A Methodology for Targeting Hospital Cases for Quality of Care Record Reviews

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Abstract: We tested the efficacy of selected case characteristics in targeting quality of care problems for medical record review. The case characteristics, all of which apply to patients who die in a hospital, consist primarily of procedures and DRGs (diagnosis-related groups) for which death rarely occurs, and a set of complications of surgical care. All characteristics are obtainable from combinations of the principal and secondary diagnoses and procedures in the case, and are available from discharge abstracts.

The presence of a quality of care problem is confirmed through a review of the medical record by a nurse and two or more physicians.

A logistic regression model that controls for various patient and hospital variables is used as a measure of each of the proposed case characteristics. The results indicate that most of the characteristics are associated with higher percentages of quality of care problems than cases chosen at random, and that the methodology has promise as a tool for targeting cases for medical record review. (*Am J Public Health* 1989; 79:430–436.)

Introduction

In the last two decades, the costs of hospital care and other types of health care have risen more rapidly than the cost of living or the inflation rate. Partly as a result of the concentration of researchers and regulators on efforts to curtail these rising costs, hospital quality assurance initiatives have been relegated to a less important role than they deserve. Furthermore, it is feared that hospitals may have reduced diagnostic and therapeutic resources to patients, and discharged patients prematurely.[1]

Until recently, hospital quality assurance efforts have been quite limited. For the most part, surveys and quality of care reviews have relied on the first two of Donabedian's tripartite categorization of measures for judging quality: structure and process.[2] Quality of care researchers, regulators and review agencies have come to realize, however, that we must also incorporate Donabedian's third type of measure (outcome) into our reviews if we hope to accurately measure the quality of care in an institution.

A prime example of initiatives geared toward the use of outcome measures is the new agenda set forth by the Joint Commission on Accreditation of Healthcare Organizations, which is in the process of developing "clinical outcomes" to be reported by hospitals.

Several recent research studies have also used outcome measures to assess various aspects of quality of care in hospitals. A particularly well-researched issue has been the relation between the volume of patients treated at a hospital for a particular surgical procedure and the outcome achieved. Numerous studies reported that high surgical volumes for selected procedures are associated with better outcomes (lower mortality rates or shorter lengths of stay) for surgical patients.[3–6]

Another quality of care issue that has attracted considerable research attention is the "small area variations" in the rates of surgery for various procedures. Research by Wennberg and his associates[7–10] demonstrates that surgery rates among counties in the same state vary significantly even after adjusting for patient characteristics. This has led to the conclusion that physician practice patterns account for a significant percentage of observed differences.

Perhaps the most publicized efforts to develop outcome measures for quality of care in hospitals were the 1986 and 1987 reports by the Health Care Financing Administration (HCFA) that list hospitals with Medicare patient mortality rates significantly higher or lower than the national average.[11,*,†]

One shortcoming of the HCFA methodology involves the utility of the results for targeting purposes. Limited resources available to review organizations, state surveyors, accrediting agencies and hospitals as well as cost effectiveness concerns suggest a focus on reviews of selected *cases* (those most likely to evidence quality of care problems).

Another criticism of the HCFA model is that it has no proven link to the existence of quality of care problems. That is, it has not been proven that HCFA outlier hospitals have higher proportions of cases with quality of care problems (or deaths resulting from quality of care problems) than non-outlier hospitals. Recent studies by Dubois, *et al*,[12,13] which use a methodology similar to HCFA's, are laudable in that a validation component is included. However, the database and the set of independent variables used in these studies are different from those used by HCFA.

The study described here is an attempt to identify hospital *cases* that are more likely to evidence quality of care problems than the average case. Our methodology is more suited than the HCFA methodology to integration with typical survey protocols, peer reviews, or hospital self-monitoring, all of which must identify specific hospital records to review.

The study has been confined to patients dying in a hospital. However, the number of in-hospital deaths generally exceeds the resources available for medical record reviews. Thus, the study attempts to define a subset of in-

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Editor's Note: See also related editorial p 415 this issue.

*Krakauer H: Prediction of statistical outliers. Health Care Financing Administration 1986, personal communication.

†Krakauer H: Outcomes in in-hospital care of Medicare patients in 1983 and 1984. Health Care Financing Administration 1986, personal communication.

hospital deaths for medical record review. It should be noted that the subset was not limited to deaths within 30 days of admission as in the HCFA study. The case characteristics that will be studied are referred to as targeting criteria. Although they apply primarily to surgical patients, some medical cases are included.

Methods

Identification of Targeting Criteria

The first step was to identify the case characteristics (targeting criteria) to be used in targeting a subset of in-hospital deaths in New York State in 1985 and 1986. To be effective as targeting criteria, these characteristics had to be retrievable from discharge data abstracts. Since 1980, every acute care hospital in New York State has been required to send a discharge data abstract to the State Department of Health for every inpatient stay. These abstracts contain information pertaining to demographics, dates of admission and discharge, diagnoses, procedures, admission status, and discharge disposition.

Given the available information and the decision to restrict the targeting to a subset of patients who died in the hospital, a set of 11 targeting criteria was proposed by a consultant surgeon. The intent was to select cases that would have a higher percentage of quality of care problems than cases without the criteria, as judged by medical record review. Appendix A describes each of the 11 criteria, which are not mutually exclusive.

There are two types of rare deaths; the only difference is that rare death diagnosis-related groups (DRGs) are used for the second criterion and rare death procedures are used for the first criterion. These rare death DRGs are similar to the "sentinel events" defined by Rutstein and his colleagues.[14]

Criteria (3) and (4), "death occurred within one day of surgery" and "death occurred two days after surgery," respectively, are based on the rationale that a patient dying shortly after surgery except for the exclusions noted may have experienced complications resulting from poor quality of surgical care or surgery that was inappropriate. The reason for using "within one day of surgery" and "exactly two days from surgery" was to evaluate any differences between the two. The intent was to combine these two criteria if both proved to be significant.

Criteria (5)–(9) include fluids/electrolyte imbalance, wound disruption or infection, acute renal failure, cardiopulmonary arrest, and other complications of surgery (mechanical complications of a device implant or graft, complications affecting specified body systems, and previously unspecified complications of surgical and medical care). For each of the criteria (5)–(9), the definition is such that the complication is coded as a secondary diagnosis in a surgical case with one or more non-diagnostic procedures. These cases are targeted because of the possibility that the complication occurred *during* the hospital stay.

Criteria (10) and (11), "burns from treatment" and "poisoning complications," are also specified as secondary diagnoses to increase the chance that they occurred during the hospital stay. They differ from criteria (5)–(9) in that they do not necessarily apply to surgical patients.

Case Sampling

To determine the effectiveness of the targeting criteria in identifying cases with quality of care problems, we identified retrospective samples of cases with and without the targeting criteria. We limited the sample selection to 104 hospitals reviewed by the Department's three downstate review agents. Resource constraints of the agents limited the total sample size to 8,109. Table 1 provides a breakdown of the sample by targeting criterion and review agent.

Since it was necessary to choose a sample with a sufficient number of cases having each of the targeting criteria, the sample was stratified so that it contained a higher percentage of cases with the targeting criteria than did the population of all in-hospital deaths. The resulting sample is not appropriate for estimating the percentage of quality of care problems that exist for cases with in-hospital deaths. For each case sampled, patient and facility characteristics (Appendix B) were also noted. These "control" variables were used in a multivariate model.

The first level of review of the medical record was performed by a registered nurse who determined whether the information appearing on the cover sheet (e.g., patient death, diagnoses, etc.) was correct. Any errors were noted and the correct information, determined after consultation with a medical record technician, was used to determine if the case should be reclassified as to the presence or absence of targeting criteria. Approximately 9 per cent of the cases

TABLE 1—Sample Sizes by Targeting Criterion and Review Agent

Targeting Criterion	IPRO**	CMR**	NYCHSRO†	Total	Percentage of Total Sample
Primary Surgical Procedures with Mortality Rate Less than .5%	330	141	135	607	7.5
DRGs with Mortality Rate Less than .5%	123	100	78	301	3.7
Death Occurred within 1 Day of any Surgical Procedure	675	378	317	1,371	16.9
Death Occurred on 2nd Day Following any Surgical Procedure	432	206	192	832	10.3
Surgical Case with Fluid/Electrolyte Imbalance Reported as a Secondary Diagnosis	736	472	284	1,495	18.4
Surgical Case with Infection or Wound Disruption Reported as a Secondary Diagnosis	103	33	31	167	2.1
Surgical Case with Renal Failure Reported as a Secondary Diagnosis	55	30	70	155	1.9
Surgical Case with Cardiopulmonary Arrest Reported as a Secondary Diagnosis	173	75	224	472	5.8
Other Complications of Surgery	504	229	222	955	11.8
Burn is Reported as a Secondary Diagnosis	10	14	6	30	.4
Poisoning is Reported as a Secondary Diagnosis	68	49	48	167	2.1
Total Unduplicated Targeted Samples*	2,833	1,518	1,213	5,564	68.6
Deaths not elsewhere classified	1,167	982	396	2,545	31.4
Total Samples	4,000	2,500	1,609	8,109	100.0

*Will be less than the sum of individual target groups because of cases with multiple target attributes.
**Island Peer Review Organization.
***Comprehensive Medical Review, Inc.
†New York County Health Services Review Organization.

contained errors requiring correction. The record was next examined for any evidence of quality of care issues via a subjective review. If the nurse had any doubts regarding the quality of care rendered, the record was referred to a physician for review. Each physician was a board-certified specialist or sub-specialist who had experience performing quality of care review and utilization review. Quality of care was judged subjectively by the physician in two ways: first, whether the care departed significantly from professionally recognized standards; and second, if there was such a departure, whether it caused or contributed to the patient's death. In those instances where the physician identified a quality issue, the hospital was notified and given the opportunity to respond. Upon receipt of the hospital's response, one or more physicians reviewed all the case material and issued a final determination. For simplicity of exposition, this step will hereafter be referred to as the second physician review.

It should be noted that physicians and nurses were not apprised of either the targeting criteria or the cases that had one or more targeting criteria.

Reliability

Because of resource constraints, reliability could not be measured accurately. Cases in which the first physician found no quality of care problem were not reviewed by a second physician. Cases in which the first physician found a quality of care problem were reviewed by one or more additional physicians, but the second reviews were conducted with additional information supplied by the hospital. Nevertheless, 66 per cent of the time the second physician agreed with the first physician that a problem existed. This concordance would probably have been higher if both physicians had reviewed the same record prior to additional input by the hospital.

Data Analysis

From the sampling and record review just described, the following information was available for each case (record):

- the presence or absence of a quality of care problem;
- which, if any, of the targeting criteria were present;
- the status of each control variable (age, sex, race, payor, county, admission status, hospital size, hospital sponsorship, hospital teaching status, utilization review (UR) agent, year of death, length of stay.

This information was used to determine if, for each of the 11 targeting criteria, the percentage of quality of care problems was higher than the corresponding percentage for cases without the characteristics.

Since we wanted to compare the proposed targeting criteria with other alternatives (such as patient and facility characteristics) for targeting, we used a logistic regression model to predict the presence of quality of care problems (the dependent variable) as a function of the targeting criteria and the various patient and facility characteristics (the control variables). Because the sample of cases was stratified to include an overrepresentation of cases with targeting criteria, a single logistic regression model would have underestimated the relative strength of each targeting criterion (because it would be contrasted with a sample having an overly rich representation of other targeting criteria). Thus, 11 separate regression models were formulated. Each model consisted of all cases with a given targeting criterion, and a simulated random sample. The random sample was chosen by picking targeted and non-targeted cases in proportion to their presence in the general population of hospital cases. No cases with the specific targeting criterion being tested were in the random sample, however. Thus, each regression model tested the ability of a specific targeting criterion to identify quality of care problems in comparison with a random sample of cases, while controlling for the factors presented in the Appendix.

Results

Table 2 presents the results of the targeting process by targeting criterion. Column (1) presents the number of cases selected by criterion; column (2) presents the number reviewed by a nurse. Differences between the numbers in the two columns represent cases for which medical records were not available or (rarely) for which a patient death was erroneously coded. The third column presents, by criterion, the number and percentage of cases reviewed by the nurse that were forwarded to the first physician. The percentages of cases forwarded ranged from 6.5 per cent for the non-targeted cases to 35.9 per cent for "other complications of surgery." The average percentage of targeted cases that were forwarded was 15.5 per cent, indicating that the nurse was about 2.4 times more likely to forward a targeted case than a non-targeted case; also, the nurse did not know which cases were targeted.

Columns (4) and (5) present the number and percentage of cases in which care departed from standards and in which care caused or contributed to patient death, respectively. The percentage of cases in which care departed from standards was 3.9 per cent for all targeted cases and 1.7 per cent for non-targeted cases. For targeted cases, the percentages ranged from 9.8 per cent for rare death DRGs to 2.2 per cent for fluid/electrolyte imbalance.

For quality of care problems that caused or contributed to patient deaths, the percentage was 2.4 per cent for all targeted cases and 1.0 per cent for non-targeted cases. For targeted cases, the percentages of quality of care problems ranged from 5.7 per cent for rare death DRGs to .6 per cent for poisoning complications.

Logistic Regression Results

The results of the logistic regression model for the quality of care definition "care that departed from professionally recognized standards" are presented in Table 3 for the targeting criteria. The odds ratio given for each criterion is an estimate of the relative chance of a case with the criterion having a quality of care problem compared to cases without the criterion, while holding other variables constant.

As is indicated in Table 3, all but three of the targeting criteria (fluid/electrolyte imbalance, burns and poisonings) proved to have significantly higher rates of quality of care problems independent of the control variables. Although cases having two or more criteria had a higher percentage of quality of care problems, no interactions between criteria were significant in the regression model. They comprised only 10 per cent of the cases. Also, no interactions between targeting criteria and control variables were significant.

Hospitalizations in New York County (Manhattan), review by New York County Health Services Review Organization, hospitalizations in proprietary facilities, patients with lengths of stay less than four days, hospitalizations in non-teaching hospitals, and Black patients were all associated with higher rates of quality of care problems.

Table 3 also presents analogous results for care that caused or contributed to patient deaths. In addition to the three targeting criteria that were not significant for the other

TABLE 2—Results of Record Review by Targeting Criterion: Total*

Targeting Criterion	(1) Total Cases	(2) Nurse Reviews	(3) No. of Cases Forwarded to First Physician (%) N	(3) No. of Cases Forwarded to First Physician (%) %	(4) Cases in Which Care Departed from Standards N	(4) Cases in Which Care Departed from Standards %	(5) Cases in Which Care Caused or Contributed to Patient Death N	(5) Cases in Which Care Caused or Contributed to Patient Death %
Primary Surgical Procedures with Mortality Rate Less than .5%	607	576	124	21.5	33	5.7	16	2.8
DRGs with Mortality Rate Less than .5%	301	264	65	24.6	26	9.8	15	5.7
Death Occurred within 1 Day of any Surgical Procedure	1,279	1,229	242	19.7	59	4.8	46	3.7
Death Occurred on 2nd Day Following any Surgical Procedure	832	802	141	17.6	35	4.4	20	2.5
Surgical Case with Fluids/Electrolyte Imbalance Reported as a Secondary Procedure	1,419	1,384	128	9.2	30	2.2	17	1.2
Surgical Case with Infection or Wound Disruption Reported as a Secondary Diagnosis	167	161	29	18.0	7	4.3	3	1.9
Surgical Case with Renal Failure Reported as a Secondary Diagnosis	155	151	34	22.5	9	6.0	4	2.6
Surgical Case with Cardiopulmonary Arrest Reported as a Secondary Diagnosis	472	463	142	30.7	33	7.1	25	5.4
Other Complications of Surgery	992	955	343	35.9	35	3.7	24	2.5
Burn is Reported as a Secondary Diagnosis	30	27	3	11.1	2	7.4	1	3.7
Poisoning is Reported as a Secondary Diagnosis	167	162	12	7.4	4	2.5	1	.6
Total of above	5,564	5,362	833	15.5	208	3.9	130	2.4
Total of non-targeted cases	2,545	2,479	161	6.5	43	1.7	24	1.0

*The total number of cases having each of the individual criteria is larger than the total because some cases have more than one criterion.

quality of care judgment, "wound disruption or infection" was also not significant. Thus, seven of the 11 criteria were significant for care that caused or contributed to patient deaths. Significant control variables were county (for four models), UR agent (two models), length of stay (one model), hospital sponsorship (four models), and primary payor (one model). For the variable "primary payor", Medicaid patients had higher rates of quality of care problems than patients of other payors.

Discussion

This study has demonstrated that information from uniform hospital discharge data sets can be used to target cases for quality of care review that have higher chances of having a quality of care problem than other cases. In contrast with methods for calculating adjusted hospital mortality rates for targeting, the approach presented here has been validated by medical record reviews. Furthermore, it is more useful in that it identifies specific cases in every hospital for review rather than just targeting a subset of hospitals. Also, certain

TABLE 3—Odds Ratios and Confidence Intervals for Targeting Criteria

Targeting Criterion	Care That Departed from Professionally Recognized Standards: Odds Ratio	Care That Departed from Professionally Recognized Standards: Confidence Interval for Odds Ratio	Care that Caused or Contributed to Patient Death: Odds Ratio	Care that Caused or Contributed to Patient Death: Confidence Interval for Odds Ratio
Primary Surgical Procedures with Mortality Rate Less than .5%	3.22	2.01, 5.15	3.26	1.76, 7.09
DRGs with Mortality Rate Less than .5%	5.19	3.20, 8.41	4.97	2.64, 9.35
Death Occurred within 1 Day of any Surgical Procedure	2.84	1.94, 4.17	3.54	2.21, 5.69
Death Occurred On 2nd Day Following any Surgical Procedure	1.99	1.58, 2.50	2.28	1.30, 3.98
Surgical Case with Fluid/Electrolyte Imbalance Reported as a Secondary Diagnosis	1.13	.718, 1.79	1.17	.58, 1.76
Surgical Case with Infection or Wound Disruption Reported as a Secondary Diagnosis	3.04	1.07, 5.45	2.01	.73, 3.28
Surgical Case with Renal Failure Reported as a Secondary Diagnosis	3.18	1.52, 6.78	2.82	1.12, 7.09
Surgical Case with Cardiopulmonary Arrest Reported as a Secondary Diagnosis	3.40	2.08, 5.55	3.96	2.22, 7.06
Other Complications of Surgery	2.49	1.56, 3.97	2.41	1.40, 4.17
Burn is Reported as a Secondary Diagnosis	3.38	.75, 15.14	2.78	.71, 4.85
Poisoning is Reported as a Secondary Diagnosis	1.09	.38, 3.09	2.26	.25, 4.27

types of hospitals and patient characteristics are likely to be associated with quality of care problems.

Reweighting cases to simulate a random sample yields an overall percentage of 1.9 per cent for cases departing from standards and 1.2 per cent for cases in which care caused or contributed to patient deaths. Few studies in the literature provide a clue as to whether these percentages can be considered high or low. The study by Dubois, *et al,*[13] found more quality of care problems. Eighteen per cent of the deaths due to cerebrovascular accident, 24 per cent due to pneumonia, and 37 per cent of those due to myocardial infarction were judged to be "possibly preventable."

In a study conducted by the US Health and Human Services Department, 6.6 per cent of the 7,050 records reviewed were found to be receiving care that could be called poor quality—including improper diagnosis, treatment and therapy.[15] This percentage is about twice as high as that reported by the hospitals' federal peer review organizations.[15] The Medical Insurance Feasibility Study reviewed about 21,000 California hospital records and concluded that about 5 per cent of all admissions resulted in an injury caused by medical treatment.[16] A more recent study found that less than 1 per cent of hospital admissions are associated with poor care that results in temporary or permanent disability or death.[17] Thus, in general, the percentages reported in this study are lower than those reported in other studies. However, it is extremely difficult to compare results among studies because of the absence of uniformity in types of cases reviewed and in criteria for judging quality of care problems.

Despite the relative success of the study, several extensions would be beneficial. These include: enhancing the effectiveness of the targeting criteria, and developing other targeting criteria that will span the myriad of serious quality of care problems that occur in hospitals. Efforts to improve the effectiveness of the targeting criteria should focus on the incorporation of unambiguous severity of illness measures in definitions of the criteria. Severity of illness packages such as MedisGroups[18] and Computerized Severity Index[19] could be used to capture severity of illness at admission and then combined with the presence of post-admission complications to refine target definitions. The premise is that complications occurring during the hospital stay for patients with low severity of illness at admission will be more likely to be a result of poor hospital care.

With regard to the development of new criteria, two broad types of extensions can be explored. First, targeting can be expanded to include cases in which the patient did not die in the hospital. In some of these cases, the patient will have died a short time after discharge as a result of the complications. In other cases, the patient will not have died of the complications but will have experienced significant morbidity as a result of substandard hospital care.

The second means of expanding the current set of targeting criteria is to develop a set of medical complications to accompany the surgical complications. Some possibilities include infections; reactions from transfusions, injections and infusions; and vascular complications resulting from infusion, perfusion or transfusion. This extension is particularly important; in fact, many researchers feel that the majority of quality of care problems in hospitals are medical rather than surgical mishaps.

Another area that requires additional research is the development of protocols for quality of care determinations that are aimed at achieving maximum possible validity and reliability in decision making. As this was a pilot study, stringent validity and reliability tests were not included. However, given the relative success of the study, these issues will be addressed as part of a current effort of incorporating case targeting into New York State's new hospital surveillance program.

One particular concern is the validity of the judgments made by nurses in the initial screen. This is extremely important because most cases were not reviewed by physicians (they were screened out by nurses). In order to verify the validity of the nurse screens, a subset of cases screened out by nurses should be reviewed by physicians to ascertain that the physicians agree that no quality of care problems exist.

Unfortunately, limited resources did not allow for unbiased reliability tests in the study reported here. The best estimate, which was not a true estimate of reliability, was 66 per cent agreement on cases in which the first physician found a quality of care problem. However, we do not expect that any reliability problems would affect the *relative* percentages of quality of care problems for targeted and non-targeted cases, which was the focus of the study. Nevertheless, more work needs to be done in measuring the reliability of quality of care determinations and ensuring that it is at an acceptable level.

Our work should be interpreted in the light of related research. The study by Dubois, *et al,*[13] is especially notable. As mentioned earlier, they used two types of quality of care review: a structured review that employed weighted process-of-care scales—11 for pneumonia and 10 each for cerebrovascular accident and myocardial infarction—and a review in which experts made subjective judgments as to whether the deaths were preventable. The former method found no differences in quality of care among high and low outlier hospitals whereas the latter method, which appears to be very similar to the subjective process used in this study, found that the high outliers had more preventable deaths than the low outliers. There is no way of determining whether either of the two results is valid. However, in assessing this anomaly, Dubois and colleagues imply that a major reason for the discrepancy may be that the structured approach was too myopic in only considering the specified criteria for noting a quality of care problem. With respect to reliability, however, the structured approach was superior.

The set of protocols and criteria developed by the Harvard Medical Practice Study Group in their ongoing study of medical injuries in New York State is also of value as a guide to improving validity and reliability.[‡] In this study, the Harvard Group defines an "adverse event" as a disabling injury inflicted upon a patient as a result of the process of medical management, whether it was negligent or not. Then, for adverse events, the probability of causation (how probable the condition was attributable to medical management rather than to the disease) and the probability of negligence (the probable contribution of negligence in medical management to the adverse event) are estimated.

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APPENDIX A
Definition of Mortality Study Targeting Criteria

Criterion	Description
1) Primary Surgical Procedures with Mortality Rate Less Than .5%	Principal procedure associated with mortality less than 0.5 per cent in 1985 Exclusions: None
2) DRGs with Mortality Rate Less than .5%	DRGs associated with mortality less than 0.5 per cent in 1985 Exclusions: None
3) Death Occurred within 1 day of any Surgical Procedure	Death occurred on same date or day following surgical date Exclusions: • Patients with any diagnosis of selected neoplasms (196.0 to 198.89)* • Patients with unscheduled admission and admitting or primary diagnosis of injury or poisoning (800.00 to 995.89) • Selected surgical procedures • Diagnostic and therapeutic principal procedures (87.0 to 99.99)
4) Death Occurred on 2nd Day Following any Surgical Procedure	Death occurred on second day following surgical date Exclusions: Same as for Criterion 3
5) Surgical Case with Fluid/Electrolyte Imbalance Reported as a Secondary Diagnosis	Surgical case with a secondary diagnosis of fluid electrolyte, or acid-base balance (276.0 to 276.9) Exclusions: Same as for Criterion 3, and • Admitting or primary diagnosis of fluid electrolyte, or acid-base balance (276.0 to 276.9)
6) Surgical Case with Infection or Wound Disruption Reported as a Secondary Diagnosis	Surgical case with a secondary diagnosis of wound disruption (998.3) Exclusions: • Diagnostic and therapeutic principal procedures (87.0 to 99.99)
7) Surgical Case with Renal Failure Reported as a Secondary Diagnosis	Surgical case with a secondary diagnosis of urinary complication (997.5) Exclusions: • Diagnostic and therapeutic principal procedures (87.0 to 99.99)
8) Surgical Case with Cardiopulmonary Arrest Reported as a Secondary Diagnosis	Surgical case with a secondary diagnosis of cardiac complication (997.1) Exclusions: • Diagnostic and therapeutic principal procedures (87.0 to 99.99)
9) Other Complications of Surgery	Surgical case with a secondary diagnosis of mechanical or other body system reaction (996.00 to 999.9) Exclusions: • Diagnostic and therapeutic principal procedures (87.0 to 99.99) • Patients with no secondary procedure • Cases with Criteria 7) and 8)
10) Burn is Reported as a Secondary Diagnosis	Burns as a secondary diagnosis (940.0 to 949.5) Exclusions: • Admitting or primary diagnosis of burn (940.0 to 949.5)
11) Poisoning is Reported as a Secondary Diagnosis	A secondary diagnosis of selected drug poisonings (960.0 to 989.0) Exclusions: • Admitting or primary diagnosis of selected drug poisonings (960.0 to 989.9)

*Entries in parentheses are ICD-9-CM codes.

APPENDIX B
Control Variables Used in the Study

Variables	Description
Sex*	Male
	Female
Race*	White
	Black
	Hispanic
	Other
Age*	Continuous
Payor*	Blue Cross
	Medicare
	Medicaid, Other Government
	Other Commercial
	Other (Workers Comp., No Charge, Self-Pay)
County	Nassau
	Suffolk
	Bronx
	Kings
	New York
	Queens
	Richmond
Admission Status*	Unscheduled
	Scheduled
Hospital Size	Small (1–275)
	Medium (276–900)
	Large (901+)
Hospital Sponsorship	Proprietary
	Voluntary, Public
Hospital Teaching Status	No
	Yes
Utilization Review Agent	Island Peer Review Organization
	Comprehensive Medical Review Inc.
	New York County Health Services Review Organization
Year of Death*	1985
	1986
Length of Stay*	1–3 days
	4–14 days
	15–30 days
	31–60 days
	>60 days

*Contained in the Statewide Planning and Research Cooperative System (SPARCS)

APHA Releases Report on 'Illicit Drug Use and HIV Infection'

Illicit Drug Use and HIV Infection—The 3rd report of the Special Initiative on AIDS, a program activity of the American Public Health Association—has been released. This new report, prepared by the AIDS Working Group, summarizes the characteristics of illicit drug use and the scope and distribution of the HIV epidemic among intravenous (IV) drug users. Strategies to reduce the risk of HIV infection among drugs users are reviewed, including the need for education, health care, and drug treatment services upon demand, and strategies to promote safe sex.

To date, three reports have been issued in this AIDS Report Series. No. 1, *Casual Contact and the Risk of HIV Infection* was released July 1988; No. 2, *Contact Tracing and Partner Notification,* November 1988; and *Illicit Drug Use and HIV Infection,* January 1989. Single copies of the various reports are available for $3 each prepaid from APHA Publication Sales, 1015 15th Street, NW, Washington, DC 20005. Bulk rates available on request.