CASE STUDY: HOSPITAL RISK MANAGEMENT

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Hospitals today face a wide range of risk factors that can determine success or failure, including:

- Competitive responses both from other hospitals and physician groups.
- Changes in government rules and regulations.
- Razor-thin profit margins.
- Community relations as expressed through zoning and permitting resistance.
- State of the bond market and the cost of borrowing.
- Oligopsony (market with a few buyers) of a few large payers, for example, the state and federal governments.
- Success at fund-raising and generating community support.
- Dependence on key physicians, admitting preferences, and age of medical staff.
- High fixed cost structure.
- Advances in medical technology and their subsequent influence on admissions and lengths of stay.

In addition, hundreds of hospitals across the country are faced with aging facilities. Their dilemma is whether to renovate or relocate to a new site and build an entirely new facility. Many of these hospitals were first constructed in the early 1900s. Residential neighborhoods have grown up around them, locking them into a relatively small footprint, which severely hampers their options for expansion.

The Problem

Located in a large metropolitan area, CMC is a 425-bed community hospital. The region is highly competitive, with 12 other hospitals located within a 20-mile radius. Like most hospitals of similar size, CMC consists of a series of buildings constructed over a 50-year time span, with three major buildings 50, 30 and 15 years old. All three facilities house patients in double occupancy (or two-bed) rooms.

The hospital has been rapidly outgrowing its current facilities. In the last year alone, CMC had to divert 450 admissions to other hospitals, which meant a loss of $1.6 M in incremental revenue. Figure 7.21 shows CMC's average daily census and demonstrates why the hospital is running out of bed space.

Because of this growing capacity issue, the hospital CEO asked his planning team to project discharges for the next 10 years. The planning department performed a trend line analysis using the linear regression function in Excel and developed the chart shown in Figure 7.22. Applying a Poisson distribution to the projected 35,000 discharges, the planners projected a total bed need of 514. They made no adjustment for a change in the average length of stay over that 10-year period, assuming that it would remain constant. See Figure 7.23.

Confronted with the potential need to add 95 beds, the board of directors asked the CEO to prepare an initial feasibility study. To estimate the cost of adding 95 beds to the existing campus, the administrative staff first consulted with a local architect who had designed several small projects for the hospital. The architect estimated a cost of $260M to renovate the

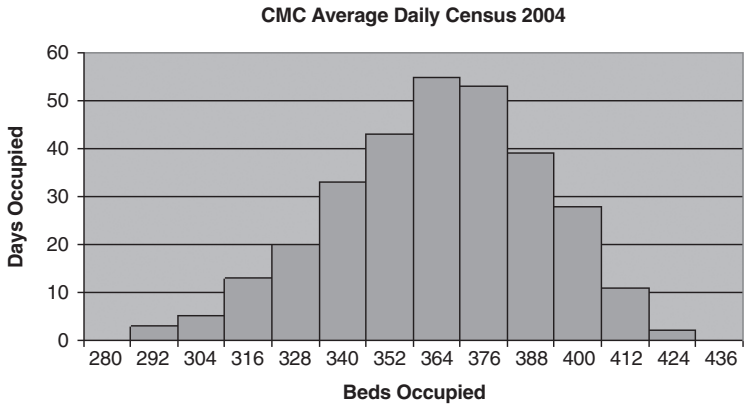


FIGURE 7.21 Histogram of CMC bed occupancy by number of days beds were occupied.

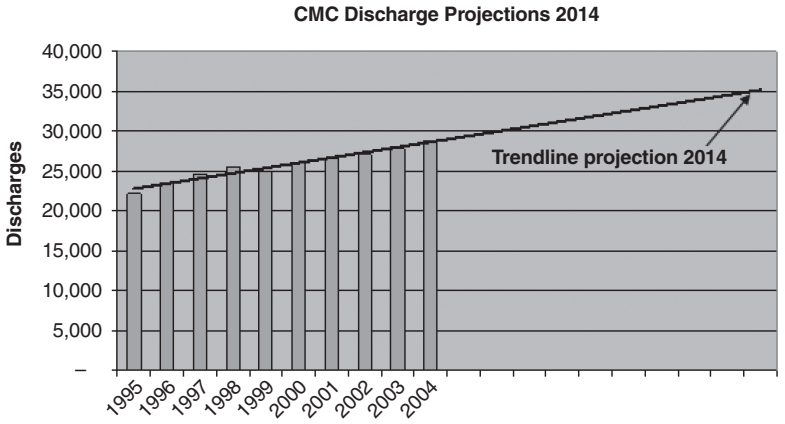


FIGURE 7.22 Trend line projections of CMC discharges for next 10 years (provided by CMC planning department).

existing structure and build a new addition, both of which were required to fit 95 more beds within the hospital's current footprint. To accommodate the additional beds on the current site, however, all beds would have to be double occupancy. Single occupancy rooms—the most marketable today—simply could not be accommodated on the present campus.

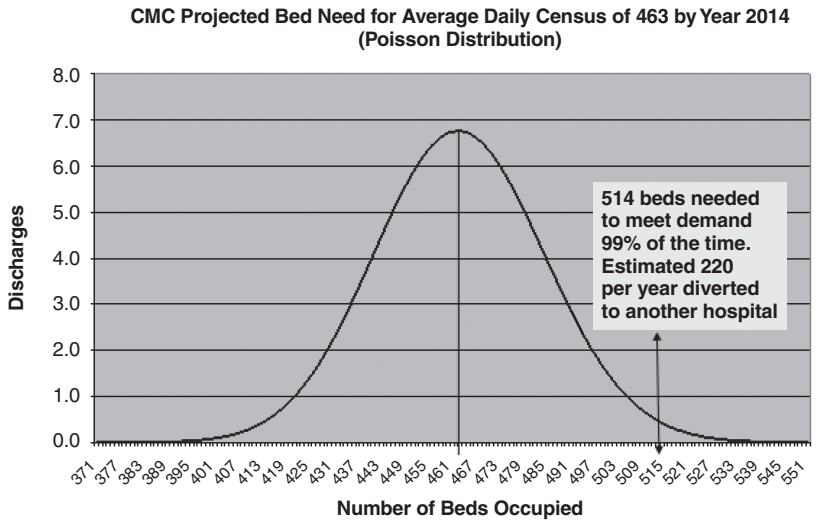


FIGURE 7.23 Projected CMC bed needs based on estimated average daily census of 463 patients for year 2014 (provided by CMC planning department).

In 1990, the hospital board faced a similar decision, whether to build a needed addition on the present campus or to relocate. The board opted to invest $90 million in a major expansion on the current site. Faced with the current dilemma, many of those same board members wished that in 1990 they had been able to better analyze their future options. A number of them expressed regrets that they did not relocate to another campus then. They clearly understood that their current decision—to renovate and add to the existing campus or to relocate—would be a decision the hospital would live with for the next 30 to 50 years.

There was no available site in the town (25 acres minimum), but there was space available in the adjacent town near a new $110 million ambulatory care center the hospital built five years ago. Yet, given the amount invested in the current campus and the uncertainty of how a new location would affect market share, there was real hesitancy to relocate.

The board had other considerations as well. Historically there had been litigation involved every time the hospital tried to expand. The neighboring property owners unsuccessfully opposed the Emergency Department expansion in 1999, but had managed through various legal actions to delay the construction three years. This delay added significantly to the cost of construction, in addition to the revenue lost from not having the modernized facility available as projected.

Two members of the board had attended a conference on the future of hospitals and noted that building more double occupancy rooms was not a good decision for the following reasons:

- By the time the facility was ready for construction, code requirements for new hospital construction would likely dictate single occupancy rooms.
- Patients prefer single rooms and CMC would be at a competitive disadvantage with other hospitals in the area that were already converting to single occupancy.
- Single occupancy rooms require fewer patient transfers and therefore fewer staff.
- Rates of infection were found to be considerably lower.

After receiving a preliminary cost estimate from the architect on a replacement hospital, the CFO presented the analysis shown in Figure 7.24 to the Finance Committee as an initial test of the project's viability. The initial projections for a new hospital estimated construction costs at $670 million. The study estimated a $50 million savings by not funding further capital improvements in the existing buildings. The CFO projected that the hospital would have a debt service capacity of an additional $95 million, assuming that the planning department's volume projections were accurate and that

Initial Capital Analysis for New Hospital ($ in M)		
Cost of Project	$	670
Less: Unrestricted Cash	$	(150)
: Deferred Maintenance	$	(50)
: Existing Debt Capacity	$	(100)
: Future Debt Capacity Based on New Volume	$	(95)
: Sale of Assets	$	(56)
: Capital Campaign	$	(150)
Capital Shortfall	$	69

FIGURE 7.24 Capital position analysis for new hospital as prepared by CMC chief financial officer.

revenue and expense per admission remained static. The balance would have to come from the sale of various properties owned by the hospital and a major capital campaign. Over the years, the hospital had acquired a number of outlying buildings for administrative functions and various clinics that could be consolidated into a new facility. In addition, there was a demand for additional residential property within the town limits, making the hospital's current site worth an estimated $17 million. Although skeptical, the CFO felt that with additional analysis, it could be possible to overcome the projected $69 million shortfall.

The board authorized the administration to seek proposals from architectural firms outside their area. The Selection Committee felt that given the risks of potentially building the wrong-sized facility in the wrong location, they needed firms that could better assess both risks and options. At the same time, as a hedge pending the completion of the analysis, the committee took a one-year option on the 25-acre property in the adjacent town. After a nationwide review, CMC awarded the project analysis to a nationally recognized architectural firm and Stroudwater Associates, with the strategic planning and analytics in Stroudwater's hands.

The Analysis

Stroudwater first needed to test the trend line projections completed by CMC's planning department. Rather than taking simple trend line projections based on past admissions, Stroudwater used a combination of both qualitative and quantitative forecasting methodologies. Before financial projections could be completed, a better estimate of actual bed need was required. Stroudwater segmented the bed need calculation into five key decision areas: population trends, utilization changes, market share, length of stay, and queuing decisions. Given the rapid changes in health-care technology in particular, it was determined that forecasting beyond 10 years was

too speculative, and the board agreed that 10 years was an appropriate period for the analysis. In addition, the hospital wanted to project a minimum of 3 years beyond completion of hospital construction. Because projections were required for a minimum of 10 years, and because of the large number of variables involved, Stroudwater employed Monte Carlo simulation techniques in each of these five decision areas. See Figure 7.25.

For qualitative input to this process, the hospital formed a 15-person steering committee composed of medical staff, board directors, and key administrative staff. The committee met every three weeks during the four-month study and was regularly polled by Stroudwater on key decision areas through the entire process.

In addition, Stroudwater conducted 60 interviews with physicians, board members, and key administrative staff. During the interviews with key physicians in each major service line, Stroudwater consultants were struck by the number of aging physicians that were in solo practice and not planning to replace themselves, a significant risk factor for CMC. The CFO identified another issue: A majority of physicians in key specialties had recently stopped accepting insurance assignments, further putting the hospital at risk vis-à-vis its major competitor whose employed physicians accepted assignment from all payers.

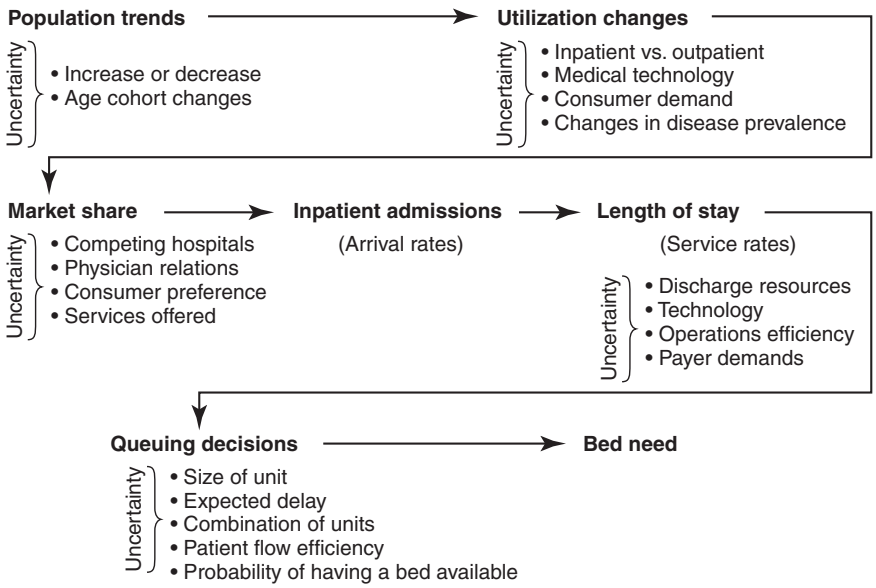


FIGURE 7.25 Stroudwater Associates methodology for forecasting hospital bed requirements.

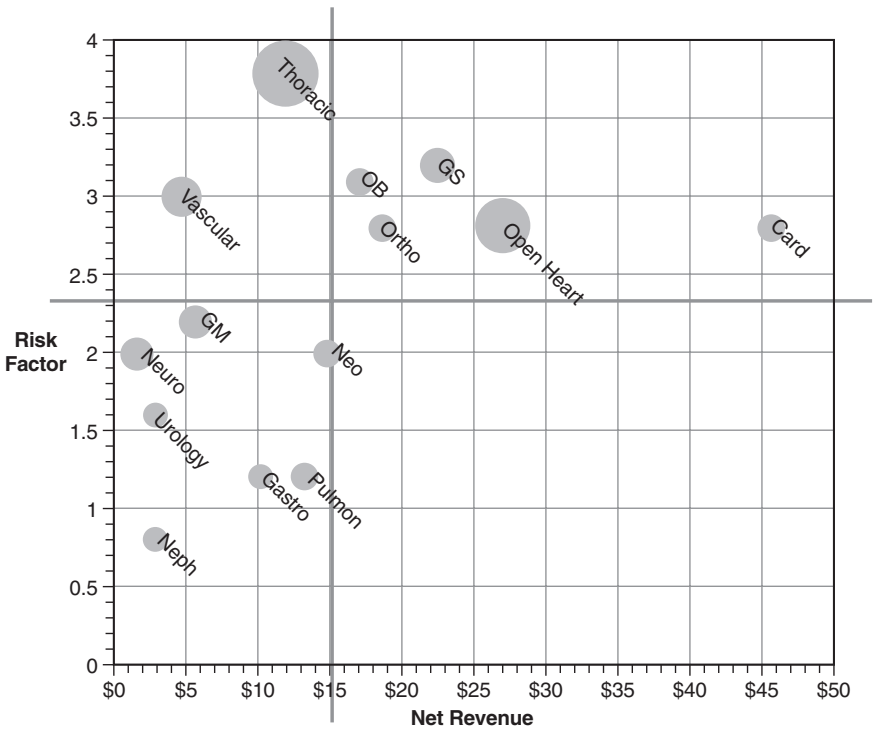


FIGURE 7.26 Bubble chart highlighting service lines considered most at risk (upper right quadrant). Operating margin is represented by the size of the bubble.

To understand better what service lines were at risk, Stroudwater developed a bubble diagram (Figure 7.26) to highlight areas that needed further business planning before making market share estimates. The three variables were net revenue, operating margin, and a subjective risk factor rating system.

The following risk factors were identified, assigned a weight, rated on a scale of one to five, and plotted on the y-axis:

- Size of practice—percentage of solo and two-physician practices in specialty.
- Average age of physicians in specialty.
- Potential competitive threat from other hospitals.
- Percentage of admissions coming from outside of service area.
- Percentage of physicians in the specialty accepting assignment from major insurance carriers.

The analysis revealed five key specialties—orthopedics, obstetrics, general surgery, open-heart surgery, and cardiology—in which CMC's bottom line was at risk, but which also afforded the greatest opportunity for future profitability. To better inform market share estimates, Stroudwater then developed mini business plans for each of the areas identified in the upper right-hand quadrant of Figure 7.26.

Population Trends To determine future population numbers in the CMC service area, Stroudwater depended on nationally recognized firms that specialize in population trending. Because hospital utilization is three times higher for over 65 populations, it was important to factor in the ongoing effect of the baby boomers. Stroudwater also asked members of the Steering Committee to review the 2014 population projections and determine what local issues not factored into the professional projections should be considered.

The committee members raised several concerns. There was a distinct possibility of a major furniture manufacturer moving its operations to China, taking some 3,000 jobs out of the primary service area. However, there was also the possibility of a new computer chip factory coming to the area. Stroudwater developed custom distributions to account for these population/employment contingencies.

Utilization Projections On completion of its population forecasting, Stroudwater turned its attention to calculating discharges per 1,000 people, an area of considerable uncertainty. To establish a baseline for future projections, 2004 discharge data from the state hospital association were used to calculate the hospitalization use rates (discharges per 1,000) for CMC's market. Stroudwater calculated use rates for 34 distinct service lines. See Table 7.10.

Stroudwater factored a number of market forces affecting hospital bed utilization into the utilization trend analyses. The consultants considered the following key factors that might decrease facility utilization:

- Better understanding of the risk factors for disease, and increased prevention initiatives (e.g., smoking prevention programs, cholesterol-lowering drugs).
- Discovery/implementation of treatments that cure or eliminate diseases.
- Consensus documents or guidelines that recommend decreases in utilization.
- Shifts to other sites causing declines in utilization in the original sites
  - As technology allows shifts (e.g., ambulatory surgery).
  - As alternative sites of care become available (e.g., assisted living).

TABLE 7.10 Utilization Trends for 2014 by Service Line

	2004						2014		
Product Line	Discharges	Length of Stay	Population	Discharges 1000	Days 1000	Average Length of Stay	Population	Change in Utilization (%)	Estimated Total Market Discharges
Abortion	137	213	1,193,436	0.12	0.18	1.6	1,247,832	0	1
Adverse Effects	878	2,836	1,193,436	0.74	2.40	3.2	1,247,832	0	9
AIDS and Related	358	3,549	1,193,436	0.30	3.00	9.9	1,247,832	0	3
Burns	66	859	1,193,436	0.07	0.73	10.0	1,247,832	0	
Cardiology	19,113	75,857	1,193,436	16.17	64.19	4.0	1,247,832	18	20,1
Dermatology	435	3,446	1,193,436	0.37	2.92	7.9	1,247,832	0	4
Endocrinology	3,515	18,246	1,193,436	2.97	15.44	5.2	1,247,832	5	3,7
Gastroenterology	9,564	46,103	1,193,436	8.09	39.01	4.8	1,247,832	5	10,0
General Surgery	7,488	51,153	1,193,436	6.34	43.28	6.8	1,247,832	9	7,9
Gynecology	3,056	6,633	1,193,436	2.59	7.31	2.6	1,247,832		3,2
Hematology	1,362	10,325	1,193,436	1.15	8.74	7.6	1,247,832	8	1,4
Infectious Disease	2,043	15,250	1,193,436	1.73	12.90	7.5	1,247,832	0	2,1
Neonatology	1,721	20,239	1,193,436	1.46	17.13	11.8	1,247,832	4	1,8
Neurology	5,338	34,873	1,193,436	4.52	29.51	6.5	1,247,832	12	5,8
Neurosurgery	3,042	13,526	1,193,436	2.57	11.45	4.4	1,247,832	12	3,2
Newborn	11,197	25,007	1,193,436	9.47	21.16	2.2	1,247,832	–5	11,6
Obstetrics	13,720	36,962	1,193,436	11.61	31.28	2.7	1,247,832	–5	14,4
Oncology	1,767	11,563	1,193,436	1.50	9.76	6.5	1,247,832	15	1,5

Source: State Hospital Discharge Survey.

- Changes in practice patterns (e.g., encouraging self-care and healthy lifestyles, reduced length of hospital stay).
- Changes in technology.

Stroudwater also considered the following factors that may increase hospital bed utilization:

- Growing elderly population.
- New procedures and technologies (e.g., hip replacement, stent insertion, MRI).
- Consensus documents or guidelines that recommend increases in utilization.
- New disease entities (e.g., HIV/AIDS, bioterrorism).
- Increased health insurance coverage.
- Changes in consumer preferences and demand (e.g., bariatric surgery, hip and knee replacements).

In all key high-volume services, Stroudwater consultants made adjustments for utilization changes and inserted them into the spreadsheet model, using a combination of uniform, triangular, and normal distributions.

Market Share The Steering Committee asked Stroudwater to model two separate scenarios, one for renovations and an addition to the current campus, and the second for an entirely new campus in the adjacent town. To project the number of discharges that CMC was likely to experience in the year 2014, market share assumptions for both scenarios were made for each major service line.

A standard market share analysis aggregates zip codes into primary and secondary service markets depending on market share percentage. Instead, Stroudwater divided the service area into six separate market clusters using market share, geographic features, and historic travel patterns.

Stroudwater selected eight major service areas that represented 80 percent of the admissions for further analysis and asked committee members and key physicians in each specialty area to project market share. The committee members and participating physicians attended one large meeting where CMC planning department members and Stroudwater consultants jointly presented results from the mini-business plans. Local market trends and results of past patient preference surveys were considered in a discussion that followed. As an outcome from the meeting, participants agreed to focus on specific factors to assist them in estimating market share, including:

- Change in patient preference.
- Proximity of competing hospitals.
- New hospital "halo" effect.

- Change in "hospital of choice" preferences by local physicians.
- Ability to recruit and retain physicians.

Using a customized survey instrument, Stroudwater provided those participating in the exercise with four years of trended market share data; challenging them to create a worst-case, most likely, and best-case estimate for (1) each of the six market clusters in (2) each of the eight service lines for (3) each campus scenario.

After compiling the results of the survey instrument, Stroudwater assigned triangular distributions to each variable. An exception to the process occurred in the area of cardiac surgery. There was considerable discussion over the impact of a competing hospital potentially opening a cardiothoracic surgery unit in CMC's secondary service market. For the "current campus" scenario, the Steering Committee agreed that if a competing unit were opened it would decrease their market share to the 15 to 19 percent range, and they assigned a 20 percent probability that their competitor would open the unit. Should the competitor not build the unit, a minority of the group felt that CMC's market share would increase significantly to the 27 to 30 percent range; a 30 percent probability was assigned. The remaining members were more conservative and estimated a 23 to 25 percent market share. Similarly, estimates were made for the new campus in which participants felt there were better market opportunities and where losses would be better mitigated should the competing hospital open a new cardiothoracic unit.

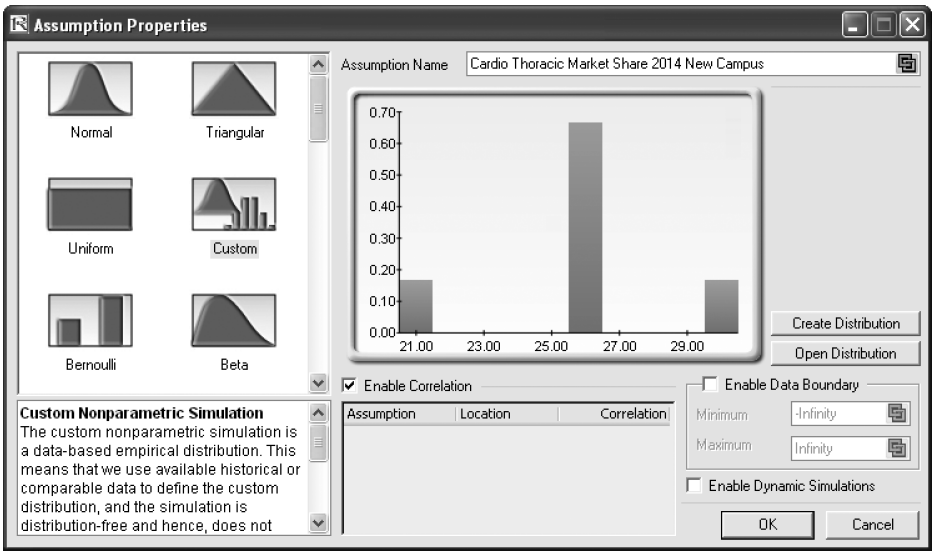
Stroudwater used the custom distributions shown in Figure 7.27.

Average Length of Stay Stroudwater performed length of stay estimates for 400 diagnostic groupings (DRG) using a combination of historic statistics from the National Hospital Discharge Survey of the National Center for Health Statistics and actual CMC data.

Key CMC physicians participated in estimating length of stay based on the benchmark data, their knowledge of their respective fields, and historic CMC data. Stroudwater consultants separately trended historic lengths of stay and developed an algorithm for weighting benchmark data and CMC physician estimates. Length of stay estimates were rolled up into one distribution for each of the major service lines.

At this point, Stroudwater performed a sensitivity analysis (Figure 7.28) to determine which assumptions were driving the forecasts. Based on the relative unimportance population had on outcome, the population distribution assumptions were dropped in favor of single point estimates.

Queuing Decisions A typical approach to determining bed need, and the one used by the CMC Planning Department, is to multiply projections for single point admissions by those for single point lengths of stay to determine



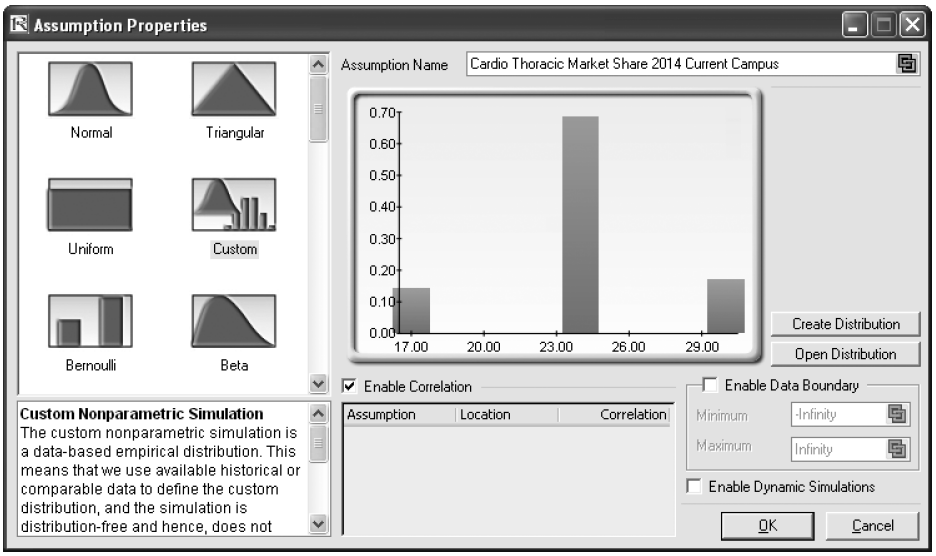


FIGURE 7.27a & **7.27b** Cardiothoracic market share using custom distributions comparing market share assumptions for both current and new campus.

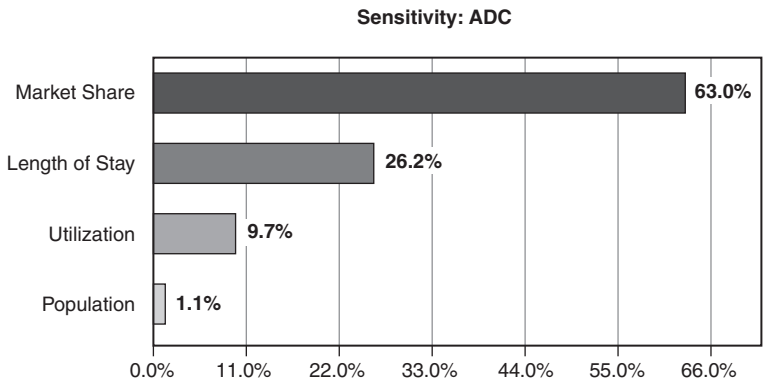


FIGURE 7.28 Sensitivity analysis of key variables in Monte Carlo simulation.

the total number of patient days. Patient days are divided by 365 to determine the average daily census (ADC). A Poisson distribution is then applied to the ADC to determine the total number of beds required. In addition to the problems of single point estimates, Poisson distributions assume that all arrivals are unscheduled and thus overstate the bed need if any of the services have elective or urgent admissions.

Because CMC had categorized all of its admissions by urgency of the need for a bed, Stroudwater was able to conduct an analysis for each unit and found wide differences in the timing needs for beds ranging from OB with 100 percent emergency factor to Orthopedics with 57 percent of its admissions classified as elective. See Table 7.11.

To deepen the analysis, the physician members of the committee met separately to determine which units could be combined because of natural affinities and similar nursing requirements. The Steering Committee then met to discuss service targets for each category of admission. They agreed

TABLE 7.11 Orthopedic/Neurosurgery Admissions Classified by Admission Priority

	Emergency	Urgent	Elective	Total
Total Days	5,540	415	7,894	13,849
Total Admissions	1,497	112	2,133	3,743
Percentage (Admits)	40%	3%	57%	100%

TABLE 7.12 MGK Blocking Model Showing Bed Need Service Targets

Unit	Discharges Arrival Rates	Service Rate 1/ALOS	CV	Bed Needs Service Target: Emergency < 1 day	Urgent 1–2 days	Elective 2–3 days
Medical						
Cardiology	8.6301	0.0606	142.3973	71%	25%	4%
General						
Surgery	10.9315	0.0741	147.5753	49%	2%	49%
Orthopedics	17.9795	0.0901	199.5719	40%	3%	57%

that "Emergencies" had to have a bed available immediately, "Urgent" within 48 hours, and "Elective" within 72 hours. Using a multiple channel queuing model jointly developed by Dr. Johnathan Mun and Lawrence Pixley, bed needs were determined for each of the major unit groupings. See Table 7.12 and Table 7.13.

Distributions had been set for utilization and market share by service line to determine the arrival rates needed for the queuing model. Length of stay distributions by service line had been determined for the service rate input to the model. Forecast cells for Monte Carlo simulation were set for "Probability of Being Served" for <1, 1–2, and 2–3 days for each of the units respectively.

As its planning criteria, the committee decided on a target rate of 95 percent confidence in having a bed available with a greater than 50 percent certainty. Stroudwater employed an iterative process to the model, rerunning the Monte Carlo simulation until the performance criteria were met. For example, the first run for Orthopedics at 75 beds had a certainty of 47.8 percent at 95 percent confidence level compared to a later run of 78 beds with a certainty of 60.57 percent. The 78-bed figure was adopted. See Figure 7.29.

The Results of the Analysis

The committee's perception was that a new hospital located in a neighboring community closer to its target markets would improve market share in key specialties. That perception was reinforced by Stroudwater's findings in the projected differences in bed need between the two sites. See Table 7.14.

The project architects utilized the bed demand information and completed construction cost projections for each of the two scenarios. With a need for only 39 additional beds on the current campus compared to the

TABLE 7.13 MGK Blocking Model with Determination of Beds and Probability of Availability

Unit	Period/Day 3 No. Beds Per Day	No. Beds Per Period	Beds Busy	Prob. Busy	Prob. Served < 1 Day	Prob. Served 1–2 Days	Prob. Served 2–3 Days
Medical							
Cardiology	102	34	34	76.3%	99.4%	100.0%	100.0%
General							
Surgery	66	22	22	84.7%	89.6%	100.0%	100.0%
Orthopedics/							
Neuro	78	26	26	81.9%	96.0%	100.0%	100.0%
Total		82					

original projection of the need for 95 additional beds, the architects were able to design space that afforded 92 private rooms.

The architects estimated the project cost for the new replacement facility at $587 million compared to $285 million for the renovation/addition option for the current campus. The new campus solution afforded an estimated increase in capital campaign contributions of $125 million and income from sale of assets of $56 million, bringing the borrowing required to an estimated $231 million. Borrowing for the current campus option was estimated to be $110 million.

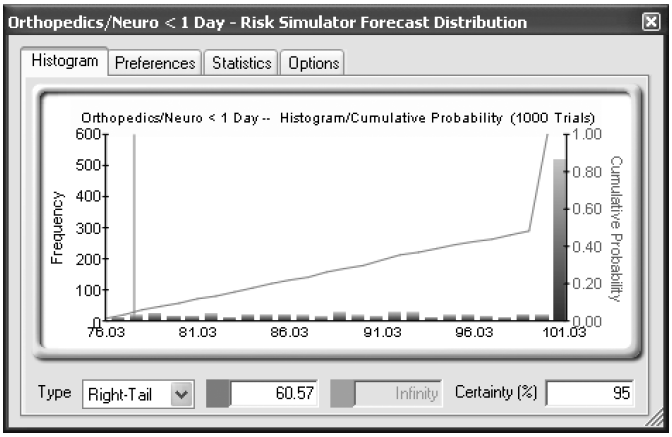


FIGURE 7.29 Frequency distribution for 78 orthopedic beds at new campus site.

TABLE 7.14 Results of Bed Need Projections for Both Current and New Campus Solutions

Service Line	2004 Current Campus	2014 Projections	
		Current Campus	New Campus
Obstetrics	47	48	49
Cardiology	41	43	47
Pulmonary	50	55	56
Infectious Disease	18	20	19
Ortho/Neurosurgery	49	69	73
Rehabilitation	16	18	18
Hematology/Oncology	14	15	16
General Surgery	38	41	42
Vascular/Cardiac Surg.	64	60	68
Urology	14	14	16
Gastroenterology	18	21	21
Neurology	18	20	21
Other Medical	12	14	15
Other Surgical	25	26	28
Total Beds	425	464	489

The pro formas reflected the following advantages to the new campus solution:

- Revenue per admission and per bed was higher with the new campus scenario because of the expected increase in higher margin specialty admissions. Cardiothoracic surgery, for example, contributed $11,600 per case in margin compared to $2,200 for Urology.
- CMC was averaging 6.1 full-time equivalent (FTE) employees per bed in the current facility, much of it due to facility inefficiencies. Stroudwater projected that a renovated campus could bring down the FTE to occupied bed ratio to 6.0 but projected the new facility at 5.8.
- Utility costs were projected to drop from the current $4.51 to $4.08 per square foot and maintenance costs were expected to drop from $2.46 to $1.40 per square foot.
- Loss of revenue from disruption of operations would be minimized with the new campus solution.
- The adjacent community provided assurances to CMC that it would not experience zoning difficulties should the hospital choose to relocate, whereas because of ongoing community opposition to further construction on the existing campus, a three-year delay in construction was expected.

In addition to the foregoing pro forma presentations (see Tables 7.15 and 7.16), Stroudwater provided the board with the Monte Carlo simulation results for projected profit margin in the year 2014 as shown in Figure 7.30. Interestingly, the profit margins projected for the two scenarios were remarkably similar, with the new hospital scenario having a slightly higher probability of exceeding a 4 percent profit margin. Given the similar outcomes of the pro formas, the board elected to proceed with the new campus solution. They felt that even though moving to the adjacent community was a risk, the risk of remaining on the current site was even greater. They realized that their future expansion options were limited should the projections prove to underrepresent future demand for services, whereas the new campus afforded them a great deal of flexibility for unanticipated events.

A bond rating agency rewarded CMC's approach to risk assessment with a favorable rating. Its opinion letter reflected the following observations:

- CMC received high marks for the decision-making process. The agency appreciated the alternative analysis of building on the present campus compared to a new campus and the unique approach of incorporating uncertainty into the calculation of bed need. It noted that the original projections for a 515-bed facility were scaled back to 489 beds as a result of the analysis.
- CMC received points for involving the physicians in the Steering Committee, and for the fact that CMC administration continually met with the medical staff to provide updates on the analysis.
- The agency felt that the relocation to the new campus was a risk by moving away from existing physician offices, but the risk was not only mitigated but enhanced by a privately owned and developed 300,000 square foot medical office building as part of the new campus. (It noted the lack of room for medical office facilities on the existing campus.) It also accepted the argument that CMC's long-term financial viability was improved by the future ability to recruit and retain physicians, particularly in large group practices.
- The fact that the new hospital would be located adjacent to CMC's ambulatory care center that had already been in full operation for 6 years was also viewed positively as patients were accustomed to traveling to this site.
- The agency found that management had compellingly examined all reasonable scenarios for patient volume and third-party reimbursement and their impact on earnings and liquidity.

The following were the principal advantages of using applied risk analysis in this case:

- Board members, many of whom were familiar with applied risk analysis in their own industries, were more comfortable making a major relocation

TABLE 7.15 Pro Forma for New Hospital Scenario

	FY2008	FY2007	FY2008	FY2010	FY2011	FY2012
Total Operating Revenue	$338,250,000	$350,550,000	$358,360,000	$364,000,000	$361,088,000	$382,720,000
Total Expenses	$314,215,000	$325,641,000	$332,003,200	$336,336,000	$320,762,624	$328,852,160
EBIDA	$ 31,613,900	$ 32,487,900	$ 33,935,700	$ 35,242,900	$ 44,325,376	$ 57,867,840
EBIDA Margin	9.2%	9.1%	9.3%	9.5%	12.2%	15.1%
Total Capital and Other Costs	$ 10,602,167	$ 10,774,367	$ 10,883,707	$ 10,962,667	$ 34,891,167	$ 36,583,630
Operating Income /(Loss)	$ 13,432,833	$ 14,134,633	$ 15,473,093	$ 16,701,333	$ 5,434,209	$ 17,284,210
Operating Margin	4.0%	4.0%	4.3%	4.6%	1.5%	4.5%
Contributions and Investment Income	$ 7,578,900	$ 7,578,900	$ 7,578,900	$ 7,578,900	$ 4,000,000	$ 4,000,000
Net Income/(Loss)	$ 21,011,733	$ 21,713,533	$ 23,051,993	$ 24,280,233	$ 9,434,209	$ 21,284,210
Profit Margin	6.1%	6.1%	6.3%	6.5%	2.6%	5.5%
Income Available for Capital	$ 31,613,900	$ 32,487,900	$ 33,935,700	$ 35,242,900	$ 44,325,376	$ 57,867,840
Debt Service Coverage Ratio	6.1	6.1	6.2	3.3	1.3	3.5

TABLE 7.16 Pro Forma for Current Campus Scenario

	FY2008	FY2007	FY2008	FY2010	FY2011	FY2012
Total Operating Revenue	$338,250,000	$350,550,000	$358,360,000	$364,000,000	$361,088,000	$370,760,000
Total Expenses	$314,215,000	$325,641,000	$332,003,200	$336,336,000	$321,845,888	$326,759,160
EBIDA	$ 31,613,900	$ 32,487,900	$ 33,935,700	$ 35,242,900	$ 43,242,112	$ 48,000,840
EBIDA Margin	9.2%	9.1%	9.3%	9.5%	11.9%	12.9%
Total Capital and Other Costs	$ 10,602,167	$ 10,774,367	$ 10,883,707	$ 10,962,667	$ 23,318,486	$ 23,370,578
Operating Income/(Loss)	$ 13,432,833	$ 14,134,633	$ 15,473,093	$ 16,701,333	$ 15,923,626	$ 20,630,262
Operating Margin	4.0%	4.0%	4.3%	4.6%	4.4%	5.6%
Contributions and Investment Income	$ 7,578,900	$ 7,578,900	$ 7,578,900	$ 7,578,900	$ 4,000,000	$ 4,000,000
Net Income/(Loss)	$ 21,011,733	$ 21,713,533	$ 23,051,993	$ 24,280,233	$ 19,923,626	$ 24,630,262
Profit Margin	6.1%	6.1%	6.3%	6.5%	5.5%	6.6%
Income Available for Capital	$ 31,613,900	$ 32,487,900	$ 33,935,700	$ 35,242,900	$ 43,242,112	$ 48,000,840
Debt Service Coverage Ratio	6.1	6.1	6.2	3.3	2.7	6.1

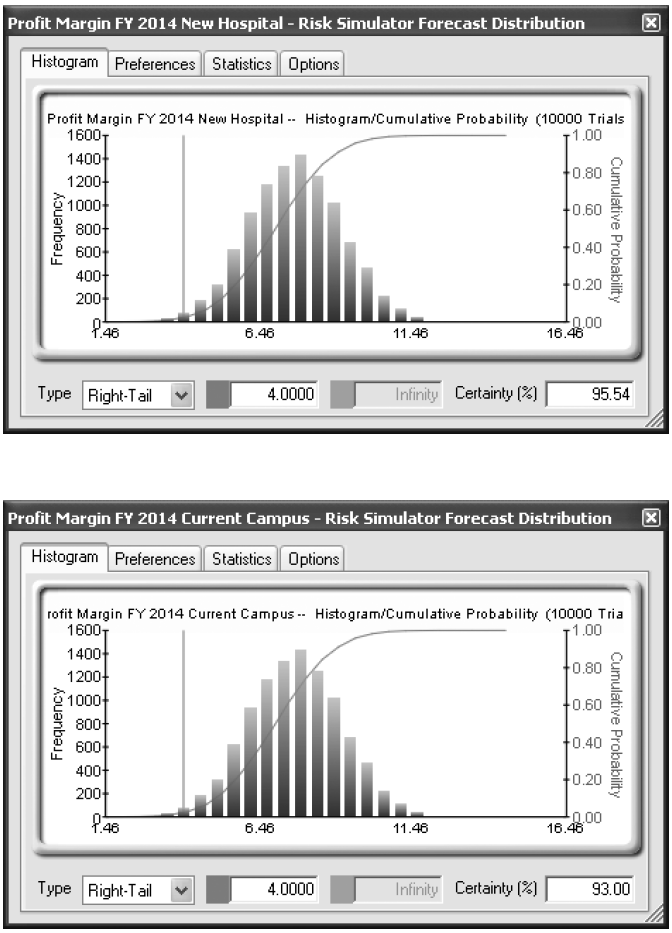


FIGURE 7.30 Frequency distribution of profit margin comparing alternative scenarios.

decision based on a range of probable outcomes rather than on previously employed single point estimates.

- The bond-rating agency awarded the hospital a favorable bond rating because "what if" scenarios were employed and because of the methods utilized in both identifying and mitigating risk factors.
- The hospital was able to reduce the number of projected beds and hence its overall construction cost because of the more sophisticated queuing methodology employed.