speciality	❑ Yes	❑ No
Nurse teaching	❑ Yes	❑ No
Move into management	❑ Yes	❑ No
Community care	❑ Yes	❑ No
Other	❑ Yes	❑ No

EDUCATIONAL QUALIFICATIONS OBTAINED SINCE GCSE/O LEVELS

PLEASE TICK AS APPROPRIATE

❑ A Level ❑ Degree ❑ Higher Degree ❑ Bachelor of Nursing

❑ ONC/OND ❑ HNC/HND ❑ BTEC ❑ Other (please specify below)

PLEASE GIVE BRIEF DETAILS OF ANY WORK EXPERIENCE PRIOR TO COMMENCING NURSE TRAINING:

PREVIOUS NURSING EXPERIENCE

Have you always nursed within the United Kingdom? ❑ Yes ❑ No

If you have worked abroad, please answer the following:

Which countries have you worked in? .....

.....

.....

For how long have you worked abroad? .....

Do you feel that you acquired new skills from this experience? ❑ Yes ❑ No

If so, what are they? .....

Do you use these skills in your present employment? ❑ Yes ❑ No

In your present situation do you feel that good use is being made of your skills? (Please tick)

	Utilisation				
	very little use	*little use*	*some use use*	*good use*	*very good*
Basic nursing skills	❑	❑	❑	❑	❑
Rehabilitation skills	❑	❑	❑	❑	❑
Technical Nursing skills	❑	❑	❑	❑	❑
Management skills	❑	❑	❑	❑	❑
Teaching skills	❑	❑	❑	❑	❑
Communication skills	❑	❑	❑	❑	❑

Is there anything about your job that makes you really satisfied or gives you a feeling of accomplishment or achievement?

❑ Yes ❑ No

If yes, please say what it is

EXPERIENCE WITHIN THE U.K.

HIGHEST GRADE REACHED
(please tick)

Medical	❑	sister/ charge nurse	❑	senior staff nurse	❑	staff nurse	❑	enrolled nurse	❑ auxiliary nurse
Surgical	❑	sister/ charge nurse	❑	senior staff nurse	❑	staff nurse	❑	enrolled nurse	❑ auxiliary nurse
Paediatrics	❑	sister/ charge nurse	❑	senior staff nurse	❑	staff nurse	❑	enrolled nurse	❑ auxiliary nurse
Care of Elderly	❑	sister/ charge nurse	❑	senior staff nurse	❑	staff nurse	❑	enrolled nurse	❑ auxiliary nurse
ITU	❑	sister/ charge nurse	❑	senior staff nurse	❑	staff nurse	❑	enrolled nurse	❑ auxiliary nurse
Coronary care	❑	sister/ charge nurse	❑	senior staff nurse	❑	staff nurse	❑	enrolled nurse	❑ auxiliary nurse
Obstetrics and Gynae	❑	sister/ charge nurse	❑	senior staff nurse	❑	staff nurse	❑	enrolled nurse	❑ auxiliary nurse
Psychiatric	❑	sister/ charge nurse	❑	senior staff nurse	❑	staff nurse	❑	enrolled nurse	❑ auxiliary nurse
Mental Handicap	❑	sister/ charge nurse	❑	senior staff nurse	❑	staff nurse	❑	enrolled nurse	❑ auxiliary nurse
Community	❑	sister/ charge nurse	❑	senior staff nurse	❑	staff nurse	❑	enrolled nurse	❑ auxiliary nurse
Bank	❑	sister/ charge nurse	❑	senior staff nurse	❑	staff nurse	❑	enrolled nurse	❑ auxiliary nurse
Agency	❑	sister/ charge nurse	❑	senior staff nurse	❑	staff nurse	❑	enrolled nurse	❑ auxiliary nurse
Other	❑	sister/ charge nurse	❑	senior staff nurse	❑	staff nurse	❑	enrolled nurse	❑ auxiliary nurse

THANK YOU VERY MUCH FOR YOUR HELP WHICH IS GREATLY APPRECIATED

APPENDIX TWO

INSTRUMENTS FOR MEASURING EFFECTIVENESS

A2.1 Re-designed Qualpacs Form

QUALITY PATIENT CARE SCALE
INFORMATION FACE SHEET

Fill in for each session

WARD .....

Name _____ Type _____

Number of rooms _____ Number of beds _____

Number of patients _____

Dependency level of patients being assessed

Number of patients ☐

Dependency levels ☐

☐

Date: _____ Rater _____

Time of day _____ am/pm

Day of week_____

Additional notes or questions:

QUALITY PATIENT CARE SCALE
STAFF / INFORMATION FACE SHEET

STAFF ON DUTY

Grade of staff	Numnber	Clinical grades by number							
Sister/charge nurse		F		G		H		Other	
RGN		D		E		F		Other	
EN		C		D		E		Other	
Auxiliary		A		B				Other	
Learner									
Orderly		A		B					

Non-nursing staff by number	Ward clerk		Domestic		Other (state who)	

Other information:

PATIENT INFORMATION

Patient A	Patient B
Room (type)	Room (type)
Date of admission:	Date of admission:
Diagnosis on admission:	Diagnosis on admission
Current diagnosis:	Current diagnosis:
Condition of patient:	Condition of patient:

QUALPACS PATIENT CARE SCALE

Date _____ Rater _____

INTERACTIONS RECORD: AM/PM

NO:

TIME:

PSYCHOSOCIAL : INDIVIDUAL

Actions directed towards meeting psychosocial needs of individual patients.

		1	2	3	4	5	6	7	8	9	10	11
1. Patient receives nurse's full attention. #D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
2. Patient is given opportunity to explain his feelings. #D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
3. Patient is approached in a kind, gentle, and friendly manner. #D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
4. Patient's inappropriate behaviour is responded to in a therapeutic manner. #D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
5. Appropriate action is taken in response to anticipated or manifest patient anxiety or distress. #D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											

		1	2	3	4	5	6	7	8	9	10	11
6. Patient receives explanation and verbal reassurance when needed. #D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
7. Patient receives attention from nurse with neither becoming involved in a nontherapeutic way. #D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
8. Patient is given consideration as a member of a family and society. #D/*I	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
9. Patient receives attention for his spiritual needs. #D/*I	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
10. The rejecting or demanding patient continues to receive acceptance. #D/*I	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											

		1	2	3	4	5	6	7	8	9	10	11
11. Patient receives care that communicates worth and dignity of man. #D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
12. The healthy aspects of the patient's personality are utilized. #D/*I	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
13 .An atmosphere of trust, acceptance, and respect is created rather than one of power, prestige, and authority # D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
14. Appropriate topics for conversation are chosen. # D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
15. The unconscious or nonoriented patient is cared for with the same respectful manner as the conscious patient. # D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											

PHYSICAL

Actions directed towards meeting physical needs of patients.

		1	2	3	4	5	6	7	8	9	10	11
24. Nursing procedures are adapted to meet needs of individual patient for treatment. # D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
25. Patient's daily hygiene needs for cleanliness and acceptable appearance are met. # D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
26. Nursing procedures are utilized as media for communication and interaction with patient. # D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
27. Physical symptoms and physical changes are identified and appropriate action taken. # D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
28. Physical distress evidenced by the patient is responded to quickly and appropriately. # D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											

		1	2	3	4	5	6	7	8	9	10	11
29. Patient is encouraged to observe appropriate rest and exercise. # D/*I	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
30. Patient is encouraged to take adequate diet. # D/*I	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
31. Action is taken to meet the patient's needs for adequate hydration and elimination. # D/*I	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
32. Behavioural and physiological changes due to medications are observed and appropriate action taken. # D/*I	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
33. Expectations of patient's behaviour are adjusted and acted upon according to the effect the medication has on the patient. # D/*I	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											

		1	2	3	4	5	6	7	8	9	10	11
34. Medical asepsis is carried out in relation to patient's personal hygiene and immediate environment. # D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
35. Medical and surgical asepsis is carried out during treatments and special procedures. # D/*I	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
36. Environment is maintained that gives the patient a feeling of being safe and secure.. # D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
37. Safety measures are carried out to prevent patient from harming himself or others. #D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
38. Established techniques for safe administration of medications and parenteral fluids are carried out. #D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											

GENERAL

Actions that may be directed toward meeting either psychosocial or physical needs of the patient or both at the same time.

		1	2	3	4	5	6	7	8	9	10	11
39. Patient receives instruction an necessary. #D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
40. Patient and family are involved in planning for care and treatment. # D/*I	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
41. Patient's sensitivities and right to privacy are protected. # D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
42. Patient is helped to accept dependence/ independence as appropriate to his condition.# D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
43. Resources within the milieu are utilized to provide the patient with opportunities for problem solving. #D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											

		1	2	3	4	5	6	7	8	9	10	11
44. Patient is given freedom of choice in activities of daily living whenever possible and within patient's ability to make the choice. # D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
45. Patient is encouraged to take part In activities of daily living that will stimulate his potential for positive psychosocial growth and movement toward physical independence. # D*I	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
46. Activities are adapted to physical and mental capabilities of patient. # D/*I	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
47. Nursing care is adapted to patient's level and pace of development. # D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
48. Diversional and/or treatment activities are made available to the patient according to his capabilities and needs. # D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											

		1	2	3	4	5	6	7	8	9	10	11
49. Patient with slow or unskilled performance is accepted and encouraged. # D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
50. Nursing care goals are established and activities performed which recognize and support the therapist's plan of care. # D/*I	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
51. Interaction with the patient is within framework of the therapeutic plan. # D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
52. Close observation of the patient is carried out with minimal disturbance. # D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
53. Response to the patient is appropriate in emergency situations. # D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											

COMMUNICATION

Communication on behalf of the patient.

		1	2	3	4	5	6	7	8	9	10	11
54. Ideas, facts, feelings and concepts about the patient are communicated clearly in speech to medical and paramedical personnel. # D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
55. Family is provided with the opportunity for reciprocal communication with the nursing staff. # D/*I	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
56. Ideas, facts and concepts about the patient are clearly communicated in charting. *I	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
57. Well-developed nursing care plans are established and incorporated into nursing assignments. *I	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
58. Pertinent incidents of the patient's behaviour during interaction with staff are accurately reported. # D/*I	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											

		1	2	3	4	5	6	7	8	9	10	11
59. Staff participate in conferences concerning patient care. # D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
60. Effective communication and good relationships with other disciplines within the hospital are established for the patient's benefit. # D/*I	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
61. Patient's needs are met through the use of referrals, both to departments in the hospital and to other community agencies. # D/*I	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											

PROFESSIONAL IMPLICATIONS

Care given to patient reflects initiative and responsibility indicative of professional expectations.

		1	2	3	4	5	6	7	8	9	10	11
62. Decisions that are made by staff reflect knowledge of facts and good judgment. # D/*I	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
63. Evidence (spoken, behavioural, recorded) is given by staff of insight into deeper problems and needs of the patient. # D/*I	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
64. Changes in care and care plans reflect continuous evaluation of results of nursing care. # D/*I	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
65. Staff are reliable: follow through with responsibilities for the patient's care. # D/*I	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
66. Assigned staff keep informed of the patient's condition and whereabouts. # D	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											

		1	2	3	4	5	6	7	8	9	10	11
67. Care given the patient reflects flexibility in rules and regulations as indicated by individual patient needs. # D/*I	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											
68. Organization and management of nursing activities reflect due consideration for patient needs. # D/*I	Best care											
	Between											
	Average care											
	Between											
	Poorest care											
	Not applicable											
	Not observed											

A2.2 Outcome Measurement Instrument

OUTCOME MEASURES

Date: Time of day: Rater:

Patient Dependency Level:

Scoring system: All criteria will be scored by direct observation.
Exceptions occur only where criteria is cued. #D. *I. *A.
In such cases, please indicate method of observation by circling appropriate cue.
E.g. (#D) (*I)

1. Patient Hygiene:

Desired Outcome: Patients receive assistance when illness prevents them from carrying out aspects of their personal hygiene.

Criteria	Yes	No	Not observ.	Not applic.
a. General care is given and assistance offered with bathing and washing	1	2	3	4
b. Mouth care is given or offered at least twice a day. #D. *I	1	2	●	4
c. Provision is made for patient to wash hands after using bed pan.	1	2	●	4
d. Bed linen is clean, and patient is provided with change of clothing if soiled.	1	2	●	4
e. Patient's general appearance indicates hygeine needs are met.	1	2	●	4
f. Nails, hands and feet and skin are clean and hair is tidy.	1	2	●	4
g. Bedside environment is neat and orderly.	1	2	●	4

2. Patient nutrition and hydration

Deiried Outcome: Patients whose nutritional and fluid balance is at risk will be assessed and care implemented.

Criteria	Yes	No	Not observ.	Not applic.
a. Patient's mouth and tongue are clean and moist.	1	2	●	4
b. Patient is provided with fluid (including N.G. feeding).	1	2	●	4
c. Patient is encouraged to drink fluids between scheduled meal/coffee/tea times.	1	2	●	4
d. Intake of food and drink is monitored and recorded accurately where ordered. #D. *I.	1	2	●	4
e. Assistance is given with food and drinks when help is needed.	1	2	●	4
f. Food tray is checked before it is removed from the patient for amount of food consumed.	1	2	●	4

3. Pressure Sores/Skin Integrity

Desired Outcome: Skin care of patients who are at risk of skin breakdown reflects good nursing practice.

Criteria	Yes	No	Not observ.	Not applic.
a. The patient is repositioned at least every 4 hours. #D. *I.	1	2	●	4
b. A special mattress, elbow and/or heel protectors, and/or other devices are used to protect bony prominences and other sensitive areas of the body. *I. #D.	1	2	●	4
c. The bony prominences and other sensitive areas are inspected daily for reddened areas. #D. *I.	1	2	●	4
d. Nurse ensures patient's skin is not in direct contact with plastic sheet.	1	2	●	4
e. The bed linen is clean, dry and free from wrinkles and crumbs.	1	2	●	4
f. The patient's skin is clean and dry.	1	2	●	4

4. Intra-Venous Therapy

Desired Outcomes: Patient receives prescribed intra-venous fluid at correct rate of flow for prescribed period of time.

Criteria	Yes	No	Not observ.	Not applic.
a. IV fluid is checked to ensure that it is the one prescribed. #D. *I.	1	2	●	4
b. The rate of flow of the infusion is checked at least hourly to ensure it is appropriate for the prescription.	1	2	●	4
c. The patient's fluid input and output are recorded accurately. #D. *I.	1	2	●	4
d. Patients receiving blood transfusion will have TPR recorded, and general condition noted, hourly. #D. *I.	1	2	●	4
e. Site of intra-venous infusion is checked for signs of inflammation of vein or swelling of surrounding tissue at least every 4 hours. #D. *I.	1	2	3	4

5. Planning for Patient Discharge

Desired Outcome: The patient and/or family is provided with information and the necessary arrangements are made to ensure that his physical, psychological and social needs are met following discharge from hospital.

Criteria	Yes	No	Not observ.	Not applic.
a. Patient and family are given adequate notification of discharge to allow for preparations to be made. *I. *A.	1	2	●	4
b. Patient's home circumstances – and support likely to be available – is assessed at the earliest possible stage. *I.	1	2	●	4
c. When necessary, appropriate support services are notified of patient's discharge (e.g. Community nursing services, social worker, occupational therapist). *I. #D. *A.	1	2	●	4
d. Patient and/or family receives either verbal or written instructions regarding the period of convalescence and procedures to follow if problems arise. #D. *I. *A.	1	2	●	4
e. Patient and/or family is provided with written details of follow-up appointment. #D. *A.	1	2	●	4
f. Patient and/or family is given written instrructions of his prescribed medication, along with an indication of their possible side effects. #D. *A.	1	2	●	4
g. Patient is given the opportunity to ask questions and express any anxieties about discharge. #D. *A.	1	2	●	4

6. Pain Control

Desired Outcomes: Pain resulting from illness or surgery will be controlled or alleviated.

Criteria	Yes	No	Not observ.	Not applic.
a. Patient's need for analgesia is monitored. #D. *I.	1	2	●	4
b. Patient's reponse to analgesia is monitored. #D. *I.	1	2	●	4
c. Reassurance and support are offered to comfort patient and allay fear and anxiety. #D. *I.	1	2	●	4
d. Patient is assisted to change position.	1	2	●	4
e. Proper body alignment is maintained.	1	2	●	4
f. Therapies (other than drugs) are used if indicated – e.g. hot and cold applications, use of T.E.N.S., massage and relaxation techniques. #D. *I. (T.E.N.S. = transcutaneous electrical nerve stimulation)	1	2	●	4

7. Education/Rehabilitation

Desired Outcome: The patient will acquire sufficient knowledge to; (i) participate fully in his disease rehabilitation management while in hospital and; (ii) function as independently as possible when discharged from hospital.

Criteria	Yes	No	Not observ.	Not applic.
a. Patient's learning and educational needs are identified. This should include physical, psychological and social aspects of his care. *I. #D.	1	2	●	4
b. The teaching and rehabilitation programmes of the nurses are coordinated with those of other disciplines, when necessary, to ensure compatibility with procedures prescribed or treatments being given. #D. *I.	1	2	●	4
c. Patient and/or family indicate knowledge and understanding of his disease or operation performed. *I. *A.	1	2	●	4
d. Patient and/or family verbalizes the importance of taking prescribed medications or continuing with specific treatments whether in hospital or on discharge; e.g. (i) taking insulin (ii) hypertensive medications (iii) using inhalers (iv) changing ostomy bags. *A. *I.	1	2	●	4
e. The patient understands the rationale for rest, exercise or in the case of surgery, early ambulation. *I. *A.	1	2	●	4
f. The patient and/or family will recognise physical, psychological or social factors which may limit his lifestyle. *A. *I.	1	2	●	4

8. Elimination

Desired Outcome: The patient will achieve and maintain a pattern of elimination which ensures the adequate removal of waste products from the body.

Criteria	Yes	No	Not observ.	Not applic.
a. Bowel function is monitored and any problem identified acted upon (e.g. diarrhoea, constipation, or changes in stool appearance). #D. *I.	1	2	●	4
b. Bladder function is monitored and any problems identified are acted upon (e.g. incontinence, urinary retention or changes in urine appearance). #D. *I.	1	2	●	4
c. Feacal constipation is prevented through advice on diet, exercise and fluid intake and treated by the administration of laxatives, suppositories and enemata where prescibed. #D. *I.	1	2	●	4
d. Patient is given prompt assistance to use bedpan, commode or go to toilet when help is needed or requested.	1	2	●	4
e. The patient's privacy and dignity are maintained during elimination.	1	2	●	4
f. Patients with a colostomy, ileostomy, or ileal conduit are assisted and encouraged by nursing staff to care for the skin surrounding the stoma sites and to change stoma bags as necessary. #D. *I.	1	2	●	4
g. Intake and output of fluids are measured and recorded where this is prescribed (e.g. N/G drainage, Foley catheter, wound drains, heamorrhage). *I.	1	2	●	4
h. All drainage tubes, bags, tubes and bottles are correctly positioned to ensure maximum drainage and avoid stasis (e.g. catheters, wound drains, nasogastic tubes).	1	2	●	4
i. Drainage tubes are checked for patency to ensure drainage is taking place. #D. *I.	1	2	●	4

A2.3 Guidelines for Using Outcome Measures

Guidelines for Outcome Measures

The Outcome Measures cover 8 areas of nursing care. These are:

1. Patient Hygeine.
2. Patient Nutrition.
3. Pressure sores/Skin integrity.
4. Intra-venous Therapy.
5. Planning for patient discharge.
6. Pain control.
7. Education/Rehabilitation.
8. Elimination.

Each element specifies a desired outcome to be achieved and list approximately 6 criteria by which this can be measured.

Scoring system.

A simple system which applies to all outcome is used and this is essentially self-explanatory. e.g. Yes; No; Not applicable; or Not observed. It is important to note that only 2 criteria can be scored in the not observed column. To ensure accuracy of recording the other spaces in the "not observed" columns are blocked.

Any criteria that is not directly observed during the observation period can be elicited either by; (1) asking the patient or; (2) reviewing the records or care plan. These criteria are cued accordingly.

Example:

5D. Patient and/or family receives either verbal or written instructions regarding the period of convalesence and procedures to follow if problems arise. ǂD. *I. *A.

ǂD = Direct observation.

*I = Indirect _ chart or care plan.

*A = Ask patient.

Also, in such cases please indicate method of observation by circling appropriate cue/s. e.g. (ǂD.) (*A.)

There is one exception to the above guidelines and this is number 3A in "Pressure sore/Skin integrity" measurement.

3A. The patient is repositioned every 4 hours _ since this may not be observed within the two hour observation period, observors can obtain this information either by checking the patient at the end of the second QUALPAC observation period, or by checking the care plan.

Data collection.

1. The observors will score the "Outcomes" at the end of each "QUALPACS" observation period.
2. Unlike "QUALPACS" (where information from 2 patients is collected on one "QUALPAC" form) each patient observed will be scored individualy for "Patient Outcomes".
3. Again, as applies to "QUALPACS", patient records, care plans, charts (as well as patient input) will be reviewed for evidence that care has been given.

APPENDIX THREE

DATA COLLECTION PROCEDURES

APPENDIX THREE

DATA COLLECTION PROCEDURES

A3.1 SELECTION AND TRAINING OF NURSE OBSERVERS

Because of the amount of data to be collected it was decided that other observers would be required to assist in this process. For this purpose, an agreement was negotiated with Nurse Managers at the various sites to release four members of their nursing staff to act as observers (at a later date this was increased to six nurses). Given that observational methods are more vulnerable to human perceptual errors than virtually any other data collection procedure, certain criteria were laid down for their selection.

Where possible, staff observers were chosen according to the following criteria:

* Clinically active in order to understand the stress that nurses sometimes work under.

* Have adequate clinical experience in order to evaluate the care given by their colleagues. It was requested that those chosen be Grade E or above.

* Be willing participants.

Although these criteria were not met in every case this problem was overcome by training the observers and carrying out inter-observer reliability tests on data collected during the practice sessions.

A3.2 THE TRAINING PROGRAMME

When several observers are collecting research data, even when the techniques are robust, in order to ensure that accuracy is maximised and biases are minimised, the training of observers is crucial. The main concern in organising the training schedule, therefore, was to ensure that ample time was allowed for the hospital nurse observers to obtain sufficient practice in using the instruments.

Consequently, certain procedures were followed at each site.

1 The nurse observers were familiarised with the aims and objectives of the study.

2 The observers were trained in the application of the instruments. This included training (at least) four observers in the use of Qualpacs and the Outcome Measures and (at least) two observers in carrying out Activity Sampling (see Appendices in the Interim Report (Carr-Hill et al, 1991) for the training details and schedules).

3 Each observer had four practice sessions to allow them time to become accustomed to gathering and recording the necessary information on the Qualpacs and Outcome Measure 'Forms'. For the first two practice sessions one Research Fellow worked with a pair of 'hospital observers'. During a subsequent practice session the 'hospital observers' worked in pairs, this time without the presence of members of the Research Team. Following these three sessions inter-observer reliability tests were carried out.

Apart from one person at one site, inter-observer reliability testing showed no significant

difference between raters. In the one case where a difference was noted this nurse was dropped from the study. This 'slot' was filled by one of the Research Team. To complete the training session, and after a 'feedback and discussion' period, the hospital observers had one last (solo) practice session before commencing the actual data collection phase of the project.

4 Observers were advised about what was expected of them in their role of non-participant observer and reminded of the importance of maintaining confidentiality.

A3.3 DATA COLLECTION

At each site, data were collected simultaneously on the two wards following pre-determined guidelines (see below for typical schedule). The collection took place over a six day period (on each ward, at each site). Again to give sufficient coverage of both high and low periods of activity on the wards data collection followed a similar pattern to that outlined in the second pilot study, i.e. observation sessions during the period of 5.30 am to midnight and included two weekend days; each day was divided into sessions of six hours, allowing for two, 2 hour periods of direct observation and one hour of indirect observation (one half hour prior to and one half hour following the direct observation period). The indirect observation period was spent listening to and evaluating verbal reports from nurses or studying and assessing nursing records.

Apart from such considerations as coverage, the above timetable was so designed to meet the demands of the Qualpacs instrument. Given that an assessment of quality in relation to skill mix was the pivot on which the other variables turned, this had to be the central focus of the

data collection. Consequently, collection of other relevant data was built around this schedule.

The procedure for the collection of other relevant data, at each site, was as follows:

1 Information on the Outcome Measurement was gathered by the nurse observers at the same time as they were using the Qualpacs instrument.

2 Activity Sampling was carried out at the same time as the Qualpacs observation session (for three days on each ward) by other nurse observers trained in Activity Sampling procedures. On some occasions, when coverage was not available, Activity Sampling was carried out by members of the research team.

3 Data for Patient Dependency Levels (and other workload factors) were collected at 9.00 pm on each ward (for the six days of the study, at each site). As had already been decided, some of this information had to be determined and recorded retrospectively in order to allow accurate comparisons of data. At one site, where the nurse observers were exceptionally well qualified and willing, these data were collected by the nurse observers. At the other four sites, where the nurse observers had reservations about collecting these data, they were collected by the Research Team.

4 The Self-completion Staff Questionnaire was distributed to all members of the nursing staff on each ward. These were completed and returned to the Research Team before they left the site.

5 Interviews with the ward sister (and deputy/ies) for collection of the information on the TNFI (Kitson, 1984) were pre-arranged and lasted approximately one hour. In each instance this interview was conducted by one of the Research Team.

6 On most wards The Ward Profile was distributed to the Senior Ward Sister during the training week of the study. Since this is a rather detailed instrument it was felt this would allow ample time for its completion.

A3.4 RECORDING OF OBSERVATIONS

Given the focus of the project on skill mix in nursing, staff had to be identified by clinical grade on the 'Qualpacs', Activity Sampling and the Dependency Level Forms. To facilitate this process all ward staff were issued with colour coded identity badges. To give an example of how this coding system functioned, a Registered Nurse with Grade E status would be coded RE or, alternatively, an Enrolled Nurse with a grade C status would be coded EC. An identity number was then added to this code. This identity number was simply used to assist the nurse observers to locate staff when carrying out the Activity Analysis. To ensure anonymity and confidentiality, staff were not identified by name.

A typical timetable for data collection is attached as Figure 3.1A

	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
MORNING	A 7.30am - 10.30am 7.30am - 8.00am Collect Information Start Observation 8.00am - 10.00am	A 7.00am - 10.30am 7.00am - 7.30am Do dependency levels 7.30am - 8.00am Collect Information Start Observation 8.00am - 10.00am	A 6.00am - 9.30am 6.00am - 6.30 am Collect Information 6.30am - 8.30am Observation 9.00am - 9.30am Do dependency levels		B 7.00am - 10.30am 7.00am - 7.30am Do dependency levels 7.30am - 8.00am Collect Information 8.00am - 10.00am Observation	B 7.00am - 10.30am 7.00am - 7.30am Do dependency levels 7.30am - 8.00am Collect Information 8.00am - 10.00am Observation	B 6.00am - 9.30am 6.00am - 6.30am Collect Information 6.30am - 8.30am Observation 9.00am - 9.30am Do dependency levels
		BREAK		BREAK		BREAK	
	11.30am - 2.30pm 11.30am - 12.00 Collect Information Start Observation 12.00 - 2.00pm	11.30am - 2.30pm 11.30am - 12.00 Collect Information Start Observation 12.00 - 2.00pm	10.00am - 1.00pm 10.00am - 10.30am Collect Information 10.30am - 12.30pm Observation		11.30am - 2.30pm 11.30am - 12.00 Collect Information 12.00 - 2.00pm Observation	11.30am - 2.30pm 11.30am - 12.00 Collect Information 12.00 - 2.00pm Observation	10.00am - 1.00pm 10.00am - 10.30am Collect Information 10.30am - 12.30pm Observation
AFTERNOON	B	B	B 12.30pm - 3.30pm 12.30pm - 1.00pm Collect Information 1.00pm - 3.00pm Observation		A	A	A 12.30pm - 3.30pm 12.30pm - 1.00pm Collect Information 1.00pm - 3.00pm Observation
		BREAK		BREAK		BREAK	
	3.30pm - 6.30pm 3.30pm - 4.00pm Collect Information 4.00pm - 6.00pm Start Observation		4.30pm - 8.00pm 4.30pm - 5.00pm Collect Information 5.00pm - 7.00pm Observation 7.30pm - 8.00pm Do dependency levels		3.30pm - 6.30pm 3.30pm - 4.00pm Collect Information 4.00pm - 6.00pm Observation		4.30pm - 8.00pm 4.30pm - 5.00pm Collect Information 5.00pm - 7.00pm Observation 7.30pm - 8.00pm Do dependency levels
EVENING	7.00pm - 10.30pm 7.00pm - 7.30pm Do dependency levels 7.30pm - 8.00pm Collect Information 8.00pm - 10.00pm Start Observation	3.30pm - 7.00pm 3.30pm - 4.00pm Collect Information 4.00pm - 6.00pm Observation 6.30pm - 7.00pm Do dependency levels			7.00pm - 10.30pm 7.00pm - 7.30pm Do dependency levels 7.30pm - 8.00pm Collect Information 8.00pm - 10.00pm OBSERVATION	3.30pm - 7.00pm 3.30pm - 4.00pm Collect Information 4.00pm - 6.00pm Observation 6.30pm - 7.00pm Do dependency levels	
		BREAK		BREAK		BREAK	
		8.00pm - 11.00pm 8.00pm - 8.30pm Collect Information 8.30pm - 10.30pm Observation				8.00pm - 11.00pm 8.00pm - 8.30pm Collect Information 8.30pm - 10.30pm Observation	

Figure 3.1A Timetable for Data Collection

by Hospital Researchers

Ward 1				Ward 2		
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
A & B On Wards 7.00am 1. Collect Dependency levels. 2. Check all staff ID's & staff numbers 8.00am - 10.00am Do activity analysis	A On Wards 7.00am 1. Collect Dependency levels. 2. Check all staff ID's & staff numbers 8.00am - 10.00am Do activity analysis	A On Wards 6.00am 1. Check staffing and ID's. 6.30am - 8.30am Activity analysis. 8.30am Collect dependency levels.		A & B On Wards 7.00am 1. Collect Dependency levels. 2. Check all staff ID's & staff numbers 8.00am - 10.00am Do activity analysis	B On Wards 7.00am 1. Collect Dependency levels. 2. Check all staff ID's & staff numbers 8.00am - 10.00am Do activity analysis	B On Wards 6.00am 1. Check staffing and ID's. 6.30am - 8.30am Activity analysis. 8.30am Collect dependency levels.
	BREAK		BREAK		BREAK	
11.30am Recheck staffing and ID's. 12.00 - 2.00pm Do activity analysis	11.30am - 12 noon Recheck staffing and ID's. 12.00 - 2.00pm Activity analysis.	10.00am Recheck staffing levels and ID's. 10.30am - 12.30pm. Activity analysis.		11.30am - 12.00 Check staffing and ID's. 12.00 - 2.00pm Activity analysis.	11.30am - 12.00 Recheck staffing and ID's. 12.00 - 2.00pm Activity analysis.	10.00am - 10.30am Recheck staffing levels and ID's. 10.30am - 12.30pm Activity analysis.
B 3.30pm - 4.00pm Check staffing and staff ID's. 4.00pm - 6.00pm Activity analysis.	B 4.00pm -4.30pm Check staffing and staff ID's. 4.00pm - 6.00pm Activity analysis.	B 12.30pm - 1.00pm Check staffing and staff ID's. 1.00pm - 3.00pm Activity analysis.		A 3.30pm - 4.00pm Check staffing and staff ID's. 4.00pm - 6.00pm Activity analysis.	A 3.30pm - 4.00pm Check staffing and staff ID's. 4.00pm - 6.00pm Activity analysis.	A 12.30pm - 1.00pm Check staffing and staff ID's. 1.00pm - 3.00pm Activity analysis.
	BREAK		BREAK		BREAK	
7.00pm - 8.00pm 1. Recheck staffing. 2. Do dependency levels. 8.00pm - 10.00pm Do activity analysis	7.30pm - 8.30pm 1. Do dependency levels. 2. Recheck staff. 8.30pm - 10.30pm Activity analysis.	4.30pm - 5.00pm 1. Check staffing and ID's 5.00 - 7.00pm Activity analysis. 7.00pm - 7.30pm Do dependency levels		7.00pm - 8.00pm 1. Dependency levels 2. Recheck staffing and ID's 8.00pm - 10.00pm Do activity analysis	7.30pm - 8.30pm 1. Dependency levels 2. Recheck staffing and ID's 8.30pm - 10.30pm Activity analysis.	4.30pm - 5.00pm 1. Check staffing and ID's 5.00 - 7.00pm Activity analysis. 7.00pm - 7.30pm Do dependency levels

Figure 3.1B Timetable for Data Collection

by Research Staff

APPENDIX FOUR

ACTIVITY ANALYSIS DATA

APPENDIX FOUR

ACTIVITY ANALYSIS DATA

Activity data were collected in the fifteen wards. Thirty one categories of activity were coded (see Appendix 1.2) which have been grouped into four broad categories of care: direct care, indirect care, associated care and non-productive time. These data can be assessed in two different ways.

1 The proportion of each category of care delivered by each grade of staff can be calculated. This indicates the quality of the 'mix' delivered to the patient. The corresponding data are presented in Tables A4.1 to A4.5.

2 The proportion of the time available from each grade which is spent on the four categories of care can be calculated. These distributions in principle, indicate the 'efficiency' with which grade of staff is being used in their nursing role. Previous research (Ball et al, 1984) found that the average distribution of nurses' time to be Direct Care 52%; Indirect Care 24%; Associated Work 14% and Non-Productive time 10%.

The two sets of data complement each other in the sense that the effectiveness of a high grade 'mix' in the delivery of Direct Care depends on how much time overall is spend on Direct Care; and the effectiveness of higher grade staff spending a larger proportion of time on Direct Care depends on the relative numbers of each grade on the ward.

With so many possible variables, there are a large number of possible correlations to examine. The main text focuses on direct care and non-productive time. There are also suggestions that the proportion of time spent by F & G grades on indirect care - organising the care of others? - is associated with better quality whilst in wards where they spend more time on associated care, quality is lower.

Table A4.1 Percentage of Time Spend on Direct Care by Grade of Staff (as a Percentage of all Direct Care Delivered on Ward)

Ward	F&G	E	D	% Given by D, E F & G Grades	C	A	L	% Given by C, A/B & Learners
1	14	5	24	43	9	17	31	57
2	7	10	39	56	10	15	19	44
3	15	5	17	37	15	8	40	63
4	26	13	13	52	9	15	24	48
5	6	17	32	55	27	18	-	45
6	7	15	12	34	-	9	57	66
7	17	11	27	55	12	16	17	45
8	15	15	12	42	46	12	-	58
14	7	21	7	35	5	22	38	65
15	15	6	12	33	22	25	20	67
16	7	27	36	70	-	18	12	30
17	-	28	34	62	4	6	28	38
18	10	17	17	44	18	11	27	56
19	4	18	36	58	22	7	13	42
20	10	29	25	64	2	34	-	36

Table A4.2 Percentage of Time Spent on Direct Care by Grade of Staff (as a Percentage of each grades Overall Time on Ward)

Ward	F&G	E	D	C	A	L
1	45	40	49	36	44	66
2	39	52	64	65	60	59
3	52	38	51	60	54	49
4	46	48	44	42	57	67
5	41	41	50	65	50	-
6	74	41	43	-	48	50
7	45	69	52	43	52	52
8	53	64	51	65	51	-
14	41	52	38	57	57	59
15	49	30	58	61	63	57
16	20	37	42	-	60	48
17	-	56	69	*	64	65
18	49	49	63	66	65	48
19	*	51	68	63	56	41
20	61	57	58	*	67	-

* Not enough cases

Table A4.3 Percentage of Time Spent on Indirect Care by Grade of staff (as a Percentage of each Grades Overall Time on Ward)

Ward	F&G	E	D	C	A	L
1	28	33	19	21	15	16
2	31	27	17	14	7	16
3	22	29	26	11	11	19
4	24	13	19	26	9	16
5	37	38	16	10	12	-
6	24	34	34	-	12	21
7	31	12	14	24	7	4
8	26	21	23	16	12	-
14	33	29	38	38	14	25
15	41	50	24	18	18	26
16	28	26	28	-	4	31
17	-	25	21	*	15	17
18	29	28	24	18	7	25
19	*	21	17	14	15	21
20	15	24	30	*	13	-

* Not enough cases

Table A4.4 Percentage of Time Spent on Associated Work by Grade of staff (as a Percentage of each Grade's Overall Time on Ward)

Ward	F&G	E	D	C	A	L
1	23	21	16	15	17	9
2	13	16	9	13	17	8
3	17	16	12	15	18	12
4	20	6	9	8	11	7
5	22	12	20	17	29	-
6	3	9	6	-	28	14
7	11	8	13	9	22	18
8	12	6	10	7	15	-
14	23	13	5	5	19	6
15	8	2	9	3	18	7
16	35	19	14	-	17	11
17	1	7	4	*	10	7
18	14	13	7	6	21	13
19	*	21	9	11	15	18
20	20	5	3	*	9	-

* Not enough cases

Table A4.5 Percentage of Non-Productive Time by Grade of Staff (as a Percentage of Each Grade's Overall Time on Ward)

Ward	F&G	E	D	C	A	L
1	4	6	16	28	25	9
2	17	5	10	8	16	16
3	9	16	11	13	16	20
4	10	33	28	25	23	10
5	0	9	14	8	9	-
6	0	16	17	-	12	16
7	13	11	21	24	19	26
8	9	9	16	12	22	-
14	4	6	19	0	11	11
15	4	18	10	5	16	10
16	18	18	16	-	19	10
17	-	12	6	*	10	11
18	7	10	6	10	7	14
19	*	6	6	12	15	20
20	4	13	8	*	11	-

* Not enough cases

APPENDIX FIVE

SEPARATING THE EFFECTS OF GRADE AND WARD ON EFFECTIVENESS

APPENDIX FIVE

SEPARATING THE EFFECTS OF GRADE AND WARD ON EFFECTIVENESS

A5.1 INTRODUCTION

The analyses in Chapter Five showed how there is a strong association between grade of staff and quality of care at each level of analysis; however, given that there are equally sharp variations in the proportion of trained staff between wards, and that these variations are associated with the ward average quality (see Table 6.1 in Chapter 6), the question arises as to whether the 'grade effects' discussed and dissected in Chapter 5 (whether on quality or outcome) are not an artefact of the data.

Superficially, the breakdowns by ward (Table A5.1) suggest that the effect for quality of care remains: but questions such as these can only properly be answered within a multivariate framework where multi-collinearities and overlapping effects can be analysed. The dependent variables for the analysis are

- overall average quality or average quality in each of the five sections

- (at the Qualpac and Ward Levels only) overall proportion of outcome items achieved or whether or not outcome achieved along each of the eight dimensions.

Table A5.1 Overall Quality of Care by Grade of Staff Aggregated over all Sessions at Ward Level

Wards	1	2	3	4	5	6	7	8	14	15	16	17	18	19	20
Grade															
F & G	3.16	3.26	2.81	2.41	3.12	3.22	3.23	2.68	2.81	3.01	3.08	-	2.93	3.34	3.71
E	2.54	3.16	2.59	2.38	2.56	2.68	3.27	2.59	2.41	3.19	2.89	3.10	2.89	2.89	3.27
D	2.63	3.22	2.63	2.28	2.91	2.97	3.03	2.52	2.90	3.21	2.77	3.17	2.91	2.99	3.33
C	2.57	2.87	2.76	2.49	2.50	-	2.97	2.67	2.83	2.75	2.51	2.86	2.65	3.08	3.58
A & B	2.73	3.14	2.54	2.37	2.62	2.50	2.60	2.45	2.58	2.73	2.63	3.01	2.49	2.86	3.15
Learners	2.77	3.20	2.62	2.60	-	2.62	2.83	-	2.71	2.77	2.95	2.88	2.42	2.91	-
All Grades	2.69	3.15	2.62	2.43	2.66	2.75	2.94	2.58	2.60	2.80	2.81	3.04	2.72	2.95	3.86
F Test for Linearity	6.35	1.61	11.49	36.00	39.18	197.00	207.6	18.0	3.7	45.4	3.3	37.5	143.5	11.37	131.9
Probability Level	.0118	.205	.0007	.0000	.0000	.0000	.0000	.0000	0.545	.0000	.07	.0000	.0000	.0008	.0000

The basic independent variables for this analysis are:

- the ward, a fifteen category factor[1]

- the grade or indicator of grademix of staff

- dependency level of patients

A5.2 RATINGS LEVEL

The analysis here is a little different because each rating belongs to a specific Qualpac section and so, the section number has to be treated as an independent influencing factor (or the analysis has to be run separately for each subset of data). In fact, the results are quite similar and so, only the simpler results are presented (Table A5.2a).

At this level, not only are there separate main effects for the 'grade' and 'ward' variables but there is also an identifiable distinct effect for the joint effect of grade and ward.

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[1] In analyses reported earlier, the basic unit of analyses was taken to be the hospital and type of ward. As there did not appear to be a consistent difference between medical and surgical wards across the seven hospitals, the above approach is preferred.

Table A5.2a Analysis of Variance at Ratings level

	Sum of Squares	Degree of Freedom	Mean Square	F	Sig
Within and Residual	18863	38485	0.49		
Qualpac Section	53	4	13.3	27	.000
Grade	92	1	92.3	188	.000
Ward	811	14	57.9	118	.000
Grade by Qualpac Section	9	4	2.4	5	.000
Grade by Ward	241	14	17.2	35	.000

Concentrating only on the grade effect, it can be seen that not only are there wide variations in the coefficients between wards (Table A5.2b) but also that there is no systematic difference between medical and surgical wards in the same hospital (in three of the seven hospitals where both wards were studied the medical ward was better; and in four the surgical ward was better). However, one can say that hospital 2 has a systematic negative effect and hospital 7 a systematic positive effect.

Table A5.2b Main Effects of Grade and Ward and Interactions

Main Effect for Grade = -0.053

Ward Number		WARD	
		Main Effect of Ward	Interaction with Grade
1	M	-.20	+.025
2	S	+.22	+0.038
3	M	-.23	+.021
4	S	-.69	+.088
5	S	-.09	-.022
6	M	+.11	-.036
7	M	+.38	-.061
8	S	-.31	+.016
14	S	-.40	+.065
15	M	+.17	-.030
16	M	-.11	+.021
17	S	+.30	-.019
18	M	+.18	-.078
19	M	+.08	+.019
20	S	+.59	-.046

A5.3 INTERACTION LEVELS

At the interaction level, the analysis in the main text distinguished between those interactions involving only one grade (where there is no skill mix story to be told) and those interactions with two or more grades. There is a similar division in the analysis here.

In each of the analyses, there is a main effect for ward (A5.3). In general, the main or predominant grade also has a significant effect upon quality; whilst the dependency level only occasionally has a significant effect. There is also a suggestion that the ward effect is most important for the third (General Care) and fifth (Professional Implications) sections of Qualpacs and the main grade effect is most important for the fourth section (Communication on behalf of the patient).

A5.4 QUALPACS LEVELS

The analysis at the Qualpacs level is reported in Table A5.4. The dependency level variable was never significant and so has been omitted from the analysis. Once again, there is always a ward main effect which appears to be stronger with the second (Physical Care) and fifth (Professional Implication) sections of Qualpacs. The main grade variable was not always significant with overall quality and the first Qualpacs section. As an alternative, the proportion of grade C and above was entered in the analysis and this proved to be significant with the third and fifth Qualpacs sections.

A5.5 ANALYSIS OF OUTCOME DATA

At the Qualpac level, it is also possible to use the 'outcome' data as the dependent. They can be treated either as a surrogate of the quality of care or as depending upon the quality of care.

Table A5.3 Analysis of Variance at Interaction Level: Mean square attributable to each Main Effect

a) All Interactions	Independent Variable			
	Ward	Dependency Level	Main Grade	Within and Residual
Overall quality	9.6++	1.2++	1.0+	0.25
Psychosocial	7.8++	1.5	46.4+	0.77
Physical	5.1++	0.8	22.4+	1.28
General	28.2++	15.5++	4.8	1.78
Communications	9.7++	3.8+	356.3++	1.42
Prof. implications	69.0++	7.3+	125.5+	1.70
b) More than One Grade				
	Ward	Dependency Level	Main Grade	Within and Residual
Overall quality	3.8++	0.3	0.1	0.22
Psychosocial	4.8++	1.4	9.1+	0.51
Physical	5.2++	1.3	1.6	0.98
General	7.6+	2.2	0.5	1.57
Communications	5.7++	1.4	21.8++	1.6
Prof. implications	29.0++	5.9+	2.7	1.7
c) One Grade Only				
Overall quality	4.3++	0.9+	8.9++	0.26
Psychosocial	4.4++	1.0	2.9+	0.53
Physical	5.5++	0.3	0.01	1.23
General	30.2++	8.5++	0.5	1.79
Communications	5.3++	2.2	19.5++	1.06
Prof. implications	51.6+	4.6+	7.6	1.54

Key

+ $p \leq 5\%$
++ $p \leq 50\%$

Table A5.4 Analysis at Qualpac Level

	Ward	Higher Grade	Main Grade	Within and Residual
Overall quality	2.33++	0.44+		0.08
Psychosocial	2.92++	0.45+		0.09
Physical	3.30++	0.58+	(0.35+)	0.14
General	2.44++	-	0.34+	0.14
Communications	2.67++	-	0.52	0.25
Prof. implications	3.70++	-	0.50+	0.22

Key
+ $p \leq 5\%$
++ $p \leq 10\%$

A5.6 TREATING THE OUTCOME MEASURE AS A SURROGATE FOR QUALITY

There is always a ward main effect which appears to be stronger with the seventh and eighth outcome measures (Table A5.5). The dependency level variable was never significant. The main grade variable as such was not significant but the proportion of grade C and above was significant with the overall proportion of outcomes achieved and with the fifth and eighth outcome dimensions.

A5.7 INCLUDING THE QUALITY INDICATORS AS PREDICTORS OF OUTCOMES

It is equally, or perhaps even more, plausible to consider the outcome measure, recorded only once in the 2 hour session, as a summary measure which is dependent on or resulting from

the quality of care provided. On this basis, the scores from the five Qualpac sections (and the overall score) have been included as factors and, as one might expect given the correlations already discussed, there is a significant effect (although perhaps not quite so large as one might expect).

Table A5.5 Mean Squares Attributable to Grade and Ward Main effects

	Ward	Higher Grade	Within and Residual
% of Outcomes Achieved	.27++	.07+	.01
Patient Hygiene	1.73++	.32	.21
Patient Nutrition and Hydration	1.92++	.01	.21
Pressure Sores/Skin Integrity	2.00++	.16	.19
Intra-Venous Therapy	.69++	.10	.22
Planning for Patient Discharge	1.03++	1.27++	.18
Pain Control	1.22++	.01	.22
Education/Rehabilitation	2.83++	.22	.17
Elimination	2.55++	1.67++	.18

Key

+ $p \leq 5\%$
++ $p \leq 10\%$

Table A5.6 Mean Square Attributable to Grade Quality and Ward Main Effect

	Ward	Quality	Higher Grade	Within and Residual
% of Outcomes Achieved	0.18++	0.29++	0.05++	0.01
Patient hygiene	1.40++	1.88++	0.05	0.21
Patient nutrition and hydration	1.72++	0.03	0.15	0.21
Pressure sores /skin integrity	1.96++	0.12	0.42	0.19
Intra-venous therapy	0.64++	0.51	0.62	0.22
Planning for patient discharge	0.99++	0.68+	0.33	0.18
Pain control	0.87++	3.78++	0.15	0.21
Education/ rehabilitation	2.27++	0.79+	0.03	0.17
Elimination	2.30++	0.40	0.04	0.19

Key

+ $p \leq$ significant at the 5% level
++ $p \leq$ significant at the 10% level

The analysis shows that there is a ward main effect. The quality variable is significant with the overall outcomes score and the fifth, sixth and seventh outcomes. The proportion at grade C was significant with the overall outcome score but not with the separate outcome dimensions.

A5.8 CONCLUSIONS

The analysis can obviously be pursued further in several directions. But the exclusive focus on the grade effect has shown surprisingly consistent results across the levels:-

- there is a very strong grade effect at the rating level which is 'diluted' at each succeeding level of aggregation (interaction, qualpac session and ward)

- there is also a strong ward effect at each of the lower levels of aggregation (qualpac session, interaction and rating)

- at the (basic) ratings level of analysis, we found an interaction term such that the overall 'grade effect' varies with ward.