Identification of factors contributing to increased length of stay in two Diagnosis Related Groups

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Abstract

This paper discusses a study conducted to identify factors that contributed to increased length of stay for two diagnosis related groups (DRGs) and their consequential impact on nursing salaries, The study shows that three separate clusters of cost drivers (DRG-related, nurse-related, and patient-related) contributed to increased length of stay for DRG 177 (chronic obstructive airways disease) and DRG 367 (cholecystectomy without exploration of the common bile duct). It was not possible to establish a link between length of stay and nursing salaries due to lack of relevant data.

The results of the study can be used to raise professional awareness to the difficulties encountered by nurse managers in controlling length of stay when there are substantial numbers of different DRGs in acute care wards. The results can also be used as a basis for conducting larger studies into DRGs with higher than expected lengths of stay.

Casemix funding

Nursing services are the primary reason for admitting patients to hospital, and the provision of 24-hour care seven days per week means that nursing service costs are the largest solitary factor impacting on a hospital's expenditure. While it is possible to identify nursing expenditure as a proportion of the gross operating budget from the cost centre reports, according to Hathaway and Picone (1995) it is not possible to gain an accurate picture of patient expenditure due to lack of data on resource consumption. In spite of this, nurse executives and nurse unit managers have come under increasing pressure to account for spending.

Reacting to the high costs associated with the provision of health care, the Victorian Government introduced casemix funding in the early 1990s. The new model provided funding to hospitals based on identifying diagnosis related groups (DRGs), which theoretically denote patients with similar levels of complexity, who consume similar resources and have a similar length of stay (LOS). Each DRG has its own cost weight and an inlier length of stay (a range of days the patient is expected to stay in hospital, related to the disease category) that incorporates high and low boundary points. When a patient's stay is within the range but above the state average number of days for a particular DRG, then the term high inlier is invoked and if the stay extends beyond the number of inlier days expected, the term high outlier is used (Johnson-Lutjens, 1991). The length of stay in the casemix model is important because of the relationship between funding for a particular DRG and the associated costs encountered during an inpatient stay. Understanding the factors involved with length of stay will help policymakers and managerial staff administer and control budgets more effectively.

Research issues

Research on length of stay and nursing expenditure for particular DRGs is limited. To date, neither researchers nor managers have specifically determined the extent to which nursing resources are required for a particular DRG. Progress has been made with respect to measurement of nursing costs by DRG (see for example Oates et al, 1998), but not with respect to causes of variations.

According to Shamian, Hagen, Hu, and Fogarty (1994), nurses have argued that reduced length of stay for patients may be associated with increased nursing resource consumption, but there has been little empirical evidence to support this. Anecdotes from discussion with nurses suggest that a patient admitted as a result of the "saved day" requires more nursing care than the discharged patient (Arndt and Skydell, 1985). Johnson-Lutjens (1991) compared the link between length of stay, nursing time required to provide care, nursing resource use and the patient's medical condition. She found that 19% of variance in the length of stay was related to nursing care activity. She also indicated that, although some nursing care hours could be predicted in relation to the patient's medical condition (DRG), a substantial amount of variance remained unexplained.

Unfortunately, studies such as those undertaken by Johnson-Lutjens (1991) and Shamian, Hagen, Hu, and Fogarty, (1994) do not give a clear picture about the relationship between nursing costs and length of stay related to specific DRGs. Because this is an important area related to financial management many health care executives believe that there is an urgent need for more research.

The study

A study was conducted across two campuses of a health care services network in Melbourne, to identify factors contributing to increased length of stay and the impact of length of stay for specific DRGs on nursing salaries. Two DRGs that had a significant percentage of high outliers and/or high inliers above the Victorian State average were identified for inclusion in the study. Six wards in acute medical-surgical hospitals were selected for data collection.

Given the complexity of the investigation, the study was carried out in two phases. Phase 1 identified two DRGs and their percentage distribution in the wards. It also provided a profile of nursing salaries and wages in these wards. Phase 2 identified factors impacting on the LOS for the two DRGs. In order to enlighten nursing practice by allowing exploration of the depth, richness and complexity inherent in holistic nursing care giving, a qualitative methodology was employed (Burns and Grove, 1987).

Data collection methods

Phase 1 involved reviewing the hospital DRG database to identify one medical and one surgical DRG with significant numbers of inliers or outliers above the State average. The DRGs included in the study as a result of the search were DRG 177 Chronic Obstructive Airways Disease (COAD) and DRG 367 (Cholecystectomy without exploration of the common bile duct). The database also provided information on the age of patients; doctors providing treatment and the percentage distribution of DRGs 177 and 367 across several wards. Nursing salaries and wages in the wards included in the study were analysed to determine if there was a global relationship between the percentage distribution of DRG 177 and 367 and the cost of nursing care provision.

From the information gained in phase 1, a questionnaire was developed. In-depth, semi-structured interviews were then conducted with nurses responsible for management of a ward. Each interview lasted approximately thirty minutes. Transcripts were prepared from the interviews and used for analysis.

A meeting with nurse unit managers and associate (deputy) nurse unit managers was arranged to provide information about phase 1 of the study. Letters of invitation, an explanatory statement of the study and consent to participate forms were given out at the meeting. Consenting participants returned the forms to the research team.

Application was made to the research and ethics committee in the university for approval to conduct the study. Confidentiality of participants was assured by using code numbers known only to the researchers. The hospital

database used in the study did not identify patient details but only DRG classification information relating to the length of stay, the age of patients, doctors providing treatment and the percentage distribution across several wards.

Method of analysis

The technique described by Miles and Huberman (1984, 1994) for analysing qualitative data was used in the analysis phase of this study. A complete record was kept of all aspects of the research. A preliminary analysis of the interviews was made and involved listening to each tape and typing the verbatim statements. When this process was complete, each tape was listened to again and checked for errors in the transcribed text. The transcripts were read and reread by the authors of this paper, until a pattern of recurring themes emerged. The data were then classified according to the major themes identified.

Validity and reliability measures are not easily selected in qualitative research. However, Lo Biondo et al (1990) suggest that describing the process of data collection enhances validity. The data collection processes used in this study are referred to earlier in this paper. According to Miles and Huberman (1984, 1994) displaying participants' verbatim statements in the final report and in published articles assists with internal reliability. Selected participant statements are provided in the results section of this paper.

The limitations of this study relate mainly to the methodology chosen. The sample size and the data accessed were chosen specifically for this research and are therefore representative of this group at a specific point in time.

Results

The results of phase 1 of the study provided the following information. For DRG 367 (Cholecystectomy without exploration of the common bile duct), it was noted that approximately 20% (49 separations out of total of 242) were above the state average LOS of 3.09 days (see Table 1).

Table 1: summary Information on DRGs: July 1999-April 2000

DRG	Number of separations	Total inliers above the state average LOS	Total high outliers	Total Number and percentage of Separations above the state average LOS
367 inlier range 0-9 days State average LOS 3.9 days	242	42	7	49
177 inlier range 2-18 days State average LOS 6.43 days	410	150	39	189

There was no correlation between age and LOS in this DRG. Several doctors had a larger number of patients above the state average category than others, suggesting that there may be differences in medical practice that affect LOS. It was also noted that the same DRG number 367 applies to both laparoscopy and laparotomy procedures although each requires different post-operative care and LOS (discussed later).

For DRG 177 (Chronic obstructive airways disease), it was noted that 46.3% of separations (189:410) were above the state average LOS of 6.43 days (see table 1). There was some correlation between age and LOS in this DRG.

It was interesting to note that two campuses were involved in the data collection for DRG 177 and one campus had an average length of stay longer than the other. For Campus A, average patient age was 69.17years and the average length of stay for these patients was 8.49 days. For Campus B, average patient age was 75.83 years and the average length of stay for these patients was 11.77 days, as shown in Tables 2 and 3).

Table 2: summary of data relating to doctor speciality, patient age, average LOS, Campus A

Doctor category	Patient numbers	Average patient age	Average LOS/doctor
Respiratory	15	58.40	9.60 days
Respiratory	11	68.81	9.27
Respiratory	10	69	8.10
(GP)	6	80.50	12.50

Table 3: summary of data relating to doctor speciality, patient age, average LOS, Campus B

Doctor category	Patient numbers	Average patient age	Average LOS/doctor
GP)	7	73.57	12 days
(GP)	6	71.50	12.83
(GP)	4	84.75	11.25
(GP)	4	73.50	11

GPs were the main health care providers for DRG 177 and tended to keep the patients in longer than other doctors.

Using the information gained from phase 1 of the study, interviews were conducted with three nurse unit managers and three associate nurse unit managers. As a result of the analysis, three major themes were identified that impacted on the length of stay for patients classified in DRG, 367 and 177. The themes were identified as DRG-related drivers, nurse-related drivers and patient-related drivers. Each category had a number of important sub-categories, as summarised in Table 4. These are briefly discussed below.

Table 4: major themes and subcategories of drivers of LOS

DRG-related drivers	Nurse-related drivers	Patient-related drivers
Doctor-related 1. DRG177: Differences between the Respiratory Doctors & GPs:	*Caseload Issues Issues* 1. Multiple DRGs in a ward.	*Complicating factors* 1. DRG 367
2. DRG367: Differences between the surgical doctors	2. Lack of DRG information & knowledge.	2. DRG 177
3. Doctors' work routines.		
Ward-related Issues 1. Occupancy of wards may affect LOS.	*Staffing Issues* 1. Ratios.	*Social support and placement issues*
2. Differences in expectations of LOS between wards.	2. Skill Mix	
	3. Sick Leave	
	4. Overtime	
	5. Nurse Bank and Agency	
	Morale	
	Clinical Pathways	

DRG drivers related to length of stay

Doctor-related issues

1. DRG177 - differences between the respiratory doctors and GPs:

It was found that differences between specialist and non-specialist doctors have an impact on length of stay. For example, it was reported that patients are discharged, depending on the treating doctor, not necessarily on the medical condition. The following comments reflect this:

> "...depending on whether they are admitted under a respiratory physician or if they are under a GP unit. A GP unit tends to be a lot slower because they rely on their consultant, the head GP to come in and make all the decisions."

> "...the patients here are looked after by their GPs, so that means that the GP knows what is going on in their lives outside of the hospital. They tend to be fairly slow about discharging patients from here because they know there is no pressure not to."

In some cases certain doctors had patients on clinical pathways, which helped monitor the LOS. The respiratory doctors seemed more cognisant of the pathways: Some comments were:

> "...under Dr X who is a respiratory physician you find that they are sort of on a pathway. They come in on antibiotics and hydrocortisone then they go to prednisolone for a few days reducing and then they're home, but if they come in under the GP unit ... the rule of thumb is ... keep them on IV hydrocortisone longer ... so that their stay is (inevitably) longer."

2. DRG 367- differences between the surgical doctors.

Nurse managers reported that differences in doctor management have an effect on patient length of stay. One nurse manager said:

> "...for every case it is a different situation. Mr Y is very keen to get them eating and drinking and going straightaway, even when they are still vomiting. The rest are fairly conservative and follow the same routine ... nil orally for 24 hours and then start fluids and if they are tolerating increase."

3. Doctors' work routines

There seems to be an extended length of stay in some cases related to doctor time management in the surgical wards. One participant said:

> "...the registrar and the resident see the patients every day normally. They are in consultation with the consultant ...they would normally come in and see the patient (for discharge) at 8 o'clock in the morning before they go to theatre and the discharge should be done then and the patient's home by 10 o'clock. If the registrar and the resident choose to go to theatre first then we will be sitting around all day waiting for them to come out and say that you can go home."

Ward-related issues

1. Occupancy of wards may affect LOS.

If a ward is never full and there is no pressure on patient throughput, then it may be easier to keep patients in hospital, thus increasing the LOS. According to one nurse:

> "...they can hang around for a couple of more days because there is empty beds in the hospital and we'll get them (the patients) even a little bit better."

2. Differences in expectations of length of stay between wards

Although it was only mentioned once it may be significant in that there was an expectation that patients stay more than one day in general wards whereas, in the short stay ward, the expectation is that patients are discharged on the same or next day. Placing patients in general wards may increase the length of stay for those cases expected to be home the same day, even though their condition does not warrant it. One participant commented:

> "...I know that if a (Laparoscopic Cholecystectomy) is done and goes to short stay they virtually all go home the next day. If a (Laparoscopic Cholecystectomy) is done and comes to the (general) ward it always stays a little bit longer."

Nursing drivers related to LOS

Caseload issues

1.Multiple DRGs in a ward.

The casemix on the wards in this study was highly variable as measured by DRG. This required nurses to have a large but often superficial knowledge base about patient care issues. The nurses also had to deal with multiple doctors and their multiple approaches to the same DRGs. This scenario prevents nurses from becoming highly skilled and expert in the management of a restricted caseload. As a result, high stress levels accompanied by low morale may have had an effect on sick leave and workload. The following comment reflects what was said:

> "...we do have a wide variation. We are supposed to be ... basic thoracic but we have ... psychiatric patients, surgical patients as well as medical, asthma, COAD and AMI."

2. Lack of DRG information and knowledge

There was a general lack of information and knowledge related to the DRG classification of patients on the wards. Because classification is not made until the patient has been discharged, the DRG profile is not an issue for nurse managers. Several comments were made when asked about the DRG profile on the ward that reflect this attitude:

> "...I have an understanding of caseload and I don't take a great deal of notice of the DRGs."

> "...no idea. I have no control who comes into my ward so I cannot say you are not coming in here because you are going to cost me too much. I have patients here on whom I am spending hundreds of dollars on dressings and I can't say you're not coming on my ward because you are going to blow my budget."

Staffing issues

1. Ratios

Staffing on the wards was controlled by a nurse-patient ratio predetermined by the union. Without patient dependency needs being identified formally, matching patient requirements to nursing time and therefore costs was not possible. When asked how the number of staff required for each shift was decided, the following comment was made:

> "...(When the) dependency of patients is quite high ...that has a very big impact upon how many nursing hours (are needed). I do not actually plan nursing hours in a formal way but we use our clinical judgement on a day-to-day basis in terms of working out our staffing and we can fluctuate. I actually have an EFT that provides me with 5 nursing staff in the morning plus myself and 5 nursing staff in the afternoon including the ANM (associate nurse unit manager) and that looks after 27 patients."

2.Skill mix

Due to the shortage of nurses across the State it was very difficult to plan for the "right" level of nurse at the bedside especially when extra nurses were required on a daily basis. The fact that nurse unit managers have to take available staff, rather than being able to identify and request a nurse with a specific skill set, may mean that the extra nurse per shift is paid at a level higher than the skill mix required for that particular shift. The reverse may also be true, and further study is required. When asked about controlling the skill mix of nurses per shift, the following was said:

> "...skill mix wise when I do the roster, obviously I will have to have an ANM on every shift, so that is a senior person. I try to have a middle level seniority type person underneath them. I have enough division 2s on my roster on every shift, but I am struggling for seniority in middle level of activity ... because the ward has a lot of people on maternity leave."

> "...unfortunately the nurses available are quite low at this time so it is not always possible (to get the level of nurse required) and often we are replaced with ENs. But it puts extra strain on the RNs because...they have to do their drugs (for the ENs) and oversee them."

3. Sick leave

Although the percentage of sick leave noted in the databases indicated that sick leave was on the high side in all the wards in the study (more than 5%), the participants believed sick leave was minimal or on a par with other areas. This comment reflects a widespread view:

"...I've actually looked at my sick leave, we actually do get figures ... and my sick leave is actually not higher than any other acute medical ward."

4. Overtime

Overtime was not generally encouraged. However, some overtime was recorded and payment requested. In some instances, the central staffing area requested permanent full time or part time staff to work overtime, when no bank or agency staff were available. In some instances nurses were requested to work double shifts. This type of approach was not popular with most nurse unit managers and, generally speaking, they preferred part time staff to be asked to work extra time ahead of full time staff. The following comments indicate some of the practices and attitudes to overtime:

"...there are some people who put down overtime (for payment) and there are other people who take time in lieu. The other thing that happens is of course the people who work part time ...if they do work an extra half an hour, I say 'put it down on your time card' (because) that's not paid as overtime."

"...we never get paid overtime ...we get time in lieu. If someone has worked back half an hour ...on my shift, I'll say to them 'on the weekend just come in half an hour later or go off earlier.' As for working overtime, we sort of try not to encourage that because it wears people out."

"...if they are really desperate they will ask you if you can get someone to do a double shift...some of them will do it because they want the money. But I think it is a recipe for burnout and if you start encouraging it you are going to get people falling like flies."

5. Nurse bank and agency

Nurse bank and agency personnel were used on a daily basis in most wards. When asked how often agency or nurse bank personnel were required, the following was said:

"...we use a lot. We have our own nurse bank. But depending on the time of year of course, they choose to be off most holiday times, which is more frequent now with four terms of school. Agency staff are usually (booked) for the morning shifts the day before."

Morale

The morale in the group interviewed was low and was associated with feelings of being over-worked and undervalued. The casemix of patients also caused some distress when it was felt that appropriate care could not be given - for example, caring for psychiatric patients on a general ward. The following comments were made about morale:

"...it (is) difficult really, when you are trying to organise ...especially if you have these psychiatric patients who do cause a bit of a problem."

"...over the last few years we have had a lot of sick leave and I think it just goes back to ...since we have had this (emphasis) on casemix and throughput. There is never really a lull in the nursing week and I think that some people are finding that very stressful. "

"...the work is awful. We have incontinent confused people. ...I mean the morale is really bad in this hospital at the moment ...but the girls have been trying very hard to keep (the morale) it up. I don't think we need jelly beans and movie tickets, just an occasional pat on the back and say well done."

Clinical pathways

It has been recognised in the literature that clinical pathways tend to help decrease the LOS. There were only a few in place in the hospital during this study. There seemed to be little commitment to developing and implementing clinical pathways by the multidisciplinary team. The input in most cases seems to involve nursing staff only. One nurse said:

"...I see that (using clinical pathways) is prescription nursing. Its sort of like you have to be told what to do, so that everything gets done the right way so that the patient goes out on time. ...It is a little bit as though it is de-skilling people from making judgements and making decisions about how they manage a patient."

Patient drivers related to LOS.

Complicating factors

1. DRG 367

Complications after surgery were a major driver in increasing the LOS. Several nurses commented:

> "...if they (patients) get a biliary leak or something like that ...they go from (being) fairly sick to an acutely ill patient."
>
> "...mainly it's if they develop an Ileus. They are vomiting and they are not tolerating diet and fluids, seems to be the main reason that they stay in. The ones that came in for a Lap-Chole (Laparoscopic Cholecystectomy) that progressed to an open Chole (Laparotomy with Cholecystectomy), so therefore it wasn't expected, so they may have a few more set backs because in their mind ('I was going home and now I have this big cut and I have all these tubes here')."

2. DRG 177

A large number of patients in DRG 177 had comorbidities, which impacted on the length of stay. When asked what patient issues might impact on length of stay, the following comments were made:

> '... there is a lot of anxiety in relation to COAD (Chronic Obstructive Airways Disease) and if you've got COAD you're anxious and if you live by yourself, that just absolutely doubles the problem. ... Some of the shortness of breath is anxiety ...actually doing an oxygen saturation on them (often shows that) their blood gases are not too bad ...it's really more that they get anxious because they are away from the oxygen. So it's because they are oxygen-dependent (psychologically), not because they are physically dependent. Those issues could be dealt with a little better than they are currently."
>
> "...lots of our patients of course have multi-organ problems. Airways disease is one component and sometimes we have patients up to three weeks. A lot of them are still smoking while they are still in hospital."

Social Support and placement issues

The lack of social support especially in the elderly had an impact on discharge date. When asked about the factors delaying discharge of patients, the following comments were made:

> "...social issues such as 'I live alone, there's nobody there with me.' There's certainly services offered to people like that, but the doctors tend to feel that if they are not quite well enough to go home it would be better to keep them an extra day or two. Get them right and have them go home and be successful."
>
> "...we had a problem in our past with the social work department and that would probably impact on COADs ...they do need support ...there were days when we would get a different social worker everyday."
>
> "They have some beds at the new (private) rehab ...but they only take straightforward people who are going to be there for two weeks or so. They don't really want people with other issues (comorbidities)."

Discussion

Long-stay patients may affect the cost of providing nursing care. It has therefore become important for health care organisations to attempt to identify relationships between length of stay for DRGs and the cost of providing nursing care. This study has provided some insight into the factors increasing length of stay for two DRGs. However, no link could be made between DRG classification and the specific cost of nursing time, due to a lack of data on individual patients' needs for nursing care.

Some issues were mentioned by only one or two nurse unit managers and were therefore not analysed. However, central allocation of nursing staff combined with historical style budgeting practices seemed to impact on accountability for financial resources at unit level. Only two nurse unit managers mentioned the availability of data related to DRGs and length of stay and, even then, they did not feel the information was useful as a management tool.

The multiple DRGs cared for in a single unit, combined with the large number of doctors, made it difficult to establish clinical pathways. Differences in medical practices mentioned by nurses in this study did seem to influence length of stay, which supports Fosbinder's (1986) conclusion that the cost of nursing care increases when individual doctors change nursing care instructions or order procedural changes with respect to any one DRG. This can have major implications when complex casemix wards have a range of medical staff prescribing care for the same DRGs.

Social issues, including requirements for placement and patient education about the illness, emotional state, family support, age, as well as expectations for care were acknowledged as impacting on the length of stay for many patients.

In order to justify expenditure, control costs and argue for more appropriate budgets, nurses need to be more cognisant of the relationship between the cost of nursing services and the factors impacting on the length of stay for DRGs in their units. Management tools are needed to help ensure they can manage effectively and efficiently.

Recommendations

Education and support should be provided regularly to improve nurses' knowledge of DRGs. Increased education in this area might improve accountability for financial control and monitoring length of stay. It may be valuable to attempt to highlight for nurse unit managers certain patients during their inpatient stay regarding the DRG status and what it means with respect to cost. Investigating the expense of nurse bank or agency replacement staff versus the actual skill mix required on wards may supply valuable information to help control costs.

Further research to identify factors impacting on length of stay should be conducted with other DRGs that have a high percentage of high inliers or outliers above the State average, in order to construct a profile and influence revenue distribution. A review and comparison of DRG revenue against nursing salaries, per cost centre, may provide valuable insight into performance.

Doctors need to be more involved in peer review of medical practices related to patient management and discharge protocols. More doctors committed to and involved in the team development of clinical pathways would also be beneficial.

As discussed earlier, DRG 367 classifies two types of surgical procedures. As there is a completely different requirement for LOS and nursing time between a Laparoscopy (normally home on the same day or day after surgery) and Laparotomy (requires numerous days depending on the patient's condition), consideration should be given to splitting this DRG. This will provide a clearer picture of the length of stay related to Cholecystectomy.

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