PATTERNS OF SPECIALTY CARE: ACADEMIC HEALTH CENTERS AND THE PATIENT CARE MISSION

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January 1999

Support for this research was provided by The Commonwealth Fund. The views presented here are those of the author and should not be attributed to the Fund or its directors, officers, or staff.

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EXECUTIVE SUMMARY

Providing highly specialized, technologically complex care is one of academic health centers' (AHCs) important missions, which also include education, research, and often care of indigent patients. Although AHCs are acknowledged as major sources of specialty care, no quantitative research has been done on what types of care and how much of it they are actually providing. In addition, no studies have been undertaken to examine how much competition AHCs face in delivering this kind of care or how changes in the health insurance market are affecting delivery.

This analysis represents an initial quantitative evaluation of patterns of specialty care in three types of hospitals—AHCs, major teaching hospitals, and non-teaching hospitals. AHCs include hospitals that are closely affiliated with medical schools, while major teaching hospitals comprise those institutions, excluding AHCs, that have at least one resident for every four beds. Non-teaching hospitals comprise the remaining acute-care hospitals. The analysis also compares public AHCs and teaching hospitals, which are owned by state or municipal governments, with private AHCs and teaching hospitals.

Using 1991 and 1994 hospital discharge data from nine states, the study examined nearly 900 hospitals in 38 metropolitan areas with at least one AHC or major teaching hospital. The discharges were classified into diagnosis-related groups (DRGs), and patterns of care for six groups were examined: transplants, burn care, major trauma, high-risk infants, acquired immune deficiency syndrome (AIDS), and major coronary procedures. The four variables chosen for analysis were: the availability of certain types of specialty care; the level of investment, or capacity, for providing specialty care; the volume of specialty care; and AHCs' role in making certain such care is available in their communities.

Patterns of Care: An Overview

The study found that AHCs are major sources of specialty care in their communities, while major teaching hospitals and even some larger non-teaching hospitals (those with more than 200 beds) also provide specialty care services. In general, AHCs tend to have the broadest range and provide the greatest volume of specialty services among all hospital types.

Transplant Patients

Private AHCs predominate as providers of transplant services. They perform nearly 45 percent of all these procedures, an average of 114 cases per hospital each year. Although

fewer public AHCs have transplant programs, those that do are nearly as successful as their private counterparts, averaging nearly 100 cases annually. Furthermore, despite significant numbers of programs in major private teaching hospitals and other large hospitals, these facilities perform substantially fewer transplants than do AHCs.

Burn Care

AHCs dominate in the field of burn care, accounting for about half of all burn-unit beds. Clearly, severely injured burn patients are taken to places where they can receive this specialized care. Public AHCs have made the largest investment in burn care: nearly 60 percent have a burn unit, and they account for a third of all burn-care beds in their communities. Private AHCs, by contrast, have a much smaller commitment to developing burn-care units and thus treat fewer patients.

Major Trauma Care

In this area of specialty care, AHCs and other major teaching hospitals face significant competition from other large hospitals. Non-teaching hospitals treat 65 percent of all trauma patients, while AHCs treat just 19 percent. Public AHCs, however, treat twice as many patients as they have beds available, whereas private AHCs appear to be underutilized in their communities. Insurance coverage seems strongly correlated with where major trauma patients are treated. Non-teaching hospitals provide the vast majority of trauma care for patients insured by Medicare and health maintenance organizations (HMOs). Self-pay (charity) patients, however, are concentrated in AHCs and major teaching hospitals.

Care for High-Risk Infants

As with trauma care, a patient's insurance status is an important determinant of where high-risk infants are treated. More than three-quarters of high-risk infants covered by HMOs and other forms of private insurance are cared for in major private teaching hospitals and large, non-teaching hospitals. Medicaid and self-pay patients, on the other hand, are more highly concentrated in public AHCs and major public teaching hospitals. Given the high volume of Medicaid cases, Medicaid is the predominant payer of care for high-risk infants treated in public teaching institutions, including nearly 70 percent of those infants in public AHCs.

Acquired Immune Deficiency Syndrome (AIDS)

AIDS patients in the study were found to be concentrated in the major teaching hospitals, most of which have a dedicated AIDS unit. Although AHCs and major teaching hospitals had only about a quarter of these units, they furnished nearly half of all inpatient AIDS

care. Medicaid enrollees accounted for the highest proportion of AIDS patients—about 40 percent.

Major Coronary Care Procedures

Although AHCs' share of the total market for coronary care is smaller than that of non-teaching hospitals, AHCs treat a much more complex mix of patients. Private AHCs and major private teaching hospitals, in particular, have made major investments and commitments to this specialty in terms of coronary care unit (CCU) size and caseload. These two types of hospitals account for more than 23 percent of CCU beds and treat nearly 36 percent of patients needing major coronary care. The vast majority of these cases were covered by Medicare, other private health insurance, or HMOs.

Conclusions

Some important observations can be drawn from this study:

- AHCs are essential contributors to the provision of highly specialized care in their communities. A disproportionate share of transplant and burn patients, for example, are cared for by AHCs.

- For those medical procedures for which insurance coverage is widespread, AHCs face greater competition from other hospitals, especially major teaching hospitals and large non-teaching hospitals. This is particularly evident in the provision of coronary care.

- For some types of specialty care—including AIDS, high-risk infant, and major trauma care—a patient's insurance status is an important determinant of where the care is delivered. Uninsured and Medicaid patients are more likely to be treated in an AHC, whereas patients insured by HMOs and other private plans are more likely to be treated in non-teaching hospitals. In addition, while uninsured patients requiring specialty care are concentrated in public AHCs and major public teaching hospitals, private AHCs also provide a disproportionate share of this care.

- Most specialized units, such as CCUs and neonatal intensive care units, serve patients with a wide range of conditions and severity of illness. What distinguishes AHCs is that they tend to treat more complex cases. Assessing the AHC specialty care mission calls for the use of more refined tools that account for differences in patient severity and complexity.

- Selecting the most appropriate measures is necessary to study the unique contributions AHCs make in providing specialized care. This research demonstrated that for some services, such as transplants, simple counts of hospital discharges may be adequate. For other services, more complex measures, such as length of stay, may be more useful. Future research should consider severity measures, as well as other measures of resource use, to reveal the unique aspects of care available in these specialized units.

PATTERNS OF SPECIALTY CARE: ACADEMIC HEALTH CENTERS AND THE PATIENT CARE MISSION

INTRODUCTION

Academic health centers (AHCs)—hospitals closely affiliated with medical schools—have a unique combination of missions that includes research, education, and the provision of highly specialized and technologically complex services. Because many AHCs are public institutions, they are also important sources of all types of care, including specialty care for the poor and uninsured in their communities.

Traditionally, AHCs have subsidized their missions from patient care revenues and, in the case of public institutions, transfers from state and local governments. In recent years, however, AHC leaders and others have expressed growing concern that the ability to support AHCs' missions is being threatened by increasing competition in health care markets. One reason is that managed care plans, among them health maintenance organizations (HMOs) and preferred provider organizations (PPOs), are negotiating discounts from providers and directing their enrollees to those that will accept lower payments.

Given their higher costs, AHCs have not done particularly well in attracting patients from managed care plans. Indeed, they have fewer HMO patients than other privately insured patients, although the extent varies by type of ownership and level of HMO market penetration.[1] The potential loss of patient care revenues and its impact has led to several proposals, including one by The Commonwealth Task Force on Academic Health Centers, to provide alternative financing sources for AHCs' mission-related activities.

Despite concerns about how greater competition will affect AHCs, their financial status does not appear to have seriously eroded. While the average profit margin for major teaching hospitals, including AHCs, is somewhat below that for all other hospitals (4.2% vs. 6.4%) their profit margins have been increasing.[2,3] These margins reflect a variety of factors, including higher payments related to changes in Medicaid disproportionate share policies and relative stability in Medicare's support for graduate medical education. In addition, teaching hospitals have initiated efforts to control their costs by freezing salaries, keeping vacant positions open, downsizing hospital staffs, and other measures.[4]

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[1] J. Reuter and D. Gaskin, "Academic Health Centers in Competitive Markets," *Health Affairs* 16 (July/August 1997):242–252.

[2] Medicare Payment Advisory Commission, *Report to the Congress: Medicare Payment Policy, Volume I: Recommendations,* Washington, D.C., March 1998, p. 118.

[3] J. Reuter, *The Financing of Academic Health Centers: A Chart Book,* The Commonwealth Fund, New York, N.Y., September 1997, p. 34.

[4] J. Iglehart, "Health Policy Report: Rapid Changes for Academic Health Centers," second of two parts, *New England Journal of Medicine* 6 (February 9, 1995):407–411.

This report looks at specialty care as part of AHCs' patient care mission. While AHCs are often cited as important sources for these services, no quantitative research has been done on what types of and how much specialty care they are providing. There are also no studies examining how much competition AHCs face in delivering this kind of care, or how changes in the health insurance market are affecting delivery. This report addresses the first two questions and provides baseline data for subsequent studies of the effect of market changes on specialty care. (Methodology can be found in Appendix A.)

Based on 1991 and 1994 all-payer hospital discharge data from nine states, the study includes 898 hospitals in 38 metropolitan statistical areas with at least one AHC or major teaching hospital. The discharges were classified into diagnosis-related groups, and patterns of care for six groups were examined: transplants, burn care, major trauma, high-risk infants, acquired immune deficiency syndrome (AIDS), and major coronary procedures.

DEFINING THE PATIENT CARE MISSION

For most patients, AHCs and other teaching hospitals provide services that are similar, if not identical, to those available from any large urban hospital. The poor and those needing highly specialized care constitute the patient care social mission of AHCs.[5] That mission encompasses delivering highly specialized and technologically sophisticated care, such as tertiary or quaternary care.[6]

Other hospitals, particularly other major teaching institutions, may provide a significant amount of specialty care. Unlike these institutions, however, AHCs' core missions usually emphasize this type of care.

This study presents data that describe the availability and volume (hospital discharges) of key specialty care services and the distribution of such care among different types of hospitals. For each aspect of the specialty care mission, four types of variables were used to describe the characteristics of an institution's commitment to or involvement in this care:

- **Availability.** Does a facility make a specific type of care or service available? What percentage of each type of hospital provides the service? For example, what percentage of AHCs provide transplant services, or have advanced diagnostic equipment available?

[5] D. Blumenthal, *Understanding the Social Missions of Academic Health Centers,* Report of The Commonwealth Task Force on Academic Health Centers, The Commonwealth Fund, New York, N.Y., January 1997, p. 66.

[6] Tertiary care includes complex surgical care, e.g., coronary artery bypass grafts and special diagnostic services such as magnetic resonance imaging and positron emissions tomography. Quaternary care includes burn and trauma care, transplant services, inpatient care for AIDS patients, and neonatal

- **Level of investment.** If it can be determined, what is the capacity of different types of hospitals in providing the service? For example, what is the average number of beds in a neonatal intensive care unit (NICU)?

- **Delivery of services.** What is the volume of such care provided? For example, how many transplants are performed each year? How many poor and uninsured patients are cared for in each type of hospital? While patients requiring high-technology or specialized care will naturally gravitate to facilities offering such services, is the volume of specialized care a hospital provides disproportionate to its resources or market share?

- **Role in the community.** Do AHCs have a unique or predominant role in providing care in their communities? What share of specialty care do they provide to self-pay patients? Finally, are AHCs predominant providers of specialized care to certain populations, such as the poor or uninsured?

Variables for each of these four categories could not be defined for all aspects of specialty care as it relates to the patient care mission. Nonetheless, these categories provide a framework for exploring a wide variety of activities related to this mission.

INSURANCE STATUS AND DELIVERY OF SPECIALTY CARE

Health insurance status plays a major role in where specialty care is provided, and public AHCs and major teaching hospitals furnish a disproportionate share of such care to the poor and the uninsured (Table 1). More than 60 percent of patients admitted to public AHCs and major public teaching hospitals in 1991 and 1994 were Medicaid or self-paying (charity) cases. Public AHCs traditionally have pursued this mission somewhat more vigorously than private ones.[7]

The volume of self-pay admissions rose by 39,000 from 1991 to 1994, a 7.2 percent growth rate during the three-year period. Most of this increase (31,000 cases) was seen in public AHCs, where the number of charity cases climbed from 14.3 percent to 18.8 percent. For all other hospital types, self-pay patients were a smaller share of total admissions in 1994 than in 1991.

Treating Medicaid patients clearly grew more attractive during this period. Total

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intensive care.

[7] J. Reuter and D. Gaskin, "The Role of Academic Health Centers and Teaching Hospitals in Providing Care for the Poor," in S. Altman, U. Reinhardt, and A. Shields (eds.), *The Future U.S. Healthcare System: Who Will Care for the Poor and Uninsured?,* Chicago, IL: Health Administration Press, 1997, pp. 151–166.

Medicaid admissions went up by 21.7 percent from 1991 to 1994. Most of this growth was due to large increases in the volume of Medicaid admissions to major private teaching hospitals and to non-teaching hospitals, both large and small, where the share of Medicaid patients rose by two to three percentage points. Among the possible contributors were rapidly rising Medicaid reimbursement rates related to expanded Medicaid disproportionate share payment policies.

Medicaid and self-pay patients, who make up a major proportion of the patient population in public AHCs and major public teaching hospitals, receive a disproportionate share of their total care from these institutions (Table 2). Although these facilities constitute only 4.7 percent of all hospitals in their communities and have only 9.3 percent of the beds, they furnished over 20 percent of the care received by Medicaid and uninsured patients. In fact, they provided more than twice the amount of care than would have been the case had these patients been evenly distributed among all types of hospitals (Table 2). Despite furnishing significant amounts of care to the poor and uninsured, private AHCs delivered slightly less than their share of this care.

PATTERNS IN THE DELIVERY OF SPECIALTY CARE

This study examines six types of specialty care: transplant services, burn care, major trauma care, care of high-risk infants, care for persons with acquired immune deficiency syndrome (AIDS), and major coronary care procedures.

Transplants

In 1994, the study hospitals performed 6,596 transplants, 14.8 percent more than in 1991. Medicare covered 44 percent of these procedures; private insurance, both traditional plans and HMOs, 40 percent; Medicaid, 9 percent; and other types of insurance, 5 percent. Only 2 percent were self-pay or charity cases. Teaching hospitals of all types account for the majority of institutions with transplant programs (Table 3). AHCs have 33.9 percent of these programs and other major teaching hospitals, 26.5 percent. That transplant services are concentrated in teaching institutions may be due partly to Medicare's historical role in financing kidney transplants. To ensure quality of care, Medicare has certified only a limited number of hospitals in which it will cover kidney transplants—a policy that may have prevented the proliferation of other organ transplant services at non-teaching hospitals.

Private AHCs predominate as providers of transplant services. They perform nearly 45 percent of all these procedures, an average of 114 cases per hospital each year. Although fewer public AHCs have transplant programs, those that do are nearly as successful as their private counterparts, averaging nearly 100 cases annually. Furthermore, despite significant numbers of programs in major private teaching hospitals and other large hospitals, these

facilities perform substantially fewer transplants than do AHCs, averaging only 36.4 cases and 22.3 cases per hospital per year, respectively.

In general, type of insurance coverage did not appear to be a major determinant of where transplants are provided. Private AHCs provided 44 percent of transplants covered by HMOs, 40 percent of those covered by Medicare, 48 percent covered by Medicaid, and 50 percent covered by other private insurance. Self-pay transplant patients are somewhat more concentrated in public AHCs; however, because of the small number of these cases (112), the significance of this observation is not clear.

The fact that AHCs are attracting HMO transplant patients is interesting, since previous research has suggested they are not competing successfully in the HMO market. In this area of highly specialized care, however, they are successful: in 1994, private AHCs performed 43.9 percent of all transplants for patients insured by HMOs and 44.9 percent of the total number of transplant procedures.

Burn Care

In 1994, 5,546 burn patients were discharged from the hospitals in this study, a 13.2 percent increase over 1991 (Table 4). AHCs dominate in the field of burn care, accounting for about half of all burn-unit beds. Clearly, burn patients gravitate to places where they can receive this specialized care. Public AHCs have made the largest investment in burn care; nearly 60 percent have a burn unit and treat nearly a quarter of all patients. In fact, public AHCs are three times more likely than private ones to provide burn care and have a third of all burn-care beds in their communities. Private AHCs, by contrast, have made a much smaller commitment to creating burn-care units and thus treat fewer patients.

Yet even though public and private AHCs both have made a greater commitment to making burn care available, they have relatively fewer burn patients per burn-unit beds compared with other hospital types. This lower ratio is possibly attributable to the definition of burn patients and the use of simple counts of admissions that are not specific enough to measure the true nature of burn care provided in AHCs. These cases may actually be more severe, requiring longer lengths of stay and greater use of resources. Further research will be needed to determine an appropriate measure of the burn-care component of AHCs' patient care mission.

As with transplant services, type of insurance coverage does not seem to substantially affect where burn patients are treated. For example, the percentages of HMO, Medicare, Medicaid, and privately insured burn patients treated in public AHCs are quite similar, ranging from 19.4 percent to 22.7 percent. Lack of coverage seems to be a significant factor, however. Self-pay patients are twice as likely as the insured to be treated in public AHCs or

major public teaching hospitals.

Major Trauma Care

In 1994, 59,780 major trauma patients were treated in the study communities, an increase of 15.1 percent over 1991 (Table 5). In this area of specialty care, AHCs and other major teaching hospitals face significant competition from other large hospitals.

A disproportionate share of large non-teaching hospitals provide some level of trauma care. Whereas these hospitals represent 41 percent of all hospitals in these communities, they account for 60 percent of all the trauma units. All trauma units in AHCs are regional trauma centers. Approximately 20 percent of the trauma centers in all other types of hospitals are community-level ones. Major public teaching hospitals are less likely to provide trauma care than other types of large hospitals. The distribution of trauma cases appears to mirror the number of hospital beds (Table 5). Major exceptions are for public AHCs, which treat more than twice their share of major trauma cases.

In contrast to the situation with transplants and burn care, insurance coverage seems strongly correlated with where major trauma patients are treated (Table 6). Medicare beneficiaries account for nearly half of all trauma cases studied (46.8%). Large and small non-teaching hospitals provide the vast majority of trauma care for patients insured by Medicare (81.3%) and by HMOs (72.1%). Self-pay patients, on the other hand, are concentrated in the 44 public teaching facilities (AHCs and major teaching hospitals), which furnish 40.4 percent of that care. Trauma patients covered either by Medicaid or other private insurance are somewhat more concentrated in public and private AHCs and in major public teaching hospitals.

The concentration of self-pay trauma patients in public teaching facilities is consistent with the general pattern of care for all types of self-pay patients. However, care patterns observed for trauma patients insured by Medicare, Medicaid, or other private insurance are not explained simply, nor is the large share of trauma cases Medicare beneficiaries represent in this sample. One possible avenue for future research would be to break trauma cases into smaller, more homogeneous groups. If, for example, certain types of fractures were categorized as major trauma cases, the reasons behind their distribution might become more obvious.

Care for High-Risk Infants

In 1994, there were 42,474 hospital discharges of high-risk infants, a drop of 25 percent from the number of patients in 1991 (Table 7). High-risk infant care is the only type of care in this study that declined from 1991 to 1994. The falloff occurred regardless of insurance or

hospital type, with only two exceptions. First, the number of high-risk infants insured by HMOs rose by 3 percent, possibly reflecting growth in the HMO population in general. Second, the number of high-risk uninsured infants in public AHCs more than doubled, from 198 to 409 cases.

Medicaid covered the highest proportion (42.7%) of these infants, whereas HMOs and other private insurance accounted for 23.2 percent and 25.6 percent, respectively. Self-pay patients made up a relatively small share—only 4.9 percent—probably because Medicaid coverage is available for most pregnant women who are poor.

Most AHCs have a neonatal intensive care unit (NICU) (Table 7). However, they account for only about one-fifth (19.4%) of NICU beds in the study locales. Major teaching hospitals are somewhat less likely to have an NICU, yet they account for almost a third (31.1%) of all NICU beds. Together, AHCs and major teaching hospitals have just over half of all such beds.

As with some of the other types of specialty care, the pattern for high-risk infant care generally corresponds with the location of resources (Table 7). These babies are usually cared for in institutions that have an NICU. However, public AHCs provide somewhat more care for high-risk infants, relative to their NICU bed count, than do private AHCs and major private teaching hospitals.

Where high-risk infants are treated is related to type of insurance coverage (Table 8). More than three-quarters of high-risk infants covered by HMOs and other forms of private insurance are cared for in major private teaching hospitals and other large hospitals. Medicaid and self-pay patients, on the other hand, are more highly concentrated in public AHCs and major public teaching hospitals. Given the high volume of Medicaid patients, Medicaid is the predominant payer of care for high-risk infants treated in public teaching institutions, accounting for 69.1 percent of those infants in public AHCs and 82.9 percent of those in major public teaching hospitals. In public AHCs, 11.1 percent are self-pay patients; in major public teaching hospitals, the figure drops to 6.6 percent.

Acquired Immune Deficiency Syndrome (AIDS)

The sample hospitals treated 18,179 AIDS patients in 1994 (Table 9).[8] Medicaid enrollees accounted for the highest proportion of cases—39.6 percent—while Medicare accounted for

[8] Theoretically, AIDS could be a very interesting case study of trends in the patient care mission. However, the implementation in 1993 of a revised classification system and an expanded surveillance system led to a greater than 100 percent increase in cases reported nationwide from 1992 to 1993—and a 300 percent rise in AIDS cases in this study. As a result, comparisons across this change would include a substantial but unknown amount of reporting error.

18.6 percent, private insurance accounted for 17.5 percent, HMO enrollees accounted for 12.5 percent, and self-pay patients accounted for 7.3 percent. These cases were concentrated in the 142 major teaching facilities, most of which (87.4%) have a dedicated AIDS unit. Although AHCs and major teaching hospitals had only 26.3 percent of these units, they furnished nearly half (49.1%) of all inpatient AIDS care (Table 9).

The distribution of patients among hospital types varies markedly by insurance coverage (Table 10). AIDS patients covered by HMOs and other private plans are treated far less often at AHCs and major public teaching hospitals than at any other kind of institution. In contrast, Medicaid and self-pay AIDS patients, who gravitate to public AHCs, make up nearly 70 percent of the cases in these facilities.

Major Coronary Care Procedures

In 1994, the study hospitals performed 266,099 major coronary procedures, a 34.5 percent increase over 1991. The vast majority (88.5%) of these cases were covered by Medicare (47.3%), other private health insurance (26.0%), or HMOs (15.2%). Only 5.5 percent were covered by Medicaid, 2.9 percent were self-pay, and 3 percent were covered by other types of insurance.

Most AHCs are capable of providing major coronary care services, though they face significant competition from major teaching hospitals and large non-teaching institutions (Table 11). Some 84.6 percent of AHCs have a cardiac care unit (CCU), but they account for only 13.6 percent of such beds in their community; more than half of these beds are in large non-teaching hospitals. Furthermore, while relatively few small hospitals have CCU beds, their total CCU capacity is the same as that in AHCs—13.6 percent. Similar patterns are seen for availability of angioplasty services and cardiac catheterization laboratories.

Although nearly all public AHCs provide coronary care and have a CCU, their CCUs are modest in size and have only a moderate caseload of patients undergoing major coronary procedures. This may be partly due to the relatively low proportion of Medicaid patients who receive such care. Major public teaching hospitals also have a very low commitment to coronary care: fewer than half have CCUs, and the facilities are relatively small and perform very few major coronary procedures.

Only three-quarters of private AHCs and major private teaching hospitals provide coronary care, but they have made major investments and commitments to this specialty in terms of CCU size and caseload. These two types of hospitals account for 23.1 percent of CCU beds and treat 35.5 percent of patients needing major coronary care. These cases are concentrated in private AHCs and in major private teaching facilities (Table 12).

Another way to look at the concentration of major coronary procedures in AHCs is to compare their share of the market for this care with their share for simpler cardiac procedures like pacemaker implantations (Table 12). This analysis found that complex procedures are largely concentrated in AHCs and major teaching hospitals; it seems that coronary care programs of non-teaching facilities focus on less complex procedures, while major teaching institutions tend to handle more complicated ones. However, the distinction is not sharp, since large non-teaching hospitals provide more than half of all major coronary procedures. The issue, rather, is one of relative commitment to more specialized aspects of cardiac care.

Medicaid and uninsured patients undergoing major coronary procedures are somewhat more concentrated in public AHCs. Roughly one-fifth of Medicaid patients and one-tenth of self-pay patients are treated in these institutions. While poor and uninsured patients are only a small proportion of patients receiving this service, they account for a third of the major coronary cases in public AHCs.

Availability of Other Types of Specialized Services

Besides the six types of care examined in the study, other types of services come under the purview of AHCs' mission to furnish specialty, high-technology care. Although this topic is beyond the study's scope, a look at the availability of some other services broadens the picture presented here (Table 13).

Compared with their private counterparts, public teaching hospitals (both AHCs and other major teaching hospitals) are much less likely to provide sophisticated imaging services such as lithotripsy and selected high-technology, radiologic, and imaging services (diagnostic radioisotope facilities, MRIs, PET scanners, and SPECTs). For instance, MRIs are found in nearly three-quarters of private AHCs but fewer than half of public ones. In some cases, large non-teaching hospitals are as likely as public AHCs to furnish a particular service. The sheer number of such services offered by large non-teaching hospitals suggests that AHCs face significant competition in these areas.

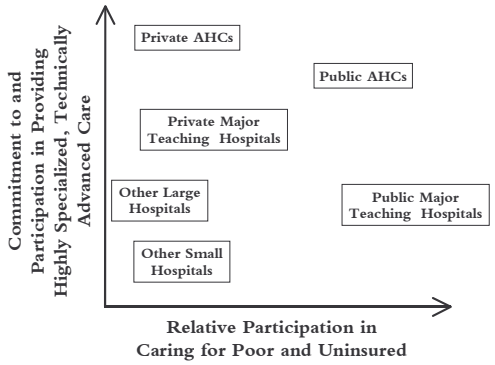
Several possible reasons explain why public teaching hospitals are less likely to offer high-tech services. One is that they may not want to duplicate services available from other community institutions. Another is that they may lack the financial resources to buy or lease these costly machines. Study data do not permit a more detailed exploration of this pattern, but suggest a need for further research to determine whether financial constraints are keeping public teaching hospitals from buying such equipment.

SUMMARY OF FINDINGS

This report has examined specialized, technically advanced care as part of the overall AHC

patient care mission. It has also explored how insurance coverage affects patterns of delivery for such care, especially for services provided to the poor and the uninsured. Figure 1 depicts the relative commitment of the different types of hospitals to providing services in these two areas. Basically, hospitals fall somewhere on a continuum that reflects their delivery of such services (the vertical axis) and commitment to providing care to the poor and uninsured (the horizontal axis).

Figure 1
Relative Commitments and Participation in Patient Care Social Missions



Source: Institute for Health Care Research and Policy, Georgetown University

Private AHCs

Private AHCs are the technological elite among hospitals, offering a wider variety of specialized services than any other type of hospital. Besides their high-volume transplant programs, these institutions have large coronary care programs backed up by cardiac catheterization laboratories. Their programs tend to focus on complicated cases. Private AHCs also are the likeliest to have costly, specialized technology like lithotripsy and PET and SPECT imaging equipment. They do not seem especially committed to serving the poor and uninsured; in 1994, they had the smallest share of self-pay patients among all types of hospitals.

Public AHCs

In many respects, public AHCs resemble their private counterparts. On average, they offer a broad range of highly technical and sophisticated services. In certain areas, such as burn and trauma care, they are the clear leaders. Furthermore, in some instances the fact that public AHCs offer specialized services seems to go hand-in-hand with an emphasis on caring for the poor and uninsured. That they treat a disproportionate share of high-risk infants and AIDS patients supports this observation.

Compared with private AHCs, however, public ones place less emphasis on treating conditions such as coronary problems, which are usually covered by Medicare or private

insurance. Finally, public AHCs are less likely than their private counterparts to offer particular specialty services, including transplants and sophisticated diagnostic imaging. Those that offer such services, however, have made a solid commitment. Public AHCs with a transplant program, for example, have nearly the same volume of these cases as is found in private AHCs. Public institutions are simply less likely to provide the service in the first place.

With regard to care for the poor and uninsured, public AHCs have made a substantial commitment. In 1994, three of every five patients treated in these facilities were either uninsured or covered by Medicaid. Moreover, during the study period public AHCs saw a marked increase in self-pay patients, whose numbers grew from 14.3 percent to 18.8 percent of all patients. For some types of specialty care (AIDS, high-risk infants, and trauma), insurance coverage seemed related to where patients were treated. Public AHCs treated a disproportionate share of Medicaid and self-pay patients in each of these areas.

Major Private Teaching Hospitals

Using high-tech equipment as a measure, major private teaching hospitals offer a less sophisticated level of care than AHCs, but more advanced than care available at major public teaching and other large urban hospitals. Compared with AHCs, a smaller percentage of major private teaching hospitals offer the services studied, though they ranked higher than other large hospitals. Their strong suit seems to be providing high-technology care to insured populations.

Most major coronary procedures, for instance, are covered by HMOs, Medicare, or other private insurance, and major private teaching hospitals have very active and successful coronary care programs. However, whether this is a cause-and-effect relationship is uncertain. AIDS is also illustrative: AIDS patients covered by HMOs gravitate to major private teaching hospitals rather than public teaching facilities or private AHCs.

Finally, even though the specialty programs at these institutions seem to prosper thanks to the high proportion of paying patients, major private teaching hospitals also provide a significant amount of care to the poor and uninsured. Overall, they have a higher share of Medicaid or self-pay patients (28.0%) than do private AHCs (24.7%).

Major Public Teaching Hospitals

Somewhat surprisingly, major public teaching hospitals do not provide the broad range of high-technology services commonly offered in AHCs and major private teaching hospitals. Rather, they offer essentially the same types and volume of specialty care that are available in large non-teaching hospitals. The difference lies in emphasis: major public teaching hospitals may be well-equipped to handle burn care or high-risk infants, but they may have less to offer—relative to average large urban hospitals—in terms of CCUs, trauma centers,

lithotripsy, or advanced imaging technology.

A commitment to providing care to the poor and uninsured is the distinguishing characteristic of these institutions. In 1994, nearly 70 percent of patients in major public teaching hospitals were either Medicaid or self-pay.

Large and Small Non-Teaching Hospitals

In most respects, large and small non-teaching hospitals provide less technically advanced care and less care to the poor and uninsured than do AHCs and major teaching hospitals. This observation is not a criticism; it merely reflects a difference in mission. Rather than focusing on specialized care, such facilities concentrate on providing a large quantity of the relatively routine care most patients need.

Nonetheless, as a group non-teaching hospitals provide a significant portion of the specialized care in their communities. In 1994, they furnished more than half of all the services examined in this study—except for transplants and burn care—and thus are important sources for specialized care. Even small urban hospitals deliver some specialized services: in 1994, they accounted for 4.4 percent of all major coronary procedures, 10.7 percent of AIDS care, 9.2 percent of high-risk infant care, and 15.6 percent of major trauma care.

CONCLUSIONS AND FUTURE RESEARCH

The primary purpose of this study was to evaluate patterns of specialty care as part of AHCs' patient care mission. To do that, a variety of concepts and measures were developed and tested for potential use in tracking changes in this area over time. Assessing the care provided to Medicaid and uninsured patients was relatively straightforward, and the findings in this much-studied area resemble earlier ones. To monitor changes over time, relatively simple measures like the proportion of Medicaid-covered discharges or uninsured patients seemed adequate. While more complex measures could be used, doing so would not necessarily enhance understanding of institutions' changing commitments to this area.

To assess AHC involvement in specialized care, the study examined (1) availability of the service, (2) level of investment or size of program, (3) delivery of service or volume, and (4) role in the community. Facilities were compared based on these characteristics, and several important findings emerged from this analysis. The first observation is relatively obvious, but bears repeating and emphasis: *Patients in need of specialized care go to the facilities that offer it.* For most specialized services, identifying both where they are provided and an institution's capacity for furnishing them are key to understanding patterns of care. Consequently, a crucial step in tracking AHCs' patient care mission is assessing availability and capacity. Prior research suggests that availability does not vary within a short time span.[9]

[9] D. Gaskin, *The Role of Urban Safety Net Hospitals in the Provision of Essential Services* (IWP 97-109),

However, shrinking a unit that provides specialized services may be an early signal than an institution is initiating changes in its patient care mission.

Second, most specialized units, such as CCUs and NICUs, serve patients with a wide range of conditions and severity of illness. What distinguishes AHCs is how they use that capacity. For example, compared with other hospital types, AHCs treat a much more complex mix of coronary patients, as indicated by the ratio of major cases to simpler pacemaker implants. Thus, assessing the AHC specialty care mission calls for the use of more refined tools that account for differences in patient severity and complexity.

Third, for some types of specialized services, insurance status plays a key role in where patients receive care. Privately insured AIDS patients usually are treated in major private teaching and non-teaching hospitals, whereas poor and uninsured AIDS patients are found more often in AHCs. Even though an AHC may not provide a disproportionate share of a specialized service in its community, it may be a critical source of that care for the poor and uninsured.

Finally, selecting the most appropriate measures is necessary to study the unique contributions AHCs make in providing specialized care. This research demonstrated that for some services, like transplants, simple counts of hospital discharges may be adequate. For others, more complex measures, such as ratio of number of cases to capacity, may be more useful. For example, more sophisticated measures for burn and trauma care, such as length of stay and complexity, should be developed and tested. In this study, the groupings of patients were too broad to capture which cases needed the high-tech care provided by burn units. Future research should consider different groupings, as well as other measures of resource use, to reveal the unique aspects of care available in these specialized units.

This analysis made an initial quantitative evaluation of patterns of specialty care as part of AHCs' patient care mission. It identified several measures that could be used in tracking such care. The next step is to use these yardsticks to study how health care market changes affect the ability of AHCs to provide specialized care.

Institute for Health Care Research and Policy, Georgetown University, Washington, D.C., December 1997, p. 32.

Table 1
Hospitals' Share of Total Medicaid and Self-Pay Hospital Admissions, 1991 and 1994

	Public AHCs	Private AHCs	Major Public Teaching Hospitals	Major Private Teaching Hospitals	Other Large Non-Teaching Hospitals	Other Small Non-Teaching Hospitals	Total
Medicaid, 1991	46.5%	21.2%	57.5%	21.2%	12.7%	17.0%	18.8%
Self-pay, 1991	14.3%	3.9%	15.1%	5.7%	4.6%	5.2%	5.7%
Total Medicaid and self-pay, 1991	60.8%	24.1%	73.6%	28.2%	17.3%	22.2%	24.5%
Medicaid, 1994	42.6%	20.9%	54.7%	23.3%	15.7%	20.2%	20.7%
Self-pay, 1994	18.8%	3.8%	14.2%	4.7%	4.5%	4.6%	5.6%
Total Medicaid and self-pay, 1994	61.4%	24.7%	68.9%	28.0%	20.2%	24.8%	26.3%

Table 2
Medicaid and Self-Pay Hospital Admissions, 1991 and 1994

	Public AHCs	Private AHCs	Major Public Teaching Hospitals	Major Private Teaching Hospitals	Other Large Non-Teaching Hospitals	Other Small Non-Teaching Hospitals	Total
Medicaid admissions, 1991	12.3%	9.2%	12.7%	12.9%	34.6%	18.3%	100.0%
Self-pay admissions, 1991	12.4%	5.5%	10.8%	11.3%	41.7%	18.3%	100.0%
Total admissions for financially vulnerable populations, 1991	12.3%	8.4%	12.3%	12.5%	36.3%	18.3%	100.0%
Medicaid admissions, 1994	10.4%	7.6%	9.5%	15.8%	39.5%	17.2%	100.0%
Self-pay admissions, 1994	17.1%	5.1%	9.2%	12.0%	42.0%	14.7%	100.0%
Total admissions for financially vulnerable populations, 1994	11.8%	7.1%	9.4%	15.0%	40.0%	16.6%	100.0%
Total hospital discharges	5.1%	7.6%	3.6%	14.0%	52.1%	17.6%	100.0%
Ratio of share of care for vulnerable populations to share of discharges, 1994	2.339	0.937	2.624	1.068	0.769	0.943	

Table 3
Organ Transplant Services, 1994

	Public AHCs	Private AHCs	Major Public Teaching Hospitals	Major Private Teaching Hospitals	Other Large Non-Teaching Hospitals	Other Small Non-Teaching Hospitals	Total
Number of transplants	1,492	2,964	163	1,055	890	32	6,596
Share of total transplants	22.6%	44.9%	2.5%	16.0%	13.5%	0.5%	100.0%
Proportion of hospitals offering transplant services	71.4%	83.9%	13.0%	39.2%	10.4%	2.2%	31.6%
Number of hospitals with one or more transplant programs	15	26	3	29	40	8	121
Share of total transplant programs	12.4%	21.5%	2.5%	24.0%	33.1%	6.6%	100.0%
Average number of transplants per hospital with transplant program	99.5	114.0	54.3	36.4	22.3	4.1	54.5

Table 4
Burn Care, 1994

	Public AHCs	Private AHCs	Major Public Teaching Hospitals	Major Private Teaching Hospitals	Other Large Non-Teaching Hospitals	Other Small Non-Teaching Hospitals	Total
Number of burn cases	1,287	644	718	1,044	1,380	473	5,546
Share of total burn cases	23.2%	11.6%	12.9%	18.8%	24.9%	8.5%	100.0%
Proportion of hospitals with burn unit	57.1%	19.4%	13.0%	6.8%	3.1%	0.0%	4.2%
Share of total burn unit beds	33.6%	16.8%	10.5%	12.9%	26.1%	0.0%	100.0%
Ratio of share of total burn cases to share of total burn unit beds	0.690	0.690	1.232	1.458	0.952	N/A	

Table 5
Major Trauma Care, 1994

	Public AHCs	Private AHCs	Major Public Teaching Hospitals	Major Private Teaching Hospitals	Other Large Non-Teaching Hospitals	Other Small Non-Teaching Hospitals	Total
Number of major trauma cases	6,449	4,733	2,933	6,625	29,745	9,295	59,780
Share of total major trauma cases	10.8%	7.9%	4.9%	11.1%	49.8%	15.6%	100.0%
Hospitals with regional trauma center	80.9%	83.9%	47.8%	79.7%	59.0%	15.0%	43.9%
Hospitals with community trauma center	0.0%	0.0%	8.7%	8.1%	16.7%	4.6%	9.9%
Proportion of hospitals with either a regional or community trauma unit	81.0%	83.9%	56.5%	87.8%	75.7%	19.7%	53.8%
Share of total trauma units (any level)	3.5%	5.4%	2.7%	13.5%	60.0%	14.9%	100.0%
Share of total hospital beds	5.2%	8.4%	4.2%	13.6%	51.3%	17.3%	100.0%
Ratio of share of total major trauma cases to share of total hospital beds	2.062	0.944	1.162	0.815	0.971	0.898	

Table 6
Share of Major Trauma Care, by Type of Insurance Coverage, 1994

	Public AHCs	Private AHCs	Major Public Teaching Hospitals	Major Private Teaching Hospitals	Other Large Non-Teaching Hospitals	Other Small Non-Teaching Hospitals	Total
HMO	9.3%	5.7%	2.9%	9.9%	53.5%	18.6%	100.0%
Medicare	2.4%	4.7%	1.9%	9.7%	60.3%	21.0%	100.0%
Medicaid	22.1%	13.7%	12.2%	15.1%	29.1%	7.7%	100.0%
Other private insurance	16.2%	13.7%	5.6%	12.0%	41.7%	10.8%	100.0%
Self-pay (charity)	28.6%	7.0%	11.8%	10.1%	35.0%	7.5%	100.0%
Total trauma care	10.8%	7.9%	4.9%	11.2%	49.7%	15.6%	100.0%

Table 7
Care for High-Risk Infants (HRIs), 1994

	Public AHCs	Private AHCs	Major Public Teaching Hospitals	Major Private Teaching Hospitals	Other Large Non-Teaching Hospitals	Other Small Non-Teaching Hospitals	Total
Total number of HRI cases	3,691	4,665	3,062	8,143	19,006	3,907	42,474
Share of total HRI cases	8.7%	11.0%	7.2%	19.2%	44.8%	9.2%	100.0%
Proportion of hospitals with neonatal unit	71.4%	71.0%	65.2%	66.2%	35.5%	6.8%	29.2%
Average beds in neonatal unit	20.9	26.4	21.7	22.5	14.6	11.0	17.5
Share of total neonatal beds	6.8%	12.7%	7.1%	24.0%	43.4%	6.0%	100.0%
Ratio of share of total HRI cases to share of total neonatal beds	1.244	0.850	0.994	0.782	1.055	1.514	

Table 8
Share of Total Care for High-Risk Infants, by Type of Insurance Coverage, 1994*

	Public AHCs	Private AHCs	Major Public Teaching Hospitals	Major Private Teaching Hospitals	Other Large Non-Teaching Hospitals	Other Small Non-Teaching Hospitals	Total
HMO	2.3%	7.8%	1.0%	16.2%	60.6%	12.0%	100.0%
Medicaid	14.0%	11.3%	14.0%	16.8%	34.8%	9.1%	100.0%
Other private insurance	4.0%	12.0%	1.6%	26.9%	48.8%	6.7%	100.0%
Self-pay (charity)	19.6%	6.2%	9.7%	14.9%	40.6%	9.1%	100.0%
Other	4.6%	27.6%	3.4%	16.2%	38.3%	9.8%	100.0%
Share of care for high-risk infants	8.5%	10.8%	7.1%	18.8%	45.8%	9.1%	100.0%

* Medicare is not shown because it covers an extremely small number of high-risk infants.

Table 9
AIDS Care, 1994

	Public AHCs	Private AHCs	Major Public Teaching Hospitals	Major Private Teaching Hospitals	Other Large Non-Teaching Hospitals	Other Small Non-Teaching Hospitals	Total
Number of AIDS cases	3,122	1,674	1,049	3,067	7,317	1,950	18,179
Share of total AIDS cases	17.2%	9.2%	5.8%	16.9%	40.3%	10.7%	100.0%
Proportion of hospitals with inpatient AIDS unit	95.2%	74.2%	78.3%	85.1%	60.3%	32.0%	52.6%
Share of total hospitals with AIDS unit	4.2%	4.9%	3.8%	13.4%	48.9%	24.8%	100.0%

Table 10
Distribution of AIDS Cases, by Type of Insurance Coverage, 1994

	Public AHCs	Private AHCs	Major Public Teaching Hospitals	Major Private Teaching Hospitals	Other Large Non-Teaching Hospitals	Other Small Non-Teaching Hospitals	Total
HMO	1.5%	1.8%	1.6%	22.7%	53.5%	18.9%	100.0%
Medicare	11.6%	9.8%	6.7%	20.4%	40.4%	11.1%	100.0%
Medicaid	24.9%	10.8%	8.5%	14.4%	33.9%	7.6%	100.0%
Other private insurance	4.5%	10.2%	1.7%	18.1%	50.8%	14.7%	100.0%
Self-pay (charity)	30.6%	3.2%	6.8%	14.0%	39.5%	6.0%	100.0%
Other	43.3%	19.6%	3.3%	7.9%	19.4%	6.5%	100.0%
Total	17.2%	9.2%	5.8%	16.9%	40.3%	10.7%	

Table 11
Availability of Facilities for Coronary Care, 1994

	Public AHCs	Private AHCs	Major Public Teaching Hospitals	Major Private Teaching Hospitals	Other Large Non-Teaching Hospitals	Other Small Non-Teaching Hospitals	Total
Coronary Care Unit (CCU)							
Percent of hospitals with CCU	95.2%	77.4%	43.5%	70.3%	61.9%	29.0%	50.0%
Average beds in CCU	10.9	16.8	9.6	12.6	10.9	5.9	10.2
Share of CCU beds	4.8%	8.8%	2.1%	14.3%	56.4%	13.6%	100.0%
Angioplasty							
Proportion of hospitals offering angioplasty	80.9%	83.9%	34.8%	56.8%	41.0%	8.5%	31.3%
Share of total hospitals offering angioplasty	6.0%	9.2%	2.8%	14.9%	55.8%	11.0%	100.0%
Cardiac Catheterization Laboratory							
Proportion of hospitals with catheterization laboratory	81.0%	83.9%	47.8%	79.7%	59.0%	15.0%	43.9%
Share of total hospitals with catheterization laboratory	4.3%	6.6%	2.8%	15.0%	57.4%	14.0%	100.0%

Table 12
Major Coronary Procedures (MCPs), 1994

	Public AHCs	Private AHCs	Major Public Teaching Hospitals	Major Private Teaching Hospitals	Other Large Non-Teaching Hospitals	Other Small Non-Teaching Hospitals	Total
Total number of MCP cases	14,974	43,247	4,221	50,991	140,973	11,693	266,099
Share of total MCP cases	5.6%	16.3%	1.6%	19.2%	53.0%	4.4%	100.0%
Share of total pacemaker implants	2.9%	5.6%	0.2%	9.6%	17.9%	63.9%	100.0%
Average number of MCP cases per hospital with CCU	749	1802	422	981	595	110	593
Ratio of share of MCP cases to share of CCU beds	1.183	1.844	0.757	1.339	0.939	0.323	
Relative complexity of coronary care as measured by ratio of share of total MCP cases to share of total pacemaker implants	1.943	2.925	10.343	2.000	0.829	0.245	

Table 13
Availability of High-Technology Care

	Public AHCs	Private AHCs	Major Public Teaching Hospitals	Major Private Teaching Hospitals	Other Large Non-Teaching Hospitals	Other Small Non-Teaching Hospitals	Total
Lithotripsy							
Proportion of hospitals with service	47.6%	58.1%	8.7%	16.2%	15.4%	2.7%	12.4%
Share of total hospitals with service	9.0%	16.2%	1.8%	10.8%	53.2%	9.0%	100.0%
Diagnostic Radioisotope Facility							
Proportion of hospitals with service	80.9%	80.6%	73.9%	83.8%	79.2%	52.2%	68.6%
Share of total hospitals with service	2.8%	4.0%	2.8%	10.1%	49.3%	31.0%	100.0%
Magnetic Resonance Imaging (MRI)							
Proportion of hospitals with MRI	47.6%	74.2%	30.4%	59.5%	46.0%	26.0%	39.5%
Share of total hospitals with MRI	2.8%	6.5%	2.0%	12.4%	49.6%	26.8%	100.0%
Positron Emission Tomography (PET)							
Proportion of hospitals with PET	14.3%	19.4%	0.0%	4.0%	3.9%	2.5%	4.0%
Share of total hospitals with PET	8.3%	16.7%	0.0%	8.3%	41.7%	25.0%	100.0%
Single Photon Emission Computed Tomography (SPECT)							
Proportion of hospitals with SPECT	38.1%	71.0%	39.1%	51.4%	46.0%	28.1%	39.6%
Share of total hospitals with SPECT	2.2%	6.2%	2.5%	10.7%	49.4%	28.9%	100.0%

APPENDIX A

Data Sources and Measures

This report is based on 1991 and 1994 all-payer discharge data from nine states: California, Florida, Illinois, Massachusetts, New Jersey, New York, Pennsylvania, Washington, and Wisconsin. These states have provided the data files that are included in a multiyear, all-payer discharge database that has been assembled at Georgetown University over the past five years. They were selected because they have had the capability to provide discharge data for several years, and because they include the geographic areas where a high proportion of AHCs are located.

The sample of hospitals used in this report includes all acute care general hospitals and children's hospitals located in a metropolitan statistical area or primary metropolitan statistical area (MSA/PMSA) that has at least one academic health center or major teaching hospital. Academic health centers are those hospitals that are closely affiliated with a medical school.[10] Nationally, there are 127 such institutions. Major teaching hospitals are defined in this study as those institutions, other than AHCs, that have at least one resident for every four beds. In the study states, there are 38 MSA/PMSAs with at least one AHC or major teaching hospital. In 1994, these MSA/PMSAs included 898 non-federal, acute care, general hospitals (see Table A-1). The sample includes about 40 percent of all AHCs and 47 percent of all acute-care, major teaching hospitals. In addition to AHCs and major teaching institutions, the study MSA/PMSAs included 366 large acute-care hospitals (with at least 200 beds) and 383 small acute-care hospitals (fewer than 200 beds).[11]

Table A-1
Ownership and Teaching Status for Study Hospitals, 1994

Hospital Type	AHCs	Major Teaching	Large (200 or more beds)	Small (less than 200 beds)
Public	21	23	34	17
Nonprofit	30	74	228	325
For-profit	1	0	104	41
Total	52	97	366	383

[10] There is no universally accepted list of AHCs. The set used in this report is based on a list of AHCs developed at Georgetown University. This group includes the 118 hospitals defined as "integrated academic medical centers" by the Association of American Medical Colleges (AAMC) and nine other institutions that are not members of AAMC but that are either under common ownership or are closely affiliated with a medical school.

[11] For simplicity of presentation, large and small hospitals that do not have at least 0.25 residents per bed are referred to in this report as non-teaching hospitals. Many of these institutions train residents; a few have made significant commitments to their training programs.

Descriptive data on the sample of hospitals were extracted from the 1991 and 1994 American Hospital Association *Annual Survey of Hospitals.* The data elements extracted include bed size, number of residents, number of special-purpose beds by type (CCU, burn care, and neonatal intensive care), and type of specialty services provided (transplants, burn units, trauma centers, specialized cardiology services, and specialized imaging services).

Discharge abstracts for all sample hospitals were extracted. This database includes 9.2 million discharges for 1991 and 10.2 million for 1994. Total discharges in the study hospitals increased by 10.6 percent over the three-year study period.

Each discharge was classified into a diagnosis-related group, based on the All Patient Refined Diagnosis Related Groups (APR-DRG), version 12.0.[12] The APR-DRGs with the greatest concentration within AHCs are shown in Appendix C . The discharges then were further categorized into six groups of DRGs, where each group represented a type of case that could be a significant component of an AHC's patient care mission; that is, some of the groups include high-technology or highly specialized services. Others, such as care for high-risk infants, are services or problems for which poor individuals may be at greater risk. The assignment of individual APR-DRGs to each group is listed in Appendix B. The six groups are:

- Organ transplants (kidney, heart, liver, and lung)
- Burns (including extensive and non-extensive burns)
- Major trauma (head trauma with coma, major chest trauma, multiple trauma);
- High-risk infants (birth weight less than 1,500 grams, and birth weight less than 2,500 grams but also requiring a major surgical procedure or having other major problem)
- AIDS
- Major coronary procedures (bypass, valve procedures, and percutaneous procedures).

In describing AHCs' patient care mission, separating the complex from the routine was desirable. Thus, in the case of trauma, high-risk infants, and major coronary care procedures, the groupings were intended to include only those DRGs in the related major diagnostic grouping that indicated the need or use of major or complex procedures. Most hospitals have the capability to provide simple coronary procedures, such as routine pacemaker implants, or to treat minor trauma cases.

[12] The author would like to gratefully acknowledge 3M Health Information Systems, who provided the

In 1994, there were 398,674 discharges in these six categories of APR-DRGs in the sample hospitals, of which 88,942 (22.3%) were treated in AHCs. Patients in these groups represented 6.9 percent of all discharges from AHCs and 3.5 percent of discharges from all other sample hospitals.

Other DRGs, or groups of DRGs, could have been added to the list of six used here. Possible candidates could include bone marrow transplants, patients receiving lithotripsy services, or groups of rare diseases. Examination of these was left for future research.

The insurance status of each discharge was classified into one of six groups: health maintenance organization (HMO), Medicare, Medicaid, other private insurance, self-pay (charity), and other (workers' compensation, CHAMPUS, and other plans). It should be noted that there is some variation in how hospitals and states report coverage for Medicare and Medicaid beneficiaries enrolled in managed care plans. Some states provide separate categories for reporting whether a Medicare and Medicaid beneficiary is enrolled in a managed care plan. Other states leave it to the individual hospitals to decide whether to report a discharge as Medicare, Medicaid, or HMO. In this study, Medicare and Medicaid managed care enrollees were classified as having HMO coverage whenever they could be separately identified.

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programs for classifying patients into APR-DRGs.

APPENDIX B

Categorization of APR-DRGs

Group	APR-DRG	Name
Organ Transplants		
	103	Heart transplant
	302	Kidney transplant
	480	Liver transplant
	484	Lung transplant
	602	Neonate with organ transplant
Burns		
	456	Burns, transferred to another facility
	457	Extensive burns without O.R. procedure
	458	Non-extensive burns with skin graft
	459	Non-extensive burns with wound debridement or other O.R. procedure
	472	Extensive burns with O.R. procedure
Major Trauma		
	27	Head trauma with coma
	83	Major chest trauma
	209	Major joint and limb reattachment of lower extremity for trauma
	730–732	Major O.R. procedures for multiple trauma
	733–734	Multiple trauma
High-Risk Infants		
	610–623	Neonates with birth weight less than 1500 grams, with and without major O.R. procedure and with and without major problems
	640–642	Neonates with birth weight more than 1500 grams but less than 2000 grams, with major O.R. procedure or other major problem
	650–652	Neonates with birth weight more than 2000 grams but less than 2500 grams, with major O.R. procedure or other major problem
	660–662	Neonates with birth weight more than 2500 grams, with major O.R. procedure
	670–673	Neonates with birth weight more than 2500 grams, with major problem

APPENDIX B (continued)

Group	APR-DRG	Name
AIDS		
	700	Tracheotomy for HIV infection
	701–703	HIV with O.R. procedure
	704–707	HIV with major HIV-related diagnoses or problems
	708	HIV without major HIV-related diagnoses or problems
Major Coronary Procedure		
	104–105	Cardiac valve procedures
	106–107	Coronary bypass, with and without cardiac catheterization
	108	Other cardiothoracic procedures for major anomalies
	109	Other cardiothoracic procedures, except for major anomalies
	110	Major cardiovascular procedure, except for occlusion
	111–112	Percutaneous cardiovascular procedures, with and without acute myocardial infarction

APPENDIX C

APR-DRGs Concentrated in Academic Health Centers

Rank*	DRG	DRG Name	Total Volume	Percent in AHCs	Cumulative Percent
1	480	Liver transplant	1,326	75.0%	0.010%
2	484	Lung transplant	296	73.6	0.012
3	103	Heart transplant	830	70.5	0.018
4	302	Kidney transplant	4,416	60.0	0.050
5	603	Neonate, with ECMO, with major O.R. procedure	30	56.7	0.051
6	317	Admit for renal dialysis	1,121	54.3	0.059
7	730	Craniotomy for multiple significant trauma	1,272	46.7	0.068
8	660	Neonate, birth weight >2499g with major cardiovascular O.R. procedure	414	41.1	0.071
9	481	Bone marrow transplant	4,011	40.9	0.101
10	604	Neonate with ECMO, without major O.R. procedure	52	40.4	0.101
11	457	Extensive burns without O.R. procedure	218	38.5	0.103
12	600	Neonate tracheotomy with organ transplant, major O.R. procedure, or ECMO	65	38.5	0.103
13	472	Extensive burns with O.R. procedure	517	37.1	0.107
14	602	Neonate, with organ transplant	6	33.3	0.107
15	286	Adrenal and pituitary procedures	3,535	33.3	0.133
16	458	Non-extensive burns with skin graft	4,212	33.0	0.164
17	323	Urinary stones with ESW lithotripsy	2,939	31.2	0.185
18	2	Craniotomy without intracranial hemorrhage and deep coma	33,072	31.2	0.428
19	610	Neonate, birth weight <750g with major O.R. procedure	384	31.0	0.431
20	234	Cranial and facial bone reconstructive procedure except multiple trauma	4,776	30.7	0.466
21	399	Hemophilia, factors viii and ix	862	30.5	0.472
22	467	Other factors influencing health status	17,559	30.4	0.601
23	661	Neonate, birth weight >2499g with major nervous system O.R. procedure	395	29.4	0.604
24	732	Other O.R. procedure for multiple significant trauma	10,865	29.4	0.683
25	482	Tracheotomy for face, mouth, and neck diagnoses	5,616	29.1	0.725

APPENDIX C (continued)

Rank*	DRG	DRG Name	Total Volume	Percent in AHCs	Cumulative Percent
26	601	Neonate tracheotomy, without organ transplant, major O.R. procedure, or ECMO	81	28.4%	0.725%
27	441	Hand procedures for injuries	3,546	28.2	0.751
28	786	Major larynx and tracheal procedures, except tracheotomy	2,217	27.4	0.768
29	108	Other cardio-thoracic procedures for major heart anomalies	3,724	27.3	0.795
30	396	Sickle cell anemia crisis	26,389	27.2	0.988
31	122	Cardiovascular occlusion procedures	1,719	27.1	1.001
32	439	Skin graft for injuries	1,528	27.1	1.012
33	191	Pancreas, liver, and shunt procedures	11,532	26.9	1.097
34	353	Pelvic evisceration, radical hysterectomy, and radical vulvectomy	4,451	26.8	1.130
35	740	Cystic fibrosis	5,340	26.7	1.169
36	227	Multiple cranial and facial bone reconstructive procedures	300	26.7	1.171
37	650	Neonate, birth weight 2000–2499g with major O.R. procedure	254	26.4	1.173
38	13	Multiple sclerosis and cerebellar ataxia	8,725	26.0	1.237
39	109	Other cardio-thoracic procedures, except for major health anomalies	7,217	25.8	1.290
40	4	Spinal procedures	9,328	25.6	1.358
41	731	Spine, hip, femur, or limb procedure for multiple, significant trauma	4,762	25.4	1.393
42	460	Non-extensive burns, without O.R. procedure	8,573	25.3	1.456
43	704	HIV with multiple major HIV-related infections	1,878	25.2	1.470
44	54	Facial bone procedures, except major head and neck	15,720	24.9	1.585
45	633	Multiple, other, and unspecified congenital anomalies	217	24.9	1.587
46	1	Craniotomy with intracranial hemorrhage and deep coma	12,772	24.2	1.680
47	755	Dorsal and lumbar fusion procedures for curvature of the back	2,981	24.1	1.702
48	700	Tracheotomy for HIV infection	42	23.8	1.702

APPENDIX C (continued)

Rank*	DRG	DRG Name	Total Volume	Percent in AHCs	Cumulative Percent
49	37	Orbital procedures	4,054	23.7%	1.732%
50	737	Ventricular shunt procedures	9,048	23.7	1.799
51**	105	Cardiac valve procedures, without cardiac catheterization	18,002	23.1	1.931
53**	706	HIV with major HIV-related diagnosis without multiple major or significant HIV-related diagnosis	1,655	22.6	1.943
55**	454	Other injury, poisoning and toxic effect diagnosis	12,864	22.3	2.037
57**	662	Neonate, birth weight >2499g with other major O.R. procedure	3,200	21.5	2.061
58**	615	Neonate, birth weight 750–999g with major O.R. procedure	341	21.4	2.063
61**	620	Neonate, birth weight 1000–1499g with major O.R. procedure	236	21.2	2.065
64**	705	HIV with major HIV-related diagnosis with multiple major or significant HIV-related diagnosis	7,509	20.9	2.120
69**	380	Abortion, without dilation and curettage	9,658	20.3	2.191
92**	640	Neonate, birth weight 1500–1999g with major O.R. procedure	221	18.1	2.192
93**	651	Neonate, birth weight 2000–2499g with major anomaly	1,104	18.0	2.201
94**	708	HIV without major or significant HIV-related diagnosis	1,563	18.0	2.212
		All DRGs	13,632,250	9.5	100.000

* The ranking and volumes of APR-DRGs were determined using a database that included other specialty hospitals, and MSA/PMASs without either AHCs or major teaching hospital located with it.

** These DRGs were within the top 50 DRGs by rank in 1991.