

Emergency Department Boarding: Methods Accounting for Loss Productivity

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Introduction

Boarding admitted patients in an emergency department (ED) represents one of the greatest challenges to emergency care in the United States. The Institute of Medicine in 2006 recommended an end to boarding admitted patients within EDs.¹ Subsequent research has established adverse implications of ED boarding on patient quality outcomes.² However, since 2010, the average ED length of stay for an admitted patient, including boarding time, has increased from 281 minutes to 304 minutes.³

Effective hospital leadership monitors a variety of metrics regarding ED quality, throughput, and staffing efficiencies. While alternative productivity calculations exist, such as the use of Ambulatory Payment Classifications, most US EDs calculate productivity by using a unit of service called worked hours per patient visit (wHPPV), where total productive staff hours are divided by the number of patient visits. Boarding patients present a challenge when interpreting wHPPV. These patients require additional staff resources than the typical ED patient due to their prolonged time in the ED and acuity. For this reason, it's prudent to have a method to account for boarding patients. Without this, EDs may appear less productive, resulting in less human capital than necessary to provide care.

Little to no research has evaluated standardized methodologies to account for the productivity impact of admitted patient boarding.⁴ The challenge with using the wHPPV model in relation to boarding is the lack of consideration for a patient's acuity and length of stay, as each patient, regardless of those factors, counts as one visit.⁵ This paper provides insight into the challenges associated with properly measuring for boarding patients' impact on ED productivity; it also discusses the impact of four methods on accounting for such loss.

Boarding admitted patients in an emergency department (ED) represents one of the greatest challenges to emergency care in the United States

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- 1 Institute of Medicine, *The Future of Emergency Care in the United States Health System* (2006), available at: <http://www.nationalacademies.org/hmd/Activities/Quality/emergencycare.aspx>.
- 2 A.J. Singer, H.C. Thode Jr, P. Viccellio et al., "The association between length of emergency department boarding and mortality," *Acad. Emerg. Med.* 18 (2011): 1324–1329; P.C. Sprivilis, J.A. Da Silva, I.G. Jacobs et al., "The association between hospital overcrowding and mortality among patients admitted via Western Australian emergency departments," *Med. J. Aust.* 184 (2006): 208–212; D.B. Chalfin, S. Trzeciak, A. Likourezos et al "DELAY-ED Study Group. Impact of delayed transfer of critically ill patients from the emergency department to the intensive care unit," *Crit. Care Med.* 35 (2007): 1477–1483; D.B. Diercks, M.T. Roe, A.Y. Chen et al., "Prolonged emergency department stays of non-ST-segment elevation myocardial infarction patients are associated with worse adherence to the American College of Cardiology/American Heart Association guidelines for management and increased adverse events," *Ann. Emerg. Med.* 50 (2007):489–496.
- 3 Emergency Department Benchmarking Alliance, 2016 Cohort Tables Final (2017).
- 4 C. Morley, M. Unwin, G.M. Peterson, J. Stankovich, & L. Kinsman, "Emergency department crowding: A systemic review of causes, consequences and solutions," *PLoS ONE* 13(8) (2018), available at: <https://doi.org/10.1371/journal.pone.0203316>
- 5 Emergency Nurses Association, *Position Statement: Staffing and Productivity in the Emergency Department*, (2018), available at: https://www.ena.org/docs/default-source/resource-library/practice-resources/position-statements/staffingandproductivityemergencydepartment.pdf?sfvrsn=c57dcf13_6.

Standards for Boarding in the Emergency Department

The Emergency Department Performance Measures and Benchmarking Summit group in 2006 defined a boarded patient as “an admitted patient for whom the time interval between decision-to-admit and physical departure of the patient from the ED treatment area exceeds 120 minutes.”⁶

The National Quality Forum (NQF) in 2008 defined ED boarding as the time from a physician’s decision-to-admit to the patient’s departure from the department.⁷ The American College of Emergency Physicians (ACEP)⁸ and Emergency Department Benchmarking Alliance (EDBA) have since supported this time metric.⁹

In 2013, the Joint Commission, a hospital accreditation organization, described boarding in a then-upcoming patient-flow standard and recommendation (Standard LD04.03.11):¹⁰

Boarding is the practice of holding patients in the Emergency Department or another temporary location after the decision-to-admit or transfer has been made. The hospital should set its goals with attention to patient acuity and best practice; it is recommended that boarding time frames not exceed 4 hours in the interest of patient safety and quality of care.

Though the Joint Commission’s note makes a distinction that patient boarding begins after decision-to-admit and that this time frame should not exceed four hours, we have observed that some hospitals define boarding as beginning only after the four-hour mark has passed. Other hospital systems use variations of the boarding term in their calculation methodologies.

While there is agreement on the general definition of boarding, discussion remains on when boarding actually begins. Boarding for any length of time creates additional workforce needs within the ED, and how hospital leadership accounts for the associated labor cost varies greatly across the country.

Limitations of Current Boarding Definition

Although the NQF defined boarding and ACEP and EDBA endorsed the definition of the term, the operational definition of “decision-to-admit” lacks consensus. Many believe that decision-to-admit is the actual moment a physician/provider determines hospitalization is warranted. An example of this would be an emergency physician’s evaluation for a 63-year-old male presenting with chest pain who has a history of myocardial infarction, stent placement, and multiple comorbidities. The physician may know when she initially evaluates the patient that hospitalization in an observation status is required, at a minimum.

Others believe the decision-to-admit is the moment when all of the following conditions have occurred: (1) sufficient diagnostic information has been resulted and reviewed, (2) appropriate stabilization care has been provided, and (3) the ED physician/provider has contacted the admitting provider and transferred physician/provider responsibility of care.

6 S. Welch, J. Augustine, C. Camargo, and C. Reese, “Emergency Department performance measures and benchmarking summit,” *Academic Emergency Medicine* 13(10) (2006, October): 1074–1080, available at: <https://www.ncbi.nlm.nih.gov/pubmed/16946283>.

7 National Quality Forum, *National Voluntary Consensus Standards for Emergency Care: A Consensus Report* (2009), available at: http://www.qualityforum.org/publications/2009/09/national_voluntary_consensus_standards_for_emergency_care.aspx.

8 ACEP, “Definition of a boarded patient,” Policy Statements (2018, September), available at: <https://www.acep.org/patient-care/policy-statements/definition-of-boarded-patient/#sm.00006mqo0s1ctsf8qtes3q1xi33z2>.

9 J. Wilner, S. Welch, J. Pines, J. Schuur, N. Jouriles, & S. Stone-Griffith, “Emergency department performance measures updates: proceedings of the 2014 emergency department benchmarking alliance consensus summit,” *Academic Emergency Medicine* 22(5) (2015, May): 542–553.

10 The Joint Commission, “The ‘Patient Flow Standard’ and the 4-hour Recommendation,” *Joint Commission Perspectives* 33(6) (2013, June), available at: <https://www.jointcommission.org/assets/1/18/S1-JCP-06-13.pdf>.

The Emergency Medical Treatment and Active Labor Act (EMTALA) requires hospital EDs to medically screen every patient who requests emergency care and stabilize or transfer those with medical emergencies.¹¹ Given this requirement, we believe the latter definition of decision-to-admit to be more appropriate. That is, we recommend the decision-to-admit timestamp be defined as occurring only after stabilization care is provided and transfer of physician/provider responsibility of care has occurred.

Defining Boarding for Calculating Productivity

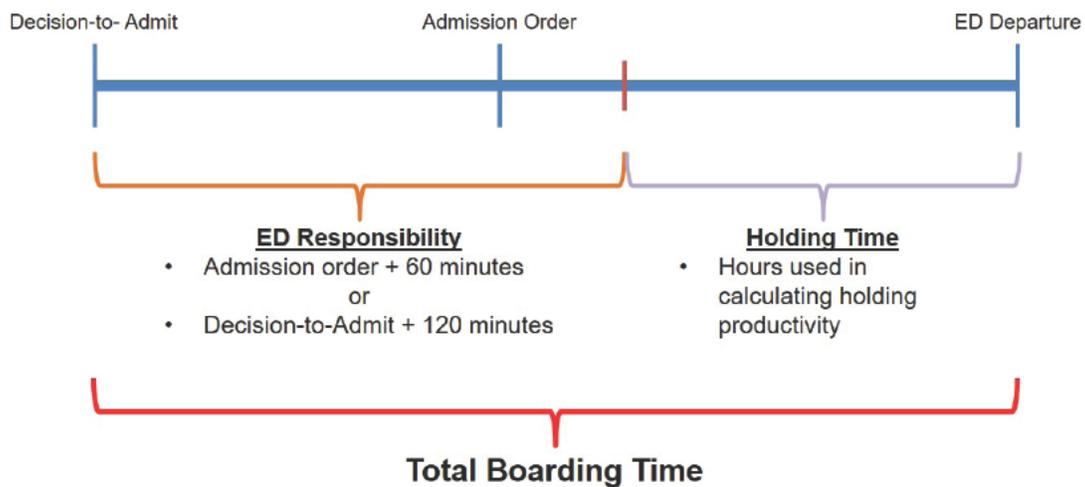
Boarding is defined by the NQF and ACEP as the time between the decision-to-admit through departure from the ED.¹² In many facilities, ED patients are not transported to an inpatient setting without an admission order. Logically, even when a decision-to-admit or admission order is received, the patient isn't immediately transported to the inpatient unit. The patient must be readied for admission, and a nursing hand-off of patient care from the ED to the inpatient unit must take place. Thus, even when the ED provider has transferred care to an inpatient provider, the ED staff are still responsible for processes to admit the patient. We find that these processes typically take approximately 60 minutes.

We recommend applying the following standards and terminology in calculating boarding time of admitted patients in the ED. Figure 1 displays these standards.

- ED is responsible for productivity of patient from admission order plus 60 minutes.
- In absence of an admission order timestamp in the data extract, decision-to-admit plus 120 minutes will be used. This provides an additional 60 minutes to secure admission orders.
- Time in excess of this window will be referred to as "Holding Time."

FIGURE 1

ED boarding and holding time calculations



11 ACEP, EMTALA (*Emergency Medical Treatment And Labor Act*) [2015], available at: <https://www.acep.org/life-as-a-physician/ethics--legal/emtala/emtala-fact-sheet/>

12 ACEP, "Definition of a boarded patient," Policy Statements (2018, September), available at: <https://www.acep.org/patient-care/policy-statements/definition-of-boarded-patient/#sm.00006mqo0s1ctsf8qtes3g1xi33z2>; NQF, *National Voluntary Consensus Standards for Emergency Care: A Consensus Report* (2009), available at: http://www.qualityforum.org/publications/2009/09/national_voluntary_consensus_standards_for_emergency_care.aspx

ED Productivity and Units of Service

While different methods are used to calculate productivity for a hospital staff's ED, the most widely implemented metric in US hospitals is wHPPV. This metric is calculated over a specified time period as:

$$\text{wHPPV} = (\text{total worked hours in the ED cost center} / \text{total number of ED visits})$$

Methods of Accounting for Holding in Productivity

In our observations and experience, four primary methods are used in accounting for excess staffing requirements related to admitted patient holding:

- ED only (no adjustments for holding productivity)
- ED only with calculated "buffer"
- Use of virtual cost center
- Calculated modified visits

Below, we discuss each method of accounting for holding in productivity.

ED Only (no adjustments for holding productivity)

Definition: All worked hours are maintained within the ED cost center. This includes worked hours caring for patients in the ED and in holding, as well as hours worked by non-ED staff (inpatient nurses) that may be floated to the ED during times when an unusually high number of patients (both ED patients and holding patients) are within the ED.

EXAMPLE: In a pay period (14 days), an ED had budgeted a wHPPV of 2.86 and realized a wHPPV of 3.04. The pay period consisted of 1,373 visits associated with 4,174 worked hours, of which 1,284 were holding hours. The ED's wHPPV in this method does not differentiate holding hours from total worked hours in any productive standard.

Pros: This method is the most straightforward and provides for clear management by ED leadership.

Cons: For holding patients, no additional productive factor is provided for patient care. If holding is significant, the department's productivity measurement may not be sufficient to provide adequate resources to properly care for patients and could lead to staff shortages or insufficient care for holding patients.

ED Only with Calculated "Buffer"

Definition: Worked hours are kept within the ED cost center. However, a mathematical calculation is used to determine the productivity impact associated with the holding of admitted patients in the ED.

EXAMPLE: As above, in a pay period (14 days), an ED had 1,284 holding hours, a volume of 1,373 visits, a budgeted wHPPV of 2.86, and an actual wHPPV of 3.04 [4,174 worked hours].

wHPPV Buffer Calculation

$$(1,284 \text{ Hold Hours}) * (0.25 \text{ Nurse to Patient Ratio}) = 321 \text{ Required Care Hours}$$

$$\frac{(321 \text{ Required Care Hours})}{(1,373 \text{ Pay Period Volume})} = 0.23 \text{ wHPPV for Holding}$$

Initially, 1,284 hold hours are divided by an industry-accepted standard of one nurse to four patients, thus multiplying by 0.25, which results in 321 required care hours, or hours that require nurse staffing. In the same manner of calculating wHPPV, the required care hours are divided by the volume to reflect the wHPPV required for the holding patients.

A wHPPV of 0.23 would constitute a “buffer” that is added to the budgeted wHPPV of 2.86, such that the department’s productivity target would be between 2.86 and 3.09. The department’s actual wHPPV for the pay period was 3.04; therefore, it was within its productive target for the pay period. Further, by subtracting the buffer from the actual wHPPV (3.04–0.23), the department’s wHPPV without holding is 2.81, which is less than the 2.86 budgeted target.

Pros: In this method, all worked hours remain in the ED cost center, which is straightforward from an accounting perspective. There is also financial oversight of productivity by ED and financial leadership. This method also provides a calculation for the additional worked hours to care for hold patients. The method allows for the ED to anticipate the need for resources over and above its budgeted staffing plan to care for long-term holding patients. Credit is given based on the number of holding hours and converting those hours into a wHPPV “buffer.”

Cons: This method still reflects that the ED is above its productivity target on most financial statements. The holding of admitted patients in the ED is a hospital throughput problem, not an ED problem. While these calculations would be conducted and provided as rational for being over an ED’s productivity, hospital leadership needs a culture and understanding of the buffer methodology. This approach would not be successful in an organizational culture that has absolute departmental consequences for not meeting productivity targets.

Use of Virtual Cost Center

Definition: ED labor is divided between two cost centers: one aimed at “regular” ED care and a second “virtual” cost center dedicated for staff hours related to holding. Holding hours are converted to required care hours; then ED nursing worked hours are transferred or moved from the ED cost center to the virtual cost center. This practice in essence artificially lowers the ED overall worked hours, decreasing the wHPPV calculated. The virtual cost center, and associated labor attributed to it, then clearly defines the labor necessary for providing care to holding patients and creates an accurate representation in the ED cost center of the labor that was utilized in caring for ED patients.

EXAMPLE: In a pay period (14 days), an ED had 1,284 holding hours, a volume of 1,373 visits, a budgeted wHPPV of 2.86, and an actual wHPPV of 3.04 (4,174 worked hours). In our example, 321 hours constitutes the required care hours for holding.

Required Care Hour Calculation

$$(1,284 \text{ Hold Hours}) * (0.25 \text{ Nurse to Patient Ratio}) = 321 \text{ Required Care Hours}$$

The virtual cost center identifies the number of hours and FTEs that were required to care for holding patients within the ED. A total of 3,853 worked hours (4,174 less 321) would be attributed to the regular ED cost center, and 321 worked hours would be transferred to the virtual cost center. The regular ED cost center would then have a calculated wHPPV of 2.81, less than the budgeted target of 2.86.

Pros: This method shows and represents a “clean” ED productivity of ED operations without holding.

Cons: Currently, this is a manual process requiring clerical and leadership staff time to quantify and transfer the number of hours to the virtual cost center. This process typically entails the ED leader reclassifying

employees' hours in the time clock system from the ED cost center to the virtual cost center. This process may lead to inaccurate productivity reports. In addition, this process would have to be completed in a timely manner and before the end of payroll. Further, the virtual cost center is a "black hole" of worked hours. Facilities do not attribute full-time equivalent (FTE) or hired staff into this cost center; the extra worked time is typically in the form of overtime or agency staffing. This also leads to poor management of this virtual cost center, as there isn't typically a hospital leader tasked with managing the labor of this cost center. Also, there isn't a financial metric (such as ED visits) to accompany the cost center, thus it is simply an accounting method to identify and track the labor utilization of ED staff caring for holding patients. Thus, this is an accounting exercise that artificially lowers the ED wHPPV by reducing the total number of hours in the ED cost center.

Calculated Modified Visits

Definition: Holding hours are converted into patient visits; then a "modified" ED volume is used to calculate productivity.

EXAMPLE: In a pay period (14 days), an ED had 1,284 holding hours, a volume of 1,373 visits, a budgeted wHPPV of 2.86, and an actual wHPPV of 3.04 (4,174 worked hours).

Modified Visit Calculation

$(1,284 \text{ Hold Hours}) * (0.25 \text{ Nurse to Patient Ratio}) = 321 \text{ Required Care Hours}$

$$\frac{(321 \text{ Required Care Hours})}{(2.86 \text{ Budgeted wHPPV Target})} = 112 \text{ Modified Additional Visits}$$

The new modified visits would be 1,485 (1,373+112), reducing actual wHPPV from 3.04 to 2.81 modified.

Pros: This method provides a reasonable accounting method for attributing productivity to holding.

Cons: Due to current financial accounting systems that do not have a methodology for calculating these values, this method requires manual calculation and labor to determine the number of modified visits. Another challenge is identifying how the modified visits number will be used and where will it be reported. This method would require a facility-specific method for gathering and reporting these numbers. Last, the facility will have two visit numbers, which could cause confusion to those uninformed of the process.

Recommendation for Accounting for Admitted Patient Holding in the Emergency Department

These calculations provide a fair and equal representation of the productivity required to care for holding patients. With the exception of the *ED Only* method, the alternatives provide end results that are essentially equal. Therefore, the final evaluation considers which method is most operationally effective, leaves the least room for error, and best drives a culture for reducing admitted patient holding hours.

In the absence of a preexisting method for calculating holding productivity, we recommend using the *ED Only with Calculated "Buffer"* method for adjusting productivity to reflect holding patients. This method is easy to calculate and does not require the creation and maintenance of other cost centers or monitoring tools. This method can also be calculated on daily, weekly, monthly, or yearly bases, providing additional flexibility in creating yearly budgets and monitoring techniques. Figure 2 displays a simulated client analytics platform based on this recommendation.

FIGURE 2
Simulated client analytics platform

Historical Daily Ed Detail January 2019																		
	Visits	Admits	Percent Admits	AMA	Percent AMA	LWBS	Percent LWBS	Avg Time: Arrival to Room	Avg Time: Room to Provider	Avg Time: Arrival to Provider	Avg Time: Provider to Dispo	Avg Time: Dispo to Depart	Avg Time: Dispo to Depart*	Avg Time: Arrival to Depart ALOS	Avg Time: Arrival to Depart-Admits	Admit Hold Time (hours)	Average Admit Hold Time (hours)	Admit Hold wHPPV
January 12, 2019	203	31	15.27%	1	0.49%	1	0.49%	8.0	11.5	16.0	148.9	54.9	36.2	215.3	366.9	62.8	2.03	0.08
January 11, 2019	229	33	14.41%	0	0.00%	0	0.00%	9.2	11.8	17.1	131.4	48.6	39.5	194.7	337.2	49.1	1.49	0.05
January 10, 2019	240	47	19.58%	3	1.25%	1	0.42%	10.2	10.9	19.0	146.5	68.0	33.4	231.8	417.5	124.1	2.64	0.13
January 9, 2019	243	58	23.87%	2	0.82%	1	0.41%	10.7	14.9	19.9	147.3	63.8	37.9	229.1	374.4	145.2	2.50	0.15
January 8, 2019	285	59	20.70%	3	1.05%	0	0.00%	11.9	20.2	29.7	147.8	78.1	30.4	254.3	492.3	243.8	4.13	0.21
January 7, 2019	290	53	18.28%	6	2.07%	1	0.34%	15.0	20.5	31.1	160.0	67.3	38.2	250.5	445.5	162.8	3.07	0.14
January 6, 2019	280	55	19.64%	2	0.71%	3	1.07%	11.8	20.2	28.8	161.1	54.2	41.9	236.3	375.1	102.1	1.86	0.09
Grand Total	1,770	336	18.98%	17	0.96%	7	0.40%	11.2	16.3	23.8	149.6	62.8	36.8	232.1	408.1	889.8	2.65	0.13

The blue shaded area indicates total hold time hours used to calculate the Admit Hold wHPPV using the “Buffer” method.

Inpatient holding within the ED continues to challenge hospitals across the country. Hospitals that have no current method of accounting for the additional labor requirements within the ED to care for holding patients are understaffing departments. By utilizing one of the outlined methods, hospitals will have a clearer picture of the labor needs of holding patients within the ED.

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