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# The Effect of Continuous Lateral Rotation Therapy Lag Times on Hospital Length of Stay and Total Hospital Cost

## Introduction

In today's health care environment, hospitals are charged with caring for higher acuity patients whose treatment often involves invasive procedures, such as mechanical ventilation. Hospital-acquired pneumonia remains the leading cause of death from infection, and is the leading cause of morbidity/mortality in the intensive care unit (ICU).<sup>1</sup>

Continuous Lateral Rotation Therapy (CLRT) delivered via framed products has been demonstrated to decrease the incidence of nosocomial pneumonia, ICU length of stay (LOS), and number of ventilator days by varying degrees.<sup>2-4</sup> Similar findings have been reported in at least one study conducted on CLRT delivered by a mattress replacement.<sup>5</sup> In spite of these findings, CLRT is only utilized in 54% of acute care hospitals nationwide.<sup>6</sup>

Protocols used in the literature surrounding CLRT consistently recommend early stratification of patients who are at risk to develop nosocomial pneumonia, and subsequent placement on specialty beds that deliver CLRT within 24 hours of identification.<sup>7-9</sup> However, in clinical practice, patient placement on specialty beds is often delayed due to financial and/or staffing constraints. No study has been conducted to date that examines the effect of lag time on hospital LOS and/or hospital cost.

The underutilization of a therapy combined with the high incidence and poor prognosis associated with hospital-acquired pneumonia suggests a need for education surrounding the optimal use of CLRT. The purpose of this study was to determine whether or not lag time (defined as the time elapsed between patient admission and subsequent placement on a CLRT product) had a direct impact on specialty bed and hospital LOS, and/or on total hospital costs.

## Materials & Methods

This study used detailed resource utilization data from the Premier Perspective Comparative Database, which is the largest hospital-based, service-level comparative database in the US. Data was provided by Premier Healthcare Informatics, Charlotte, NC. The subject population included those patients 18 years of age and older who were placed on specialty beds designed to deliver CLRT between January 1, 2000 and December 31, 2000. Seventy-five percent of subjects received CLRT via Hill-Rom® specialty beds during their hospitalization.

Dependent variables included the number of days the patient received CLRT via specialty bed (bed therapy), the number of days from initiation of CLRT to discharge (bed therapy to discharge), and cost of all services received during hospitalization (total hospital costs). The independent variable was lag time. No data was collected on the amount of time subjects spent in rotation, nor was angle of rotation measured. Further, no data was available to indicate whether CLRT protocols were utilized for patient placement on a specialty bed.

One-way ANOVA (analysis of variance) was performed on the data in order to detect a difference between the dependent variables based upon lag times. Probability (p value) less than 0.05 was considered statistically significant. Separate analysis was performed on framed CLRT products and non-framed CLRT products.

## Results

Data was collected on 1197 subjects who were placed on framed CLRT products, and 526 subjects who received CLRT via mattress replacement products. Table 1 contains means and standard deviations for the dependent variables calculated on CLRT framed products; the data is presented graphically in Figure 1. Table 2 contains the same values calculated on CLRT non-framed products; data is graphically presented in Figure 2.

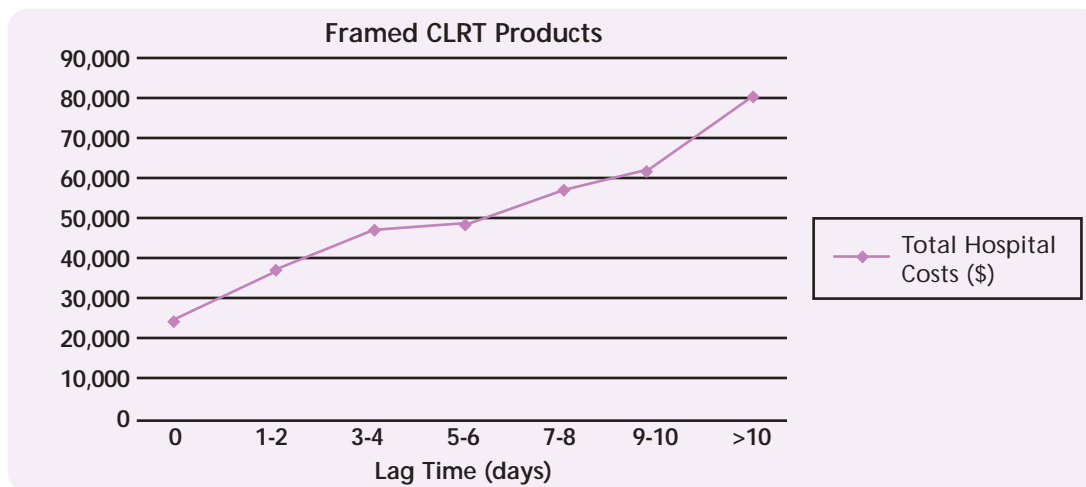
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**Table 1.** Mean(SD) LOS and Hospital Costs for Framed CLRT Products

	Lag Time (days) 0 n=98	1-2 n=292	3-4 n=233	5-6 n=153	7-8 n=126	9-10 n=62	> 10 n=233	p value
Bed Therapy	10.9 (13.36)	12.77 (15.10)	13.47 (14.33)	12.37 (13.86)	16.23 (18.33)	16.02 (18.05)	17.28 (20.63)	<0.001
Bed Therapy to Discharge	13.77 (13.77)	16.66 (18.15)	17.87 (16.37)	16.42 (14.87)	20.48 (21.02)	19.63 (18.61)	21.78 (22.10)	<0.001
Total Hospital Cost (\$)	23,638 (25,080)	37,704 (41,609)	46,334 (38,966)	47,849 (36,159)	56,107 (39,185)	60,218 (39,681)	79,409 (53,656)	<0.001

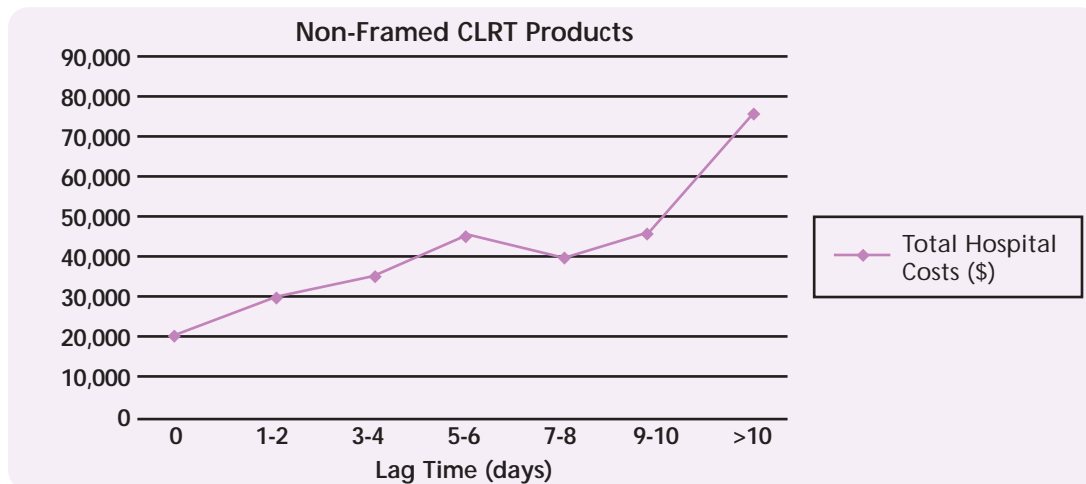
**Figure 1.** Hospital Costs Associated with Lag Time for Framed CLRT Products



**Table 2.** Mean(SD) LOS and Hospital Costs for Non-Framed CLRT Products

	Lag Time (days) 0 n=58	1-2 n=148	3-4 n=81	5-6 n=60	7-8 n=46	9-10 n=35	> 10 n=98	p value
Bed Therapy	9.31 (8.52)	11.45 (12.74)	14.59 (19.51)	11.93 (11.48)	10.02 (9.24)	13.83 (15.52)	15.28 (17.54)	<0.001
Bed Therapy to Discharge	11.95 (11.29)	15.77 (19.78)	16.74 (19.86)	17.68 (22.38)	13.70 (12.55)	17.54 (22.86)	20.43 (21.01)	<0.001
Total Hospital Cost (\$)	19,966 (21,041)	29,606 (42,526)	36,137 (40,515)	43,769 (49,886)	40,812 (45,537)	46,479 (41,180)	76,318 (55,251)	<0.001

**Figure 2.** Hospital Costs Associated with Lag Time for Non-Framed CLRT Products



One-way ANOVA revealed statistically significant differences between lag times of 0 (includes those patients placed within 24 hours of admission) and all lag times up to > 10 days. Subjects who were placed on CLRT within 24 hours of admission to the hospital demonstrated statistically significant decreases in the time spent on specialty beds, time from initiation of CLRT to discharge, and total costs associated with their hospitalization.

## Discussion

The findings reported in Tables 1 and 2 above have important clinical relevance with regard to the timing of placing patients on specialty CLRT beds. The time patients spent on CLRT beds, their time from CLRT initiation to discharge from the hospital, and total costs associated with their hospitalization all increased significantly as lag times increased.

The medical literature has shown that CLRT has decreased the incidence of nosocomial pneumonia, ventilator days, and ICU LOS, while lowering hospital costs in a variety of patient populations. This study has further demonstrated that the ability to affect hospital LOS and hospitalization costs is directly related to the time that elapses between admission and placement on CLRT beds. Development and implementation of a CLRT protocol designed to identify those patients for whom this therapy is indicated is a first step toward improving patient outcomes. Early placement of those patients on CLRT beds is equally crucial in order to affect long-term improvement in both patient and financial outcomes.

## References

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CLS088 01/23/03

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