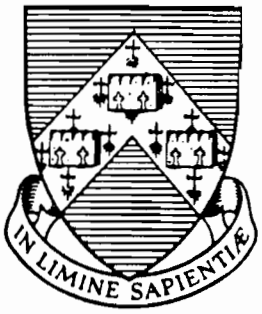


UNIVERSITY
OF YORK

CENTRE FOR HEALTH ECONOMICS
HEALTH ECONOMICS CONSORTIUM

Measuring Nursing Workload: A Cautionary Tale

by

Sue Jenkins-Clarke

DISCUSSION PAPER 96

Centre for Health Economics
University of York

MEASURING NURSING WORKLOAD : A CAUTIONARY TALE

by

SUE JENKINS-CLARKE

March 1992

THE AUTHOR

Sue Jenkins-Clarke is a Research Fellow at the Centre for Health Economics, University of York.

ACKNOWLEDGEMENTS

This paper is based on part of a study on Nursing Workload and Case-Mix commissioned by the Department of Health. I would like to thank the manufacturers of the Nursing Workload Management Systems for their agreement in allowing access to their software, and to the hospitals for supplying the information for this part of the study.

I am grateful to my colleagues for their comments and to Vanessa Waby for typing the manuscript.

FURTHER COPIES

Further copies of this document are available (at price £4.00 to cover the cost of publication, postage and packing) from:

The Publications Secretary

Centre for Health Economics

University of York

YORK

YO1 5DD

Please make cheques payable to the University of York. Details of other papers can be obtained from the same address, or telephone York (0904) 433648 or 433666.

SUMMARY

The need to develop methods of measuring nursing workload is not new, but the search for accurate methods to calculate the demand for nursing has assumed greater significance in recent years owing to the advent of resource management and the necessity to manage efficiently the most costly resource in the NHS; that of nursing. Currently there are 23 Nurse Management Systems available to choose from and of these, some are ward nurse tracking systems/nurse deployment or rostering systems, some are designed to provide workload requirements, and others, which tend to be those introduced most recently, serve a care-planning function. This paper examines the methodologies and instruments used for measuring nursing workload and describes the rationale for selecting four Nursing Workload Management Systems (NWMs) for review.

Integral to every NWM calculation is a series of parameters or assumptions. These parameters are derived, in most cases, from the results of activity analysis undertaken at the site where the chosen NWM is being implemented. The choice of basic parameters appropriate to individual wards/units is a crucial factor in the derivation of workload estimates and the financial consequences of these choices can range from £28,000 to £64,000 per annum per ward.

There is general agreement that efficient nursing utilisation is becoming increasingly urgent in the "new" NHS. Whilst the reliability of **all** NWM systems is being questioned in the USA, criticism of NWM systems in the UK tends to be confined to certain aspects of a particular system or approach rather than to workload measurement as a whole. This UK perspective must be widened by the recognition of the fundamental weaknesses of reliability and consistency of NWM systems.

SECTION I

1. Introduction

The need to develop methods of measuring nursing workload is not new, but the search for accurate methods to calculate the demand for nursing has assumed a greater significance in recent years owing to the advent of resource management and the necessity to measure the most costly resource in the NHS: that of nursing. Attempts continue to be made to measure nursing workload and an increasing number of management systems are being introduced into hospitals and the community.

Background

The systematic collection of nursing manpower data started in earnest in the UK nearly two decades ago, and even at this early stage in the evolution of workload systems, there were different approaches. As these approaches have been re-defined, so too have the systems, resulting in a complex picture which seems to defy clarification. There have even been two different definitions of the word "workload" according to DHSS/ORS (1985); the first describing workload as an aggregation of the time spent on individual activities for each patient, and the second definition relating the number of nurses working on the ward to aggregate measures of activity on a ward.

Of the six core methods of measuring nursing manpower, five adopted the former definition of workload and it is these methods which form the basis of most of the systems

currently on the market. The first five systems (The Northern RHA application of the "Aberdeen formula", the Cheltenham DHA patient dependency method, the Oxfordshire DHA patient dependency method, the Leicestershire DHA patient dependency method, and the Telford Consultative Approach) use the former definition of workload and the Trent RHA "Senior-Gratton" formula uses the second definition. These have been extensively summarised in DHSS/ORS, 1985.

Nursing manpower management has become important at all levels within the NHS; from national and regional structures to ward level. In the past, national and regional manpower planning has favoured the "top-down approach" to manpower estimation whilst ward level planning has tended to adopt "bottom-up" approaches. The "top-down", managerial approach embodies the aggregation of manpower estimates in order, for example, to cost nursing establishments, and is therefore the approach commonly adopted for strategic planning: an example of the "top-down approach" is the Trent RHA "Senior-Gratton" formula. These methods, according to the 1985 DHSS/ORS publication "relate manpower numbers in broad terms to measures of output or activity. It is also often extended to relate manpower and activity to cost constraints and strategic priorities." These methods lack flexibility and do not take into account variations in patient dependency required, for example, for different patient groups, bed occupancy or ward design. As a point prevalence exercise, the aim of such methods was to provide nursing manpower statistics although this important limitation has sometimes been overlooked, and these methods have been wrongly applied to forecasting and manpower.

The "bottom-up approach" to measuring nursing manpower has achieved greater

approval by the nursing profession as a whole because this approach has taken into account patients' needs for nursing care and is therefore seen to be more "user friendly" to nurses at the ward level. Systems embodying the "bottom-up approach" take into account the nature and timing of tasks undertaken by nurses on the wards and relating these to the condition of the patient: hence they are sometimes referred to as patient-nurse dependency studies. Dependency studies on the market prior to 1978 have been reviewed by Wilson-Barnett (1978) and DHSS/ORS (1983). These studies rely on measuring the process of patient care, and then allocating patients into groups according to the amount of nursing care received or required.

Duberley and Norman (1990) describe two main types of dependency studies; those allocating a standard time for nursing care of patients within each dependency group, and those allocating a standard time for each activity which is then summed. Early examples of these manpower studies is that of Goddard (1963), which subsequently influenced the emergence of the Aberdeen formula. Other examples were those of Barr, Rhys-Hearn and the Leicestershire, Oxfordshire and Cheltenham methods. It is these early versions of workload common to all of the methods cited above which form the basis of most of the Nursing Workload Management Systems (NWM systems) currently available.

Although all these systems cited involve a degree of objectivity, one approach evolving when core systems were being developed took professional judgement as the central element for manpower planning. This system is known as the Telford Consultative Approach (1979) and relies upon ward staff setting "acceptable" levels of staff numbers for each day and night in order to provide minimal/safety care and acceptable care. These standards of

minimal/safety care and ideal care are not documented; instead, they are agreed at the individual ward level. Subsequent staffing levels are then discussed, agreed and reviewed and then applied to patient groupings.

These "foundation" systems, based on some form of activity analysis, have spawned a plethora of second and third generation systems, and have become increasingly complex and sophisticated. This complexity has arisen partly because methods have been generated which attempt to take into account the advent of new nursing philosophies, such as the nursing process and care planning. Whilst the "top-down approach" has served a purpose for costing nursing establishments, "bottom-up" approaches did not initially lay claim to this function.

2. Current Systems

Choosing Systems for Review

There are 23 Nurse Management Systems currently available (Greenhalgh, 1991), of which some are ward nurse tracking systems/nurse deployment or rostering systems such as ANSOS, Crestbond and Merit, and others are designed to provide workload requirements, such as SENS, NISCM and PENFRO. Other systems, which tend to be those introduced most recently, serve a care planning function and include EXCELCARE, up-dated FIP, I-Care and Data-Med.

Initial thoughts centred on choosing ward nursing management systems implemented in the Resource Management Initiative (RMI) sites because these sites would have gone

through the process and experience of choice and implementation of nursing management systems. The systems implemented at these sites are as follows:

1. FIP (Financial Information Project)
2. EXCELCARE
3. NISCM (Nursing System for Change Management)
4. Criteria for Care

The issues and progress of implementation of nursing management systems at the RMI sites have been reviewed by Norman et al (1988) who concluded that their evaluation was somewhat premature in that systems, at sites where choices had been made, were at various, usually early, stages of implementation.

At the time of these initial explorations it was becoming clear that the 23 systems currently listed in the Greenhalgh guide could be grouped into categories depending on each system's approach to workload measurement. Broadly speaking, these approaches are:-

1. dependency driven; i.e. systems which produce workload requirements based mainly on the dependency of ward patients on nursing care in order to perform the basic activities of daily living.

2. 'task oriented'; i.e. systems which rely on recording and predicting nursing interventions for individual patients.

3. Care-plan driven; i.e. systems which measure workload by producing nursing care plans which are then used to predict workload.

4. ward-based; i.e. systems which produce ward over-views of staffing requirements by concentrating on patient through-put/ bed occupancy.

Because areas overlap between these categories they are not mutually exclusive. The flexibility of systems means that other modules can be added to the framework - for example, the parallel development of patient information systems. The approaches outlined here describe the developmental frameworks.

The Nursing Workload Management (NWM) systems chosen by the six original RMI sites can be placed within approaches 1-3 and it is systems falling in these categories that were investigated in this study. They are as follows:-

1. Dependency level approach. The systems chosen are Criteria for Care and SENS. SENS, although not implemented by any of the RMI sites, has been used on a DoH funded project on Skill Mix underway at the Centre for Health Economics at the same time as this project.

2. 'Task oriented' approach. The system chosen is the Financial Information Project (FIP). At the time when choices were being made, FIP was being modified to include work on the development and implementation of incorporating care planning activities into their framework. The workload measures produced for this report are based on

the initial, and not the modified, system.

3. Care planning approach. The system chosen is EXCELCARE which essentially describes present and future workload in terms of Units of Care produced from process and outcome standards for each patient.

All of these systems have their research and development origins in the USA but Criteria for Care and FIP have been extensively developed in the UK for a number of years.

The fourth, ward-based approach referred to on page 6, has been excluded from this review on the basis that it is largely a standard setting exercise, based on the ward (as opposed to the individual patient) level. It is also still in the development phase and does not lend itself to measuring certain models of nursing, such as primary nursing, since its foundation lies in the extent to which nursing interventions have been carried out or not.

3. Brief Descriptions of the Systems

Criteria for Care (C for C)

Criteria for Care arose out of the North-West Nurse Staffing Levels Project in 1978 (Ball, Goldstone and Collier, 1984) and is arguably the oldest system which is still in operation and indeed continues to be the first choice for a number of hospitals.

Patient dependency classification forms the foundation of this NWM system and unlike

other systems, it does not differentiate between different types of care (for example, between basic and technical care). Its main purpose is "designed to provide a means of prospectively identifying the 'workload' and therefore the staff required on particular wards to enable better distribution of staff" (Greenhalgh, 1991). The workload measure is derived from combining patient dependencies on the ward with predetermined timings expressed as ratios. Ball et al (1984) maintain it is simple to use and indeed it has been used as a manual system in Lincolnshire Health Authority for a number of years. The computerised version is now available and has been installed at the Freeman Hospital, Newcastle-upon-Tyne as part of the Resource Management Initiative.

South-East Nursing System (SENS)

This system has been developed by the South-East Thames RHA and bears a number of resemblances to Criteria for Care. It is a patient dependency driven system and the criteria for classifying patients into dependency groups is similar to C for C. In calculating workload estimates, information is also collected on day-cases/ward attenders, theatre cases and extra individual patient timings excluded from patient dependency time.

The inclusion of SENS in this review of NWM systems has been influenced by the choice of this system for the Skill Mix and the Effectiveness of Nursing Care study funded by the DoH which ran concurrently with this project at the Centre for Health Economics. It was the system of choice following an extensive review of measurement systems largely on the basis that SENS can produce workload calculations based on clinical grade of staff; this was a crucial ingredient for the Skill Mix project.

SENS, as its origins suggest, has been implemented in a number of hospitals in the South-East Thames Regional Health Authority, notably Ashford, Greenwich and various Medway hospitals.

Financial Information Project (FIP)

FIP's origins were based in the West Midlands RHA as a Research and Development project financed by the DHSS, started in 1979. Its original form centred round a costing module which produced planned and actual nursing costs. Two other modules composed the ward nursing system; in addition to the costing module, activity and manpower components were incorporated into the framework. This computerised version arose out of the conversion of the manual Cheltenham DHA patient dependency method referred to earlier in this paper.

The activity module is based on an assessment of patients' individual nursing requirements by clinical grade of staff and assesses patients according to general (or basic) nursing care, essentially patients' ability to undertake activities of daily living, and also technical care, divided into shared technical activities, such as drug rounds and individual technical activities. As in SENS, time admitting, discharging and attending to day-cases/ward attenders and theatre cases is included in the workload calculation.

The initial 'task-oriented' approach of recording individual patient requirements has been superseded in later versions of FIP which have been up-graded to produce care plans. This NWM system is being implemented extensively in hospitals throughout the UK.

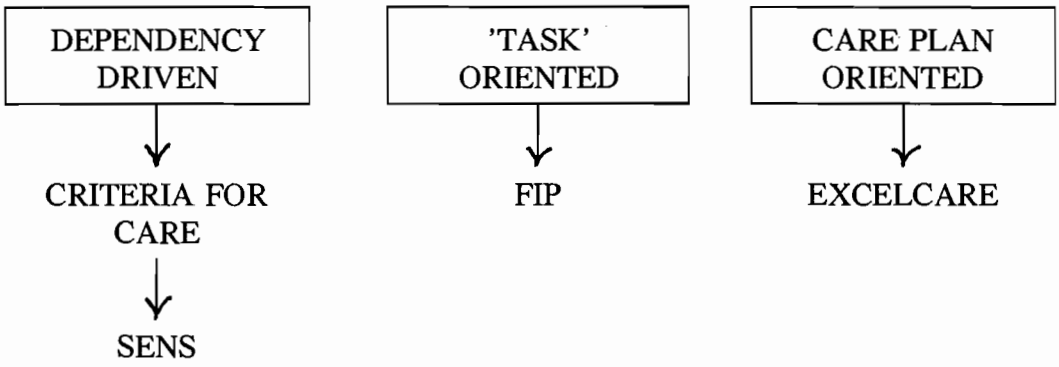
EXCELCARE

This system has been imported from the USA with only limited distribution in the UK, notably at one of the six original RMI sites, Huddersfield Royal Infirmary, and, more recently, at the Basildon and Orsett Hospitals. It is claimed to be the 'leader' of the comprehensive NWM packages based on a care planning approach.

The core of this system from which workload calculations are derived is the recording of Units of Care for each patient. Each Unit of Care describes nursing input for specific needs and the choice of each Unit of Care automatically selects observations and interventions pertinent to that care, previously defined. Because grades of staff are specified, workload, staffing and hence costing can be calculated. Because of the flexibility of this system, nurses can amend care plans at any stage during a shift and therefore work completed and still outstanding can be noted and dealt with. It is therefore used retrospectively as well as prospectively for planning nursing care.

These four systems were chosen for the review of nursing workload measures; they represent working examples of the 3 different approaches to measurement shown in Figure 1.1. The intra-system differences described in the following sections form part of a report submitted to the Department of Health entitled 'Nursing Workload Measures and Case-Mix' (Jenkins-Clarke and Carr-Hill, 1991).

Figure 1.1 Choice of Nursing Workload Measures



4. The Parameters of NWM Systems

Integral to every NWM calculation is a series of parameters or assumptions. These parameters are derived, in most cases, from the results of activity analysis undertaken at the site where the chosen NWM is being implemented. Ideally, activity analysis should be undertaken on each ward, day and night, for a given time period and repeated at intervals for reliability and changes in ward activity. Clearly this is a costly, labour intensive, and potentially disruptive exercise and it is not surprising that these activities are rarely undertaken on a hospital-wide basis. Prior to implementing a chosen NWM system therefore, some hospitals "import" information resulting from activity analyses undertaken on other wards in the same hospital, or from other sites, or they may use information provided by the company supplying the system.

The decision relating to the extent to which activity analysis is carried out ward by ward is central and all NWM systems rely upon these data in order to set their own timings to calculate workload. These minutes of time (fractions of an hour) represent nursing time spent on caring for patients with differing dependency levels (as in time bands or ratios in C

for C and SENS, time spent on individual tasks (as in FIP where, for example, the time required for giving an enema has been set at 5 minutes and the time taken for doing a minor dressing 10 minutes[1]), and time spent on individual Units of Care as in EXCELCARE (for example the time required to change/straighten bed linen is 15 minutes and the time taken to discuss a patient's discharge is estimated at 20 minutes).

Activity analysis underpinning all NWM systems involves observing and recording the activities of all nursing staff at regular intervals over a 24 hour period, day and night. This recording is usually carried out at 15 minute intervals. The activities are then grouped into categories depending on the NWM: for C for C and SENS, the four categories are direct care, indirect care, associated work and personal time; and for FIP, the categories relate to basic and technical care divided into factors and subfactors within these two groups which are timed with the most appropriate grade of staff identified to undertake each factor; EXCELCARE allows considerable flexibility in categorising activities in that each site can define which criteria may be grouped under direct, associated and personal care time.

Nevertheless, it is clear that the choice of these basic parameters is a crucial factor in the estimates derived from the NWM system. The decisions taken on the choice of parameters were as follows:

---

[1] These examples have been taken from a consensus of timings from activity analysis undertaken at 10 different hospital sites.

For Criteria for Care

Initially, it was presumed that timings and ratios from published data based on 'model' wards would be used (Ball and Oreschnick, 1986), but after a site visit to a hospital where extensive activity analyses had been undertaken, it was decided that timings generated by the latter site should be adopted for this project. The timings were implemented in this particular hospital from 1st May 1990 (personal communication) and were as follows:

	Dependency Level				
	I	II	III	IV	(V)
Minutes	75	90	187.5	307.5	(937.5)
Ratios	1	1.2	2.5	4.1	(12.5)

(Dependency Level V describes patients requiring "specialling" over 24 hours)

The numbers of patients multiplied by these ratios generate a workload index (WLI). Because of the cumbersome nature of converting this WLI into workload hours required, the index is multiplied by a constant (k) which summarises the following observations:-

i) direct care activity = 50%

ii) 8% deducted for meal breaks

iii) 10% added for sickness, annual leave and continuing education and

iv) WTE - taken as 37.5

In this instance k_1 was calculated to be 0.4956. By adjusting observations i) to 55%

direct care activity and ii) allocating 92 minutes to dependency level I patients (as in the model ward timings described in the next section) k_2 was calculated to be 0.552669. The significance of altering timings, ratios and percentage of time spent on direct care activity is described in the following section.

For FIP

For this investigation, the standards adopted for the basic activities of mobility, hygiene, continence, nutrition and psychological assessment were those timings resulting from activity analysis exercises undertaken at other sites. Timings were recorded for each of the statements relating to the items listed above by day and night and whether the patient was male or female. The timings relating to technical care resulted from activity analysis taken from the same sites. The timings for shared profiles (such as drug rounds, hand-over times and consultant rounds) were also taken from the above activity analyses but were confirmed by direct observation at the first site visited as part of this project.

Examples of some timings are as follows:

giving an enema	:	15 minutes
recording fluid balance	:	2 minutes
giving a subcutaneous injection	:	6 minutes
major dressing	:	35 minutes
Temperature, pulse and respiration rate measurement (TPR)	:	2 minutes
Blood glucose measurement (BM stix)	:	5 minutes

For SENS

SENS allows users flexibility in deciding the amount of time necessary to undertake a wide range of patient and ward activities. The parameters used to generate workload requirements using SENS were those adopted from the Skill Mix project since we were able to install this system at the Centre for Health Economics. Thus timings on, for example, emergency admissions of dependency group IV patients, intermediate dressings, extra time allowed for theatre patients and extra time allowed for ward attenders/day cases, were agreed with the nurses working on the Skill Mix Project. The average guide percentages of nursing time spent on different types of care were taken from the SENS manual: the proportion of direct care being 52%, that of indirect care 24%, associated care 14%, and personal time 10%.

For EXCELCARE

The timings used to describe the Units of Care integral to this particular workload system are those resulting from timing studies undertaken within one health authority (personal communication). They are extensive, recent, and have now been agreed by users and providers implementing the system.

Examples of some timings, per shift, of activities which comprise various Units of Care are as follows:

Care of pyrexial patient	:	20 minutes
Checking of naso-gastric tube	:	10 minutes

Administering medication	:	2 minutes
Recording B/P on admission	:	2 minutes
Recording fluid intake and output	:	1 minute

The proportion of time spent on direct care has been calculated as 80%. Although this is wildly different from the proportion of time spent on direct care in any of the other three systems described above, the reasons for this difference are the criteria used to describe direct, indirect and associate care. For EXCELCARE many of the criteria used in other systems to allocate activities to indirect or associated care are considered more appropriately classified as direct care.

The implications of adopting different parameters are discussed in the following section.

SECTION II

Intra System Differences of Workload Measures

The basic parameters derived from activity analysis have been described in Section 1.4. These activity analyses are expensive to undertake and so parameters are often 'imported' from another hospital or another ward on the same site. The consequences of importing parameters from activity analyses undertaken on other wards/specialties, or other sites can best be illustrated using the following examples. Although two NWM systems have been chosen for illustration, all the NWM systems reviewed in this Discussion Paper can be

subjected to a similar type of scrutiny.

Example 1: Differences in minutes

This example illustrates the differences occurring when differing numbers of minutes are attributed to patients in the lowest dependency level. The first set of minutes are those published by Criteria for Care for their 9 model ward timings; 92 minutes (Ball and Oreschnick, 1986). The second set of timings are those established following extensive activity analysis in a hospital with a long tradition of research and familiarity with this particular NWM (personal communication). This hospital (B) calculated that patients in the lowest dependency category (I) required 75 minutes of nursing care over a 24-hour period.

The workload index (WLI) is calculated as follows (using patient data from one of the sites visited for this project):

Table 2.1 Workload Index Calculation

	Dependency Level				
	I	II	III	IV	
Number of patients	12	16	2	1	= 31 patients
x ratios	1	1.2	2.5	4.1	
	12	19.2	5	4.1	= 40.3 WLI

Calculation of the nursing workload from the WLI of 40.3 representing 31 patients assuming the difference in minutes between Hospitals A and B described above and 50% of time spent on direct nursing care is shown in Table 2.2.

Table 2.2 Costs Attributable to Workload

	Hospital A	Hospital B
Dependency Level I	92 mins	75 mins
Required workload (in WTE)	24.604	19.973
Using April, 1991 salary ratings - mid-point (£13,777.5)	£338,982	£275,178
DIFFERENCE IN SALARY COSTS =	£63,804 pa	

Thus the implications of importing Hospital A's or Hospital B's timings could make a difference in staffing costs of £63,804 per annum, simply by a timing difference of 17 minutes for Dependency I patients.

Example 2: Differences in ratios

There are almost countless ways of producing different results for nursing workload requirements; the examples included here are not theoretical and are the standards/parameters employed in a variety of hospitals where Criteria for Care has been implemented. The following example uses the same ward data as in Example 1, but illustrates the differences found when comparing the model ward ratios with ratios calculated from activity analysis in a substantial number of wards within one health authority (personal communication).

31 patients allocated to the same dependency groupings as in Example I are shown below, the only difference being a ratio of 1.7 for dependency level II patients instead of a ratio of 1.2 (the latter being the standard used in both Hospital A and B in the previous example).

Table 2.3(a) Workload Indices Derived from Differing Ratios

	Dependency Level				
	I	II	III	IV	
Number of patients	12	16	2	1	= 31 patients
Hospital A's ratios	1	1.7	2.5	4.1	
	12	27.2	5	4.1	= 48.3 WLI

Table 2.3(b

	Dependency Level				
	I	II	III	IV	
Number of patients	12	16	2	1	= 31 patients
Hospital B's ratios	1	1.2	2.5	4.1	
	12	19.2	5	4.1	= 40.3 WLI

The calculation of nursing workload requirements from the two workload indices in Tables 2.3(a) and (b) above using identical patients, in the same dependency categories, assuming Hospital B's standards of 72 minutes and 50% of time being spent on direct nursing care (from Example 1), results in the following differences in salary costs.

Table 2.4 Costs Attributable to Different Workload Indices

	Hospital A	Hospital B
Workload Index	48.3	40.3
Required workload (in WTE)	23.937	19.973
Using April, 1991 salary ratings - mid-point (£13,777.5)	£329,792	£275,178
DIFFERENCE IN SALARY COSTS =	£54,614 pa	

Thus if a hospital, having chosen Criteria for Care as its workload measure, selects Hospital B's ratios for dependency levels in preference to Hospital A's, a saving of £54,614 could be made. This cost difference is derived solely from a single alteration in ratios for dependency II - type patients, from 1.2 in Table 2.3(b) to 1.7 in Table 2.3(a).

Example 3: Differences in time spent on direct nursing care

Another source of difference arises when the proportion of nursing time devoted to direct nursing care is changed. It is logical to assume that the amount of direct nursing care differs from specialty to specialty and that, for example, a higher proportion of direct nursing care time is allocated to patients in a geriatric ward in comparison to patients in a general surgical ward. An 'across the board' estimate of, for example, 52% of direct nursing care for all specialties may lead to errors in staff forecasting (both over-and under-estimates). Using the same criteria for activities described as direct care, as opposed to indirect, associated on personal time, most hospitals opt for a range of 48-53% direct care.

The following example illustrates the implications for choice of proportions of time

spent on direct nursing care, using SENS.

Table 2.5 shows the financial implications of adopting a lower estimate of the amount of time spent on direct nursing care (48%) when compared with a higher estimate of 53%; the latter figure could be taken to represent the amount of nursing care which may reasonably be expected on a geriatric ward, and the former figure might represent the amount of direct nursing care calculated for a surgical ward, for example.

Table 2.5 Differences in the amount of direct nursing care for one ward over 6 days

% time spent on direct care	48%	53%
Day 1	137.0	123.09
2	126.71	114.1
3	134.63	121.15
4	125.17	112.99
5	127.15	114.32
6	119.76	107.91
Total Hours	770.42	693.56
Hours difference	76.86	
In WTE	2.05	
Salary difference (@ £13,777.5 pa)[2]	£28,238	

Thus if a ward manager chose to allocate 48% of time to direct nursing care as opposed to 53%, this decision could raise expenditure by £28,000 per annum per ward.

---

[2] Calculated at the mid-point of the clinical grading structure for staff ranging from Grade A to Grade I, thus excluding student nurses' pay. The salaries have been taken from those payable from April 1 1991.

The actual amount of time spent on patient care is integral to the SENS system and is constant; the differences shown in Table 2.5 above refer to 48% or 53% of actual time allocated to patients in the SENS dependency groups. For example, for patients in dependency level II SENS allocates 2 hours/120 minutes and it is 48% or 53% of 120 minutes which is reflected in Table 2.5.

NWM systems such as SENS and Criteria for Care have their roots buried in categorising patients into dependency groupings for generating workload requirements. Spurious results may be produced if rigorous training is not undertaken to explain, in considerable detail, the criteria for classifying patients into dependency groupings. The difficulties of training and up-dating staff responsible for allocating patients into dependency groups may be well recognised but cannot be over-emphasised. The daily requirement of these systems to allocate dependency levels to all patients on the ward may seem burdensome unless senior ward staff feel some commitment and understanding of this necessary exercise in order to produce reliable workload estimates.

Example 4: Differences in dependency groupings

The final example in this section illustrates the differences occurring when two groups of nurse categorise the same patients into dependency groups; one indicative set of dependency groupings being kindly given by senior ward nursing staff (Group A) and the other set allocated by research nurses working on the ward (Group B).

The tables relating to this example show differences attributable to categorising the

same 16 patients into dependency groups for one day only, chosen at random from six days' data. The resulting workload indices, calculated from dependency level grouping, use the same ratios as in Example 1 and Hospital B's standards of 72 minutes for dependency level I patients and 50% of time spent on direct nursing care.

Table 2.6(a) Group A Categorisation of Patients

	Dependency Level				
	I	II	III	IV	
Group A ratings	-	11	2	3	= 16 patients
x ratios	1	1.2	2.5	4.1	
	-	13.2	5	12.3	= 30.5 WLI

Table 2.6(b) Group B Categorisation of Patients

	Dependency Level				
	I	II	III	IV	
Group B ratings	10	2	2	2	= 16 patients
x ratios	1	1.2	2.5	4.1	
	10	2.4	5	8.2	= 25.6 WLI

The calculation of nursing workload requirements resulting from the two different workload indices as described in Tables 2.6(a) and (b) using identical patients and parameters produce different costs, as shown in Table 2.7 overleaf.

Table 2.7 Costs Attributable to Different Workload Indices

	Group A	Group B
Workload Index	30.5	25.6
Required workload (in WTE)	15.116	12.687
Using April, 1991 salary ratings - mid-point (£13,777.5)	£208,261	£174,795
DIFFERENCE IN SALARY COSTS =	£33,466 pa	

This last example illustrates the implications attached to allocating patients into dependency categories, crucial to a number of NWM systems currently available. Examples 1-3 in this section describe the cost implications of a series of managerial decisions (the consequences of differing timings, ratios and proportions of nursing care) whereas Example 4 begs the question of professional judgement implicit in this particular exercise. These judgements are passed on a daily basis on all wards implementing workload systems which are dependency-driven and rely upon accurate staff training to produce reliable results. It should be pointed out in Example 4 the dependency category ratings were allocated retrospectively - ie, allocated to patients resident in the ward in the preceding 24 hours.

SECTION III

DISCUSSION

There is general agreement that the efficient use of nursing resource is becoming increasingly urgent in the 'new' NHS. The reliability of NWM systems as a whole is being questioned in the USA (Brooten, 1988) and can be contrasted to criticisms of NWM systems in the UK which tend to be confined to certain aspects of a particular system or approach rather than to workload measurement as a whole (for example Bagust, 1990).

The primary objective here has been to review the methodologies of examples of NWM systems designed to measure workload using different approaches. Two issues are raised in the light of the examples illustrated in Section II; these are the reliability of NWM systems and the implications of importing parameters prior to implementation.

The reliability issue is illustrated in Example 4 in the preceding section, where the dependency levels of patients are given for one day chosen from six days of observation. Differences were of a similar order for the remaining five days. A striking feature of these limited data was that there were no instances of Group A (ie ward staff) recording patients in dependency level I; this contrasts with Group B's allocation where, out of a total of 83 patients who could be compared, Group B recorded 45 patients as dependency level I and Group A had no patients at this dependency level. Where there was agreement between the two groups it was nearly always in the allocation of patients into the most highly dependent group (level IV). This tendency to maximise patient dependency clearly has repercussions for workload estimation and these findings may generate considerable inefficiency in resource

use.

An accurate assessment of the parameters or assumptions integral to all NWM systems is of major importance for the estimation of workload. Examples 1 to 3 in Section II show the differences occurring when one set of minutes, ratios and amount of time spent on direct nursing care is adopted in preference to another; the examples used to generate workload estimates are not fictitious and indeed are ones which have been widely introduced in a number of hospitals in different RHAs.

Although Example 1 (differences in minutes) uses Criteria for Care to illustrate the financial implications of choosing model ward timings or those generated by Hospital B, similar differences may be found using any of the systems reviewed here (and many others) since these systems all rely upon timed interventions of one sort or another. EXCELCARE's Units of Care and FIP's basic and technical items of care rely on minutes and SENS permits extra time to be added to the calculation for specified procedures. Ideally all of these timings should be established at the time of implementation but anecdotal evidence suggests that hospitals rarely undertake a full and comprehensive activity/work study analysis prior to implementation. Thus timings are 'borrowed' from other wards, or other institutions, or an alternative scenario is that timings generated from a comprehensive activity analysis across several sites may be adopted for wards which are atypical in terms of patient dependency, ward activities or case-mix.

The temptation to conclude therefore that there are 'gold standards' which could be applicable to all sites must be avoided. Rather it is of greater importance to establish timings

which are ward-specific and where activity analyses can be undertaken at regular intervals in order to identify staff or case-mix changes which may affect workload requirements.

Three of the examples used to demonstrate the financial implications of importing parameters (those relating to the number of minutes allocated to patients in the least dependent group, ratio differences for Criteria for Care, and the percentage of time spent on direct nursing care) are examples of decisions which need to be taken at the senior managerial, service planning or project level prior to implementing the workload system of choice. This contrasts with the fourth example, that of the cost implications relating to differing patient dependency level categories. Decisions about allocating patients to dependency levels are taken daily (at least) by ward staff and rely upon their professional judgement. It could be argued that these findings lend support to the case for measuring workload by other approaches. For example, Bagust (1990) argues that 'dependency systems do not offer a reliable basis for costing' and states that 'nursing dependency is an artificial abstraction'.

The differences in dependency groups reported here contrast with those reported by Waite (1986). Although the sample size was unclear, Waite concluded that nurses were able to classify reliably patients into dependency groups and that subsequent workload measures generated produced similar results. (The two workload measures tested were the Brighton approach to the Telford Consultative Method and the workload index generated according to Barr's checklist).

This analysis of NWM systems begs the question of to what extent is the activity of

nursing actually reflected in the output of these (or any) NWM systems? Also to what extent is it justifiable to sacrifice simplicity for flexibility? The 'newcomers' to the NWM system market (such as EXCELCARE) are sophisticated to allow for flexibility, but such complexity may be reflected in difficulties in implementing and running such systems. The evidence of the measures analysed in this study suggest that operational requirements need to be drawn up with careful thought.

Conclusions

1. Whichever nursing workload management system is chosen, attention and resources must be made available to undertake a fully comprehensive activity analysis in individual ward settings. This investment should increase the maximum chance of reliably generating workload estimates which would be directly related to the activity patterns on the wards/sites where the chosen system is being implemented.

2. The temptation to import parameters from other sites/hospitals/wards must be resisted. The consequences of succumbing to this temptation are illustrated in Section II. This not only applies to borrowing timings from activity analyses undertaken elsewhere but also to decisions relating to percentages of time devoted to direct, indirect and associated care.

3. Given the financial implications of importing potentially erroneous timings from elsewhere, it may be prudent to invest in 'activity analysis teams'. These teams,

suitably trained and familiar to ward staff, might be relied upon to undertake this work efficiently and in a way least likely to cause antagonism or the suspicion of ward staff.

4. The reliability of all NWM systems ultimately rests with the ward nursing staff. Failure to train, educate and explain the necessity for resource management in nursing results in failures to accept the importance of data collection. The often quoted "we do the dependencies when we have time" attitude obviously generates erroneous data for service planners. This is not an original observation, but the implications of failure to produce reliable results is reported here.

5. The dearth of independent, impartial advice must be a cause for concern. A facility for obtaining such advice prior to choosing a workload system would therefore be most welcome, in order that, for example, current information could be given to hospitals/wards on the most appropriate workload measures for a particular model of nursing.

The financial implications relating to the NWM systems described here have excluded any reference to the skill/grade-mix of nursing staff. This important, complex issue is the subject of another report and publications from the Centre for Health Economics (Carr-Hill et al, forthcoming). Altering the grade-mix of staff whilst maintaining the same standards of care may cost more (by 1% according to Ball et al (1989)), but this influence on nursing workload has been forfeited for the sake of clarity here.

'First thoughts on an information strategy for the NHS' by the NHS Management

Executive (1991) is predicting that 'most major acute hospitals will have computerised at least four of the following 'core' systems : radiology, pathology, pharmacy, nursing and theatre management by 1993'. Given the problems of accuracy, reliability, consistency and implementation of NWM systems in UK hospitals at the present time - and Brunel University's (1989) conclusion that the implementation of information systems in general is patchy (even in the pioneering Resource Management sites which have been tackling these problems for several years) - such forecasts are indeed optimistic. In order to produce accurate and appropriate means of measuring the most costly resource in the NHS, the nursing profession has much to contribute, and must gain confidence in participating in the IT debate in order to play an appropriate part in resource management in the 'new' NHS.

This Discussion Paper is devoted to a review of NWM systems and a description of the intra-system differences within each of the measures chosen. A study has been undertaken to collect the patient and nursing information necessary to generate workload estimates from the systems described here. This study has shown that there are substantial problems associated with consistency, stability and reliability of these NWM systems. The relationship between nursing workload systems, actual hours worked, case-mix (DRGs) and patient outcome measures is the subject of a report submitted to the Department of Health entitled "Nursing Workload Measures and Case Mix" by Sue Clarke and Roy Carr-Hill. Further publications from this project will be forthcoming in 1992.

REFERENCES

Bagust A. Dispel that old myth. Health Service Journal 1990; 5 July: 1000-1001.

Ball J, Oreschnick R. Criteria for Care. Senior Nurse 1986; 5 (4): 26-29.

Ball J A, Hurst K, Booth M R & Franklin R. "But who will make the beds?" Report of the Mersey Region Project on Assessment of Nurse Staffing and Support Worker Requirements for Acute General Hospitals. Mersey RHA & Nuffield Institute for Health Service Studies, 1989.

Ball J A, Goldstone L A, Collier M M. Criteria for Care. The manual of the Northwest Nurse Staffing Levels Project. Newcastle-upon-Tyne Polytechnic Products Ltd, 1984.

Blueprint for hi tech NHS unveiled. Health Service Journal 1991; 4 April: 21.

Brooten D. Effect of DRGs on Research. Nurse Clin. North America 1988; 23 (3): 587-596.

Carr-Hill R, Higgins M, Dixon P, Gibbs I, Griffiths M, McCaughan D and Wright K. Skill Mix and the Effectiveness of Nursing Care. York : Centre for Health Economics, University of York, 1992.

DHSS Operational Research Service. Nurse Manpower Planning: approaches and techniques. HMSO, 1983.

DHSS Operational Research Service. A critique of methods for determining nursing staffing levels. ORS 1051, April, 1985.

Duberley J, Norman S. Nursing workload measurement and nursing data for resource management. Financial Management Directorate, Resource Management Unit, NHS Management Executive, July, 1990.

Goddard A A. Workload measurement as a basis for calculating nursing establishments. Leeds Regional Hospital Board, 1963.

Greenhalgh & Co Ltd. Nurse Management Systems - Release 6. Macclesfield : Health Care Management Consultants, 1991.

Health Economics Research Group. Brunel University. Resource Management Process and Progress, Department of Health, 1989.

Jenkins-Clarke S & Carr-Hill R. Nursing Workload Measures and Case-Mix : an investigation of the reliability and validity of nursing workload measures. York : Centre for Health Economics, University of York, 1991.

Norman S, Quinn H, Malin H. The Resource Management Initiative and Ward Nursing Information Systems. Department of Health Nursing Division and Operational Research Services, September, 1988.

Telford W A. Determining nursing establishments. Health Service Manpower Review 1979; 5 (4).

Waite R. Nursing by numbers. Nursing Times 1986; Feb 19 : 40-42.

Wilson-Barnett J. Review of Patient - Nurse Dependency Studies. Nursing Research Liaison Group, DHSS, 1978.