Hypothesis: Survival following massive transfusion in patients who have undergone trauma has improved during the past 10 years.

Design: Retrospective cohort study.

Setting: Academic level I trauma center in an urban community.

Patients: All patients who underwent trauma and who received greater than 50 U of packed red blood cells or whole blood in the 48 hours following admission to the emergency department.

Interventions: Data were obtained from blood bank records, the trauma registry, patient medical records, and hospital purchasing records. Patients were divided into 2 groups for comparison (early [1988-1992] and late [1993-1997] periods).

Main Outcome Measures: Survival and changes in trauma care provision.

Results: Survival following massive transfusion in patients who have undergone trauma has significantly increased during the past 10 years (16% vs 45%, early vs late period, \(P = .03\)). Factors associated with poor outcome included male sex, major vascular injury, high Injury Severity Score, severe acidosis, prolonged hypotension, refractory hypothermia, and decreased use of platelet transfusion (all \(P < .05\)). In the later period, there was more aggressive correction of coagulopathy, more efficient use of warming measures, decreased operative times for the initial operation, and increased use of component therapy (all \(P < .05\)).

Conclusions: Survival following massive transfusion has significantly (\(P = .03\)) increased during the past 10 years. Factors that may have contributed to this include more effective and efficient rewarming procedures, improved application of damage control techniques, more aggressive correction of coagulopathy, and improved blood banking procedures.

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his study was undertaken to determine whether survival following massive transfusion has improved during the past 10 years. In addition, we sought to identify aspects of trauma care that have contributed to survival. Massive transfusion was defined as greater than 50 U of packed red blood cells or whole blood given in the first 48 hours following admission to the emergency department. Our hypothesis was that survival following massive transfusion has improved during the past 10 years because of changes in trauma care provision systems and resuscitation techniques.

RESULTS

PATIENT DEMOGRAPHICS

Forty-six patients were identified. One patient was excluded from final analysis because of a severe fatal head injury; the patient was declared brain dead on hospital day 4. Overall, there were 35 male and 10 female patients included in the study. The mean age of the patients was 32.0 ± 10.4 years (range, 16-79 years), the mean Injury Severity Score was 30.4 ± 12.3 (range, 10-75), the mean revised trauma score was 6.6 ± 1.2 (range, 1.87-7.84), and the mean Glasgow Coma Scale score was 12.6 ± 2.6 (range, 3-15).

There were 22 penetrating injuries and 23 blunt injuries. Anatomic regions injured included the head or neck (n = 10; Abbreviated Injury Score [AIS], 3.1 ± 1.1), face (n = 2; AIS, 1.0 ± 0.0), thorax (n = 20; AIS, 3.3 ± 0.8), abdomen (n = 44; AIS, 4.3 ± 0.7), extremities (n = 14; AIS, 3.4 ± 0.7), and skin (n = 23; AIS, 1.0 ± 0.1). Most patients had a major vascular and/or liver injury (n = 41, 91%). Specific organ injuries included the liver (n = 27), major vascular (n = 26), chest (n = 18), spleen (n = 12), pelvis (n = 9), pancreas (n = 8), intestine (n = 19), kidney (n = 13), and head (n = 9).

The average number of units of packed red blood cells and whole blood transfused in 48 hours was 63.1 ± 13.4 (range,
PATIENTS AND METHODS

The blood bank database was reviewed for the period of 1988 to 1997. Forty-six patients who underwent trauma and who received greater than 50 U of packed red blood cells or whole blood within 48 hours of arrival at the emergency department were identified. The trauma registry (TraumaOne database; Lan cet Technology Inc, Cambridge, Mass), blood bank records, and patient medical records were reviewed. Information regarding patient demographics, injury type and severity, transfusion therapy, and resuscitation techniques was recorded. Survival was defined as discharge from the hospital alive. The cause of death was identified, and all patients who died from severe traumatic brain injury were excluded from the final analysis. Hospital purchasing records were reviewed to identify changes in the use of resuscitation equipment. Damage control laparotomy was defined as completion of the operation with packing or definite plans for reoperation for repair of injuries.

Patients were divided into early (1988-1992) and late (1993-1997) periods for comparison. t Tests and \( \chi^2 \) analyses were used to compare groups. Pearson correlation and linear regression analyses were used to confirm changes over time. Demographics regarding survivors and nonsurvivors were compared. Pearson correlation coefficients were derived using survival as the dependent variable. Data are given as mean ± SEM unless otherwise indicated.

Survival significantly increased over time (\( P = .03 \)) (Figure 1). Survival during the past 4 years was 54%. This difference remained when patients were grouped according to injury severity (Figure 2).

There were 13 survivors and 32 nonsurvivors (overall survival, 29%). There was no significant difference in survival for patients with penetrating injuries vs patients with blunt injuries (27% vs 30%, \( P = .82 \)).

Survivors and nonsurvivors are compared in Table 2. The transport time was slightly longer for survivors. Nonsurvivors had higher Injury Severity Scores (including abdominal AIS and thoracic AIS), more major vascular injuries, refractory hypothermia, prolonged hypotension, and more severe acidosis (all \( P < .05 \)).

Male sex was associated with a significantly higher mortality (80% vs 40%, men vs women, \( P = .01 \)). The average Injury Severity Score was similar for men and women (32.9 ± 10.9 vs 29.7 ± 12.5), but men were more likely to have sustained penetrating trauma (63% vs 0%). However, when comparing patients with blunt trauma only, the survival rate remained significantly higher for women (60% vs 8%, \( P < .01 \), despite similar Injury Severity Scores (32.9 ± 10.9 vs 41.6 ± 18.3, women vs men, \( P = .40 \)).

Differences in transfusion therapy for survivors and nonsurvivors are shown in Table 3. Survivors received 1 platelet transfusion for every 7.7 U of blood, while nonsurvivors received 1 platelet transfusion for every 11.9 U of blood (\( P = .03 \)). Fresh frozen plasma (FFP) was given for every 1.8 U of blood in survivors vs every 2.5 U of blood in nonsurvivors (\( P = .06 \)).

CHANGES OVER TIME

Aspects of transfusion therapy differed over time. The percentage of whole blood units, the percentage of plateletpheresis units, and the ratio of red blood cells–platelet

Table 1. Patient Demographics*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients</td>
<td>25</td>
<td>20</td>
<td>...</td>
</tr>
<tr>
<td>Survivors</td>
<td>4 (16)</td>
<td>9 (45)</td>
<td>.03</td>
</tr>
<tr>
<td>Age, y</td>
<td>28.0 ± 7.6</td>
<td>37.0 ± 12.0</td>
<td>.03</td>
</tr>
<tr>
<td>Oldest survivor, y</td>
<td>51</td>
<td>79</td>
<td>...</td>
</tr>
<tr>
<td>Male sex</td>
<td>21 (84)</td>
<td>14 (70)</td>
<td>.27</td>
</tr>
<tr>
<td>Penetrating injury</td>
<td>14 (56)</td>
<td>8 (40)</td>
<td>.30</td>
</tr>
<tr>
<td>Glasgow Coma Scale score</td>
<td>11.7 ± 3.3</td>
<td>13.6 ± 1.7</td>
<td>.07</td>
</tr>
<tr>
<td>Injury Severity Score</td>
<td>30.6 ± 12.6</td>
<td>30.2 ± 11.9</td>
<td>.92</td>
</tr>
<tr>
<td>Revised trauma score</td>
<td>6.4 ± 1.3</td>
<td>6.9 ± 1.0</td>
<td>.33</td>
</tr>
<tr>
<td>Length of stay, d</td>
<td>8.6 ± 8.9</td>
<td>17.6 ± 14.1</td>
<td>.06</td>
</tr>
<tr>
<td>Anatomic area involved</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head</td>
<td>5 (20)</td>
<td>4 (20)</td>
<td>&gt; .99</td>
</tr>
<tr>
<td>Major vascular</td>
<td>14 (56)</td>
<td>12 (60)</td>
<td>.79</td>
</tr>
<tr>
<td>Liver</td>
<td>16 (64)</td>
<td>11 (55)</td>
<td>.55</td>
</tr>
<tr>
<td>Spleen</td>
<td>5 (20)</td>
<td>7 (35)</td>
<td>.27</td>
</tr>
<tr>
<td>Pancreas</td>
<td>4 (16)</td>
<td>5 (25)</td>
<td>.73</td>
</tr>
<tr>
<td>Intestine</td>
<td>11 (44)</td>
<td>8 (40)</td>
<td>.79</td>
</tr>
<tr>
<td>Kidney</td>
<td>8 (32)</td>
<td>5 (25)</td>
<td>.62</td>
</tr>
<tr>
<td>Pelvis</td>
<td>5 (20)</td>
<td>5 (25)</td>
<td>&gt; .99</td>
</tr>
<tr>
<td>Chest</td>
<td>10 (40)</td>
<td>8 (40)</td>
<td>&gt; .99</td>
</tr>
</tbody>
</table>

* Data are given as number (percentage) of patients or mean ± SD unless otherwise indicated. Ellipses indicate data not applicable.

Figure 1. Improved survival following massive transfusion during the past 10 years (\( P = .03 \)).
transfusions differed between periods. These results were confirmed with Pearson correlation and linear regression analysis over time (Table 4).

Markers of resuscitation and management techniques were compared (Table 5). The operative time for the initial procedure was lower in the second group, as was the lowest recorded platelet count. The average time to reach a temperature of 36°C was also shorter in the second period. Only 1 of 13 patients who took longer than 8 hours to reach a temperature of 36°C survived.

There was also a trend toward more early deaths (≤3 days) in the 1988-1992 group. The average time to death was 4.2 days in the early group and 5.9 days in the late group.

At our institution, patients who have undergone trauma and who require massive transfusion are resuscitated with warm fluids via a rapid infuser. In 1993, a new rapid infuser was purchased for use in trauma resuscitation (SIMS Level 1 System 1000; SIMS Level 1, Inc, Rockland, Mass). Hospital purchasing records showed a dramatic increase (6-fold) in the use of the level 1 countercurrent warming system from 1993 to 1995. Use of the level 1 system from 1995 to 1997 has remained constant. Before 1993, an older, less efficient rapid infuser was used. The use of warm water blankets and external conductive devices has increased 6-fold from 1994 to 1997.
**Table 5. Resuscitation Variables by Period**

<table>
<thead>
<tr>
<th>Variable</th>
<th>1988-1992</th>
<th>1993-1997</th>
<th>t Test or ( \chi^2 ) P</th>
<th>Correlation to Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to reach 36°C, h</td>
<td>8.4 ± 5.1</td>
<td>4.8 ± 2.4</td>
<td>.07</td>
<td>( r = -0.43, P = .003 )</td>
</tr>
<tr>
<td>Patients who reached 36°C</td>
<td>72</td>
<td>90</td>
<td>.14</td>
<td>( r = 0.23, P = .12 )</td>
</tr>
<tr>
<td>Time in the operating room, h</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First</td>
<td>4.2 ± 1.4</td>
<td>2.6 ± 0.8</td>
<td>&lt;.001</td>
<td>( r = -0.41, P = .005 )</td>
</tr>
<tr>
<td>Damage control</td>
<td>3.4 ± 0.7</td>
<td>2.5 ± 0.7</td>
<td>.04</td>
<td>( r = -0.45, P = .01 )</td>
</tr>
<tr>
<td>Platelet count, × 10⁶</td>
<td>65.8 ± 29.2</td>
<td>45.4 ± 11.6</td>
<td>.06</td>
<td>( r = -0.27, P = .07 )</td>
</tr>
<tr>
<td>Early deaths (≥3), %</td>
<td>35</td>
<td>35</td>
<td>.08</td>
<td>( r = 0.02, P = .88 )</td>
</tr>
<tr>
<td>Fibrinogen level, mmol/L</td>
<td>86.3 ± 38.4</td>
<td>77.1 ± 37.8</td>
<td>.54</td>
<td></td>
</tr>
<tr>
<td>Prothrombin time, s</td>
<td>22.8 ± 4.6</td>
<td>23.0 ± 5.3</td>
<td>.93</td>
<td>( r = 0.002, P = .98 )</td>
</tr>
<tr>
<td>Base deficit, mEq/L</td>
<td>16.3 ± 4.5</td>
<td>15.0 ± 4.0</td>
<td>.39</td>
<td>( r = -0.26, P = .09 )</td>
</tr>
</tbody>
</table>

*Data are given as mean ± SEM or percentage.

**COMMENT**

In the 1970s, massive transfusion was defined as greater than 10 U of blood transfused in 24 hours. Reported survival rates were dismal (6.6%). During the past 2 decades, however, survival rates have improved and the criteria to define massive transfusion have evolved. Recent reports use variable end points, increasing the number of transfusions during an entire hospital stay. This improvement is even more significant for the second period, during which survival was 45% for the past 5 years and 54% for the past 4 years. In contrast to previous reports, we found no difference in survival in patients with blunt vs penetrating trauma. In addition, despite similar injury type and severity, there were fewer early deaths from 1993 to 1997, suggesting that improvement in trauma care provision and resuscitation allowed these patients to be sustained for longer periods following injury.

Factors associated with poor outcome included major vascular injury, a high Injury Severity Score, severe acidosis, prolonged hypotension, refractory hypothermia, and decreased use of platelet transfusions and FFP. Many of these factors have previously been reported in the literature as predictive of outcome. There was a negative correlation between male sex and survival. Previous researchers have also identified male sex as a risk factor for mortality following trauma and injury. Sex and hormonal differences have been identified for various disease processes, including the immune response to hemorrhage or sepsis.

While previous studies have attempted to identify risk factors that predict mortality following massive transfusion, few have focused on specific aspects in trauma care that have impacted patient survival. This study identifies several distinct changes that may have contributed to the improved outcome of patients following massive transfusion.

During the past decade, there has been increased attention to rewarming during the resuscitation of hypothermic patients who have undergone trauma. Hypothermia has been associated with dysrhythmias, shifts of the oxyhemoglobin curve, inhibition of the clotting cascade, and increased wound infections and infectious complications. Traditional methods of rewarming include application of warm blankets, external conductive devices, heating and humidifying air in the ventilatory circuit, and warming intravenous infusions. While all of these techniques are used at our hospital, the level 1 infuser has been used more aggressively in the emergency department and during resuscitation during the past 5 years. It is used for all patients who have undergone trauma who remain hypotensive despite initial fluid resuscitation. Early devices for rapid warm fluid infusion were suboptimal, with low flow rates (150 mL/min), infectious complications, and the potential for venous air embolism. Newer devices are safer and are able to provide blood at much faster rates (>1000 mL/min). Use of adjunctive warming devices such as warm water and warm air blankets has also dramatically increased during the past 5 years. During the past 5 years, we have been...
able to more efficiently warm patients to a temperature of 36°C following massive transfusion (Table 5), and this may have contributed to our improved survival.

Damage control laparotomy for severe injury has gained increasing popularity during the past 10 years.\textsuperscript{9,21} The priorities of damage control celiotomy include control of hemorrhage, identification of injuries, and control of contamination. Immediate survival is the primary goal. A patient’s physiologic limits must be recognized early, and the duration and scope of surgery modified accordingly to prevent complete cardiovascular collapse. Although damage control laparotomy was used equally in the late and early periods, the decision to terminate the initial procedure was made much earlier in the second period. This led to shorter operative times during the initial procedure and an increased number of operations (Tables 2 and 4). Damage control techniques used included perihepatic liver packing with staged laparotomy, bowel resection (rather than repair), and retroperitoneal and pelvic packing. During the past 10 years, we have become more skilled at identifying patients who would benefit from damage control laparotomy. It is critical to make this decision early, before the patient’s physiologic limits are exceeded.

Transfusion practices in this study also differed between survivors and nonsurvivors, as previously mentioned. Survivors underwent more aggressive transfusion with platelets and FFP (Table 3). Survivors received 1 plateletpheresis for every 7.7 U of blood transfused, whereas nonsurvivors received only 1 plateletpheresis for every 11.9 U of blood transfused ($P = .03$). A similar trend was seen for FFP transfusion (1 U of FFP for every 1.8 U of blood in survivors vs 2.5 U of blood for nonsurvivors). While protocol replacement of clotting factors has not been shown to improve outcome,\textsuperscript{22} substitution of clotting factors should not be delayed once massive transfusion has begun. Early aggressive correction of coagulopathy appears important to good outcome.

Blood banking practices have evolved dramatically during the past 10 years. Component therapy is the standard. Patients receive packed red blood cells primarily, with FFP, cryoprecipitate, and platelets being transfused only as indicated by coagulopathy. Component therapy allows the physician to give transfusion products specific for each patient’s needs. This may improve treatment outcomes in addition to maximizing donor resources. Separation of blood into its constituent parts also allows for optimal storage and function of each component.\textsuperscript{23} By altering storage and collection for each particular blood component, overall function and therapeutic value of component transfusion improve.

This study demonstrates that survival following massive transfusion in patients who have undergone trauma has improved dramatically during the past 10 years. Survival rates of greater than 50% can be achieved. Important factors that may have contributed to this improved survival include (1) more effective and efficient rewarming, (2) improved use and earlier application of damage control techniques, (3) aggressive resuscitation to correct coagulopathy, and (4) improved blood banking techniques. As trauma care provision systems continue to evolve, survival is likely to continue to improve. Thus, continued resuscitation despite massive transfusion is warranted.

Presented at the 70th Annual Session of the Pacific Coast Surgical Association, San Jose del Cabo, Baja California Sur, February 15, 1999.

The statistics were reviewed by Anita Iannucci, PhD, senior statistician at the University of California Irvine Center for Statistical Consulting, Orange.

We thank Stephanie Lush, MSN, for her assistance in the preparation of the manuscript.

Reprints: Marianne E. Cinat, MD, Department of Surgery, University of California Irvine Medical Center, 101 The City Dr, Bldg 53, Rte 81, Orange, CA 92868 (e-mail: mcinat@uci.edu).

REFERENCES


DISCUSSION

John T. Owings, MD, Sacramento, Calif: I commend Drs Wilson and Cinat, and their colleagues, for the fine survival rate
achieved in a very severely injured group of trauma patients. The core issue addressed is futility. Specifically, the futility in caring for injured trauma patients. The authors point out that many things have changed over the past decade. Changes as noted by the authors include increased emphasis on component blood banking practices, the more liberal use of the damage control laparotomy technique, and more aggressive rewarming policies and procedures. Other changes that have occurred in the past decade include improved prehospital trauma care with decreased field times, advances in critical care such as the increased use of pressure cycle ventilation, and improved nutritional support. In addition to these patient-care–related changes, we certainly also recognize there have been decreased financial resources available to care for the most critically injured, and also an increase in the prevalence of deadly infectious disease that these most severely injured patients may harbor. Given these latter changes, the question frequently asked is when is it okay to quit? Quitting saves time and money and reduces the exposure to potentially lethal bodily fluids. If the point of true futility has been reached, then quitting is best for all.

Recently, in the literature, the point of absolute futility has been sought by many authors. Is there an age that is too old, a duration of CPR [cardiopulmonary resuscitation] that is too long, a temperature that is too cold, or a number of transfusions that is too great to survive? I applaud the authors for answering this latter question. No, there is not a specific number of transfusions that is too great to survive. We should not quit simply because a pre-established number of packed red blood cells has been given to our patients.

When reviewing the changes in practice vs improved survival, I would caution the authors, however, from blurring the distinction between an association and a causal relationship. The authors have shown that the survival of severely injured patients has improved in their institution as a function of time. Throughout the paper the authors list a number of other factors that have also changed over time, such as blood banking practices, transfusion practices, time to rewarm the patient, the use of the damage control laparotomy technique. They conclude that these factors are the most important contributors to improved survival over time. I agree that these changes that they have discussed are for the better. These changes, though associated with both improved survival and the passage of time, are not necessarily any more responsible for the improved survival than they are for the passage of time. Put simply, the relationship between the various practice changes and the improved survival is only associative and not causative.

How did you come to choose the periods with which to compare these data? Was there a specific practice change that occurred at the midpoint in order to come up with these 2 groups? The second question: You compare resuscitation end points. Given the retrospective design of this study, how did you choose the time of those end points to review? Did you choose a fixed period of time from admission, period of time that has to do with your own internal lab draws, or was there a final lab draw that was used? To better assess the relative contribution of each of the different practice changes that you discussed, did you consider doing a multivariate logistic regression analysis, or were the numbers too small to perform this statistical analysis? Finally, probably most importantly, how have your findings actually affected the way that you practice trauma surgery?

Clauton Shatney, MD, San Jose, Calif: I have 2 questions. The first question falls upon the futility issue that Dr Owings has just talked about. I really couldn’t get a feel for the kind of patients you are talking about in your paper. It is one thing to say, okay, they had x number of transfusions, but it is another thing with regard to how rapidly they are bleeding, what their injury pattern is, etc. I couldn’t get a really good feel for that. The reason I ask that question is I don’t know your policy regarding decision of death on arrival of patients in full cardiac arrest, for example, or who you might go after with massive transfusions.

The second question I had regard your operative times in both time frames. They are quite long for what you would perceive to be a nearly exsanguinating if not exsanguinating patient—more than 4 hours in the first time period and still 2.4 hours, if I read it correctly, in the second time period. You alluded to damage control in your concluding slides, but did you actually break your data down into those who did and didn’t have damage control by looking at the operative reports and seeing what was going through the surgeon’s mind, so you could see the impact of a damage control mode vs a fully aggressive, let’s-do-it-all-at-one-time operative intervention?

M. Atik, MD, Idylwild, Calif: I hope the authors will forgive me for making a suggestion for an alternative conclusion of their study. They said that despite extensive injuries the patient with massive transfusion can have a good outcome. I wonder if they would consider replacing it with, “despite massive transfusion, extensive injuries can have better and improved outcome.” I say that because, as most of you know, the transfusions are often based on tradition, habits, and previous training rather than physiological needs of the patient. In this study, the credit should really go to the trauma team and the safer and improved blood products. We should not misunderstand the purpose of this elegant study, as an advocate of massive transfusion. We should still pursue the quest for finding ways and methods of finding a rational basis for transfusion in order to avoid the associated complications and risks without jeopardizing the oxygen delivery to the tissues.

Ronald V. Maier, MD, Seattle, Wash: To expand a little bit on what Dr Owings was saying, you have to be careful about linking concomitant events as being causal to your outcome. Although I agree, I don’t think you have data showing that these changes which you have identified actually caused your improvement in outcome. I think they are important and there are other data supporting their importance. However, being a believer in trauma systems, I actually would like to argue more from this viewpoint. Why didn’t you look at system changes in your 2 time periods. I am sure things changed in this system around your hospital and in your hospital. What changed in the prehospital arena? Was there increased paramedic training to improve care of patients in the field? Did you reorganize the surgeons involved in trauma care to optimize the staff? What happened in your system? I think it is an extremely important component to why we have improved survival in severely injured patients, and that is what you have identified here. Your system has changed; what did you do to make things better?

Thomas Berne, MD, Los Angeles, Calif: Did you change your resuscitation? For instance, did you move to superoptimization as a goal?

Dr Wilson: Thank you, Dr Owings, for your kind remarks. The time periods were simply chosen as 2 consecutive 5-year intervals, a decade during which we had satisfactory records of our trauma activities. The indices selected were measured as the most depressed physiologic measurement within the first 48 hours of entry to the hospital. As you suggest, Dr Owings, in this retrospective review, 40 patients are too small a number for more sophisticated statistical analyses.

How did the findings affect how we practice? We emphasize early rewarming and maintenance of a core body temperature higher than 36°C, a pRBC [packed red blood cell]–platelet transfusion ratio of about 1:7, and in selected patients damage control laparotomy.

Dr Shatney asked about our patient profile. The study group had 50% penetrating and 50% blunt injuries, which differs from our overall pattern of 83% blunt and 15% penetrating. None of these patients were full arrest on arrival. You note that the OR [operating room] time has decreased significantly in the second period, which may be due to the damage control concept.
Dr Atik, it must be rewarding for you to see the early work you did on platelet function continue to be clinically useful, and we agree with your suggestion.

Dr Maier, surely trauma systems are the fundamental reason why our mortality rates continue to decrease. We did examine the prehospital transit time, and we found no difference between the 2 periods.

Lastly, Dr Berne, if we have to look beyond these changes in treatment, rather than resuscitation parameters, I would emphasize the professionalism and dedication of our trauma surgeons. I am very pleased that the paper received this much discussion. In summary, it is more than coincidental that the factors identified by Dr Cinat and her colleagues are associated with this improved response.

In Memoriam

Joel Wilson Baker, MD

Born in Shenandoah, Va, in 1905, Dr Joel Baker graduated from medical school at the University of Virginia in 1928 and was recruited by Virginia Mason (VM) Hospital and Clinic founder Dr James Tate Mason, Sr, to Seattle, Wash, for his internship at VM. Dr Baker continued under a surgical preceptorship with Dr Mason and stayed at VM as a member of the medical staff for 42 years, he served as chair of the Department of Surgery for 34 years, and he was chair of the clinic for 19 years (1945-1964).

He combined a keen sense of humor with superb judgment, unmatched technical ability, personal discipline, and remarkable administrative talents. He had the unique ability of involving others in the administrative process, thereby gaining their support and cooperation. He was clinical professor of surgery at the University of Washington (1930-1980) when he was elected emeritus.

Dr Baker served as surgery consultant to the King County Harborview, Children’s Orthopedic, the US Naval (Bremerton, Wash), and the US Public Health (Seattle) hospitals. He was the first surgical consultant (1945) to Madigan General US Army Hospital and became emeritus surgical consultant in 1977. In 1965, Dr Baker spent 2 months on a tour of duty with general orders representing the Surgeon General of the Army (Leonard Heaton) visiting military medical bases in Alaska, Okinawa, South Korea, Japan, Thailand, Vietnam, the Philippines, and Hawaii.

Dr Baker was elected as a director to the American Board of Surgery (1955-1960) and served on the Board of Regents of the American College of Surgeons (ACS) (1953-1965), becoming president of the ACS in 1969-1970. In 1951, he founded and was the first president of the Washington Chapter of the ACS. He was the only surgeon to serve as president twice, 1951 and 1952. He served as president of the Pacific Coast Surgical Association (1971-1972) and received an honorary fellowship in the Royal College of Surgeons, Edinburgh, Scotland (1974). His major interest was the postgraduate training of surgeons, having developed the general surgical residency at VM in the early 1940s. This program is the oldest surgical residency in the Northwest.

Dr Baker published 136 papers (7 after his retirement), numerous textbook chapters, and authored many instructional films, often under the sponsorship of the American College of Surgeons. Joel Wilson Baker, MD, died July 4, in Seattle. He was 94 years old.

Claude H. Organ, Jr, MD, Editor
Oakland, Calif
L. William Traverso, MD
Philip C. Jolly, MD
Seattle, Wash

Photograph provided courtesy of Virginia Mason Medical Center, Seattle, Wash.