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Photo courtesy of Mayo Clinic, Rochester, Minnesota

Preventing Retained Foreign Objects

"The retained foreign object reduction effort has resulted in a significant and sustained reduction in the frequency and types of surgical RFOs and has provided a model for all operating room quality improvement efforts."
—Cima et al.
(p. 123)

Features

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Methods, Tools, and Strategies

Rethinking Satisfaction Surveys: Time to Next Complaint

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Article-at-a-Glance

Background: Patient satisfaction surveys require considerable time and resources. Instead of only systematically seeking patient's input through standardized satisfaction surveys, it is proposed that insights into the performance of the organization should also be based on patient complaints. Complaint data are available at a fraction of the cost of conducting satisfaction surveys, and even though complaints may be rare, new analytical tools (for example, time-between control charts) enable the analysis of these data in ways that are helpful to improvement teams.

Case Study: Medical/Surgical Unit: The choice of whether the analysis should be done per day, per visit, or per discharge depends on the availability of data and the frequency of complaints. A case study shows that an analysis of the last 100 complaints (collected in a 50-day period) was sufficient to detect statistically significant change in the process of care. In the medica/surgical unit, although a complaint occasionally occurred, a series of complaints for the 22nd through the 24th day was unusual. These days of back-to-back complaints marked a departure from the general pattern of no complaints, for which improvement teams could determine the special cause.

Discussion: Whereas complaint data represent only the very dissatisfied patients, satisfaction surveys report the average of satisfied and dissatisfied patients. As a consequence, complaint data allow health care managers to hear the voice of their customers without the distortions caused by including other, more satisfied patients. The cost advantage of time to complaint is obvious. The most expensive component of conducting satisfaction surveys is the data collection. In contrast, most hospitals and many other organizations maintain a system for collecting patient complaints for legal and risk management reasons. Much more can be revealed about a unit's operations when both the complaint and the satisfaction rates are calculated.

Patient satisfaction surveys require considerable time and resources: Hospitals and other health care organizations prepare or purchase surveys, collect data, call nonresponders, analyze data, benchmark the data against national norms, provide feedback to providers, organize improvement teams, implement changes in work processes, and resurvey patients to see if the changes improved their satisfaction. It is not surprising that in this long and expensive process, the improvement component sometimes receives limited attention. Thus, organizations collect a great deal of data, but few changes occur.

Concern with the cost of conducting satisfaction surveys has led us to rethink the process. Instead of systematically seeking patients' input only through standardized satisfaction surveys, we—as well as others[1,2]—propose to also rely on patient complaints.

Patient satisfaction and complaint are complementary concepts. Patients who complain are dissatisfied, and if more patients complain, more should be dissatisfied. One possible linear relationship between the rate of complaints, C, and the rate of satisfaction with services, S, is represented by the following formula:

$$S = \alpha + \beta(1 - C)$$

In this formula, α and β are constants calculated from complaint and satisfaction rates in a large number of health care organizations.

Empirical evidence supports the claim that complaints and satisfaction rates are related concepts.[3,4] One recent study found that satisfaction with inpatient physicians was correlated with rates of complaints and with subsequent episodes of risk management.[5] Yet other studies have not found as strong a relationship.[6]

Satisfaction ratings are typically not related to technical quality of care.[7–9] In contrast, patient complaints are more closely related to the technical quality of care and certainly are related to risk management events.[3,10] Pichert and colleagues, who analyzed seven years of data and calculated rates of complaints across various departments of a medical center, suggested the use of complaint data to measure the departments' performance.[10] Yet, few health care organizations use complaints as a marker of performance; most rely on rates of satisfaction. One concern is that complaints are rare, so it may take a long time for care process changes to be reflected in the data. In this article, we show how complaint data can be analyzed using a small number of observations and short time frames, thus making complaint data relevant and practical for improvement teams. By way of an example, we show that an analysis of the last 100 complaints (collected in a 50-day period) was sufficient to detect a statistically significant change in the process of care.

Time-Between Control Charts

We focus on analysis of days/visits to next complaint; in contrast to analysis of rate of complaint, this method of analysis requires radically less data.[11] Note that the average of days to a complaint is inversely related to the daily rate of complaint. If A designates the average number of days to next complaint, then the daily rate of complaint, C, can be calculated from the formula:

$$C = \frac{1}{1 + A}$$

This relationship is derived from the definition of probability as the number of days with complaint (in this case 1) divided by number of days of observations, which is one plus A. For example, if we have to wait five days before we see a complaint then the daily probability of complaint is one complaint in six days. As days to the complaint increases, the daily rate of complaints decreases. In essence, a test of days to next complaint is in fact a test of changes in daily rate of complaints.

A focus on days/visits to next complaint allows the use of a time-between control chart.[12,13] This type of chart assumes that the daily probability of a complaint has a Bernoulli distribution; then, days/visits to next complaint has a geometric distribution. This distribution can be used to test if a series of consecutive complaints exceeds what could be expected by chance alone. Benneyan has described the statistical details of the approach.[11,14] Others have applied this approach to analysis of medication errors[15] and analysis of diaries of asthmatic patients.[12] In this article, we describe how the approach can be used to analyze time/visits till next complaint.

The choice of whether the analysis should be done per day, per visit, or per discharge depends on the availability of data and the frequency of complaints. In our case study (pages 158–159), we have chosen to perform the analysis per day. Also note that although we focus on complaints, occasionally customers write to express praise, which health care managers could also analyze using the days-to-next-complaint method.

Process improvement teams use control charts to examine events over time. In these charts, observed data are compared with upper and lower control limits. Typically, the analyst estimates the control limit from the process average plus or minus three standard deviations. This procedure assures that more than 99% of data fall within the upper and lower control limits. If a point falls outside these limits, then it has a low probability of being due to chance alone and it is most likely to be a function of a change in the underlying process. In this manner, control charts can be used to identify process changes.

The time-between control charts make a number of assumptions:

1. Data are available on the date of complaint (or the consecutive visit number) and the provider or the departments involved.

2. There is only one observation per period. Thus, if there are several complaints in a day, it is important to analyze complaints per visit as opposed to per day so that there is at most only one complaint per period.

3. The variable plotted is dichotomous and discrete—the complaint either occurs or it does not. The severity of the complaint is not taken into account.

4. The probability of complaint within each time period is independent of the probability of other time periods. In other words, if one patient complains in a visit it is unlikely to lead to another doing so in a subsequent visit. This assumption is not valid in situations where patients receive services in groups.

5. Perhaps most important, the variable plotted is rare. If complaints are frequent, then the analysis focuses on number of consecutive days until next complaint. If complaints are rare, the analysis focuses on number of consecutive days/visits with complaints. In both situations, what matters is to count the number of consecutive occurrence of the rare event.

In a time-between control chart, the control limits are calculated from the ratio R, which is defined as follows:

$$R = \frac{\text{Days with complaints}}{\text{Days without complaints}}$$

If plotting consecutive days without complaints, the ratio R is defined as follows:

$$R = \frac{\text{Days without complaints}}{\text{Days with complaints}}$$

The control limits are calculated as follows:

$$\text{UCL} = R + 3\sqrt{R(1 + R)}$$

$$\text{LCL} = 0$$

Table 1. Complaints in Last 50 Days at an Acute Hospital

Department	Date of First Complaint	Date of Last Complaint	Number of Complaints	Daily Probability of One or More Complaints	Average Days to Next Complaint
Vascular Interventional Procedures	2/23/07	2/23/07	1	.02	48.00
Patient Relations Office	2/16/07	2/16/07	1	.02	48.00
Health Information Management	3/26/07	3/26/07	1	.02	48.00
Outpatient Surgery	2/18/07	2/18/07	1	.02	48.00
Medical Staff	2/13/07	2/13/07	1	.02	48.00
Case Management	3/12/07	3/12/07	1	.02	48.00
Business Office	3/01/07	3/21/07	2	.04	23.50
Progressive Care	2/27/07	3/24/07	4	.08	11.25
Radiology	2/16/07	3/27/07	5	.10	8.80
Medical/Surgical	2/12/07	3/29/07	7	.14	6.00
Emergency Department	2/08/07	3/26/07	23	.47	1.13

Because the event of interest is rare, the lower control limit (LCL) will always be a negative number; however, because a negative number of days is not possible, the LCL is set at zero. The control limits calculated in this fashion should contain more than 99% of the data if the process has not changed.

Improvement teams use control charts to determine if the underlying process has changed. An occasional complaint may happen by mere chance and should be ignored. If the number of days/visits till next complaint or the number of consecutive complaints exceeds the upper control limit (UCL), then this pattern of complaints is unlikely to be due to chance alone (the probability of observing such an event is < 1%). The process has changed significantly and the improvement team can investigate what led to the change.

Case Study

We demonstrate the time-between control chart procedures with data from an acute hospital in the United States. We used the last 100 complaints (data collected during a 50-day period) collected from different departments. Note that 50 days is a relatively short length of time compared with that of a typical satisfaction survey, which is usually collected for a year-long period. Most organizations have access to longer streams of complaint, but we chose this short time frame to illustrate the power of the method of analysis even in small data sets. Table 1 (above) shows the rate of complaints within the various departments.

Organizations can use the information regarding departmental differences in complaints to focus their improvement efforts. In this case, the rate is highest in progressive care, radiology, the medical/surgical unit, and the emergency department (ED).

Medical/Surgical Unit and ED

Many ED complaints are linked to denial of service. These patients will not be included in satisfaction surveys, which are typically given to patients who have received services.

To examine whether there has been a significant process change, we constructed time-between charts for the data. In the first step, we listed the data for each department and marked the number of complaints on each day (Table 2, page 159; columns 2 through 4). The numbers of consecutive complaints for each department are shown in columns 5 through 7. For example, on February 8, 2007, there were no complaints in the medical/surgical unit; on February 12, there was one complaint; but no further complaints occurred until February 18. The longest series of consecutive complaints started on March 1 and lasted three days. For the ED, on some days there were more than one complaint per day, for which the correct method of analyzing these data, as stated, is per visit and not per day so that there is one observation per time period. However, because we did not have data on the number of visits, we counted the multiple complaints per day as one complaint.

In Step 2, we calculated the UCL from R, the ratio of days with complaint to days without complaint:

Medical/Surgical Unit	ED
$R = \frac{7}{43} = 0.16$	$R = \frac{23}{27} = 0.85$
$UCL = 0.16 + 3\sqrt{0.16(1.16)} = 1.47$	$UCL = 0.85 + 3\sqrt{0.85(1.85)} = 4.62$

Figure 1 (page 160) shows the resulting data for the ED.*

* Figures 1–3, unlike the typical format of the g-type control chart, the complaints are plotted by day of occurrence to best portray the history of the incidence of complaints.

Table 2. Calculation of Days to Next Complaint

	Compliants, No.			Days of Consecutive Complaint		
Date	Emergency Department	Medical/Surgical	Outpatient Surgery	Emergency Room	Medical/Surgical	Outpatient Surgery
2/8/07	1			1	0	0
2/9/07	3			2	0	0
2/10/07				0	0	0
2/11/07	2			1	0	0
2/12/07		1		0	1	0
2/13/07				0	0	0
2/14/07				0	0	0
2/15/07	2			1	0	0
2/16/07	1			2	0	0
2/17/07	5			3	0	0
2/18/07		1	2	0	1	1
Data not shown for 2/19/07–2/28/07						
3/1/07	1	8		2	1	0
3/2/07	2	1		3	2	0
3/3/07	1	2		4	3	0
3/4/07	2			5	0	0
Data not shown for 3/5/07–3/25/07						
3/26/07	3			2	0	0
3/27/07				0	0	0
3/28/07				0	0	0
3/29/07		2		0	1	0
Days of no complaints				27	43	49
Days of one or more complaints				23	7	1
Total days				50	50	50
Ratio *R*				0.85	0.16	0.02
Upper Control Limit				4.62	1.47	0.45

Note that the variation in the data could be due to chance (that is, it is < UCL). The series of consecutive days of no complaints starting on the 21st day exceeds the UCL. Observing so many consecutive days of no complaints was unusual. Such a run of good days was unlikely to have resulted from chance alone. Therefore, we concluded that in this period there was an improvement, for which improvement teams should look for special causes.

The data for the medical/surgical unit are shown in Figure 2 (page 160). As before, we plotted the days since the start of the 50-day period on the x-axis. Because complaints were rare, we plotted consecutive days of complaints on the y-axis. Occasionally a complaint occurred, but the series of complaints that starts on the 22nd day was unusual. These days of back-to-back complaints marked a departure from the general pattern of no complaints, for which improvement teams would determine the special cause. In this case study, monitoring the process in the last 50 days was sufficient to detect a change in the care process on days 22 through 24, and an improvement team can focus on why these days had an excessive number of complaints.

Outpatient Surgical Department

A similar analysis can be done for any unit, even units with very few data points. For example, in a 50-day period the outpatient surgical departments experienced only two complaints, both on the same day. The UCL was calculated to be 0.45. The observed day of complaint was a radical departure from the pattern of no complaints in this department (Figure 3, page 160). Because complaints were so rare, observing even one complaint was a significant event. Although it might appear that we relied on one day to make an inference about the process, we were in fact relying on not 1 but 50 data points, constituting a long stream of observations. Logically, if day after day no one complains, then the first complaint will be considered a surprise and an unusual event. Even units with no or very rare complaints can be monitored.

Discussion

In recent decades, progress has been made in incorporating the customer's voice into measures of quality, typically in the form of standardized and reliable satisfaction surveys.[16] Satisfaction surveys are used in improvement efforts to trace whether changes in care processes have led to improvement and to a health care organization's performance—both of which can also be addressed by analyses of complaints.

Unsolicited complaints provide clinicians with a vivid, readily available voice of the patient. Whereas complaint data include only the very dissatisfied patients, satisfaction surveys report the average of satisfied and dissatisfied patients. In satisfaction surveys, the larger majority of satisfied patients dwarf the responses from the smaller minority of dissatisfied patients. The resulting average responses represent a loss of important information on the nature of the possible problems underlying the complaints that may be in need of improvement.

For benchmarking, organizations need data relative to their performance to other hospitals; such data could represent complaint data as well as patient satisfaction data, as long as the data are collected in a standardized manner. Most organizations do not share their complaint data, but there is no foreseeable obstacle to their doing so; most complaint databases do not contain patient-identifying information. The control-chart calculations depend on date of complaint and place of complaint, both of which are relatively easy to standardize.

The cost advantage of time to complaint is obvious. The most expensive component of conducting satisfaction surveys is the data collection. In contrast, most hospitals and many other organizations maintain a system for collecting patient complaints for legal and risk management reasons. The Joint Commission requires that hospitals review patient and family complaints* but does not specify whether the data on patient perceptions of care should be drawn from satisfaction or complaint data.†[17]

The real choice, of course, is not between data on complaints and satisfaction. One would have greater confidence in data when satisfaction and complaint rates agree. We suspect that in practice these two rates may not yield same conclusions. It is possible for units to have high complaint and high satisfaction rates. In such cases, it is possible that the patients who complain are not completing satisfaction surveys. Alternatively, whereas satisfaction ratings focus on care, complaints focus on care processes (the so-called technical quality of care). In any case, a great deal more can be revealed about a unit's operations when both the complaint and the satisfaction rates are calculated. J

* Standard RI.01.07.01, "The patient and his or her family have the right to have complaints reviewed by the hospital (RI-11).

† Element of Performance 16, "Patient perception of the safety and quality of care, treatment, and services" (PI-5) for Standard PI.01.01.01, "The hospital collects data to monitor its performance" (PI-4).

Emergency Department's Complaints

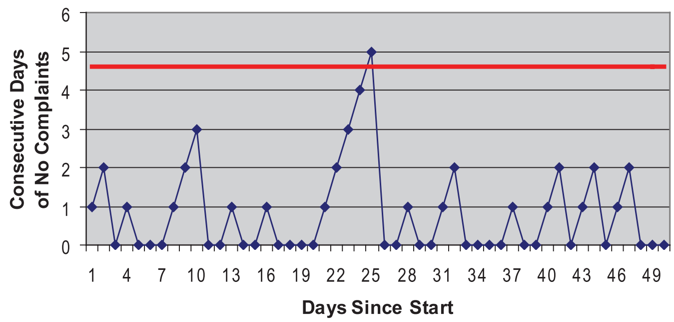

Figure 1. *The x-axis shows days since start of the examination of complaints. The y-axis shows the duration of consecutive days of no complaints. The solid straight line shows the upper control limit, and the jagged line shows the length of various series of days in which there were no complaints. Days 21 through 25 constitute a statistically significant departure from the pattern.*

Complaints in the Medical/Surgical Unit

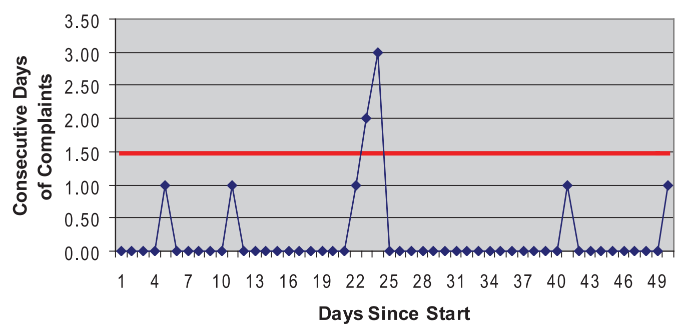

Figure 2. *Days 22 through 24 constitute a statistically significant departure from usual pattern.*

Complaints in Outpatient Surgical Unit

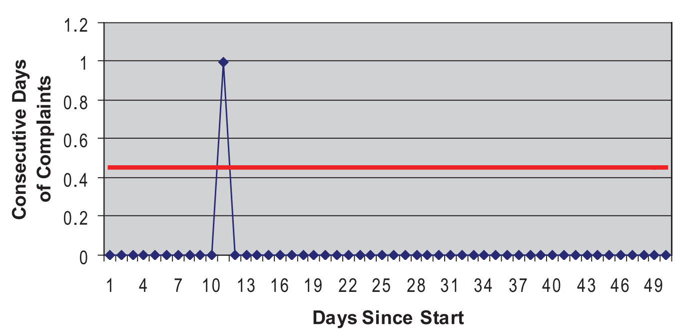

Figure 3. *Day 11 constitutes a statistically significant departure from the usual pattern.*

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