

PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Patient disposition using the Emergency Severity Index: a retrospective observational study at an interdisciplinary emergency department
AUTHORS	Völk, Stefanie; Koedel, Uwe; Horster, Sophia; Bayer, Andreas; D'Haese, Jan; Pfister, Hans-Walter; Klein, Matthias

VERSION 1 – REVIEW

REVIEWER	FitzGerald, Gerard Queensland University of Technology, School of Public Health
REVIEW RETURNED	14-Dec-2021

GENERAL COMMENTS	<p>Thank you for asking me to review this paper. Its stated aim was “to characterise the in-house resources needed for ED patients according to ESI scores at triage and the most likely medical discipline that is needed for the patient according to the chief complaint.”</p> <p>The study collected data on ED attendances over a three-year period at a single hospital in Munich. The data collected included the ESI score, mode of arrival, discharge destination and presenting complaint. The study found that there was a direct association between ESI scores and the need for intermediate or intensive care and that the presenting complaint or specialty group responsible for those patients, had generally the same distribution as the overall score.</p> <p>Thus, it seemed that the addition of a presenting complaint did not add to the predicative power of the ESI.</p> <p>The ESI is one of a number of international triage scales used in the emergency department context. Its design differs from the others in common use including the Manchester Triage Scale, the Australasian Triage Scale and the Canadian Triage and Acuity Scale. It is a 3-tier assessment of acuity, resource requirement and vital signs.</p> <p>All of the scales are predictive of outcomes including mortality, admission rates to hospital, time in hospital, admission to ICU and length of time in ICU and are associated with in-hospital mortality. Additionally, all of the scales have been demonstrated to be related to resource consumption within the ED and within the health system more generally. Indeed, the ATS is the basis of Urgency Related Groups which form the basis of Emergency Department funding in Australia.</p>
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	<p>This study does not address the issue of resource consumption within the Emergency Department.</p> <p>the paper is well written and structured to present the data obtained. However, it is difficult to see what this study adds to the international literature. Much of this data is collected at hospital level and in some jurisdictions collected at system wide level and regularly reported. The argument that less urgent triage scores my lead to discharge has been used by politicians and others to suggest that those patients are inappropriately attending the emergency department. However, even as this study has found, 22% of ESI 4 and 11% of ESI 5 patients were actually admitted to hospital, and therefore any suggestion that those patients are inappropriate simply on the basis of their emergency assessment and could be discharged without assessment is clearly inappropriate.</p> <p>The study also raises the prospect of diagnostic specific triage scales such as the neurological triage system. There are several diagnostic specific scales used not only for triage, but also for system evaluation. However, it is unlikely to be useful for management within the emergency department to have to apply multiple different scales based on diagnosis.</p> <p>Perhaps the only key finding is that the addition of diagnosis is not necessarily predictive of outcomes, as defined by hospital admissions or intensive care admissions.</p> <p>Perhaps the authors could give consideration to the following:</p> <ol style="list-style-type: none"> 1. A broader discussion of the evolution and use of Triage Scales and their role in ED and health system management. 2. A considered discussion on exactly what this paper adds to the international literature. 3. A more considered discussion of the limitations of this study and 4. A considered discussion about the utility of these findings to policy and practice.
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REVIEWER	Brazauskas, Ruta
	Medical College of Wisconsin, Division of Biostatistics
REVIEW RETURNED	23-Dec-2021

GENERAL COMMENTS	<p>It is an observational study of patients presenting at a single emergency department (ED). The study aimed to characterize patient disposition according to the Emergency Severity Index (ESI) assigned at the time of triage. Overall, the paper is very well written. Statistical analysis methods are suitable for the problems being addressed. I have a few minor comments:</p> <p>Methods, page 6/23 line 46: how exactly was the Bonferroni adjustment made? Was it applied to all comparisons made throughout the paper or just select ones? Which p-values were adjusted?</p> <p>Page 18/23, Table 1: Replace the title of the first column "Frequency of symptom" with "Rank of symptom frequency" because it is not the actual frequency of the symptom which is given in that column.</p> <p>Page 19/23, Table 2: what does the "n" in each cell represent - the number of patients in that group or the number of admissions in that group? Please make its meaning clear.</p> <p>Comment on Figure 1 and 2: The color scheme looks very nice, but it makes reading these figures hard, especially Figure 2A with</p>
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	multiple categories pictured with minor color differences. Maybe they could be redone using more contrasting colors (red, blue, green, yellow, etc.)
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VERSION 1 – AUTHOR RESPONSE

Reviewer 1: Thus, it seemed that the addition of a presenting complaint did not add to the predicative power of the ESI.

Response: Thank you for this remark. We agree, that at first glance for most subgroups, addition of specialty (according to the presenting complaint) did not necessarily add much predicative power to the ESI. However, we would like to emphasise two findings of particular interest, which we included in the discussion of our revised manuscript: First, failure of ESI to predict hospital admission was more likely for some specialties (Table 2) like neurosurgery (54% of ESI 4 and ESI 5 patients needed admission), neurology (20% of ESI 5 patients needed admission) or internal medicine (21% of ESI 5 patients needed admission). Second, differences were also evident for required intensive care capacities (30% of ESI 1 patients with neurological or medical symptoms required immediate intensive care compared to 17% of patients with surgical symptoms).

Reviewer 1: The ESI is one of a number of international triage scales used in the emergency department context. Its design differs from the others in common use including the Manchester Triage Scale, the Australasian Triage Scale and the Canadian Triage and Acuity Scale. It is a 3-tier assessment of acuity, resource requirement and vital signs. All of the scales are predictive of outcomes including mortality, admission rates to hospital, time in hospital, admission to ICU and length of time in ICU and are associated with in-hospital mortality. Additionally, all of the scales have been demonstrated to be related to resource consumption within the ED and within the health system more generally. Indeed, the ATS is the basis of Urgency Related Groups which form the basis of Emergency Department funding in Australia. This study does not address the issue of resource consumption within the Emergency Department.

Response: Thank you for sharing these aspects. To address your points, we broadened our discussion on other triage scales and included as important limitation of our study that resource consumption within the emergency department was not considered. We share your point that the association of ESI with resource consumption within the emergency department has already been addressed by previous studies. This issue was not in the scope of our work.

Reviewer 1: The paper is well written and structured to present the data obtained. However, it is difficult to see what this study adds to the international literature. Much of this data is collected at hospital level and in some jurisdictions collected at system wide level and regularly reported. The argument that less urgent triage scores may lead to discharge has been used by politicians and others to suggest that those patients are inappropriately attending the emergency department. However, even as this study has found, 22% of ESI 4 and 11% of ESI 5 patients were actually admitted to hospital, and therefore any suggestion that those patients are inappropriate simply on the basis of their emergency assessment and could be discharged without assessment is clearly inappropriate.

Response: We totally agree with you that the political discussion on abuse of emergency departments by patients with non-severe symptoms triaged to high ESI scores is inappropriate. This is one very important key message of our work as we show that less urgent triage scores are still associated with significant numbers of admissions. A profound emergency workup is needed to distinguish patients who could be discharged from those qualified for admission. Furthermore, also among

discharged patients a significant number still requires the medical support offered at the emergency department to be discharged safely (although this interesting point was not assessed in our study). We broadened the discussion on these aspects.

Reviewer 1: The study also raises the prospect of diagnostic specific triage scales such as the neurological triage system. There are several diagnostic specific scales used not only for triage, but also for system evaluation. However, it is unlikely to be useful for management within the emergency department to have to apply multiple different scales based on diagnosis.

Response: We share your point of view – it is not practical to use different triage systems for subgroups of patients. Nevertheless, we believe that it is important for physicians to know about specialty-specific pitfalls of the scores. We would like to point out that we looked at discharge destinations of patients after their treatment in the emergency department but not at the workup undertaken within the emergency department. Thus, we cannot comment on the impact of ESI (with or without considering a certain specialty group) on the acute severity and urgency of treatment within the emergency department - this was simply not in the scope of our study.

Reviewer 1: Perhaps the only key finding is that the addition of diagnosis is not necessarily predictive of outcomes, as defined by hospital admissions or intensive care admissions.

Response: Thank you for raising this point. Our data indicates that there are some situations in which the addition of the presenting complaint might be of interest such as (1) need for hospital admission in patients with high ESI scores and symptoms pointing at problems in neurosurgery, neurology, and internal medicine and (2) differences in required intensive care capacities of ESI 1 patients between neurology, internal medicine, and surgery.

Reviewer 1: Perhaps the authors could give consideration to the following:

1. A broader discussion of the evolution and use of Triage Scales and their role in ED and health system management.
2. A considered discussion on exactly what this paper adds to the international literature.
3. A more considered discussion of the limitations of this study and
4. A considered discussion about the utility of these findings to policy and practice.

Response:

1. Thank you for this advice. We are happy to expand the information on triage scales and their role in emergency departments and health system management both in the introduction and in the discussion section of our revised manuscript.
2. We also specified our discussion on what our paper adds to the international literature. We included the points that a significant number of patients with high ESI scores requires hospital admission, arguing against the political discussion that such patients could always be discharged easily without further workup and the idea to use ESI in combination with the presenting symptom to improve the early assessment of needed in-house hospital resources.
3. We revised the discussion section of our study thoroughly. Besides the limitations of a single centre retrospective study we included that risk factors (apart from specialty), resource consumption within the emergency department and discharged patients could not be analysed.
4. In our revised manuscript we added information on the utility of our findings to policy and practice. In particular, we pointed out that care of patients even with high ESI scores is appropriate in the emergency department as a relevant proportion of these patients needed admission.

Reviewer 2 (Dr. Ruta Brazauskas, Medical College of Wisconsin): It is an observational study of patients presenting at a single emergency department (ED). The study aimed to characterize patient disposition according to the Emergency Severity Index (ESI) assigned at the time of triage. Overall, the paper is very well written. Statistical analysis methods are suitable for the problems being addressed. I have a few minor comments:

Methods, page 6/23 line 46: how exactly was the Bonferroni adjustment made? Was it applied to all comparisons made throughout the paper or just select ones? Which p-values were adjusted?

Response: Thank you very much for revising our manuscript and for sharing your suggestions. We used Bonferroni adjustment for multiple comparisons of admitted patients between all ESI scores in the second paragraph of the section “analysis of medical subgroups”. After alpha-adjustment, p-values <0.005 were considered significant. For comparisons between conservative and operative groups (first and last paragraph of the section “analysis of medical subgroups”), chi-square test of independence was applied. We added the missing information in our statistics section.

Reviewer 2: Page18/23, Table 1: Replace the title of the first column “Frequency of symptom” with “Rank of symptom frequency” because it is not the actual frequency of the symptom which is given in that column.

Response: Thank you for your help. We are happy to rephrase this accordingly.

Reviewer 2: Page 19/23, Table 2: what does the “n” in each cell represent - the number of patients in that group or the number of admissions in that group? Please make its meaning clear.

Response: Thank you very much for this hint. We apologise for the lack of clarity in Table 2. As we intended to address the number of admitted patients in each group, we emphasised this information and also slightly modified the structure of Table 2 to avoid misunderstandings.

Reviewer 2: Comment on Figure 1 and 2: The color scheme looks very nice, but it makes reading these figures hard, especially Figure 2A with multiple categories pictured with minor color differences. Maybe they could be redone using more contrasting colors (red, blue, green, yellow, etc.).

Response: We really appreciate this advice. We changed colours and formatting of both figures accordingly and agree that it made reading much easier.

We thank you once again for your interest in our research and for the opportunity to address the reviewers’ comments. Based on our modifications, we would appreciate if you would consider our revised manuscript for publication in BMJ Open.

VERSION 2 – REVIEW

REVIEWER	FitzGerald, Gerard Queensland University of Technology, School of Public Health
REVIEW RETURNED	17-Mar-2022

GENERAL COMMENTS	Thank you for addressing the previous comments. The additional discussion has in my view more strongly captured the ongoing debate regarding triage. This paper now adds to the international literature not only by exploring triage in a different context but also by demonstrating the limits of an urgency categorization for predicting patient outcomes.
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	I have only one minor suggestion. You refer to "high ESI scores" by which you mean ESI category 4 or 5. Whereas others may interpret the term "high" as referring to the level of urgency. My I suggest you use a slightly different term such as "lower acuity"
REVIEWER	Brazauskas, Ruta Medical College of Wisconsin, Division of Biostatistics
REVIEW RETURNED	26-Feb-2022
GENERAL COMMENTS	My comments were adequately addressed.