Mobility identifies acutely ill patients at low risk of in-hospital mortality

* a prospective multicenter study

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Mobility identifies acutely ill patients at low risk of in-hospital mortality: a prospective multicenter study

Running title: Mobility identifies low risk acutely ill patients

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All costs were borne by the authors. John Kellett is a major shareholder, director and chief medical officer of Tapa Healthcare DAC. The other authors have no potential conflicts of interest.

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Abstract

Introduction: a retrospective study has reported that impaired mobility on presentation (IMOP) enhanced the ability of vital signs to predict mortality in acutely ill patients. This study was designed to further examine the association between IMOP and in-hospital mortality.

Methods: prospective observational study of three different cohorts of acutely ill patients admitted to hospitals in Esbjerg, Denmark (998 patients), Basel, Switzerland (743 patients) and Kitovu, Uganda (1,622 patients).

Results: There were significant differences in age, gender, length of stay, proportion of medical and surgical patients, and in-hospital mortality between the three cohorts. Yet in all three cohorts a National Early Warning Score (NEWS) ≥3 when first recorded and IMOP increased the risk of in-hospital mortality to approximately the same extent. IMOP and NEWS ≥3 when first recorded were, therefore, used for risk categorization: patients with a NEWS <3 when first recorded and normal mobility on presentation had the lowest in-hospital mortality risk and those with NEWS ≥3 when first recorded and IMOP had the highest risk. The number of these low risk patients ranged from 26% in Kitovu to 42% in Esbjerg, and their in-hospital mortality rates did not significantly differ in all three cohorts, ranging from 0.2% in Esbjerg to 0.4% in Basel.

Conclusion: In this prospective multicenter study IMOP enhanced the risk categorization of acutely ill patients from very different clinical settings. The combination of IMOP and first recorded NEWS identified a substantial proportion of patients in all cohorts with a low risk of dying while in hospital.

Clinical Trial Registration: the Esbjerg data was collected as part of trial registered with the US National Library of Medicine, ClinicalTrials.gov Identifier: NCT03108807.
Introduction

Normal vital signs do not completely eliminate the risk of death, and patients with potentially serious conditions can present with normal vital signs [1]. In a retrospective multicenter study we found that mobility on presentation has the potential to further enhance the ability of vital signs to predict outcome. This study showed that impaired mobility on presentation (IMOP) as a marker of reserve capacity is a key predictor of outcome in acutely unwell patients, with a similar performance in widely different patient populations [2]. However, the study was limited by inconsistencies in the way mobility was measured in the different hospitals and the fact that complete sets of vital sign were only measured in 75% of patients [3].

In this prospective observational multicenter study designed to overcome the shortcomings of our retrospective study, we report the association between IMOP and mortality in three completely different clinical settings and cohorts of acutely ill patients admitted to hospitals in Denmark, Switzerland and Uganda. In all three cohorts IMOP was defined as lack of a stable independent gait, and systems were used to ensure vital sign collection was correct, complete and current [4]. Since follow-up of Ugandan patients not admitted to hospital was not possible, and in order to eliminate the obvious influence of altered mental status on mobility, the study only included alert patients admitted to hospital.
Methods

Study design: a post-hoc analysis of three independent prospective observational studies carried out in three different countries and according to the STROBE guidelines [5].

Settings: the Hospital of South West Jutland in Esbjerg, Denmark, is a 450-bed regional teaching hospital that serves approximately 220,000 inhabitants. Medical patients are referred to the emergency department (ED) by general practitioners (GP), outpatient clinics, out-of-hours GP service and emergency medical services.

St. Joseph's Kitovu Health Care Complex is a 220-bed healthcare facility located near Masaka, Uganda, 140 km from the capital city of Kampala. Together with the 330-bed Masaka Regional Referral Government Hospital, it serves Masaka Municipality (population of 79,200), and Masaka District with a rural population of 804,300. The hospital has a 46-bed medical ward, but no intensive care or renal dialysis unit, and cannot provide artificial ventilation.

The University Hospital of Basel is a 700-bed academic tertiary care centre in Northwestern Switzerland with an ED census of roughly 50,000 patients per year. Obstetric, paediatric and ophthalmologic patients are treated elsewhere.

Participants: in order to exclude the influence of altered mental status on impaired mobility this study only included patients who were alert and calm on admission to hospital. All participants were acutely ill and aged 18 years or older. In all three cohorts, patients could only be included in the study once: only the assessment on first admission was used for any patients who were subsequently readmitted.

Data collection: The Esbjerg cohort was recruited between April 24th and August 19th 2017 as part of a separate ongoing study [ClinicalTrials.gov, Identifier: NCT03108807]. It included all patients who required any blood sample on a clinical indication on arrival to the hospital's ED and who gave written informed consent. The three trained research assistants who performed the screening and inclusion processes were only available between 10 am and 10 pm 7 days a week. Therefore, patients
presenting to the ED between 10 pm and 10 am could not be included in the study. Vital signs were routinely collected upon presentation to the ED and entered into the hospital database by the regular staff.

The Kitovu cohort was derived from all the alert and calm patients consecutively admitted to Kitovu Hospital’s acute medical ward. This data was collected as part of an ongoing quality improvement project. From August 10th, 2016 to January 15th, 2018 two nurses, employed 12 hours per day for 7 days a week, entered each patient's clinical status and vital signs twice daily into a clinical data management and decision support system (Rapid Electronic Assessment Data System [READS], Tapa Healthcare DAC). Vital signs were entered into READS at the bedside immediately after their measurement; all data entries were automatically time and date stamped.

The Basel cohort was derived from a quality control study including all consecutive alert and calm patients admitted to hospital through the ED during a 3-week period (January 30th to February 19th, 2017). Triage clinicians recorded a complete set of vital signs and assessed mobility at ED arrival. Trained study personnel who were available 24 hours per day entered the information into machine-read case report forms. Study personnel were unaware of the purpose of the study.

Data analysis
The National Early Warning Score (NEWS), a well validated predictor of imminent mortality [6], was calculated from the heart rate, respiratory rate, systolic blood pressure, level of consciousness, temperature, oxygen saturations, and the need for supplemental oxygen. In order to convert NEWS into a categorical variable an arbitrary cut-off of >=3 NEWS was selected. Impaired mobility on presentation (IMOP) was defined in all three cohorts as lack of a stable independent gait when first assessed [7]. Therefore, any patients that were unsteady on their feet, needed a walking stick or aid to steady themselves, needed help to walk, or were bedridden were considered to have IMOP.

Outcomes:
For the Esbjerg cohort in-hospital mortality, and mortality 30 and 100 days after admission were extracted from the Danish Civil Registration System for all patients to
secure complete follow-up [8]. For the Kitovu cohort status at 30 days after admission was collected directly from patients or their carers while still in hospital or by a phone call after discharge. For the Basel cohort in-hospital, and mortality 30 and 100 days after admission were extracted from the EHR or collected from the cantonal civil registry, health insurance databases and telephonic interviews with patients and family physicians.

**Statistical methods**
Calculations were performed using Epi-Info version 6.0 (Center for Disease Control and Prevention, USA) and R version 3.3.2 (https://www.Rproject.org/). Numeric variables were compared using Student's t-test and categorical variables were compared using Chi square analysis that applied Yates continuity correction. Survival analysis was performed using the Online Application for the Survival Analysis software (OASIS) available at http://sbi.postech.ac.kr/oasis/surv/ [9]. Kaplan–Meier survival curves were compared by the log-rank test, and censoring was used to account for missing data. The p value for statistical significance was 0.05.

**Ethics**
The original study, from which the data of the Esbjerg cohort was obtained, was approved by the Danish Regional Committee of Health Research Ethics (Identifier: S-20170005) and the Danish Data Protection Agency (Identifier: Region Syddanmark 2452).

Ethical approval for the Kitovu cohort was obtained from the Ethics Committee Kitovu Hospital, which conformed to the principles outlined in the Declaration of Helsinki [10]. Since no interventions were additional to the usual standard of care, the need for written informed consent was waived.

Ethical approval of the Basel cohort was obtained by the local ethics committee (identifier 236/13, www.eknz.ch). The need for written informed consent was waived. Patients were excluded if they actively declined participation or the EHR contained a general rejection to participation in research.
Results

There were 998 patients in the Esbjerg cohort, 743 in the Basel cohort and 1,622 in the Kitovu cohort: 14 (1.4%) patients in Esbjerg, 22 (3.0%) in Basel and 93 (5.7%) in Kitovu died in hospital. None of the Esbjerg patients, 1.9% of the Basel patients and 55.5% of the Kitovu patients were lost to follow-up. All of the Kitovu cohort and 98.6% of the Esbjerg cohort were medical patients, compared with 64.1% of the Basel cohort. The three cohorts also had significantly different lengths of hospital stay. Kitovu patients were much younger, less likely to be male, and more likely to die than Basel and Esbjerg patients. Kitovu patients were also twice as likely to have a NEWS when first recorded ≥3 and to have a first recorded NEWS ≥3 plus IMOP as the other two cohorts (Table 1). One patient in Esbjerg died in hospital more than 30 days after admission, one in Basel and none in Kitovu.

The first recorded NEWS was significantly higher in patients who died in hospital compared with survivors (7.2 SD 3.2 versus 3.3 SD 2.6 p <0.0001 in Kitovu, 3.7 SD 2.9 versus 1.9 SD 2.2 p 0.02 in Esbjerg and 3.4 SD 2.5 versus 1.7 SD 2.0 p 0.0001 in Basel). There was also a statistically significant association between IMOP and NEWS ≥3 when first recorded with mortality in all three cohorts, although for the Esbjerg cohort this did not become apparent until 100 days after admission (Table 2).

When patients were categorized into four groups according to their first recorded NEWS ≥3 and IMOP the only significant differences in the in-hospital mortality of the three cohorts was found in patients with a first recorded NEWS ≥3 and IMOP (Figure 1): in Esbjerg 3.0% of these patients died, in Basel 7.6% died, and in Kitovu 13.9% died. However, only the difference between the in-hospital mortality of Kitovu and Esbjerg patients reached statistical significance (odds ratio 5.17, 95% CI 1.97 – 14.81, Chi-square 13.72, p 0.0002).

When categorized according to IMOP and first recorded NEWS the 30-day survival of Basel and Esbjerg patients were not significantly different. However, apart from Kitovu and Esbjerg patients with normal mobility and a first recorded NEWS <3, the survival of Kitovu patients was worse than the other two cohorts (Table 3). For patients with a first recorded NEWS <3 and ≥3 the Kaplan-Meier survival curves for
those with IMOP were significantly different from those with normal mobility on presentation: for Esbjerg patients this difference was not statistically significant until 100 days after admission (Figure 2).
Discussion

Major finding
This post-hoc analysis of a prospective multicenter study confirms that in three very different clinical settings and patient cohorts IMOP is a significant and clinically useful predictor of mortality. It predicted an increased risk of mortality for acutely ill patients admitted to hospital with and without severe vital sign abnormalities.

Patients with normal mobility on presentation and NEWS <3 when first recorded had the lowest risk of in-hospital mortality, ranging from 0.2% in Esbjerg to 0.4% in Basel. This low-risk category included between 26% of all patients in Kitovu and 42% in Esbjerg. Therefore, IMOP can be used to improve the risk categorization of vital signs when integrated into NEWS in acutely ill patients from very different clinical settings, and their combination can identify a substantial proportion of patients with a low risk of dying while in hospital.

Strengths and Limitations
One of the major strengths of this study is the 100% follow-up rate of Esbjerg patients, and the close to 100% follow-up of Basel patients. A weakness, however, is the incomplete follow-up of Kitovu patients; there are many complex reasons why follow-up of patients after hospital admission is difficult in sub-Saharan Africa. Even though follow-up has become easier as the result of the widespread availability of mobile phones, we found a 30-day follow-up of patients to be difficult and barely affordable with our limited resources. Although censoring was used to account for missing data, the survival curves of the Kitovu patients must be interpreted with caution.

IMOP was systematically assessed in all cohorts and vital signs were documented for all patients. In order to exclude the influence of altered mental status on impaired mobility this study only included patients who were alert and calm on admission. No patient was included more than once to ensure that chronically ill patients with frequent re-admissions did not bias the results. Unfortunately it was not recorded whether impaired mobility was acute, temporary or permanent after admission, and how many patients with impaired mobility had long standing conditions such as
severe arthritis or degenerative neurological disease. It might be that more Ugandan patients had recently acquired gait impairment as a result of their acute severe illness, whereas in more of the much older Danish and Swiss patients IMOP was from the gradual onset of frailty or chronic disease. Physiological reserve reduces progressively with age and one of its common manifestations is frailty [11]. Assessing frailty can be complex and there is a lack of consensus on its definition and identification [12,13] and objectively measuring frailty in busy emergency departments has been found to be impractical [14,15]. However, using IMOP is a reasonable pragmatic approach for patients in acute settings as even those who have chronic impairment when they are well are likely to become more impaired when they are acutely ill.

We did not have consecutive sampling in the Esbjerg cohort. This study was also limited by the smaller size of the Danish and Swiss cohorts, and the small number of deaths, especially amongst Danish patients. The need for consent was waived in the Ugandan cohort, and was assumed in the Swiss cohort unless proactively denied by the patient. In contrast all the Danish patients had to provide written informed consent, making it more likely that these patients were less severely ill than those in the other two cohorts. This may explain the lower in-hospital mortality of the Danish cohort, although it should be noted that by 30 days the mortality rates of Danish and Swiss patients were identical (Table 3).

**Interpretation**

Different clinical conditions can be associated with different vital sign derangements. For example, hypotension and tachycardia occur in hypovolemia, tachypnea and hypoxia in pneumonia, and hypoxia and bradypnea in sedation. By aggregating all the vital signs into a single score NEWS is able to capture the risk of imminent mortality for most, but not all, conditions. This study shows that the addition of mobility on presentation further enhances the ability of NEWS to predict outcome.

The only Kitovu patients that had a significantly different in-hospital mortality from Danish and Swiss patients were those with IMOP and a first recorded NEWS ≥3: this might be explained by different diagnoses, the lower quality and intensity of care available to Ugandan patients, or it might be that more Ugandan patients had acquired
IMOP as a result of their acute severe illness, whereas in many of the much older Danish and Swiss patients IMOP could have been from the gradual onset of frailty or chronic disease.

**Generalisability**

This study supports the adoption of IMOP as an additional vital sign [16]. Mobility and NEWS when first recorded improved the risk categorization of acutely ill patients from markedly different clinical settings, and identified a substantial proportion of patients in all cohorts with a low risk of dying while in hospital. It is possible that many of these easy to identify patients might be treated better, more safely, quicker and at less cost in an ambulatory care facility [17].

**Conclusion**

This post-hoc analysis of a prospective study of three divergent populations of acutely ill patients considerably strengthens our contention that IMOP should be an additional vital sign. IMOP as a predictor of mortality enhances the clinical value of traditional vital signs in different clinical settings. In all of them, the combination of mobility and NEWS identifies a substantial proportion of patients with a low risk of dying while in hospital.
Funding and Conflict of interest statement
All costs were borne by the authors. John Kellett is a major shareholder, director and chief medical officer of Tapa Healthcare DAC. The other authors have no potential conflicts of interest.

Acknowledgements:
The authors wish to acknowledge and thank Tapa Healthcare DAC (Dundalk, Ireland) for the complimentary use of their Rapid Electronic Assessment Data System (READS). The sponsor played no part in the design or execution of the study, and all other costs were borne by the authors.

Authorship:
The concept and design of the three studies and their combination were made by Drs Nickel, Brabrand and Kellett. They were assisted in data acquisition, analysis and interpretation by Dr Nieves Ortega in Basel, Dr Lyngholm in Esbjerg and Dr Wasingya-Kasereka in Kitovu. All the authors were closely involved in the drafting of the paper, and all approved for the final version. All agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.
References:


Legends to tables

Table 1: The differences between age, length of stay, type of patient, gender, NEWS when first recorded and mobility on presentation, numbers lost to follow-up and mortality in the three different cohorts. LOS = length of hospital stay in days; NEWS = National Early Warning Score; IMOP = impaired mobility on presentation; MOP = normal mobility on presentation (i.e. an independent stable gait).

Table 2: Unadjusted odds ratio for mortality at different times after admission for the three cohorts according to NEWS when first recorded and mobility on presentation and male gender. NEWS = National Early Warning Score; IMOP = impaired mobility on presentation. * odds ratio is compared to those patients without the parameter

Table 3: Statistical differences by log rank test (i.e. p values) between the Kaplan-Meier survival curves of Kitovu, Esbjerg and Basel patients. NEWS = National Early Warning Score, MOP = Mobile on presentation, IMOP = Impaired mobility on presentation
Legends to figures

Figure 1: In-hospital mortality categorized by NEWS when first recorded and mobility on presentation. NEWS = National Early Warning Score, MOP = mobile on presentation, IMOP = impaired mobility on presentation. There were no statistically significant differences between any of the cohorts except for Kitovu and Esbjerg patients with impaired mobility on presentation (IMOP) and a first recorded NEWS $\geq 3$.

Figure 2: Kaplan-Meier survival curves for patients stratified by NEWS when first recorded and mobility on presentation. NEWS = National Early Warning Score, MOP = mobile on presentation, IMOP = impaired mobility on presentation.
Table 1

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td><strong>number</strong></td>
<td>998</td>
<td>743</td>
<td>1,622</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Age years mean</strong></td>
<td>66.0 SD 17.0</td>
<td>67.0 SD 20.0</td>
<td>51.7 SD 21.1</td>
<td>p = 0.26</td>
<td>p&lt;0.001</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>(median, range)</td>
<td>70 (18–97)</td>
<td>72 (18–101)</td>
<td>50 (18–106)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>LOS days mean</strong></td>
<td>4.9 SD 8.7 (median, IQR)</td>
<td>7.4 SD 7.5 (I-74)</td>
<td>3.0 SD 2.4 (0-22)</td>
<td>p&lt;0.001</td>
<td>p&lt;0.001</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>(range)</td>
<td>2.0 (1-5)</td>
<td>5 (1-8)</td>
<td>2.0 (1-4)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Medical patients</strong></td>
<td>984 (98.6%)</td>
<td>476 (64.1%)</td>
<td>1,622 (100.0%)</td>
<td>p&lt;0.001</td>
<td>p&lt;0.001</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td><strong>Surgical patients</strong></td>
<td>14 (1.4%)</td>
<td>267 (35.9%)</td>
<td>0 (0.0%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Male gender</strong></td>
<td>512 (51.3%)</td>
<td>386 (52.0%)</td>
<td>681 (42.0%)</td>
<td>p = 0.83</td>
<td>p&lt;0.001</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td><strong>NEWS &gt;=3</strong></td>
<td>309 (31.0%)</td>
<td>190 (25.6%)</td>
<td>963 (59.4%)</td>
<td>p = 0.02</td>
<td>p&lt;0.001</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td><strong>IMOP</strong></td>
<td>440 (44.1%)</td>
<td>442 (59.5%)</td>
<td>746 (46.0%)</td>
<td>p&lt;0.001</td>
<td>p = 0.36</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td><strong>NEWS &lt;3 MOP</strong></td>
<td>415 (41.6%)</td>
<td>230 (31.0%)</td>
<td>426 (26.3%)</td>
<td>p&lt;0.001</td>
<td>p&lt;0.001</td>
<td>p = 0.02</td>
</tr>
<tr>
<td><strong>NEWS &lt;3 IMOP</strong></td>
<td>274 (27.5%)</td>
<td>323 (43.5%)</td>
<td>233 (14.4%)</td>
<td>p&lt;0.001</td>
<td>p&lt;0.001</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td><strong>NEWS &gt;=3 MOP</strong></td>
<td>143 (14.3%)</td>
<td>71 (9.6%)</td>
<td>450 (27.7%)</td>
<td>p = 0.05</td>
<td>p&lt;0.001</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td><strong>NEWS &gt;=3 IMOP</strong></td>
<td>166 (16.6%)</td>
<td>119 (16.0%)</td>
<td>513 (31.6%)</td>
<td>p = 0.78</td>
<td>p&lt;0.001</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td><strong>In-hospital mortality</strong></td>
<td>14 (1.4%)</td>
<td>22 (3.0%)</td>
<td>93 (5.7%)</td>
<td>p = 0.04</td>
<td>p&lt;0.001</td>
<td>p 0.005</td>
</tr>
<tr>
<td><strong>Lost to follow-up by 30 days</strong></td>
<td>0 (0%)</td>
<td>14 (1.9%)</td>
<td>900 (55.5%)</td>
<td>p = 0.001</td>
<td>p&lt;0.001</td>
<td>p&lt;0.001</td>
</tr>
</tbody>
</table>

Table 1: The differences between age, length of stay, type of patient, gender, NEWS and mobility on admission, numbers lost to follow-up and mortality in the three different cohorts. LOS = length of hospital stay in days; NEWS = First recorded National Early Warning Score; IMOP = impaired mobility on presentation; MOP = normal mobility on presentation (i.e. an independent stable gait).
Table 2

<table>
<thead>
<tr>
<th>Parameter</th>
<th>n</th>
<th>Mortality (%)</th>
<th>Unadjusted Odds ratio *</th>
<th>Chi-square</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEWS when first recorded &gt;=3</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Kitovu in-hospital mortality</td>
<td>963</td>
<td>87 (9.0%)</td>
<td>10.81 (4.49 – 27.80)</td>
<td>46.28</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Kitovu 30 day mortality</td>
<td>460</td>
<td>124 (27.0%)</td>
<td>4.72 (2.75 – 8.18)</td>
<td>39.57</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Esbjerg in-hospital mortality</td>
<td>309</td>
<td>9 (2.9%)</td>
<td>4.10 (1.23 – 14.32)</td>
<td>5.88</td>
<td>0.02</td>
</tr>
<tr>
<td>Esbjerg 30 day mortality</td>
<td>309</td>
<td>16 (5.2%)</td>
<td>2.04 (0.97 – 4.28)</td>
<td>3.52</td>
<td>0.06</td>
</tr>
<tr>
<td>Esbjerg 100 day mortality</td>
<td>309</td>
<td>36 (11.7%)</td>
<td>2.54 (1.51 – 4.28)</td>
<td>13.74</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Basel in-hospital mortality</td>
<td>190</td>
<td>11 (5.8%)</td>
<td>3.03 (1.20 – 7.65)</td>
<td>5.85</td>
<td>0.02</td>
</tr>
<tr>
<td>Basel 30 day mortality</td>
<td>190</td>
<td>16 (8.4%)</td>
<td>2.58 (1.23 – 5.39)</td>
<td>6.76</td>
<td>0.009</td>
</tr>
<tr>
<td>Basel 100 day mortality</td>
<td>190</td>
<td>25 (13.2%)</td>
<td>2.39 (1.33 – 4.27)</td>
<td>9.18</td>
<td>0.002</td>
</tr>
<tr>
<td>IMOP</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Kitovu in-hospital mortality</td>
<td>746</td>
<td>76 (10.2%)</td>
<td>5.73 (3.25 – 10.22)</td>
<td>49.18</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Kitovu 30 day mortality</td>
<td>344</td>
<td>106 (30.8%)</td>
<td>4.10 (2.67 – 6.34)</td>
<td>48.81</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Esbjerg in-hospital mortality</td>
<td>440</td>
<td>9 (2.0%)</td>
<td>2.31 (0.70 – 8.05)</td>
<td>1.59</td>
<td>0.21</td>
</tr>
<tr>
<td>Esbjerg 30 day mortality</td>
<td>440</td>
<td>19 (4.3%)</td>
<td>1.63 (0.78 – 3.45)</td>
<td>1.52</td>
<td>0.22</td>
</tr>
<tr>
<td>Esbjerg 100 day mortality</td>
<td>440</td>
<td>49 (11.1%)</td>
<td>3.20 (1.83 – 5.65)</td>
<td>19.39</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Basel in-hospital mortality</td>
<td>442</td>
<td>19 (4.3%)</td>
<td>4.46 (1.24 – 19.11)</td>
<td>5.69</td>
<td>0.02</td>
</tr>
<tr>
<td>Basel 30 day mortality</td>
<td>442</td>
<td>31 (7.0%)</td>
<td>5.60 (1.86 – 18.90)</td>
<td>11.66</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Basel 100 day mortality</td>
<td>442</td>
<td>49 (11.1%)</td>
<td>4.05 (1.88 – 8.98)</td>
<td>15.20</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Table 2: Unadjusted odds ratio for mortality at different times after admission for the three cohorts according to NEWS when first recorded and mobility on presentation and male gender. NEWS = National Early Warning Score; IMOP = impaired mobility on presentation. * odds ratio is compared to those patients without the parameter.
Table 3

<table>
<thead>
<tr>
<th></th>
<th>Kitovu versus Esbjerg</th>
<th>Kitovu versus Basel</th>
<th>Basel versus Esbjerg</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEWS &lt;3 MOP</td>
<td>p 0.36</td>
<td>p 0.04</td>
<td>p 0.16</td>
</tr>
<tr>
<td>NEWS &lt;3 IMOP</td>
<td>p 0.0005</td>
<td>p 0.04</td>
<td>p 0.22</td>
</tr>
<tr>
<td>NEWS &gt;=3 MOP</td>
<td>p 0.006</td>
<td>p 0.03</td>
<td>p 0.77</td>
</tr>
<tr>
<td>NEWS &gt;=3 IMOP</td>
<td>p &lt;0.0001</td>
<td>p 0.001</td>
<td>p 0.13</td>
</tr>
</tbody>
</table>

Table 3: Statistical differences (i.e. p values) between the Kaplan-Meier 30 day survival curves of Kitovu, Esbjerg and Basel patients. NEWS = National Early Warning Score, MOP = mobile on presentation, IMOP = Impaired mobility on presentation.
Figure 2a – Kitovu in-patients
Figure 2b – Basel in-patients
Figure 2c – Esbjerg in-patients

![Survival graph showing days after admission with different NEWS criteria.](image)

Survival

Days after admission

- NEWS<3 MOP
- NEWS<3 IMOP
- NEWS>=3 MOP
- NEWS>=3 IMOP

p = .0002

p = .047