

# **Working Hard: Hardly Working**

## **Comparing Clinical Productivity of Anesthesiology Groups**

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**Productivity:** The rate at which goods or services are produced especially output per unit of labor.  
**Benchmarking:** To measure (a rival's product) according to specified standards in order to compare it with and improve one's own product.

### **INTRODUCTION AND OBJECTIVES**

The ability to measure clinical productivity and compare it meaningfully with the productivity of others is important to anesthesiology groups for several reasons. Both private-practice and academic groups need to be able to measure productivity objectively in order to make data-driven decisions about strategic planning and operations. For private-practice groups, measurements of productivity, especially clinical productivity of individuals, are the basis of revenue-distribution plans to individual partners. For academic groups, university administrations (e.g., deans and hospital administrators) provide an additional impetus to create a system of metrics by increasingly demanding that all departments, including anesthesiology departments, be able to measure productivity and compare it to industry standards—a process commonly called "benchmarking."

The larger topic of measuring clinical productivity can be separated into four areas: an overview of confounding factors that make measurements and comparisons difficult<sup>1-3</sup>, individual productivity measurements<sup>1,3</sup>, internal group productivity measurements, and external group productivity comparisons<sup>3-6</sup>. The goals of this presentation is to discuss the last area: how to meaningful compare clinical productivity of anesthesiology groups. After the presentation, you should be able to use the methodology to (1) compare clinical productivity of different hospitals at which your group provides care, and (2) compare your group's productivity with other academic groups by utilizing the SAAC/AAPD report on clinical productivity survey.<sup>6</sup> You should also have an understanding of the limitations of the methodology.

### **INDIVIDUAL VS. GROUP MEASUREMENTS**

Individual and group measurements are not the same thing. Measurements of individual productivity should reflect the individual's contribution as well as areas that the individual has some influence. In contrast, the group measurements should reflect how the group as a whole functions. These differences can be easily seen by using a team sports as an analogy. For example, in basketball, individual measurements include many different statistics for each position, such as assists for point guards, rebounds for power forwards, and blocked shots for centers. In contrast, the meaningful external team comparison (i.e., how teams are judged to be good) is simply the win-loss record. In anesthesiology, we have an analogous situation. Measurements of individual productivity should be tailored to the different types of functions (e.g., ICU, Pain Management, General OR, Pediatric, Cardiac) while the group measurement should reflect the contribution of the whole group.

## **INTERNAL VS. EXTERNAL MEASUREMENTS**

Comparisons of individuals are done within a group (internal measurement), and in practicality, comparisons of individuals in two different anesthesiology departments (external measurements) are not done. In contrast, anesthesiology groups desire to both track and trend their productivity over time (internal measurements) and compare themselves externally to other groups (external measurements or benchmarking). Continuing the basketball analogy – despite a favorable win-loss record (external), a team’s coach may be unhappy with certain aspects of the team or group performance, such as rebounding or field goal percentage (internal measurements). Therefore, the coach relies not only on the external measurement (win-loss) to evaluate his team’s performance. Similarly in anesthesiology, external measurements of group productivity can be used to compare productivity with other groups, but these comparisons should not be the only measurements. Groups should also collect "internal" measurements specific to their group (i.e., "key indicators," such as the number of cases scheduled per day, percentage of ORs still running at 3 PM, total charges billed per month, or revenue per month). Each group must choose what key indicators to use for their clinical setting and practice.

## **COMPARING CLINICAL PRODUCTIVITY OF ANESTHESIOLOGY GROUPS**

The topic of internal measurements is beyond the scope of this presentation because of the need to analyze each group’s business and clinical setting before evaluating which internal measurements that would be most helpful. The discussion will therefore focus on how to meaningfully compare the clinical productivity of different anesthesiology groups.

### **Meaningful Comparisons**

In order to make meaningful comparisons, the methodology must include standardized measurements that answer relevant questions. The data collected in an industry-wide report will be based on self-reported surveys. Because of the survey-format to collect the data from many groups, the measurements will be limited in that financial data (e.g., reimbursement, compensation) are not collected. On the other hand, if a group uses the methodology to compare hospitals at which the group provides care, financial data could be included in an internal evaluation. To provide meaningful comparisons, the difference in staffing ratios must be accounted for in the measurements.<sup>4</sup> Finally the measurements must allow for relevant questions to be answered, such as the following<sup>5</sup>:

- Are we producing as much as the average group?
- Are working longer hours than others?
- How does surgical duration affect my billings?
- Do we have harder cases?

### **Data Collected**

To illustrate how productivity of anesthesiology groups can be compared, several hypothetical groups will be shown. The definitions of the data collected (and measurements) used can be found in Table 1 and 2 in reference 5. The data used for comparison is based on daily staffing and yearly billing data. The daily number of anesthetizing sites staffed on regular day (OR Site) and the number of anesthesiologists needed to staff those sites (OR FTE) are estimated from the OR schedule for each group. [Note: An anesthesiologist not scheduled to work at beginning of the day – that is post-call or on-call – is not included in this OR FTE number. Also, the 16 OR FTE are the daily number of faculty needed to cover the ORs. The

actual number of FTEs needed that take into account non-clinical time, vacation, call, etc will be much higher.<sup>2]</sup> Annual billing information – cases billed (case), total ASA units billed (tASA), and time units (TU, 15-minute) are also collected from each group. Excluded from this data are obstetric anesthesia service and any service not billed using ASA units. Obstetric services are not included because billing methodology is different than the OR and is not consistent among all groups.<sup>7</sup> Similarly, RVU-based procedures are not consistently reimbursed by payers and hence differ among groups. Fortunately, RVU-based procedures are a small percentage of the billed charges from the OR.<sup>1</sup>

### **Hypothetical Groups**

To illustrate how groups can be compared, three hypothetical groups (A, B, C – see Table 1) will be used. Group A is a private-practice physician-only group covering 20 OR sites with 20 OR FTE. Group B is an academic group covering 30 OR sites with 16 OR FTE. Group C is a private-practice group using medical direction model to cover 15 OR sites with 5 OR FTE. The data collected for each group is shown in Table 1.

### **Meaningful Comparisons of Productivity Measurements**

Note: For more detailed definitions and calculations of the productivity measurements discussed below, the reader is referred to reference 5.

*Who is most productive?* To quantify overall productivity of a group, the "final output" measurement is used. "Cases billed" as a measure of final output does not account for variability of base and time units between cases, but tASA does. As a denominator, the traditional method has been to use "per FTE" or anesthesiologist. Using tASA/FTE, one would conclude that Group C is most productive and Group A is least with Group B in the middle. (See Table 2) But this measurement does not account for concurrency (i.e., staffing ratio) differences between the groups. In contrast, tASA/OR site eliminates the issue of concurrency differences. When tASA/OR site is used, the conclusions are much different.<sup>4</sup> Now, both Group A and Group B have the same value with Group C slightly less. The use of "per OR site" appears to provide for meaningful comparison because it eliminates the confounding affect of the difference in concurrency.

*Are the groups working the same amount of time? What accounts for differences in tASA/OR site between the three groups? Could it be that Group C does not work as long? Or are there other factors?* To examine these issues, additional measurements are needed. The first examines the amount of billed time per OR site. The measurement used is billed hours per OR site per day (h/OR/d) and is estimated from TU/OR site. (see Table 3) In comparing Group A and B, we find that although the two groups produce the same amount per OR site, Group B has to bill an average of 2.6 h/OR/d more than Group A to achieve equity. Therefore the hourly billing productivity (total ASA units per billed hour of care = tASA/h) must be higher in Group A than in Group B. This difference in tASA/hr is related to the surgical duration.<sup>5</sup> Group B is an academic anesthesiology group that provides care for academic surgeons, i.e., surgical house officers. The surgical residents should take longer than the fully trained private surgeons for whom Group A (and C) provide care. This difference in surgical duration is noted in the measurement of case duration (h/case). Group B's h/case is twice that of Group A or Group C. (Table 3) Because of this longer duration, for the same time period (e.g. 8 hours), Group B will

provide care for less cases than Group A or C. Therefore, Group B will bill less base units than the others resulting in a lower tASA/hr. Therefore to bill the same amount per OR site (tASA/OR site), Group B will need to work more hours than the others.

In contrast, Group C's tASA/OR site is less than Group A's because they billed less hours. In this comparison, the tASA/h are the same, and therefore the difference in overall productivity is the billed hours. Even though billed hours are similar, the actual hours worked may not be the same. The actual hours worked equals billed hours and non-billable hours. The non-billable hours are influenced by utilization of OR time, case scheduling, OR block allocation, and number of OR sites. Nevertheless, if billed h/OR/d are lower and tASA/h are the same, then the overall productivity (tASA/OR) will be less.

Finally, attempting to answer if the base/case is responsible for differences in productivity, all three groups have the same base/case in this example. Base/case does not appear to explain the differences in surgical duration or the difficulty of anesthetic cases. For instance, anesthesia for repair of abdominal aortic aneurysm (AAA) has the same base units per case for all groups. But in Group B, the AAA surgery will take longer than Groups A or C. I would argue that the longer the case the harder the anesthetic management, but the base/case is the same.

*Not all hospitals are the same.* In Table 3, a fourth anesthesia group is included – a private-practice physician-only group providing care at an ambulatory surgical center (ASC). The purpose of this fourth group is illustrate that not all hospitals are the same. ASC's function and operate differently than regular hospitals. ASC's hours of operation are limited and shorter than regular hospitals. Surgical duration is generally shorter in ASCs. The type of procedures by definition must be ambulatory surgery. In Table 3, the effect on the productivity measurements can be seen. The overall productivity is lower than the first three groups, but the h/OR/d is also lower. On the other hand, tASA/h is higher because of the shorter surgical duration (h/case).

## **REAL DATA**

One of the goals to comparing oneself to other groups is being able to benchmark one's activities. The hypothetical groups above illustrate the methodology and principles that would allow one to do so if the data was available for a large sample. As shown in the hypothetical groups above, not all hospital/groups are the same. Therefore, focused data of similar-type hospitals will allow for better comparisons or benchmarking. The data can be organized using grouping variables such as type of anesthesiology practice (private-practice vs. academic), type of practice model (MD-only vs. medical direction), type of hospital (ASC, Academic Medical Center, Community, or County/Indigent), number of anesthesitizing sites or OR sites (1-9, 10-19, or 20+), and type of surgical staff (private-practice, mixed, or academic).

For a comparison of private-practice and academic anesthesiology groups, an example of the comparisons in a small sample (11 private-practice and 9 academic) has been published.<sup>5</sup> The hypothetical groups illustrated above are based on these results. In this study, the surgical duration greatly affected the productivity measurements. (Table 4) The surgical duration is different for private-practice anesthesiology groups and academic anesthesiology departments because they provide care for different types of surgeons. The academic groups provide care for surgeries that involve surgical residents, but the private groups in this study did not have

surgical residents performing the surgeries. The surgical durations were 1.6 hours/case for the private groups and 2.6 hours for the academic groups. The affect on billing is seen in the tASA/hr produced. Because the private groups had shorter cases, they can provide for more cases per hour than the academic groups. Hence, the hourly productivity (tASA/hr) was much less in the academic groups (6.3 vs. 8.4 in private). The implications are the following: (1) if an academic group and private group billed the same amount of time, then the private group would bill more tASA/OR site and hence be more productive; (2) if both groups billed the same amount per OR site, then the academic group would have to work significantly longer (in billed time) than the private group. In the study, the latter was the situation. Both groups had similar median tASA/OR but the academic groups' median hrs/OR site was 7.8 hours which as almost 2 hours longer than the private groups' (6.0 hours).

In a larger (industry-wide) study of academic anesthesiology departments, hospitals at which the departments provide care were compared. In addition, data from this survey can be used for benchmarking group clinical productivity.<sup>6</sup> The results were based on members of the Society of Academic Anesthesiology Chairs/Association of Anesthesiology Program Directors (SAAC/AAPD). Fifty-eight hospitals from 37 anesthesiology departments were included. The results were organized by grouping variables of type of hospital (Academic Medical Center – AMC, Indigent/County, Community, or Ambulatory Surgical Center – ASC), number of OR sites (1-9, 10-19, or 20 or more), and by surgical staff (Academic, Private, or Mixed). Median values of productivity measurements for all the groupings and categories are shown in Table 5. Quartile data (minimum, 25<sup>th</sup> percentile, median, 75<sup>th</sup> percentile, and maximum) are reported in the study.<sup>6</sup>

The results are important because they demonstrate that not all hospitals are alike, especially when comparing clinical productivity. For instance, ASCs are clearly different. Whether analyzed by type of hospital or by the number of ORs, ASCs differed significantly from other facilities. ASCs function distinctly differently from their non-ASC counterparts. First, ASCs have fixed hours of operations (i.e., the recovery room) and close at a specific time, thereby limiting the hours the ORs are scheduled for operation and the maximum expected duration of surgery. In addition, by definition, the types of surgical procedures are limited to outpatient or ambulatory surgery; these hospitals are also limited in scope because of the facility's capabilities (e.g., equipment, space, or staff). Because of these differences, the categories within the hospital size grouping variable were separated into ASC and non-ASC facilities. The productivity measurements illustrate the results of this pattern of utilization (Table 5). ASCs produced the fewest h/OR/day. The median value for h/OR/day was only 3.8 h for ASCs, although unbilled hours, including turnover time and room set-up time, extend the amount of time the OR is used each day. In contrast, non-ASC facilities usually are not limited by fixed hours. When comparing non-ASC facilities with a small numbers of operating rooms to ASCs, the small, non-ASC facilities generated 75% more billed hours per OR. The shorter billed h/OR/day of ASCs also results in lower tASA/OR. Furthermore, surgical duration (h/case) is also lowest in ASC facilities.

When benchmarking, comparing a hospital to all hospitals will lead to a different evaluation than when comparing to like-hospitals. As an example, 3 hospitals are benchmarked using the results from the SAAC/AAPD survey<sup>6</sup> are shown in Tables 6-8.

## **OTHER COMMENTS**

*FTE data collection.* Except for reporting concurrency or staffing ratios, FTE data is not utilized in the comparison of anesthesiology groups. Despite this evidence, a group may still want to use tASA/FTE as an indicator of productivity. Although tASA/FTE can easily be calculated as the product of median concurrency and median tASA/OR site, this resulting measurement is misleading as an external benchmark when comparing groups having different concurrencies. On the other hand, as an internal benchmark of group (not individual) performance, a group could multiply its own concurrency by its median tASA/OR site to quantify tASA/FTE uniquely for the group. The group may then choose to follow this as a key indicator, assuming concurrency does not change.

## **SUMMARY: WHAT DOES THIS MEAN TO ME?**

*Limitations.* There are several limitations to the methodology presented. First, the measurements of clinical productivity are based on billed units, not on revenue. Second, the number of staff one needs is based on number of anesthetizing sites that need to be staffed, not on productivity measurements.

*Comparing measurements of clinical productivity.* The goal of the methodology was to identify underlying factors that contribute to overall productivity in specific groups (Figure 1). Overall billing productivity, tASA/OR, is defined by two major factors: hourly billing productivity (tASA/h) and billed hours (h/OR/d). Surgical duration (hr/case) influences tASA/hr. Therefore, low tASA/hr could be explained by long case duration or low base units. Our studies identified surgical duration as the major factor.<sup>8</sup> In addition, the hourly revenue does not usually pay for the hourly staffing costs.<sup>9</sup> Billed hours are influenced by OR utilization and workload/OR, but do not represent total hours worked because non-billable time is not measured. Low h/OR/d could be explained by poor utilization of OR time because of inefficient scheduling or excessive numbers of anesthetizing sites. Because all circumstances influencing h/OR/d are not measured, each group must assess their individual situation.

*Comparing to “like-hospitals.”* As demonstrated in the benchmarking examples, one should only compare similar facilities. If a group provides care in two or more facilities that are differently organized, productivity goals should be set for each facility. In addition, a group that has generates high tASA/OR but has poor revenue because of a poor payer mix may be able to use comparisons to justify the need for subsidization of the group by the facility in order to maintain services.

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**Table 1: Comparing Hypothetical Groups: Data Collected**

Group	Descriptor	FTE	OR Site	Cases	tASA	TU
A	Private MD-only	20	20	30,000	300,000	120,000
B	Academic	16	30	32,143	450,000	257,143
C	Private Medical Direction	5	15	21,000	210,000	84,000

The data collected for comparing anesthesiology groups. Definitions can be found in Table 1 of reference 5. FTE = OR FTE = the average daily number of anesthesiologists who were scheduled to work the OR sites, OR sites = average daily number of anesthetizing sites staffed, Cases = cases billed for 1 year, tASA = total ASA units billed for one year, TU = 15-minute time units billed for one year.

**Table 2: Comparing Hypothetical Groups: “per FTE” vs. “OR site”**

Group	Descriptor	tASA/ FTE	tASA/ OR site
A	Private MD-only	15,000	15,000
B	Academic	28,125	15,000
C	Private Medical Direction	42,000	14,000

Based on the data collected (see Table 1 above), the comparison of overall productivity can be done. The traditional method is to compare “per FTE” leading to the conclusion that Group C is most productivity and Group A is least productive. Unfortunately, since “per FTE” does not take into account the differences in concurrency (i.e., staffing ratios), the conclusions are not meaningful. In contrast, “per OR site” measurements eliminates the concurrency difference issue. In this case, the conclusions are much different – Groups A and B are most productive, but Group C is not much less. tASA = total ASA units, FTE = OR FTE, OR site = anesthetizing site

**Table 3: Comparing Hypothetical Groups: Productivity Measurements**

Group	Descriptor	tASA/ OR site	h/OR/d	h/case	tASA/h	Base/ case
A	Private MD-only	15,000	6.0	1.00	10.0	6.0
B	Academic	15,000	8.6	2.00	7.0	6.0
C	Private Medical Direction	14,000	5.6	1.00	10.0	6.0
D	ASC Private MD-only	12,000	4.0	0.75	12.0	6.0

Comparing clinical productivity of different anesthesiology groups based on data collected (see Table 1 above). For more detailed definitions and calculations see Table 2 in reference 5. Additional comparisons beyond the overall productivity (tASA/OR site) allow for a more meaningful comparisons and accounting for difference in surgical duration and base units. Further, the example illustrates that not all hospitals are the same and therefore any benchmarking data should include overall data and focused results for smaller groupings, e.g., private-practice vs. academic anesthesiology group, ASC vs. other hospitals. tASA = total ASA units, OR site = OR = anesthetizing site, h = billed hour of anesthesia care = time units/4

**Table 4: Median and Range of Productivity Measurements for All Groups and for Private-Practice and Academic Groups**

	Private-practice Groups (n=11)		Academic Groups (n=9)		p-value
	Median	(Range)	Median	(Range)	
Concurrency	1.26	(1.00 - 2.50)	1.56	(1.19 - 2.06)	0.37
tASA/OR site	12,700	(8,800 - 17,000)	12,400	(10,600 - 16,400)	0.94
hrs/OR/day	6.0	(3.2 - 8.6)	7.8	(6.9 - 9.9)	0.03
case/OR site	1,120	(583 - 1,350)	713	(657 - 1,049)	0.01
hrs/case	1.5	(0.6 - 2.2)	2.6	(2.2 - 3.2)	0.001
tASA/hr	8.38	(7.07 - 12.72)	6.31	(5.83 - 6.65)	0.001
base/case	6.39	(4.71 - 10.92)	6.24	(4.35 - 8.39)	1.00

Median and range for productivity measurements. The variations in practice settings seen in the data collection for private-practice groups are seen in the productivity measurements, especially in hrs/OR/day and tASA/hr. All the private-practice groups had shorter surgical durations (hrs/case) than any of the academic groups. Academic and private-practice group measurements compared with p-value <0.05 significant.

tASA = total ASA units, OR site = anesthetizing site, hrs = time units/4, base = base units

From Anesthesiology 2002;92:608-615

**Table 5: Academic Groups – Median Data and Productivity Measurements: Overall Groups and Subgroups**

Grouping Variable	Category	n	Cases	OR sites	tASA/OR	h/OR/day	H/case	tASA/h	Base/case
ALL	All groups	58	12,500	18.1	11,700	7.1	2.4	6.7	6.4
By OR size	ASC (all 1-9 ORs)	7	1,900	3.0	8,200	3.8	1.6	8.2	5.4
	non-ASC 1-9 ORs	10	4,400	6.5	10,500	6.7	2.4	6.9	6.3
	10-19 Ors	16	11,700	17.0	12,100	7.3	2.6	6.5	6.4
	≥20 Ors	25	23,000	29.0	12,900	7.4	2.4	6.6	6.6
Hospital type	AMC	34	15,000	23.0	12,600	7.6	2.6	6.6	6.6
	Indigent	5	12,600	18.2	12,400	8.3	2.9	5.9	5.4
	Community	12	7,300	10.3	11,500	6.5	2.1	7.3	6.5
	ASC	7	1,900	3.0	8,200	3.8	1.6	8.2	5.4
Surgical staff	Surgeons: academic	34	13,200	19.5	11,700	7.4	2.7	6.5	6.3
	Surgeons: mixed/private-practice	24	10,400	15.0	11,700	6.6	2.1	7.3	6.6

Median values for selected data and productivity measurements from a survey of academic anesthesiology programs. Thirty-seven academic anesthesiology departments reported data for 58 hospitals shown above. Productivity measurements were used to compare groupings of academic anesthesiology programs. Obstetric anesthesia care was excluded. OR = operating room; tASA = total ASA units; h = billable hours (15-min time units)/4; day = annual data/250, case = billed case; base = base units; OR site = anesthetizing site; ASC = ambulatory surgical center; AMC = academic medical center; Surgeon: academic = surgical residents involved in all or almost all surgeries; Surgeon: mixed = surgical residents involved in some surgeries; Surgeon: private-practice = no surgical residents involved in surgeries.

From reference 6 (in press) and Anesthesiology 2002;92:A1135

**Tables 6-8: Examples of Benchmarking of Academic Groups. (From Reference 6).**

Percentiles are based on quartile data for that specific category. ASC = Ambulatory Surgical Center, tASA = total ASA units, OR = OR site, h = billed hour = time units/4, d = 250 days/year, AMC = Academic Medical Center, Academic surgeons (surgical residents involved in all or almost all cases), mixed surgeons (surgical residents involved in some or no cases).

Table 6: Example Benchmarking – ASC with 2.0 OR sites and Mixed Surgeons

Percentiles	tASA/OR	h/OR/d	h/case	tASA/h	Base/case
All Groups	0-25	0-25	0-25	75-100	75-100
OR 1-9 Sites, ASC	50-75	50	50-75	50-75	75-100
Mixed Surgical Staff	0-25	0-25	25	75-100	75-100

Table 7: Example Benchmarking – AMC with 12.0 OR sites and Academic Surgeons

Percentiles	tASA/OR	h/OR/d	h/case	tASA/h	Base/case
All Groups	50-75	25-50	50	75	25-50
10-19 OR Sites	50-75	25-50	0-25	75	25-50
AMC	25-50	25-50	0-25	50-75	0-25
Academic Surgical Staff	50-75	25-50	0-25	75-100	25-50

Table 8: Example Benchmarking – Community Hospital with 6.0 ORs and Mixed Surgeons

Percentiles	tASA/OR	h/OR/d	h/case	tASA/h	Base/case
All Groups	0-25	0-25	25-50	25-50	25-50
1-9 OR Sites	25-50	25-50	25-50	25-50	25-50
Community	25-50	25-50	50	25-50	25-50
Mixed Surgical Staff	25	25-50	50	0-25	25-50

**Figure 1: Clinical Productivity of an Anesthesiology Group**

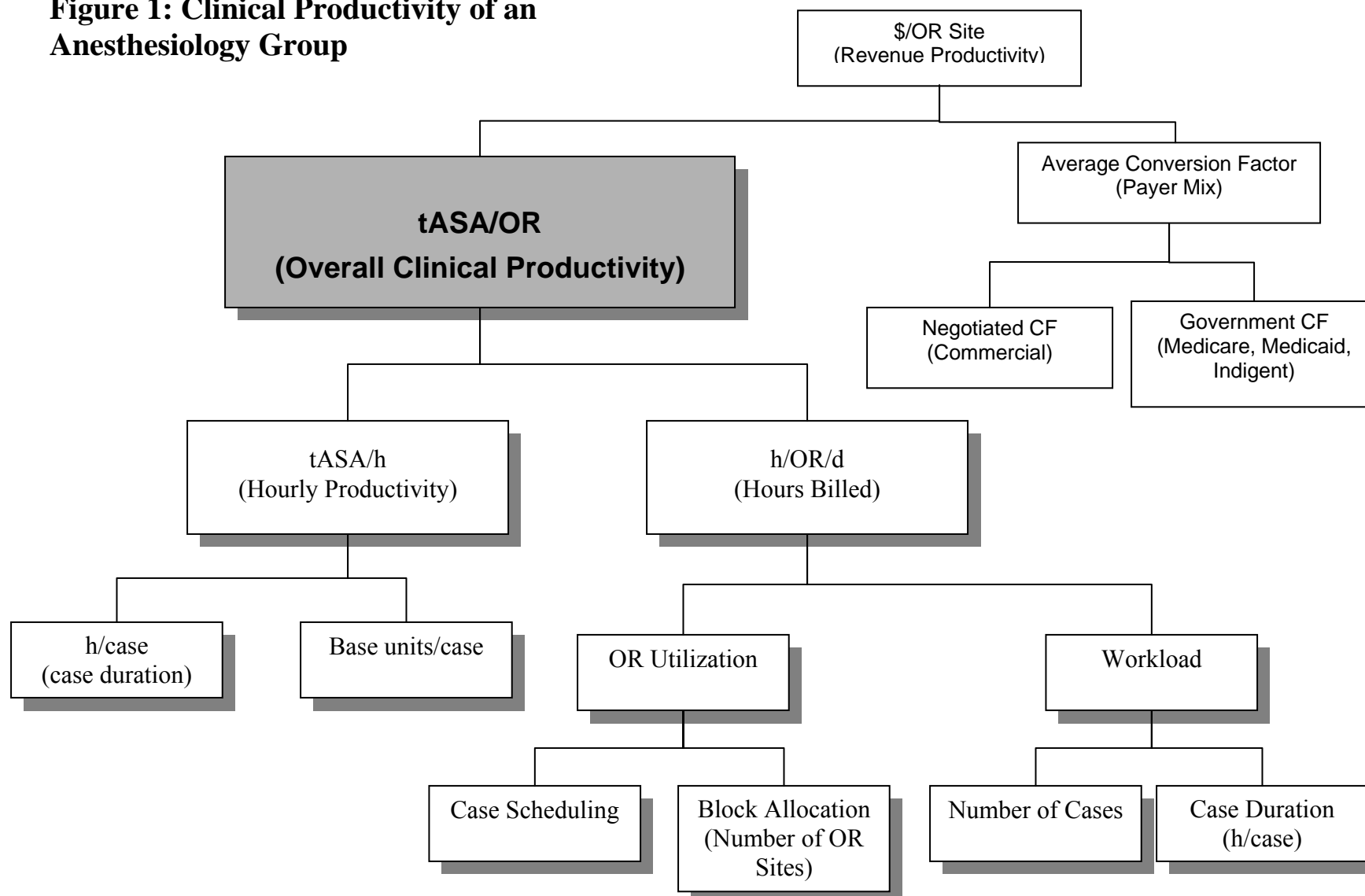


Figure 1: Factors influencing productivity of anesthesiology groups. \$/OR site = dollars of revenue per OR site, tASA = total ASA units, h = billed hour = time units/4, d = 250 days/year.