Mortality of patients transferred to a tertiary care hospital

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■ **BACKGROUND** Seriously ill patients are often transferred from community hospitals to tertiary care hospitals.

■ **OBJECTIVES** To review the numbers, sources, and outcomes of patients transferred to the Cleveland Clinic Hospital from 1989 through 1992.

■ **METHODS** Retrospective analysis.

■ **RESULTS** Compared with the Cleveland Clinic's overall hospital mortality rate of 3.09% (3760 of 121 014 patients) during this period, the mortality rate among transferred patients was 8.26% (1092 of 13 226 patients). Although transferred patients accounted for only 10.9% of the total admissions, they represented 29.0% of the deaths. Transfers from other hospitals in the Cleveland Health Quality Choice (HQC) program, a community-wide quality-assessment project, increased 40.2% in 1992 (during the initial data collection period for the HQC program), while those from non-HQC hospitals increased only 0.9%.

■ **CONCLUSIONS** Patients transferred to a tertiary care hospital from other acute care hospitals have a 2.7-fold greater chance of dying in the hospital than nontransferred patients. Public scrutiny of quality may increase the likelihood of transfer of seriously ill patients to tertiary care centers.

■ INDEX TERMS: PATIENT TRANSFER; QUALITY OF HEALTH CARE; HOSPITAL MORTALITY ■ CLEVE CLIN J MED 1993; 60:449–454

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SERIOUSLY ILL PATIENTS in need of highly specialized services are often transferred from community hospitals to tertiary care hospitals, where such services are more readily available. This is appropriate and in the public interest, since most studies have shown that increased experience in the treatment of complex cases leads to better outcomes, and more experience with specialized procedures (such as coronary artery bypass surgery) is likely to reside in tertiary care hospitals.[1]

There has been considerable interest in economically motivated, inappropriate interhospital transfer of patients, often referred to as "dumping," precipitated by fixed payment systems or lack of adequate insurance to cover the costs of care for such patients.[2] This type of transfer has been shown to affect outcome adversely and has been addressed legislatively with varying degrees of success.[3,4] On the other hand, appropriate transfer of properly selected, seriously ill patients, even those who are medically unstable, has not been shown to have an adverse effect on outcome and

TABLE 1
TRANSFERS TO THE CLEVELAND CLINIC HOSPITAL

Source	1989	1990	1991	1992
HQC* hospitals	831	887 (+6.74%)†	824 (−7.10%)	1155 (+40.17%)
Non-HQC hospitals	2074	2296 (+10.70%)	2568 (+11.85%)	2591 (+0.90%)
Total	2905	3182 (+9.53%)	3392 (+6.60%)	3746 (+10.44%)

*Cleveland Health Quality Choice program
†Percent change from the previous year

may well be in the patient's best interest.[5,6]

This is an era of quality assessment, public dissemination of hospital mortality figures, and aggressive health care marketing.[7,8] The Cleveland Health Quality Choice (HQC) program is a recent, highly publicized initiative dedicated to the objective presentation of quality data on the majority of hospitals in the Cleveland area.[9,10] This program, supervised by Cleveland Tomorrow, the Council of Smaller Enterprises, and the Health Action Council (representing the business community), the Academy of Medicine of Cleveland (representing the physician community), and the Greater Cleveland Hospital Association (representing the hospital community), assesses patient satisfaction as well as risk-adjusted outcomes (mortality and length of stay) for patients admitted to either the regular nursing units or the intensive care units of hospitals. The intent is to publish the results so that business and other health care consumers can take into account quality as well as cost in purchasing health care.

In a highly competitive environment subjected to this type of public scrutiny, a new type of interhospital transfer, which we refer to as a "quality-improvement transfer," could emerge, motivated by the desire to improve mortality statistics by transferring patients considered likely to die. Quality-improvement transfers positively influence the mortality figures of the hospital of origin and negatively affect those of the receiving hospital. Although quality-improvement transfers probably benefit the transferred patients in most cases, superficial review of the resulting mortality statistics could lead to mistaken conclusions about the relative quality of these hospitals.

In order to determine whether such behavior occurs and, if so, to assess the influence of quality-improvement transfers on mortality statistics of a tertiary care medical center, we reviewed the numbers, sources, and outcomes of patients transferred to the Cleveland Clinic Hospital from 1989 through 1992. The initial data collection for the Cleveland HQC program also took place during this period.

METHODS

All patients transferred to the Cleveland Clinic Hospital from 1989 through 1992 were identified through the hospital's central computer system (Clinical Abstract System). Demographic data as well as the diagnosis-related group (DRG), hospital of origin, length of stay, reimbursement type, and outcome were recorded for each patient.

Two groups of hospitals of origin were identified for comparison purposes. The 29 hospitals other than the Cleveland Clinic participating in the HQC program made up one group, and all other hospitals constituted the other group. During the 4-year period under consideration, 28.0% of the transfers came from HQC hospitals.

Statistical comparisons were carried out using the chi-square method.

RESULTS

The mortality rate for all patients admitted to the Cleveland Clinic from 1989 through 1992, including those transferred here, was 3.09% ± 0.10% (standard deviation) of 30 254 ± 410 admissions annually. The mortality rate among the 13 225 patients transferred to the Cleveland Clinic during that time was significantly higher at 8.26% (χ^2 = 908; $P < 10^{-8}$). Although transferred patients accounted for only 10.9% of the admissions, they contributed 29.0% of the deaths.

Table 1 shows the numbers of patients transferred to the Cleveland Clinic Hospital annually for 4 years beginning in 1989. As a group, the other hospitals in the HQC program increased their transfers by 40.2% from 1991 to 1992 (*Figure 1*), while those not involved in the project increased theirs by only 0.9% during the same time period. The difference in relative numbers of transfers to the Cleveland

Clinic between the HQC and non-HQC hospitals in 1992 as compared with 1991 was highly significant ($\chi^2 = 38.0$, $P < 10^{-8}$). The number of transfers (1155) received by the Cleveland Clinic from HQC hospitals in 1992 was 8.9 standard deviations higher than the mean for the previous 3 years (847 ± 34.5), increasing the HQC hospitals' share of transfers to the Cleveland Clinic from 26.9% ± 2.3% in 1989 through 1991 to 30.8% in 1992.

Twenty-eight of the 29 HQC hospitals increased their transfers to the Cleveland Clinic in 1992 as compared with the mean of the previous 3 years; seven of these increased by more than three standard deviations and another four by more than two standard deviations over their mean of the previous 3 years (*Figure 2*). Of the seven hospitals with the most significantly increased numbers of transfers (indicated in *Figure 2* by two asterisks), all are community hospitals, and six are located in the suburbs. Five are in hospital networks. One has an internal medicine training program. If we consider all 12 of the hospitals with significantly increased transfers to Cleveland Clinic, (one or two asterisks in *Figure 2*), 11 are community hospitals (the other is a tertiary-care teaching hospital), eight are suburban, eight are in networks, and two have internal medicine training programs, including the teaching hospital mentioned above. The only hospital that significantly reduced transfers to the Cleveland Clinic is an inner-city community hospital, in a network, with an internal medicine training program.

Table 2 compares the mortality rates among patients transferred from HQC hospitals with those of patients transferred from non-HQC hospitals. The mortality rate of patients from HQC hospitals was significantly higher than that of patients from non-HQC hospitals in the last 3 of the 4 years, but interestingly, the mortality rate was less in 1992, the year the total number of transfers increased, than in either of the 2 previous years. Nevertheless, in 1992 the absolute number of deaths in patients transferred from HQC hospitals was slightly higher than in 1991, even though the percentage was lower. For the entire 4-year period, the mortality rate for patients transferred from HQC hospitals was 10.4%, compared with 7.43% for patients from non-HQC hospitals ($\chi^2 = 30.7$, $P < 10^{-7}$).

Table 3 shows mortality rates for transferred patients in six groups comprising the 14 major DRGs with the highest number of deaths. We refer to this subset of 5448 patients hereafter as the "high-mor-

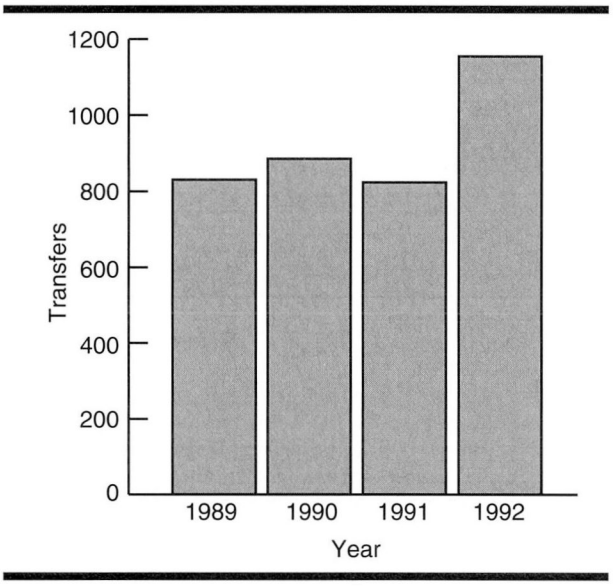

FIGURE 1. The annual numbers of transfers to the Cleveland Clinic from other Health Quality Choice hospitals from 1989 through 1992; note the 40% increase in transfers between 1991 and 1992.

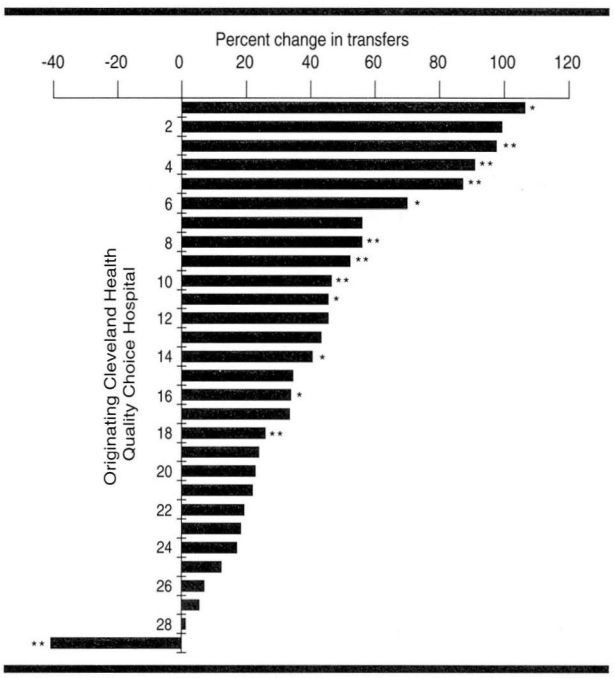

FIGURE 2. Increases in transfers from the individual Health Quality Choice hospitals in 1992 as compared with the mean numbers of transfers from 1989 through 1991; one asterisk denotes more than two standard deviations and two asterisks denote more than three standard deviations above the mean for the previous 3 years.

TABLE 2
MORTALITY RATES OF TRANSFERRED PATIENTS

Source	1989	1990	1991	1992
HQC* hospitals	8.90%	11.16%	11.65%	9.96%
Non-HQC hospitals	7.52%	7.58%	7.63%	7.02%
Total	7.92%	8.58%	8.61%	7.93%
P value (HQC vs non-HQC hospitals)†	> .2	< .005	< .0005	< .005

*Cleveland Health Quality Choice program
†P values calculated by chi-square method

TABLE 3
MORTALITY RATES OF TRANSFERRED PATIENTS
IN THE MAJOR DIAGNOSTIC GROUPS WITH THE HIGHEST NUMBERS OF DEATHS

	Deaths/number of patients transferred (%)			
Diagnostic group	1989	1990	1991	1992
Cardiac*	41/628 (6.53%)	61/707 (8.63%)	77/889 (8.66%)	70/922 (7.59%)
Vascular†	8/303 (2.64%)	14/465 (3.01%)	31/562 (5.52%)	44/630 (6.98%)
Respiratory‡	0/0	10/24 (41.7%)	23/57 (40.4%)	44/91 (48.4%)
Liver§	6/14 (42.9%)	5/21 (23.8%)	7/30 (23.3%)	9/31 (29.0%)
Malignancy‖	2/6 (33.3%)	4/7 (57.1%)	1/11 (9.1%)	8/14 (57.1%)
Infection¶	5/9 (55.6%)	4/10 (40.0%)	2/6 (33.3%)	8/11 (72.7%)

*Cardiac diagnosis-related groups (DRGs) include 104 and 105 (cardiac valve procedures with pump, with or without catheterization, respectively); 106 and 107 (coronary artery bypass surgery with or without catheterization, respectively); 123 (circulatory disorder with acute myocardial infarction, expired); and 127 (heart failure with shock)
†Vascular DRGs include 110 (major reconstructive vascular procedure, age > 70 or complicating conditions); 112 (vascular procedure except major reconstruction); and 144 (other circulatory diagnosis with complicating conditions)
‡Respiratory DRGs include 475 (respiratory system diagnosis with ventilator support) and 483 (tracheostomy except for mouth, larynx, or pharynx disorder)
§Liver DRGs include 202 (cirrhosis and alcoholic hepatitis)
‖Malignancy DRGs include 473 (acute leukemia without major operating room procedure, age > 17)
¶Infection DRGs include 416 (septicemia, age > 17)

tality" group. Although all categories of disease are represented, there is a predominance of cardiovascular diagnoses. These cardiac and vascular DRGs account for 92% of the high-mortality patients, but they represent only 71% of the deaths.

The mortality rate in the transferred patients with respiratory diagnoses was 45%. Although patients with respiratory disorders represented only 3% of the transferred patients in the high-mortality DRGs, they contributed 16% of the deaths. Except for DRG 123 (acute myocardial infarction, expired), which has 100% mortality by definition, the highest DRG-specific mortality rate (62%) occurred in the ventilator-dependent subgroup of patients with respiratory disorders (DRG 475). The number of transfers in this category started from zero in 1989, jumped to 24 in 1990, more than doubled in 1991, and nearly doubled again in 1992.

Other groups of patients in the high-mortality subset included those with infection (septicemia, 53% mortality), malignancy (acute leukemia, 39% mortality), and liver disease (cirrhosis and alcoholic hepatitis, 28% mortality). Although all three of these groups together constituted only 3% of the transferred patients, they accounted for 13% of all the deaths.

Analysis of age, payer, and length-of-stay data showed no consistent trends over the 4 years under consideration. Medicare patients made up about half of the transferred patients, a slightly higher proportion than that of the Cleveland Clinic's inpatient population in general.

DISCUSSION

Patients are transferred from one hospital to another for a variety of reasons. The most appropriate transfers are carried out to provide necessary services that are not available in the hospital of origin.

Some transfers are made because of physician or patient preference based on perceived relative quality. It has been suggested that others are made on economic grounds.[2,4,11] Patients admitted to private hospitals without adequate insurance coverage may be sent to public hospitals, where government funding may cover all or part of the costs.

The safety of transporting seriously ill patients has been examined in several studies.[5,6] Both land and air transportation have been evaluated.[12–14] Few deaths during transfer have been reported. Furthermore, most studies conclude that the delay in care introduced by transporting patients rather than treating them at the original site does not usually compromise the ultimate outcome.[15] There is evidence, however, that the care of transferred patients consumes more resources than that of non-transferred patients.[16] It has also been reported that patients transferred primarily for economic (as opposed to medical) reasons do not do as well as they would have if they had been treated at the original site.[17] Taken together, these results suggest that in a medically indicated transfer, the medical benefits outweigh the additional risks imposed by the transfer. When there are no medical advantages to the transfer, these additional risks are not counterbalanced, and the outcome is adversely affected.

Our data indicate that patients transferred to a tertiary care facility are two to three times more likely to die in the hospital than patients admitted there originally, although over 90% of transferred patients survive their hospital stays. This is similar to the findings of Borlase et al,[18] who reported that patients transferred on an urgent basis had a significantly higher mortality rate (36%) than patients admitted electively (12%) ($P < .05$). It is likely that this increased risk of death is due to selection bias, since transferred patients tend to be so ill that they cannot be adequately cared for at the hospital where they were originally admitted. There may also be a component of lead-time bias, in that transferred patients may have some delay in initiation of the treatment for which they were transferred as compared with non-transferred patients.[19] Clearly, it is in the patient's best interest to be cared for in the institution where the likelihood of success is greatest. The aggregation of such patients at a single institution, however, adversely affects the mortality rate at that institution while improving the mortality rates at the institutions sending such patients.

If an institution's quality is believed to be inversely proportional to its mortality rate (clearly a debatable assumption),[20] tertiary care institutions receiving critically ill patients from other hospitals may be perceived to have lower quality of care because their mortality rates are higher. Such hospitals, in fact, receive the most critically ill patients precisely because their ability to provide high-quality care is recognized by referring physicians and patients. Experience with the inappropriate use of Health Care Financing Administration mortality data and transplant survival data as quality indicators by the media does not, unfortunately, instill confidence that the media have the sophistication or the willingness to interpret such data properly.[21,22]

Because of the difficulty in comparing quality among institutions dealing with patients having significant differences in severity of illness, several statistical risk-adjustment methods designed to correct for this have been devised.[23–25] Although these methods have varying degrees of validity for large populations, their use to predict outcomes for individual patients or small numbers of patients from selected subpopulations may be inadequate. Furthermore, a logical consequence of the use of these methods in a competitive marketplace is extraordinary pressure on hospitals to find ways to improve their assessed performance so as to better their standing in the marketplace. One obvious possible tactic would be to identify patients who have a high risk of dying, and transfer them elsewhere. Whatever the motivation for these quality-improvement transfers, such patients may well have a better chance for survival at the tertiary care hospital that receives them than at the hospital of origin.

Do some hospitals move patients for nonmedical reasons? The suspicion that they do has led to widespread description of this practice with the term "dumping." Jablonski et al[26] reported that patients seldom give informed consent to interhospital transfer. Studies of dumping related to Medicare reimbursement issues resulted in legislation specifically designed to prevent this behavior.[3,27] Quality-improvement transfers constitute a special case, however, and cannot be considered as dumping. Whatever the motivation for transferring these patients may be, their best interests are most likely served by transfer.

Our data show that a 40% increase in transfers to the Cleveland Clinic from other HQC hospitals occurred with the onset of HQC data collection,

and 13 hospitals increased their transfers by more than 50%. It is possible that the timing of this increase was coincidental and attributable to random variation in the rate of interhospital transfers to the Cleveland Clinic. The Cleveland Clinic instituted more aggressive, regionally oriented marketing programs in 1989, which may have been responsible for some of the increase; however, there was no increase in transfers until 1992, and no other indicators of patient activity showed increases approaching the magnitude of that seen in hospital transfers. Also, the federal government instituted a new physician payment system that could have caused physicians to consider earlier transfer of patients to a tertiary care center. These alternative explanations do not, however, explain the restriction of the response to hospitals participating in the HQC program. In any case, our findings suggest that quality-improvement transfers may be an unpredicted effect of imminent public disclosure on hospital and physician behavior. It is important that tertiary care hospitals be able to meet this increased demand and provide the high-quality care that these patients require.

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