
3.

Cost of ICU Care

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COMPONENTS OF ICU COSTS

The cost of intensive care units (ICUs) can be divided into the direct costs of operating the ICU and the indirect costs for *central services* that are allocated to the ICU (6). Sanders estimates (212) that for Massachusetts General Hospital in Boston about 65 percent of ICU costs (for labor, equipment, etc.) are direct, and that about 35 percent of costs (for hospital overhead, housekeeping, etc.) are indirect.

Direct costs include fixed costs and variable costs. Fixed costs exist no matter how many patients are treated in the ICU and include depreciation for the cost of construction, renovation, and

equipment, as well as equipment maintenance (6). Variable costs are dependent on the volume of services provided. Some variable costs, such as personnel costs, are fixed over a specific range in patient volume, but change when the patient volume exceeds the range. Other variable costs, such as nondurable equipment and oxygen, are dependent directly on total patient days (6). Data from both foreign and domestic ICUs indicate that 50 to 80 percent of direct costs are variable personnel costs, primarily for nursing (42,101,155, 212). On average, ICUs use almost three times as many nursing hours per patient day as do general floors (205).

COSTS OF AN ICU DAY

It has become increasingly clear that hospital charges do not represent the true costs of providing hospital services (80). Generally, charges are greater than operating costs, in order to pay for bad debts, to support nonreimbursable educational and preventive health programs, and to pay for costs disallowed by cost-based insurers, including many Blue Cross plans, Medicaid, and Medicare (80). For example, by analyzing cost and billing data, the Health Care Financing Administration has calculated the national ratio of allowable Medicare inpatient operating costs to Medicare inpatient charges at 0.72 (74).

ICUs are different from most hospital services (including general room and board¹), however, in that charges for ICU room and board are often set below cost (6,212,240). In one detailed econometric analysis, ICU charges for room and board in one hospital were found to be only slightly more than half of calculated costs (109). ICU data from U.S. hospitals consist mostly of room and board charge data, unadjusted for actual cost. The

charges or costs for the ancillary services used by ICU patients are not matched to their ICU stays, because hospitals report their charges for the various ancillary services by department, not by site of patient location. If one considers only ICU room and board charges in estimating ICU costs, one may significantly underestimate the relative costliness of ICU care, then, because ICU charges underestimate ICU costs and because the costs of ancillary services that are performed when patients are in the ICU are not included.

With the exception of certain administrative costs that support ICU physician staff, the costs of physician services to ICU patients generally are not included in hospital cost reports or in hospital charges. As will be discussed further in chapter 6, there is reason to believe that ICU patients receive a greater intensity of billable physician services than non-ICU patients.

Cost data from other countries provide an opportunity to determine relative costliness of ICU v. non-ICU care, particularly in countries where hospitals receive operating budgets. In those fixed revenue systems, hospitals do not need to charge more than costs in some departments to make up

¹Overall, room and board charges make up slightly less than half of total hospital inpatient charges; the rest is made up of various categories of ancillary services.

for losses in other departments. Estimates of costs for a day of ICU care compared to a day of ward care have ranged from a 2.5:1 ratio in France (182), to 3:1 in Canada and Australia (29,89), and to 4:1 in Great Britain (174). An attempt in the early 1970s to estimate actual costs (including ancillary services) in the United States yielded an estimate of 3.5:1 in a large, teaching hospital (97). But anecdotal reports now suggest that relative costs of ICU to non-ICU care in some institutions are as much as 5:1 (93).

Numerous U.S. studies of the per diem charge ratio for room and board in the ICU compared to non-ICU floors have shown a range of 2:1 to 2.5:1 in small community hospitals (43,140) to about 3:1 in large community and teaching hospitals (140).

The Equitable Life Assurance Hospital Daily Service Charge Survey of 2,519 hospitals in 1982 (71) showed an average charge of \$408.50 for an

intensive care bed and \$167.50 for a private bed, a ratio of about 2.5:1.

Patients in ICUs have a relatively greater percentage of their charges attributed to ancillary services than to accommodations compared to general floor patients. In a recent study of a large-sized community hospital, for example, 45.7 percent of the total charges for ICU patients were for room and board, while 57.1 percent of the total charges for non-ICU patients were for room and board (175). Generally speaking, the more acutely ill the patient, the greater the percentage of the bill attributable to ancillary services (49,67,162,271).

In short, ICU patients consume more direct resources, mostly for nursing, than regular floor patients, as well as a greater proportion of ancillary services, particularly laboratory and pharmacy services (49,101) than regular floor patients.

TOTAL NATIONAL COSTS OF INTENSIVE CARE

There is a notable lack of precision in estimates of the portion of hospital care costs that can be attributed to intensive care. In a major review of ICUs in *Technology in Hospitals* (205), Louise Russell provided a method for indirectly estimating the national cost of ICU care. Recent reviews using Russell's method (described in app. B) estimate that 15 to 20 percent of total costs of hospital care can be attributed to intensive care (40, 136,206).

Before refining and updating this estimate, it is important to present the alternative ways of analyzing the costs of intensive care, including calculations of: 1) the direct and indirect costs of operating an ICU; 2) the total hospital costs, including the costs of ancillary services as well as ICU costs, incurred by patients when they are in the ICU; 3) the total hospital costs attributable to patients who spend any time in ICUs; and 4) the incremental cost generated by ICUs above the cost that a hospital would have to absorb for treating very sick patients who would remain in the hospital even if ICUs did not exist. The last definition is particularly relevant to this case

study, since it is consistent with the concept that the ICU is a separate technology, independent of the patients treated in it.

Estimates of the total hospital cost of patients when in an ICU (Definition 2) and of the incremental costs of operating an ICU (Definition 4) are probably the most relevant in terms of public policy considerations, but are not easily made from available hospital accounting sources (267). The direct and indirect costs of an ICU (Definition 1) and the total costs of intensive care patients (Definition 3) are more easily estimated from hospital accounting data, but have much more limited policy relevance.

Based on these considerations, estimates of the percentage of total national inpatient hospital costs attributable to intensive care according to the different definitions can be made:

- **Definition 1:** The direct and indirect costs of running the ICU, as reflected in charges for ICU room and board—8 to 10 percent.
- **Definition 2:** The total hospital costs of patients when in the ICU—14 to 17 percent.

- **Definition 3:** The total hospital costs for patients who spend any time in the ICU during a hospitalization—28 to 34 percent.
- **Definition 4:** The incremental cost generated by ICUs above the cost that a hospital would have to absorb for treating ICU-type patients if the ICU did not exist—cannot be estimated.

The assumptions underlying the estimates and the calculations are available in appendix B.

Given these percentages, one can estimate the national cost of adult intensive care. It should be emphasized that these estimates necessarily include the costs of coronary care, but not those

costs associated with most physician services, neonatal, pediatric, or burn units, or the provision of intensive care in Federal hospitals, operated mainly by the Veterans Administration and the Department of Defense. In 1982, total national expenditures for hospital care were \$136 billion, of which 84 percent were for acute care in community hospitals—or \$114 billion (87a). Since an estimated 87 percent of community hospital costs are inpatient costs (4), \$13 billion to \$15 billion were spent **in 1982 for costs associated with patients in adult ICUs and coronary care units, according to Definition 2 above.**