# The Multifaceted Challenge of Emergency Department Boarding: Implications and Potential Solutions for the Crowding Crisis

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**Abstract:**

Across the United States, hospitals today increasingly operate at, or beyond, full capacity. There are seasonal, weekly and daily variations in volume, but this has become a concerning trend with significant downstream effects. A major public health concern which has emerged is emergency medicine “boarding”. Boarding is the practice of keeping patients in the emergency department as they await an inpatient bed opening. Boarding is now a common practice that can last hours to days, with patient care suffering as a consequence (Rabin et al., 2012). When patients spend a significant portion of their inpatient stay in the hallways of an emergency department, both the quality and consistency of care they receive can be impacted. A lack of inpatient beds available means more patients will continually board in the emergency department. At its root, boarding is a problem that stems from hospital overcrowding. It is a direct consequence of increased patient volumes with significant adverse effects on both quality and process outcomes for patients. Currently, emergency medicine boarding has transcended to a nationwide phenomenon affecting nearly all hospitals across the United States. The support of hospital leadership to implement system-wide boarding reduction techniques will be paramount to addressing this growing concern.

**Background:**

In 1975, the United States had 1.5 million inpatient hospital beds (Yang, 2024). Today, the United States has 900,000 (American Hospital Association, 2025). The total population has increased by over 50% these past 50 years, yet the total inpatient hospital capacity has fallen precipitously (US Census Bureau, 2025). On a per-person basis, there is currently 1 inpatient hospital bed for every 390 people today, compared with 1 per 143 people in 1975. There has been a consequent increase in the supply and type of outpatient care services available but inpatient care is still an essential part of the healthcare landscape. The consequences of failing to meet this demand will have significant impacts on the sickest of our patients- the emergent patients who require inpatient care.

Over the same 50-year time interval, average life expectancy has gone up by double digits (O'Neil, 2023). People today are living longer and aging with more disease burden, suffering more sequelae from complex illness than in years past. We've advanced from a world where end stage renal disease was a terminal diagnosis to one where hemodialysis and kidney transplants extend life expectancies by decades. Yet, it seems as if we have less capacity to treat patients when they fall ill. Since 1975, the obesity prevalence in adults has nearly tripled to 42% and the rate of diabetes has quintupled to 12% (CDC, 2024). Mental health needs have also dramatically increased over time. We now have a population that lives longer lives, with increased medical problems, who ultimately end up spending more time seeking medical care. The consolidation and privatization of hospitals, has further accelerated this mismatch between demand and supply. An older population with more comorbidities who consume more medical

care than ever before is on a crash course with a system that may not be adequately prepared to handle the volume.

As it currently stands, hospitals have been, and for the foreseeable future, will continue to be, the cornerstone of the US health system. Hospitals provide the space for treatment of patients in every capacity, from preventative care to emergent health issues. If the total capacity of this healthcare institution continues to fall, deleterious effects on the health of patients may result.

Thus, dangerously crowded hospitals today will lead to suboptimal care environments, overburdened healthcare employees, medical care delays and increased costs for the entire system. Further complicating matters, a significant physician shortage already exists and the American Association of American Medical Colleges predicts an estimated 124,000 physician shortage in a decade (AMA, 2023). The supply chain of medicine is a delicate weave with a long lead time that has been painfully slow and unable to catch up thus far. During the COVID-19 pandemic, patients experienced firsthand the damaging effects that an inpatient capacity shortage has on the ability of the system to provide care when pushed past the limit. Furthermore, hospitals in a post-COVID era have struggled to hire and maintain the staff necessary for safe patient ratios in most inpatient settings (Yang, Y et al., 2024).

Healthcare is a fundamental human right. A society underprepared to provide this necessary benefit is one with a tenuous future. We can see the foundational cracks beginning to appear within the local ecosystem of a hospital. The front door to the hospital, the emergency department, has been showing signs of this strain for decades.

Nowhere is the supply-demand mismatch for healthcare more pronounced than in the modern-day emergency department (ED). A phenomenon which has increasingly permeated EDs across the US is boarding. Emergency department boarding, the practice of holding admitted patients in the emergency department as they await an inpatient bed, has transcended from an emerging singularity in the 1980s to a full-blown healthcare crisis today. Admitted patients are frequently stuck in the emergency department for extended periods of time as they wait for an inpatient bed to become available. This waiting period of hours to days, and sometimes weeks, can frequently lead to a significant portion of an inpatient admission being spent in the emergency department.

In 2006, the US Institute of Medicine declared “crowding” in an ED, where the number of patients exceeded treatment capacity, to be a “national epidemic” (Institute of Medicine, 2007). Twenty years have passed and this problem has not gotten materially better, but worse. Wait times for emergency care have increased significantly as patient volumes have gone up over the years (Fitzpatrick, 2023). Emergency departments operate beyond capacity when hospitals are full. Patients who are boarding in the emergency department consume nursing and physician resources at a time when there is already a limited supply. This can lead to an increased burden on the capacity and ability of providers and ancillary staff to care for new patients. When all available inpatient hospital beds are occupied but the influx of patients into the emergency department doesn’t stop, a bottleneck develops which can paralyze the system from functioning effectively. This problem can be so severe that in some emergency departments, the proportion of boarding patients can outnumber those actively seeking acute care, turning the emergency department into a quasi- holding area without a release valve. Stable patients waiting for an

inpatient bed line the hallways, suffer from worse clinical care, and ultimately impede care for more critical patients due to resource limitations (Rabin et al., 2012).

Adding to the boarding problem is the problem that the standards set by the healthcare governing bodies are simultaneous unrealistic and insufficient. The Center for Medicare and Medicaid Services defines an acceptable boarding time as 6 hours (Janke et al., 2022). For a high functioning ED, the average door-to-disposition time for a patient is 4 hours (Al Nhdi et al., 2021). Therefore, patients can spend an additional 150% of the time it takes for their emergency medicine physician to stabilize, diagnose and treat their condition just waiting for an inpatient bed. Boarding has been shown to decrease nearly every quality improvement outcome from morbidity to mortality and cause reductions in key performance metrics from hospital length stays to throughput times (Rabin et al, 2012). From a patient care and quality perspective, boarding is unequivocally negative.

Ultimately, emergency department boarding is an entity with impact on nearly every department in the hospital. It leads to a vicious spiral in which boarding lengthens hospital stays, which increases inpatient census, which in turn worsens boarding. This phenomenon is a self-fulfilling, unyielding problem that is disastrous for the entire hospital. The inability to move admitted patients to an inpatient bed is a reflection of the systemic problem which must be addressed. There are potential solutions which can improve best practices of care delivery and mitigate boarding, but most solutions are complex and time-consuming to implement.

**Strategic Implementations of Potential Boarding Reduction Methods**

Given the budgetary and space constraints that most hospitals face, the straightforward answer of recruiting more staff or building more inpatient floors is more wishful thinking than potential reality. Therefore, hospitals must be innovative. First and foremost, optimal space utilization is critical to maximize the potential utility for patients. Shared patient rooms and semi-private patient care spaces on inpatient wards provide a viable care environment without a compromise in quality of care when hospitals are overcrowded (Atsavapranee et al., 2023). Additionally, when those inpatient rooms become full, there's an alternative to patients waiting in hallways of the emergency department. The first step is to instead have boarding patients utilize the halls of the inpatient floors- a step which could place boarding patients in safer, quieter, less crowded areas while alleviating the strain on the emergency department. This has been shown to be both clinically successful and preferable for patients in comparison to emergency department hallway boarding (Richards, 2011). This could also potentially expedite patient progression into an inpatient room as incentives would be aligned to control flow within each inpatient floor. The mechanics of patient movement are complicated within a large hospital and shifting patients closer to their end goal of an inpatient room can yield significant benefits, especially on weekends and nights when patient transporters may be limited. Additionally, nursing and physician staff on a given inpatient ward could more closely monitor their patients and provide more expedited care as a result. It is important to note that the benefits gained from shared inpatient rooms and hallway beds must be weighed against losses in patient privacy and this solution may not work for all patient admissions. Additionally, having the ability to flex patient bed locations can have significant benefits with seasonal increases in

patient volume. With more patients coming into hospitals during respiratory and flu season, when patient volumes are traditionally highest for hospitals, this ability to flex for surge volume can be instrumental to maintaining high quality care. In figure 1- we can see an example of how costs to a hospital would decrease on a per-patient, per night basis with the utilization of shared patient rooms and hallway beds. A hospital could potentially increase their inpatient capacity by 30% while decreasing per-patient nightly costs by an equivalent amount. While physician, nursing and ancillary staffing costs will rise to meet the patient volume increase, the subsequent per-patient decrease in overhead costs through cost- sharing of fixed costs will lead to an overall benefit to the hospital from an improvement in the supply- demand mismatch. The potential savings in cost to the hospital can then be shared with patients to offset potential losses in patient privacy.

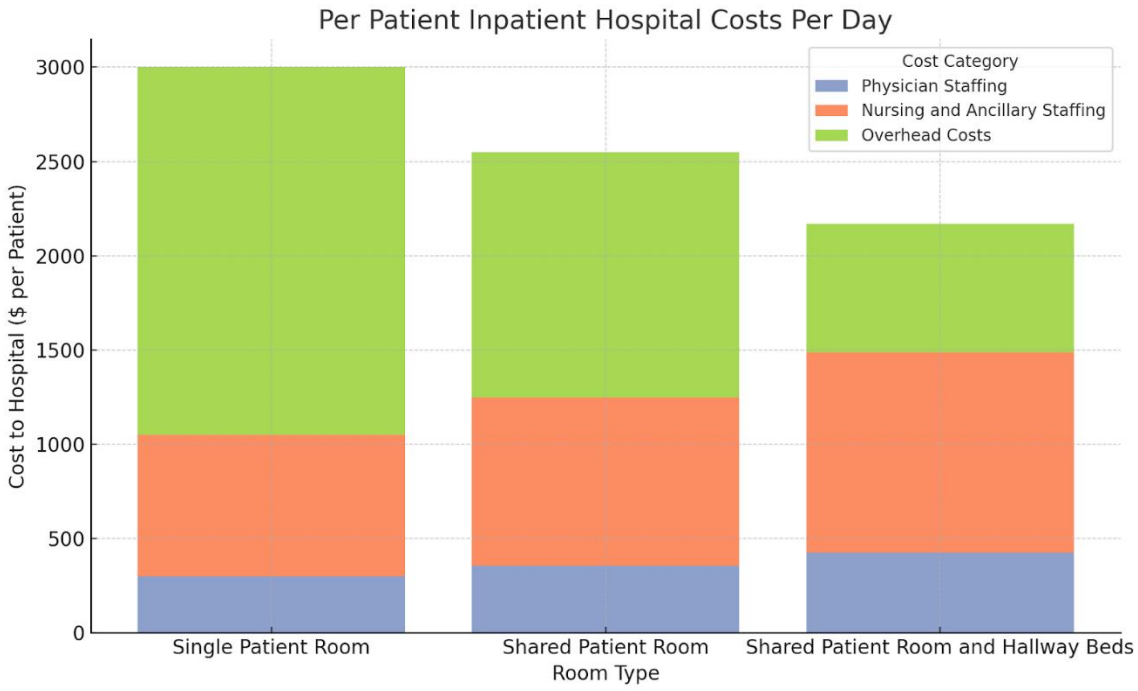


Figure 1: Per Patient Costs to Hospital by Bed Type

Another structural implementation hospitals can adopt is the creation of an observation unit. Observation units are ideal for patients who require a shorter hospital stay, typically less than 24 hours. Observation units tend to be less expensive to operate compared to inpatient units given reduced staffing requirements and patients who require less services but still necessitate further monitoring as part of their care. An observation unit can alleviate some of the volume burden by shifting stable patients away from an inpatient stay and towards a shorter, more regimented care course with close follow-up. Observation units have been shown to have synergistic effects for emergency department boarding given its ability to decrease the amount of admitted patients (Parwani, 2018).

Another measure which can be taken by hospitals is the smoothing of elective surgical schedules to accommodate peaks in demand for inpatient beds. A significant proportion of elective procedures- from hip replacements to cardiac valve replacements and spinal fusions- end with an inpatient stay for post-surgical recovery. Scheduling these non-emergent procedures to account for variations in inpatient volumes would have a significant impact on overcrowding in hospitals. While this may be less desirable for surgeons, the smoothing of timing using an around-the-clock scheduling of these procedures could be of significant benefit for the system. We can learn from the aviation industry which has adopted this practice of supply maximization and potentially take advantage of “red-eye” elective procedures. Pilot studies have already examined the efficacy and utility of surgical procedure smoothing and moving these procedures towards times of the week when inpatient census is lower has been shown to be an effective patient volume control mechanism (Wilson, 2005).

Lastly, there are process changes in the admission and discharge process which can be implemented to address patient volume. Active inpatient bed management through the use of a hospital command center with central bed management is an effective technique to manage flow. When inpatient discharges can be anticipated and dedicated teams are focused on discharge planning- shorter, equally effective inpatient stays can lead to more capacity for patient care. In the same vein, any implementations to streamline inpatient discharge processes will lead to the same beneficial effects on patient volume. A discharge lounge, where patients that no longer need inpatient care and are just waiting on transportation, social work, or placement can also expedite the discharge process and shorten a hospital stay. Lastly, the addition of artificial intelligence and predictive analytics in healthcare can improve the efficiency of inpatient admissions. Anticipating which patients are trending towards early, or late, discharges can mobilize resources where they are needed, helping clinical teams prioritize dispositions and provide more efficacious patient care.

**A Potential Rationale for Boarding's Continued Existence**

From a patient care perspective, boarding is unequivocally negative. For patients, there is no silver-lining. Boarding increases patient length of stays, morbidity, mortality and decreases patient satisfaction and the overall quality of care received (Rabin et al, 2012). Therefore, perhaps boarding's continued existence and hesitancy for solution implementation is rooted in an incentive on the hospital side. The adverse effects on patient care outcomes have led many

experts in healthcare to postulate that there may be an underlying financial rationale for why boarding-reduction tactics have not been consistently implemented across the board.

First and foremost, patient boarding is invisible from a financial and payment perspective. Private insurers, Medicare and Medicaid all consider an inpatient admission to begin when the patient disposition is changed to admitted. Whether that patient goes directly from the emergency department to an inpatient bed or spends the first 2 days of their clinical course in an emergency department hallway, insurers will pay for that visit all the same. Thus, from a payment perspective, to insurers, patient boarding is invisible and entirely indistinguishable from days spent in an inpatient unit. Medicare and private insurers alike will reimburse a hospital stay the same regardless of how much of that stay was spent boarding in the emergency department.

From a hospital perspective, boarding may actually be a financially advantageous process when it comes to their bottom line. Hospitals, although often non-profit entities, are similar to for-profit businesses in that they use operating margins to grow and sustain operations. A restaurant with a line out the door will reap the benefits of steady volume and an ability to control influx. A hospital is no different in some aspects. Although it can't control the volume that comes through the front door (the emergency department), it can control the volume and types of patients who move past the emergency department. In a sense, a hospital's main, and only, control valve comes at the step beyond initial patient admission. Controlling who goes upstairs, and when they go upstairs, is the primary lever hospitals have at their disposal to control patient volume. It should come as no surprise that 60% of hospitals reserve empty beds on inpatient floors even when patients are boarding in the emergency department. Most of

these empty beds are reserved for post-surgical patients after elective procedures and for high-reimbursement surgical transfer admissions (Janke et. Al, 2022). Additionally, hospitals with subspecialty designations and more elective surgical caseloads will have larger numbers of inpatient reserved beds and may suffer from worse boarding problems as a result. When a hospital has control over the types of inpatient beds they staff- they may increase the distribution of specialty inpatient services which benefit from higher reimbursements than traditional internal medicine units. Hospitals are likely more incentivized to have more beds for specialty patients like those in neurology, cardiology and orthopedics and patients receiving those services likely won't wait as long for a bed. Figure 2 is an example of a split of inpatient beds within a subspecialty tertiary medical center.

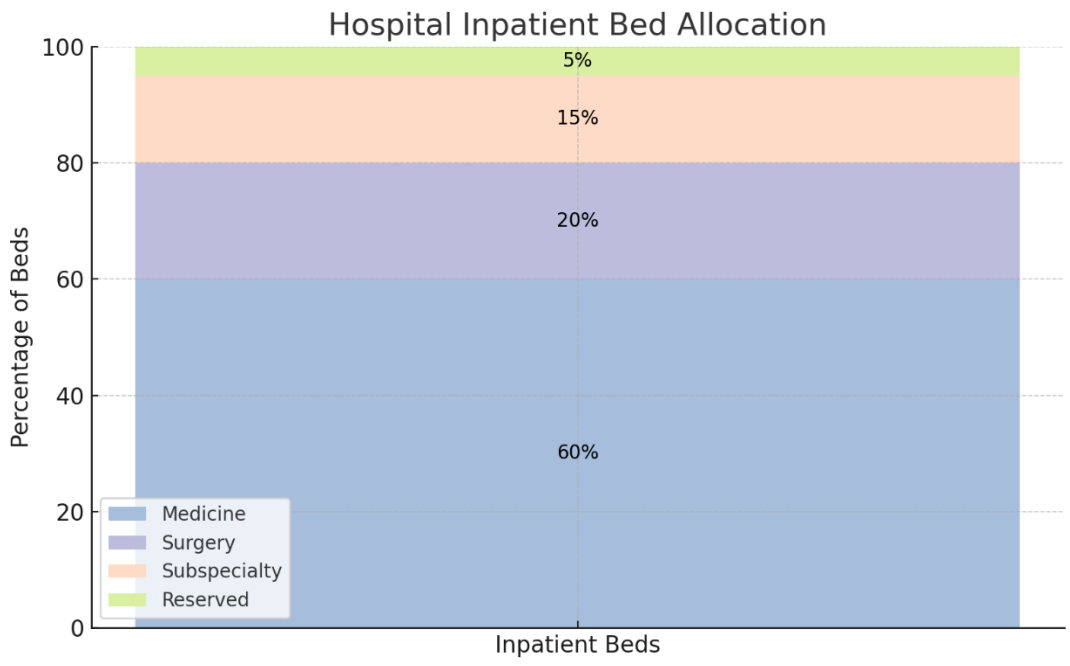


Figure 2: Hospital Inpatient Bed Allocation by Type

However, a hospital has limited control over their emergency department's patient acuity and insurer mix. Given the Emergency Medical Treatment and Labor Act, a hospital emergency department must see and treat patients regardless of ability to pay. Therefore, it should be unsurprising that looking at Medicare data, we can see that even though the majority of all hospital admissions are from the emergency department, the revenues generated from emergency department admissions pale in comparison to those from planned surgical or procedure admissions, direct admissions, and specialty service hospital transfer admissions (Mchugh et. Al, 2008). Therefore, since hospitals have control over the selection of patients for elective admissions in comparison to the risk of unreimbursed or under- reimbursed emergency department admissions, the task of assigning bed availability can be complex.

In a fee-for-service healthcare environment, payment schedules for surgical cases and invasive procedures reign supreme in comparison to medical cases that require non-procedural care. The noble charge of taking care of patients and maximizing health outcomes should be the only unifying goal of a healthcare system, but we can see that perverse incentives may lead hospitals to stray from the course. Hospital administrators and managers may actually leverage boarding as a control gate to prioritize patients to take advantage of the payment discrepancy between the patient that requires an interventional cardiology procedure over one that does not need a procedure.

**An Examination of Boarding within a large Academic Hospital Center**

A tertiary hospital center in the United States can average between 50,000 and 150,000 annual visits in their emergency department. Emergency departments will usually convert 20% of their emergency department visits into a hospital admission- this number can vary but admission rates are between 15% and 25% considering patient acuity mix. Respiratory season, typically November- February, will lead to seasonal volume surges of 20%, leading to an asymmetric number of patients seen in the winter quarter which can have significant impact on a hospital's operations.

Thus, we can take a deeper look at a hospital with 100,000 emergency department visits leading to 20,000 annual admissions to see just how quickly boarding adds up. If that hospital's admitted patients board for just 6 hours on average (the Center for Medicare and Medicaid Services goal time), a total of 120,000 hours will be spent boarding. In that single hospital, patients will have spent over 13 years waiting for a bed. This situation is technically an ideal one- as this hospital meets the standard for boarding time. There are thousands of hospitals in the US, many with boarding times far exceeding 6 hours. Average boarding times can extend beyond 24 hours in a large urban hospital setting. During seasonal surges of patient volumes, boarding begins to have a cumulative effect. An increase of 20% from surge volume will compound to a doubling of boarding times for patients. On the inpatient floors, patient flow grinds to a near stop given overburdened medical care teams lacking the space or capacity to provide optimal care. Patient length of stays can increase exponentially as a result when volumes are high due to increased errors and patient safety events.

Given the likely flow rate of patients towards boarding hours, hospitals can consider several ways to manage that flow through the various mechanisms discussed to reduce boarding. Most of these implementations come at significant cost, but can lead to significant long term benefits. Examining Figure 5, we can see that a hospital can decrease total boarding hours by an estimated 50% with implementation of shared patient rooms, an observation unit, and a smoothing of the surgical schedule in order to better accommodate patient volume.

Shared patient rooms and hallway beds will lead to the largest decrease in total boarding as the conversion of private rooms and non-isolation beds should allow for the most significant decrease due to the immediate increase in supply of inpatient beds. A conservative estimate would lead to a potential 30% decrease in boarding hours from shared rooms and inpatient hallway beds.

The next step which should be taken is the creation of an observation unit to decrease boarding. A reasonable development would be the creation of an observational unit with capacity equal to 5% of the total inpatient beds. This observation unit would be able to absorb a significant number of patients who would otherwise require admission and add to the total boarding burden. We can see in figure 5 that the benefits from an observation unit with regimented turnaround of patients would lead to an additional 20% reduction in total boarding hours for patients. Lastly- the smoothing of surgical schedules accommodating admission volumes could lead to an additional 15% decrease in total boarding hours over the year. Surgeons performing an increased proportion of operations on weekends and evenings when emergency department volumes are relatively lighter could further alleviate overcrowding if implemented.

| **Options for Boarding Reduction** | | | | |
|---|---|---|---|---|
| | Before Implementation of Boarding Reduction Techniques | Case A: Shared patient rooms/ Hallway rooms | Case B: Observation unit | Case C: Surgical Schedule Smoothing |
| Total Boarding Hours | 120,000 | 84,000 | 67,200 | 57,120 |
| Percentage Reduction of Boarding | | 30% | 20% | 15% |

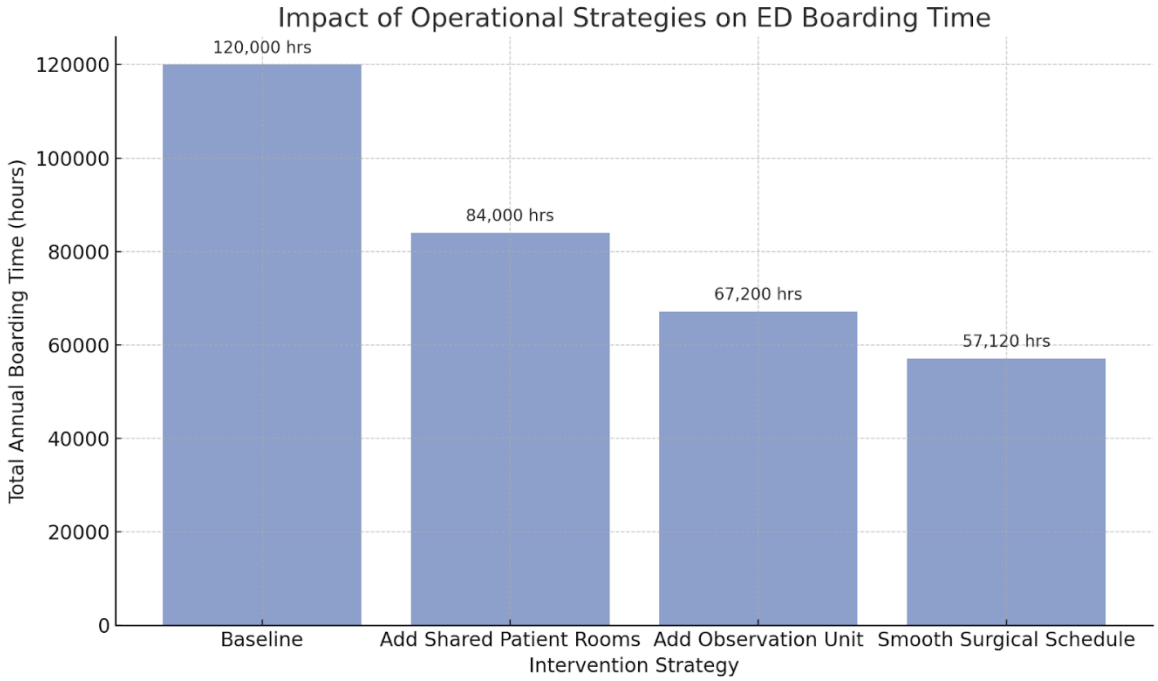


Figure 5: Impact of Operational Strategies on ED Boarding

**Conclusion:**

Emergency Department boarding is a result of hospital crowding with some elements of this waiting game being be self-inflicted. Potential solutions for boarding exist, but they are underutilized and not widely adopted. Boarding is associated with worse patient outcomes and throughput measures. However, it may be operationally and even financially beneficial for hospitals to have control over which patients board, and for how long. Ultimately, boarding is indicative of a systemic problem for the healthcare industry. As the public becomes more cognizant of the significant effects from boarding, hospitals may be forced to adjust and pivot away from this system. Solving emergency department boarding will be instrumental for hospitals to provide what's best for patients.

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