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# Hospital Financial Management: What Is the Link Between Revenue Cycle Management, Profitability, and Not-for-Profit Hospitals' Ability to Grow Equity?

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## EXECUTIVE SUMMARY

Effective revenue cycle management—from appointment scheduling and patient registration at the front end of the revenue cycle to billing and cash collections at the back end—plays a crucial role in hospitals' efforts to improve their financial performance. Using data for 1,397 bond-issuing, not-for-profit US hospitals for 2000 to 2007, this study analyzed the relationship between hospitals' performance at managing the revenue cycle and their profitability and ability to build equity capital. Hospital-level fixed effects regression analysis was used to model four different measures of profitability and equity capital as functions of two key financial indicators of revenue cycle management—amount of patient revenue and speed of revenue collection. The results indicated that higher amounts of patient revenue in relation to a hospital's assets were associated with statistically significant increases in operating and total profit margins, free cash flow, and equity capital ( $p < 0.01$  for all four models); that is, hospitals that generated more patient revenue per dollar of assets invested reported improved financial performance. Likewise, a statistically significant link existed between lower revenue collection periods and all four indicators of hospital financial performance ( $p < 0.01$  for three models;  $p < 0.05$  for one model). Hospitals that collected faster on their patient revenue reported higher profit margins and larger equity values. For revenue cycle managers, these findings represent good news: Streamlining a hospital's management of the patient revenue cycle can advance the organization's financial viability by improving profitability and enabling equity growth.

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## INTRODUCTION

Hospitals' profitability and ability to grow equity are key factors in their efforts to maintain the up-to-date facilities and equipment needed to attract well-trained healthcare professionals and provide high-quality patient care. Profitable hospitals are able to retain and reinvest more of their earnings, which translates into higher growth in equity capital. For not-for-profit hospitals in particular, retained earnings represent the most important source of equity. Unlike their for-profit counterparts, not-for-profit hospitals cannot raise equity externally by issuing shares (Rivenson et al. 2000). Managers of not-for-profit hospitals have to focus their efforts to build equity on their organizations' internal operations and supplement these efforts with profitable nonoperating activities, including raising capital through donations and gifts and managing their financial investments. In the current business environment, however, many hospitals have experienced investment losses and shrinking donations and gift receipts, and the importance of boosting the profitability of operating activities has increased (Reiter and Song 2011; McCue 2010).

Hospitals' core operating activity is the provision of patient care. Hence, managing the flow of patients through the hospital—from appointment scheduling and patient registration at the front end of the revenue cycle to billing and cash collection at the back end—is crucial. Aimed at generating higher revenues and reducing average collection periods (Rauscher and Wheeler 2008), the effective management of the

patient revenue cycle has the potential to boost hospitals' profitability and thus strengthen their ability to grow equity. Despite practitioners' interest in revenue cycle management (see, for instance, Danielson and Fuller 2007; Hammer 2005; May 2004), no empirical study has explicitly focused on exploring the relationship between hospitals' performance at managing the revenue cycle and their long-term financial performance. Descriptive studies of the factors associated with hospitals' profitability have supported the idea that revenue cycle management plays an important role in financial performance (Cleverley 1990). Profitable hospitals have been found to experience both higher amounts of patient revenue as a result of higher gross charges and lower revenue deductions and average collection periods as a result of lower investments in accounts receivable (Cleverley 1990). Empirical analyses of the determinants of hospitals' profitability, however, have generally ignored the potential benefits of effective revenue cycle management for hospitals' profitability (see, for instance, Cody, Friss, and Hawkinson 1995; Gapenski, Vogel, and Langland-Orban 1993; Younis, Rice, and Barkoulas 2001; Younis et al. 2003; McCue and Diana 2007).

This study attempts to fill some of the gaps in the literature and explores whether effective revenue cycle management can help hospital managers improve their organizations' profitability, strengthen their ability to grow equity, and thus remain financially viable in the long term. More specifically, this study analyzes the relationship between two key financial indicators of

effective revenue cycle management—the amount of patient revenue a hospital generates in relation to its assets and the speed with which a hospital collects its patient revenue—and four indicators of financial performance—operating and total profit margins, free cash flow, and the value of the hospital's equity capital. We answer the following research questions: What is the link between revenue cycle management performance and hospitals' operating and total profit margins? What is the link between revenue cycle management performance and hospitals' free cash flows? And, finally, does effective revenue cycle management translate into higher values of equity capital and hence stronger balance sheets for not-for-profit hospitals? Besides filling an important gap in the literature, the findings of this study are of particular interest to hospital revenue cycle managers and consultants as they seek to improve their organizations' long-term financial viability by investing in revenue cycle excellence.

### CONCEPTUAL FRAMEWORK

Patient care revenue makes up the bulk of a hospital's revenue (McKay and Gapenski 2009). Management of the flow of patients through the hospital and the associated revenues thus has important implications for a hospital's financial performance. Generating higher amounts of patient revenue is directly linked with improved profitability and equity growth. As part of their management of the revenue cycle, hospital managers may pursue more aggressive pricing and attempt to reduce revenue deductions, in particular contractual allowances granted

to third-party payers and charity care, resulting in higher net patient revenues (Griffith and White 2006). In addition, more effective revenue cycle management may reduce the number of uninsured and self-pay patients a hospital serves through improved financial counseling, and it may consequently lower the hospital's bad debt and operating expenses. Higher net patient revenue and lower operating expenses result in higher operating and total margins, thus improving a hospital's profitability and allowing it to build equity capital. We therefore hypothesize that greater patient revenues in relation to a hospital's assets will be associated with higher hospital profits and equity values.

Managing the flow of patient revenue also involves managing patient accounts receivable. Under the current third-party payer system, hospitals generally do not collect revenue at the point of service but rather bill the patient's third-party payer after services have been rendered. As a result, a significant portion of a hospital's revenue is outstanding at any point in time. Along with cash and inventories, accounts receivable represent a large share of a hospital's current assets. Models designed to optimize current asset balances reflect balancing of the benefits of holding the asset with the costs of holding the asset (Baumol 1952; Miller and Orr 1966). Unlike cash and supplies stocks, which have clear benefits in terms of transaction convenience and lower out-of-stock cost, there is little benefit to accounts receivable as an asset, in particular for healthcare organizations. Hence, managers have generally sought to minimize accounts receivable so as to minimize

the costs of financing the asset (Griffith and White 2006). Besides reducing short-term liabilities and interest expense (Soenen 1993), shorter collection periods may also generate surplus cash that can be reinvested. Unlike their for-profit counterparts, which have an incentive to return excess cash to shareholders in the form of dividends and stock repurchases, not-for-profit hospitals tend to hoard excess cash (Rivenson et al. 2000). Invested in both short- and long-term securities, these cash reserves frequently generate substantial nonoperating income and thus improve the hospital's bottom line (Song, Wheeler, and Smith 2008). We therefore hypothesize that lower balances of accounts receivable will be associated with improved profitability and higher equity values.

## METHODS

### Data and Sample

For the purpose of this study, we analyzed audited financial statement information collected by Merritt Research Services for all bond-issuing, not-for-profit US hospitals.<sup>1</sup> The analysis was limited to the years 2000 to 2007. Since complete longitudinal data were not available for all hospitals, separate samples were derived for the analyses of hospitals' profitability and equity values to preserve the sample size as much as possible (see Exhibit 1). Of the 1,502 hospitals (9,871 hospital-year observations) for which financial data were available, 1,170 hospitals (6,062 hospital-year observations) had sufficient information for our analysis of hospital profitability, and 879 hospitals (3,310 hospital-year observations) had sufficient information for our analysis of

hospital equity values. The final samples represented 77.9 percent and 58.5 percent of all hospitals in the initial data set, respectively.

### Indicators of Hospital Financial Performance

The dependent variables used in this study consisted of four measures of hospital financial performance: total profit margin, operating profit margin, free cash flow, and hospital equity value. Total profit margin is considered one of the most popular indicators of hospital profitability (Cleverley, Song, and Cleverley 2010). Total profit margin is calculated as the difference between a hospital's total revenues and expenses (i.e., its excess of revenues over expenses, or net income) divided by total revenues. It represents the overall profitability of the firm per dollar of revenue earned. A second commonly used measure of hospital profitability is operating profit margin, which measures profitability solely with respect to patient care services and other operating activities (Cleverley, Song, and Cleverley 2010). Operating profit margin is calculated as the difference between a hospital's operating revenues and operating expenses (i.e., its operating income) divided by operating revenues.

Unlike profit margins, free cash flow is based on an organization's cash inflows and outflows rather than its accounting earnings. Some finance scholars have argued that a hospital's true financial condition is more closely related to the cash flows it generates than to its reported income, which can be subject to managerial manipulation (Phillips 2003). Free cash flow is

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**EXHIBIT 1**  
**Sample Derivation**


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	Profitability	Equity Value
Number of hospital-year observations in the initial data set	9,871	9,871
Observations excluded due to missing or implausible values for:		
Operating profit margin <sup>a</sup>	294	N/A
Total profit margin <sup>a</sup>	34	N/A
Free cash flow	7	N/A
Equity value <sup>b</sup>	N/A	5,174
Days in net accounts receivable	377	9
Net patient revenue per total assets	120	25
Days in accounts payable	91	27
Average age of property, plant, and equipment	32	6
Debt financing ratio	141	0
Financial asset ratio <sup>c</sup>	22	0
Patient days	2,691	1,320
Revenue growth	0	0
Number of hospital-year observations in the final sample (as a percentage of hospital-year observations in the initial data set)	6,062 (61.4%)	3,310 (33.5%)
Number of hospitals in the final data set (as percentage of hospitals in the initial data set)	1,170 (77.9%)	879 (58.5%)

<sup>a</sup> Implausible values for both operating and total profit margin were defined as those values smaller than -20 percent or larger than 20 percent.

<sup>b</sup> Of the 5,174 hospital-year observations that were excluded because of missing values for hospitals' equity values, 1,981 observations were excluded because their forecasted free cash flow was missing or negative, which prevented the use of the simplified discounted cash flow valuation model developed above and would have required more detailed analysis and valuation on a case-by-case basis; 35 observations were dropped because earnings quality could not be assessed and no reliable estimate of the growth rate of the free cash flows could thus be calculated; 3,088 observations were excluded because the estimated return on equity was missing or negative; 71 observations were dropped because the weighted average cost of capital was missing or negative; and 9 observations were excluded because information on long-term investments was missing.

<sup>c</sup> Implausible values were defined as those smaller than 0 or larger than 1.

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calculated as the change in net assets plus interest and noncash expenses minus investments in fixed assets and net working capital. It represents the amount of cash left over after undertaking the firm's operations and making all

investments necessary to ensure its continued operation (Horngren et al. 2006).

Free cash flow plays an important role in estimating a hospital's equity value. While the market value of for-profit hospitals' equity can be calculated

as the product of share price and the number of shares outstanding, estimating equity values for not-for-profit hospitals is challenging (Long 1976; McCue, McCue, and Wheeler 1988; Phillips 2003) and involves forecasting a hospital's future free cash flows and then discounting these cash flows at the firm's weighted average cost of capital (see, for instance, Brealey, Myers, and Allen 2007). Notationally,

$$V_0 = \sum_{t=1}^{T-1} \frac{FCF_t}{(WACC)^t} + \frac{FCF_T}{(WACC)^T} + ExcessCashInv_0 + LTDebt_0$$

whereby  $FCF_t$  is the projected free cash flow in period  $t$ ,  $WACC$  is the weighted average cost of capital, and  $ExcessCashInv_0$  and  $LTDebt_0$  are the excess cash and investments and the long-term debt a hospital holds at the time of the valuation, respectively. While future free cash flows would ideally be projected based on forecasted financial statements, for the purpose of this study free cash flows were estimated using the simple average of the free cash flow of the current and two prior periods multiplied by an average annual growth rate of 7.3 percent (based on data from the American Hospital Association for 1990 to 2005), which was adjusted for differences in a hospital's quality of earnings (Phillips 2003).

A hospital's weighted average cost of capital was calculated as

$$WACC = r_D \times \frac{D}{D + E} + r_E \frac{E}{D + E}$$

whereby, following Wheeler and Smith (1988),  $D$  represents the book value of the hospital's debt,  $E$  represents the book value of the hospital's equity,  $r_D$  is

the cost of debt financing (calculated as net interest expense divided by a hospital's long-term liabilities), and  $r_E$  is the cost of equity financing (calculated as the average of the hospital's return on equity over the past five years).<sup>2</sup>

### Indicators of Revenue Cycle Management Performance

Revenue cycle management was measured using two key financial indicators of hospitals' ability to (1) generate and (2) collect patient revenue. Days in net accounts receivable, also known as the average collection period, represents the most important financial measure of hospitals' performance at managing the revenue cycle (Berger 2008; Hammer 2005; May 2004; Prince and Ramanan 1992; Quist and Robertson 2004). Calculated as net patient accounts receivable times 365 days divided by net patient revenue, the average collection period describes the number of days of net patient revenue that a hospital has due from patient billings after all revenue deductions.

Besides the speed of revenue collection, Rauscher and Wheeler (2008) have argued that an equally important indicator of revenue cycle management performance is a hospital's ability to generate patient revenue by reducing revenue deductions and write-offs. We measured the amount of revenue a hospital generates in relation to its assets as a hospital's case mix-adjusted net patient revenues divided by its total assets. Scaling revenues by the case mix index adjusts for differences in patients' severity of illness across hospitals. Expressing revenues as a percentage of total assets adjusts for differences in

hospital sizes and thus differences in the volume of care provided.

### Analytic Model

The relationship between revenue cycle management and not-for-profit hospitals' financial performance was analyzed using ordinary least squares regressions with hospital-level fixed or random effects. We estimated two models:

$$P_{it} = \beta_1 RCM_{it} + X_{it}\beta + \mu_i + \varepsilon_{it}$$

$$V_{it} = \gamma_1 RCM_{it} + Y_{it}\gamma + \mu_i + v_{it}$$

The dependent variables analyzed in the first model,  $P_{it}$ , were the three measures of hospital profitability discussed above, while the dependent variable analyzed in the second model,  $V_{it}$ , was a measure of hospital equity value. The independent variables of interest for both models were indicators of a hospital's performance at managing the revenue cycle,  $RCM_{it}$ . A set of control variables,  $X_{it}$  and  $Y_{it}$ , was included in each model containing hospital-level organizational and financial characteristics as well as state and year dummy variables (see Exhibit 2). The subscripts  $i$  and  $t$  referred to hospital  $i$  in year  $t$ . Because of the potential for hospital-level variation in financial performance, we included hospital-specific error terms,  $\mu_i$ , to control for unobserved, time-invariant heterogeneity across facilities, such as a hospital's management style. However, our analytic model does not take into account the effect of unobserved, time-varying factors, such as changes in a hospital's payer environment, and can thus produce biased regression coefficient estimates. In all regressions, robust standard errors were calculated using

White's correction for heteroskedasticity to adjust for correlations of error terms across observations.

## RESULTS

### Descriptive Findings

The hospitals analyzed in this study reported a median of 59.1 days and an average of 60.8 days in net accounts receivable (see Exhibit 2). While most hospitals experienced reductions in average collection periods during this time, substantial variation remained in the speed with which hospitals were able to collect on their patient revenues. During the same time period, average net patient revenues per total assets equaled 0.64 (i.e., hospitals collected an average of 64 cents in net patient revenue for each dollar invested in assets). Median net patient revenues per total assets were 0.61. Similar to average collection periods, the amount of net patient revenue varied considerably across hospitals.

With respect to financial performance, hospitals reported median total profit margins of 3.9 percent and median operating profit margins of 1.6 percent (see Exhibit 2). Average total and operating profit margins were 3.9 percent and 1.2 percent, respectively. Median free cash flows amounted to \$3,544,500, which translated into median discounted cash flow-based equity values of \$144,763,600. At \$7,295,800 and \$390,940,000, respectively, both average free cash flows and average equity values were substantially larger.

To assess whether the valuation model used in this study produced realistic estimates of hospitals' equity values, we divided our estimates by the number of beds of each hospital, which

**EXHIBIT 2**  
**Definition of Variables and Descriptive Results**

Variable	Definition	Median	Mean (s.d.)
<i>Hospital profitability and equity values</i>			
Total profit margin	$(\text{Total revenues} - \text{Total expenses}) \times 100\% / \text{Total revenues}$	3.88	3.93 (4.35)
Operating profit margin	$(\text{Operating revenues} - \text{Operating expenses}) \times 100\% / \text{Operating revenues}$	1.63	1.18 (4.58)
Free cash flow	Change in net assets + Interest expense + Noncash expense - Investments in fixed assets - Investments in net working capital	\$3,544,500	\$7,295,772 (\$37,212,600)
Discounted cash flow-based equity value	See formula in the "Indicators" section	\$144,763,600	\$390,940,000 (\$968,127,000)
<i>Revenue cycle management performance</i>			
Days in net accounts receivable	$(\text{Net accounts receivable} \times 365 \text{ days}) / \text{Net patient revenue}$	59.12	60.76 (16.85)
Net patient revenue per total assets	$(\text{Net patient revenue} / \text{Case mix index}) / \text{Total assets}$	0.61	0.64 (0.25)
<i>Control variables</i>			
Days in accounts payable	$(\text{Accounts payable} \times 365 \text{ days}) / \text{Purchases}$	15.9	19.10 (11.61)
Average age of property, plant, and equipment	Accumulated depreciation/Depreciation expense	9.6	9.93 (2.70)
Financial asset ratio	$(\text{Long-term investments} + \text{Assets limited as to use}) / \text{Total assets}$	0.27	0.27 (0.15)
Debt financing ratio	Total liabilities/Total assets	0.48	0.48 (0.16)
Patient days	Total number of inpatient days per year	53,764	97,950 (172,584)
Revenue growth	$(\text{Net patient revenue of current year} - \text{Net patient revenue of previous year}) / \text{Net patient revenue of previous year}$	0.080	0.086 (0.083)

*Note:* Summary statistics for the independent and control variables are calculated for the larger of the two samples, the sample derived for the analysis of hospital profitability, which included 1,170 hospitals and 6,062 hospital-year observations. Descriptive results for the independent and control variables for the sample used to analyze discounted cash flow-based equity values do not differ substantially from the results presented above and are thus not shown here.



resulted in a median equity value of \$581,835 per bed. This estimate was somewhat higher than comparable estimates reported in prior empirical studies. Phillips (2003), for instance, found that for 30 hospital mergers and acquisitions between 1992 and 1996, the average price paid per bed—a proxy for a hospital's equity value per bed—was \$322,456. A more recent study by McCue and Kim (2005) reported median prices per bed of between \$110,416 and \$316,335 for 67 hospital mergers and acquisitions between 1999 and 2001. Given that the estimates published in the literature were not adjusted for inflation and given that the hospitals analyzed in this study tended to be larger, better performing hospitals, our valuation approach appears to produce reasonable estimates of hospitals' equity values.

### **Multivariate Findings**

Effective revenue cycle management was associated with both improved hospital profitability and greater equity values (see Exhibit 3). As hypothesized, we found negative coefficients on days in net accounts receivable and positive coefficients on net patient revenue per total assets in all four analyses. A decrease in the average collection period by one day was linked to increases in total and operating profit margins of 0.068 and 0.065 percentage points, respectively. Likewise, decreasing a hospital's days in net accounts receivable by one day was associated with increases in free cash flow and discounted cash flow-based equity values of \$50,830 and \$4,009,301, respectively. These findings are consistent with prior empirical

evidence of a strong positive relationship between shorter average collection periods and profitability for for-profit firms in various industries (Lazaridis and Tryfonidis 2006; Deloof 2003; Wang 2002; Shin and Soenen 1998). The positive relationship between the effective management of accounts receivable and financial performance thus also holds true for not-for-profit organizations, hospitals in particular.

Complementing the findings for speed of revenue collection, an increase of one percentage point in hospitals' amount of patient revenue per total assets was associated with increases in total and operating profit margins of 0.02 and 0.03, respectively. A similar increase in the amount of patient revenue was also linked to increases in free cash flow-based and discounted cash flow-based equity values of \$12,971 and \$9,110,706, respectively. Generating higher patient revenues was thus strongly positively related to hospitals' financial performance. These findings provide evidence that, besides improving the speed of revenue collection through more effective management of accounts receivable, generating more patient revenue plays an important role in not-for-profit hospitals' profitability and ability to build equity capital.

### **DISCUSSION**

Successful management of the patient revenue cycle plays an important role in not-for-profit hospitals' efforts to boost profitability, build equity capital, and thus remain financially viable over the long term. This article demonstrates that not-for-profit hospital profitability is clearly linked to revenue cycle

**EXHIBIT 3**

**Hospital-Level Fixed or Random Effects Regression Analysis of Hospital Profitability and Equity Values**

<b>Variables</b>	<b>Total Profit Margin</b>	<b>Operating Profit Margin</b>	<b>Free Cash Flow (in 000s)</b>	<b>Equity Value (in 000s)</b>
Constant	8.37** (.77)	6.08** (.59)	-8,330.50* (3,274.25)	-847,814 (491,161)
<i>Revenue Cycle Management Performance</i>				
Days in net accounts receivable	-.0677** (.0056)	-.0649** (.0049)	-50.83* (24.70)	-4,009.30** (1,426.33)
Net patient revenue per total assets	1.77** (.53)	3.34** (.38)	12,970.55** (2,245.39)	911,070.60** (157,983.80)
<i>Control Variables</i>				
Days in accounts payable	-.0318** (.0094)	-.0536** (.0071)	-184.12** (52.70)	-4,335.95 (2,595.65)
Average age of plant, property, and equipment	.223** (0.039)	-.008** (.031)	-336.22* (157.78)	-699.24 (11,797.91)
Debt financing ratio	-10.52** (.82)	-7.66** (.57)	N/A	518,754.60* (217,767.70)
Financial asset ratio	7.21** (.75)	3.27** (.58)	9,594.87** (3,262.93)	696,743.00** (207,897.90)
Patient days (in 000s)	.0025 (.0016)	.0084 (.0061)	.083** (.017)	4,090.35 (3,762.15)
Revenue growth	7.88** (.90)	10.17** (1.13)	-926.66 (5,609.04)	324,122.90 (184,681.10)
Year dummies	7 included	7 included	7 included	7 included
Hospital fixed or random effects	1,170 fixed effects included	1,170 random effects included	1,170 random effects included	879 fixed effects included
Adjusted R <sup>2</sup>	.21	.17	.15	.33

Note: Heteroskedasticity robust White standard errors are in parentheses. Independent variables were lagged in all analyses.

\* Statistically significant at the 5 percent confidence level.

\*\* Statistically significant at the 1 percent confidence level.

management performance. Greater amounts of patient revenue per total assets and faster collection periods are associated with improved operating and, to a somewhat smaller degree, total profit margins. As hospitals adopt more aggressive pricing policies and reduce revenue deductions and write-offs, operating revenue per patient increases, resulting in higher operating income and, consequently, higher operating margins. Higher average patient revenue also has a positive, albeit smaller, effect on total margin. While operating income represents an important element of net income, the latter also depends on nonoperating activities, in particular the management of endowments and financial investments (McCue 2010; Reiter and Song 2011). Larger, well performing not-for-profit hospitals, such as those analyzed in this study, have been found to generate substantial amounts of nonoperating income, which may be an important reason that net patient revenue per total assets displays a stronger link with operating than with total profit margins.

In addition to the amount of patient revenue, the speed with which hospitals collect revenue plays an important role in their financial performance. Shorter collection periods are associated with improved operating and total profit margins. Collecting patient revenues faster reduces a hospital's balance in accounts receivable and, consequently, its need for short-term financing and its interest expense. Reduced interest expense translates into higher operating and net income and improved profit margins. Unlike net patient revenue per total assets, which is more strongly associated

with a hospital's operating performance, days in net accounts receivable displays almost equally strong links with both operating and total profitability. Given that reductions in interest expenses have a direct effect on a hospital's operating performance but only an indirect effect on its total profitability, this finding may indicate that hospital managers use surplus cash as a result of shorter collection periods not only to reduce their organizations' short-term liabilities but also to invest in interest-bearing securities, which produce additional investment income and, consequently, increase non-operating income.

A second important finding of this study is that effective revenue cycle management is associated with not-for-profit hospitals' ability to grow their equity capital. Greater amounts of patient revenue and shorter collection periods are strongly linked to higher equity values. As expected, greater amounts of patient revenue and shorter collection periods are associated with higher free cash flows, which represents a key component of discounted cash flow-based equity valuation. Generating more patient revenue results in additional cash inflows from patients and third-party payers, which boosts a hospital's cash flow from operations, one of the major components of its free cash flow. Likewise, each reduction in accounts receivable results in a one-time cash inflow as it reduces a hospital's investment in net working capital and thus increases its free cash flow.

While our conceptual model discussed the pathways through which effective revenue cycle management is hypothesized to improve a hospital's

financial performance, the research design of this study does not allow us to determine whether revenue cycle management is indeed exogenous to financial performance. Not only does managing the revenue cycle effectively affect hospitals' financial results, but also superior financial performance may provide hospitals with the resources they need to improve their management of the revenue cycle. Strong financial performance may enable hospital managers to focus more of their time and resources, both of which may be more readily available in organizations that perform well, on managing the revenue cycle. Financially well-off hospitals may, for instance, have the resources to implement a more sophisticated billing and denials management system and thus reduce their outstanding accounts receivable and shorten their average collection periods.

Concerns regarding the reverse causality discussed above are, however, mitigated by empirical evidence that over the past decade, not only the most profitable hospitals but also hospitals across the board achieved substantial improvements in their revenue cycle performance. Hospitals were able to boost their patient revenue by continuing the aggressive pricing policy many of them had begun to adopt and collect their patient revenue faster (Solucient 2005). While certain investments in revenue cycle management, such as the implementation of an electronic health record system that collects and connects all of a patient's clinical and administrative data, are indeed difficult and costly to introduce (Eldenburger, Schafer, and Zulauf 2004), others can

be implemented by reorganizing and streamlining small but key aspects of the revenue cycle, such as standardizing the process of collecting patient information during registration through education and training sessions for all staff members involved (May 2004).

The generalizability of our findings, however, is limited. Our sample does not represent a random sample of US hospitals; it includes only bond-issuing, not-for-profit hospitals. These hospitals are generally larger and better performing than the average hospital—they have higher occupancy rates, lower average lengths of stay, greater cash reserves, and stronger operating and total profit margins. The findings of this study thus likely hold true for larger, financially well-off, not-for-profit hospitals but may not be generalizable to smaller, poorer performing hospitals. Moreover, the results may not generalize to for-profit hospitals, which have been found to differ from not-for-profit hospitals on a number of organizational and financial characteristics (see, for instance, Sloan 2000). Our findings do, however, hold for both individual hospitals and health systems. When we ran our analyses separately for the subsets of individual hospitals and health systems in our sample, we found no meaningful differences.

## **IMPLICATIONS FOR PRACTICE**

In times of increasingly constrained reimbursement, hospitals are challenged to provide high-quality care profitably. As our results have shown, improving the flow of patients and dollars through the hospital is strongly linked with better

financial outcomes. For revenue cycle managers and consultants, these findings provide empirical support for their continuous efforts to improve their organizations' revenue cycle management. Examining each step of the revenue cycle for potential improvement opportunities and thus streamlining the entire revenue cycle frequently is a worthwhile undertaking that has the potential to deliver a positive return on investment.

As a result of healthcare reform, revenue cycle management will become more important in the future. Although the Affordable Care Act (ACA) is expected to reduce the number of uninsured and thus hospitals' charity care and bad debt burden, hospitals can also expect to see cuts in Medicare and Medicaid reimbursement rates and in disproportionate share payments. In addition, hospitals will likely face a growing self-pay population as employers continue to shift more of their employees to high-deductible health plans or decide to drop health insurance coverage altogether. As a result, most hospitals can expect to experience declines in their patient revenue base. Effective management of the revenue cycle has the potential to offset some of these revenue reductions and thus help hospitals maintain their liquidity and profitability as the ACA takes full effect over the next few years. Hospitals will, however, need to redesign their revenue cycle by overhauling current practices. Among other things, hospitals will need to adopt financial systems that can accommodate higher patient volumes, facilitate coverage eligibility verification, and provide enhanced patient access to financial information.

Besides changes in insurance coverage and payment rates, the ACA will further complicate revenue cycle management for hospitals by fostering alignment with physicians and other healthcare providers and introducing a system of bundled payments. Hospitals that establish accountable care organizations (ACOs), for instance, will have to manage not only their own revenue cycle but also the flow of patients and dollars throughout the ACO network. Effective revenue cycle management in such multisetting care models will need to be redefined to include the capability to share information and manage payments across multiple providers so that everyone involved can avoid negative financial impacts and remain financially viable in the future.

## NOTES

1. Audited financial statement information for bond-issuing, not-for-profit hospitals was supplied by Merritt Research Services LLC of Cedar Rapids, Iowa. The software to construct the data set used in this research was provided by InvestorTools, Inc. of Yorkville, Illinois.
2. In theory, the cost of a firm's equity capital should reflect the premium demanded by equity investors to invest in a firm or project with comparable risk. In the absence of a residual claimant, however, the cost of equity financing for a not-for-profit hospital can be difficult to determine and the hospital's board of directors must usually provide guidance on the return required by the community for capital investments (Wheeler and Smith 1988). The rate of return on a not-for-profit hospital's equity should thus be derived from its long-range financial plan, which indicates the rate of growth necessary to

achieve the institution's goals (Conrad 1984; Wheeler and Clement 1990). Hence, one common approach to determining the required return on equity for not-for-profit organizations is to calculate the actual return on equity over the past few years, which can then serve as a starting point in establishing future target growth rates (Wheeler and Smith 1988).

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## PRACTITIONER APPLICATION

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**S**cientifically determined data help managers improve their ability to run their organizations, and the authors of this article have done a fine job in establishing the link between effective revenue cycle management (RCM) and the financial health of nonprofit hospitals. This link is probably applicable to most healthcare delivery organizations.

One of the main reasons I chose a career in healthcare management was my strong desire to comprehend complex systems and translate them into easily understandable components. I was also passionate about applying these skills to increase the effectiveness of the delivery of quality care to patients and to help improve their lives.

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