



Emergency Medicine Provider Productivity

An Information Paper

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Introduction

Steadily growing US emergency department (ED) patient volumes have led to serious crowding and increasing lengths of stay in the early years of the 21st Century. While rising ED utilization is the primary cause of these problems they are being compounded by increasing patient acuity as the population ages, fewer EDs, manpower shortages of emergency physicians and nurses, boarding patients in the ED due to the lack of availability of in-patient beds, and dwindling on-call consulting and admitting medical staff rosters. Seeking to respond to these challenges emergency medicine (EM) group practices and their hospital partners are taking a closer look at individual provider productivity in search of greater efficiency. The purpose of this paper is to discuss the various approaches to assessing emergency medical practitioner productivity along with an analysis of the strengths and weaknesses of each.

Historical Perspective

Prior to the implementation of the Resource-Based Relative Value Scale (RBRVS) by the Healthcare Finance Administration (HCFA, now CMS) in 1992, ED provider productivity was discussed almost exclusively in terms of patients per hour since there was no generally accepted method of differentiating the work of caring for one type of patient versus another. In the American College of Emergency Physician's (ACEP's) first ED management book, *Emergency Department Organization and Management*, published in 1975, on page 20 of Chapter 3: Staffing the Emergency Department, the following quote is found: "Generally, four physicians can usually cope with a patient load of up to 30,000 patients per year." Assuming 48 hours per week (a common workload in the early days of EM) and working 48 weeks per year, that is 3.26 patients per hour. The author goes on to say that this assertion of course assumes adequate nurse staffing and ancillary support services (adequate was not defined), but this statement appears to be the earliest published statement addressing emergency physician productivity. This same statement appears in the 2nd Edition of the book published in 1978.

In 1987, Dr. John van de Leuv, one of the contributors to early ACEP ED management texts and the editor of the 1978 edition mentioned above, writing in *Management of Emergency Services*, says that approximately 2.4 patients per hour is the most appropriate emergency physician workload in his estimation. That same year, In the *Emergency Medicine Clinics of North America* chapter titled "The Emergency Department Medical Director," Dr. Thom Mayer is quoted as saying "most emergency physicians should see no more than 2.6 to 3.1 patients per hour."

Dr. Dighton Packard, writing in 1992 in *Managing the Emergency Department – A Team Approach*, references the 1984-85 HCFA *Physician Practice Costs and Income Survey*, which found that emergency physicians see on average 2.8 patients per hour. Dr. Packard goes on to conclude that 3 patients per hour is a reasonable approximation of an appropriate caseload but that the number probably ranges "...between 1.8 and 5 patients per hour."

The problem with the patients per hour approach is that no two patients present with the same problem(s) or require the same amount of time to address their problem(s). Taking care of someone who has been in a motor vehicle collision (MVC) requires much more time and skill than taking care of someone with an earache. What was needed was a way to stratify patient acuity, complexity and workload.

EM practice has changed significantly since its inception in the late 1960s and early 1970s. There are fewer EDs today than there were then with those that remain averaging much higher patient volumes. The average patient acuity has increased along with the volume. Average provider work hours have decreased in recognition of the high burnout rate experienced by the first generation of emergency physicians. With

the advent of board certification in 1980, emergency medicine has come into its own as the 23rd medical specialty and emergency physicians are better trained and more capable than ever before. Given these developments it is not surprising that emergency physician productivity assessment has evolved as well.

Variables Affecting Emergency Physician Productivity

There are a multitude of variables that affect physician productivity and must be considered especially when comparing productivity from one institution to another. One way to categorize these factors would be to divide them into community factors, hospital factors, ED factors, and provider factors.

Community factors refer to the make-up of the hospital in a particular community and the resources available to provide services to the patients in that community. Resources often parallel the financial health of the community and hospital. Metrics that give you an idea of these resources include but are not limited to:

- Percentage uninsured patients, (may have greater difficulty accessing follow-up care)
- Availability of social resources, such as homeless shelters and free clinics
- Prevalence of urgent care centers, freestanding EDs or local “mini” clinics, which may siphon off patients who typically require the least amount of resources and physician time and often do not include uninsured who are referred out
- Age distribution of patients
- Percentage of non-English speaking residents
- Accessibility of follow up care (ie, availability of primary care physicians, sub-specialists, psychiatrists)

In communities where resources are limited, the extent of evaluation, treatment and admissions are affected because more must be done medically to evaluate these patients in the ED, when follow up is limited in order to maintain safety. This practice may cause longer throughput times and increased utilization.

Hospital factors refer to the mission and commitment of the hospital to care for unscheduled patients who present to the ED. Hospitals are structured differently depending on their for profit/nonprofit status, who they are owned by, whether or not they are affiliated with a university or are teaching hospitals and the competition from other hospital systems in the area.. Hospital structure also varies based on the hospital’s mission. Comparing physician productivity in a small community hospital versus a tertiary teaching hospital is difficult due to a variety of variables. Some of these “Hospital Factors” include but are not limited to:

- Type of hospital--university vs. community
- Presence of house staff (number, quality of residents and medical students)
- Teaching responsibilities
- Financial structure (for profit, not for profit)
- Financial health of the hospital
- Size (number of hospital beds)
- Availability and responsiveness of subspecialty resources, hospitalists and or house staff
- Availability of ancillary services, such as social work, IV team, transport, phlebotomy
- Sophistication of hospital systems for example the ability to mobilize multiple resources in response to critical illness or injury (trauma team, STEMI team, stroke team, sepsis team, etc)
- Efficiency of other hospital departments such as laboratory and radiology
- Presence of dedicated admitting physicians such as house staff or hospitalists
- Availability of on call physicians or call panels

- Attitude of hospital administration about:
 - the ED in general
 - boarding of inpatients in the ED
 - nurse staffing levels
 - negotiating with on call specialists
 - interacting with prehospital providers
 - The Joint Commission
 - care of the indigent
 - patient satisfaction scores (closely related to throughput times)

In some hospitals, the emergency physicians can determine the need for admission, write some initial inpatient orders and send the patient to the ward very efficiently. In other hospitals the on call admitting physicians may want the emergency physician to do an extensive work up prior to admitting the patient (even when it was clear from the start that the patient needed to be admitted). Hospital factors may be difficult to measure, but if comparison of productivity and efficiency is to be made from one practice site to the next, hospital factors must be considered.

ED resources and support are often what we think about when first addressing the efficiency of an ED. The ED size, layout, operational systems and staff are common areas in which to focus. Some of these physical and operational systems include but are not limited to:

- Number of ED beds
- Ease of use of documentation and order entry systems
- Patient tracking systems
- Efficacy of communication technology
- Access to ED ultrasound
- Physical layout of ED
- Availability and proximity of equipment and supplies
- Use of bedside registration
- Availability of dedicated ED ancillary staff, such as forensic nurse examiners, ED social workers, transporters, ED technicians, mental health workers, and ED pharmacists
- Nurse/patient ratio
- Experience level of staff
- Use of mid-level providers
- Extraneous duties performed by EP
- Reading triage EKGs within 10 minutes (and other core / quality measures)
- Providing EMS medical control
- Fielding phone calls from referring physicians
- Following up on radiology over-reads or delayed laboratory results for discharged patients
- Responding to emergencies on the inpatient floor
- Use of hospital information systems from the documentation portion of and EMR through availability of data from the medical records departments
- Use of electronic medical records [up to 40% decreased productivity when first introduced (unpublished data)]

Most ED operations teams will at times be questioned regarding optimal efficiency. Concerns regarding long wait times, high left without being seen rates and low patient satisfaction scores often prompt administration to look into ways to improve ED efficiency. There may be anecdotal perceptions that several “slow” docs make this worse or that the group needs to add additional provider hours or one of the

providers “orders too many tests.” How does one address these concerns? The answer is to produce useful data.

Benchmarking Efficiency and Productivity

A good place to start evaluating efficiency is to first look at throughput as a whole. Drilling down on the entire ED patient visit from arrival to discharge (physically out of the department) will help identify where opportunities for improvement exist and where resources should be applied. Dividing the visit into functional time segments will make this process easier. It is important to understand if the areas of opportunity come from nursing, ancillary staffing, physician productivity and staffing, lab and radiology, management of inpatient beds and ICU staffing or processes relating to these segments. Time segments may include:

1. Patient arrival time to patient in room
2. Patient in room time until seen by provider
3. Time to provider to disposition decision
4. Disposition decision to actual discharge from the department

If the time to room is long, then evaluation of the triage process or waiting room metrics may be in order [arrival curves by hour of the day, number and quality of triage nurses, use of medical screening exam (MSE)]. If in the above data, when comparing providers, a particular provider has long room to provider times (as compared to his or her colleagues at the same practice site) or long seen by provider to disposition times, it may be necessary to counsel the individual or look at provider staffing patterns. If however, these times vary little between providers the previous perception that a doctor was slow may be refuted. If the “seen by provider to disposition” decision is long, it would be reasonable to look at lab and imaging turnaround time along with individual physician productivity metrics. If the disposition decision to actual discharge from the department is long, then subdividing patients into discharged and admitted may be helpful and then look further into the processes of getting a patient discharged or getting a patient moved to the ward or unit.

In addition, to compare physician productivity in terms of acuity, documentation and volume, the use of RVUs per patient and RVUs per hour will allow a more accurate evaluation and comparison between providers (see below).

What about nursing and ancillary coverage? This is a dicey area to address especially if there is any room for improvement on the provider side. However, many EDs are understaffed with nurses and techs and due to the culture of “calling off,” staffing may be down on any given day regardless of how many nurses or techs were originally scheduled because the individual that “calls off” is not routinely replaced. One metric that may address accountability on the hospital and nursing side is to measure the nursing hours scheduled per shift or per day versus the actual number of nursing hours worked (overtime and managers not working clinically do not count). It is very difficult for a provider to be consistent from a productivity stand point when staffing from the hospital (nursing and other ancillary services) is inconsistent and insufficient.

In order for data to be generated accurately and used properly, there must be good communication and leadership on the physician, nursing and ancillary areas of the ED operations. Each division within the department must feel that the data is fair and useful. An atmosphere of cooperation and collegiality must exist.

Resource Based Relative Value Scale (RBRVS)

RBRVS provides a set of objective patient acuity measures to help rank the provider work needed to take care of the spectrum of patients that present to the typical ED. While the primary intent of RBRVS was to tie payment to the amount of resources each type of patient required for their care it also provided the first objective measure of practitioner work. The relative value of the critical care charge code (99291) in 2009 is ten times that of a Level I Evaluation & Management charge code (99281) and so too the relative amounts of provider skill, risk, and practice overhead that are needed to evaluate and care for each type of patient.

RBRVS expresses provider work in terms of Relative Value Units (RVUs). Each provider service is assigned a relative value by the Relative Value Scale Update Committee (RUC) of the American Medical Association in their capacity as custodians of the Current Procedural Terminology (CPT) provider charge code system. The RVUs associated with each service are based on the extent of the resources needed to provide that particular service. Resources in turn are defined in terms of a work complexity and extent component, and liability risk and practice overhead expense components. In 2009, draining a subungual hematoma is said to be approximately one RVU of work while an appendectomy is said to be 16 RVUs of work. In payment terms, an appendectomy commands approximately 16 times more payment than draining a subungual hematoma. This stratification of work using RVUs has been adopted by many emergency physician groups as an objective yardstick by which to measure emergency physician provider productivity.

Using the product of **Patients per Hour** times **RVUs per Patient** to get **RVUs per Hour** is helpful in evaluating and managing emergency physician productivity. When productivity for one individual is low when compared to peers each parameter provides guidance as to where the problem may lie. Patients per Hour are a measure of practice efficiency and intensity – how fast the provider processes patients and picks up new patients. **RVUs per Patient are a measure of patient acuity and of documentation since the quality of the documentation drives the number of RVUs per Patient.** The product of the two, with some caveats as we will see in later sections of this paper, is more objective than any previous productivity measure available to emergency medical providers. The ideal emergency medicine productivity-driven compensation system balances RVU production against objectively measurable and reliable patient satisfaction, best practice compliance and/or utilization metrics.

Some EM groups place a high value on the production of non-economic outcomes. The use of Teaching Value Units¹ in an academic emergency medicine program's compensation methodology is but one example of this.

Proper Leadership is Needed to Affect Change and Improve Productivity

Solutions to problems of resource utilization, cost, public health, departmental flow and patient satisfaction require the active participation of physicians to find solutions. Knowledge and training in the process of change will allow physicians to continue to be leaders and successfully work with hospital administrators and department managers to maximize efficiency, flow, utilization safety and patient satisfaction.

One common example can be seen in the patient who presents with ST segment elevation myocardial infarction. Prompt transfer to a cath lab is a shared goal of patients, EMS systems, nurses, emergency physicians, the cardiac cath team and hospital administration. This complex collection of interdependent components is a system that interacts to achieve a common purpose. Thus, if some patients fail to get prompt cardiac care, change of the system is required. A system inevitably creates the results that it is designed to produce, so simply getting everybody to work harder independently is not enough. *Changes*

to both the system design and interdependences of the elements are a requirement for improvement. For example, electronic transmission of the EKG during transport may be a change that would allow early activation of the cardiac care team, achieving both a change to the system design and interdependencies between the parties.

Several models exist to guide improvement within organizations, including Six Sigma DMAIC (a mnemonic for the five basic steps) and others. The model for improvement by Langley, Nolan and Nolan² and Associates in Process Improvement, Inc. provides structure for organizations to address the process of change and improvement. Here, specific aims are set and measures are created to learn whether improvements have been made. The key to its success is that process improvements require systemic change and obtaining good ideas for change from multiple sources and stakeholders is essential.

Effective leaders are able to suggest incremental changes that result in progressive improvement. These incremental changes or aims should be specific, time sensitive and measurable. For instance, a goal of improving the cath activation system is not enough. A proper aim statement might be for the hospital to be in the 99% percentile for cath lab activation times by the end of the year. This statement represents a real challenge. Ambitious goals motivate systemic change.

Measurement is essential to improvement in order to assess whether a given change is successful. How else will we know if a change is a success? Measurement helps to clarify aims, establish improvement and understand the causes of failure and success. All physicians have been taught rigorous study designs, like double blinded control studies during medical school and residency. Large scientific studies are essential to the discovery of new knowledge. Ironically, improvement is paralyzed by the search for the perfect measurement because improvement simply requires bringing established knowledge into daily practice. Small representative samples built into daily work perform best. Outcome measures gauge the ultimate result. For instance, what is the door to balloon time? Process measures ask if the system is working to achieve the desired result. An example would be the times to activate the cath team and the times the cath team arrives to the hospital. It is important to start with baseline data. We must know where we started so that any change that is made to current practice can be measurably linked to outcome metrics. Finally it is necessary to include a balancing measure to ensure that changes do not have unanticipated consequences. One such measure might be the rate of false activation of the cath team by electronic EKG transmission.

It may seem as though ideas to improve healthcare are ubiquitous, but shifting entrenched customs and practices and the cultures they were derived from can be daunting. Boarding overflow patients on inpatient units rather than in the ED, is a terrific way for hospitals to cope with ED overcrowding. In practice however, there is fierce resistance to the concept. Effective leaders are able to challenge the status quo by communicating effectively that the current system cannot remain, and offer superior alternatives. Ideas for change can come from multiple sources. Critiquing the current system is useful to identify weak elements. New technologies can be employed. Benchmarking is the comparison of a process to the 'best practice' to identify areas for improvement. Take time for creative thinking and reexamine the existing process.

The Plan-Do-Check-Act cycle was developed by Walter A. Shewhart, PhD, subsequently modified by Deming and called the Plan-Do-Study-Act (PDSA) as a way for organizations to test changes in real work settings.³ The PDSA cycle relies on inductive learning. A general, systemic rule is induced from a sample of observations. It allows for testing of changes, observation of results, modifications and repeat testing. The process is intuitive and is often unknowingly applied to our daily lives. For example; an emergency physician who has a great day after arriving rested and early for a shift concludes that punctuality improves performance. Once an aim is set, the PDSA cycle is used to test changes in a real work setting.

Improving our health care system requires focusing on the many links and interactions between elements. For instance, getting patients to the inpatient unit from the emergency department faster requires the interaction of multiple elements including radiology, registration, nursing and physicians. Systemic change requires more than improving our physician skills. Although some physicians navigate the system more efficiently than others, it is not obvious or easy for everyone. Cooperation with the other services is essential and an effective team for change can exert influence on multiple elements of a system. The team should include a system leader who is respected and has the authority to make changes, a technical expert and someone to monitor daily progress.

External pressures are forcing the evaluation and transformation of our current healthcare system. Physicians are needed both as leaders and participants in this process. Recognition of the need for changes to our healthcare system and the value building improvement into daily work is vital to success. Meeting the needs of our patients necessitates us to careful and deliberate reflection and action. Physicians can serve to provide ideas for change contribute data and provide analysis for further advancement and incremental change.

One method to evaluate the ED and model how arrival curves affect throughput in the system is the use of queuing theory tools. While this is beyond the scope of this paper, there are some resources that can be used to provide insight into viewing throughput in your ED at the end of this paper.

Conclusion

There are many elements that must be considered when evaluating and managing the efficiency and productivity of the ED and the physicians functioning therein. While it would be comforting to have an absolute baseline from which to compare productivity and efficiency, it remains difficult across ED locations due to specifics discussed above. A “Benchmark” as it were is probably not easily established because of the differences in EDs. It is complicated to do a true apples to apples comparison. However, as mentioned in the section on RVUs and comparison of physician productivity by RVUs per patient or per hour may be helpful. Again one must remember to adjust for variables such as time of day, nursing and ancillary staffing and day of the week (remember that bankers hours make up the minority percentage of hours in the ED).

Perhaps the most valid evaluation of productivity, staffing and efficiency in modern emergency departments today is a comparison against oneself. This means defining useful metrics, using these metrics to measure a baseline, doing an analysis (perhaps after completing some flow studies), making changes and then measuring again.

Understanding how to measure productivity of the ED as a whole by metrics that include staffing, wait times, throughput times, boarding etc...and then making incremental changes and measuring again is a method that will ensure purposeful change and improved efficiency. Simply saying “the nursing administrator feels there needs to be more physician coverage” or “there are not enough nurses on” or Dr. Jones is too slow, are statements that need to be verified by productivity data if you want to avoid the potential for low or nonimpact changes.

As a final note, with over 4000 hospital emergency departments in the country today, and many progressive, functional ED leaders, the tools needed to accomplish accurate ED and physician productivity measurement in one form or another already exist. Perhaps a future project or extension of this article might be a warehousing of such tools for use and distribution.

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