Nursing and Payment by Results: Understanding the cost of care

Executive Summary

Introduction

NHS England has been reimbursing providers for acute care using an activity based casemix payment system called Payment by Results (PbR) since 2003. PbR uses Healthcare Resource Groups (HRGs) as a means of classifying patients' treatment episodes for reimbursement. They are developed by clinical working groups from national data and are designed to group together episodes that are clin

What did the study find?

Data was gathered on 60 wards for all patients during six shifts in which nursing activity studies took place (approx.100 patients per ward; 117,400 nursing activities during 360 early, late or night shifts totalling 3,668 nursing care hours).

Each patient was assessed up to three times a day by the primary nurse using the Leeds University patient dependency rating scale (which ranges from 1=independent to 4=fully dependent on nurses). The HRG study ward dependencies were compared with the larger Leeds dataset for benchmarking and data extraction purposes (see Appendix 1). All ward staff (including RNs, HCAs, ward clerks and housekeepers) were observed every ten minutes for up to 60 hours throughout six shifts including nights and weekends in each ward. Thirty-two activity descriptions were used to record nursing interventions:

a) direct (face-to-face) patient care (e.g. giving medication); 56,725 face-to-face nursing interventions were observed in 60 HRG study wards.
b) indirect care, away from the bedside (e.g. updating patient records). Around 28,923 indirect nursing interventions were observed in 60 HRG study wards.
c) non-nursing duties (e.g. non patient administration, general cleaning), totalling 18,987 activities, were observed in the HRG study wards. This figure may seem high, but up to 40% of the ward establishment in some cases were HCAs and ancillary staff.
d) personal time (e.g., drinks, breaks); 12,704 activities were observed.

A range of different wards were covered by the study and data obtained for each as described above. The results were then converted to a daily nursing cost[3]. A selection of results has been presented below but a full copy of the methods and results can be sent on request. The table below summarises the results from 6 main ward types:

Ward type	Most commonly observed HRG in the study wards	Daily HRG reimbursement (*assuming average LoS*)	Actual Nursing costs per day	% of daily reimbursement
Palliative care wards	HRG S21 - convalescent or other relief care (non elective)	£323	£158	49%
Medical wards	HRG E11 - Acute myocardial infarction with complications (non-elective)	£1368	£71	5%
Orthopaedic wards	HRG H80 - Primary hip replacement (elective)	£381	£80	21%

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[3] See appendix 3 for a complete breakdown of how observed activity was converted into a daily nursing cost weighted for patient dependency

Stroke care
wards

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Introduction

NHS England has used Health Resource Groups (HRGs) as a currency for reimbursing providers for the care they deliver since 2003. Simply put, HRGs classify patients' treatment episodes for a reimbursement tariff designed to pay health providers for treatment and care. They are also used for benchmarking and audit purposes. A process of classifying each episode of care is carried out (Coding) which places patients into clinically similar case groups assuming they consume similar health resources. However, provider costs for the same treatments often vary significantly.

It has become apparent to the RCN that whilst this system offers many potential benefits for improving our understanding of the care pathway in an acute and long stay setting, it also has some potential pitfalls for nurses and nursing care.

In the current economic climate, the funding allocated to public services is under particular scrutiny and services such as the NHS face substantial efficiency savings as part of contributing its part towards a reduction in public sector borrowing[5]. Therefore, systems that reimburse care providers within the NHS are highly likely to be used by Government as a powerful tool to drive providers to focus on and reduce costs even more.

For example, during 2006/7 the RCN gathered significant evidence from around NHS England that some 20,000 posts were frozen or lost in response to reductions in overall funding[6]. Where that focus on costs was crudely defined, specialist nurses and nurse leaders at ward and organisational who play a significant role in assuring the quality of patient care and promoting self care were found to be particularly at risk. The answer to the question of whether or not a service was delivered 'within tariff' was a frequent determinant of the future investment in that service. Issues about patient preference, professional decisions and quality were frequently subordinate to such concerns.

Whilst there are other factors that may influence provider decisions to cut workforce numbers, it is clear that the development and use of activity-based payment systems in the NHS has an impact on Nursing care and investment in nursing services.

The RCN commissioned this study, 'Nursing and Payment by Results', to begin to address the invisibility of nursing activity and costs within Payment by Results (PbR) and to provoke further discussion with professionals and policy makers about the way forward. This report summarises the results of that study conducted by Keith Hurst of Leeds University which looked at the relationship between actual nursing activity in a number of acute/long stay care settings; patient dependency; and reimbursement under the HRG based system known as PbR.

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[5] See HM Treasury budget report (2009) '*Building Britain's Future*'. HMSO, London
[6] RCN (2006) '*Keep Nurses working, keep patients safe*'. RCN Campaign

Background

Case-mix activity based payment systems such as PbR are not unique to the UK. Many countries around the world use Diagnosis Related Groups (DRGs) to classify their patients. In NHS England, HRGs replaced DRGs and have been built specifically for the NHS activity based case-mix payment system, 'Payment by Results', therefore, is currently an England only initiative, although HRGs and other elements of PbR have been used in Northern Ireland.

The PbR system replaced NHS block contracts in 2003 in which NHS Trusts were paid whether work was completed or not. In PbR, money follows the patient pathway, "rewards efficiency and effectiveness and encourages patient choice and service responsiveness"[7].

A major weakness with HRGs (and DRGs) is that their costs are based on a costing model that focuses predominantly on medical diagnosis and its prescribed interventions. Whilst this is not a problem in itself, when coupled with the fact that Nursing costs components are crudely aggregated (at least in NHS England), rather than systematically coded, it results in a system of reimbursement that does not consider patient dependency, or actual nursing activity. Neither does PbR recognise service quality since underlying data were not drawn from best-practice sites.

In other words, whilst overall nursing workforce costs are included to a degree, the actual contribution of nursing teams at all levels is largely 'invisible', as is the effect of patient dependency on the amount or intensity of effort required by those nurses to deliver the care required.

Why is this important for nursing? The tariff (or price list) is fixed so it is imperative that costs are accurately understood and apportioned. The PbR tariffs are based on average costs hence Trusts may win or lose depending on their efficiency relative to the tariffs. In reality, costs may vary for several reasons (such as demographics) and so there is a risk that a Trust may lose or gain under PbR for reasons other than efficiency or quality.

In addition, once providers have been reimbursed under PbR, they are free to allocate those resources in whatever manner they wish. Diagnosis and procedure costs are clearly directly coded to the patient and 'visible' within PbR so it is arguably easier for providers to allocate resources to cover those costs.

Nursing costs however are not 'visible' and in effect risk being resourced by 'what is left over' from the reimbursement of medical diagnosis and procedure costs unless data is provided arguing for a greater share of the funds. In the absence of that data and as nursing is the major ward cost and there is likely to be pressure to reduce these costs in particular.

It is therefore important that Nurse Managers have access to accurate nursing information for sustaining the quality of care and its associated nursing skill mix costs. Ward nursing

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[7] Department of Health (2004)

cost information in particular is vital for ensuring that providers do not shift costs by varying nursing skill mix or by altering care models inappropriately.

Existing methods for separating nursing costs from other HRG components have ranged from non-existent, to fixed nursing costs (ignoring patient dependency or nursing workload) to sophisticated DRG nursing costs drawn from patient generated workload and staffing data.

However in the UK, there is a paucity of nursing activity data and its contribution to overall costs; there is even less information on nursing's contribution to quality. In the midst of significant pressure to understand costs and incentivise activity-based on quality, nursing in the UK finds itself under scrutiny from several directions.

Nursing needs to develop a more sophisticated understanding of its contribution to care from different perspectives to enable managers and nurses to take part in discussions about the future of systems, which seek to classify, quantify, incentivise and deliver high quality patient care.

As far as we are aware, this study is the first time patient dependencies and related nursing activity and quality have been aligned to HRGs. Without this connection, estimated HRG nursing costs are less accurate because they are based on an assumption that beds are occupied by patients with uniform nursing needs, which is clearly not the case

What was the aim of the study?

In the above context, the study was designed to:
1. Identify nursing costs based on nursing time and grade needed for selected HRGs by collecting patient and nursing activity data from 'best practice' settings.
2. Establish, if any, the connections between HRG costs and nursing activity to construct an HRG and associated nursing care dataset for common HRGs in the Leeds University nursing database.
3. Compare selected HRG nursing costs (derived from nursing data obtained from best-practice settings) with the reimbursement providers receive under the PbR tariff.

As nursing inputs are linked with quality of care[8], the data that informs the PbR tariff should preferably be based on nursing costs drawn from quality-assured wards. The HRG nursing cost component also raised certain questions, which the study sought to answer, namely:

1. Is it possible to determine optimum staffing and related costs for common HRGs?
2. Can optimum staffing be converted into nursing costs and made transparent in the PbR tariff?

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[8] *Op cit*

The study was overseen by a Steering Group[9] which ensured that the study site selection, data collection processes, and analysis of the results met best practice standards as far as possible.

In each study ward, specially trained nurse assessors (auditors) collected data on patient age, diagnoses, co-morbidities and treatments; their dependency scores; and any nursing care received by the patient over a 48 hour period.

Data gathered included the patients' age, diagnosis, co-morbidity and treatment (which were later converted into a HRG codes). Data were gathered for all patients during six shifts in which nursing activity studies took place (approx.100 patients per ward; 117,400 nursing activities during 360 early, late or night shifts totalling 3,668 nursing care hours).

Each patient was also assessed up to three times a day by the primary nurse using the Leeds University patient dependency rating scale. The HRG study ward dependencies were compared with the larger Leeds dataset for benchmarking and data extraction purposes (see Appendix 1). The Leeds rating system was used because the study's HRG-related dependency data could be compared with dependency data collected in the same way from one thousand wards for benchmarking purposes.

All ward staff (including RNs, HCAs, ward clerks and housekeepers) were observed every ten minutes for up to 60 hours throughout six shifts including nights and weekends in each ward. Thirty-two activity descriptions were used to record nursing interventions:

a) direct (face-to-face) patient care (e.g. giving medication); 56,725 face-to-face nursing interventions were observed in 60 HRG study wards.
b) indirect care, away from the bedside (e.g. updating patient records). Around 28,923 indirect nursing interventions were observed in 60 HRG study wards.
c) non-nursing duties (e.g. non patient administration, general cleaning), totalling 18,987 activities, were observed in the HRG study wards. This figure may seem high, but up to 40% of the ward establishment in some cases were HCAs and ancillary staff.
d) personal time (e.g., drinks, breaks); 12,704 activities were observed

Indirect care, non-nursing duties and 'non-productive' time (e.g., meal breaks) form the 'ward overhead', which features as a separate part of the nursing workload calculation and ward cost (see Appendix 2).

Nursing and ward quality data were gathered in each HRG ward the main purpose of which was to include only 'best-practice' wards and ichrks and a/ev1arsd-4 T0012 To9includinrurpose of

Substantive posts, plus bank, agency and overtime were converted into full-time equivalents, and so formed each ward's 'actual' nursing establishment. Time-out (lost time) such as annual, sickness, compassionate, maternity and study leave were also collected as they feature significantly in HRG cost calculations.

The most common HRGs in the specialities studied (medicine, long-stay elderly care, elderly acute care, stroke, palliative care, special needs and orthopaedic and surgical) were selected for analysis. To date, 6,295 patients, each with an HRG code, related dependency, activity and quality information were analysed (see Appendix 3 for further detail).

As a result of this study, the RCN has built a substantial database that includes patient and nursing data from 60 wards to date. Without these data, HRG nursing costs could not be estimated. However, this study has only just scraped the database's surface. Patient dependency, nursing activity and quality data, and the HRG information have been stored

£323 (assuming average length of stay). Using the data from the study wards, the nursing costs consumed 49% of that reimbursement or £158 per day.

The case mix shows that almost all the patients observed were rated dependency 3 or 4 – therefore requiring the most intensive levels of nursing care. Such a high level of dependency is also likely to be relevant to other practitioners such as physiotherapists who are likely to have a significant role in improving mobility and self care.

Even with significant nursing inputs, on face value it looks as if there might be sufficient reimbursement for providers to enable them to deliver effective patient care for this HRG. However the above figures do not include other costs faced by the provider such as medical costs, procedures, therapies and so on. In all the HRGs studied, it was difficult to establish AHP inputs (because most activity takes place off the ward) and their impacts on costs although that data maybe more easily gathered given the more discreet nature of the inputs.

Stroke care wards
The most commonly occurring HRG on these wards was HRG A22 non-transient stroke or cerebro-vascular accident >69 or with complications (non-elective) which was observed as having a high percentage of dependency 3 and 4 patients.

Out of a daily reimbursement rate of £311 (assuming average length of stay of 13.2 days) £93 or 30% would have been consumed by nursing care costs. This is surprisingly low considering the dependency of the patients concerned. This may be explained by the significant emphasis on multidisciplinary inputs and a significant role for physiotherapists, speech therapists and so on. Whether the reimbursement meets other therapist costs is not clear and a potential subject for further study.

Orthopaedic wards
The tariff for HRG H80 - Primary hip replacement (elective) pays £381 a day for the primary hip replacement (elective) HRG assuming an average length of stay of 13.7 days. Looking after these patients in best-practice surgical wards costs £80 each day. That is, nursing costs absorbed 21% of the daily payment tariff and 32% of the long-stay payment.

Again it appears that observed nursing costs sit well within the tariff payment, but they exclude, for example, surgery and prosthesis expenditure, which are likely to be substantial.

Elderly Care wards
HRG A38 - Alzheimer's disease (non-elective) was a very common observed HRG although it is unclear if Alzheimer's disease was the eventual actual diagnosis. This may not have been resolved until later after any acute episode or symptoms had been managed. The dependency mix shows again that 68% of patients were rated as dependency 3 or above.

Not surprisingly on these study wards nursing costs consumed 66% of the daily tariff reimbursement with an average length of stay of 40 days. This represents a significant

proportion of the costs, which leaves little for funding drugs, diagnostics, and the significant input of other professions such as physiotherapists and occupational therapists all of whom have an important role in terms of reducing length of stay and any associated risks such as slips, trips and falls.

Medical wards

The most commonly observed HRG (HRG E11 - acute myocardial infarction with complications (non-elective)) may suggest a high level of resource allocation given the life threatening nature of the condition and the specialised level of knowledge required.

The observed case mix shows a fairly low level of patient dependency with over 60% of the patients being classed as dependency 1 or 2. The reimbursement of £4787 per patient (or daily rate of £1368 assuming an average length of stay) is likely to be almost entirely consumed by expensive drugs, diagnostics and medical time.

Whilst the observed nursing care component only consumed 5% of the HRG costs, it is important to identify whether that 5% would be sufficient to provide the skill mix to provide the right level of expertise and knowledge to support the care of patients with these conditions.

The lower level of activity observed might also be explained by context of care and in particular the use of various technologies to monitor the patient. It is also possible that the nurses involved here would need a high degree of medical knowledge, technical ability to interpret a range of physiological indicators and trends as well as have proficient communication skills to deal with the anxiety that is likely to be present in many patients admitted under this HRG.

It is already the case that providers frequently say that they do not have sufficient funds to invest in advanced nurse practitioners who are able to add significant value to patient care through patient education and information to lead towards better self care. The absence of data about the contribution of such practitioners towards successful patient outcomes would make a case for investment even harder given the predominant medical focus of this care pathway.

Surgical wards

The most commonly observed HRG for this environment during the study was HRG P13 - other gastrointestinal or metabolic disorders with complications (non-elective). The currently tariff pays £432 a day. The cost of nursing care for the patients in the study looking after these patients in best-practice surgical wards costs £97 each day, 22% of the daily payment tariff.

In some sense this was an unusual HRG to be the most commonly observed as it does not directly relate to a surgical procedure i.e. time in theatre. The dependency of the patients within this HRG were predominantly assessed at level 2 (52% of observed patients) with 30% assessed as level 3. This suggests that patients in this category were relatively self caring or required a low level of nursing inputs. Repeating the exercise for a more complex HRG could reveal different results.

Study limitations

First and foremost it is important to state again that this is a small scale study, looking at a limited number of patients over a 48 hour period. It is worth noting that currently there are over 1,400 HRGs – the study deals only with the 6 most commonly occurring in the study wards. With more resources and a bigger sample, it might be possible to track an entire patient care episode thus further illustrating the changes in patient dependency over time in relation to costs. This would be a valuable exercise to attempt to explain variations in cost over time.

Moving forward, understanding the nursing contribution to patient care will be problematic for a number of reasons. Primarily the UK is far behind other countries in establishing coding practices and systems that are detailed enough to capture nursing activity.

Developments in the electronic patient record have been painfully slow in many respects and confidence that such records will assist understanding and documenting patient care is reportedly low[10]. Because of this, systems that have been designed to capture activity

wards look particularly vulnerable given the high proportion of the reimbursement absorbed by nursing care costs in the study.

Why should a clearer understanding of nursing activity and costs be developed within a fixed price payment system such as PbR? It is already clear that there is a connection between nursing inputs and the quality of care[12]. In the absence of data which clearly illustrates the *actual* nursing contribution, providers may be tempted to cut nursing numbers to achieve reduced costs.

One of the most promising opportunities to address the above comes from Lord Ara Darzi's NHS review (England) – the Next Stages Review (NSR, 2008) – which contains several recommendations for the NHS's future direction, the most significant of which is the renewed focus on quality.

Partly arising from the NSR and in order to inform decision making from the bedside to the Board Room, a series of metrics for measuring the quality of care have been launched. These metrics are designed to help providers benchmark existing care pathways and from there monitor variations in outcomes.

It is not clear however how this links to the existing incentives contained within PbR. This should be a concern to policy makers and providers of care.

There are signs of investment in making this connection through the development of best practice tariffs led by the DH PbR team. However it is becoming clear that a lack of basic data on nursing *activity* within the NHS (which may or may not be connected with patient care *quality*) may hamper both the efforts to develop best practice tariffs and the nursing profession's efforts to demonstrate its effectivenestTc 0ltractRenestTc 0ltn20ibaa1.92 0 Td(qua23 T-eTt5

- o Future workforce planning may be hampered by broad or ill-defined notions of the contribution each constituent part makes to the cost effectiveness of multidisciplinary teams.

For the future it is essential that further detailed work is carried out on nursing activity but not just for the purposes of creating a more sophisticated activity-based reimbursement system.

A connection must be made between best practice care pathways, workforce design and the financial incentives inherent within PbR. Without this connection, estimated HRG nursing costs are less accurate because they are based on an assumption that beds are

multidisciplinary team such as associated therapists, healthcare support workers, medical technicians?

o Given the gap between actual activity and reimbursement, are resources being inappropriately allocated and thus not always incentivising the most effective care pathways or models?

One way to address some of these issues in the short to medium term would be to look at a range of HRGs where the tariff could be 'unbundled' in light of more accurate nursing activity data to establish whether current reimbursement accurately reflects actual patient need and dependency.

Historically, DRG-based nurse staffing methods estimated the nursing resource required for specific DRGs. Unfortunately these methods did not reflect patient's day-to-day nursing needs (Twigg and Duffield, 2009).

This consolidates the argument, therefore, to base PbR reimbursement also on nursing costs and to ensure reimbursement is fair. Moreover, if it's possible to plot HRG patients' dependency pathways then it may be possible to estimate the nursing cost for each HRG treatment and care phase, which may be useful for unbundling the tariff.

Conclusions

Whilst recognising the study's limitations, it suggest that an understanding of nursing care processes within a fix priced case-mix activity based payment system might be an important addition to the existing understanding of hospital patient care costs.

It is worth pointing out again that the observed care costs referred to above as a percentage of the tariff reimbursement do not include other substantial medical, diagnostic, and pharmaceutical costs, which may consume all or most of the tariff aside from nursing costs. However, there are several challenges that face the implementation of a system that addresses the issues outlined above.

- Firstly, any system put in place to address the paucity of nursing data should not place a disproportionate data gathering burden on clinicians.
- Secondly, the data gathered must make sense to clinicians in the context of holistic patient care.
- Thirdly, there must be a feedback mechanism in place. The objective of this mechanism should be to encourage ownership of the analytical process and the data derived from the care given in order to better understand variation and thus to seek improvement.

The aim of such an exercise would be to develop a system which will enable more accurate analysis of service needs against provision which could help providers allocate existing resources more effectively as well as provide evidence for increases in resource allocations where appropriate.

Bibliography and References

Audit Scotland (2002). '*Planning Ward Nursing – legacy or design?*' Edinburgh: Audit Scotland

RCN (Royal College of Nursing) Policy Unit (2005). '*Payment by Results (PbR) Reform of Funding Flows in the NHS*' London.

Twigg, D. and Duffield, C. (2009). *'A review of workload measures: A context for new staffing methodology in Western Australia'* International Journal of Nursing Studies 46, pp.131-139.

Welton, J. Fischer, M. DeGrace, S. Zone-Smith, L. (2006). *'Hospital nursing costs, billings and reimbursement'* Nursing Economics Vol. 24, No 5, pp. 239-245.

Appendix 1: Study methods

The UK research governance committee (COREC as was, now the NPSA) agreed that the project was clinical and organisational audit, and service development rather than research; ethics approval, therefore, was not needed. Informed consent was obtained from staff and patients and clinical and non-clinical managers gave approval to undertake the study.

A Project Steering Group was convened which oversaw:

1. The selection of 60 hospital wards (across ten different Trusts) and data collection from those wards.
2. Meeting hospital managers, explaining, elaborating and agreeing project aims, objectives and methods.
3. Appointing project coordinators in each site to act as a liaison between the hospital and principal investigator (PI, Keith Hurst).
4. Recruiting and educating local nurse assessors (ward auditors) to collect inpatient data.
5. Obtaining approval to collect data.
6. In each study ward, collecting patient age, diagnoses, co-morbidities and treatments; their dependency scores; and any nursing attention received.
7. In each study ward, collecting nursing quality; funded and actual staffing; and lost time.
8. Aligning data described in 6 and 7 above to form a composite HRG nursing dataset.
9. Converting HRG nursing data into a nursing cost per day to compare costs with PbR tariff payments.
10. Writing reports explaining the project's method and findings to inform and influence relevant stakeholders.

The Leeds University nursing database is one of the UK's largest patient and nursing activity and quality datasets but it is not possible to align patient dependency, nursing workload, cost and quality data retrospectively to HRGs for estimating HRG nursing costs. The study, therefore, aimed to modify the Leeds nursing information collection systems so that patient dependency data and related nursing workload activity from high-quality 'best practice' hospital wards were linked to HRGs costs. The PI recruited study wards by approaching hospital managers interested in HRG nursing issues but increasingly managers contacted the PI asking to join the project. Consequently, about one new ward was added to the Leeds University nursing database each week.

The aim was to include wards where the commonest HRGs were found, and to recruit sufficient wards in case some were excluded if nursing standards were not met. Staff in 60 acute and long-stay wards representing a mix of specialities in secondary and tertiary, mainstream and foundation hospitals in ten trusts participated in the study.

assessment; care plans; implementing care plans; evaluation; ward resources; policy and procedures.

One third of patients (representing the ward's case mix) were assessed in each HRG ward. Assessors judged nursing standards by:

Appendix 2: Study ward patient and Leeds database dependencies

This appendix illustrates the distribution of dependency scores in the study wards as compared to those gathered for the much larger Leeds database. It shows that dependency profile of the study wards is similar to that of the Leeds database wards.

Specialty		Dep. 1	Dep. 2	Dep. 3	Dep. 4	χ^2, df, p
Long-stay elderly care wards	Average patients in 10 HRG wards	0.6	5.8	10.2	3.5	1.38, 3, NS
	Average patients in 134 Wards (Leeds database)	2.6	5.2	10.5	5.3	
Acute-elderly care wards	Average patients in 3 HRG wards	2.7	7.8	11.7	2.2	0.64, 3, NS
	Average patients in 30 Wards (Leeds database)	2.1	10.2	11.2	3.7	
Medical wards	Average patients in 7 HRG wards	2.3	10.7	6.4	2.9	0.60, 3, NS
	Average patients in 97 Wards (Leeds database)	4.5	11.3	7.0	2.8	
Orthopaedic wards	Average patients in 3HRG wards	1.8	4.9	7.4	1.1	0.64, 3, NS
	Average patients in 78 Wards (Leeds database)	3.9	8.6	8.0	1.8	
Stroke wards	Average patients in 2 HRG wards	0.1	2.8	11.5	8.2	2.9, 3, NS
	Average patients in 14 Wards (Leeds database)	1.5	5.6	10.0	5.3	
Surgical wards	Average patients in 4 HRG wards	3.2	11.6	7.6	2.9	0.32, 3, NS
	Average patients in 101 Wards (Leeds database)	3.8	9.5	5.6	2.2	
Special needs	Average patients in 3 HRG wards	0.0	1.0	2.0	4.3	1.6, 3, NS
	Average patients in 70 Wards (Leeds database)	4.0	5.5	8.0	11.5	
MAU	Average patients in 2 HRG wards	0.6	5.4	2.5	0.5	0.22, 3, NS
	Average patients in 18 Wards (Leeds database)	2.0	10.0	4.8	1.6	

Appendix 3: developing a daily rate for actual care costs

This report refers in several places to a daily rate for nursing care and compares them with the per diem rate allowed under tariff.

This appendix illustrates the process for converting patient numbers and dependency mix into a ward establishment and nursing cost. In this case the non-transient stroke HRG has been used as an example (using two Stroke Wards from the study)

Step 1. Obtain average number of patients in dependency categories 1 to 4; for example:

Dependency Category	1	2	3	4	Total
Number of patients	0.1	2.8	11.5	8.2	22.5

Dependency category 1 patients are virtually independent of nurses. Dependency 4 patients, on the other hand, are dependent on nurses for most if not all their needs.

Step 2. Record the average amount of direct care time given to each dependency category per day (using data only from quality assured wards):

Dependency Category	1	2	3	4
Daily time in minutes	24	79	214	245

The daily times (in minutes) were obtained from observing nursing care in the two stroke wards. In short, the lowest dependency (1) patient gets half an hour of hands-on care each day. The most dependent (4) patient, on the other hand, receives four hours of nursing care a day. Because this care is direct or hands-on care, the 'ward overhead' needs adding later.

Step 3. Convert the times in Step 2 above into ratios by dividing dependency category 1 minutes into dependency 2 minutes, dependency 1 into dependency 3 and dependency 1 into dependency 4:

Dependency Category	1	2	3	4
Ratios	1	3.3	8.9	10.2

Calculations using care ratios make the remaining task easier and more meaningful. In short, it becomes clear that dependency 4 patients get ten times more nursing care than dependency 1 patients (which reflects the 4's higher dependency).

Step 10. Convert the total nursing htConve7the total nur9

Appendix 4: Specialities (fully) analysed in the HRG Study (to date)

The table in this appendix shows the number of patients in each study ward as a percentage of the overall population observed. Only the higher percentages were reported in this study. However a longer period of time may reveal that other areas would be worthy of study too.

Specialty	Patients	%
Acute elderly	326	6
Critical Care Units	51	1
Elderly	1423	23
Elderly Mentally Infirm	135	2
Medical	812	14