We then completed an in-depth analysis of divisional and departmental peer review proceedings to identify the final adjudication of FTR as preventable, potentially preventable, or nonpreventable. The Pearson χ² test and a paired t test were performed for univariate analysis and a logistic regression for multivariate analysis using Stata, version 12.0 (StataCorp). P values were 1-sided, and statistical significance was defined as P < .05.

Results | Of the 802 patients who underwent emergency surgery, 682 (85.0%) were men and 120 (15.0%) were women, with a mean (SD) age of 33.8 (14.7) years. Of these, 172 patients (21.4%) developed a complication. We found that 78 patients (45.4%) had a medical complication and 94 (54.6%) had a surgical complication. The most common complication was pneumonia (24 patients), and the incidence of FTR was 30.8% (53 patients). On univariate analysis, age, sex, and type of complication were similar between patients in the FTR and non-FTR groups. The FTR group had more patients with a blunt mechanism of injury, hypotension, a higher Injury Severity Score, a lower Glasgow Coma Scale score, and a shorter length of stay. Binary variables were assigned a value of 0 if the variable was absent and 1 if present. Variables with P < .20 were included in the multivariate analysis. On multivariate analysis, factors associated with FTR were insurance status.

### Table. Multivariant Analysis of Factors Associated With Failure to Rescue

<table>
<thead>
<tr>
<th>Factor</th>
<th>Risk of Failure to Rescue, OR (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insurance coverage</td>
<td>0.26 (0.09-0.73)</td>
<td>.01</td>
</tr>
<tr>
<td>Age per 1-y increase</td>
<td>1.02 (0.99-1.05)</td>
<td>.14</td>
</tr>
<tr>
<td>Penetrating mechanism of injury</td>
<td>0.84 (0.33-2.12)</td>
<td>.71</td>
</tr>
<tr>
<td>Hypotension on admission to ED*</td>
<td>3.35 (1.35-8.30)</td>
<td>.01</td>
</tr>
<tr>
<td>Higher Injury Severity Score&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.07 (1.03-1.11)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Higher Glasgow Coma Scale score on admission to ED&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.95 (0.86-1.05)</td>
<td>.33</td>
</tr>
</tbody>
</table>

Abbreviations: ED, emergency department; FTR, failure to rescue; OR, odds ratio.

<sup>a</sup> Defined as a systolic blood pressure of 90 mm Hg or lower.

<sup>b</sup> Higher scores indicate more severe injuries.

<sup>c</sup> Higher scores indicate less neurologic impairment.

### Figure. Dispersion of Trauma Patients Who Underwent Emergency Surgery

Preventable and possibly preventable cases represent only a few of the cases designated as failure to rescue (FTR).

Role of Preventability in Redefining Failure to Rescue Among Major Trauma Patients

Failure to rescue (FTR) is defined as death after a major complication and has been adopted as a measure of quality in surgical patients. Current definitions of FTR are limited because they do not account for the influence of preventability on mortality. The aim of this study was to examine the association of preventability with rates of FTR among patients with major trauma.

Methods | This 6-year, retrospective cohort study was performed at a university-affiliated level I trauma center. We identified all adult patients with neck, torso, and peripheral vascular injuries (n = 802) who were taken directly from the emergency department to the operating room for emergency surgery. Institutional review board approval and waiver for patient consent were obtained from the John F. Wolf, MD, Human Subjects Committee, Los Angeles Biomedical Research Institute.

Patients whose outcomes were classified as FTR were compared with those in the non-FTR group. Variables analyzed were demographic characteristics, Injury Severity Score (higher scores indicate more severe injuries), Glasgow Coma Scale score (higher scores indicate less neurologic impairment), transfusion requirements, presence of a head injury, location of the injury (chest, abdomen, or extremity), toxicology screen results, insurance status, and hypotension on admission (defined as systolic blood pressure ≤90 mm Hg). Complications were categorized as either medical or surgical.
ment embraced by the American College of Surgeons, which ventable FTRs. This approach is now part of a national move-
group would affect our results.

treatment. Exclusion of those deaths from the preventable
condition, some patients who died may have opted to forgo further
objective nature of the determinations of preventability. In ad-
sign, a patient cohort from a single institution, and the sub-
lower Injury Severity Score were also associated with FTR.
and takes responsibility for the integrity of the data and the accuracy of the data
For early stage breast cancer, breast-conserving surgery (BCS) is a compelling alternative to mastectomy, resulting in lower complication rates,1 equivalent patient-reported quality of life and cosmesis,2 and equivalent or better survival rates.3 Unfortunately, these benefits may not be fully realized in women who undergo repeated surgery, usually to increase the resec-
tion margin.4 Although considerable attention has been drawn to this problem, the costs and complications resulting from additional operations are not well-characterized. Herein we pre-
sent a retrospective review of insurance claims data for BCS patients performed to assess clinical complications and economic outcomes.

Discussion | Failure to rescue has been used to assess quality of care. Its utility, however, is limited because of imprecise defi-
nitions and difficulty in collecting standardized data for comparison.2

The current definition of FTR may be inadequate and over-
emphasizes variables beyond a trauma system’s control. This definition also classifies most nonpreventable deaths as FTR. This classification system leads to an inflated FTR rate that in
cudes many cases in which no “failure” occurred. Incorporation of preventability into definitions of FTR may allow for more precise assessments of surgical performance.

Identifying the characteristics and risk factors in this more specific group may aid in the development of strategies to improve surgical care. In our cohort of all patients who developed a complica-
tion after emergency surgery (both preventable and not pre-
ventable), we found that 78 patients (45.4%) had a medical complica-
tion and 94 (54.6%) had a surgical complication. We have

Future efforts to improve patient care should focus on pre-
ventable FTRs. This approach is now part of a national move-
ment embraced by the American College of Surgeons, which has set a goal of zero preventable deaths from trauma.4

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Administrative, technical, or material support: Coates, Yule, Vasak.

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