Clinical intuition ratings are associated with morbidity and hospitalisation

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Disclosure
None.

SUMMARY

Objective: To evaluate how the rating of the severity of sickness – as performed by the physician, nurse and patient – is associated with hospitalisation and acute morbidity. **Methods:** Prospective observational study, performed in the emergency department of a tertiary hospital. Patients, physicians and nurses were interviewed separately after the first contact from 21 October through to 11 November 2013. **Results:** Of 2426 presenting patients, 1861 were screened, and 1196 were included. A total of 299 (25%) were hospitalised, 504 (42%) suffered acute morbidity. In the univariate analysis, the physician's, nurse's and patient's rating of severity of sickness, expressed on a scale from 0 to 10, was significantly associated with hospitalisation (physicians: OR 1.61, 95% CI 1.50–1.73; nurses: OR 1.52, 1.41–1.64; patients: OR 1.16, 1.10–1.22), and with acute morbidity (OR 1.49, 1.40–1.59; OR 1.39, 1.30–1.48 and OR 1.05, 1.003–1.09 respectively). The area under the curve of the receiver operating characteristic curves was 0.77, 0.72 and 0.61 for hospitalisation, and 0.72, 0.68 and 0.54 for acute morbidity. The interrater reliability was estimated by the intraclass correlation, which was 0.49 for physician/nurse, 0.17 for nurse/patient and 0.07 for physician/patient. In a multivariable analysis model consisting of age, male sex, ethnic origin, ratings of severity of sickness, symptoms, ability to go home and hospitalisation during the preceding 12 months, only age, and the physician's and nurses' rating of severity of sickness remained significantly associated with both outcomes. **Conclusion:** The first impression of severity of sickness was associated with hospitalisation and morbidity.

What's known
The association of the physician's and nurse's first impression of the patient's severity of sickness with morbidity and hospitalization is unknown.

What's new
In our study, physician and nurse rating of severity of sickness was independently associated with hospitalization and acute morbidity, with a moderate interrater reliability. In contrast, patient self-rating of severity of sickness was only weakly significantly associated with hospitalization, and severity of pain was not associated with either outcome. This information could be used during rapid medical assessment in the emergency department (ED). This is the first study that evaluated such ratings in the ED.

Introduction

The Rapid Medical Assessment (RMA) programme is a methodology for reducing waiting times in emergency departments (ED) (1,2). RMA begins immediately after the patients enter the ED, and includes an initial clinical assessment by a physician, ordering diagnostic tests and in some cases, rapid discharge. Since the short initial assessment is based solely on the clinical skills of the physician, evidence based clinical tools are needed. Although it has been reported that patients with previous hospitalisation, patients with abdominal – or chest – pain, and patients with dyspnoea are frequently hospitalised (3–5), little is known about the association between the physician's, nurses' and patient's impression of the severity of sickness and hospitalisation and morbidity (6,7).

Before implementing RMA in our ED, we performed a study to examine (i) the distribution of presenting symptoms, and discharge diagnoses, (ii) the distribution of acute morbidity among the different diagnoses, (iii) the association of readily available parameters such as age and sex with outcomes and (iv) the predictive power of physician, nurse and patient ratings of the severity of sickness, with hospitalisation and acute morbidity.

Methods

Study design and setting

We conducted this prospective observational study from 21 October through to 11 November 2013 at the ED of Basel University Hospital, a 700-bed tertiary hospital. This ED is an interdisciplinary ED, serving medical and surgical patients, but not paediatric, gynecological or ophthalmologic patients. The study protocol was approved by the local ethics committee, and all included patients signed a written informed consent form.

Selection of participants

All adult patients (≥ 18 years) presenting to the ED were eligible. Patients with a life threatening condition, patients who could not be interviewed because of dementia, intoxication, or because of language problems, and patients who were not willing to participate were excluded.

Measurements

Patients were enrolled by a study team working 24 h a day, 7 days a week. The study team worked in three shifts, and consisted of one medical student from 7 pm to 8 am, and of two medical students from 11 am to 7 pm. The members of the study team were instructed to interview physicians, nurses and patients after the first contact between patient, physician and nurse, and received instruction in interviewing patients. Patients, physicians and nurses were interviewed separately. All information was registered on a printed form. All completed forms were checked by administrative staff, and all forms were double-checked and digitalised by a professional external Institute (Health Care Research Institute AG, Zürich, Switzerland). Attending nurses and physicians were asked the following question: 'How sick does this patient look?' Patients were asked the following questions: 'How sick do you feel?' The severity was expressed on a visual analogue scale (VAS), from 0 (not sick at all) to 10 (extremely sick). Patients were also interviewed as follows: (i) They were systematically asked about disorders of each organ: Fever, rash, headache, dizziness, acute visual disorder, acute hearing disorder, nasal discharge, sore throat, cough, sputum, dyspnoea, chest pain, abdominal pain, nausea, vomiting, diarrhoea, constipation, bloody stool, dysuria, neck pain, back pain, arm pain, leg pain, joint pain, joint swelling, leg swelling, loss of consciousness, numbness, palsy, gait disorder, speech disorder, fatigue, weakness, loss of appetite and sleep disorder. (ii) Patients were asked 'On this VAS from 0 (no pain) to 10 (worst imaginable pain), how severe is your pain?' (iii) Patients were asked 'Have you been hospitalised during the last 12 months? If yes, was the hospitalisation a result of a visit to the emergency department?' (iv) Patients were asked 'On this VAS from 0 (definitely no!) to 10 (yes, of course!), can you imagine that you can go home after the examination in the ED?' Ethnic origin was recorded by the study team. Other information about patient characteristics (age, sex, comorbidities, length of hospital stay (LOS) and patient diagnoses at discharge from the ED or from the hospital), was retrieved from the internal electronic medical database.

Outcomes

The two outcomes were hospitalisation and acute morbidity.

Hospitalisation was defined as follows:

LOS ≥ 24 h, including transfers to other hospitals from the emergency department.

Acute morbidity was defined as follows:

1 Any condition
(i) that requires specific medical therapy, such as antibiotics, diuretics, anticoagulants or antihypertensive drugs;
(ii) that requires invasive procedures, such as surgery, acute endoscopy or coronary angiography;
(iii) that requires prolonged monitoring, such as acute stroke, myocardial infarction, respiratory compromise, metabolic disorder, haemodynamic instability, intracranial or gastrointestinal bleeding, anaphylaxis or suicidal tendency.
2 Any bone fracture or disease of the spine with a neurological deficit.

Statistical analysis

Univariable und multivariable logistic regression was performed to calculate the association between the independent variables (i) the physician, (ii) nurse, and (iii) patient rating of the severity of sickness; (iv) severity of pain; (v) ability to go home after the assessment in the ED; (vi) number of symptoms, (vii) dyspnoea, (viii) nausea, (ix) abdominal pain, (x) chest pain, (xi) headache, (xii) dizziness, (xiii) weakness; (xiv) age, (xv) male sex, (xvi) ethnic origin, (xvii) hospitalisation within the preceding 12 months, (xviii) admittance via ED if hospitalised during the previous year and the outcome measures hospitalisation and acute morbidity. Results were expressed as odds ratios (OR) with corresponding 95% confidence intervals. For metric or ordinal variables, ORs were expressed as the ratio of the odds increasing the predictor one unit. Based on the prediction of the logistic regression model, ROC-curves and corresponding area under the curve (AUC) with 95% confidence intervals were calculated. ROC-curves were only determined for the physician, nurse and patient ratings of severity of sickness for the two outcomes hospitalisation and acute morbidity. The interrater reliability of the ratings of severity of sickness performed by physician/nurse, nurse/patient and physician/patient was estimated by the interclass correlation, using linear mixed-effects models. A p-value of < 0.05 was considered to be significant. All calculations were performed with the statistical software R (version 3.0.1).
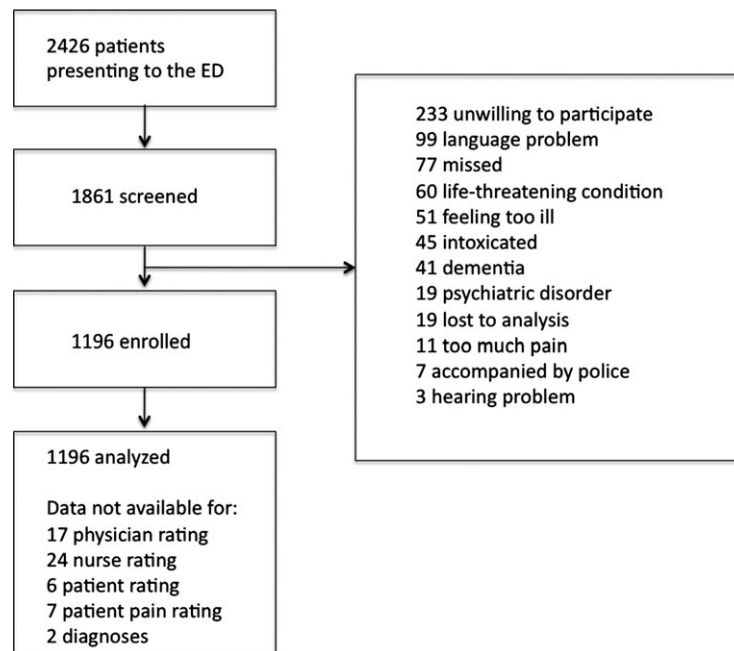
Figure 1 Overview of inclusion of patients. Physician rating, nurse rating and patient rating: rating of severity of sickness

Results

During the study period, 2426 patients presented to the ED. A total of 1861 patients were screened by the study team. After eliminating 665 patients in accordance with the exclusion criteria, 1196 patients were included (see Figure 1). Table 1 shows the characteristics of all included patients: The median age was 48 years (range 16–99), 635 (53%) were male, and 840 (71%) were central or north Europeans. A total of 954 (80%) patients had an emergency severity index (ESI) of 3 or 4. A total of 299 (25%) patients were hospitalised, and 504 (42%) patients suffered acute morbidity. The most common complaints were dizziness, headache, leg pain and abdominal pain (see Table 1). The most common discharge diagnoses were made in the categories of trauma and musculoskeletal disorders. Acute morbidity was more prevalent in non-trauma conditions such as pneumonia, sepsis, and metabolic disorders (see Table 2). Of 115 patients with chest pain, only 37 (32%) were admitted, and 25 (22%) suffered acute morbidity; 16 (14%) suffered a cardiac disorder. Of 199 patients with headache, 41 (21%) were admitted, and 50 (25%) suffered acute morbidity, and of 205 patients with dizziness, 46 (22%) were admitted and 66 (32%) suffered acute morbidity. A detailed description of the classification of the diagnoses and the predefined framework for the classification of acute morbidity based on a previous study (8) is shown in Table S1.

The univariate analysis (see Table 3) showed an association between age, male sex and ethnic origin with acute morbidity.

Using multivariable analyses (see Table 4), we found a significant positive association between acute morbidity and dyspnoea, but significant negative associations with chest pain, headache and dizziness; there was no association for abdominal pain or the number of symptoms nor ethnic origin except of Eastern Europe and Turkey (negative association with acute morbidity). Only age and physician and nurse rating of severity of sickness remained significantly associated with both outcomes.

With respect to hospitalisation alone, the patient rating of severity of sickness was still significantly associated, and the rating of ability to return home was still significantly inversely associated.

Figure 2 shows the relation of the rating of the severity of sickness to the proportion of hospitalised patients (Figure 2A) and to the proportion of patients suffering acute morbidity (Figure 2B). In the univariate analysis, as shown in Table 3, the ratings of physicians, nurses and patients, expressed on a VAS from 0 to 10, were significantly associated with hospitalisation and acute morbidity. The interrater reliability was estimated by the intraclass correlation, which was 0.49 for physician/nurse rating, 0.17 for nurse/patient rating and 0.07 for physician/patient rating.

Figures 3A, B show the receiver operating characteristic (ROC) curves of the rating for the two

Table 1 Characteristics of 1196 included patients	
Age, years, median (range)	48 (16–99)
Male sex, n (%)	635 (53)
Ethnic origin	
Central/northern Europe, n (%)	840 (71)
Mediterranean, n (%)	96 (8)
Turkey, n (%)	73 (6)
Eastern Europe, n (%)	38 (3)
Asia, n (%)	31 (3)
Africa, n (%)	30 (3)
Americas, n (%)	19 (2)
No data, n (%)	4 (0.5)
Multimorbidity,* n (%)	175 (15)
Symptoms, n, median (range)	2 (0–18)
Dizziness, n (%)	205 (17)
Headache, n (%)	199 (17)
Leg pain, n (%)	197 (17)
Abdominal pain, n (%)	154 (13)
Arm pain, n (%)	151 (13)
Nausea, n (%)	139 (12)
Weakness, n (%)	137 (11)
Chest pain, n (%)	115 (10)
Dyspnoea, n (%)	109 (9)
ESI	
1, n (%)	5 (0.5)
2, n (%)	220 (18)
3, n (%)	520 (44)
4, n (%)	434 (36)
5, n (%)	16 (1)
No data	1 (0.1)
LOS, days, median (range)	8 (1–140)

LOS, length of hospital stay; ESI, emergency severity index; *History of ≥ 2 chronic diseases (i.e. heart disease, pulmonary disease, renal disease, liver disease, rheumatological disease, diabetes mellitus).

Table 2 Discharge diagnoses and classification by acute morbidity

Diagnosis	Acute morbidity Yes (n)	Acute morbidity No (n)	Total (n)
Trauma without fracture	27	262	289
Musculoskeletal disorder	17	105	122
Abdominal disorder	48	72	120
Fracture	87	0	87
ENT disease	21	34	55
Skin Infection	48	2	50
Viral Infection	1	35	36
Urinary tract infection	37	0	37
Neurological disease	19	14	33
Urologic disease/renal failure	27	5	32
Cardiac disease	27	4	31
Skin problem/allergic reaction	6	23	29
Chest pain, non-specific	0	27	27
Stroke*	26	0	26
Syncope, vasovagal/ orthostatic	0	22	22
Headache, primary	0	21	21
Pneumonia	18	0	18
Other infection/sepsis	18	0	18
Arrhythmia	12	5	17
Vertigo/dizziness	0	17	17
Exacerbated COPD/ asthma	14	2	16
Psychiatric disorder	1	13	14
Hypertension	9	4	13
Metabolic disorder	11	0	11
Rheumatological disease	7	2	9
Thromboembolism	6	0	6
Intoxication	2	3	5
Dyspnoea, non-specific	0	3	3
Cancer, new diagnosis	2	0	2
Liver disease	2	0	2
Other	11	15	26

ENT, ear nose and throat; *Including two secondary headaches (one subdural haematoma and one subarachnoid bleeding because of ruptured aneurysm).

outcomes: For hospitalisation, the area under the curve (AUC) was 0.77, 95% CI 0.73–0.80 (physicians), 0.72 (0.69–0.76) (nurses) and 0.61 (0.57–0.65) (patients). For acute morbidity, the AUC was 0.72 (0.69–0.75), 0.68 (0.65–0.71) and 0.54 (0.50–0.57) respectively.

Discussion

In our study, physician and nurse rating of severity of sickness (answer to the question 'How ill does this patient look?', expressed on a VAS from 0 to 10) was independently associated with hospitalisation and acute morbidity. The interrater reliability was moderate between nurses and physicians, comparable to that of the National Institute of Health stroke scale, the road test after stroke or the ultrasound imaging of the inferior vena cava performed by emergency

department residents (9–11). In contrast, patient self-rating of severity of sickness was only weakly, but significantly associated with hospitalisation, and severity of pain was not associated with either outcome. Moreover, there was very low interrater reliability between healthcare professionals and patients.

The poor interrater reliability between healthcare professionals and patients is in line a study from 1966, where the physician's urgency rating did not correlate with the patient's report of duration of the

Table 3 Univariate analysis

	Hospitalisation			Acute morbidity		
	OR	95% CI	p-value	OR	95% CI	p-value
Age	1.05	1.04–1.06	< 0.001	1.03	1.02–1.03	< 0.001
Male sex	1.02	0.79–1.33	0.87	1.34	1.07–1.69	0.012
Ethnic origin						
Mediterranean	0.27	0.13–0.50	< 0.001	0.56	0.36–0.87	0.011
Eastern Europe/Turkey	0.31	0.19–0.49	< 0.001	0.41	0.28–0.58	< 0.001
Africa/Asia/South America	0.29	0.13–0.59	0.001	0.55	0.32–0.90	0.022
Hospitalisations during preceding 12 months	1.47	1.13–1.92	0.004	1.35	1.08–1.71	0.01
Admitted via ED	0.77	0.53–1.14	0.19	1.05	0.74–1.50	0.79
Number of symptoms	1.11	1.04–1.18	0.001	1	0.94–1.10	0.93
Dyspnoea	3.24	2.16–4.84	< 0.001	2.27	1.53–3.42	< 0.001
Chest pain	1.48	0.97–2.23	0.063	0.77	0.52–1.14	0.2
Abdominal pain	1.24	0.84–1.79	0.27	1.58	1.12–2.22	0.009
Nausea	0.93	0.60–1.39	0.72	0.86	0.59–1.23	0.4
Headache	0.74	0.51–1.07	0.19	0.4	0.28–0.56	< 0.001
Dizziness	0.84	0.59–1.20	0.35	0.6	0.43–0.82	0.002
Weakness	1.61	1.09–2.35	0.014	1.36	0.95–1.95	0.089
Pain (VAS 0–10)*	1.01	0.97–1.05	0.65	1	0.96–1.03	0.71
Ability to return home (VAS 0–10)*	0.74	0.71–0.77	< 0.001	0.88	0.84–0.91	< 0.001
Physician rating of severity of sickness (VAS 0–10)*	1.61	1.50–1.73	< 0.001	1.49	1.40–1.59	< 0.001
Nurse rating of severity of sickness (VAS 0–10)*	1.52	1.41–1.64	< 0.001	1.39	1.31–1.48	< 0.001
Patient rating of severity of sickness (VAS 0–10)*	1.16	1.10–1.22	< 0.001	1.05	1.003–1.09	0.034

VAS, visual analogue scale; ED, emergency department. *ORs were expressed as the ratio of the odds increasing or decreasing the predictor one unit.

Table 4 Multivariate model

	Hospitalisation			Acute Morbidity		
	OR	95% CI	p-value	OR	95% CI	p-value
Age	1.04	1.03–1.05	< 0.001	1.01	1.004–1.02	0.003
Male sex	1.20	0.83–1.73	0.33	1.46	1.10–1.94	0.009
Ethnic origin						
Mediterranean	0.48	0.20–1.03	0.071	0.72	0.42–1.21	0.22
Eastern Europe/Turkey	0.71	0.38–1.29	0.27	0.58	0.38–0.89	0.013
Africa/Asia/South America	0.72	0.29–1.65	0.47	0.71	0.38–1.30	0.26
Hospitalisations during preceding 12 months	0.85	0.60–1.22	0.39	1.08	0.82–1.42	0.61
Number of symptoms	1.05	0.93–1.19	0.45	0.98	0.87–1.09	0.72
Dyspnoea	1.67	0.91–3.06	0.10	1.89	1.11–3.25	0.02
Chest pain	0.65	0.35–1.20	0.18	0.38	0.22–0.64	< 0.001
Abdominal pain	1.07	0.64–1.78	0.79	1.45	0.95–2.22	0.087
Headache	0.64	0.36–1.10	0.11	0.41	0.26–0.63	< 0.001
Dizziness	0.66	0.38–1.1	0.13	0.63	0.41–0.96	0.031
Weakness	1.17	0.64–2.13	0.61	1.35	0.82–2.25	0.24
Pain (VAS 0–10)*	0.99	0.93–1.05	0.64	0.99	0.94–1.04	0.69
Ability to return home (VAS 0–10)*	0.79	0.74–0.83	< 0.001	0.95	0.91–1.001	0.055
Physician rating of severity of sickness (VAS 0–10)*	1.38	1.26–1.52	< 0.001	1.36	1.26–1.47	< 0.001
Nurse rating of severity of sickness (VAS 0–10)*	1.16	1.05–1.28	0.004	1.17	1.08–1.27	< 0.001
Patient rating of severity of sickness (VAS 0–10)*	1.10	1.02–1.19	0.013	1.01	0.95–1.07	0.84

VAS, visual analogue scale. *ORs were expressed as the ratio of the odds increasing the predictor one unit.
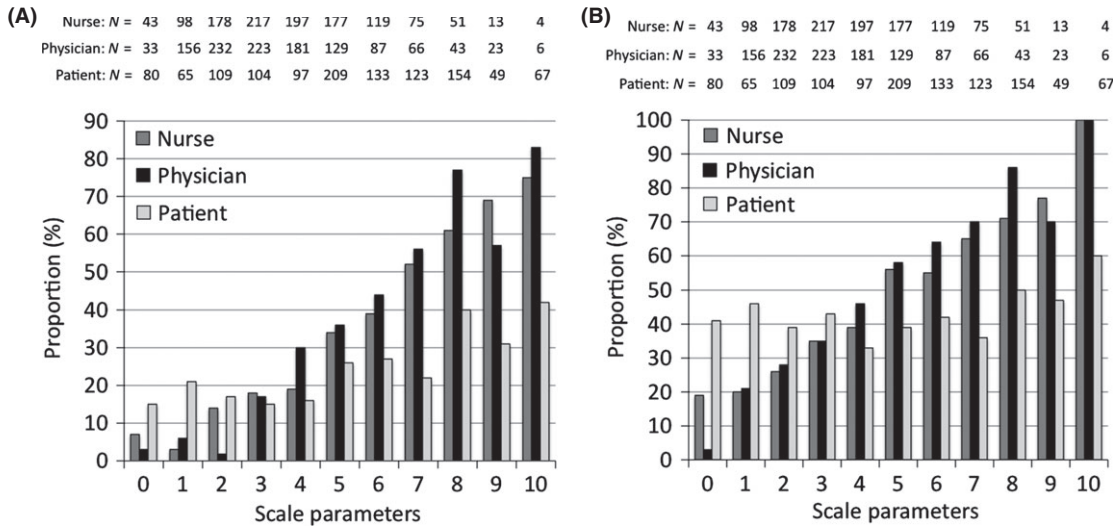
(A)
Nurse: N = 43   98   178   217   197   177   119   75   51   13   4
Physician: N = 33   156   232   223   181   129   87   66   43   23   6
Patient: N = 80   65   109   104   97   209   133   123   154   49   67

(B)
Nurse: N = 43   98   178   217   197   177   119   75   51   13   4
Physician: N = 33   156   232   223   181   129   87   66   43   23   6
Patient: N = 80   65   109   104   97   209   133   123   154   49   67

Figure 2 (A) Correlation of scale parameters and the proportion of hospitalised patients. (B) Correlation of scale parameters and the proportion of patients with acute morbidity. A total of 1192 cases were analysed. Data were not available in 24 (2%) cases for nurse rating, in 17 (1.4%) cases for physician rating, and in 6 (0.5%) cases for patient rating. The interrater reliability was estimated by the intraclass correlation, which was 0.49 for physician/nurse rating, 0.17 for nurse/patient rating, and 0.07 for physician/patient rating. Scale parameters: On a scale from 0 (not sick at all) to 10 (very sick), nurses, physicians, and patients rated the severity of sickness. Hospitalisation: Length of hospital stay ≥ 24 h, including transfers to other hospitals from the emergency department. Acute morbidity: Any condition (i) that requires specific medical therapy, such as antibiotics, diuretics, anticoagulants or antihypertensive drugs; (ii) that requires invasive procedures, such as surgery, acute endoscopy or coronary angiography; (iii) that requires prolonged monitoring, such as acute stroke, myocardial infarction, respiratory compromise, haemodynamic instability, intracranial or gastrointestinal bleeding or suicidal tendency. Any bone fracture or disease of the spine with a neurologic deficit
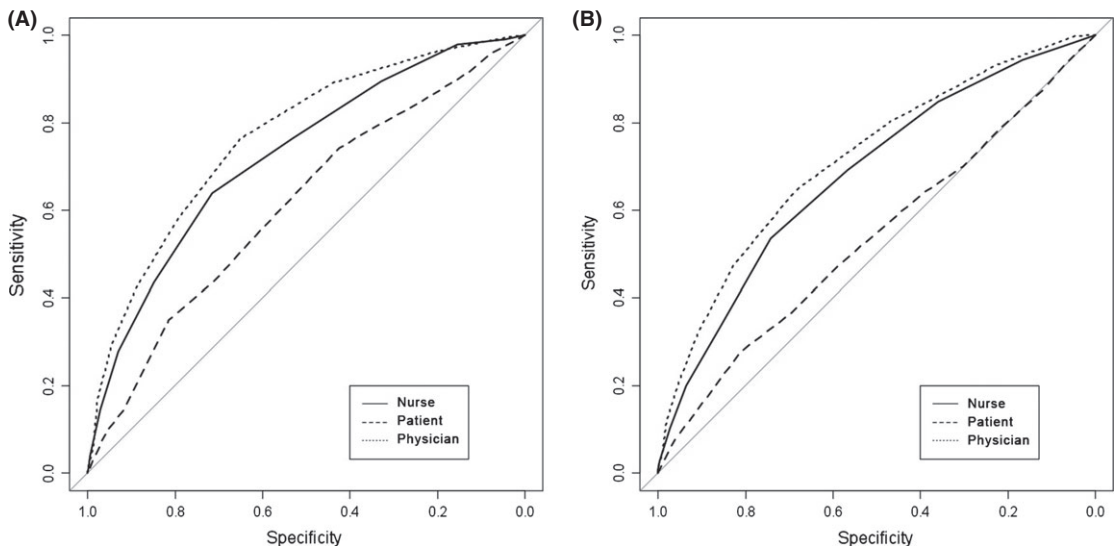
Figure 3 (A) Receiver operating characteristic curves of the rating of severity of sickness for the outcome hospitalisation: the area under curve was 0.77, 95% CI 0.73–0.80 (physicians), 0.72, 95% CI 0.69–0.76 (nurses) and 0.61, 95% CI 0.57–0.65 (patients). (B) Receiver operating characteristic curves of the rating of severity of sickness for the outcome acute morbidity: the area under curve was 0.72, 95% CI 0.69–0.75 (physicians), 0.68, 95% CI 0.65–0.71 (nurses) and 0.54, 95% CI 0.50–0.57 (patients)

disorder, which was taken as an index of the patient's perception of urgency (12). However, in our study, a low self-rating of the ability to return home was associated with hospitalisation. This might reflect the patient's influence on the physician's decision to admit patients to the hospital.

There are only few studies that evaluated the association between severity ratings of sickness in the ED and any outcomes. Very recently, Brabrand et al. showed that staff of a medical admission unit are able to identify patients at increased risk of in hospital mortality using clinical intuition (7). Other studies in different settings have found that visual information plays a role in rating: One study found that the patient's facial expression could help to predict outcomes such as mortality (13). Another study found that volunteers could accurately infer sexual orientation after a one-second video clip (14). Yet another study showed that features of psychopathy could be detected by lay raters from only small samples of behaviour (15), and another study showed that a stranger's socioeconomic status was transmitted in brief patterns of non-verbal behaviour (16). Another study, including 178 ED patients, found that physicians were able to predict the disposition (discharge vs. admission) on the basis of a brief observation of less than 1 min, with a sensitivity of 88% and specificity of 65%. However, patient demographics, principle complaints and vital parameters were provided to the physicians (17). This also applies to our present study, in which – apart from visual information and heuristics -, potential knowledge of previous comorbidities, and information from vital parameters, history taking, and quick clinical examination, may possibly also have influenced the physician and nurse rating of the severity of sickness.

The association of age and male sex with morbidity is well known, and was reported in large studies such as the Framingham study (18), while the association of ethnic origin with morbidity is less clear. It has been reported that immigrants are at greater risk for depression and dysphoric disorders, and that female immigrants with dysphoric disorders more often use secondary- and tertiary healthcare services than non-immigrants (19–21). Thus, the inverse association with acute morbidity in certain ethnic groups could reflect a higher prevalence of psychosomatic disorders in this population. However, it is also possible that the severity of disease in these patients was underestimated by the attending physicians, and that immigrants with trivial conditions might visit EDs more frequently, rather than general practitioners.

The strong association between dyspnoea and hospitalisation and acute morbidity in our study is in line with another study, in which 59% of patients presenting to the ED with dyspnoea were admitted (4). On the other hand, the low prevalence of acute morbidity in patients with complaints such as chest pain, headache or dizziness is in line with previous studies (4,22–24). About half of the patients presenting with abdominal pain suffered from acute morbidity in our study, which is in line with previous reports (5,25,26).

Our study has several limitations: First, the members of the study team were instructed to interview physicians and nurses after the first contact with the patient. However, we did not evaluate factors that might have influenced the impression of the severity of sickness, such as vital parameters, reports from paramedics or previously performed laboratory and radiological examinations brought by the patient, and given to the attending physician. Moreover, physicians and nurses could have been interviewed after being informed of the results of rapidly performed diagnostic tests such as electrocardiograms. This is particularly likely in situations of overcrowding, when the study team might not always manage to perform the interviews just after the first contact. Thus, the physician's and nurses' impression of the severity of sickness represents an impression after a brief contact with the patient, based on several factors, including visual impression, heuristics, history taking, physical examinations and potential knowledge about results of diagnostic tests. On the other hand, this is a real life situation. Furthermore, recall bias could have been introduced during the interviews, when patients were asked for admissions within the previous year. This might have led to differential misclassification of the study subjects with regard to the outcome variables. Second, we did not evaluate the clinical experience of the interviewed physicians and nurses. Thus, we could not determine the extent to which clinical experience influenced the association between the impressions of severity of sickness and the outcomes. Third, we did not assess whether patients had already been informed of a diagnosis by the referring physician. Thus, the weak significance of the association between the patients' impression of the severity of sickness with the two outcomes could be just a result of bias. Fourth, not all patients presenting to the ED could be screened for enrolment. This was because of the fact that – especially in situations of overcrowding – patients classified as ESI 5 and patients with minor eye, ear or skin problems were registered by our administrative staff as ED patients, but were sent to other outpatient clinics of our hospital before entering the ED. Moreover, during overcrowding, rapidly discharged patients could have been missed by the study team. Thus, it is probable that patients suffering from trivial conditions (i.e. ESI 5 patients) are underrepresented in our study population. Finally, this was a single centre study, performed during a period of 3 weeks, which limits the generalisability of our findings. Our definition of acute morbidity

might not be applicable to other settings. However, our framework could be useful for further studies. Also, the criteria for hospitalisation might differ between our and other settings.

In conclusion, age and the physicians' and nurses' impression of severity of sickness after a first contact with a patient in the ED, were independently associated with hospitalisation and acute morbidity, with a moderate interrater reliability between physicians and nurses. This could help in the decision to hospitalise patients after a rapid medical assessment.

Acknowledgements

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Table S1. Detailed description of classifications of discharge diagnoses.

Table S2. Univariate analysis, adjusted for ethnic origin.