Articles

Use of Risk-Adjusted Outcome Data for Quality Improvement by Public Hospitals

JOHN M. LUCE, MD, *San Francisco*; GREGORY D. THIEL, MPA, *and* MICHAEL R. HOLLAND, MM, *Berkeley; and* LOUISE SWIG, MPH, SUSAN A. CURRIN, RN, MS, *and* HAROLD S. LUFT, PhD, *San Francisco, California*

In 1993 the California Office of Statewide Health Planning and Development (OSHPD) began public release of risk-adjusted monitoring of outcomes (RAMO) under the California Hospital Outcomes Project. We studied how 17 acute care public hospitals in California used these RAMO data for quality improvement purposes following their initial distribution, first, by analyzing the outcome data for San Francisco General Hospital Medical Center as recommended by OSHPD and, second, by querying the departments at the other 16 public hospitals to determine how their own analyses compared. We found that the hospitals generally did minimal analyses of the OSHPD RAMO data and considered the data of little value to them. Only 3 hospitals initiated quality improvement activities based on their data review. The major reasons given by the hospitals for not using the RAMO data were that their outcomes were adequate, as verified by a comparison of their observed outcomes and those expected after risk-adjustment; that the hospitals had too few patients in the diagnostic categories; that they had too few resources; and that they were not concerned with the data's public release. Other possible explanations were that awareness of the California Hospital Outcomes Project was not widespread at the time of the study, that the RAMO data were not distributed in a way that encouraged their use, and that public hospitals were not inclined to use the outcome data because the project was imposed on them. Whatever the explanation, our study suggests that the California Hospital Outcomes Project has had little effect on quality improvement in public hospitals.

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Risk-adjusted outcome data are commonly used to assess the quality of a hospital in response to external review or for improving performance internally.[1-5] In California, hospital discharge data collected by the Office of Statewide Health Planning and Development (OSHPD) are used under the California Hospital Outcomes Project to accomplish risk-adjusted monitoring of outcomes (RAMO).[6] The first report of the California Hospital Outcomes Project contained OSHPD discharge data from 1988 to 1990 and was publicly released in the fall of 1993. Included were one medical outcome, in-hospital mortality of patients with acute myocardial infarction, and two surgical outcomes, complications and lengths of postoperative stays for patients with cervical and lumbar discectomy. Cesarean section rates were considered for inclusion as an obstetrical outcome, but after a decision was made to study all methods of delivery, the obstetrical portion of the first report was postponed.[7]

In the first California Hospital Outcomes Project report, outcomes that were significantly better than expected or not better than expected were highlighted for public release of the RAMO data. Hospitals could determine if their outcomes were worse than expected by analyzing the data for their institutions, and this information was available to others who analyzed the report. In addition, two different models were used to adjust for patient differences among hospitals. The first employed only medical conditions likely to be present before hospital admission. The second model included these conditions and other diagnoses, such as shock, that might either have developed after admission or have been present at admission, in addition to social characteristics such as race and health insurance status. These last variables were thought to have substantial potential for altering the risk estimates at public hospitals.

In June 1993, California hospital chief executive officers received from OSHPD a draft of the first report of the California Hospital Outcomes Project that contained their facilities' RAMO data in the two areas described. The hospitals were given 60 days to review the data and make comments about them for the report, which was

From the Institute of Health Policy Studies (Drs Luce and Luft) and the Department of Medicine (Dr Luce), University of California, San Francisco, School of Medicine; the Department of Quality Management, San Francisco General Hospital Medical Center (Dr Luce and Ms Swig and Ms Currin); and the California Association of Public Hospitals and Health Systems (Mr Thiel and Mr Holland), Berkeley.

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Reprint requests to John M. Luce, MD, San Francisco General Hospital Medical Center, 1001 Potrero Ave, Rm 5K1, San Francisco, CA 94110.

ABBREVIATIONS USED IN TEXT

HCFA = Health Care Financing Administration
OSHPD = Office of Statewide Health Planning and Development
RAMO = risk-adjusted monitoring of outcomes

scheduled for public release in December of that year. The hospitals also were provided with diskettes containing the RAMO data formatted to supply information relevant to understanding the outcomes of individual patients, such as the dates of their admission, their comorbidities, and whether they were transferred to or from other hospitals. In a booklet distributed with the diskettes, OSHPD offered detailed instructions about how hospitals might use the information included on the diskettes and also analyze the medical records of the patients listed on the diskettes both to respond to public release of their outcomes and to assess and improve the quality of care of other patients in the diagnostic and procedural categories.

Shortly after the drafts of the first California Hospital Outcomes Project report were distributed, we did the following study of the use of RAMO data for quality improvement by acute care public hospitals in California. The study consisted of two parts. First, we analyzed the RAMO data for patients at one public hospital, San Francisco General Hospital, as recommended by OSHPD. Then, using this analysis as a standard, we compared how other public hospitals analyzed their own RAMO data and used this information to improve quality. We focused on public hospitals because they care for many Californians and because they are expected to have poorer patient outcomes and hence to have a greater need for quality improvement. We also hoped to provide OSHPD with information regarding the effects of the California Hospital Outcomes Project on public hospitals.

Methods

San Francisco General Hospital Analysis

The analysis of OSHPD RAMO data at San Francisco General Hospital was conducted by the hospital Quality Management Department (L.S., S.A.C., and J.M.L.) after the draft report was forwarded to the hospital in June 1993. The study was limited to a single outcome, mortality of patients with acute myocardial infarction, because cervical and lumbar discectomies are not commonly done at San Francisco General Hospital. The study followed seven sequential steps:

- Reviewing the overall mortality results for patients with acute myocardial infarction as distributed by OSHPD,
- Obtaining from the diskette provided by OSHPD for further analysis a list of patients who died following acute myocardial infarction,
- Evaluating the accuracy of the hospital's coding of the discharge data it provided OSHPD,
- Performing a medical records technician review of the records of patients who died of acute myocardial infarction,
- Performing a nurse review of the records,
- Performing a physician review of the records, and
- Discussing the results of the analysis with hospital administrators and medical leaders before recommending projects for quality improvement.

Statewide Public Hospital Study

In December 1993, after the San Francisco General Hospital analysis was complete and the first California Hospital Outcomes Project report was publicly released, we (J.M.L., G.D.T., and M.R.H.) wrote the administrator and medical directors of the quality management departments of 22 other acute care public hospitals that are members of the California Association of Public Hospitals and Health Systems and asked if they were willing to fill out a standardized questionnaire to provide demographic information and to determine how they had used the RAMO data relevant to their own hospitals. The directors were informed that in return for filling out the questionnaires, they would receive copies of the analysis that San Francisco General Hospital performed on its own OSHPD RAMO data regarding patients who died of acute myocardial infarction. The letter was followed by phone calls to the quality management directors. If the directors agreed to participate in the study, they were sent the questionnaires and asked to return them by mail.

The study questionnaire began with questions related to hospital demographics. To provide an index of hospital commitment to quality and improvement, the questionnaire asked at what level the hospital staff was trained in continuous quality improvement and the number of continuous quality improvement activities in the hospital, both graded on a scale of 0 to 5. The hospitals' overall resource allocation to continuous quality improvement was graded on a scale of 0 to 10, with 0 being "none" and 10 "a very great deal." To provide information about the hospital use of other risk-adjusted outcome data in the past, the questionnaire asked whether hospitals had previously reviewed Medicare mortality data from the Health Care Financing Administration (HCFA) and whether they reviewed the medical records of Medicare patients who died. The questionnaire offered several options to explain why hospitals did not use the HCFA data if this was the case. In addition, the questionnaire asked for the overall value of the HCFA data to the hospitals, both on a scale of 0 to 10, with 0 being "none" and 10 being "a very great deal."

To determine public hospitals' use of the RAMO data provided by OSHPD, the questionnaire listed the seven steps followed by San Francisco General Hospital. Performing all seven steps for patients with acute myocardial infarction would yield what was called a Quality Improvement Score of 7, and also performing all seven steps for patients with cervical and lumbar discec-

tomy would yield a total Quality Improvement Score of 14 (hospitals without enough patients in these categories for the RAMO data to be meaningful would yield proportionately lower maximum possible Quality Improvement Scores). The questionnaire provided the same possible explanations as with the question regarding the HCFA data and why the various steps were not undertaken by the hospitals. The questionnaire also asked for a list of any quality improvement activities that had been initiated as a result of the use of the OSHPD RAMO data. In addition, the questionnaire asked the hospitals how they would characterize the overall value of the data to them on a scale of 0 to 10, with 0 being "none" and 10 "a very great deal."

After their questionnaires were returned in January 1994, the quality management directors received a copy of San Francisco General Hospital's analysis. In July 1994, they received a follow-up query to assess whether their hospitals had used the analysis in making quality improvement changes. The follow-up query asked whether hospitals had reviewed the San Francisco General Hospital analysis. It then asked that the usefulness of the San Francisco General Hospital analysis be graded on a scale of 0 to 10, with 0 being "useless" and 10 "very useful." The query then asked whether hospitals had made improvement changes related or unrelated to the San Francisco General Hospital analysis and, if so, what the changes were.

After receipt of the study questionnaires and follow-up queries, we analyzed the results and calculated the public hospitals' Quality Improvement Scores. Then, from the detailed statistical tables provided by OSHPD in the first California Hospital Outcomes Project report, we determined the z score used by OSHPD to indicate whether individual public hospitals had significantly different-than-expected adverse outcomes and then computed aggregate z scores (a z value greater than 1.96 or less than -1.96 is statistically significant at $P < .05$). We also determined from the tables the P values used by OSHPD to indicate the probability that differences in observed and expected outcomes at individual hospitals were attributable to chance, with a P value of .05 or less indicating systematic nonchance variations.[7] These individual hospital outcomes were recorded because hospitals with worse-than-expected outcomes might have a greater incentive to improve quality and therefore might have initiated more quality improvement activities.

Results

San Francisco General Hospital Analysis

Review of the OSHPD RAMO data for San Francisco General Hospital revealed that of 82 patients with acute myocardial infarction, 12 died between July 31, 1990, and May 31, 1991. Of these, 11 died at the hospital and 1 patient died after transfer to another facility. The Quality Management Department found it difficult to identify the 11 patients who died at that facility using the OSHPD RAMO data because the patients' hospital medical record numbers and Social Security numbers were not provided by OSHPD. As a result, the patients had to be identified by date of death and other distinguishing characteristics from a list of all patients with acute myocardial infarction during the OSHPD analysis period. One of the patients listed by OSHPD as having died after admission for acute myocardial infarction was miscoded by the hospital and did not actually have a myocardial infarction. Two patients were incorrectly stated by the hospital to have been 115 years old although they were much younger; this was done because the patients' ages were not known at the time discharge data were sent to OSHPD, and the hospital coders knew they would not be asked by OSHPD for corrected data if they listed the patients' ages as less than 120 years. Although all patients with acute myocardial infarction were admitted through the emergency department, most were incorrectly coded as nonemergency admissions.

No patterns such as similar times or days of death were identified in patients who died. In addition, record reviews by medical record technicians, the head nurse of the Coronary Care Unit, and the medical director of the Coronary Care Unit failed to reveal problems in the quality of care of patients with acute myocardial infarction once they were admitted to San Francisco General Hospital. The only issue raised was the poor quality of documentation of events in the field by the paramedics. This issue was subsequently taken up by the Critical Care Committee of the medical staff at San Francisco General Hospital, which declined to pursue it further.

Statewide Public Hospital Study

A total of 19 acute care public hospitals agreed to participate in the study, including San Francisco General Hospital. Of those hospitals, 17 acknowledged receiving their OSHPD RAMO data and were included in the final analysis. These hospitals were for the most part medium (100 to 299 beds) or large (300 or more beds) and located in urban or suburban areas. Most of them (15) had academic affiliations. As shown in Table 1, the public hospitals as a whole had substantial involvement in continuous quality improvement training and activities and had made considerable resource allocations to quality improvement. As shown in Table 2, however, their use of HCFA Medicare mortality data and OSHPD RAMO data for quality improvement purposes was minimal, and the value of the data release to the hospitals was perceived as low. Furthermore, few if any quality improvement activities were initiated in response to the RAMO data. The reasons cited most often by the hospitals for not using either the HCFA or OSHPD data were "outcomes adequate," followed by "too few patients in the diagnostic categories," "too few resources," and "not concerned about public release of the data."

Seven hospitals offered recommendations to improve the usefulness of the California Hospital Outcomes Project. Two hospitals cited the need for coding validation to verify the accuracy of their data. Two hospitals

TABLE 1.—*Continuous Quality Improvement (CQI) Activities of Public Hospitals (n = 17)*

Level of staff trained in CQI (scale 0–5)	
Median	4
Range	0–5
Number of CQI activities (scale 0–5)	
Median	3
Range	0–5
CQI resource allocation (scale 0–10)	
Median	5
Range	0–7

also asked that they be given instructions on how to interpret risk-adjustment methods, and two questioned the methods' accuracy. One hospital asked that OSHPD "develop data which the public can understand. The data released were developed for a statistical-type person and left too much room for misunderstanding."

Eleven hospitals responded to the follow-up query regarding their use of the San Francisco General Hospital analysis of its own OSHPD data. Of the responding hospitals, nine reviewed the analysis. Only one hospital initiated any quality improvement changes based on its review, a medical record review of RAMO data. One hospital had begun physician reviews of complications of discectomy patients coded by its medical records department to ensure the accuracy of discharge data sent to OSHPD, but this change was initiated independently of the review of the San Francisco General Hospital analysis.

Regarding their outcomes, the hospital group results for mortality from acute myocardial infarction were not significantly higher or lower than expected using both risk-adjustment models ($z = 0.497$ and 0.796, respectively). No hospital, including San Francisco General Hospital, had significantly worse-than-expected mortality among patients with acute myocardial infarction using both risk-adjustment models. The hospital group results for complications after cervical and lumbar discectomy were not worse than expected using both risk-adjustment models ($z = 0.226$ and 0.544 and 0.122 and 0.583). One hospital had a worse-than-expected complication rate for patients with lumbar discectomy using both risk-adjusted models ($P = .05$ and .05), but this appeared to be due to the fact that the sole patient who underwent this procedure had a complication. One hospital had worse-than-expected lengths of stay following cervical discectomy using the first risk-adjustment model ($P = .011$), and one hospital had longer-than-expected lengths of stay after lumbar discectomy using both risk-adjustment models ($P = .006$ and .005). None of the hospitals with worse-than-expected outcomes initiated significantly more quality improvement activities than hospitals with better-than-expected or not-better-than-expected outcomes.

Discussion

This study showed that public hospitals in California made generally little use of the RAMO data provided by OSHPD in the first year after distribution of the data to the hospitals or in the seven months following their public release. Furthermore, the use of the data by public hospitals was not increased by informing them how San Francisco General Hospital analyzed its own RAMO data. In explaining why they did not use the OSHPD RAMO data, the study hospitals most often said that their outcomes were adequate, that they had too few patients in the diagnostic categories, and that they had too few resources to devote to using the data. "Adequate outcomes" was also the reason most frequently given by the hospitals to explain why they did not use their HCFA Medicare mortality data in previous years. It would appear from these responses that public hospitals were unlikely to invest their limited resources in data review and quality improvement projects when their outcomes were not better than expected and even worse than expected for patients in the categories under study.

Public hospitals in California and other states have traditionally not had to compete for patients because they are "providers of last resort" that care primarily for the poor, many of whom are uninsured. Given this situation, it might be argued that the hospitals have little incentive to improve quality and need not be concerned about poor outcomes. Alternatively, it might be argued that public hospitals are unlikely to attract patients by demonstrating outcomes that are better than expected. Yet, competition for patients, at least those with Medicaid (Medi-Cal in California) and Medicare has increased dramatically in recent years, and most public hospitals have made important moves to maintain, if not increase, their share of sponsored patients. Furthermore, most California public hospitals have made substantial investments in quality improvement, as documented in the study. Because of this, we think that the hospitals would have made more use of the OSHPD RAMO data

TABLE 2.—*Public Hospital Use of HCFA Mortality Data and OSHPD RAMO Data*

Hospital Use	*HCFA Mortality Data Release*	*OHPD RAMO Data Release*
Hospital review of data release		
Yes	13	16
No	4	1
Hospital medical record review for individual patients		
Yes	8	7
No	9	10
Value of data release to hospitals (scale 0–10)		
Median	4	3
Range	0–10	0–10
Hospital quality improvement score for OSHPD data review (scale 0–14)		
Median	NA	4.5
Range	NA	0–11
Quality improvement activities initiated	NA	3

HCFA = Health Care Financing Administration, NA = not applicable, OSHPD = Office of Statewide Health Planning and Development, RAMO = risk-adjusted monitoring of outcomes

if they had perceived that such use would have been important and productive to them.

One explanation for the hospitals' limited use of RAMO data that was not specifically sought in the study is that the study was performed in the initial years of the California Hospital Outcomes Project, a time when awareness of the project was not broad and when only better-than-expected or not-better-than-expected outcomes were highlighted in the project report. Indeed, the quality management departments at two public hospitals denied that their facilities had ever received the OSHPD RAMO data or heard of their existence, despite the fact that the data had been sent to all hospitals in California through their chief executive officers. Although the quality management departments may have been bypassed at these two hospitals, the fact that they did not attempt to secure their hospital specific data suggests a low level of knowledge about or interest in the data and their public release.

Another possible reason that the OSHPD RAMO data were not extensively used is that the data were not distributed in a way that encouraged their use. To protect patients' confidentiality, their hospital medical record and social security numbers were not provided to California hospitals by OSHPD in the Hospital Outcomes Project Report. As a result, San Francisco General Hospital and other facilities that wanted to review individual patients' records had to identify the patients by indirect means. In addition, many directors of quality management expressed confusion about the risk-adjustment method used by OSHPD, although the method was explained in detail in the booklet distributed with the RAMO diskettes. Such confusion could have created a disincentive for conducting detailed outcome analyses.

A third possible reason for the limited use of the OSHPD RAMO data relates less to specific deficiencies in the data release process than to a distrust of the risk-adjustment method and a reluctance to allow the release of their RAMO data on the part of public, and presumably private, hospitals in California and other states. Indeed, public and private hospitals' distrust and reluctance can be traced through the history of the California Hospital Outcomes Project.[6] At this writing, hospitals continue to resent the fact that they are required at their own expense to provide OSHPD with discharge data that can be used against them in the competitive medical marketplace.

Whether this resentment remains in the future has yet to be determined. The OSHPD has made several changes in the California Hospital Outcomes Project, such as including social security numbers so that hospitals can identify patients more readily. An obstetrical outcome, readmission for postpartum complications of patients following vaginal and caesarean section deliveries, has been added to the second report, which was scheduled for release in the fall of 1995. Most important, this and presumably other future reports will highlight hospital outcomes that are significantly worse than expected in addition to those that are better than expected and not better than expected. It is not clear that worse-than-expected outcomes will be due to problems in the discharge data presented to OSHPD, risk-adjustment of the outcomes, or quality problems at the hospitals. Resolving this issue will be crucial because public and purchaser interest in the RAMO data is likely to increase as more people learn about the California Hospital Outcomes Project and other quality "report cards."

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