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Hospital Payment Source and Length-of-Stay

Louette R. Johnson Lutjens
Grand Valley State University

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Louette R. Johnson Lutjens, RN; PhD*

The primary aim of the research reported here is to examine elements of the theory of social organizations as adaptive systems as derived from Roy's model by investigating the ability of hospital payment source to predict length-of-stay. A retrospective review was conducted of 3,297 records of patients discharged under 1 of 10 frequently occurring diagnosis-related-groups. Two groups were formed to isolate the contextual stimuli – patients whose hospital care was paid for under a diagnosis-related-group payment system and patients whose hospital care was paid for under a per diem payment system. The Tilton *0* statistic indicated a high degree of similarity between the two patient groups. Thus, length-of-stay could not be effectively predicted based on the source of payment to the hospital.

As the federal government continues to ratchet down diagnosis-related-group (DRG) relative cost weights, which determine payment to hospitals, length-of stay (LOS) becomes an increasingly critical issue because of its linear relationship to health care costs. The prospective payment system featuring DRGs implemented via the 1982 Tax Equity and Fiscal Responsibility Act was a move by the government to tighten federal payment to hospitals and curb escalating health care costs. The goal of the DRG system was to reduce national health care costs by providing a payment incentive to decrease hospital LOS, the primary determinant of the use of hospital resources. The DRG system pressures hospitals to make choices regarding the allocation of resources. "These circumstances pose ethical dilemmas for all health care providers. Early discharge, for example, may be a violation of patients' right to continued necessary care" (Halloran, Kiley, & England, 1988, p. 22). There is a lingering suspicion among the citizenry that hospitals, under pressure to maintain a positive bottom line, may restrict resource allocation by creating systems and policies to encourage physicians to prematurely discharge patients depending on the hospital's payment source.

Keywords: Length-of-Stay, Organizations as Adaptive Systems, Roy Adaptation Model

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*Grand Valley State University
Allendale, MI

Conceptual Framework

The theory of social organizations as adaptive systems (SOAS) derived from the Roy adaptation model (see Figure 1) provided the theoretical framework for this study (Lutjens, 1992). This theory extends the foundational concept of person to social organizations (Schultz, 1987). Organizations are viewed as social-psycho-bio entities that function as holistic adaptive systems.

Organizations interact with a changing environment. The environment is "all the conditions, circumstances, and influences that surround and affect the

Figure 1
Theory of Social Organizations as Adaptive Systems (SOAS)

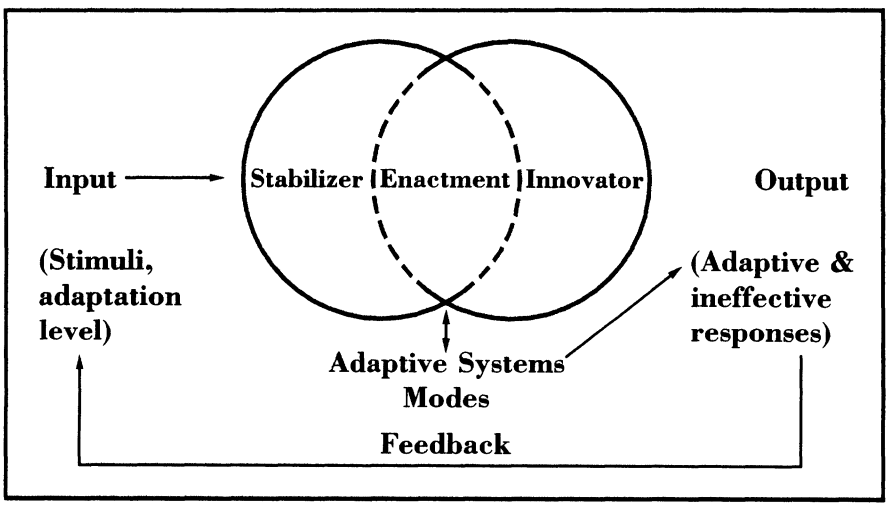

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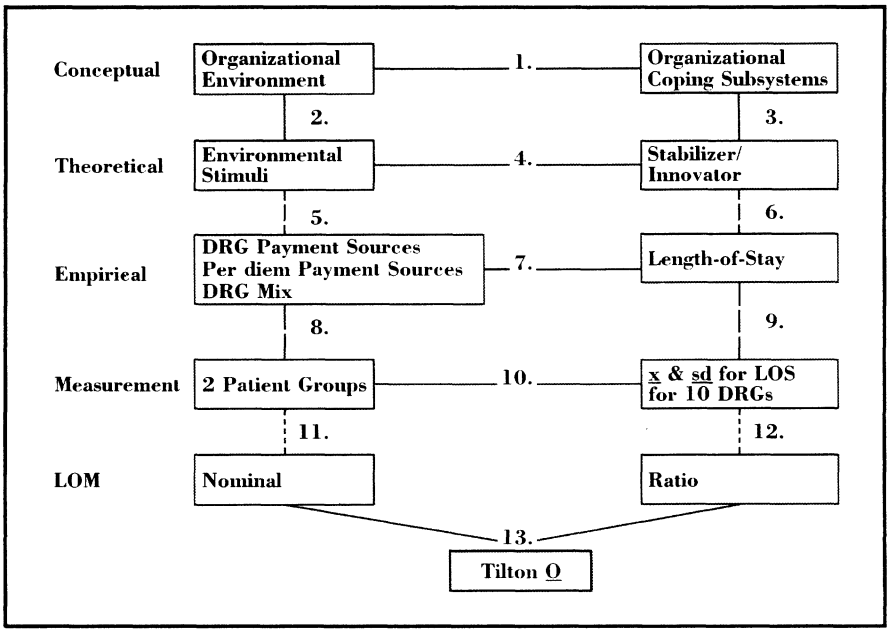
Figure 2
Conceptual-Theoretical-Empirical Structure



development and behavior" (Andrews & Roy, 1991, p. 18) of social organizations.

> The meaning of these conditions, circumstances, and influences for organizations is determined through the enactment process. Organizations select elements from the environment that are viewed as important [to them]. These elements are then re-defined and [re-shaped] to be relevant and meaningful to the organization and its goals. Hence, enactment consists of a socially constructed reality, that is, organizations reinterpret the actual environment and, in so doing, create a new reality. (Lutjens, 1992, p. 64)

General nursing activities employed by nurse administrators to efficiently and effectively manage stimuli confronting the organization consist of organizational assessment, diagnosis, goal-setting, and strategy determination and implementation. Strategies that facilitate attainment of organizational goals produce adaptive responses. These responses free energy and activities "that promote their development and refinement as social organizations, that is, to a higher level of organizational ... [health]" (Lutjens, 1992, p. 64), "the state and process of being and becoming integrated and whole" (Lutjens, 1992, p. 64).

Organizations interact, proactively and reactively, with the environment through the use of the coping subsystems of stabilizer and innovator (see Figure 2 and Table 1). The environment consists of focal, contextual, and residual stimuli arising both from within and outside the organization (see Figure 2 and Table 1). The focal stimulus is the provoking situation or event that attracts the organization's attention. Contextual stimuli contribute to the effect of the focal stimulus, the stressor. Residual stimuli also contribute to the effect of the focal stimulus, but these stimuli may be unverified, unable to be measured, or have not been measured in empirical studies "but need to be recognized in the interpretation of findings" (Roy & Anway, 1989, p. 77). The pooled effect of all these influencing stimuli (Lutjens, 1991) is the adaptation level of the organization.

Stabilizer and innovator are subsystems used by the organization to cope with the focal stimulus, the stressor, and the contextual and residual environmen-

Table 1
Relational Statements Within the Conceptual-Theoretical-Empirical Structure

1. Organizations interact with the environment through the use of coping subsystems.
2. The environment consists of environmental stimuli.
3. The coping subsystems of the organization are the stabilizer and innovator.
4. Environmental stimuli are inputs to the organizational coping subsystems of stabilizer and innovator.
5. Environmental stimuli consist of DRG payment sources, per diem payment sources, and DRG mix.
6. The manifestation of the coping subsystems is observed indirectly in the physical adaptive system mode.
7. The major determinant of the cost of hospital care provided by payment sources is length-of-stay.
8. Sixteen specific payment sources were categorized into two groups—DRG payment system and per diem payment system.
9. The manifestation of the coping subsystem in the physical adaptive system mode permits observation and measurement.
10. Is there a significant difference in LOS between patients whose hospital care is paid for under DRGs and patients whose hospital care is paid for under a per diem payment system?
11. The patient groups represent data measured at the nominal level.
12. Length-of-stay data are measured at the ratio level.
13. Tilton's *O* overlap statistic was computed to determine the degree of similarity between the two patient groups with regard to LOS.

tal stimuli that contribute to the effect of the stressor (See Figure 2 and Table 1). These coping subsystems are aimed at system maintenance and system change respectively and are linked by the interpretive process of enactment. The activity of the coping mechanisms cannot be observed directly, but the outcome of their activity is observed and measured in the adaptive system modes. Four interrelated modes of physical, interpersonal, role, and interdependence systems manifest the activity of the stabilizer and innovator organizational coping mechanisms.

The social organization in this study is the hospital. The focal stimulus is the DRG prospective payment system. Contextual stimuli include DRG (cost per case) payment sources, per diem (cost per day) payment sources, and the patient DRG (case) mix. Residual stimuli include the desire of the hospital to survive and flourish and societal concern about premature hospital discharges (see Figure 2 and Table 1).

The stabilizer coping subsystem is the information system of the hospital that provides data on the hospital payment source and LOS of patients. The innovator coping mechanism consists of decision-making individuals and teams that set hospital policy regarding discharges for the purpose of achieving, on average, LOSs congruent with DRG guidelines. The amount of financial and personnel resources allocated to utilization review exemplifies a reflection of the work of the innovator coping subsystem. The physical system adaptive mode is of particular interest in this study. This mode is "basic operating resources and conditions" (Roy & Anway, 1989, p. 80). Length-of-stay, a critical determinant of the financial condition of the hospital, is appropriately observed and measured in the physical system adaptive mode (see Figure 3). Enactment is the interpretive view of the impact of DRGs on the hospital's financial condition vis-à-vis controllable organizational factors such as LOS.

The theorem tested in this study was derived as follows:

Premise 1: Contextual stimuli act as inputs into organizational coping subsystems.

Premise 2: DRG payment sources, per diem payment sources, and DRG mix are contextual stimuli.

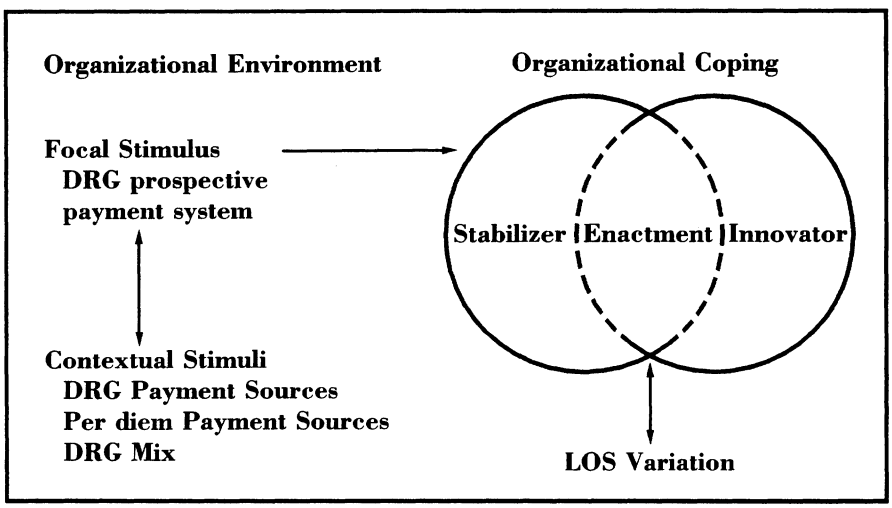
Theorem: DRG payment sources, per diem payment sources, and DRG mix act as inputs into organizational coping subsystems where information is processed and interpreted. The following question was formulated to address the relationship between hospital payment sources (contextual stimuli) and LOS: Is there a significant difference in length-of-stay between patients whose hospital care is paid for under DRGs and patients whose hospital care is paid for under a per diem payment system?

Literature Review

The early experience with DRGs produced reductions in LOS between 7-9% (Lave & Frank, 1990). Lave and Frank reported that the empirical literature consistently suggested a significant response in LOS to DRGs for all patients. Research conducted by Lave and Frank found that per case (cost per DRG) payment systems and negotiated contracts led to significant decreases in LOS for medical, surgical, and psychiatric patients. Prospective per diem (cost per day) payment structures with limits in most cases also led to decreases in LOS. Incalzi et al. (1991) found that DRGs were unrelated to LOS in their study of 214 elderly patients. Presumably the elderly patients were at least primarily insured by Medicare, which uses DRGs to determine hospital payment. Although the literature is replete with studies on DRGs and LOS, few studies relate specifically to the influence of payment systems on LOS (Lutjens, 1993).

Neatherlin, Brillhart, and Henry (1988) found that private pay patients had significantly shorter LOSs (F = 6.56, p<.04), but other per diem patients had longer LOSs than DRG patients (N = 30). A recent study by Falcone, Bolda, & Leak, (1991) found an average delay in discharges of 16.7 days for elderly patients from 80 acute care hospitals in North Carolina. Financial problems in arranging discharge and hospital payment source were significantly correlated with delays in discharges. This finding suggests that the effect on

Figure 3
Physical Adaptive System Mode in the Theory of SOAS



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LOS could be attributable to hospital payment source rather than age alone. Farren (1991) found that Medicare (DRG) medical patients ($N = 432$) had significantly longer LOSs ($Z = -2.18$, $p = .29$) than did nonMedicare medical patients. Although other hospital payment sources were identified, Farren did not report the effect on LOS of other insurances using the DRG system, such as Medicaid. Therefore, it could be argued that the increase in LOS was due to age rather than hospital payment source. Further, because the sample was limited to medical patients, it is unknown whether the same effect would be found with surgical patients or a combination of medical and surgical patients.

There is a paucity of literature on the influence of hospital payment sources on LOS. Of those studies that have been conducted, the findings were often inconclusive because patient populations were limited to the elderly, medical or surgical patients only, and/or consisted of small samples. This study examined 16 specific payment sources, including Medicare, that use the DRG system to determine payment to hospitals. Sample size was large, not delimited by patient age, and was composed of a combination of medical and surgical DRGs.

Methodology

For this ex post facto study, a 462-licensed-bed tertiary care hospital in the Midwest was chosen to obtain subjects. The types of payment sources for the study hospital included Blue Cross, Civilian Health and Medical Program for Uniformed Services (CHAMPUS), commercial, health maintenance organization(s), Medicaid, Medicare, the self-insured study hospital plan, private pay, state and federal assistance, Title 5, and Worker's Compensation. Approximately 59% of the care provided to patients in the study hospital was paid for by prementioned payment sources that used the DRG (cost-per-case) system; the remaining 41% was paid for by payment sources using the per diem (cost-per-day) system.

Sampling and Data Collection

A retrospective review was conducted of 3,297 records of patients discharged under 1 of 10 frequently occurring DRGs (see Table 2). These 10 DRGs are a sample of the study hospital's DRG mix which is a contextual stimulus. Computer printouts generated by the hospital information system (the stabilizer) were used to determine payment sources (contextual stimuli) and LOS. DRG payment patients within this sample comprised 64.8% ($n = 2,106$) of the total cases ($N = 3,297$); per diem patients were 35.17% ($n = 1,191$) of the sample.

Sixteen specific payment sources were categorized into two groups – DRG payment system and per diem payment system (see Figure 2 and Table 1). The patient groups represent data measured at the nominal level (see Figure 2 and Table 1). Length-of-stay data were measured at the ratio level of measurement (LOM) (see Figure 2 and Table 1).

Data Analysis and Findings

Tilton's O overlap statistic (Dunnette, 1966) was computed to determine the degree of similarity between two payment groups – DRG patients and per diem patients – with regard to LOS (see Figure 2 and Table 1). The means and standard deviations for LOS for the two patient groups (see Table 3) were utilized to estimate the percentage overlap, O. The greater the amount of overlap, the less effective the predictor (payment source) in separating the two groups with regard to LOS. The range of percentage overlap, O, for the 10 DRGs (see Table 4) was 81%-97% with a mode of 91% and a mean of 90.6%. An overlap of 75% or higher indicates a high degree of similarity between the two patient groups. Thus, LOS could not be effectively predicted based on whether a patient's hospital stay was paid for under the DRG payment system or the per diem payment system.

Discussion

The external focal stimulus of the DRG prospective payment system constitutes a stressor for most hospitals in the United States. Contextual stimuli that influence the impact of DRGs on hospital financial condition (physical adaptive system mode) included the mix of DRG and per diem payment sources

Table 2
The Medical-Surgical DRG Distribution for 3,297 Patients

DRG	*Description*	*n*
014	Specific Cerebrovascular Disorders except Transient Ischemic Attack	233
106	Coronary Bypass with cardiac catheterization	256
107	Coronary Bypass without cardiac catheterization	170
112	Vascular procedures except major reconstruction without pump	769
125	Circulatory Disorders except AMI with cardiac catheterization without complex diagnosis	302
127	Heart failure and shock	303
209	Major Joint and Limb Reattachment Procedures	262
215	Back and Neck Procedures, age less than 70, without comorbidities or complications	450
359	Uterine and Adnexa Procedures, age less than 70, without comorbidities or complications	184
410	Chemotherapy	368

and the sample mix of four medical and six surgical DRGs. The activity of the coping subsystems in relation to the contextual stimuli was measured in the physical adaptive system mode as LOS. Information on LOS was processed by the stabilizer coping subsystem, the hospital management information system. The findings suggest that decision-making entities (innovator coping subsystem) do not have policies or systems in the study hospital that would influence LOS based on hospital payment source. Residual stimuli that were not measured in this study but were discussed in the interpretation of the findings included patients' age and type of DRG, that is, medical or surgical. Adaptation level was conceptualized for this study as the combined effect of the focal, contextual, and residual environmental stimuli.

Adequacy of the Theory

Premises derived from the theory identified contextual stimuli of DRG payment sources, per diem payment sources, and DRG mix and proposed a relationship between the stimuli and the coping subsystems and the physical adaptive system mode. The premises and theorem formulated for this study are a direct reflection of Roy's (1980) assumptions and Lutjens' (1992) parallel assumptions that there is constant interaction between adaptive systems and their environments and that coping subsystems are used to cope with a changing world. The research question derived from the theorem reflected Roy's (Roy & Andrews, 1991) statement that the activity of the coping subsystems is observed and measured in the adaptive modes. The physical adaptive system mode is represented by LOS. The question suggested support for the theoretical relationship between environmental stimuli and organizational coping subsystems and the interrelationship between the coping mechanisms and the adaptive system mode as well.

An adaptive response was viewed as one that tempers financial concerns with, presumably, ethical principles that uphold the patients' right to continued necessary care and thus does not allocate days of hospitalization solely on the basis of payment source. These findings lend support to Roy's (1980) assumption and Lutjens' (1992) parallel assumption that a positive response to environmental change signifies adaptation.

Table 3
Means and Standard Deviations for Length-of-Stay for Two Patient Groups Categorized by Payment Source (*N* = 3,297)

DRG	DRG Payment			Per Diem Payments			Totals		
	n	*x*	*SD*	*n*	*x*	*SD*	*N*	*x*	*SD*
014	194	12.13	11.99	39	12.59	8.03	233	12.21	11.41
106	183	15.30	13.56	73	11.58	7.48	256	14.24	12.24
107	109	10.84	9.90	61	9.07	6.81	170	10.20	8.94
112	498	5.83	7.71	271	4.42	4.32	769	5.33	6.74
125	192	3.03	2.31	110	2.76	2.04	302	2.93	2.22
127	281	7.18	6.80	22	5.59	3.58	303	7.06	6.63
209	228	10.60	6.52	34	7.71	5.23	262	10.23	6.43
215	129	6.59	3.53	321	6.20	3.20	450	6.31	3.30
359	49	4.71	1.93	135	4.36	1.47	184	4.45	1.61
410	243	2.34	2.67	125	2.12	2.42	368	2.26	2.58

Table 4
Summary of Percentage Overlap for Two Patient Groups Distributed Over 10 DRGs With Payment Source as the Predictor Variable (*N* = 3,297)

DRG	DRG Payment		Per Diem Payment		Total	
	n	%	*n*	%	*N*	*O*
014	194	83.3	39	16.7	233	91%
106	183	71.5	73	28.5	256	86%
107	109	64.1	61	35.9	170	91%
112	498	64.8	271	35.2	769	91%
125	192	63.6	110	36.4	302	95%
127	281	92.7	22	7.3	303	88%
209	228	87.0	34	13.0	262	81%
215	129	28.7	321	71.3	450	95%
359	49	26.6	135	73.4	184	91%
410	243	66.0	125	34.0	368	97%

Note: An overlap (*O*) of 75% or higher indicates a high degree of similarity between the two groups.

Relationship of the Findings to Previous Research

Findings from this study were inconsistent with the early experience with DRGs reported in the literature and Lave and Frank's (1990) study which attributed decreases in LOS to DRGs. However, these studies did not specifically examine hospital payment source. The findings reported here are consistent with Incalzi et al. (1991) who found no relationship between the Medicare (DRG) payment structure and LOS in their study of 214 patients. This study lends support to their findings in that similar results were achieved with an increased sample size and the

inclusion of other DRG payment sources besides Medicare.

Findings from this study were inconsistent with other studies that compared the effect on LOS of DRG payment structures and per diem structures. The inconsistency with the findings of Neatherlin et al. (1988) may be attributed to their limited sample size ($N = 30$) and their use of one surgical DRG (laminectomy). A larger sample size composed of subjects from several medical as well as several surgical DRGs might have produced findings more similar to those in this study. The increased LOS found in the Falcone et al. (1991) study could be attributed to age alone because all subjects were elderly. A sample of patients representing various age groups might have resulted in greater consistency with the findings of this study. Likewise, the increased LOS found by Farren (1991) could be greatly influenced by age, because the subjects were grouped Medicare versus nonMedicare. The overwhelming majority of Medicare patients are older adults. The inclusion of subjects with differing insurance carriers that use DRGs to determine hospital payment might have resulted in findings similar to this study. Additionally, all subjects in the Farren study were medical patients. A combination of medical and surgical patients such as used in this study might have produced more consistent findings. Thus, the inconsistencies between the findings of this study and those of other studies may be due to the DRGs studied and characteristics of the sample groups, specifically age and insurance carriers.

Limitations, Recommendations and Implications

The retrospective design of this study limits generalizability, as does the use of only one study site. Multiple study sites and/or replication is recommended to capture any diversity that may exist among hospitals of differing types, sizes, and geographic locations.

Another limitation of this study was the small number of DRGs (10) studied. The DRG mix employed in this study may not have captured the LOS variation in payment sources. Therefore, recommendations for further research are to increase the number of DRGs and to include DRGs that represent patients with diverse payment sources.

This study contributes to nursing administration science by demonstrating the use of a nursing theory to examine a practical concern. Linkages between the theoretical and empirical components of the study have been made explicit. Findings from this study suggest that consumers trust that hospitals will not deprive patients of necessary care by premature discharge solely based on the source of payment to the hospital.

Conclusion

The primary aim of this study was to examine elements of the theory of social organizations as adaptive systems by investigating the ability of hospital payment source to predict LOS. Length-of-stay is the major determinant of the cost of hospital care which, in turn, is the most expensive segment of the health care system. Length-of-stay is of concern to consumers because it can mean depriving patients of necessary care by premature discharge. Length-of-stay is of concern to nurse administrators and hospitals because it can mean the difference between adequate and inadequate payment from the government. However, if LOS is not handled in an appropriate and ethical manner, a hospital's reputation will suffer, resulting in decreased patient satisfaction and, ultimately, decreased admissions. Findings from this study suggest that there are hospitals that are allocating resources to hospitalized patients, presumably, in an ethical and equitable manner despite financial pressures imposed by the prospective payment system that ascribes mean LOSs to each DRG.

The findings support theoretical statements of the theory of social organizations as adaptive systems thus also lending indirect support to the Roy adaptation model. This study demonstrates the utility of the theory to guide research in practice settings.

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