Quality in practice: achievements so far

Developments in total quality management in the United States: the Intermountain Health Care perspective

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Any discussion of evolving health care practices in the United States has to begin with the recent proposal by President Clinton for major health care reform, one of the six "guiding principles" of which is quality. In his presentation to congress Clinton said:

> If we reformed everything else in health care but failed to preserve and enhance the high quality of our medical care, we will have taken a step backward not forward .... Our plan will track quality indicators so that doctors can make better and smarter choices of the kind of care they provide.

These "quality indicators" fall into two categories: (*a*) "report cards," which track quality based on reportable events such as mortality, surgical morbidity, infection rates, return rates to the operating room, and caesarean-section rates, and (*b*) "practice guidelines," which in large measure have yet to be developed.

A recent review of the Clinton proposal discussed the quality aspects.

> The quality program, overseen by a 15-member advisory council, is likely to be blasted as a doomed bureaucracy. Yet it could speed the current slow evolution in quality evaluation. Overall, there's consensus the philosophy is on target and based on efforts already under way. In fact, first-generation report cards and quality measurement already have been devised by managed care plans and others.
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> Yet the federal effort would require a massive data base ... (and) once in place, there's danger that report cards will be tough to interpret .... But stringent quality oversight is essential to counter the Clinton system's built-in incentives for underuse. If adequately funded and phased in gradually, the plan's quality provisions would be an improvement over the current hodge-podge of oversight mechanisms and the black hole of knowledge on what really works in medicine.

There is much to be done to achieve true quality management in the United States. And while there is talk of quality, as a practical matter there is much more emphasis on reducing the cost of health care delivery. Not allowing cost concerns to override any discussion about quality will be increasingly difficult. Many insurance companies are already using "economic" or cost "profiling" of physicians' performance in determining which physicians to allow on their panel of providers. Of course, physicians are most anxious that quality and not cost becomes the true "guiding principle" of reform and health care delivery.

Intermountain Health Care is a not for profit health care delivery system made up of 24 hospitals, 33 clinics, 1500 affiliated physicians, and a successful group of health insurance plans. In 1984 it made a commitment to continuous quality improvement and formed the Institute of Health Care Delivery Research. Dr Brent James, its director, and his team have not only conducted important research but also educated the physicians about the process of total quality management (TQM). As a practising physician, presently the chief of surgery at the flagship hospital in the Intermountain Health Care system, I have become a participant in many quality improvement projects. The intent is not to rely solely on quality audits of measurable, reportable events but to examine many methods of health care delivery, understand them, and attempt to improve them. The steps in this process are specifically:

- Assessment of variation in methods of delivery of health care for a specific diagnosis or procedure
- Tracking the variation to its "root causes"
- Allowing the providers themselves to help educate (or self educate) those with "outlier" variation
- Ultimately, developing a "care map" or "practice guideline" which can be applied to the care of that particular problem by all of the practitioners in the group.

This process eventually develops into a pattern of care called "best care," representing the very best way of providing care for a particular problem at the lowest cost. Traditional quality assurance programmes would look at the outliers as "bad" providers and attempt to eliminate them, moving the "mean" just a small distance towards the "good" care. But by following the principles of TQM and involving the providers themselves in understanding the causes of variation, behaviour changes, care improves, and the entire group of providers moves towards "good" care. In addition, the best care is usually the least expensive care and represents the "best value" for the patient.

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As we have looked at different areas of need for quality improvement, they seem to fit into three categories:

- Avoiding complications or negative outcomes of treatment
- Better utilisation of resources without sacrificing outcome
- Better outcome at a lower cost.

Below are brief examples of current projects in each category.

Avoiding complications

Over 100 000 doses of treatment are administered annually at this hospital, and there used to be a reporting mechanism to track the occurrence of adverse drug events, whereby nurses completed a form and submitted it to the pharmacy. The average reported incidence of adverse drug events with the system was nine events per year. The first step was to use the existing computer system to follow the clinical course of the patient, any significant changes in treatment ordering, laboratory values, and other means to identify a clinically significant adverse drug event; by this means the incidence increased to 600 events a year. During this study a 5% seizure rate was noted when a particular broad spectrum antibiotic was used intravenously because most physicians were not adjusting the dose appropriately for the renal function and size of the patient. The computer was used to help calculate the appropriate dose, based on renal function, current laboratory values, and body size, and a dose reduction was found to be required in 70% of patients. Physicians' compliance with the computer prompts has risen to 99% and, more importantly, the seizure rate dropped immediately to 0·2%. Since September 1992 an antibiotic related seizure has not occurred in this hospital.

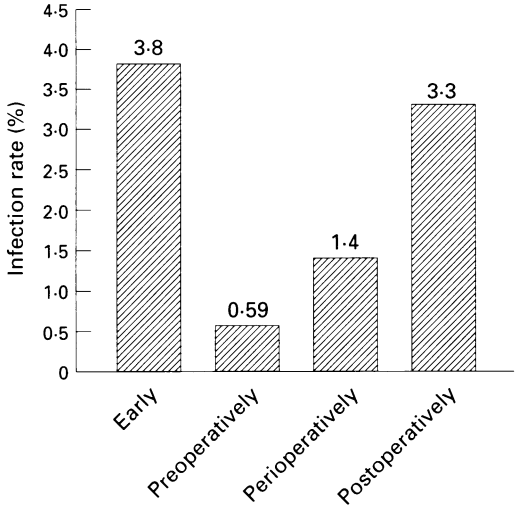

Fig 1 Infection rate among 2847 matched patients receiving prophylactic antibiotics early (2–24 h before incision), preoperatively (0–2 h before incision), perioperatively (within 3 h after incision), or postoperatively (after 3 h)

Better utilisation of resources

We have performed several studies on the utilisation of hospital resources in surgical procedures, examining the variation in length of hospital stay, operating room times, operating room costs, and total hospital costs. One such example is a study of the length of hospital stay and total hospital cost of total hip arthroplasty. After determining the variation among the surgeons the data were presented to the surgeons in a blinded fashion except to the individual surgeon. A repeat of the study showed a significant reduction in both the length of hospital stay (from a mean of 10 days to 7 days) and the hospital cost (from $12 000 to $8000) owing to improved utilisation of resources by the surgeons and a significant reduction in variation among the surgeons.

Better outcome at lower cost

We have conducted several studies to achieve better outcome at lower cost, as follows.

ADMINISTRATION OF PROPHYLACTIC ANTIBIOTICS

In this one year study 2847 matched patients were given antibiotics prophylactically in indicated cases at one of four different times: 369 patients received the drugs 2 to 24 hours before incision (early), 1708 0 to 2 hours before incision (preoperative), 282 within 3 hours after incision (perioperative), and 488 more than 3 hours after incision (postoperative). Figure 1 shows the results. The infection rate in the preoperative group (0·59%) was significantly lower than in any of the other groups (infection rates in early group 3·8%, in perioperative group 1·4%, and postoperative group 3·3%. If all of the patients had received antibiotics as in the preoperative group there would have been 27 fewer wound infections in the study group alone. The next year, after implementing computer prompting and tracking of appropriate timing of the prophylactic antibiotics, 96% of patients

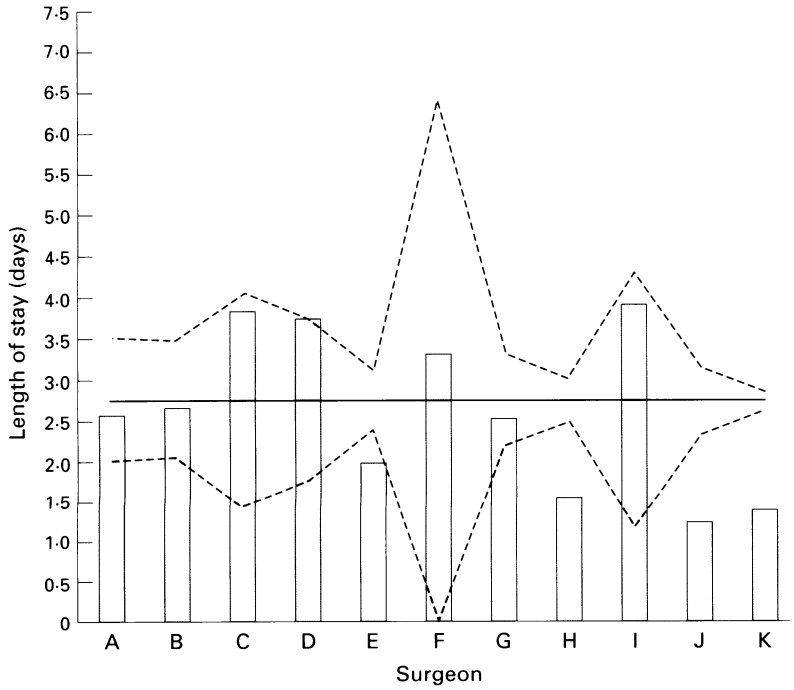

Fig 2 Length of stay by surgeon for open uncomplicated appendicectomy, 1990–93 (— mean, – – – confidence limit)

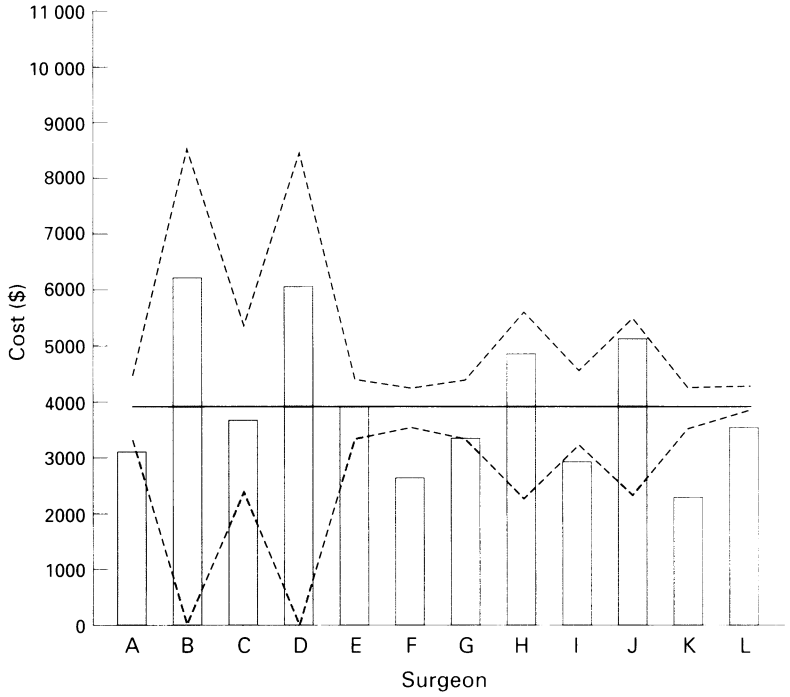

Fig 3 Hospital cost by surgeon for open uncomplicated appendicectomy, 1990–93 (— mean, – – – confidence limit; bars are avaerage costs)

received their dose of antibiotic within the 2 hour preoperative time. If the infection rate at 1985, before the study, had remained constant, there would have been in 1991 alone 51 more infections. Each deep wound infection is estimated to cost as much as $14 000, resulting in $714 000 total costs for the 51 infections at our hospital in that year; deep wound infection costs about $1.5bn annually in the United States.

ACUTE RESPIRATORY DISTRESS SYNDROME

Physicians in our intensive care unit were studying ways of improving outcome for ventilated patients with severe acute respiratory distress syndrome, and a trial was developed with a complicated set of computer based protocols with as many as a hundred different "decision nodes" or treatment options. At first, physician compliance was only 40%; every time a physician overrode the computer the override was logged, analysed, and the protocol revised if needed. After six months compliance increased to more than 90% and now is consistently 95%. More importantly, patient survival has improved from 9.5% to more than 44%. Additionally, the computer protocol saved physicians time, the patients left the unit earlier because the protocol worked around the clock, and the overall cost was less when compared to more invasive treatment protocols.

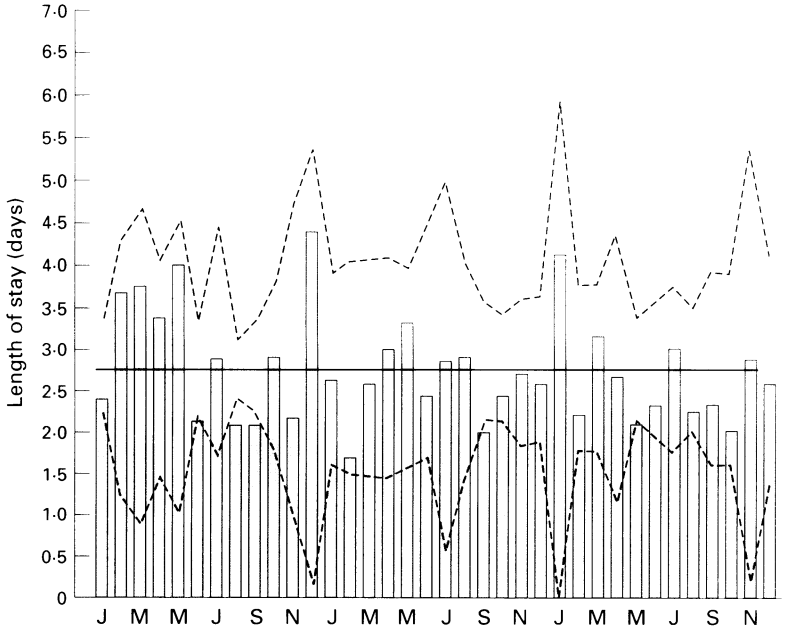

Fig 4 Mean length of stay by month for open uncomplicated appendicectomy, 1990–93 (— grand mean, – – – confidence limit)

LAPAROSCOPIC SURGERY

As a general surgeon, I am very interested in whether the new laparoscopic techniques of performing abdominal procedures are valuable. Do they consume fewer resources or more? Do they have equal or improved efficacy and outcome? How does the patient view his or her experience? We developed a computer tracking system of hospital resources and instituted routine patient follow up questionnaires which allowed us to compare open or traditional surgical procedures with the new laparoscopic technique.

When open uncomplicated appendicectomies, performed over the past three years (1990–93) were examined the variation in length of hospital stay was found to range between one day and three days (fig 2).

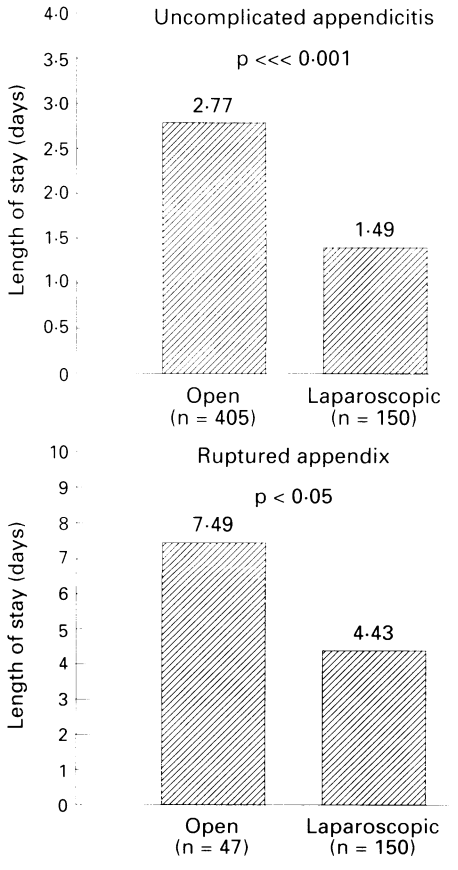

Fig 5 Mean length of stay in patients with uncomplicated appendicitis or ruptured appendix with open or laparoscopic surgery, 1990–93

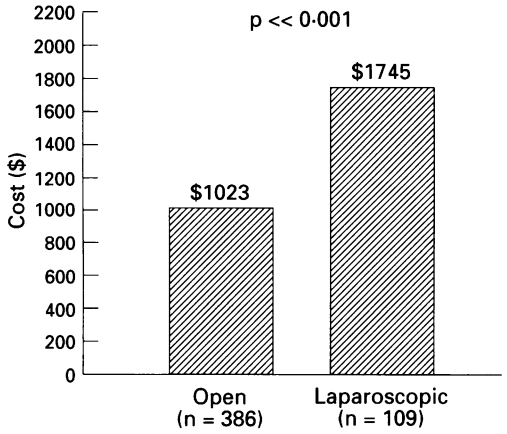

Fig 6 Mean operating room costs for open versus laparoscopic appendicectomy, 1990–93

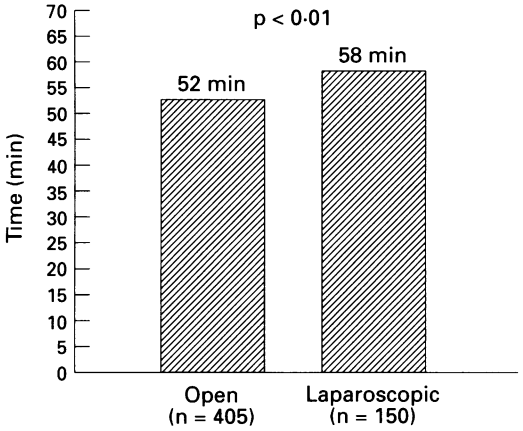

Fig 7 Mean operating time for open versus laparoscopic appendicectomy, 1990–93

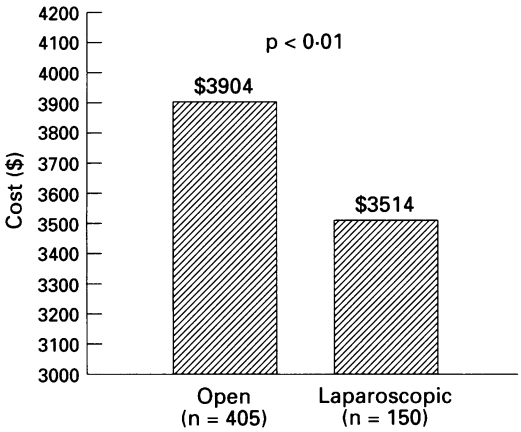

Fig 8 Mean total hospital costs for open versus laparoscopic appendicectomy, 1990–93

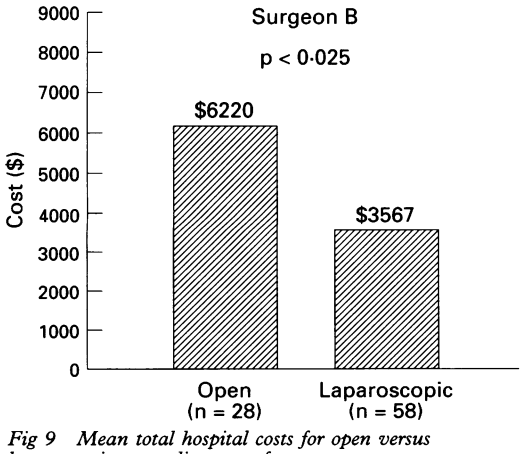

Fig 9 Mean total hospital costs for open versus laparoscopic appendicectomy for one surgeon

Hospital costs for the same group of patients varied between $2700 and $6000 per patient, when grouped according to the surgeon (fig 3). Although length of hospital stay varied among surgeons there was very little variation from the mean over time (fig 4).

These same surgeons were studied performing laparoscopic appendicectomies in a comparable group of patients, and the hospital based computer tracking system was used to analyse the hospital costs, utilisation costs, and operating room times. Each patient received an anonymous questionnaire to help determine clinical outcome and patient satisfaction. Among the findings were the following.

(1) Length of hospital stay was significantly shorter for both patients with uncomplicated appendicitis and ruptured appendix when the

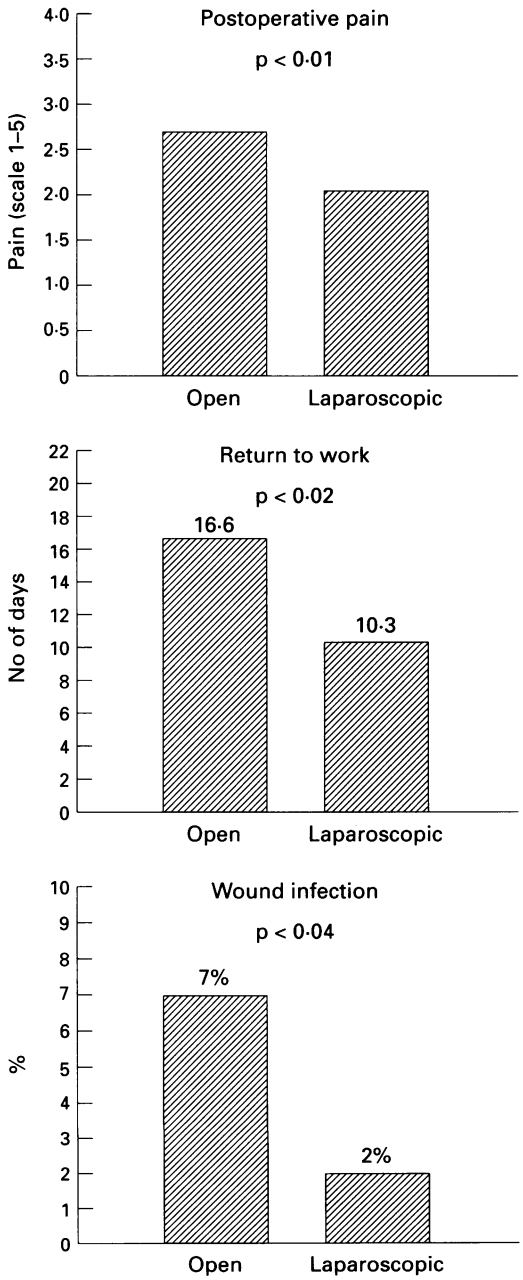

Fig 10 Mean pair score, number of days to return to work, and incidence of wound infection for open (n = 87 patients) and laparoscopic (n = 61 patients) appendicectomy

operation was performed laparoscopically (fig 5).

(2) Operating room costs were significantly greater for laparoscopic procedures compared with open procedures, due largely to the use of disposable equipment (fig 6) but only a minimal increase in operating room time was seen for the same procedures (fig 7).

(3) Total hospital costs were significantly lower for laparoscopic appendicectomy procedures (fig 8), and major potential cost savings were identified even when one surgeon's practice was compared (fig 9).

(4) Outcome for the patients undergoing laparoscopic surgery, was significantly improved, as measured by their responses to the patient questionnaire for postoperative pain at four days, return to work, and post-operative complications (wound infection). Thus postoperative pain score for patients undergoing laparoscopic surgery was 2·05 compared with 2·63 for those having open surgery, mean time to return to work was 10·3 days compared with 16·6 days, and incidence of wound infection was 2% compared with 7%.

Overall, the results indicate that the new laparoscopic surgical approach can:

- Decrease utilisation of hospital resources as evidenced by a decreased in length of hospital stay
- Decrease overall cost by decreasing hospital cost
- Improve patient outcome by reducing moribidity and pain and allowing for an earlier return to normal activity and work.

In summary our purpose has been to evaluate quality in the following terms.

- Best process of care – narrowing the variation of care decisions, working towards the best method
- Best clinical outcome – decreased morbidity and mortality
- Best patient satisfaction – both for clinical outcome and the process of care
- Best value – best value at the lowest cost.

At Intermountain Health Care we believe that the best way to achieve the best quality improvement in a health care system is to involve all of the participants – patients, providers, and systems – in employing the principles of total quality management.

- Patient involvement – in prevention; participating in best care process through education and utilisation; in evaluating functional status before, during, and after intervention; in satisfaction; in clinical outcome and follow up with providers
- Provider involvement – in planning, implementing, analysing, and educating; in defining guidelines; in reassessing and continually modifying the care map, always striving for "best care"
- System involvement – in providing structure and mechanisms, support staff, and information systems and being willing to focus on quality as a part of its mission.

An American philosopher, George Santayana, once said: "What we call the contagious force of an idea is really the force of the people who have embraced it." It will be up to all of us collectively to become the force behind moving quality management principles into the forefront of patient care methodology and ensuring that quality remains as *the* guiding principle of health care delivery in the future.