Editorial

Grading of injury severity – What should be the prerequisites to separate multiply injured patients from those in critical condition and polytrauma?

The grading of injury severity has become a crucial issue in health care. In developed countries, multiple different scoring systems serve various purposes. Some of them were developed to grade patients on scene, some on admission and some during the hospital course.\(^1\) In addition, many scores are in use to monitor complications, such as ARDS, MODS or MOF.

It is important to consider reasons for grading multiply injured patients. In general, three different views can be identified, such as medical, socioeconomic and administrative aspects. In this respect, hospital administrators require a certain assessment in order to calculate resource allocations. Hospitals usually receive additional support from the government, if their trauma load exceeds certain numbers of cases. Some of these trauma patients are frequently uninsured and underrepresented in the given insurance system.

National registries separate hospitals according to the level of care and so do hospital administrations. These mostly use grading systems for benchmarking purposes. Finally, physicians measure the quality of medical care used in order to quantify their medical success rate.\(^3\)

In the USA most clinicians differentiate between multiply injured, severely injured/polytrauma patients and critically injured patients. However, none of these are precisely defined. Most scientists separate any patient with an injury severity score (ISS) (reference) of more than 16 points as a multiply injured patient.

It appears that the following questions are of value from a medical point of view:

- When is the best time to define a patient as a multiply injured/polytraumatized?
- Who is the best trained expert to do this?
- How can feasibility be maintained while accuracy is improved?
- Moreover, what purpose can be followed?

The main purpose of defining a patient or a certain condition might be to include or exclude the patient to/from a certain group or subgroup (Table 1). In this light, several aspects should be respected when planning on grading patients or defining them as multiply injured.

To provide a uniform definition, certain prerequisites should be fulfilled, as listed in Table 2.

The definition should be sensitive to provide coverage of the patients in focus. It should be specific enough in order to safely rule out those that do not have life threatening injuries. The mortality rate of those identified by the definition should be considerable.

Parameters used for grading should have a homogenous distribution in terms of their individual mortality. The reliability of the definition should be enough to allow for widespread use, independent of different trauma systems. Finally, the ideal definition should also be able to be applicable for research purposes of different kinds.

Finally, it is crucial to determine the correct parameters for assessment of the patient (Table 3). Among these, general surgeons have relied purely on physiologic parameters to describe a patient in critical condition, such as the acid base parameters. For a patient with an acute haemorrhage, these appear to be well selected as the clinical condition can change quickly.\(^4\) For other purposes, such as research questions, a more durable grading system, such as a definition as per a certain time point is more important.

The usability of physiologic parameters closely depends on the quality of data collection. Kondo et al. examined the data sets from

---

**Table 1**

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Characteristics</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inclusion/exclusion</td>
<td>Prospective, pragmatic,</td>
<td>Clinical studies,</td>
</tr>
<tr>
<td></td>
<td>as early as possible</td>
<td>trauma registries</td>
</tr>
<tr>
<td>Subgroup description</td>
<td>Retrospective, detailed,</td>
<td>Publications,</td>
</tr>
<tr>
<td></td>
<td>discharge or thereafter</td>
<td>guidelines, subgroup</td>
</tr>
<tr>
<td></td>
<td></td>
<td>hospital analyses, national/</td>
</tr>
<tr>
<td></td>
<td></td>
<td>hospital reports</td>
</tr>
</tbody>
</table>

**Table 2**

Criteria to compare different grading systems or definitions of the severely injured patient.

1. Sensitivity
   - Trauma patients clinically considered as polytraumatized should be covered
2. Specificity
   - Patients without polytrauma should not be included
3. Mortality
   - Polytraumatized patients should demonstrate a considerable mortality rate
4. Comparability
   - Polytraumatized should be comparable across different studies and/or registries
5. Reliability
   - A definition of polytrauma should easily be made by different individuals
6. Applicability
   - In prospective and retrospective research