

TRENDS

Emergency Department Capacity And Access In California, 1990–2001: An Economic Analysis

Contrary to popular belief, EDs in California are holding their own, even contributing to hospitals' bottom lines.

by Glenn A. Melnick, Amar C. Nawathe, Anil Bamezai, and Lois Green

ABSTRACT: Media report that hospitals are closing their emergency departments (EDs) and reducing access to ED services, raising concerns that EDs are not sustainable under competition and managed care. We analyzed financial, economic, capacity, and utilization data for California EDs for 1990–2001. We found that contrary to media reports, hospitals are not abandoning the ED market. Rather, our results show a robust market, where hospitals are adding ED capacity to meet increased demand and to maintain access. Supporting economic analyses show that EDs are sustainable since they generate a sizable and growing portion of inpatient admissions, which contribute to overall economic viability.

EMERGENCY DEPARTMENTS (EDs) play a critical role in the emergency medical system and the overall health care delivery system. More than 100 million visits are made to EDs each year in the United States, and more than ten million patients enter the inpatient care system through EDs.¹ Under the current U.S. approach to organization and financing, EDs are part of a largely voluntary, informal system. Hospitals decide individually whether to include an ED in their service mix and further decide how large their EDs will be.

The academic literature and the media have covered access to and availability of ED services with increasing frequency.² There has been growing concern by some policymakers, interest groups, and the media that a voluntary ED system is not sustainable within the existing competitive, managed care-based method

of payment for health care in the United States.³ They argue that EDs are underfunded and cause hospitals to lose money and that financial pressures are forcing hospitals to close their EDs to maintain their organizational financial viability. In sum, it is argued that access to hospital emergency services is threatened. Despite the importance of the economic issues surrounding ED service availability and the degree of attention they have received in the media, there is little in the published literature to inform this debate. This paper represents an attempt to fill that gap.

Study Methods

To provide an empirical basis for understanding the economic behavior and underpinnings of the ED market, we conducted an economic analysis of EDs in California during 1990–2001. Our primary methods involved construction and analysis of a detailed hospi-

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tal-level database covering all acute care hospitals in California over the twelve-year period. Because we relied on hospitals' existing information systems and data self-reported to a state agency (Office of Statewide Health Planning and Development), we conducted a series of on-site case study interviews to document the strengths and weaknesses of the data. Site visits were conducted under the direction of a multidisciplinary technical advisory committee consisting of ED physicians, ED and hospital executives, consumers, and others.

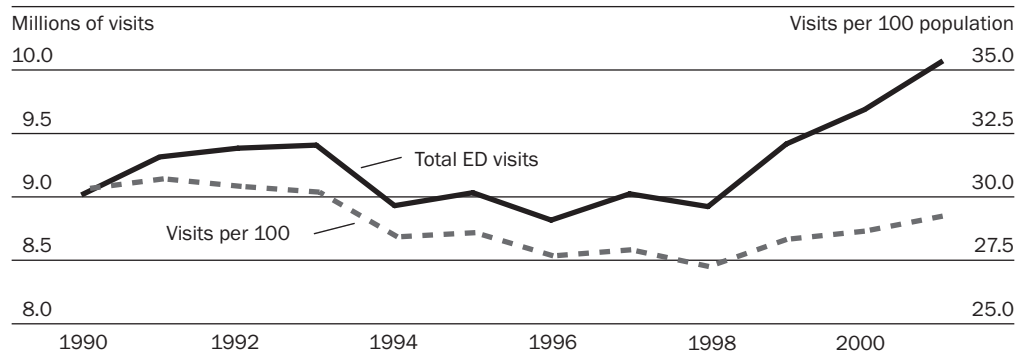
The final hospital database included measures of ED capacity and utilization, and financial measures such as costs and revenues. These were supplemented with population data for California. Our analysis proceeded in steps. We first analyzed trends in ED use over time. Next, we analyzed changes in ED capacity based on several different measures and examined the extent to which changes in capacity over time have affected Californians' access to EDs. Finally, we integrated findings from a statistical financial analysis of ED operations to document whether EDs are, in fact, a financial drain on overall hospital financial performance. The economics of trauma units is extremely complex because of a mix of state and local subsidy programs, so trauma EDs were not included in the financial analysis.

Study Findings

ED utilization. Exhibit 1 presents data on two measures of ED use: total annual ED visits (in millions) and ED visits per 100 population. There appear to be three distinct and differing utilization trends during the twelve-year study period. In the early period, 1990–1993, utilization increased slightly: Visits rose 4.5 percent, whereas the population grew 5 percent. Between 1993 and 1998, though, ED use actually declined. Total visits fell 5.3 percent, while the population grew 4.9 percent. During this second period there was growing managed care enrollment with stricter managed care controls on ED use. During 1998–2001 there were sizable increases in ED use. In this third period, visits increased 13.4 percent, while the population increased 5.6 percent.

Several factors may have contributed to this surge in ED demand. While managed care enrollment remained steady, controls on ED use have been relaxed. The “prudent layperson” standard, promulgated as part of the Balanced Budget Act (BBA) of 1997, became widely accepted by California managed care plans—including Medicare managed care plans, which have a sizable share of the market in California. At the same time, managed care plans' use of capitation to pay physicians has declined considerably. Under most capitation agreements with mechanisms to control ED use, primary care physicians paid some or all of the costs of

EXHIBIT 1
Trends In Emergency Department (ED) Visits In California, 1990–2001



SOURCE: California Office of Statewide Health Planning and Development.

NOTE: Total ED visits (solid line) relates to the left-hand y axis; visits per 100 (dotted line) relates to the right-hand y axis.

ED care for their patients. With the shift in enrollment away from capitation to preferred provider organizations (PPOs), where PPO plans pay for ED care directly, primary care physicians' referrals to the ED have risen (whereas patients might otherwise have seen in physicians' offices when they were paid under capitation arrangements). Also, during this period several large physician groups dissolved as a result of bankruptcy, leaving large numbers of patients without access to their regular physicians; this may have led them to use EDs instead. Finally, as an important backdrop, there has been increased enforcement of the Emergency Medical Treatment and Active Labor Act (EMTALA) in California beginning in 1997.⁴

■ **Capacity.** In 1990, 405 California hospitals had EDs (Exhibit 2). After peaking at 406 in 1991, the number has declined consistently. By 2001, 359 hospitals had EDs. Over the study period, the total number of hospitals with EDs fell 11 percent. These aggregate data suggest that the capacity of California's ED system is shrinking.

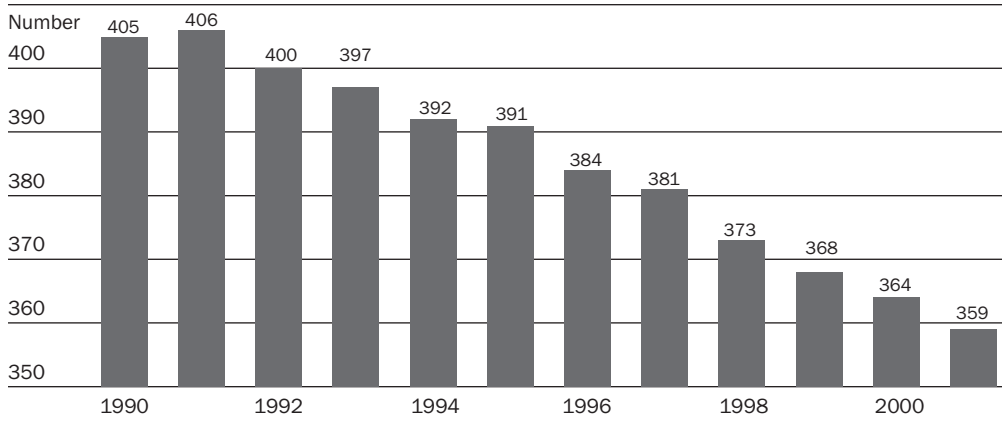
■ **Entry and exit of hospitals.** To help us gain a better understanding of the magnitude and source of change in ED system capacity, Exhibit 3 combines disaggregated data on several measures of changes in ED capacity along with changes in population for two distinct time periods, 1990–1995 and 1996–2001.

Changes in capacity at the hospital level. The exhibit first presents data pertaining to supply, entry, and exit at the hospital level. The total number of licensed hospitals in California declined over the study period. Approximately half of the hospitals entering the market in each time period included an ED in their service mix. A substantial number of hospitals left the market in California during the entire twelve-year period, and a growing percentage of those leaving the market had EDs. When taken together, these data suggest that a sizable portion of the observed reduction in total EDs in California may be more related to capacity changes at the hospital level rather than at the ED level.

Changes in capacity at the ED level. Exhibit 3 also presents data on changes in capacity at the ED level, within hospitals that remained open within each period. Over the entire twelve-year time period, only four hospitals selectively added an ED, and twenty-one hospitals selectively closed their ED when the rest of the hospital remained open.

Also, very few hospitals reduced their ED capacity. In each of the time periods, capacity was unchanged in about half of the hospitals, while about 40 percent of hospitals increased their ED bed capacity. The net effects of the changes in ED bed capacity are reflected in the measures of ED beds per 100,000 population.

EXHIBIT 2
Number Of California Hospitals With Emergency Departments (EDs), 1990–2001



SOURCE: California Office of Statewide Health Planning and Development.

EXHIBIT 3
Changes In Emergency Department (ED) Capacity In California, 1990–1995 And
1996–2001

	1990–1995	1996–2001
Hospital level		
Licensed acute care hospitals		
Number at start of period	474	477
Number at end of period	477	444
Number of hospitals entering	25	18
Percent with ED	44%	50%
Number of hospitals exiting	22	51
Percent with ED	64%	69%
ED level		
Hospitals adding ED only	2	2
Hospitals closing ED only	13	8
Percent of hospitals with no change in ED capacity	42%	47%
Percent of hospitals reducing ED capacity	14%	14%
Percent of hospitals expanding ED capacity	44%	39%
ED beds per 100,000 population (average)		
Beginning of period	14.6	15.3
End of period	15.3	15.1
Percent of hospitals with an ED		
Beginning of period	86%	82%
End of period	82%	81%

SOURCE: California Office of Statewide Health Planning and Development.

These data show that total ED capacity has more than kept pace with population growth in California. ED capacity, measured in terms of beds, expanded 20 percent over the twelve-year period, while the population rose 16.3 percent and visits increased 13.4 percent. As a result, ED beds per 100,000 population grew over the period. Finally, Exhibit 3 summarizes the percentage of hospitals with an ED at the beginning and end of each of the six-year periods. The percentage fell only slightly.

When viewed together, the data presented in this exhibit suggest a robust market for ED services, with few hospitals exiting the ED market selectively or reducing ED capacity and a high percentage of hospitals adding to their existing bed ED capacity in recent years. Further, despite the amount of entry and exit at the hospital level and the lesser activity at the ED level, the overall percentage of hospitals in California that have maintained an ED has remained remarkably stable. In sum, these data suggest that hospitals are continuing to adjust

their ED capacity to changes in the overall hospital market as well as to changes in the population, changes in demand for ED services, and possibly to constraints on inpatient bed availability, which may require ED patients to stay longer in the ED.⁵

■ **Access to ED services.** To directly test the net result of the various changes in capacity on actual access to ED services in California, we computed the distance (in miles) to the closest ED for Californians based on their ZIP code of residence and the nearest hospital with an ED.

Exhibit 4 presents summary data on ED access for different percentiles of the population in 1990 and in 2000. Overall, despite a reduction in the total number of EDs, geographic access to ED services in California changed very little between 1990 and 2000.

■ **Economic and financial analysis.** The findings pertaining to entry, exit, and changes in capacity affecting the supply of ED services suggest a stable market, with little evidence that hospitals are selectively exiting the ED

EXHIBIT 4
Changes In Emergency Department (ED) Access In California Over Time, Expressed
As Percentiles Of Population And Distance To Closest ED, In Miles, 1990 And 2000

Percentile	Miles	
	1990	2000
25th	<1.00	<1.00
50th	1.92	2.19
75th	3.94	4.14
95th	11.50	12.04
99th	20.72	21.11

SOURCE: California Office of Statewide Health Planning and Development.

market, while at the same time we see continued expansion of existing ED programs. These findings are consistent with an economic model wherein hospitals receive a positive economic return for participating in the ED market. To test this explanation, we constructed a set of statistical cost and revenue models designed to estimate the marginal contribution of having an ED toward a hospital's overall profitability. We estimated the marginal costs and revenue of both ED patients seen and discharged as outpatients and those seen and then admitted. This is important because by 2001 about one in seven ED visits resulted in an inpatient admission, and, overall, admissions through the ED represented nearly 40 percent of all inpatient admissions.

Our results present a complicated but intriguing picture of the total effects of having a nontrauma ED on a hospital's overall financial performance. In the first stage of the analysis, we found, consistent with previous findings, that hospitals lost money on each patient seen in the ED as an outpatient (that is, not admitted).⁶ We estimated that on average, hospitals with EDs that were not trauma-designated lost approximately \$84 on each outpatient ED visit. However, for patients who were admitted, we estimated that hospitals generated on average an excess of revenues over expenses of \$1,220 per ED admission. This finding is consistent with estimated inpatient profitability as reported by the Medicare Payment Advisory Commission (MedPAC) in its annual reports to Congress.⁷ It is important to note that

these estimates are based on the average hospital and may not correspond exactly to all types of hospitals, such as those providing care to a high percentage of uninsured patients. However, California's disproportionate-share hospital (DSH) program subsidizes hospitals that provide a minimum threshold of care to indigent population, so the financial status of safety-net hospitals with EDs is better than a scenario without subsidies.

Conclusions

From the data we have presented here, we see a picture of a stable supply side for EDs. Contrary to the theory that EDs are not sustainable, there is little evidence that hospitals are either adding or closing their ED programs selectively. If ED capacity declines, it is generally because a hospital exits the market entirely. Although there has been turmoil at the hospital level, resulting in a net decline in both the total number of hospitals and the number with EDs, the remaining hospitals appear to have responded by adjusting their capacity to meet the growing demand for ED care. Overall, access to EDs, as measured by distance to the nearest ED, has remained almost constant, despite sizable population growth and shifting distributions of population within California. This access finding provides perhaps, the best overall indicator of a dynamic and responsive ED market.

In another set of analyses, designed to complement the capacity analyses, we examined the flow of ED costs and revenues to hospitals

to better understand hospitals' underlying economic incentives. The findings indicate that, on average, hospitals with nontrauma EDs lose on each outpatient ED visit but gain on each ED patient who is admitted as an inpatient. When the outpatient and the inpatient effects are combined, we find that hospitals with EDs derive an economic benefit from maintaining their EDs and even expanding ED capacity if the expanded capacity leads to an increase in hospital admissions.

Finally, despite concerns voiced by some that EDs are not economically sustainable in a price-competitive managed care system, we see no evidence that EDs are unable to survive as part of hospitals' service offerings. In fact, our analyses suggest that EDs are a net contributor. Also, it appears that hospitals have recognized this and are expanding their capacity to meet growing demand.

■ **Caveats.** Several caveats should be kept in mind while interpreting and applying these findings. Our sample is confined to California, a large state with many competing hospitals operating in an environment dominated by managed care. As such, it is a reasonable test of how hospitals operate their EDs under managed care and competition. However, one aspect of the California health care system that may limit generalizability to other states is California's DSH subsidy program. This program makes supplemental payments to hospitals that serve a high proportion of indigent patients. Many hospitals, especially safety-net hospitals, rely on their EDs to help them to reach the required threshold to qualify for additional payments under this program, which can be substantial (for example, more than \$350 million was paid to hospitals with EDs in 2001). To the extent that other states do not have similar programs, or if California, facing a major budget deficit, reduces its subsidy payments, the economic balance for operating EDs could shift. Finally, we assess only hospital capacity in this study and do not address other components of the emergency medical system, such as staffing, emergency transport, and, of increasing concern, the availability of on-call specialists. Certainly further research

and attention to these evolving issues are warranted. Nevertheless, we believe that our findings contribute new insight into the published information on the financial performance of EDs and their inextricable link to overall hospital profitability.

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NOTES

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