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CENTRE FOR HEALTH ECONOMICS

**Improving the Effectiveness of
the Nursing Workforce**

Roy Carr-Hill
Susan Jenkins-Clarke

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Short Report of Analysis of NISCM Data Set *

Roy Carr-Hill

Susan Jenkins-Clarke

**Centre for Health Economics
University of York**

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Introduction

The objective of this paper is to set out the key findings and implications from an analysis of the activity and workload of nurses of different grades. This is with a view to identifying nursing skill mixes and working practices that may reduce workforce demand for more highly skilled nursing staff.

The research utilises a large data set collected across some 30 hospitals as part of a nursing workload classification system (NISCM - Nursing Information System for Change Management).

'Activity' refers to the amount of time in a shift spent on different types of tasks by nurses and 'workload' refers to the number of patients on wards by 'demand' group. The classification of patients to demand groups, which is an integral part of NISCM, is based on the observation in each ward of the number of minutes required for patients with differing dependency/demand levels.

The 'activity' evidence presented in this report is based on data from 5,208 staff recording their activity in 535 shift blocks (a 'block' is the same shift over seven days) in 19 hospitals; whilst the 'workload' evidence is based on data from 38,585 shifts in 90 wards in 17 hospitals. It should be emphasised that most of the data is 'timeless' – in the sense that nursing interventions and general skill profiles changed very little over the 1990s and, as we shall show, little variation in the patterns of activity or in the skill mix on the wards, can be attributed to the year in which the data were collected.

The original questions posed at the beginning of this exercise are given in Annex I. The ultimate aim of this analysis is to develop appropriate and relevant strategies for changing skill mixes in terms of the balance of staff groups deployed.

Main Results

Seven themes have emerged from an analysis of this data set and they are listed below.

- variation
- ward culture/division of labour
- skill mix issues
- capacity
- flexibility
- economies of scale
- distributing the overheads/housekeepers

This short report presents brief descriptions of these seven themes. A description of the data set, definitions of demand groups, classifications of activity analysis and full details of the results have been presented in a full report to the Department of Health.

The crucial definitions relating to the descriptions of grades of staff contributing to this data set are given below:

- (i) senior nurses are grades G H and I
- (ii) qualified nurses are grades D E and F
- (iii) nursing support staff are grades A B and C, nursing assistants, student nurses and nursing auxiliaries (data for grades A,B and C are presented separately in some charts and tables)
- (iv) non-nursing staff are housekeepers (or equivalent) and ward clerks
- (v) bank staff refers to all grades of bank/agency staff

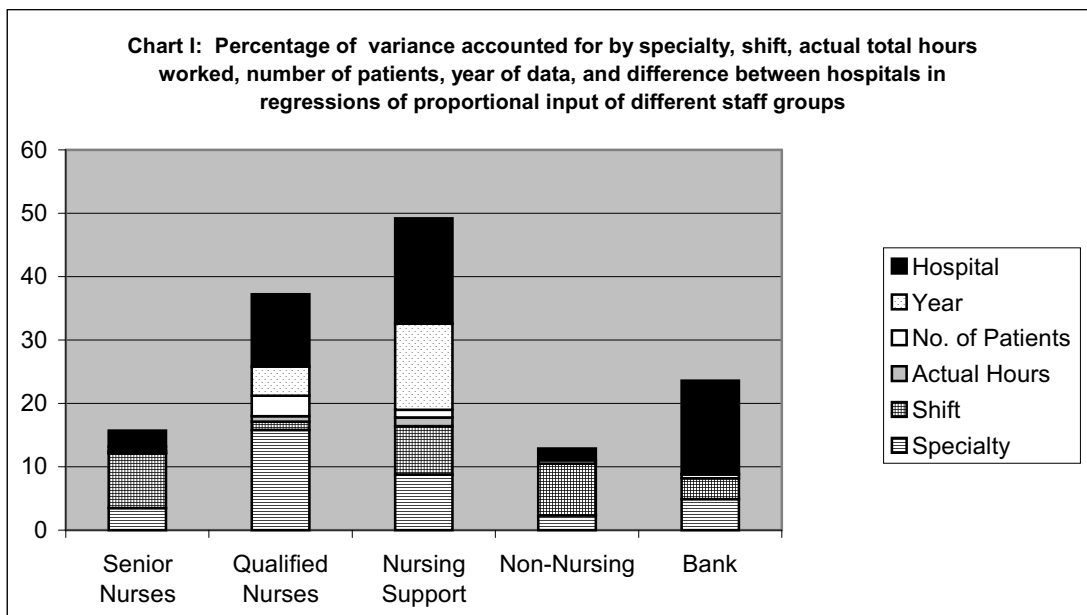
1. Variation

Key message

Differences in staffing levels between hospitals suggest that there is potential for efficiency gains in some hospitals.

Evidence

The analysis here is of the proportions of total staffing on wards that are accounted for by each grade group. The proportions are calculated by the hours worked by each grade group divided by the hours worked by all groups together. Chart I below shows an analysis of the variation across wards in the proportion of total time accounted for by each grade group that, statistically, can be attributed to ward specialty, shift, year of data collection, number of patients, proportions of patients in each demand group, and finally, the effect of differences between hospitals. As an example, 16% of the variance between wards in the proportion of total staff time contributed by qualified nurses is explained by differences in the specialties of wards and 17% is accounted for by ward specialty and time of shift combined. More details, including the values of key coefficients, are given in Table IA in Annex II.



There are two clear patterns in the data:

- (1) For senior nurses and non-nursing staff, ward specialty and hospital effect explain little of the variation in the proportion of total hours contributed. Instead it is the time of shift that has a considerable influence on the proportions of time contributed by these two staff groups. Both groups typically represent a higher proportion of total staffing in the day shifts than on the night shifts.
- (2) For qualified nurses, nursing support input and bank input, the hospital effect and to a lesser extent the specialty are most important in explaining the variance in the share of total staffing contributed by these groups. The shift makes little difference.

There appears to be substantial systematic variation between hospitals in the skill mix of nursing staff not accounted for by other factors. In more detail, differences in the proportion of total staffing accounted for by each staff group due to hospital effects are as follows:

- for senior nurses 2.5%
- for qualified nurses 7.4%
- for nursing support staff 16.6%
- for non-nursing staff 2.8%
- for bank staff 14.7%

It is of especial interest that the year of collecting data makes very little difference as this means that there was no particular trend in the deployment of different groups of nursing staff over an eight year period.

The variance explained by the hospital effect in this chart suggests that there is considerable variability in the way in which hospitals deploy nursing staff to wards – this particularly applies to nursing support staff, qualified staff and bank staff. Whilst it is not surprising that there is a large variance for bank staff – in that one would expect to see differences in employment of this group of staff due to location of hospitals for example, whether urban/rural locations etc – it is notable that there are even greater variances for nursing support staff and qualified nurses. These are illustrated in Table IB. For the same specialty during the same shift, the *average* proportional input of qualified nurses measured across a large number of shifts varies, for example in Orthopaedics, from under 40% to nearly 54%. Moreover, in any one specific ward, the variations within these averages are very large, sometimes from 0% to 100%. Whilst one cannot quantify precisely the potential ‘slack’ in deployment, it is potentially substantial.

Table IB: Variations between ward average input of qualified nurses during morning shift in selected specialties

	Care of the Elderly	General Medicine	Orthopaedics	Paediatrics
Minimum (N)	30.6 (142)	27.7 (142)	39.5 (200)	36.3 (130)
Maximum (N)	47.1 (216)	35.6 (395)	53.6 (167)	53.6 (85)

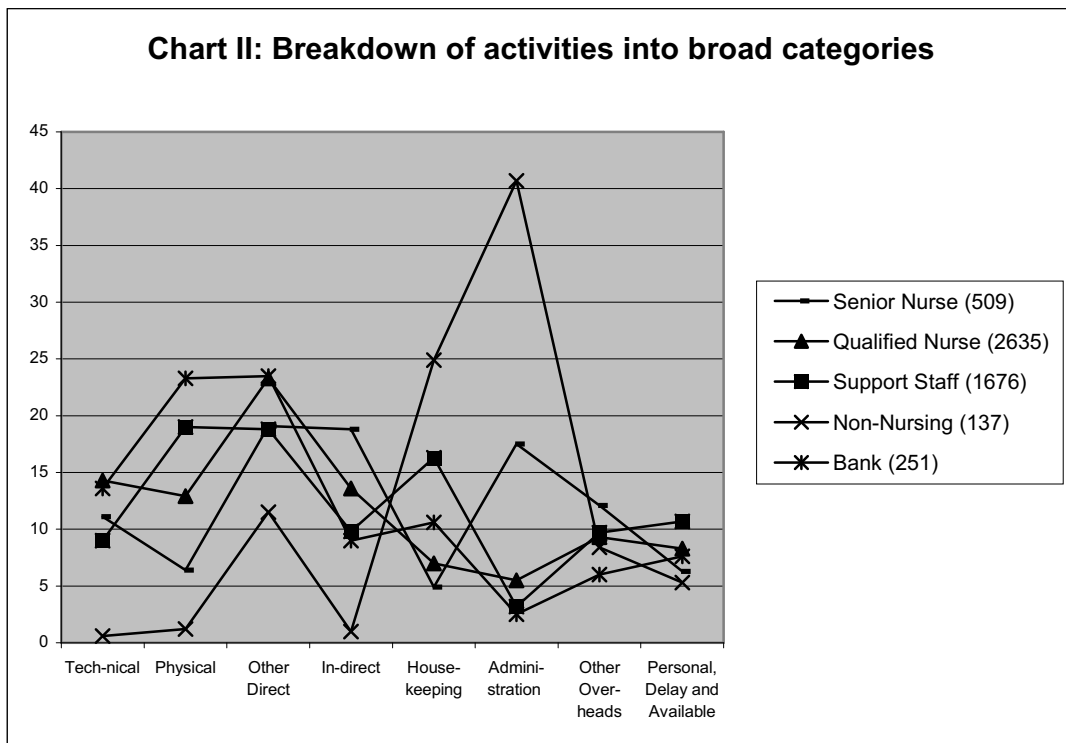
2. Division of labour

Key message

Whilst there are some wards where there is a clear demarcated division of labour between different grades of staff, the average pattern is that there is little difference in the types of tasks undertaken by different staff grades suggesting that the skills of different staff are not being used very efficiently.

Evidence

Chart II below describes the proportions of time spent by all grades of staff on direct and indirect patient care (the precise figures are given in Table II in Annex II). These two categories of care are collectively known as patient-related care. As expected, on average, the higher proportions of time spent on physical care (attention to activities of daily living for example) occur amongst less qualified staff whilst the greater proportion of technical care is provided by qualified nurses. However, excluding non-nursing staff, the overall pattern of activities is broadly similar for other grades of staff.



This chart also describes the proportions of time spent by all grades of staff on housekeeping, administration, other overheads and personal/delay and available time. This latter category is defined as spare time in which work could be done if there was any available, with personal time being essentially defined as meal breaks, and delays being defined as, for example, waiting for porters/doctors to arrive. Whilst one would expect less qualified staff to spend greater proportions of their time on housekeeping activities, it is surprising that as much as 5% of senior nurses' time and 7% of qualified nurses' time is spent on this activity. With regard to administration, there appears to be clear distinction between those grades of staff mainly undertaking this activity and it is also intuitively sensible.

Apart from the two activities of housekeeping and administration, therefore, there is little difference between the patterns of activities across all grades of staff. The same is true when one looks at more detailed breakdown of activities.

Furthermore, the inter quartile ranges show at least a three-fold difference between shifts for patient-related care and overheads (charts not shown). For example, the upper quartile figure for direct technical care for support staff (14.6%) is greater than the average value for qualified nurses (14.3%). This suggests that there do not appear to be rigid divisions of labour at the ward level. Instead, the assignment of staff to different types of activities appears to reflect particular ward management styles.

3. Skill mix issues

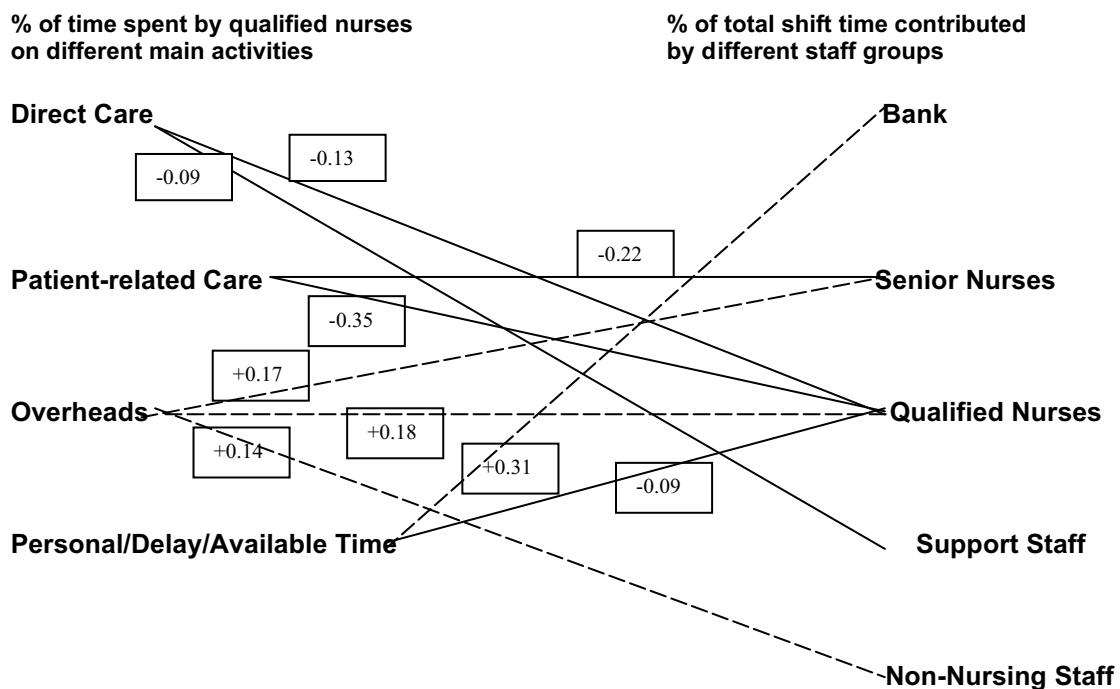
Key message

There appears to be little increased specialisation between staff groups as overall staffing increases. An additional person of any grade does more of everything.

Evidence

The next issue is whether there is any association between the way that qualified nurses spend their time and the skill mix of the total nursing workforce on the shift, and in particular the contributions of nursing support groups to release qualified nurses to carry out direct care. When we look at the breakdown of their *own* time (Chart IIIA below or Table IIIA in Annex II), the first observation is that, as the total time on the shift contributed by qualified nurses increases, there is a positive correlation with the proportion of *their own time* that they spend on overheads but a negative correlation with the other main categories (including direct care). Moreover, as the proportion of *overall shift time* contributed by other categories of staff increases, the proportion of *their own time* that qualified nurses spend on patient-related care tends to *decrease* and the proportion of time that they spend on overheads tends to *increase*.

Chart IIIA: Correlation between percentage of time spent by qualified nurses on different activity groupings and the percentage contribution to total time on shift by different staff groups



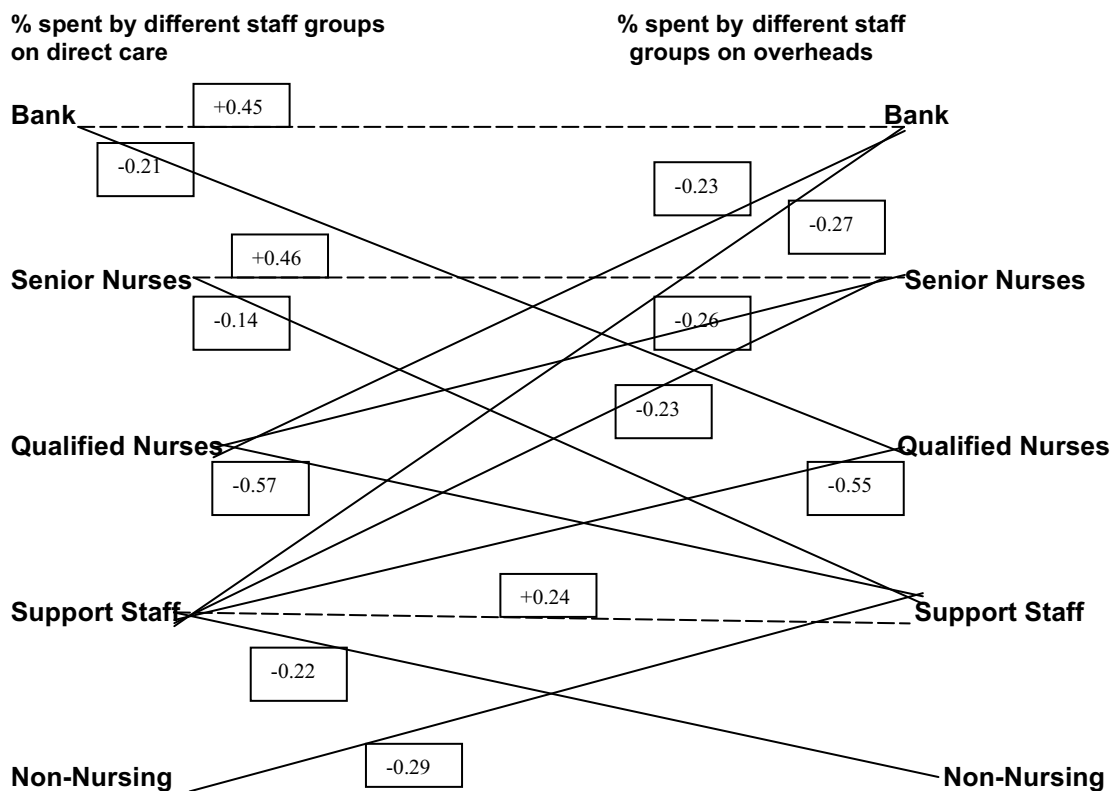
Note: Dashed lines – positive correlations; solid lines – negative correlations

If we compare the proportion of *overall staff time of all groups combined* that each staff group spends on direct care and on overhead care (Chart IIIB below or Table IIIB in Annex II), the correlations are positive and large, as one would expect, given that both increase with the total contribution of the staff group to the shift. But otherwise, the only statistically significant correlations are *negative* between the proportion of total staff time spent on overheads by the other categories of staff and the proportion of overall staff time spent by either qualified

nurses or nursing support staff on direct care. This supports the findings from Chart IIIA because one would have expected that as one group spent more time on overheads (as a percentage of the total hours worked by all groups on the shift), this would free up more time for other staff groups to spend on direct care (again, as a percentage of the total hours worked by all groups on the shift). This does not, however, appear to be the case.

There is also a strong positive correlation between the proportional input of bank staff and the proportion of their own time that qualified nurses recorded as personal/delay/ available time. We know that bank and agency staff cost more: is it also possible that they are having an adverse impact on the effective working practices of other staff?

Chart IIIB: Correlation between percentage of all time spent on shift by different staff groups on direct care and percentage of all time spent on shift by the same staff groups on overheads (for base Ns see Table in Annex II)



Note: Dashed lines – positive correlations; solid lines – negative correlations

Basically Charts IIIA and IIIB show that the qualified nurses do not seem to spend more time on direct care when there are more staff from other groups present, or when other staff groups undertake more overhead work. There is therefore no evident substitution effect consequent upon poorer or richer skill mixes. In other words, if there are more of a particular staff group, they just do more of all the work on the ward. In turn, this suggests that, generally speaking, the different staff groupings are carrying out the same pattern of activities as another member of the ward team, thus reinforcing the observation made under the previous theme.

4. Capacity

Key message

Both qualified and support staff report an increase in available time over night shifts.

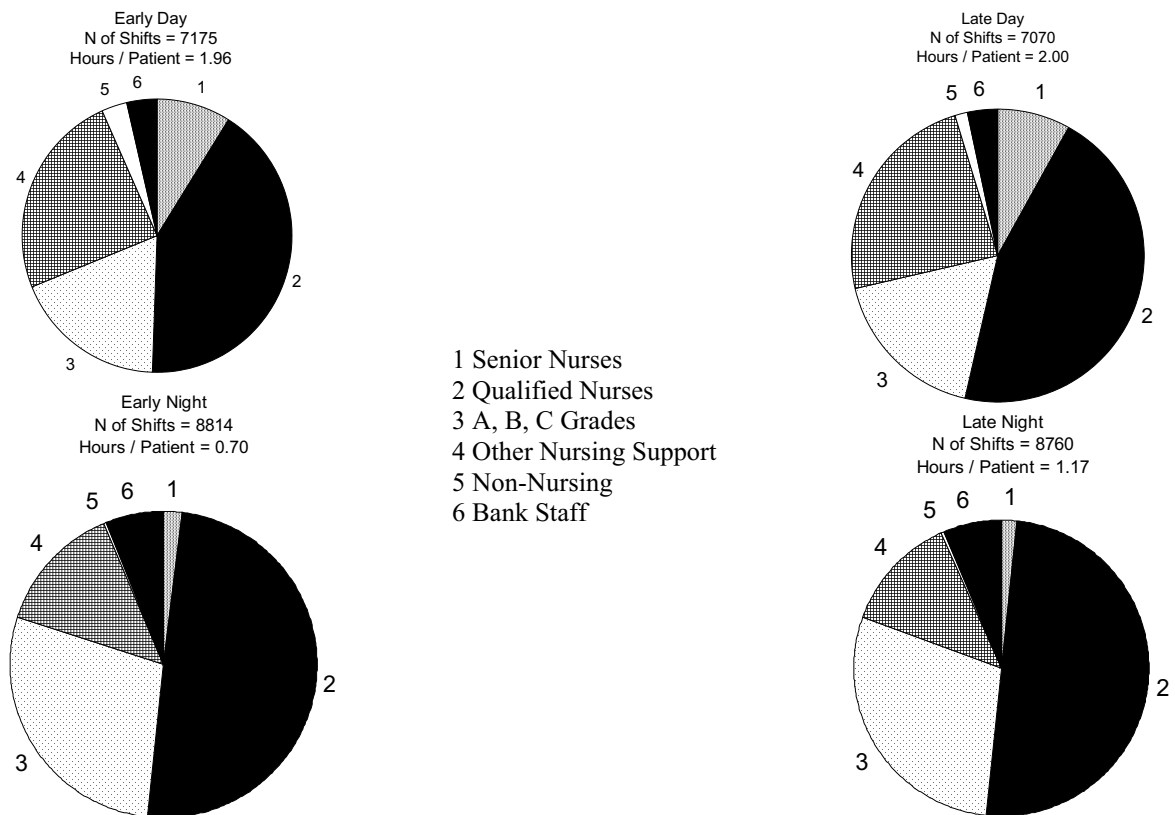
Evidence

(1) Use of capacity

Chart IV demonstrates quantitatively what is known intuitively:

- the number of hours worked per patient drops substantially from about 2 in the day shifts to about 1 in the night shifts;
- the input of senior grade nurses as a proportion of the total hours worked by all staff groups on the shift is between 8-9% during the day but drops to less than 2% during the night shifts and the input of nursing support staff also drops substantially.. The opposite occurs amongst qualified nurses where input is around 43% during the day rising to 49% at night.

Chart IV: Hours Worked per Patient and Percentages of Hours contributed by each Group of staff in each Shift



Precise figures and base Ns are given in Table IV in Annex II. Bank staff provide about 6% of input during night shifts but less than 3% during the day and that of housekeepers, ward clerks and other non-nursing staff is lower still – although this may be explained by under recording on the part of non-nursing staff. These two groups of staff do not appear to be substituting for qualified or senior nurses. It should also be noted that there appears to be a clear division between junior nursing grade staff and other nursing support workers between day and night shifts. The data are also consistent with bank staff being deployed to make up the staff complement.

(2) *Spare capacity at night*

The question of spare capacity is addressed by a description of the range of the amounts of 'spare time' recorded by all groups of staff. The categories referring to this activity are those of available time (availability being described as spare time in which work could be done if there was any available) and delay time (being defined as, for example, time spent waiting for porters/doctors to arrive).

The proportion of available/delay time recorded by qualified nurses increase from around 5% during day shifts to nearly 20% during night shifts (chart not shown). This pattern is also repeated for support staff where the proportion of time they are available or delayed increases from 8% to 23%. Clearly this finding indicates some spare qualified nursing capacity at night. This may be important when considering options for managing the impact of the Working Time Directive on doctor's hours.

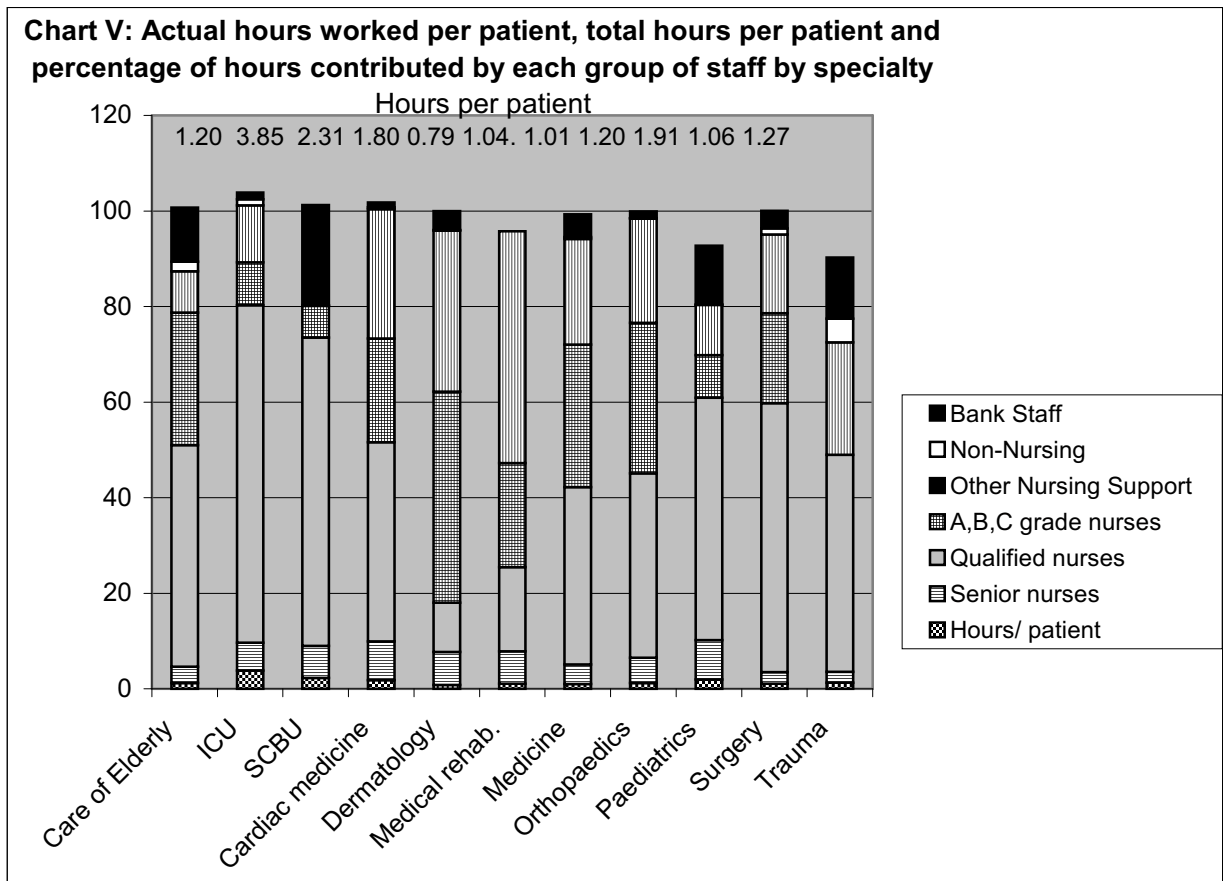
5. Flexibility

Key message

Whilst staff are deployed differently to different specialties, there is no apparent flexibility in the deployment of nursing staff in response to variations in patient demand (level of severity).

Evidence

There are clearly wide variations between the specialties in hours worked per patient (see Chart V) and in the skill mix of the nursing input. But whilst the values for ICU and SCBU wards are appropriately high and those for dermatology and medical rehabilitation low, the values for the other specialties vary substantially (for precise figures, see Table V in Annex II). In contrast, whilst only a small proportion of the nursing input on ICU and SCBU wards is provided by A, B, and C grade nurses together with other nursing support staff, they contribute over 60% of the input to dermatology and rehabilitation. There is clearly some focused deployment.



In addition, the proportion of qualified nursing hours is always positively related to the proportion of high demand patients (Table VI), whilst the proportion of A, B and C grade nurses and the proportion of nursing assistant hours (defined collectively as nursing support staff) are always negatively related to the proportion of high demand patients in the shift. Both the proportion of bank nursing hours and the proportion of non-nursing staff hours are always positively related to the number of patients on the shift. But all of these relationships are weak, showing little change in skill mix with the proportion of patients who are in the high

demand groups. This pattern is confirmed if we control for the variables two and three at a time: if we control for both number of patients and hospital, the *highest* correlation drops to 0.09.

Table VI: Correlation of percentage of high demand patients with skill mix on the ward (in terms of the percentage of the overall shift time provided by each grade of staff)

Controlling for:	N	Senior Nurse	Qualified Nurse	Support Staff	Non-Nursing	Bank Nurses
Raw correlation	27106	+.001	+.184	-.146	+.046	+.010
N of Patients, Specialty and Hospital	26990	-.012	+.089	-.085	+.034	+.013
Coefficient		0.003 ns	0.051**	-0.021*	0.004*	0.005 ns

These correlations suggest that there is very little apparent flexibility in the deployment of nursing staff in response to variations in demand. Whilst this is to be expected among ICUs and SCBUs because levels of demand are always high, the same appear to be true amongst specialties which can be described as more 'general' such as surgery, medicine and orthopaedics for example.

6. Economies of scale: is there evidence of under and over staffing?

Key message

There does not appear to be a strong relationship between numbers of patients and nurse staffing levels, suggesting the possibility of economies of scale.

Evidence

One might presume that the size of ward affects the possibilities for skill mix. But the correlation between the number of patients and the total hours worked on the shift by all staff groups combined – although highly statistically significant, given the numbers involved – is, itself, surprisingly low (0.180). After controlling for day of the week, shift, the proportion of high demand patients, hospital or specialty, the correlation is 0.203; and after controlling for all other possible variables, there is a small negative effect of the number of patients on the proportions of senior and qualified nurses' time and a small positive effect on the proportions of nursing support staff and non-nursing staff time. The largest coefficients (given in Table I in Annex II) were for the proportions of qualified nurses (-0.005) and for nursing support staff (+0.003). These imply that, all other things being equal, wards with, say, 25 rather than 15 patients had 5% less qualified nursing input and 3% more nursing support staff.

There is therefore very little 'mechanical' relation between numbers of patients and actual working hours, suggesting that, potentially, there is ample room for economies of scale (in the sense of combining wards to 'economise' on staff time) or reconfiguring the establishment staff.

7. Distributing the overheads/housekeepers

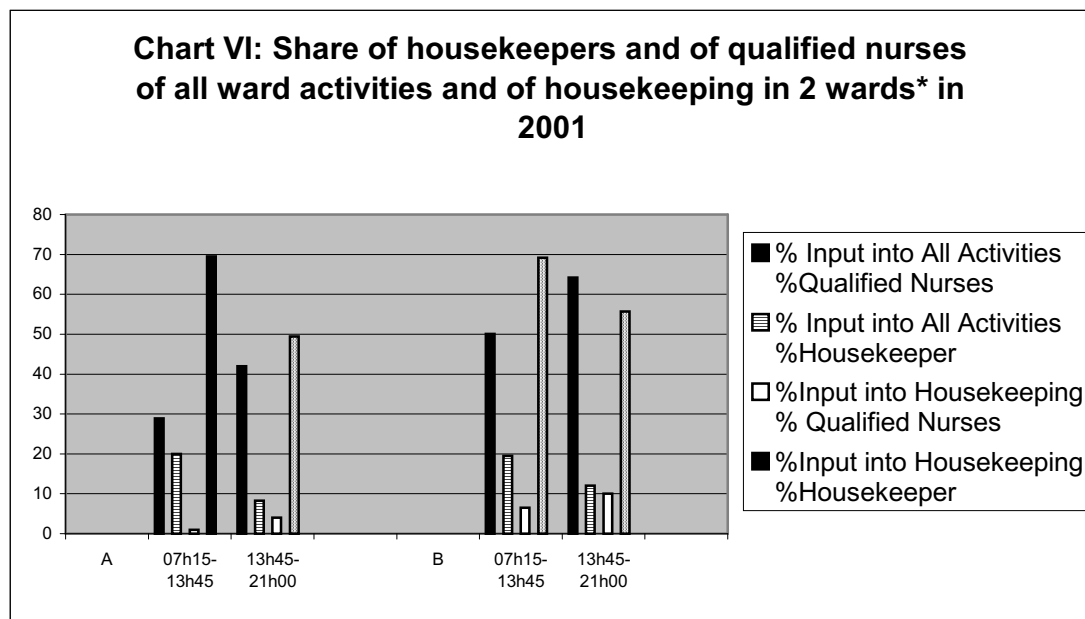
Key message

Housekeepers make a substantial contribution to overall staff input. Nursing time could be saved on administration and other non-patient-related care in wards where there is high demand (level of severity).

Evidence

Housekeepers

Anecdotal evidence – based only on recent data collected (in 2001) on two wards in the same hospital – suggests that the introduction of housekeepers onto wards may make a difference to the amount of time nurses are able to spend with patients. Chart VI shows that nursing staff, in particular grades D E and F, are delivering a (much) greater proportion of 'hands on' patient care compared to all other hospitals in our data set. (Reminder – patient-related care= direct + indirect care).



+ Ward A is a haematology ward and Ward B is a general medical ward

Whilst the differences in Chart VI between these two wards and the master data set from the 1990s cannot necessarily be attributed with any certainty to the presence of housekeepers (especially given the very small number of wards involved), clearly there is some factor at work in these wards which is changing the working patterns of qualified nursing staff.

In Table VIIA we show the extent to which housekeepers contribute to the total staff input on the ward and the percentage of the housekeeping activity carried out by housekeepers. Clearly, housekeepers are making a substantial contribution to the overall staff input (about one-eighth of the total staff input in both wards and about 20% on the pressured morning shift) and that they are carrying out more than half of the housekeeping tasks even though they only work on the two day shifts.

Table VIIA: Patient-related care across four grades of nursing staff in two wards* in 2001 compared to all hospitals in 1990s data set

	Ward A	All NISCM hospitals	Ward B	NISCM General Medicine
Grade A (Nursing Auxiliary)	62.3	46.0	65.4	65.2
Grade D (Qualified Nurse)	84.8	65.3	83.4	73.1
Grade E (Qualified Nurse)	70.3	64.1	86.1	73.1
Grade F (Sister Acting Up)	30.3	63.4	55.0	64.1

* Ward A is a haematology ward, Ward B is a general medical ward

The data from the 1990s shows that less housekeeping was being done overall and, of course, there were very few wards with staff designated as housekeepers. However, the information on qualified nurses shows that they contributed about 56% to overall shift time (of the same order as Ward B), and, of the housekeeping that was recorded, about a third was attributed to qualified nurses. In these two wards, instead of over 30%, qualified nurses are carrying out 3% and 8% of housekeeping (see Table VIIB in Annex II). If these two wards are representative, qualified nurses are still spending a not insignificant fraction of their time, even during the day shifts, on housekeeping activities. There has been a substantial shift in the burden of housekeeping.

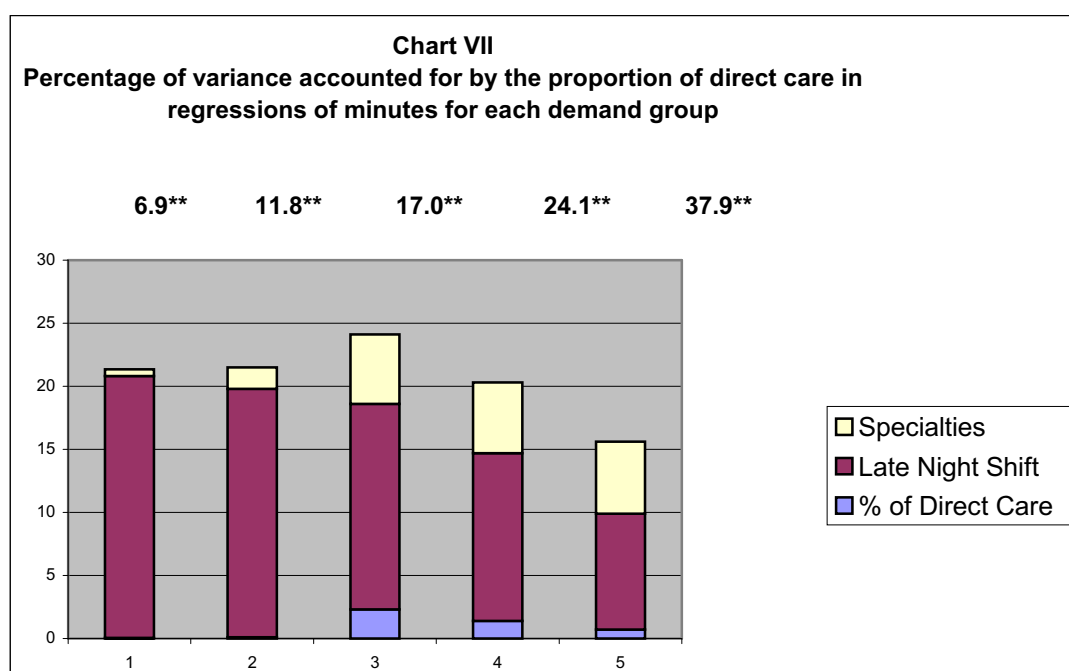
Note: Observations on demand/dependency groupings

Variations in minutes: responsive to demand and levels of direct care

The classification into demand groups in each hospital is based on the observation of the number of minutes spent by nurses on individual patients. Although the number of minutes increases for more demanding groups in approximately the same way in each hospital, there are substantial variations between hospitals in the number of minutes spent on each demand group. We have examined whether there is any association between these variations and the proportion of time spent on direct care, as one might expect this to be an important determinant of the demand grouping. Wards where the observed number of minutes for a given demand group was higher should in principle correspond to more complicated cases and therefore higher levels of direct care.

Although the raw correlations are initially negative, after controlling for shift and specialty, wards with higher values for the number of minutes are likely to have higher proportions of direct care although these levels are not statistically significant.

Separate multiple regressions, with the minutes in each demand group as the dependents and the proportion of direct care entered along with shift and specialty dummies as independent variables, have been run and the full results are shown in Table VIII of Annex II. These show the importance of the way the late night shift is organized in different hospitals in that it has a major impact on the number of minutes in each of the demand groupings. It is also clear that there is wider variability in the higher demand groups as the variance accounted for decreases steadily from 21% to 15%. Moreover, we note the positive coefficient of the percentage of direct care in the regressions for the number of minutes for demand groups 1 and 2 but negative coefficients for demand groups 3, 4 and 5 (Chart VII below (and Table VIII in Annex II)). Although these coefficients are never statistically significant, there is a very slight suggestion that a higher proportion of the time spent with the less demanding groups is on direct care (which is consistent with the observations on Care of the Elderly wards in Chart V), whilst with the more demanding groups, the staff are spending more time on indirect care and overheads. *If there are time savings to be made, it would appear to be in respect of the administrative and other non-direct care tasks associated with high demand patients.*



** estimated coefficients for late night shift

Annex I

The questions raised at the outset of this project were:

- (i) To describe the proportion of time spent, the average time spent and the distribution of time spent on activities of all grades of nursing staff (and other staff if data are available) on the four main categories of care – viz direct patient care, indirect patient care, support and administration, and personal time.
- (ii) To describe the above variables in terms of different ward types/specialties, overall staffing levels and skill mixes.
- (iii) To describe the extent to which shifts at different times of the day/week and at different times of the year affects the analysis and whether this needs to be taken into account.
- (iv) To describe any time trends apparent in the data towards higher/lower skill mixes and to identify those hospitals (if any) with higher/lower skill mixes.
- (v) To attempt to assess the potential for substitution and delegation of workload to other members of staff within the same ward environment and across ward types/specialties.
- (vi) To identify any other factors which may affect the scope for different potential skill mixes.

Annex II

Table IA: Regression of proportional input of different staff groups on number of patients, controlling for specialty, shift, year of data and actual total hours worked, and then for hospital

	Senior Nurses	Qualified Nurses	Nursing Support	Non-Nursing	Bank
Variance accounted for by: ↓					
Specialty	.035	.158	.088	.023	.049
Specialty + Shift	.121	.171	.164	.105	.082
Specialty + Shift + Actual Hours	.122	.180	.178	.105	.082
Specialty + Shift + Actual Hours + N of Patients	.126	.212	.190	.110	.088
Specialty + Shift + Actual Hours + N of Patients + Year	.132	.258	.326	.110	.089
Specialty + Shift + Actual Hours + N of Patients + Year + Hospital	.157	.372	.492	.129	.236
Coefficients: ↓					
N of Patients	-0.001**	-0.005**	0.003**	0.0003**	-0.0002 ns
Year	-0.060	+0.043	-0.079	-0.0007 (ns)	-0.017
Largest negative hospital dummy	-0.434	-0.328	-0.389	-0.0028	-0.086
Largest positive hospital dummy	0	+3.05	+0.054	+0.025	+0.173

Table 1B is in the main text

Table II: Breakdown of activities into broad categories

Grade	Technical	Physical	Other Direct	In-direct	House-keeping	Administration	Other Over-heads	Personal, Delay and Available
Senior Nurse (509)	11.1	6.4	19.1	18.8	4.9	17.5	12.1	6.3
Qualified Nurse (2635)	14.3	12.9	23.3	13.6	7.0	5.5	9.3	8.3
Support Staff (1676)	9.0	19.0	18.8	9.8	16.3	3.2	9.7	10.7
Non-Nursing (137)	0.6	1.2	11.5	1.0	24.9	40.7	8.4	5.3
Bank (251)	13.6	23.3	23.5	9.0	10.6	2.5	6.0	7.6
Total (5208)	11.9	14.4	21.3	12.4	10.3	6.7	9.7	8.3

Table IIIA: Correlation between percentage of time spent by qualified nurses on different activity groupings and the percentage contribution to total time on shift by different staff groups

% of time spent by Qualified Nurses on Different Main Activities ▼	% of total shift time contributed by different staff groups				
	Bank	Senior Nurses	Qualified Nurses	Support Staff	Non-Nursing Staff
N	102	329	689	566	99
Direct Care	-0.15	-0.11	-0.13**	-0.09*	-0.13
Patient-related Care	-0.13	-0.22**	-0.35**	+0.03	-0.07
Overheads	+0.14	+0.17*	+0.18**	-0.02	+0.14**
Personal/Delay/Available Time	+0.31*	+0.06	-0.09*	+0.03	-0.01

Table IIIB: Correlation between percentages of all time spent on shift by different staff groups on direct care and percentages of all time spent on shift by the same staff groups on overhead

%s spent by different staff groups on direct care ▼	%s spent by different staff groups on overheads				
	Bank	Senior Nurses	Qualified Nurses	Support Staff	Non-Nursing Staff
Bank (N)	0.45**(104)	0.08 (52)	-0.21*(102)	-0.17 (91)	0.25 (16)
Senior Nurses (N)	0.22 (52)	0.46**(357)	-0.01 (329)	-0.14*(312)	-0.03 (89)
Qualified Nurses (N)	-0.23*(102)	-0.26**(329)	-0.01(689)	-0.57**(566)	-0.14 (99)
Support Staff (N)	-0.27*(91)	-0.23**(312)	-0.55**(566)	0.24**(582)	-0.22*(95)
Non-Nursing (N)	-0.23 (16)	0.02 (99)	-0.06 (99)	-0.29*(95)	-0.17 (100)

Table IV: Numbers of patients, nursing hours worked and percentages of hours contributed by each group of staff by shift

Shift	N of Shifts	Hours/patient	Senior Nurses	Qualified Nurses	A,B,C Grades	Other Nursing Support	Non-Nursing	Bank Staff
Early Day	7175	1.96	8.7	40.8	18.0	23.8	3.1	3.5
Late Day	7070	2.00	8.0	44.7	17.4	23.5	1.2	3.3
Early Night	8814	0.70	1.9	48.8	27.8	13.2	0.3	6.0
Late Night	8760	1.17	1.5	49.2	28.2	12.4	0.3	6.3
All Shifts	37844	1.37	4.9	46.3	25.0	16.7	1.1	4.3

Table V: Actual hours worked per patient, total hours per patients and percentage of hours contributed by each group of staff by speciality

Specialty	N of shifts	Hours/patient	Senior nurses	Qualified nurses	A,B,C grade nurses	Other Nursing Support	Non-Nursing	Bank Staff
Care of Elderly	2658	1.20	3.4	46.4	27.7	8.7	2.0	11.3
ICU	1758	3.85	5.8	70.6	9.0	11.9	1.3	1.4
SCBU	425	2.31	6.7	64.5	6.6	0	0.1	21.0
Cardiac medicine	1128	1.80	8.1	41.7	21.7	27.1	0.4	1.0
Dermatology	1663	.792	6.9	10.3	44.2	33.7	0.1	4.0
Medical rehab.	746	1.04	6.8	17.6	21.8	48.5		
Medicine	6117	1.01	4.1	37.1	29.8	22.1	0.4	4.8
Orthopaedics	4763	1.20	5.3	38.6	31.5	21.8	0.1	1.4
Paediatrics	2062	1.91	8.3	50.7	8.9	10.5	0.1	12.3
Surgery	2034	1.06	2.4	56.3	18.8	16.5	1.3	3.7
Trauma	701	1.27	2.3	45.4	0.0	23.5	5.0	12.8
Total	38585	1.36	4.8	46.4	25.5	16.4	1.0	4.1

Tables VI and VIIA in main text

Table VII.B: Share of housekeepers and of qualified nurses of all ward activities and of housekeeping in two wards* in 2001

Ward and Shift	% input into all activities		% input into housekeeping	
	% Qualified Nurses	% Housekeeper	% Qualified Nurses	% Housekeeper
A				
07h15-13h45	28.9	20.0	1.0	69.5
13h45-21h00	42.0	8.3	4.0	49.4
All Shifts*	40.3	12.4	2.9	54.5
B				
07h15-13h5	50.1	19.5	6.5	69.2
13h45-21h00	64.2	12.0	10.0	55.7
All Shifts*	58.3	12.2	8.4	53.3

* Includes the night shifts when the Housekeepers are not on duty

Table VIII: Estimated coefficients and adjusted r^2 in regressions of minutes for each demand group on the proportion of direct care, controlling for shift and speciality

Demand groups	1	2	3	4	5
Variables included					
(1) % of Direct Care	0.00	0.02	-0.06	-0.07	-0.11
(2) Late Night Shift	6.9**	11.8**	17.0**	24.1**	37.9**
(3) Specialties?	None	Medicine, Orthopaedics	Medicine, Orthopaedics	Medicine, Orthopaedics	Cardiac, C of E, Medicine
Adjusted R squared					
(1)	0.04	0.1	2.3	1.4	0.7
(2)	20.8	19.8	18.6	14.7	9.9
(3)	21.3	21.4	21.8	18.9	14.9