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Quantitative Methods in Healthcare: Contributing to Customer Satisfaction And Quality Design

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For the healthcare industry, customer satisfaction is becoming the new measure of quality delivery of care and design. Historically, good common sense and intuition have served managers and designers well with regard to decision making; however, this effort sometimes falls short. Recently, reflecting the influence of business practices, more quantitative analytical tools are being utilized.

Quantitative methods such as queuing theory and simulation have been proved useful when looking at issues such as waiting times in healthcare settings. Retail businesses have long used queuing theory successfully to determine how best to design delivery of service methods that decrease waiting times and, in turn, improve customer satisfaction.

Research using queuing theory and computer simulation was conducted recently at an internal medicine practice at the Sycamore Primary Care Center, affiliated with Kettering Medical Center and Wright State University in Dayton, Ohio. Data were collected with regard to wait times, service delivery times, and customer satisfaction. From these data, conclusions could be drawn and recommendations made for improving the service delivery process.

With the data collected, a simulation was run to determine mean number of patients in the system and the mean number of patients waiting at a time, which can be used for waiting room design purposes.

Both the literature search and the data-gathering process bore out the hypothesis that quantitative analysis serves as a useful tool that can be applied in many ways to the benefit of the healthcare manager and designer.

This methodology serves to provide the decision-maker with supportive quantitative data as opposed to more readily available qualitative data. The quantitative data are valuable for predicting

how a system or process will function and providing measurable characteristics of the process, which are useful for evaluation purposes. The ability to evaluate a process will be useful in predicting whether that process will improve customer satisfaction.

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In today's consumer-driven healthcare market, proactive consumers are demanding convenience as well as quality. How an organization delivers service is becoming as important as the clinical quality (Anderson 1991). As healthcare organizations come to accept this reality, it is becoming apparent that they must arm themselves with improved skills and resources in order to meet these demands. "Mouthing slogans like 'the consumer is king' is easy, but revamping your business to make it customer centered takes more than platitudes . . . " (Appleby 1996). One area of knowledge and skill that is proving useful with regard to quality of service and design is that of management science.

Management science is a field that melds portions of business, economics, statistics, mathematics, and other disciplines in a pragmatic effort to help managers make optimal decisions (Lapin 1994). Whenever an evaluation of hard data can be helpful in reaching a decision, quantitative methods are used to assist managers in selecting the best alternative course of action that will help them in the pursuit of such organizational goals as cost-effectiveness, quality service delivery, and profit.

While good managers are often able to intuitively make reasonable decisions, intuition alone is not always sufficient for selling an "idea" to one's organization. It usually takes established precedents or hard data to influence those with authority. Applying the appropriate quantitative analytical tool to a given problem can produce the hard data needed to influence decision making.

What Are Quantitative Methods?

For healthcare managers and designers, two particular quantitative methods, queuing theory and simulation, have applications that can direct decision outcomes so as to maximize customer satisfaction and produce the optimum design, both of which directly impact profitability.

Queuing theory is one of the earliest quantitative methods, originating in a 1909 paper by A. K. Erlang, a Danish telephone engineer. The objective is to determine how to provide service to customers in such a way that an efficient operation is achieved. Retail businesses have historically utilized queuing theory successfully to determine how best to design delivery of service

methods that will decrease waiting times and in turn improve customer satisfaction. An analysis of significant data can determine various characteristics of the queuing system such as mean waiting time, components of the waiting time, and the mean length of the waiting line. This information can be simply acquired and easily analyzed with readily available spreadsheet software, and then used to construct a cost analysis or determine how to achieve a targeted level of satisfactory customer service. (Lapin 1994)

Simulation is a quantitative procedure that describes a process; a series of organized trial-and-error experiments are then conducted to predict the behavior of the process in operation. Simulation helps to predict the issues resulting from the variation that occurs day to day in the process due to random chance. These simulations seek to duplicate reality as closely as possible within practical limits. Consequently, those issues identified can be addressed during planning activities with decisions being based on realistic data. Given that simulations are often conducted via the computer, a number of alternative operating policies can easily be modeled such that the optimum situation can be identified (Lapin 1994).

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Figure 1
(16k)

Figure 2
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Figure 3
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Abstract

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Patient Flow Analysis

Sycamore Primary Care Center
Patient Flow Analysis

Early Arrival	Wait in Activity Area	Wait in Room	AM Wait	Time with MD
Minutes	Minutes	Minutes	Minutes	Minutes
-7.2	12	14	12.24	34
95% CI 2.69	95% CI 2.26	95% CI 2.12	95%CL 2.31	95% CI 6.22
Std Dev 11.79 Count 74	Std Dev 9.91 Count 74	Std Dev 9.32 Count 74	Std Dev 6.87 Count 34	Std Dev 25.61 Count 65
			PM Wait 16.32	
			Std Dev 10.68 Count 41	
			P(T<=t)	

Check Out	Fill Script	Overall Satisfaction	Phone Wait
Minutes	Minutes	Minutes	Minutes
6.5	7.8	4.221	1.671
95% CI 1.26	95% CI 3.09	95% CI 0.25	95% CI 0.44
Std Dev 3.40 Count 28	Std Dev 5.46 Count 12	Std Dev 0.847 Count 43	Std Dev 1.452 Count 41

Figure 1: Patient Flow Analysis

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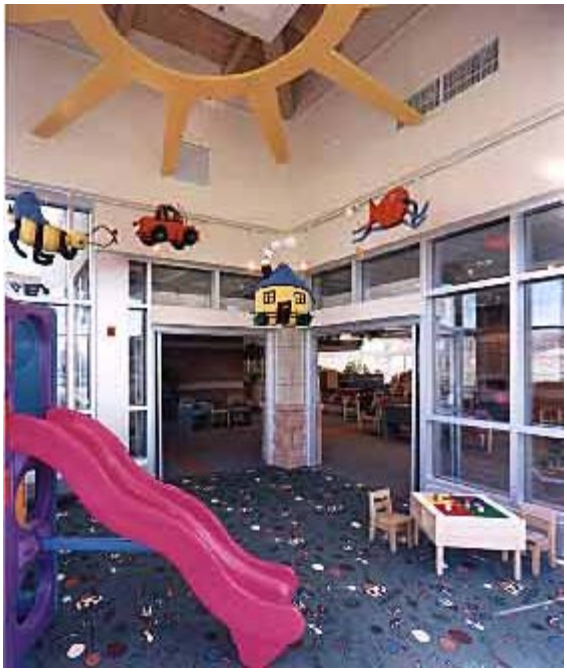

Figure 3: Playroom to entertain and physically involve patients creates a unique, interesting waiting experience.

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Sycamore Primary Care Center

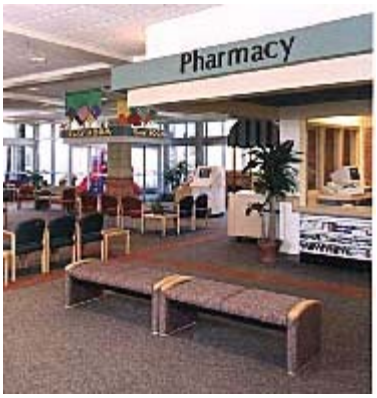

Figure 3: Waiting room design uses quantitative methods to maximize customer satisfaction.

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