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Letter to the Editor

Is it possible to quickly identify acutely unwell patients who can be safely managed as outpatients? The need for a "Universal Safe to Discharge Score"

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ABSTRACT

If scores or algorithms were developed that quickly identified patients who are bound to have 100% survival, if even only for a few days, more patients could be safely discharged from emergency department, this eliminating the risks of hospitalization for many patients. This hypothesis proposes that it is possible to develop a "Universal Safe to Discharge Score", and suggests how it might be developed and validated.

1. Introduction

Emergency admissions to hospital are increasing and there are fewer beds to accommodate them. However, does every patient admitted to hospital need to be admitted? The decisions to admit or discharge patients is made by whatever physician is encountered, not by explicit evidence-based criteria, show considerable variation, and up to 0.1% of patients discharged from emergency departments die unexpectedly within 7 days [1]. If it were possible to identify with certainty patients who were safe to discharge this would eliminate many of the risks of hospitalization (e.g. de-conditioning, delirium, hospital acquired infection, falls, pressure sores, poly-pharmacy, etc), liberate limited hospital resources, reduce healthcare costs, and be preferred by many patients.

2. The problem

Deranged vital signs, major trauma, severe pain, acute breathlessness, bleeding, acutely impaired consciousness or immobility will always mandate hospital admission. However, many patients admitted to hospital have normal or near normal vital signs. Datasets available to the authors from a number of different settings in both the developed and developing world show considerable variation in the proportion of patients with normal or near normal vital signs, and in their short term mortality (Table 1). Two cohorts of patients with normal or near normal vital signs from sub-Saharan Africa had an in-hospital mortality of 6% and 25%, respectively. Doubtless these patients were highly selected, and not representative of patient populations elsewhere. Nevertheless, these results suggest that there are variables, other than vital signs, associated with imminent death.

Patients with severely deranged vital signs are known to be sick and should any further deterioration occur it is unlikely to go unnoticed. In contrast deterioration of patients with normal or near normal vital signs on admission is often missed. Patients perceived to be at low risk on initial presentation may not appear to be too sick, and if they deteriorate their signs may be subtle and their complaints vague, nonspecific and difficult to determine the cause of. Most medical illness starts with the patient having nonspecific feelings of being unwell. The interval between these subjective nonspecific symptoms and the development of specific symptoms and objective signs may be seconds in acute cardiac disease, minutes in meningococcal sepsis, and hours or even days in other conditions. It should not be surprising that such patients may be discharged in error, or if admitted their deterioration is then missed, especially if it is gradual.

2.1. Potential alternatives to traditional vital signs for the prediction of deterioration

Although a number of disease-specific tools are already used to identify patients who have a low probability of adverse outcomes and, therefore, suitable for outpatient management, these tools can only be applied to a small proportion of patients with well-defined presentations and require a diagnosis to be made. Furthermore diagnoses may not have as great an impact as would be expected and do not trump severity of illness [2]. Several other potential predictors of deterioration have been suggested as "non-traditional" vital signs, such as changes in mental status, mobility and functional capacity [3], activities of daily living and other nursing assessments [4,5], laboratory studies including bio-markers [6], ECG findings [4], clinical judgement [7], the patient's subjective feelings [8], and symptoms such as fatigue and breathlessness [9].

2.2. What is needed to develop a "Universal Safe to Discharge Score"?

Many believe, including several members of the Safe to Discharge Collaborative, that it will be impossible to develop a survival score that is 100% certain. None of the scores currently used to predict mortality are right all the time. This is probably because our physiology strives to keep us alive, so that when it comes to predicting the time of death the sickest patient will often surprise the smartest doctor. Predicting survival, on the other hand, may prove to be easier – as our Table 1 shows traditional vital signs perform reasonably well in many patient populations, and other factors add considerably more prognostic power and identified in a cohort of 9964 acutely ill medical patients 3446 (35%) with only one death (0.03%) within 10 days [4].

As there should be only a small number of events (i.e. ideally no deaths at all), studies to identify reliable universally valid predictors of survival, which will become part of a "Universal Safe to Discharge

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Table 1
Short term mortality of patients with normal or near normal vital signs.

Data source	Reference	Normal or near normal vital signs		Total all other patients	Short term mortality	Proportion of all patients
		Dead	*Total*			
Thunder Bay, Canada – surgical [3]	Resuscitation 2012;83:297–302	10	22,633 **	30,485	0.04% #!	74%
Hospital of South West Jutland ¶¶¶ [3]	Unpublished	1	1201 *	1595	0.08% #	75%
Basel University Hospital, Switzerland §§§§ [1]	Unpublished	2	1985*	2414	0.10%##	82%
Portsmouth Hospital Trust §§§§§ [3]	Unpublished	277	199,115*	271,442	0.11%##	73%
North Denmark Region, Denmark §§§ [2]	Unpublished	38	28,646*	81,233	0.13%####	35%
Karolinska Institute, Stockholm [1]	Scan J Trauma Res Emer Med 2016;24:21	208	69,216 ***	96,512	0.30% ##	72%
Thunder Bay, Canada – medical [3]	Resuscitation 2012;83:297–302	79	26,286 **	43,693	0.30% #!	60%
Hospital of South West Jutland [3]	EJIM 2016;27:24–30	8	2515 *	4480	0.32% #	56%
Erasmus UMC Rotterdam ¶ [1]	Unpublished	362	98,475*	158,255	0.37% ###	62%
Kitovu Hospital ¶¶ [3]	Unpublished	4	849 *	2240	0.47% #	38%
Combined Irish and Danish cohort [3]	Acta Anaes Scand 2018;62(7):945–952.	37	6280 *	9684	0.59% #	65%
Moneragala, Sri Lanka- mixed [3]	BMJ Open 2018;8:e019387	125	13779*	16,386	0.91% #	84%
Kitovu Hospital [3]	Acta Anaes Scand 2018;62(7):945–952.	2	153 *	1010	1.31% #	15%
Malawi cohort § [3]	PlosOne 8(3): e59830	10	171 *	1072	5.85% #	16%
Combined sub-Saharan cohort§§ [3]	BMJ Glob Health. 2017:28;2(2):e000344	24	91 *	761	26.37% #	12%
	Total	**1137**	**471,395**	**721,262**	**0.24%**	**65%**

1 = emergency department attendees. 2 = emergency department attendees brought by ambulance. 3 = hospital admissions. * = National Early Warning Score (NEWS) < 3, ** = abbreviated NEWS, *** = Rapid Emergency Triage and Treatment System – Adult (RETTS-A) lowest triage criteria. # = in-hospital mortality, ## = 24 h mortality, #! = 5 day mortality, ### = 7 day mortality, #### = death on same day as ambulance call – either in or out of hospital. ¶ = courtesy Dr. Jelmer Alsma, Erasmus University Medical Center, Rotterdam, the Netherlands. ¶¶ = courtesy Dr. Alfred Lumala, Medical Director Kitovu Hospital Uganda, ¶¶¶ = courtesy Dr. Mikkel Brabrand, § = courtesy Dr. Jamie Rylance, §§ = courtesy Dr. Christopher Moore, §§§ = courtesy Dr. Erika Frischknecht Christensen, §§§§ = courtesy Dr. Christian H. Nickel, §§§§§ = courtesy Drs Paul Schmidt and David Prytherch.

Score", will have to be large, prospective and require the cooperation of as many and varied health facilities as possible. Our Table highlights the problems: it shows considerable inconsistencies in results, there are variations in the time mortality is measured at (e.g. 24 h, 7 days, in-hospital mortality etc), there is no long term follow-up of patients, and the quality of the data used in any of these studies/databases cannot be assessed or assured.

Data quality is generally defined as fit for purpose if it is correct, complete, and current [10]. Completeness of clinical information may be hampered if it is recorded on paper and may be hard to retrieve if it is in free text and not connected to standardized terminology. Currency (i.e. date and time stamping of data) is performed poorly in both paper and electronic records, and requires data entry at the bedside using portable devices, or continuous monitoring, and for early risk stratification it is important that data are promptly recorded in complete sets. Finally, the survival outcome of each patient must be accurately determined and recorded, as now facilitated by several national death registries.

Currently the authors are preparing a large, international, collaboration project between them to address these issues. We are developing a consensus between us on those variables that are not currently collected routinely, but are likely to predict survival. This consensus will be based on pilot studies we have already done or are in progress, and on the expert opinions of all the other members of the *Safe to Discharge Collaborative*. Some of these variables, such as impaired mobility, will require precise commonly agreed definitions to be developed and validated to ensure they can be applied in clinical practice. Next, systems that can capture current, complete and correct data will have to be developed and tested. Initially we envisage this project being several small coordinated pilot projects performed in different centres designed to determine how to collect and coordinate data in different centres, and generate enough evidence to determine how large the definitive study should be.

3. Conclusion

Many patients currently admitted to hospital have a low risk of mortality. Traditional assessment based on vital signs, triage category, selected investigations and clinical judgement cannot identify those at no risk of dying. Large prospective collaborative studies are needed to find reliable and valid alternative predictors, which would identify patients with no risk of death who could be safely managed as out-patients.

Author contributions

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Declaration of Competing Interest

None.

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Members of the Safe to Discharge Collaborative:

1. Dr. Jelmer Alsma Department of Internal Medicine, Erasmus University Medical Centre, Rotterdam, The Netherlands.
2. Prof Mikkel Brabrand, Department of Emergency Medicine, Odense University Hospital, Denmark
3. Dr. Erika Frischknecht Christensen Centre for Prehospital and Emergency Research, Aalborg University, Denmark
4. Dr Tim Cooksley, Department of Acute Medicine, University Hospital of South Manchester, Manchester, UK
5. Professor Reinold O. B. Gans, Department of Internal Medicine, University of Groningen, University, The Netherlands.
6. Dr Rashan Haniffa Network for Improving Critical Care Systems and Training, Colombo, Sri Lanka
7. Dr John Kellett, Department of Emergency Medicine, Hospital of South West Jutland, Denmark
8. Daniel Lasserson MD Professor of Ambulatory Care, Institute of Applied Health Research,University of Birmingham, UK
9. Dr Christopher Moore, Division of Infectious Diseases and International Health, University of Virginia, Charlottesville, Virginia, USA
10. Dr Ben Morton, Liverpool School of Tropical Medicine, Liverpool, UK
11. Dr Christian H. Nickel, Emergency Department, University Hospital Basel, Switzerland
12. Dr. David Prytherch, Centre for Healthcare Modelling and Informatics, University of Portsmouth, Portsmouth, UK
13. Dr Jamie Rylance, Liverpool School of Tropical Medicine, Liverpool, UK
14. Dr. Paul E. Schmidt, Department of Medicine, Portsmouth Hospitals NHS Trust, Portsmouth, UK
15. Dr Niclas Skyttberg, Department of Learning, Informatics, Management and Ethics, Health Informatics Centre, Stockholm, Sweden
16. Dr. Christian P Subbe, Ysbyty Gwynedd & Bangor University, Penrhosgarnedd, Bangor LL57 2PW, UK.

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John Kellett[a,*], Christian H. Nickel[b], Niclas Skyttberg[c], Mikkel Brabrand[a,d]

[a] *Department of Emergency Medicine, Hospital of South West Jutland, Denmark*

[b] *Emergency Department, University Hospital Basel, Switzerland*

[c] *Department of Learning, Informatics, Management and Ethics, Health Informatics Centre, Stockholm, Sweden*

[d] *Department of Emergency Medicine, Odense University Hospital, Denmark*

E-mail addresses: jgkellett@eircom.net (J. Kellett), Christian.Nickel@usb.ch (C.H. Nickel), niclas.skyttberg@ki.se (N. Skyttberg), mikkel.brabrand@rsyd.dk (M. Brabrand).

* Corresponding author.