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Emergency department utilization and capacity

See companion Policy Brief available at *www.policysynthesis.org*

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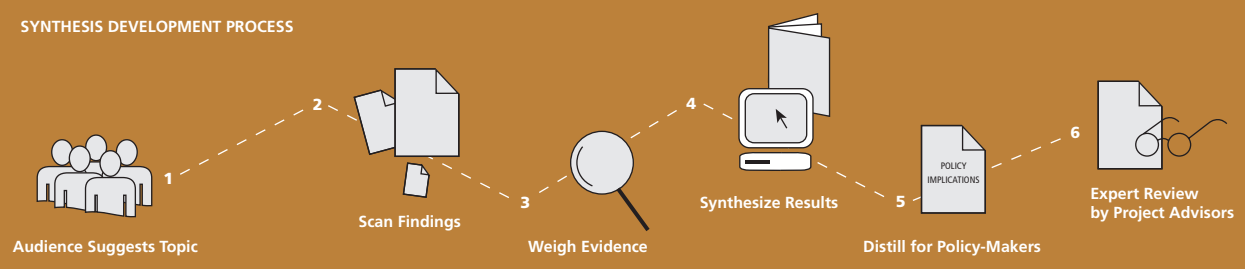
THE SYNTHESIS PROJECT (Synthesis) is an initiative of the Robert Wood Johnson Foundation to produce relevant, concise, and thought-provoking briefs and reports on today's important health policy issues. By synthesizing what is known, while weighing the strength of findings and exposing gaps in knowledge, Synthesis products give decision-makers reliable information and new insights to inform complex policy decisions. For more information about the Synthesis Project, visit the Synthesis Project's Web site at *www.policysynthesis.org*. For additional copies of Synthesis products, please go to the Project's Web site or send an e-mail request to *pubsrequest@rwjf.org*.



Introduction

The hospital emergency department (ED) plays a unique and important role in the American health sector and broader society. EDs are designed to treat the most critically ill and injured patients and they are part of the first response to public health emergencies such as natural disasters and terrorist attacks. In addition, EDs also serve as a bellwether of performance in other parts of the health care system. For example, limited access to primary care often reveals itself in non-urgent or preventable care provided in the ED (125, 14, 135).[1] The availability and utilization of ED care can reveal limitations in other areas such as inpatient and psychiatric capacity. The ED has also been described as the "safety net for the safety net" as it is the one place where patients know they can be seen regardless of financial resources or time of day (146).

Several converging events have led the Institute of Medicine (IOM) to describe emergency care in America as reaching a "breaking point" (79). From 1996–2006, annual ED visits grew from 90.3 million to 119.2 million nationally (131). On a per capita basis, ED utilization grew from 34.2 to 40.5 visits per 100 residents during the same period (131). Despite the increase in ED utilization, the number of hospitals operating EDs in the United States declined from more than 5,000 in 1991 to fewer than 4,000 in 2006 (131, 5).[2] As a result, a growing number of visits are concentrated in a smaller number of EDs, which are taking on a heavier patient load. In their safety net role, EDs face a steady demand for uncompensated care, which raises concern about the financial viability of their operations, especially in light of past ED closures.

ED overcrowding, a situation where the demand for care exceeds the ability of the ED to provide it in a timely way, has become increasingly common (79). The prevalence of ED overcrowding during ordinary times raises additional concern about the ability of emergency medical providers to respond to an unexpected surge of patients during a public health emergency.

This synthesis describes what is known, and importantly what is not known, about hospital EDs in the United States. This synthesis addresses key questions about the performance and sustainability of hospital EDs and what patterns of ED utilization reveal about the functioning of the U.S. health sector overall. The following questions are addressed:

1. What characteristics of patients and local health care systems are associated with ED utilization?
2. How frequently do patients use the ED for non-urgent or preventable conditions and what are the factors that influence this utilization?
3. How does patient cost-sharing affect ED utilization and health outcomes?
4. How do current ED utilization patterns affect hospital finances?
5. What are the causes and consequences of ED overcrowding?
6. What are the cost implications of ED utilization?

1 Preventable care refers to care in the ED that is urgent but could have been avoided with access to primary care at an earlier stage of illness or injury.

2 Since some states require general care hospitals to maintain an ED, ED closures (particularly those that are not the result of hospital closure) are likely concentrated in states without this requirement.

Methodology

The synthesis draws on previously published studies about ED utilization and capacity. It focuses primarily on the day-to-day functioning of the ED, with little analysis of public health surge capacity, which can be viewed as a separate research field altogether. Emphasis is placed on recent peer-reviewed studies in the United States that are based on national or multistate data. However, much of the current research in this area is based on single-hospital or single-state studies and reports produced by medical societies, government agencies, and other health research and policy centers. Also, certain topics such as consequences of ED overcrowding have been analyzed in an international context, making an exclusively American focus less informative. These additional studies are included whenever peer-reviewed U.S. studies are very limited or not available for a specific topic. The synthesis also highlights important areas of research that remain underdeveloped or inconclusive. A more detailed discussion of methodological issues appears in Appendix II.

Findings

What characteristics of patients and local health care systems are associated with ED utilization?

ED utilization rates are especially high among infants, people age 75 and over, nursing home residents, the homeless, African Americans, and individuals covered by Medicaid/SCHIP. Table 1 compares rates of total ED use (with and without hospital admission) among the most frequent users to the national average in 2006. As described below, heavy ED users typically have significant health needs and/or face barriers to receiving other kinds of care. The extremely high rate among nursing home residents, in particular, is driven by multiple factors including high rates of chronic illness, limited medical capabilities in nursing homes, reimbursement incentives, and poor communication between patients' families and medical providers (60). Nevertheless, many of these high-use groups account for a small percentage of total ED visits (Table 1).

Table 1: Annual ED visits by high-use population groups, 2006

Population group	ED visits per 100 individuals	Group's share of all U.S. ED visits
U.S. average	41	—
Age < 1 year	85	3%
Age 75+	60	9%
Nursing home residents	140	2%
Homeless population	84	< 1%
African American/Black	80	25%
Medicaid/SCHIP enrollees	82	26%

Source: Pitts et al., 2008 (131)

Notes: High-use populations are those with at least 60 visits per 100 individuals. Visit rates include individuals with multiple visits as well as those with no visits. Groups shares should not be summed because individuals may be part of multiple groups.

ED patients who are not admitted to the hospital and individuals with multiple ED visits account for large shares of total ED volume. Only 15 percent of ED visits resulted in admission or transfer to another hospital in 2006 (131). Data for adults from 2000–2001 show that only 23 percent made any visit to the ED (156). This percentage may be somewhat higher today, because ED utilization rates have risen since then.

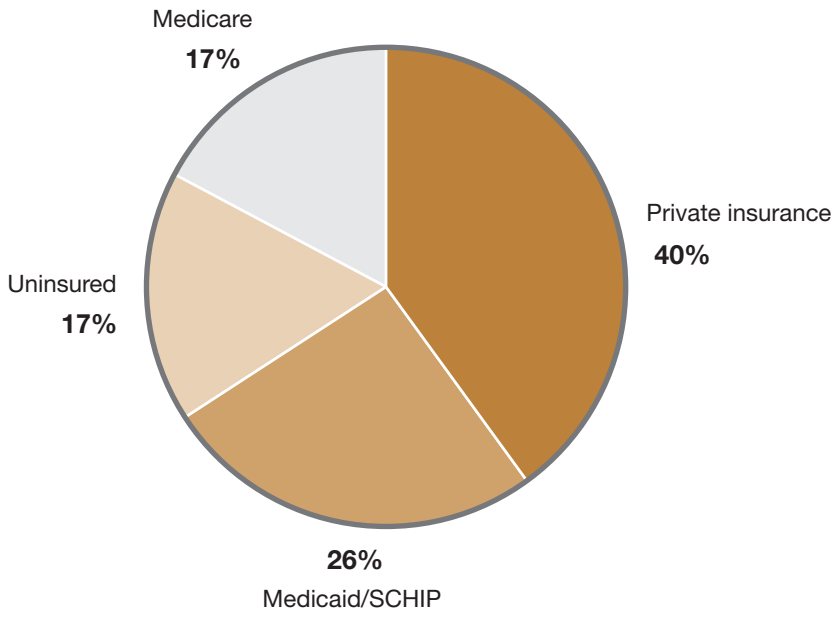
Non-citizen residents of the United States use the ED at a rate that is much lower than the national average. Hispanic residents (regardless of citizenship) have ED utilization rates similar to the non-Hispanic white population, while African Americans have higher rates. Survey data pertaining to ED visits without admission show that non-citizen residents have a substantially lower ED utilization rate (17.2 less per 100 population) than U.S. citizens after adjusting for demographic, health, and health system characteristics (29). Similarly, communities with lower-than-average ED utilization rates have a higher percentage of residents who are not U.S. citizens (29). At least two studies have shown that there is no difference in the ED visit rate between Hispanic and non-Hispanic populations (132, 29). However, African American residents use the ED more frequently (by 9.9 visits per 100 population) than white residents even after adjusting for other factors (29). Utilization rates for other racial and ethnic groups have been more difficult to estimate due to small sample sizes.

Findings

Without controlling for other factors, the *rate* of ED use is higher for uninsured patients relative to the privately insured but lower than the rate for patients covered by Medicare, Medicaid and SCHIP. After adjustment for health, income and other factors, however, ED use by the uninsured is no different from the privately insured. Compared with the privately insured, ED utilization rates are almost four times as high among Medicaid/SCHIP patients and more than twice as high for patients with Medicare or no insurance (131). After adjustment for self-reported health status, demographics, and the capacity of local EDs and primary care providers, uninsured patients used the ED at the same rate as the privately insured, while patients with Medicaid/SCHIP or Medicare coverage continued to exhibit much higher utilization rates (29).

The recent *growth in volume* of ED utilization is driven by individuals with private insurance, higher income, and private physicians as their usual source of care. Due to their large number in the general population, privately insured individuals account for the largest share of total ED visits (Figure 1). The payer mix of adult ED visits remained stable from 1996–1997 to 2003–2004 (155). As a result, most of the growth in total ED visits overall has been driven by greater use among the privately insured. Rising ED use among the privately insured coincides with rising use of all ambulatory care (31).

Figure 1: Expected payer distribution of total ED visits, 2006



Source: Pitts et al., 2008 (131)

Note: Uninsured includes patients classified as self-pay, no charge, charity, or where no other payment source was reported.

A study by Weber from 1996–1997 to 2003–2004, there were changes in the composition of adult ED visits by income and usual source of care (155). The share of visits attributable to patients with income above 400 percent of the poverty level increased steadily from 21.9 percent to 29.0 percent during the study period, while shares for other income groups fell or fluctuated with no pattern. Moreover, most ED visits throughout this period were made by individuals reporting a private physician as their usual source of care. This percentage also rose steadily from 52.4 percent to 59.0 percent.

The Weber study may understate somewhat the share of ED volume attributed to Medicaid and SCHIP, because children are excluded from the analysis. Since the analysis is based on a population-based survey, it may underrepresent undocumented and homeless patients, leaving some uninsured patients out of the analysis as well. Nevertheless, both survey and administrative data indicate that the majority of ED visits overall are made by individuals with some form of insurance.

Low income and poor health are strong predictors of ED utilization even after adjusting for other variables. The poorer health of Medicaid enrollees accounts for a large share of the difference in ED use between Medicaid and uninsured patients. After adjustment for demographics, coverage and various health system characteristics, individuals with poor health or income below the poverty level have much higher ED use rates than other individuals (29). Income differences above the poverty level are less important in predicting ED use rates. Mortensen and Song used regression decomposition techniques to explain the greater probability of any ED use by adults in Medicaid (27%) relative to uninsured adults (10%) (116). Most of this difference is attributed to lower income and poorer health measured by self-reported health status, presence of chronic illness, and difficulty with activities of daily living, all of which were less favorable in the Medicaid population.

Frequent ED users have substantial physical and mental health problems and typically low income. Studies using survey and administrative data have examined the characteristics of frequent ED users, defined as patients with multiple ED visits in a single year (76, 168, 85). A predominant characteristic among these patients is poor physical and mental health. Frequent users appear to use the ED as a supplement rather than a substitute for other forms of care. Indeed, patients with frequent ED use have higher-than-average utilization of other health services and typically have a usual source of care outside the ED (76, 168). Lack of insurance is not a factor common to frequent ED users. Instead the most frequent users most often have coverage through Medicare or Medicaid. In addition, frequent users are more likely to be poor or near poor even after adjusting for health and insurance status. Patients who visit the ED at least 3–5 times annually account for a disproportionate share of total ED visits. Although they represent less than 8 percent of all ED users (and a much smaller share of the general population), they account for 18 percent to 28 percent of total ED volume (76, 168, 85).

Patients with "extreme" levels of ED use have a variety of complex physical and mental health problems, but account for a small percentage of total ED volume. A much smaller subset of patients may be classified as "extreme" users of the ED with 10 or more visits annually (132, 18, 89, 102). These patients are of special concern due to the breadth and complexity of their physical and mental health problems. Nevertheless, extreme ED users account for a very small percentage (1 percent to 5 percent) of total ED volume.

The supply and capacity of providers to meet the demand for ambulatory care also influences the rate of ED use within communities. Although studies on the characteristics of ED users are much more common, two studies have demonstrated the importance of health system factors in determining the rate of ED use. Both show higher rates of ED utilization in areas with a limited supply of primary care providers and a greater supply of ED capacity (29, 97).

Findings

How frequently do patients use the ED for non-urgent or preventable conditions and what are the factors that influence this utilization?

Although use of the ED for non-urgent and preventable conditions appears to be very common and growing, identification of these conditions remains imprecise. Several studies have examined the urgency of ED visits based on triage categories recorded in hospital records. For example, Pitt et al. found that 12 percent of all ED visits in 2006 were classified as non-urgent (patient should be seen in 2–24 hours) versus 5 percent that were classified as requiring attention immediately (131). That same year, 13 percent of ED visits were classified as having unknown or no triage. Similar results are found in other reports of ED visits by the National Center for Health Statistics (NCHS). Using data from the NCHS, Cunningham and May attribute all of the increase in total ED visits between 1997–1998 and 1999–2000 to visits classified as semi-urgent (care required within 1–2 hours), non-urgent, or no/unknown triage (31).

An alternative assessment of the urgency and the preventable nature of ED visits is offered by the ED Use Profiling Algorithm developed at New York University (15). The algorithm allows ED visits to be classified as "ambulatory care sensitive," defined as visits for conditions that could be treated elsewhere or conditions that are emergent but preventable with earlier access to primary care.[3] Using a national sample, Weinick et al. (158) found that 56 percent of ED visits (not leading to admission) were classified as ambulatory care sensitive from 1997–2000. Details from the study are limited, since it has been published in the form of an abstract only. Other studies at the state level, however, have found similar results (37, 86).

Use of the ED for ambulatory care sensitive conditions is associated with limited access, financial or otherwise, to primary care providers. Children age 5 and under are very likely to use the ED for these conditions. Ambulatory care sensitive utilization is most common among Medicaid patients, uninsured/self-pay patients, children age 5 and under, and patients visiting public hospitals (158, 37, 86). But in terms of total volume, patients with Medicare or private insurance account for the majority of ambulatory care sensitive ED utilization.

A study of patients at five EDs in the northeastern United States found that those with a regular doctor were significantly less likely to have a non-urgent ED visit (127). However, analysis of data from a safety net clinic in St. Louis suggested that simply having access to clinic care (with no mention of a regular doctor) does not reduce non-urgent ED use (27). Moreover, parents of children age 5 and under often seek care in the ED for non-urgent conditions when their pediatrician cannot be reached quickly (28).

3 More detail about the algorithm and its limitations is found in Appendix II.

Some patients indicate a preference for ED care due to convenience, the access it provides to specialty care, or perceptions that higher-quality care is available in a hospital setting. Analysis of patient focus groups across the United States suggests a number of reasons why patients may prefer to receive primary care from an ED instead of a doctor's office or health center (135). In many neighborhoods, the hospital ED is perceived as a provider of advanced, high-quality medical care and is known for its requirement to serve all patients regardless of ability to pay. Some patients find the ED convenient, since appointments are not required and it is always open. Others view the ED as the only access point for specialty and behavioral health services, which are often unavailable or prohibitively expensive in other settings. Similar results were obtained in the "24 Hours in the ED Study," in which patients at 56 EDs nationwide were interviewed about their reasons for coming to the ED on a single day in 1994 (166).

Patient perceptions of the urgency of ED visits often differ from the judgments of clinicians and researchers. Moreover, these perceptions are often complex and uncertain, creating a demand for rapid confirmation and reassurance. A study of patients in the waiting area of an urban teaching hospital found that 82 percent of patients classified by triage nurses as non-urgent believed to the contrary that their condition was urgent (56). A limitation of the study is that patients may have exaggerated their condition to receive quicker attention (despite efforts by the researchers to limit this). In the "24 Hours in the ED Study," the chief complaints of patients classified by triage nurses as non-urgent did not differ from the complaints of patients classified as urgent (166). Moreover, 5.5 percent of patients triaged as non-urgent were later admitted as inpatients, suggesting that even clinicians might underestimate the medical needs of ED patients upon first presentation.

Patients often come to the ED for a variety of complex and overlapping concerns that are ultimately judged by clinicians as non-urgent (63). Concerns include the need to quickly relieve pain or discomfort and "making sure everything is OK." Caretakers of young children express additional concerns. Some feel they need professional reassurance to deal with their child's inability to express pain and other symptoms precisely. Others want to make sure they are not to blame for the child's problem. Some describe their choice to seek immediate verification of non-urgency as a form of parental responsibility.

How does patient cost-sharing affect ED utilization and health outcomes?

Greater cost-sharing is associated with reduced utilization of the ED, especially for non-urgent/low-severity conditions. A recent study examined changes in ED and related utilization among individuals with private employer-sponsored coverage where the employer switched from an HMO plan to a high-deductible health plan (160).[4] These individuals used less ED care, especially repeat ED visits, than a control group after adjusting for individual demographic and health characteristics. Many of these findings are consistent with the RAND Health Insurance Experiment, which found that cost-sharing reduced ED use overall and more rapidly for conditions defined as "less serious." (122, 120).

4 Deductibles of $500–$2000 for individuals and $1,000–$4,000 for families.

Findings

No studies have shown adverse health effects from ED cost-sharing. However, a number of important caveats limit the generalizability of these studies. Most studies of ED cost-sharing are limited to individual health plans and integrated delivery systems and rely on data that are at least 10 years old. The Kaiser-Permanente System in northern California is the setting for several detailed studies. They found that ED cost-sharing reduced ED use primarily through reductions in low-acuity visits (145, 74, 134, 100). Related studies found no relationship between ED cost-sharing and mortality, later hospitalization, or delay in seeking care for chest pain (74, 100). In the Kaiser System, patients who limited their use of the ED in response to cost-sharing typically obtained care from urgent care centers or other providers (134). Patients lacking access to these alternative providers may respond differently to cost-sharing.

A related study found that even though Kaiser patients were well informed about prescription and office-visit co-payments, more than half underestimated their ED co-payments by $20 or more (75). Those who believed that they had a higher co-payment (rightly or wrongly) were more likely to delay or avoid ED care.[5]

Increases in ED co-payments are associated with larger reductions in ED utilization among patients from low-income neighborhoods, including cases with high-severity diagnoses. Several studies reviewed above conducted separate analyses for patients in low-income categories, measured in each case as living in a low-income census tract. These studies found a much stronger response to ED cost-sharing in terms of total ED volume and the number of visits for high-severity conditions (74, 160, 145). The only study that examined health effects of ED cost-sharing on patients from low-income areas found no association with patient mortality (74). These studies do not measure patient income directly and do not include patients covered by Medicaid or SCHIP. Lack of precision in the way income is measured could create a downward bias in estimating the size of the relationship between income and the effects of cost-sharing. Also, patients in public programs may have even lower income and greater disability than low-income populations in private plans.

Cost-sharing for most services typically is limited in Medicaid and SCHIP. However, an analysis by the General Accounting Office (GAO)[6] found that co-payments in the ED can vary from zero to $50 per visit depending on the state, patient eligibility category, and whether the patient was admitted as an inpatient (55). Although studies have assessed the effects of cost-sharing in these programs for prescription drugs and other services, literature searches found no studies on the effects of ED co-payments in these populations.

Many studies have examined the impacts of cost-sharing in Medicare (136), but most do not examine ED use directly. Two studies using data from the state of Washington found that ED co-payments or lack of Medigap insurance did not cause delays in seeking treatment for myocardial infarction (70, 100). A study of Medicare patients covered by Kaiser-Permanente found that cost-sharing reduced ED utilization but did not lead to increased mortality or admissions to the ICU (74).

5 A caveat to this study is that it was based on a survey that excluded a number of potentially vulnerable groups, including patients with Alzheimer's, hearing difficulties, or inability to speak English.
6 GAO is now known as the Government Accountability Office.

How do current ED utilization patterns affect hospital finances?

The ED is exposed to potentially large financial losses due to federal and state laws requiring EDs to treat all patients regardless of ability to pay for services. However, no studies have evaluated directly the effects of these laws on hospitals' financial conditions. The ED is the dominant source of hospital admissions for the uninsured. In 2003, 60 percent of all inpatient admissions by uninsured/self-pay patients originated in the ED compared with 32 percent for the privately insured, 39 percent for Medicaid, and 44 percent overall (42). A study based on patient focus groups suggests that the ED is the primary, and sometimes only, path for the uninsured to receive specialty care (135).

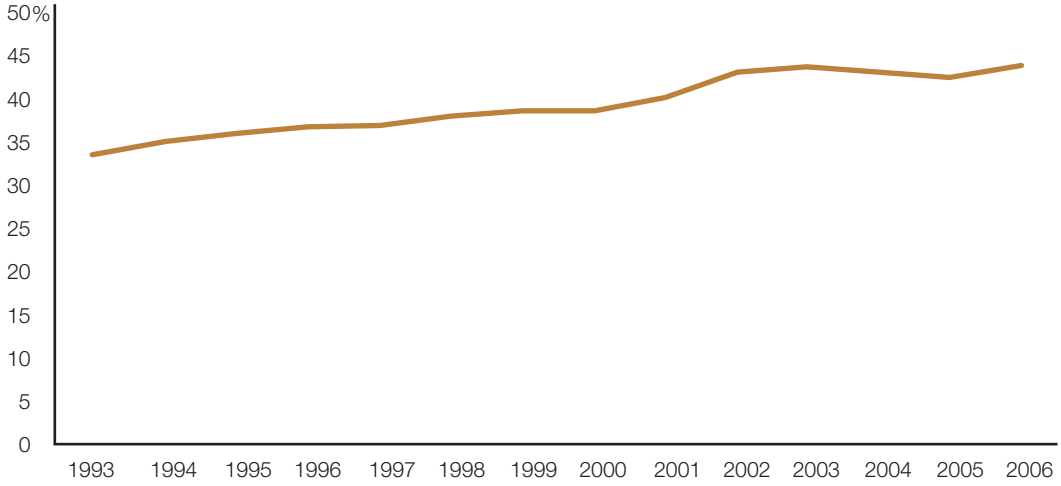
ED use by the uninsured is widely believed to be influenced by the federal Emergency Medical Treatment and Active Labor Act (EMTALA) of 1986, which requires hospitals to provide screening and stabilization to all patients regardless of ability to pay (79).[7] Although EMTALA was originally enacted to prevent denial of emergency care to indigent patients, many argue it has created a virtual "right" to any care provided in the ED (33, 47). Nevertheless, no rigorous studies have directly evaluated the impact of EMTALA on patients' care-seeking behavior or hospital finances and operations. Similarly, little is known about the impact of state regulations that require EDs to provide more extensive forms of care than those required by EMTALA.

Despite the unique regulatory mandate placed on EDs, most ED visits are provided to insured patients and the ED is a growing source of revenue from inpatient admissions. The percentage of all inpatient admissions originating in the ED has grown fairly steadily since the early 1990s (Figure 2). Although the uninsured are the most dependent on the ED as a gateway to inpatient admission, they account for only a small share of total admissions through the ED (Figure 3). Some studies suggest that the ED is a positive contributor to hospital financial performance because it is a source of profitable inpatient admissions (112, 113). Moreover, a detailed study of a single trauma center found that ED admissions are usually more profitable than other admissions (69). These findings, however, are far from universal. Net revenue from ED admissions can vary widely by payment source and clinical service category (69, 77). EDs serving large volumes of non-admitted patients and those that are part of trauma centers are more likely to contribute negatively to hospital financial performance (113, 103). Ultimately, the impact of the ED on hospital finances appears to depend heavily on hospital location, service mix, payer mix and access to public subsidies.

7 U. S. Statute 42-USC-1395-dd

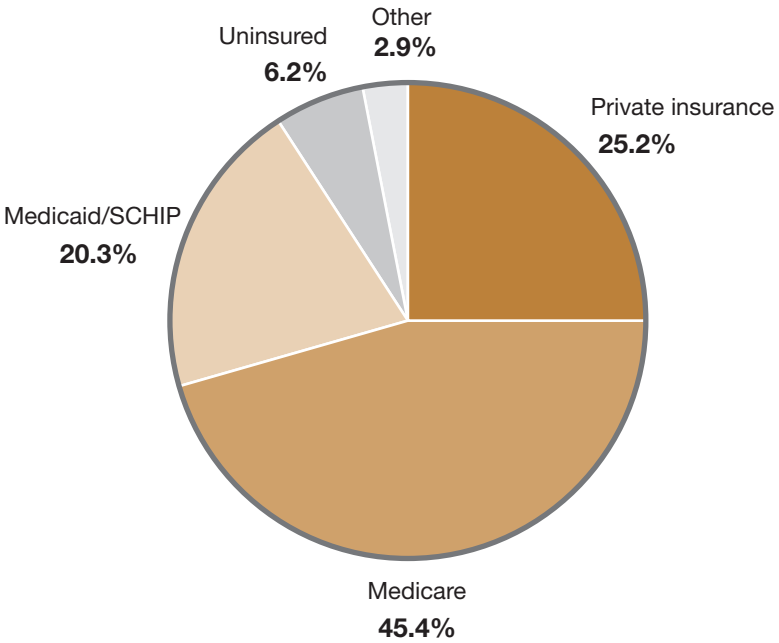
Figure 2: Trend in Share of Inpatient Admissions from the ED

Percentage of inpatient admissions originating in the ED



Source: Authors' tabulations from HCUPnet, based on data from the Healthcare Cost and Utilization Project

Figure 3: Distribution of expected payer for inpatient admissions through the ED, 2003



Source: Owens and Elixhauser, 2006 (126)

Note: Uninsured includes patients classified as self-pay, no charge, charity, or where no other payment source was reported.

Various subsidy mechanisms exist to support uncompensated care provided by EDs and hospitals, in general, with large volumes of poor and uninsured patients. In 2008, public subsidies covered 82 percent of the $35 billion of uncompensated care provided by hospitals (64). These subsidies, however, are often poorly targeted and applied inconsistently across states (111, 59). This creates a situation where some EDs with a limited uncompensated care burden have access to public subsidies that are not available to EDs with a greater burden (23).

What are the causes and consequences of ED overcrowding?

ED overcrowding is caused by a complex set of conditions that occur across hospital units and across the entire health care system. Inability to move admitted patients from the ED to the appropriate inpatient unit stands out as a major driver of ED overcrowding. The most common and rigorously documented factor associated with ED overcrowding is scarcity of beds for patients admitted through the ED (8). Studies of individual hospitals in the United States and Canada have consistently found that hospital occupancy is positively associated with patient waiting time in the ED and hours spent on ambulance diversion (49, 133, 142). In site visits and surveys, health care providers, administrators and other stakeholders across the United States have identified the lack of staffed inpatient beds as a key driver of ED overcrowding (11, 53, 93). Scarcity of beds in intensive care units and critical care units stands out as particularly important, while some hospitals have also expressed concern about the availability of telemetry, pediatric, cardiac and psychiatric beds (11). In a national study of EDs in 2003–2004, Burt and McCaig found that lack of inpatient beds was the most common cause for ambulance diversion, accounting for 56.5 percent of total diversion hours (22). A study of hospitals in Los Angeles County found that ambulance diversion became more common as area hospitals and/or EDs closed (151).

Lack of key clinical staff also has been cited as a driver of ED overcrowding (79). The study by Burt and McCaig found that "shortage of hospital or ED staff" was the reason reported by hospitals for 11.7 percent of total ambulance diversion hours in 2003–2004 (22). In a study commissioned by the American Hospital Association, the Lewin Group found that hospitals reporting the greatest time on ambulance diversion also reported the highest rate of vacant positions for registered nurses (93). Reports by the American College of Emergency Physicians describe a growing shortage of specialist physicians willing to work on-call in the ED (3, 4). Traditionally, physicians would provide some on-call service in exchange for hospital admitting privileges. But in recent years, many hospitals have found it necessary to provide compensation for time on-call or risk losing physicians (and their patients) to other hospitals or surgery centers. A peer-reviewed study of hospitals in Oregon found a rising trend in the number of facilities that had to pay for on-call coverage in the ED between 2005 and 2006 (107). The study also found that hospitals unable to cover specific specialties transferred patients to other facilities often on an "ad hoc case-by-case basis."

The California Health Care Foundation conducted a study that reviewed several reports and included interviews with various provider groups to determine why on-call ED coverage has become more difficult for hospitals (61). Reasons offered include concerns about uncompensated care, marketwide shortages of specialists, lifestyle preferences of physicians, and fear of medical liability in the ED. Nevertheless, rigorous empirical links between these factors and ED overcrowding have not been established in the research literature.

Other factors such as growing patient complexity (40, 11) and scarcity of post-acute care beds (110, 144) have been offered as additional contributors to ED overcrowding. The importance of these factors, however, has not been evaluated rigorously.

Care provided to the uninsured and patients with non-urgent conditions is not a driver of ED overcrowding. A recent review article found that uninsured volume is not a major contributor to ED overcrowding, as privately insured and Medicare patients account for a much larger share of the level and recent growth in ED volume (121). In addition, studies from Canada (143) and Australia (149) find that waiting times for severely ill patients in the ED are generally not affected by high volumes of low-severity ED patients. No studies were found that evaluated the link between ED overcrowding and the volume of non-urgent patients in the United States.

Although many clinicians believe the growth in psychiatric ED visits is a contributor to ED overcrowding, no studies have quantified this association. ED visits for patients with psychiatric diagnoses are growing faster than ED visits overall (91, 30, 68). This has created new challenges for ED staff and signals emerging shortages of mental health care. Although psychiatric patients still account for a modest share of total ED volume (5 percent to 8 percent), this trend has raised concern among ED clinicians who describe psychiatric patients as time-consuming, difficult to care for, and disturbing to other patients in the ED (123). Emergency physicians report that it is more difficult to find inpatient beds for psychiatric patients, and therefore, these patients spend more time boarding (i.e., waiting for an inpatient bed to become available) in the ED (4). Growth in the demand for psychiatric care in the ED has coincided with reductions in mental health funding and capacity nationwide, particularly for low-income populations (30). Due to the lack of more rigorous studies, however, it is not clear how much of an impact the growth in psychiatric ED volume and reductions in mental health care capacity have had on ED overcrowding.

ED overcrowding is associated with reduced access in the form of longer waiting times for care, patients leaving the ED without being seen, and disruptions to ambulance service. Several studies have associated ED overcrowding with longer waits to see a clinician and greater numbers of patients who leave the ED without being seen (21, 157). ED overcrowding sometimes leads to ambulance diversion, which occurs when ambulances are rerouted to the next available hospital. According to data from the National Center for Health Statistics (NCHS), a hospital goes on ambulance diversion about once every minute in the United States. (21). A review article found that ambulance diversion increases ambulance transport times by an average of 1.7 to 5 minutes (128). Ambulances may also be taken out of service when paramedics must wait for an open gurney in a crowded ED (41).

Nevertheless, the access implications of ambulance diversion are not straightforward. Hospitals and EMS personnel observe varying rules for going on diversion and for overriding diversion requests in special cases (128). Also, when several nearby hospitals go on diversion at the same time, it becomes impossible for ambulances to honor the requests and so hospitals on diversion continue to receive patients. A study based in central Maryland found that only 23 percent of ambulance transports were rerouted when the nearest hospital was on diversion due largely to the prevalence of ambulance diversion at other nearby hospitals (106). Yet even if hospitals' diversion requests are overridden, patients could find themselves in an ED at a time when medical providers feel ill-equipped to take on new patients (36).

A growing body of evidence links ED overcrowding to reduced health care quality and patient safety. Several studies have established a link between ED overcrowding and delay or failure to receive needed antibiotics and analgesic medications in the ED (45, 130, 129, 78). Other studies reviewed by Hoot and Aronsky found that patient mortality increases when hospitals experience ED overcrowding (72). Similarly, Weissman et al. found that adverse events (e.g., hospital-acquired infections, pulmonary embolisms) are more likely to occur when hospital occupancy approaches 100 percent (159), which is a condition that is often associated with ED overcrowding.

Although some hospitals require additional capacity and other resources to alleviate ED overcrowding, research suggests that it is often more effective to use existing capacity more efficiently. For some hospitals, the alleviation of overcrowding may involve additional capacity, staffing or physical space. However, hospitals routinely experience periods of very high occupancy followed by periods of much lower occupancy, leaving resources idle much of the time (38). Moreover, adding new capacity to an inefficient system may just create larger facilities that remain overcrowded (62, 66). Instead, many hospitals have found it more effective to improve the efficiency of their internal processes, most prominently the flow of patients across units. Several national organizations have invested substantial resources to promote improvements in hospital patient flow. These include the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), the Institute for Healthcare Improvement (IHI), the Robert Wood Johnson Foundation's *Urgent Matters* program, and the American College of Emergency Physicians. Although many approaches have been developed, a recent review found that the most successful responses to ED overcrowding involve a sustained commitment to improving workflow and efficiency throughout the entire hospital rather than the ED by itself (147).

What are the cost implications of ED utilization?

The true costs associated with care in the ED, particularly non-urgent care, are not well understood. Since EDs maintain a high level of staffing and equipment for unexpected emergencies, the cost of one additional visit to the ED can be quite low. Alternatively, care in the ED is potentially more expensive if a lack of patient records and the practice of screening for emergencies required by EMTALA lead to more expensive testing and other procedures. Only a handful of studies have examined this issue empirically (9, 163, 10, 161). Unfortunately, findings are highly inconsistent due to differences in study settings, research methodologies and measurement of clinical details. Moreover, costs of ED care may vary significantly by type of hospital (e.g., trauma center, Critical Access Hospital). The lack of consistent findings has made it impossible to draw firm conclusions about the cost of utilization that has shifted to the ED from other settings.

Similarly, it is unclear whether the diversion of non-urgent ED patients to other settings would produce significant cost savings. These efforts may be justified on the grounds of quality or continuity of care, but one study of an ED diversion program in Broward County, Fla. cast doubt on the potential for cost savings (154). It found that the program was associated with a reduction of eight ED visits per 1,000 members per month, but the costs per ED visit and health care costs overall were unaffected. Health outcomes and quality of care were not measured in the study. Importantly, children with chronic conditions and those receiving SSI benefits were excluded from the analysis. A more targeted ED diversion program focusing on high-cost/high-frequency users may have generated net savings. But since medical episodes evolve over a variety of settings, the targeting of ED utilization on its own may be of limited value.

Conclusion

The hospital ED is playing a larger role in the health care of virtually all segments of American society. High-need patients including the poor, elderly and chronically ill are heavy users of the ED. Yet the bulk of ED volume and growth is driven by non-elderly insured middle-class patients. The growing use of the ED for ambulatory care sensitive conditions signals deterioration in access to primary care regardless of patients' insurance status.

In general, ED cost-sharing may limit utilization for less urgent conditions with little or no impact on patient health, but patients with limited financial resources can delay or forego even urgent care in the face of fairly modest cost-sharing. Research shows that non-urgent ED visits often are driven by nonfinancial reasons as well. Moreover, patients with extensive medical needs appear to use the ED as a supplement rather than a substitute for other forms of care.

Because of its large and visible role in the health care safety net, the ED is exposed to potentially large financial losses from uncompensated care. Although some studies have shown that the ED can serve as a gateway to profitable inpatient admissions, this process appears to depend heavily on the clinical case mix and payer mix of individual hospitals. Access to public subsidies also plays a role in the extent to which the ED generates net profits or losses.

ED overcrowding is prevalent across the United States with negative consequences for health care access, quality and safety. Overcrowding is most often caused by the inability to move admitted patients from the ED to an inpatient bed. This bottleneck may be caused by inefficiencies in the way patients flow through various hospital units or shortages of key resources (e.g., staffed beds) in the local service area, particularly during periods of peak demand. Limitations in hospital staff, particularly specialists willing to work on-call in the ED, also contribute to ED overcrowding.

Efforts to reduce ED utilization often are viewed as a way to reduce costs while improving quality of care. This view, however, is not supported by the research literature. Only a handful of studies have examined the costs of care provided in the ED. These studies have produced widely different findings with no study standing out as clearly superior in its methodology or data source.

Implications for Policy-Makers

Hospital emergency departments (EDs) provide vital services to a wide variety of patients. ED overcrowding, ED use for non-urgent conditions, and ED closures signal problems not just for EDs but for the larger health care delivery system. In order to address these problems, policy-makers may consider the following:

Expansion of health insurance coverage on its own is likely to *increase* rather than *decrease* stress on overcrowded EDs. ED overcrowding is driven by the inability to move patients out of the ED into an inpatient bed, not the use of the ED for non-emergent care by the uninsured. Although expanded coverage may reduce the demand for uncompensated ED care (and improve hospitals' financial performance), insured patients represent the fastest growing subpopulation of ED users and are much more likely to use inpatient hospital services. As a result, expanded coverage could increase the demand for ED care and exacerbate existing bed shortages that lead to ED overcrowding. This scenario is consistent with anecdotal evidence from the recent coverage expansion in Massachusetts where ED utilization and overcrowding have both grown with expanded coverage (88).

Align reimbursement incentives to improve hospital patient flow and reduce ED overcrowding. Current reimbursement incentives often stand as barriers to improving efficiency. The ability of specialists to earn higher fees in other settings makes it difficult to maintain specialty coverage in the ED. "Patient boarding" results in overcrowding, but many hospitals fail to improve the flow of patients through the ED because they cannot gain the necessary cooperation from other hospital units (117). Improvements in patient flow often require disruption to current delivery patterns for elective surgeries and other profitable service lines with no clear monetary benefit in return. Although the ED may serve as a gateway to profitable admissions (e.g., cardiac surgery), it also attracts a less remunerative payer and service mix (e.g., uninsured, outpatient care). Hospitals that reduce ED overcrowding, therefore, may suffer financially if this reduction leads more profitable patients and their physicians to go elsewhere. Improving efficiency by correcting reimbursement imbalances may have the additional benefit of helping control cost growth (57).

Improve access to primary care, either through community providers or through delivery of primary care in the ED. Non-urgent ED visits are common and growing among a wide variety of patients due largely to difficulties obtaining care elsewhere or determining what constitutes a "true emergency." Use of the ED for primary care is not a major cause of overcrowding, however, and providing primary care in the ED may not be more expensive than in other settings. Although the ED is not the ideal place to deliver primary care, it could be made better for this purpose. Some EDs have already taken steps in this direction by setting up "fast track" units that are equipped to treat non-urgent patients presenting in the ED (80). Others have pushed this idea further by providing a range of chronic care management services directly in the ED to their so-called "frequent fliers" who are unable or unwilling to obtain care elsewhere (36).

Implications for Policy-Makers

Monitor and anticipate the effects of hospital expansions, closures and relocations on ED capacity and overcrowding. Since the 1980s, hospitals across the nation have taken beds out of service in an effort to improve efficiency and reduce costs. As a result, hospital surge capacity is in short supply in many parts of the nation (35). Although more efficiency gains may be possible in some areas, the ability of hospitals to treat more patients with less capacity will eventually diminish. The distribution of hospital capacity raises similar concerns. Changes in hospital capacity are increasingly driven by reimbursement incentives rather than careful assessment of community health needs (77, 58).

Dedicated funding for emergency capacity may be required in areas where hospitals are unable to cross-subsidize the costs of this capacity. Such funding would need to be coordinated with other public subsidies that are provided to hospitals. Emergency services are financed by a combination of patient fees, third-party reimbursement, and special grants and subsidies targeted to different classes of hospitals (e.g., trauma, teaching, safety net). Shifting patterns of health care financing and organization continue to change the balance and reliability of these revenue sources. These shifts raise concern about how to sustain the fundamental mission of the ED, which is to stand ready at all times to respond to medical emergencies. This concern will become more acute if programs designed to divert insured patients seeking non-urgent care away from the ED also divert substantial revenue. Although dedicated funding would help ensure the availability of emergency capacity, this funding would have to be viewed in light of other subsidies now being provided to the hospital sector. Currently, not-for-profit hospitals are under increasing pressure to justify their existing tax exemptions in terms of measurable community benefits (141). These developments place emergency capacity into a broader discussion about what hospitals are expected to provide for their communities and what level of public subsidy is required. The potential subsidization of ED capacity is also complicated by the fact that some hospitals advertise the speed and quality of service in their EDs as part of their marketing strategy to attract patients. In these facilities, the ED is viewed as a source of revenue rather than uncompensated costs requiring subsidization.

The Need for Additional Information

To ensure an adequate financial base to sustain the 24/7 capability of the ED, future research should examine in more detail how ED volume contributes to hospital financial performance and how this contribution varies by hospital type. Similarly, more information is needed about the characteristics (e.g., location, capabilities) of EDs that have closed versus those that have remained open and the impacts of these closures on public health.

Several studies show connections among frequent ED users, ED overcrowding, and patients who require, but do not receive, mental health services outside of the ED. These studies, however, do not provide detail on the extent to which greater availability of mental health services would affect ED utilization and overcrowding or reduce stress on ED personnel.

Given ongoing limitations in access to community-based primary care, there is a need for research that measures how primary care delivered in the ED compares with other settings in terms of quality and cost.

Methods to identify non-urgent and preventable ED visits remain underdeveloped. The related concept of preventable hospital admissions, many of which flow through the ED, has been better validated. But for a variety of reasons described in Appendix II, classification of treat-and-release ED visits remains imprecise.

Many of the studies reviewed in this synthesis are restricted to adults and patients receiving ED care without inpatient admission. Much less is known about how ED overcrowding affects the care provided to children and how the costs of care provided in the ED varies by age. Also, the exclusion of admitted patients makes it difficult to fully understand how the demand for ED care reflects the quality and availability of care delivered in other settings such as physicians' offices and health centers (see Appendix II).

Similarly, part of the evidence about how ED overcrowding affects patient outcomes is based on studies outside of the United States. Since other health systems are organized very differently, these studies can only suggest how ED overcrowding might affect patient care in the United States. Confirmation of these findings in American hospitals would strengthen the evidence base for U.S. policy-making.

Studies of ED cost-sharing focus primarily on adults with private insurance. Much less is known about how ED cost-sharing affects patients with other coverage, low-income individuals and children. In addition, only one study directly examined the effects of ED cost-sharing on health outcomes (74).

Problems with the national economy are bound to alter the mix of patients seeking hospital care with direct implications for the ED. A declining economy is expected to increase the number of patients seeking uncompensated care in the ED. The economic downturn also may reduce the number of patients receiving elective procedures, which in turn could reduce ED overcrowding. Although studies have examined the effects of recessions on insurance coverage (25) and aggregate health indicators (140), no studies have determined empirically how the macroeconomy affects utilization and overcrowding in the ED.

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Appendix II Methodological Discussion

Literature search

Articles and reports used in this synthesis were identified through MEDLINE®, PubMed®, and Google Scholar™. The search was restricted to articles appearing in 1996 going forward and references appearing in searched articles. Various combinations of the following search terms were used: emergency department (ED), emergency room (ER), utilization, costs, non-urgent, avoidable, preventable, ambulatory care sensitive, overcrowding, crowding, and ambulance diversion. To determine whether any studies have ascertained the relationship between ED utilization and the macroeconomy, *EconLit* was added to the set of search engines and the following search terms were added: recession, business cycle, macroeconomy.

The synthesis also draws on publications from the Institute of Medicine, the *Urgent Matters* program, the Center for Studying Health System Change, the Government Accountability Office, the National Center for Health Statistics, the Lewin Group, and the American College of Emergency Physicians. In drawing conclusions, greater weight is given to peer-reviewed publications and less weight is given to publications sponsored by organizations with a direct stake in policy decisions. Historical perspectives on ED use were obtained from two studies appearing in books (71, 167).

Data sources

The studies reviewed in the synthesis use a variety of methodologies applied to diverse data sources. Many are based on data from hospital billing records as captured in the Healthcare Cost and Utilization Project (HCUP) and the National Hospital Ambulatory Medical Care Survey (NHAMCS). These data represent large numbers of ED visits and include information about diagnoses and procedures. But since they are not sufficiently detailed to measure specific outcomes of ED care (e.g., time to antibiotics for pneumonia patients), the synthesis also relies on studies of individual hospitals. The obvious tradeoff is that single-facility studies do not necessarily generalize to patients in other hospitals.

A third study approach uses population-based survey data such as those conducted in the Community Tracking Study. This approach is especially useful for understanding the characteristics of heavy ED users relative to individuals who use the ED infrequently or not at all, as the latter group is not accounted for in provider databases. Population surveys also include more detailed information about health insurance coverage rather than administrative data that classifies patients according to "expected payer." Expected payer codes such as "self-pay" often include the uninsured. But the self-pay code may also include insured patients with high deductibles or those using out-of-network services. It may also include individuals who will later have their insurance status reclassified (e.g., uninsured patient enrolling in Medicaid). The drawbacks to the survey approach are that respondents may not recall information accurately, response rates may be low, clinical details are limited, and hard-to-reach populations such as the homeless and undocumented immigrants are often not included. Since each approach has relative pros and cons, the synthesis attempts to triangulate across different types of studies wherever possible.

Non-urgent and preventable ED use

There is a great deal of interest in the extent to which ED visits are non-urgent or avoidable. The studies reviewed above exhibit substantial variation in the methods used to classify visits this way. Most national studies conducted by the National Center for Health Statistics and others rely on

triage classifications in ED records (131, 31). A drawback to using triage classifications is that even though a patient could safely wait in the ED for care, the condition may in fact require care that is optimally provided in the ED. Triage classifications also do not identify conditions that are urgent but may have been avoided with earlier access to primary care. Other studies, such as those used to analyze patient cost-sharing in the ED, have used their own nonstandardized methods for classifying the urgency or severity of visits, making it difficult to draw precise conclusions across different studies.

A systematic classification system, the ED Use Profiling Algorithm, has been applied in several other studies and is included in AHRQ's toolkit for monitoring the health care safety net (12, 13). The main purpose of the algorithm, which was developed by John Billings and colleagues at New York University, is to identify ED visits that are "ambulatory care sensitive" – i.e., visits that could have been provided in a primary care setting or emergencies that could have been avoided if primary care had been delivered at an earlier stage of illness. It was developed with an expert panel of ED and primary care physicians and was based on detailed medical records for 5,700 cases in the Bronx (15).

The algorithm classifies ED visits into four non-overlapping categories: 1) non-emergent; 2) emergent, primary care treatable; 3) emergent, ED care needed, preventable/avoidable; and 4) emergent, ED care needed, not preventable/avoidable. Categories 1, 2 and 3 are considered avoidable with improved access to primary care. Importantly, the algorithm excludes ED visits for injuries, mental health, alcohol, drugs, visits leading to admission, and a subset of visits that cannot be classified.

A paper by Lowe and Fu (2008) outlines a series of limitations contained in the ED Use Profiling Algorithm (98), despite its common use. They found that the algorithm was unable to detect changes in primary care access that occurred when the Oregon Health Plan (Medicaid program) significantly curtailed enrollment. They go on to suggest a number of reasons why their results were obtained: the algorithm excluded a large number of ED visits such as those leading to admission and certain classes of outpatient care; many of the included visits fall into an "unclassified" category; and the sample sizes used to classify subsets of visits were often very small. Refinement of existing methods to classify ED visits remains an important field of ongoing research.

Many of the studies reviewed in this synthesis focus exclusively on ED visits that do not result in admission. Although the implicit assumption is that ED visits that do result in admission would not be treatable outside of the hospital, variation in medical practice and admission standards calls this assumption into question (48). The distinction between admitted and treat-and-release ED patients has become less clear with the rise in observation stays in the ED, which are referred to as a "limbo-type concept" between ambulatory and inpatient care (26). In addition, many admissions through the ED are for ambulatory care sensitive conditions, which are often preventable with primary care (125). Given the importance of bed shortages in leading to ED overcrowding, greater attention to these admissions would provide a more complete view of the connection between ED overcrowding and primary care.

Similar cautions are required for studies that exclude or deemphasize patients who arrived by ambulance. Although such patients typically arrive with true emergencies, exceptions have been noted (87, 65) and may vary by geography and patient characteristics (119, 50, 24).

Appendix II Methodological Discussion

Measurement of ED overcrowding

Although the problem of ED overcrowding has been well documented, rigorous measures of it have only recently been developed (157, 8, 148). At issue is the reliability of overcrowding measures across facilities and regulatory jurisdictions. For example, ambulance diversion is often taken as a sign of an overcrowded ED, but hospitals have different criteria for going on divert status. In some parts of the nation, hospitals can divert ambulances simply to avoid additional patients that have been diverted from other hospitals in an apparent gaming of the system (79). The incentives to practice "defensive diversion" are quite strong, as the ED is often a source of uncompensated hospital admissions among the uninsured. Yet in other parts of the nation, such as Fresno County, Calif. (6) and the state of Massachusetts (104), ambulance diversion has been banned entirely. Other crowding indicators such as "excessive waiting times" also suffer from lack of standardization.

A recent summit held by experts in emergency medicine and process measurement offered many specific indicators to measure ED overcrowding (157). Some of these measures such as ED length-of-stay can be calculated with administrative databases that are publicly available in some states. Many others such as time between decision to admit and actual admission require access to internal hospital data. Although the major concepts and data elements are well understood, more work is needed to create a consistent system to monitor prevalence and trends in ED overcrowding.

For more information about the Synthesis Project, visit the Synthesis Project Web site at *www.policysynthesis.org*. For additional copies of Synthesis products, please go to the Project's Web site or send an e-mail message to *pubsrequest@rwjf.org.*

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