Effect of Surgical Panel Composition on Patient Outcome at a Level I Trauma Center

Yale D. Podnos, MD, MPH; Samuel Eric Wilson, MD; Russell A. Williams, MD

Objective: To compare the effect of staffing with general surgeons vs trauma specialists on patient outcome at a trauma center.

Design: The care of injured patients at a level I urban trauma center serving a population of 2.5 million was the responsibility of 12 surgeons (10 general surgeons and 2 trauma specialists) between January 1 and June 30, 1996 (group 1). Between July 1 and December 31, 1996 (group 2), trauma was the responsibility solely of 4 trauma specialists. An additional comparison was made with those patients in group 1 who were admitted to the general surgeons (group 1A). The outcomes and quality of care for these periods, as determined by the quality assurance screens, were retrospectively analyzed and compared.

Setting: Urban, tertiary care, level I trauma center.

Participants: Each trauma and burn patient admitted during the study periods is included in this study. Upon the patient’s discharge from the hospital, specially trained nurses completed a review of the patient’s stay and entered it into the TraumaOne database (Lancet Technology Inc, Cambridge, Mass). There were 693 trauma patients in group 1 (472 in group 1A) and 734 patients in group 2.

Main Outcome Measures: Mortality, length of stay, and 16 quality assurance screens were quantified and compared using χ² analyses and t tests.

Results: The age and sex of the 2 groups were similar. The mortality rate was 6.2% (43/693) in group 1, 6.1% (29/472) in group 1A, and 6.5% (48/734) in group 2 (P = .80 and P = .78, respectively). When stratified by injury severity score (ISS), lengths of stay were statistically similar, except for patients with an ISS of 0 to 7. Patients with an ISS of 0 to 7 in groups 1 and 1A stayed a mean of 2.6 days, compared with 3.2 days for group 2 (P = .01 and P = .02, respectively). The results of quality assurance screens (missed injury, wound infection, re-admission, and 13 others) were similar in the 2 groups.

Conclusions: Transitions in staffing afforded the opportunity to examine patient outcomes by surgeon specialization and frequency of call. In our sample, 12 well-trained surgeons taking call less frequently managed a trauma service as efficiently as a group of 4 trauma specialists, without any differences in morbidity and mortality.

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The societal and economic effects of trauma in the United States are devastating. In 1989, an estimated 58 million people were injured, resulting in 140 000 deaths and $177.2 billion in medical expenditures. The average charges for trauma care were substantially higher than for nontrauma admissions ($12 000 vs $5000) in 1994, and these charges increase with complications. Given the economic pressures of managed care and the expectations of an increasingly educated population, expenditure of resources on trauma care is a pertinent subject for clinical investigation.

The designation of trauma centers is associated with decreased injury-related mortality. So far, there is a paucity of data on how critical care surgeon specialization, size of trauma panel, and frequency of call affect patient outcomes. During 2 consecutive 6-month periods, care of trauma patients at our level I trauma center was the responsibility first of the general surgical staff, comprising 12 surgeons (10 general surgeons and 2 trauma specialists) voluntarily taking in-house calls for two or three 24-hour segments per month, and second, 4 trauma specialists taking in-house calls for approximately 7 nonconsecutive 24-hour periods per month. This study evaluates the differences, if any, in the morbidity and mortality of injured patients between these 2 periods.

RESULTS

From January 1, 1996, to June 30, 1996 (group 1), 693 patients were admitted to the trauma service. Of these, 472 were under the care of the 10 general surgeons (group...
PATIENTS AND METHODS

PATIENT SELECTION

The University of California, Irvine, Medical Center, a level I trauma center serving a population of 2.3 million people along with 2 level II trauma centers, admits approximately 1500 trauma patients each year to its level I facility. Each trauma and burn patient hospitalized during the study periods is included. The outcome and quality of care, as determined by the quality assurance screens, were analyzed and compared for the periods from January 1, 1996, to June 30, 1996 (group 1), and from July 1, 1996, to December 31, 1996 (group 2). An additional group (group 1A) was defined as a subset of group 1, consisting of patients admitted to general surgeons who were engaged in routine general surgical practice in addition to their trauma calls.

TRAUMA TEAM COMPOSITION

Apart from the different attending surgeons, the trauma teams in both periods consistently comprised a senior resident, 2 interns, and medical students. The team, under the direct supervision of the attending surgeon, was responsible for assessment and treatment throughout each patient’s course. The attending surgeon remained constant throughout each patient’s stay (including the intensive care unit). An intensive care unit team was present but functioned entirely as a consulting service.

The 10 general surgeons included in this study had primary practice focuses in general, gastrointestinal, vascular, and oncologic surgery. Each was certified for advanced trauma lfe support and had been practicing and taking trauma calls for more than 13 years. Each had previously worked either as faculty on a trauma service or in combat areas. Every surgeon in this study (general and trauma) was involved in compulsory weekly morbidity and mortality rounds and grand rounds. An additional weekly trauma conference was attended by the trauma surgeons.

DATA COLLECTION

Upon each patient’s discharge from the hospital, a survey questionnaire was completed by a specially trained registered nurse. This extensive form contained demographic data, medical history (if known), field data, amount of time the patient was in the emergency department (ED) before being seen by the trauma team, ED interventions (if any), injury severity score (ISS), probability of survival, and details regarding the patient’s hospital course. The probability of survival is a logarithmic score using the patient’s revised trauma score, ISS, and mechanism of injury (blunt vs penetrating). The quality assurance screens compared were listed on the form, which also included unplanned intensive care unit return, missed cervical spine injury, major operating room procedure more than 24 hours after ED arrival, iatrogenic pneumothorax or hemothorax, injury missed at initial workup, patient readmitted to the hospital within 72 hours of discharge, infection of a surgically clean wound, intra-abdominal abscess, reintubation within 48 hours of extubation, self-extubation, unexpected transfer from ward to intensive care unit, patient return to the ED within 72 hours of discharge, and epidural and subdural hematomas requiring craniotomy more than 4 hours after arrival in the ED.

DATA ANALYSIS

Patient records were manually entered into the TraumaOne database (Lancet Technology Inc, Cambridge, Mass). Group 2 was compared with groups 1 and 1A using $\chi^2$ and t test analyses.

DEMOGRAPHIC CHARACTERISTICS

In groups 1 and 1A, 74% of patients were male, compared with 72% in group 2 ($P$ not significant). When stratified by ISS, no statistically significant demographic differences ($P<.05$) were noted between patients in groups 1, 1A, and 2. The only statistically significant difference was between the ages of patients in groups 1A and 2 with an ISS of 0 to 7 (26.6 vs 29.1 years, $P = .02$). This difference was not considered clinically significant. Patients in groups 1 and 1A were similar to those in group 2 with regard to probability of survival. The mean probability of survival was .948 in group 1, .936 in group 1A, and .955 in group 2 ($P = .81$ and $P = .08$, respectively). This similarity was consistent across the range of ISSs (Table 1). In group 1, 81% (561/693) of the injuries were blunt, compared with 79% (580/734) in group 2 ($P = .36$).

MORTALITY

Overall mortality was 6.2% in group 1, 6.1% in group 1A, and 6.5% in group 2 ($P = .80$ and $P = .78$, respectively). These rates are consistent with those found at other large, level I trauma centers. When grouped by ISS, there were no statistically significant differences in mortality rates. Of note, however, 1 (33%) of 3 patients with an ISS of 50 to 56 died in group 1A, compared with 4 of 4 patients in group 2 ($P = .05$) (Table 2). There were no statistically significant differences in the probability of mortality. Analysis of penetrating trauma showed mortality rates of 9.9% in group 1 and 10% in group 1A. These results are not significantly different from the mortality rate of 13% in group 2 ($P = .39$ and $P = .39$, respectively). When classified by ISS, no significant differences were seen for penetrating trauma (Table 3).

LENGTHS OF STAY

The mean overall length of stay was 4.9 days for group 1 and 5.1 days for group 1A, compared with 5.0 days for group 2 ($P = .81$ and $P = .85$, respectively). There were no statistically significant differences by ISS except in the least
injured patients (ISS, 0-7). The mean length of stay was significantly shorter in groups 1 and 1A (2.6 days) than in group 2 (3.2 days) $($P$= .01$ and $P=.02$, respectively$) (Table 4$).

**FREQUENCY OF QUALITY ASSURANCE SCREENS**

An injury was initially missed in 4 (5.8%) of 693 patients in group 1, in 2 (0.4%) of 472 patients in group 1A, and in 10 (1.4%) of 734 patients in group 2 ($P=.13$ and $P=.11$, respectively). No significant differences were seen when stratified by ISS. In groups 1 and 1A, a single cervical spine injury was missed in 693 and 472 patients, respectively, compared with none in 734 patients in group 2 ($P=.30$ and $P=.21$, respectively). In groups 1 and 1A, no patients were brought to the operating room more than 24 hours after admission for a major procedure, compared with 2 patients in group 2 ($P=.17$ and $P=.26$, respectively). No patients in groups 1 and 1A had infections of clean surgical wounds, compared with 2 patients (0.3%) in group 2 ($P=.60$ and $P=.26$, respectively). Four patients (0.6%) in group 1 and 3 patients (0.6%) in group 1A had epidural or subdural hematomas requiring craniotomy more than 4 hours after arrival in the ED, compared with 3 patients (0.4%) in group 2 ($P=.65$ and $P=.59$, respectively). Six patients (0.9%) were readmitted less than 72 hours after discharge in group 1, 5 patients (1.1%) in group 1A, and 2 patients (0.3%) in group 2 ($P=.13$ and $P=.08$, respectively).
The American College of Surgeons Committee on Trauma has said that for a hospital to be accredited as a level I trauma center, the surgeons on trauma services must meet certain requirements. The service director must be a “board certified surgeon with demonstrated special competence in trauma care” and must be “clinically capable in all aspects of trauma.” Surgeons on the panel should be involved in the care of approximately 50 or more pa-

<table>
<thead>
<tr>
<th>Injury Severity Score</th>
<th>Group 1</th>
<th>Group 1A</th>
<th>Group 2</th>
<th>Group 2 vs Group 1</th>
<th>Group 2 vs Group 1A</th>
</tr>
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<tbody>
<tr>
<td>Overall</td>
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<td>29/472 (6.1)</td>
<td>48/734 (6.5)</td>
<td>.80</td>
<td>.78</td>
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<td>15-21</td>
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<td>8/53 (15.1)</td>
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<td>.55</td>
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<td>22-28</td>
<td>13/30 (43.3)</td>
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<td>.78</td>
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<td>36-42</td>
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<td>3/4 (75.0)</td>
<td>.81</td>
<td>.44</td>
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*NA indicates not applicable.

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<tr>
<td>Overall</td>
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<td>.59</td>
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<td>.43</td>
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<tr>
<td>Overall</td>
<td>5.1 (n = 472)</td>
<td>4.9 (n = 693)</td>
<td>5.0 (n = 734)</td>
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<td>.81</td>
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<td>2.6 (n = 273)</td>
<td>2.6 (n = 416)</td>
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trauma centers should concentrate volume and, as shown
This concept, advanced by Luft et al in 1979, estab-
sicians with “special competence in the care of [the] critically injured.”7 In practice, these recommendations
have often resulted in trauma panels being limited to a small number of surgeons whose full professional hours are committed to trauma duty.

Our data suggest that a larger panel of board-certified general surgeons with trauma surgery experience taking less frequent calls can manage a trauma service without significant changes in patient outcomes compared with a smaller group of dedicated trauma surgeons. Although limiting those taking trauma calls to a small cadre to improve expertise is intuitively attractive, we were unable to prove better patient outcomes in the 1427 patients reviewed over 1 year at a busy level I trauma center. Rhodes et al suggested that having a trauma surgeon in the operating room during resuscitation was the most important factor improving patient survival, but “that for most cases the presence of an in-house trauma surgeon does not make a difference in major morbidity or mortality.”9 Rather, they concluded that a subset of severely injured patients would benefit from having a trauma surgeon in house. In our center, surgeons taking trauma calls responded to all major resuscitations and were in house or immediately adjacent to the ED. No differences in patient outcome were apparent in our sample, including those with severe injuries (overall and penetrating). Our findings could be attributed to the training in trauma surgery that general surgeons receive in residency and that is retained and refined with continuous exposure throughout their careers. A contributory factor may be technical expertise gained by general surgeons through greater participation in complex elective operations, as opposed to the specialized trauma surgeon, who may have less extensive major operative experience. For example, approximately 80% of our patients had blunt, mostly nonoperative trauma. Another possible explanation is that the processes and efficiencies of the trauma system as a whole, beginning with timely transportation by paramedics in the field and continuing through expert triage, nursing, and trauma staff, may diminish the importance of one individual in the outcome.

Institution of a trauma system in North America has greatly improved patient outcomes.5 Designation of trauma centers should concentrate volume and, as shown by Smith et al10 should lead to lower patient mortality. This concept, advanced by Luft et al11 in 1979, established an inverse relationship between institutional volume and mortality for various operations. Konvolinka et al,12 addressing surgeon caseload and mortality rates in trauma centers, found better outcomes with a higher per-surgeon volume for severely injured patients. This study did not control for varied levels of trauma system care (rural vs urban). Thus, those centers with less volume and, hence, fewer patients per surgeon could be the more remote, rural centers with less developed trauma systems. It is interesting to note, however, that any benefit from larger volume diminished considerably sooner than current guidelines for minimum patient volume per surgeon. This rather modest threshold in caseload was met by all of our surgeons, even those on call less frequently.

We found that the smaller panel of trauma specialists kept those patients with the lowest ISSs in the hospital an average of 19% longer than the larger panel of general surgeons, accounting for more than 268 extra hospital days without any measurable improvement in patient care. However, those patients seen by the larger panel of general surgeons were readmitted to the hospital within 72 hours of discharge more often than patients seen by the trauma specialists (6 of 693 vs 2 of 734 patients, $P = .08$). There are many factors that might be responsible for this difference. We feel that the greatest of these is the difference in practice geography between the 2 groups. The general surgeons, being primarily office based, may have pushed for earlier discharge.

Concerns raised regarding the length of trauma surgery careers and early burnout are accentuated by the many advertisements from institutions seeking trauma surgeons. The factors most often implicated as reasons for leaving trauma surgery are the frequent, demanding call schedule and the intensity of the work. A survey of level I trauma centers indicated that 95% limited trauma calls to a small group of surgeons, thus increasing the frequency and responsibility of being on call, with the result that 73% of surgeons were less than 50 years old, only 21% were between 50 and 59 years, and only 6% were older than 60 years.12 As surgeons age and begin to narrow their practice focus, many choose to not incorporate trauma. Young and less experienced surgeons, albeit more resilient, form the core of many trauma teams, and, indeed, first-line coverage frequently falls to fellows who have recently finished training and are seeking more experience. We believe that a modest enlargement in the size of the trauma panel, including some general surgeons with trauma experience, will prevent burnout and help to retain experienced practitioners in trauma care.

The greatest limitation in our study is its retrospective nature. Completion and computer entry of data forms, accomplished by a group of specially trained nurses and support staff, may have missed some clinical nuances. No opportunities existed to determine the consistency of data entry across staff. Finally, a possible confounder is the potential for increased acumen in extracting patient complications as the data entry staff became more practiced. They were experienced in data entry, however, and our results have been consistent from year to year.

An organized system for care of the injured patient through designated trauma centers continues to improve patient outcomes. A level I trauma service staffed by a trauma director (conforming to the American College of Surgeons Committee on Trauma guidelines) with a larger panel of experienced general surgeons can manage a trauma service without any compromise in patient care. Further study is necessary to define surgical staffing guidelines in order to achieve a balance between volume and surgeon turnover.
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REFERENCES


DISCUSSION

Jonathan R. Hiatt, MD, Los Angeles, Calif: To me, the fundamental question in trauma surgery has always been quite simple: who is on call tonight? All else follows from that anxiety query. But if I have understood Dr Williams correctly, it really doesn’t matter, as long as you have capable and committed general surgeons. I find his conclusion reassuring because I oversee a trauma call panel resembling group 1 and comprised of 4 general surgeons with primary interests in trauma and critical care and 6 general surgeons in private practice.

In this study the authors compared the trauma care delivered by 10 general surgeons with that of 4 trauma surgeons. In 6 months the general surgeons managed about 47 patients each, considerably more than the minimum annual number of 50 recommended by the Committee on Trauma of the American College of Surgeons. Outcomes measured by morbidity and mortality, length of hospitalization, and standard quality indicators were similar for both groups. The authors concluded that practicing general surgeons gave good trauma care, possibly more cost-efficient than that of the trauma experts, and they suggested that such a system might represent a solution to the known problems of high-dose trauma as a career.

The essential conclusion, in my estimation, was the authors’ speculation that “the processes and efficiencies of the trauma system as a whole may diminish the importance of one individual in outcome.” Could that be rephrased to state that the residents do most of the work, regardless of the on-call attending? Perhaps the trauma surgeons teach the residents, who then keep the general surgeons out of trouble, or some other combination involving those players. Are the attending surgeons in house and present at the outset of the resuscitation? Does that make a difference?

The overall degree of injury was not particularly severe. The probability of survival was nearly 95% in both groups, and 84% of the patients had ISSs less than 15. Is it possible that differences in outcome might be seen with larger numbers of more severely injured patients?

The issue of operative care was not discussed. The attending surgeons serve 2 major functions: they direct the triage and work-up, and they are responsible for the conduct of the general surgery procedures. Most patients in this study had blunt injury, providing challenges in management but not much operating for the general surgeon. Did you look at the number of operative cases in each group? Would it be of value to scrutinize parameters such as duration of operation or units transfused as measures of skill in trauma surgery? What criteria should be used by trauma centers to assure that their trauma surgeons are capable?

Last, a comment on the concept of cases on the margin. A trauma center is expected to produce some great saves, yet morbidity and mortality and quality improvement programs focus principally on the loss column. We found in Los Angeles County that audit filters document adherence to process but do not usually identify major opportunities for quality improvement. I submit that there are margin cases, usually operative, which because of subtle differences in skill and experience are saved by some surgeons and not by others. We know them when we see them. We talk about them in conferences, but our processes don’t tally them. Even in a busy center, a 6-month interval may be insufficient to encounter such cases and show a difference between groups. These cases are the reason that ambulances go careening through the night in search of a trauma center. Our best surgeons should await them.

John German, MD, Orange, Calif: This paper reflects a historical cycle that exists in Orange County. As you recall, Dr John West, a contemporary of Dr Bill Schecter’s, called to our attention that trauma care was woefully inadequate in Orange County emergency rooms. Dr Al Gazzaniga, the Director of Surgical Services in this hospital in the late 1960s and early 1970s, helped develop prehospital care as we know it today, with the paramedic as a provider in the field. The designation of dedicated trauma centers soon followed. The first cycle of postoperative critical care developed by Dr Gazzaniga and Dr Robert Bartlett was provided by those early critical surgical residents. A new trauma/critical care group is emerging under the directorship of Drs Le-kawa and Cinat. When Dr Gazzaniga stepped down, he left a cadre of trained surgical residents who could fill the first gap, just as we saw here in this situation. Trauma coverage was then provided by the University of California, Irvine, surgical faculty, along with this first group of surgical residents.

A new trauma service soon developed. A new crop of surgical residents were trained and developed by Dr Ken Waxman, Gail Tominaga, and Gianea Scannel. The latter 2 exemplified the young surgeon described in this paper.

The chief surgical resident, as Dr Jon Hiatt has said, is the engine that pulls the train. The engineer is the surgical attending.

The emergency room and immediate ancillary service at Irvine have been developed over 25 years so that they are able to provide immediate, appropriate care. The operating room personnel and anesthesia departments are excellent in providing this coverage.

We feel that the conclusion is appropriate, that well-trained general surgeons can cover a trauma service, but we have to ask, where do these well-trained general surgeons come from? They graduate from these trauma/critical care services which ©1998 American Medical Association. All rights reserved.
develop surgical residents at various levels of their experience so that they can fulfill this mission.

Jan K. Horn, MD, San Francisco, Calif: This paper is very timely and relevant. I have basically 2 questions for the authors. First of all, in the critical care management of these more serious trauma patients that you had in this time period, were those patients being managed by specialists in critical care, or were all of the general surgeons in your group managing them in the intensive care unit?

The second question is whether the general surgeons in the group are specialists or not. Were any of them deriving most of their income from practice in vascular surgery or other specialty kinds of practice, or are they really true general surgeons doing all of the different kinds of general surgery? Perhaps you could expand and characterize them better.

Juan A. Asensio, MD, Los Angeles: The authors, in this very provocative paper, have had the courage to challenge something that is very well established. I just have some simple questions. Did you look at different ISS groupings, for example, patients with ISSs greater than 15, 15-30, and ISSs greater than 30, and stratify them according to mechanism of injury? The reason why I ask this question is that our University of Southern California group published a while ago a paper that dealt with 2 separate study periods, each encompassing about 2 years. In this study period, we compared patients for all ISS groupings for all mechanisms of injury, prior to and after the establishment of a well-defined and staffed trauma service. For each of those groupings, we believe we made a difference, as the mortality of all patients was significantly reduced—this reached statistical significance in all groupings. I wonder if you should not extend your study to have it involve a longer period of time and look at several categories of more critically injured patients.

One more comment is relevant: we have a very large experience with penetrating cardiac injuries. Our survival rate for emergency department thoracotomies is 16%, which is roughly double the national rate, considering that our patients show up with a mean cardiovascular respiratory score of 3.45, with literally no blood pressure, and still 16% of them were salvaged. The reason that we believe that these patients were salvaged was because there were attending trauma surgeons who were there for them. I really enjoyed this paper, and I wonder if you shouldn't proceed with this challenge.

William P. Schecter, MD, San Francisco: From what I understand, the authors have not challenged that the organization of trauma services has saved many lives. What they are challenging is the recent move to restrict trauma care to full-time trauma surgeons. I agree with them that this move has certain potential negative effects.

First of all, I want to emphasize the burnout problem in giving very high, heavy night call to a limited number of surgeons. This is a major problem for the individuals and their families, and also it denies the patients and young surgeons the benefits of mature experience, because most surgeons are not going to be around for 2 or 3 decades taking that kind of heavy night call.

The second thing is, and this is something that was alluded to earlier, surgeons who do full-time trauma who don’t have an elective surgery practice generally don’t do many operations if they are working in a hospital which has a high preponderance of blunt trauma, because most blunt trauma patients don’t need laparotomies and thoracotomies. The second point is, many operations for trauma are relatively simple operations. However, when they are difficult, there is no more difficult operation, and a surgeon has to be “in shape,” as it were, for high-risk technical procedures. The only way I believe that that can happen is if they are maintaining a reasonable volume of high-risk elective cases in addition to their emergency work. The important principle is commitment to the injured patient and not whether or not an individual has a certain label of being a full-time trauma surgeon.

I don’t think anybody here is challenging the importance of a trauma service with very aggressive, weekly morbidity and mortality conferences and quality assurance. The authors have shown that limiting trauma care to full-time trauma surgeons is uncalled for; I also think it is unwise.

Dr Ascher also asked me to ask whether there is any difference in organ donation between the full-time trauma surgeons and the other surgeons, who are doing this part time.

F. Don Parsa, MD, Honolulu, Hawaii: I have a comment and a question. The comment has to do with what was alluded to earlier regarding age. Dr Russell Williams stated that “unfortunately,” more experienced surgeons over the age of 59 do not participate in trauma care. I personally don’t take issue with that. I believe that younger individuals who come out of training from trauma centers—out of the residency or fellowships—are perhaps more capable in handling trauma, not just by virtue of their age but by virtue of their more current exposure to recent advances in trauma management. My question has to do with specialists involved in trauma management. I would like to ask whether or not you have looked into the degree of involvement that one would like to seek from various specialists, and in particular from orthopedic surgeons, neurosurgeons, plastic surgeons—my own specialty—as well as other specialists. I feel that much of the initial management can be aptly carried out by a well-trained general trauma surgeon.

Stanley R. Klein, MD, Torrance, Calif: Dr Williams, I have a perspective of having worked with many of the individuals who are characterized as “general surgeons,” and I think it is only fair to point out that we spent 7 or 8 years together at Harbor-UCLA. The individuals in the general surgery group would have quite a bit of experience as trauma surgeons. My question alludes to something Dr Hiatt touched on, that is, were the resident structures on these services the same through both periods?

Claude H. Organ, Jr, MD, Oakland, Calif: I rise as an advocate for trauma services. Dr Williams and his group have brought forth a question that needs to be addressed. If we don’t investigate ourselves, then someone else is going to do it for us. There is a severe economic problem here. I call your attention to the paper by David Richardson in which he interviewed chief residents finishing graduate surgical education programs one year, and only 17% wanted to have anything to do with trauma. We must take note of that, but also, they considered traumatologists to be poor role models, which was disappointing.

In another publication, in the state of Washington, Dr Esposito interviewed fellows of the American College of Surgeons, and only 30% of those wanted to have anything to do with trauma.

The costs are serious problems. We have all these people on electronic leashes in various specialties; it’s breaking the bank, and that is why many of these trauma centers are closing down. It’s kind of nice if you have a lot of blunt trauma (carriage trauma), but in the inner cities that have significant penetrating trauma there is no method of reimbursement.

Lastly, I would just like to point out that there are very few Blaisdell’s and Zeppa’s left in this world who will take trauma call. It is a specialty that will last about 13 years, and these young people ought to have a backup specialty within general surgery. The American public is interested in this type of study; we have the best in American surgery waiting for a disaster to happen, the best anesthesiologists, surgeons, nurses, intensive care people on the one hand, and on the other hand the people with kidney disease needing kidney transplantation or those with heart disease don’t have this same access to the best. The American public is concerned about this.

Dr Williams: I appreciate the comments by the distinguished members of the audience, all of whom are significant mem-
bers of panels in one or another hospital on the West Coast, so they bring a lot of weight with the words that they had to say. In particular, I would like to thank Jon Hiatt, who has a leadership role within the Los Angeles County Trauma System.

I don't know that the care that was administered by the general surgeons was that much more cost-efficient. You could speculate why trauma surgeons kept their less injured patients in hospitals longer. It may be that, focused as their clinical work was on the intensive care unit and the wards and not having to visit clinical offices, they were prepared to see those patients every day within the hospital setting, whereas the general surgeons, who had other patient obligations, including office consultations, were anxious to discharge their patients as soon as they were well enough to be discharged. This difference was only seen in the group that was not severely injured.

There was a lot of mention by questioners about whether it was the trauma system or the surgeons, and again we want to emphasize that we support the concept of trauma systems wholeheartedly. West and Trunkey demonstrated that once the trauma system was organized in Orange County, the mortality fell compared with San Francisco, and there were several landmark papers written by Dr John West describing the organization of trauma at Irvine and Orange County.

Is it the system or is it an individual? We think it is the system that accounts for the decreased mortality, and that was pointed out in 1979 by Luft in his paper in the New England Journal, when he examined the outcomes of various operations, including cardiac surgery and prostatectomy, and concluded that if the systems within a hospital were in place to perform a procedure, this accounted for lowered mortality. That is where the information about 200 cardiac operations, for example, being the optimum comes from.

Jon Hiatt wonders whether it was the residents teaching the general surgeons, which all emanated from the trauma surgeons. As he knows, at teaching hospitals like his, it's the professors who teach the students. The attendings and the residents were all ATLS and ACLS certified. He asked, "Was the attending surgeon in house?" The answer is "yes." The reason the general surgeons were prepared to do trauma surgery was that the call was not onerous—once or twice a month. The surgeons were provided with accommodations, not the penthouses we requested but a very comfortable room at a hotel opposite the hospital, not the dank hospital trauma call room that we have all tried to sleep in with the showers down the hall. The change was enticing to the group. Change is as good as a holiday, as they say.

Does the attending surgeon’s presence in the operating room and at resuscitation make a difference? I think this has been conclusively shown in the report by Rhodes and by Shackelford when he was in San Diego; we agree that the trauma surgeon should be nearby and available for that part of the treatment because it does make a difference.

The severity of injury of the patient wasn’t particularly high, but that is the trauma system we operate in. Irvine is the only level I trauma center, so it is highly likely that many less injured patients would be triaged there, as this was the nearest trauma center. There is no other level I trauma center, and the level II trauma centers are separated by some distance across the county.

The other reason is that Orange County is less violent; it is a county that is intersected with freeways, from which much blunt trauma comes, and the citizens of Orange County are more prone to white-collar crimes, for example, that bring the county to bankruptcy.

I have mentioned the number of operative cases in each group and pointed out that the trauma surgeons did more operations, which is statistically significant. This may be lack of experience, whereas the clinically more experienced general trauma surgeons better managed patients who have blunt trauma.

Finally, “great saves.” The concept of a great save is different at each of our hospitals. For example, at Irvine we would consider it a really great save if George Burns had been admitted to the emergency room having tripped over a carpet or burnt himself with a cigar. That would be great at Irvine but probably everyday for Cedars.

The experienced surgeon is less likely to be drawn by the drama of the situation, and, in fact, the sickest patients need the most experienced surgeon, as you stated in your concluding remarks. I would like to emphasize again that the purpose of the trauma surgeon system is not just to have these great saves but rather it is to instill a process that adroitly and efficiently manages injured patients and avoids the drama of the great saves. Again, I appreciate your comments, and these certainly deserve respectful attention, considering the high office you hold within the Los Angeles County Trauma System.

Now to the 9 other questioners, I have alluded to some of their answers already. John German, whom many of you will recognize as being closely associated with Irvine and very familiar with the process, stated that this is just another historic cycle in the management of the trauma service. The point of our paper is that you don’t need to have these historic ups and downs, where all of the trauma surgeons leave and you need to recruit among the general surgeons. You can have a more constant panel of surgeons caring for the patients. What is the role of the trauma surgeon then? We believe it is to organize and administer the trauma system, to be responsible for trauma education within the hospital and within the region where the trauma service operates, and obviously to practice as a committed surgeon.

Jan Horn, the patients were under the care continuously of the same surgeon, and consultants were called in as required. The patients were not handed over to critical care specialists, but their expertise was used, as we use it in any patient we have in the operating room.

All of the general surgeons had specialties such as vascular or oncologic surgery, and it could very well be that they would have been consulted by a trauma specialist if there was, for example, a vascular surgical problem in one of the trauma patients.

Dr Asensio, we examined the differences in the high-level ISS only for mortality, and the only mechanisms of injury we separated were blunt and penetrating, and I can’t give you any information on cardiac injuries. There was no difference.

Dr Schecter, I am pleased that you emphasized we are not challenging the trauma system at all. It works well. We are emphasizing the problem of burnout among trauma surgeons, as you pointed out. Tell Dr Ascher that Irvine has a very good record of organ donation, and it’s not the surgeons who do that. It is a member of the regional organ procurement system who is called by the surgeons to consult on every patient likely to die.

I appreciate Don Parsa’s comment. The neurosurgeons and the orthopedic surgeons have to be immediately available. That is one of the prerequisites for a level 1 trauma service.

I am honored that Stan Klein, one of Los Angeles County’s most experienced trauma surgeons, recognized the years we worked together as a resident at Harbor-UCLA, certainly that was valuable for me in developing my skills. The resident team structure on the trauma service was the same. Each period had the same level of residents. Of course, the residents rotated at various intervals.

Finally, Claude Organ. I think most of us have read with disquiet the paper written by David Richardson and his article in the Bulletin of the American College of Surgeons pointing out the distaste that graduating residents have for work on the trauma service. I hope that this presentation will go some way to changing that perception.