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# Measurement of Individual Clinical Productivity in an Academic Anesthesiology Department

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## Appendix: Anesthesiologist-Independent Factors and Productivity Measures

The following discussion and examples illustrate the effect of anesthesiologist-independent factors (e.g., speed of surgeon, assignment to operating rooms, and concurrency) on different productivity measures. Factors that are not discussed below but should be considered include clinical sites that generate fewer ASA units (e.g., obstetric anesthesia or in-hospital call), and the problem of clinical sites that do not bill using ASA units. Finally, all the examples below assume that the surgical schedule is completely booked for the day. The reality is that rooms that are not completely booked or in which cases are canceled will affect the ASA units billed by the anesthesiologists but do not influence the daily need to cover the operating rooms.

### Parameters

For regular weekdays, the operating room schedule begins at 7:30 AM with daily cases ending between 4 PM and 5 PM. Time units are billed in 15-minute intervals.

Operating Rooms (OR) 1: Fast surgeon performing laporoscopic cholecystectomy. Duration of surgery is 60 minutes and turnover time is 20 minutes. Base ASA units for each case are 7 units. Time units per 60-minute case are 4 units. Therefore, in normal working hours, 7 cases can be performed starting at 7:30 AM and ending at 4:30 PM. Hence, time units billed are 28 (7×4) units, base units billed are 49 (7×7), and total units billed are 77 units.

OR 2: Slow surgeon performing laporoscopic cholecystectomy. Duration of surgery is 120 minutes and turnover time is 20 minutes. Base ASA units for each case are 7 units. Time units per 120-minute case are 8 units. Therefore, in normal working hours, 4 cases can be performed starting at 7:30 AM and ending at 4:30 PM. Hence, for this room, time units billed are 32 (4×8) units, base units billed are 28 (4×7), and total units billed are 60 units.

OR 3: Fast surgeon performing coronary artery bypass graft (CABG) surgery. Duration of surgery is 2.5 hours and turnover time is 30 minutes. Base ASA units for each case are 20 units. Time units per 150-minute case are 10 units. Therefore, in normal working hours, 3 cases can be performed starting at 7:30 AM and ending at 4 PM. Hence, for this room, time units billed are 30 (3×10) units, base units billed are 60 (3×20), and total units billed are 90 units.

**Productivity Measure Example 1: Speed of Surgeon**

Assume that anesthetic care for cases in OR 1 and OR 2 is personally provided by two different anesthesiologists (personally performed, concurrency of 1). The resulting productivity measures are illustrated in Table A1. Although both anesthesiologists work the same amount of time, the time units charged are different by at least 10%. Even more remarkable is that total ASA units

billed are different by 30%. The anesthesiologist in OR 2 would be measured as having lower productivity than the anesthesiologist in OR 1 under both the time units and total ASA units.

**Productivity Measure Example 2: Type of Surgery**

Assume personally performed care for all three operating rooms. The resulting productivity measures are again illustrated in Table A1. Although the time units only differ by 10%, the anesthesiologist in OR 3 finished the earliest but did not have the lowest time units. Further, the effect of the difference in base units can be seen by comparing the total ASA units from OR 3 as compared to the other two ORs. If all three anesthesiologists can provide care to any of the three rooms, then the anesthesiologist in OR 3 will be measured as being a "super-producer" using total ASA units charged.

**Productivity Measure Example 3: Concurrency Factor**

Assume that anesthesia care for OR 3 was personally performed (or one-on-one medical direction) by Anesthesiologist B, but the services for OR 1 and 2 were concurrently medically directed by Anesthesiologist A. That is, Anesthesiologist A will bill for services provided in both OR 1 and 2. Furthermore, under Medicare, the reimbursement for medical direction of 2 concurrent ORs is 50% of the allowable reimbursement. On the other hand, Anesthesiologist B will only bill for the services personally performed in OR 3 and these charges will be reimbursed at 100% of the allowable rate. The resulting productivity measures are shown in Table A2. Using time units or total ASA units without adjusting for the different concurrencies, Anesthesiologist A produces twice as many time units and over 50% more total ASA units. On the other hand, reimbursement for Anesthesiologist A will be over 20% less than Anesthesiologist B.

**Table A1: Effect of Speed of Surgeon and Type of Surgery on Productivity Measures**

| Personally Performed by … | OR Assignment | Speed of Surgeon | Type of Surgery | Clinical Days Worked | Time Units Billed | Total ASA Units Billed |
|---|---|---|---|---|---|---|
| Anesthesiologist A | OR 1 | Fast | Lap Chole | 1 | 28 | 77 |
| Anesthesiologist B | OR 2 | Slow | Lap Chole | 1 | 32 | 60 |
| Anesthesiologist C | OR 3 | n/a | CABG | 1 | 30 | 90 |

For details, see text. OR = operating room; ASA = American Society of Anesthesiologists; Lap Chole = laporoscopic cholecystectomy; CABG = coronary artery bypass graft.

**Table A2: The Effect of Concurrency on Productivity Measures and Reimbursement**

| Personally Performed by … | OR Assignment | Type of Anesthesia Service | Type of Surgery | Clinical Days Worked | Time Units Billed | Total ASA Units Billed | % of Allowed Reimbursed |
|---|---|---|---|---|---|---|---|
| Anesthesiologist A | OR 1 & 2 | Medical Direction | Lap Chole | 1 | 60 | 137 | 50% |
| Anesthesiologist B | OR 3 | Personally Performed | CABG | 1 | 30 | 90 | 100% |

For details, see text. OR = operating room, ASA = American Society of Anesthesiologists, Lap Chole = laporoscopic cholecystectomy, CABG = coronary artery bypass graft.