

Length of Stay and Outcome: Elective Surgery

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Surgeons now commonly encourage their patients to get out of bed and walk within the first day or two following many different surgical procedures. The history of attempts to achieve early postoperative ambulation is long and colorful, beginning in Chicago with Emil Ries in 1899 (143) and culminating with the widespread acceptance of the practice in the 1950's (8,18,19,23,28,36,59, 103,106,131,136,141). Once the principle of early ambulation was accepted, the next step was to experiment with shorter and shorter lengths of stay (LOS).

As in the myocardial infarction literature, three different kinds of studies have been performed evaluating the relationship between health outcome and LOS for elective surgery. The first group includes studies that have analyzed existing data on LOS, trying to explain differences. The second group comprises the large number of uncontrolled trials of early discharge following certain kinds of elective surgery. The third group includes a number of randomized clinical trials (RCTs) that have been carried out. Each of these groups of studies is reviewed in detail in appendix B. They are summarized here, focusing on RCTs.

The studies in the first group reported and analyzed LOS differences (64,65,75,92,119,157,168, 178). Some looked at differences between the United States and Great Britain, finding British lengths of stay longer, but not discovering why. The rest of the studies in this group reported large differences in lengths of stay across regions, among individual hospitals in the same region, and among individual surgeons. None found any relationship between LOS and outcome or quality of care, though these were usually crudely measured. None succeeded in explaining the LOS differences they observed.

The second group of studies represents the most common type of report found in this literature: the uncontrolled trial of early discharge (6,11,12,

30,33,34,41,45,49,55,84,87,122, 150,152,153,169, 171,180). This usually takes the form of a single surgeon reporting his hospital's experience with a particular scheme of early ambulation and discharge. The specific surgical procedures most commonly studied are repair of inguinal hernia, varicose vein ligation, and hemorrhoid removal. The studies are almost exclusively British. Some report experience with same-day surgery, where the patient is treated in the same hospital by the same staff that might otherwise have used inpatient postoperative care. But in these studies patients are observed for a variable period following the procedure and then discharged home within 8 hours, without an overnight stay in hospital. Some of the studies report trials of short-stay surgery, where patients are simply discharged from the postoperative inpatient ward 1 to 3 days after surgery. Studies involving treatment provided at freestanding surgicenters have not been reviewed, because the scope of this case study is limited to LOS in the acute hospital.

The results of these studies are fairly consistent. Mortality is extremely small, less than 0.1 percent. Thus, it is difficult to evaluate these studies with respect to operative mortality. While a study would have to include over 1,000 patients before even one postoperative death could be expected to occur, each of these studies comprise at most a few hundred patients, frequently representing patients undergoing several different procedures. Yet, other outcome measures have been reported. Recurrence of inguinal hernia is perhaps the most important for evaluation of herniorrhaphy. The rate of recurrence is also usually low, often under 1 percent. It is also often difficult to determine the rate precisely from published reports, *since* patients have been followed over different postoperative periods, and total patient-years at risk for recurrence are usually not reported. In addition, postoperative complications have been reported as an outcome measure. These complications may range from small wound hematomas

to serious infections. Their incidence is often not small, 10 percent in some of these studies. But it is usually difficult to interpret these figures, because different authors use different definitions of complications, and many authors do not state what these definitions are.

The most crucial defect in all of these studies, however, is the lack of control data. Without knowing precisely how a comparable group of patients fared when treated in the more traditional manner, one cannot evaluate these programs of early ambulation and discharge. Since the only outcome measure these studies are large enough to address is postoperative complications, the most important question that they leave unanswered is: Would the rate of complications have been even lower in a group of patients treated with longer periods of inpatient postoperative care?

The seven RCTs that have been performed in this area are potentially able to answer this question (3,4,48,54,121,151,154,161). Two of these studies are so methodologically poor that their results are impossible to interpret (48,54). One of them concerns LOS for gallbladder and ulcer surgery (161). This last study was very well done and demonstrated that LOS could be shortened by 2 days for these patients without any demonstrable harm. The remaining four RCTs tested the effects of early discharge, from 3 hours to 2 days following surgery, for patients undergoing inguinal herniorrhaphy, varicose vein ligation, and hemorrhoidectomy. The early discharge schemes were compared usually to traditional inpatient postoperative stays of 5 to 6 days. All of the studies were performed in Great Britain, and all excluded the elderly and patients with chronic disease. One excluded women.

The results of these four RCTs are remarkably consistent. There were no significant differences in any of them between the early and late discharge groups in operative mortality or hernia recurrence. No operative deaths were reported in any of the studies. This should not be surprising, however, since only 880 patients were involved in all four studies combined. All of the studies also reported higher postoperative complication rates for the groups of patients discharged early, from 8 to 15 percent higher than the patients with traditional lengths of stay. In two studies, the dif-

ferences did not attain statistical significance; in one, the difference was of borderline significance (significant only at the 10-percent level); and in one, the difference was statistically significant at the 5-percent level. Finally, all four studies reported that their early discharge patients used significantly more outpatient services following their surgery than the patients discharged later. One of the studies tried to measure the extent of the savings realized by the early discharge (3,4). These authors reported a definite savings in hospital costs, but this was almost entirely offset by an increased cost in the early discharge group due principally to longer time off from work.

Interpreting the results of these studies raises some difficult questions. None of the studies was large enough to address the effects of early discharge for the two most clinically important outcomes of herniorrhaphy-operative mortality and hernia recurrence. This is particularly distressful, since herniorrhaphy is the prototype early discharge procedure. One is thus left in a situation similar to that found when examining the myocardial infarction literature. Very large and expensive studies would have to be done to answer the question of whether early discharge has a small, but clinically significant effect on these outcome measures.

Should such studies be done? Or should the risk be taken that operative mortality and recurrence rates may be somewhat higher in early discharge or outpatient surgery programs in order to reap their monetary benefits? And what are those benefits? The only RCT to address this issue explicitly found that men who had their hernias repaired on a short-stay basis were out of work somewhat longer than those patients who stayed longer in the hospital. Short-stay patients also consume somewhat more outpatient services than their longer staying counterparts. These findings suggest that any immediate savings realized from shorter hospital stays may be offset in part or in full by other costs. How the results of this RCT, which was performed in Great Britain, might have differed if done in the United States is difficult to assess.

Finally, these studies raise the difficult issue of how to balance the cost of a slightly higher postoperative complication rate against the benefit of

any monetary savings. All of the authors describe the complications they report as minor, but they do not provide any information on how long these complications persisted or how much disability they caused. Perhaps the higher rate of minor complications in the short-stay group accounted for their somewhat longer absence from work.

Comparing these complications against the monetary savings is made all the more difficult, because so little is reported concerning them, and because the level of monetary savings is unknown. The studies reviewed here do not provide definitive answers to any of these difficult questions but have provided the data necessary to frame them.