The Science of Emotion

Sentiment Analysis Turns Patients' Feelings into Actionable Data to Improve the Quality of Care

By Richard B. Siegrist Jr., MS, MBA, CPA, Chief Executive Officer; and Susan Madden, MS, Vice President for Product Analytics, Press Ganey Associates

Faced with patient satisfaction scores that were not improving and requests from staff for clear guidance on how to improve those scores, Jim Merlino, MD, chief experience officer of the Cleveland Clinic Health System, decided to look to the comments written by patients on their surveys for fresh insights. Although Cleveland Clinic had long used comments to provide feedback to nursing units and service areas in the hospital, the information within the comments had not been analyzed in a systematic way. The quantity of comments made them difficult to use effectively, and even though it was relatively easy to pick out specific complaints, it was difficult to see how issues changed over time or to identify challenges that were affecting the institution as a whole. As Merlino points out: "One of the biggest challenges with satisfaction data is 'How can I improve?'" He was hoping that using comments would point the way.

In order to begin using comments more systematically, Merlino's staff first needed to group them into meaningful categories. Comments falling within one category – coordination of care – highlighted complaints from patients about physicians not providing clear explanations about their care and about getting conflicting information from different doctors. Although this problem had been recognized for some time by hospital managers, clinic physicians had discounted it as a minor issue. By quantifying the comments and turning them into hard data, "We were able to present the issue in a way that the physicians could identify with and solve," Merlino says. As valuable as this approach was, the manual categorizing of comments was also enormously labor-intensive. "The ability to automate this process would be a huge improvement," he says.

Jim Merlino, MD

	Distinct Verbatim	% of Verbatim	Sentiment Score	Overall Mean Survey Score
People	**1354**	**73.4672**	**0.4711**	**83.3199**
Process	**1351**	**73.3044**	**0.1463**	**82.6562**
Place	750	40.6945	-0.0248	82.67
Service Alerts	468	25.3934	-0.3334	81.7502
Global Other	**110**	**5.9685**	**0.9224**	**89.9573**

Sentiment Analysis of Comments at Hospital A

"One of the biggest challenges with satisfaction data is 'How can I improve?'"

— Jim Merlino, MD
Chief Experience Officer
Cleveland Clinic Health System

Turning Unstructured Data into Insight

As all health care providers know, comments made by patients on their surveys provide a rich source of information on their feelings and reactions to a health care experience. One patient might say, "My doctor was very kind, funny, understanding, made me feel relaxed, really seemed to care, as did the nurses," while another might have a very different experience, "Basically I was just left to wait in pain and ignored by all staff for about two hours." These short statements express in clear and unmistakable language what these patients experienced and perhaps even more importantly, how that experience made them feel. The challenge is how to systematically capture these thoughts and feelings in a way that can be turned into actions to improve patient care and patient satisfaction.

Written comments – text – are known as "unstructured" data, that is, data that cannot be easily quantified or analyzed. Historically, 80% of the data available to a company is "unstructured," and with the growth of online blogs, review sites and social media, the availability of this type of information has grown exponentially. Few of us plan trips or buy a television without referring to review sites from which we can gather not only specific information but also – perhaps even more importantly – read about people's experiences. Many industries – airline, hospitality, retail, pharmacy – have been reacting to this growth in information by using text analytic software to identify emerging market trends, to spot customer or product problems before they grow to be serious issues, to target product development and to identify issues impacting client satisfaction. As

the interest in unstructured data has grown, so has the sophistication of the tools to process it.

Press Ganey maintains the largest database of patient, staff and physician satisfaction data in the health care industry. Two-thirds of these surveys contain comments, many of which provide valuable insight into the reasons that people rate their health care as they do.

The 'Why' Behind the Scores

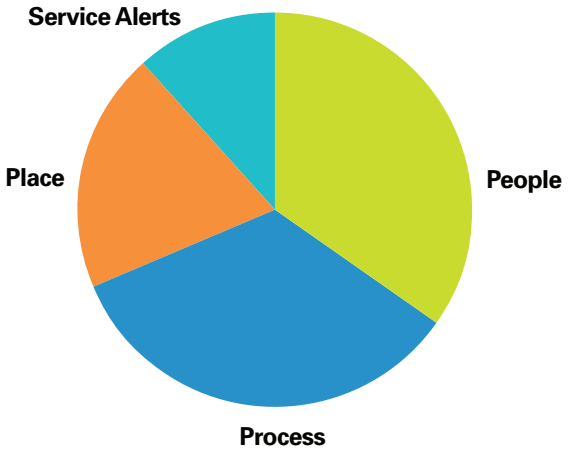
Text analytics and sentiment analysis provide a computer-based method of extracting meaning from free-text comments, of identifying issues about which people feel very strongly – both positively and negatively – and of presenting that information clearly. It can help turn unstructured data into actionable insights.

Sentiment analysis is based on natural language processing software that can analyze the linguistic relationships and connections between words, as well as the syntax and context of phrases. It can interpret special cases like negation (e.g. "the nurses did not care that I was in pain") and conditional sentiment ("I would have been happier if the doctor had explained things more clearly"). The

	Distinct Verbatim	% of Verbatim	Sentiment Score	Overall Mean Survey Score
People	**603**	**72.043**	**0.4935**	**82.655**
Process	**588**	**70.2509**	**0.1899**	**81.4971**
Place	339	40.5018	0.1353	83.5574
Service Alerts	199	23.7754	-0.1549	80.345
Global Other	**58**	**6.9295**	**0.709**	**87.0485**

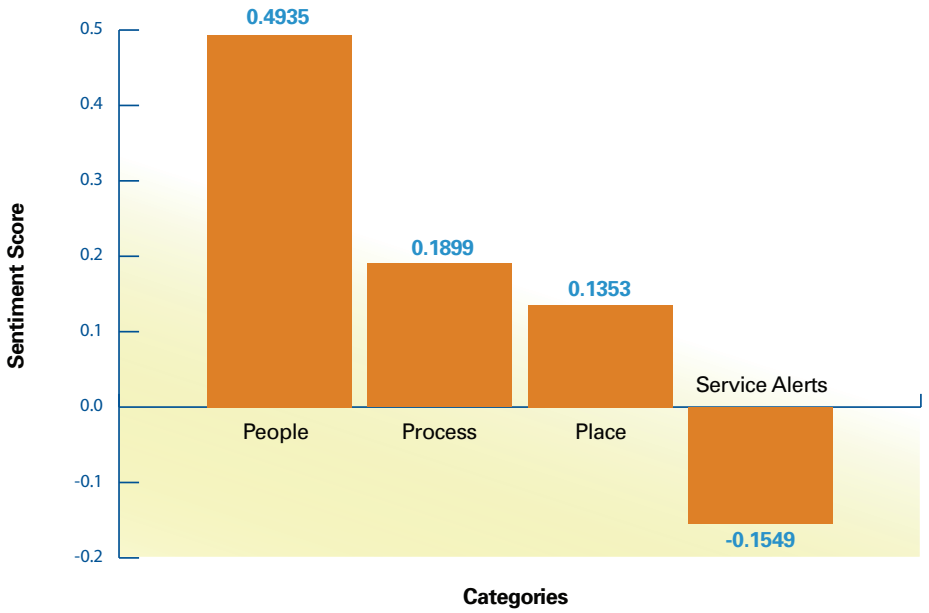
Sentiment Analysis of Comments at Hospital B

Distribution of Comments by Major Category



Source: Press Ganey pilot study of sentiment analysis at 12 hospitals

A Breakdown of Sentiment Scores by Type



Source: Press Ganey pilot study of sentiment analysis at 12 hospitals

"We were able to present the issue in a way that the physicians could identify with and solve. The ability to automate this process would be a huge improvement."

— Jim Merlino, MD

software not only searches on keywords in order to categorize comments, but rates the sentiment expressed as positive or negative on a scale ranging from plus five to minus five. Words like "very," "extremely" and "horribly" increase the intensity rating.

Many comments consist of several thoughts on different topics and with different opinions such as, "My nurses were kind and attentive, but I had trouble sleeping because of the noise from the hallway at night." The software is able to capture each of these thoughts separately and to assign sentiment scores to each. Each comment or part of a comment can fall into multiple categories, allowing for flexibility in analysis and reporting. For example, the comment above would be captured in a category about noise as well as one about nursing care.

Of critical importance, the categorization and sentiment score given to a comment can then be linked back to the "structured" data elements from a survey such as patient characteristics (sex, age, clinical information and geographic location); provider information (attending physician, nurse, nursing unit, payer and length of stay); and survey scores (overall mean scores, section scores, percentile rankings and HCAHPS scores). "Merging qualitative and quantitative data is hugely useful and takes the guesswork out of data and scores," Merlino says. "By being

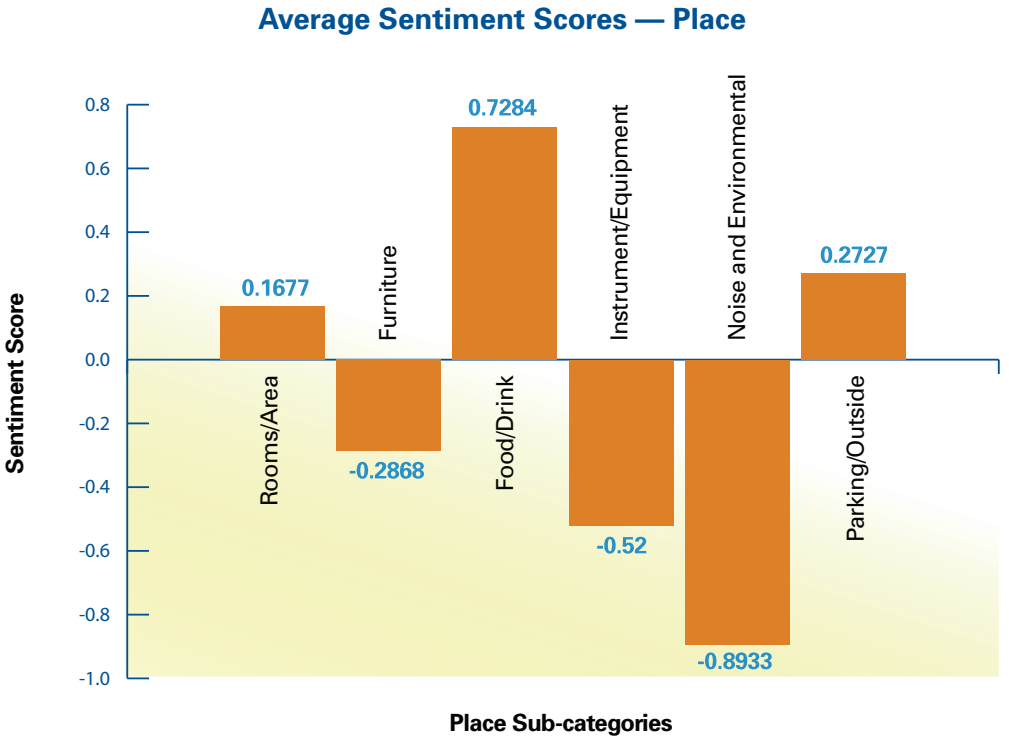
able to mine your comments, you can identify what is causing your scores to be high or low."

The Pilot Study

Over the past four months, Press Ganey has been conducting a proof-of-concept study to ensure that the approach that has worked well in other industries can be applied to health care. This pilot was limited to 12 hospitals in order to test the concept quickly. Comments were primarily taken from inpatient and emergency department surveys, but additional work was also done with comments from an outpatient clinic survey and a physician satisfaction survey. Several categorization models were developed to extract and place the information contained within the comments into various "buckets." Categories focused on capturing comments about people (nurses, physicians and staff); about patient experience (coordination of care, communication, "caring" and procedures); about accommodations, food and other services; and about service alerts (safety, privacy, HIPAA violations, service recovery). Other categories focused on common problem areas: delays, courtesy, pain and responsiveness of staff. Each comment or part of a comment could be placed into multiple categories, bringing along with it the sentiment rating given to it.

	Distinct Verbatim	% of Verbatim	Sentiment Score	Overall Mean Survey Score
Rooms/Area	**231**	**68.1416**	**0.1677**	**83.567**
Furniture	**76**	**22.4189**	**-0.2868**	**79.786**
Food/Drink	54	15.9292	0.7284	84.28
Instrument/Equipment	46	13.5693	-0.52	85.9017
Noise and environmental	**37**	**10.9145**	**-0.8933**	**80.7031**
Parking/Outside	11	3.2448	0.2727	82.8864

Category Name: Place



Source: Press Ganey pilot study of sentiment analysis at 12 hospitals

The Cleveland Clinic has taken sentiment analysis to heart.

Interestingly, the software was able to correctly categorize comments despite poor spelling and grammar.

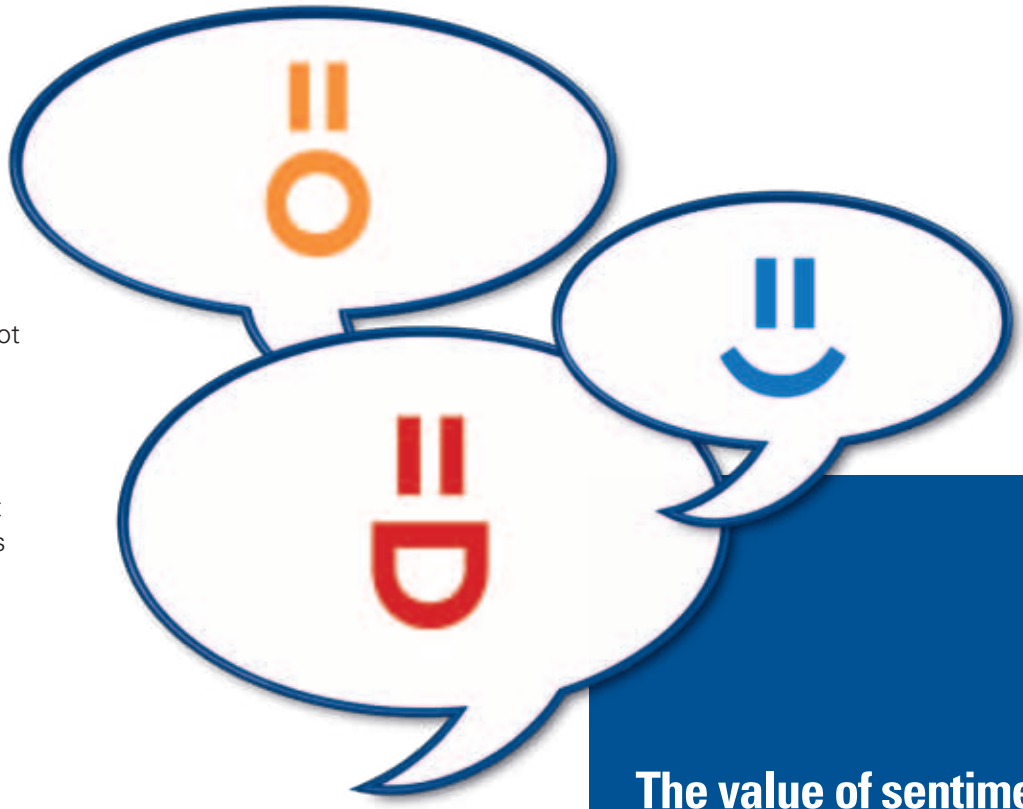
Sample Results

One of the pilot hospitals was particularly interested in exploring the causes of poor mean scores in the room and hospital environment section of their inpatient surveys.

The comments for this hospital were processed using the Categorization Model "People, Place, Process" (see chart, page 30). When grouped, the number of comments fell about equally into the three major categories (people, place, process), with a smaller percentage falling under "service alerts." Among the three major categories, place was rated the lowest. Drilling down into the subcategories within place, including rooms, furniture, food, equipment, noise and parking – the negative sentiment scores given to the comments grouped within these sub-categories flagged "noise and environment" issues as receiving many patient complaints. The negative comments reflected the quantitative ratings on the survey. Digging into this area identified three main types of problems: hallway noise, roommate/TV noise and temperature/environmental noise. The analysis revealed specific issues that could be improved with targeted interventions, and also identified issues such as food that received very positive ratings and thus were not areas to be concerned about.

Tying Comments to Structured Data

One of the strengths of sentiment analysis is the ability to tie the findings to other structured data elements, such as to specific nursing units, survey scores,



time of year when patient was in the hospital, etc., to further pinpoint the root causes and possible interventions. For example, the number and intensity of negative comments about pain occur more often in specific nursing units. Again, this would highlight the fact that in certain areas of the hospital, patients were experiencing particular problems with pain control.

Sentiment scores also reflect survey mean scores and HCAHPS scores, as the graphic on page 35 indicates. In other words, patients make negative comments and complaints when they are less satisfied with their care – an association that is commonsensical – but it also means that comments provide an accurate source of information about issues that need attention. Conversely, positive sentiment scores in comments are associated with overall higher scores on Press Ganey surveys as well as higher HCAHPS scores.

The Value of Sentiment Analysis

The value of sentiment analysis lies in its ability to convert unstructured text (comments) into structured data that can be quantified and analyzed, enabling a hospital or other provider to rise above the overwhelming details provided in individual comments to a deeper analysis of experience and emotions – the drivers of survey scores. Specifically, sentiment analysis can help to:

- Develop actionable insights such as early warnings or alerts, root-cause analyses, trending over time, and identifying the intensity of reactions and feelings to improve focus on the most important issues.
- Measure the impact of targeted interventions over time. Once a key issue has been identified using sentiment analysis and an intervention designed and implemented, the results of the action can be measured by trending the volume of comments and their sentiment scores over subsequent periods.

The value of sentiment analysis lies in its ability to convert unstructured text (comments) into structured data that can be quantified and analyzed, enabling a hospital or other provider to rise above the overwhelming details provided in individual comments to a deeper analysis of experience and emotions.

Representative Negative Comments About Room and Environment

Hallway/Staff	ROOM – **Extremely loud, not able to get any sleep.**
	ROOM – It could **get noisy in the hallway** on occasion.
	ROOM – Overly **excessive noise level by staff in hall** outside.
	ROOM – **Lot of noise in hall & across from front desk - so noisy!**
Roommate/TV	ROOM – Roommate had **TV on loud 24/7** — Maybe should change something about this.
	ROOM –The noise was of no fault to the nurses my **roommate** was very rude and was asked several times to turn down her TV!
	ROOM – **Person in next room was very loud.**
Temperature/ Environmental Noise	ROOM – **Construction was very loud.**
	ROOM – **Window side cold** at night **noise from hallway for all 3 nights.**
	Noisy with moving soil linen machines, chairs, etc.

Source: Press Ganey pilot study of sentiment analysis at 12 hospitals

- Easily identify individuals for reward and recognition programs, as well as best practices that inspire highly positive comments from patients.
- Quickly identify serious issues of safety, privacy violations and service recovery.

Next Steps

Press Ganey will be designing a sentiment analysis product to enhance its current commenting service, for release early in 2011. This package will include standard reports summarizing the key areas or issues that are generating strongly positive and negative sentiments among patients in order to help focus improvement efforts by our clients. In later releases, we will be providing clients with additional flexibility with ad hoc analytic and reporting tools.

Most of our pilot work has focused on hospital surveys. However, sentiment analysis can be used to analyze comments from all types of surveys, and our sentiment analysis product will be extended to all of our survey products.

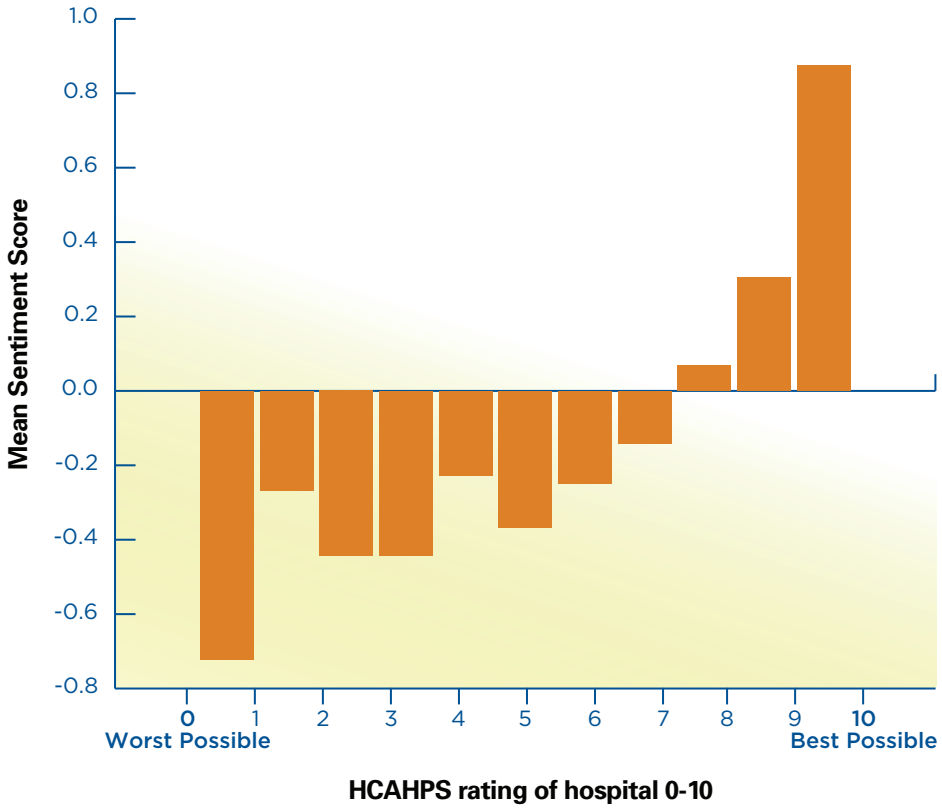
The sources of unstructured data are also not limited to satisfaction surveys. Monitoring hospital web sites, blogs and social media sites could provide additional sources of information in the future.

Parting Sentiments

"Satisfaction is not the only goal or use of sentiment analysis; we also want to use it to drive safety and quality of care," Merlino says. As satisfaction scores become increasingly important as measures of quality and are tied to reimbursement, sentiment analysis can provide a complementary perspective that fleshes out the meaning behind the scores and provides a hospital with the ability to design targeted and effective improvement efforts. This can provide an important competitive advantage, one that has been recognized in many other industries using text and sentiment analytics.

Beyond the short-term implications for reimbursement, developing loyalty and strong feelings of connection between health care providers and patients is a key component of long-term success. People with strongly positive or negative feelings are much more likely to express those feelings to others and to influence their perceptions, and in this era of easy online communication, that influence can be felt quickly and widely. Traditional ways of measuring loyalty through simple rankings do not necessarily provide an accurate assessment of the strength of feeling of your patients. In the challenge to get from good to very good, or from usually to always, sentiment analysis may be the difference maker organizations have been seeking. PG

Sentiment Scores Related to HCAHPS Performance



Source: Press Ganey pilot study of sentiment analysis at 12 hospitals

If you have suggestions for future articles for *Press Ganey Partners*, please e-mail us at partners@pressganey.com