

# BMJ Open Quality Using an original triage and on call management tool aids identification and assessment of the acutely unwell surgical patient

Stacie Hodge, Sebastian Helliard, Hamish Ian Macdonald, Paul Mackey

**To cite:** Hodge S, Helliard S, Macdonald HI, *et al.* Using an original triage and on call management tool aids identification and assessment of the acutely unwell surgical patient. *BMJ Open Quality* 2018;7:e000235. doi:10.1136/bmjopen-2017-000235

► Additional material is published online only. To view please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2017-000235>).

Received 12 November 2017  
Revised 20 March 2018  
Accepted 5 April 2018

## ABSTRACT

Until now, there have been no published surgical triage tools. We have developed the first such tool with a tiered escalation policy, aiming to improve identification and management of critically unwell patients. The existing sheet which is used to track new referrals and admissions to the surgical assessment unit was reviewed. The sheet was updated and a traffic light triage tool generated using National Early Warning Scores (NEWS), sepsis criteria and user discretion. A tiered escalation policy to guide urgency of assessment was introduced and education sessions for all staff undertaken, to ensure understanding and compliance. Through multiple 'plan-do-study-act' cycles, the new system and its efficiency have been analysed. Prior to intervention, documentation of NEWS did not occur and only 13% of admission observations were communicated to the surgical team. Following multiple cycles and interventions, 93% of patients were fully triaged, and 80% of 'red' and 'amber' patients' observations were communicated to the surgical team. The average time for a registrar to review a 'red' patient was 37 min and 79% of 'green' patients were reviewed within an hour of their presentation. Rapid identification of the unwell patient is crucial. Here we publish the first triage tool that enables early assessment of septic and otherwise potentially unwell surgical patients.

## PROBLEM

Musgrove Park hospital is a district general hospital in Somerset, UK, serving a population of over 340 000. The surgical admissions unit (SAU) aims to facilitate initial assessment and management of patients with a confirmed or probable surgical condition. Patients are either referred to this unit by general practitioners in the surrounding catchment area or from the emergency department within the hospital. The unit handles a wide range of patients, including colorectal, upper gastrointestinal, vascular and urology, on average admitting 13 patients a day. A paper sheet is commonly used in UK hospitals to track referrals and admissions to the SAU. In our unit this is referred to as the 'take sheet'. Referrals are taken by the core surgical trainee on call and listed on this sheet. All patients are

listed on the same sheet in order of acceptance with nothing to highlight the urgency of assessment required. The foundation year one (FY1) doctor is responsible for the initial assessment and management of patients prior to senior review. Due to the demands of emergency operating, the FY1 is frequently working alone on the unit. The number of patients awaiting initial clerking can quickly rise at peak times, and prior to the initiation of this project there was no formal triage system in place, with patients normally seen in the order in which they had arrived. Observations were being performed but not necessarily communicated, interpreted or acted on.

## BACKGROUND

With the advent of 'surviving sepsis'<sup>1</sup> and increasing recognition of the need to identify ill and potentially critically unwell patients as early as possible, there was a need for such a system. Rapid identification of the unwell patient is known to be crucial to their survival.<sup>2</sup> When a literature search failed to reveal any suitable published method, we proceeded to generate and implement our own triage system with a multifaceted approach to promptly identify, diagnose and manage emergency surgical admissions.

While the Manchester Triage system<sup>3</sup> is a recognised emergency department triage tool, it has not yet been validated outside of the emergency department and requires an admitting nurse who must be formally trained in its use. Unfortunately, due to financial and staffing constraints, this was felt to be unrealistic.

## BASELINE MEASUREMENT

Our project was designed on a cost neutral basis and not subject to institutional review board oversight. Baseline data was collected



Department of Surgery,  
Musgrove Park Hospital,  
Taunton, UK

## Correspondence to

Dr Stacie Hodge;  
[sh8097@bristol.ac.uk](mailto:sh8097@bristol.ac.uk)

prospectively over a 2-week period. A total of 37 patients were included in this initial dataset. Information was collected with regards to the recording of observations on arrival, whether these observations were used to calculate a National Early Warning Score (NEWS), and whether or not this score (being at the time the only objective assessment of a patient's risk of significant illness) was being communicated to doctors, either verbally or in writing.

Data collected prior to intervention showed that although observations were being done on patients as they arrived, only 13% of patients' NEWS were communicated to the surgical team on call. NEWS was not documented on the take sheet in any cases prior to intervention therefore making it very difficult for the admitting doctor to triage patients, particularly during peak times. Patients were being seen on a first come first serve basis.

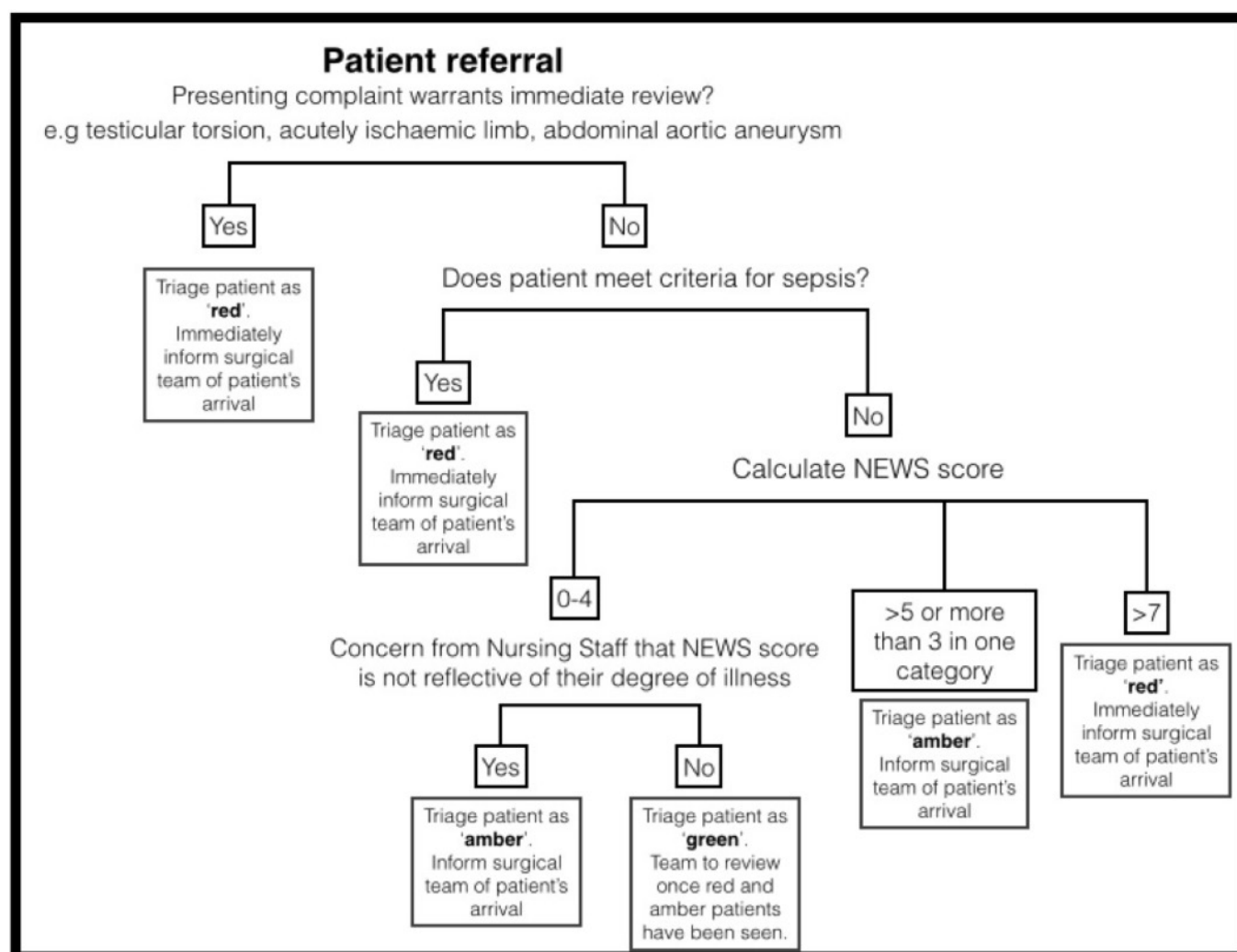
## DESIGN

This quality improvement project was undertaken between January 2015 and August 2016 at Musgrove Park Hospital in Somerset, UK. The team undertaking this project included three junior doctors, under the lead of a

general surgical consultant with involvement of the nurse unit manager, ward nurses and core surgical trainees on the surgical assessment unit. Results of the baseline measurements were presented at a multidisciplinary meeting, with the issues discussed. Focus was placed on generating a dynamic and easy to use tool which provided an objective assessment and enhanced communication between all members of the multidisciplinary team (MDT).

The 'take sheet' was redesigned, a process which had two main components. First, simple improvements were made to aid clarity and communication within the MDT: increasing the size of the form for greater clarity, adding specific columns for information such as date of birth and providing the contact details of all members of the on call team on the sheet. Second, a novel triage system, the Musgrove Acute Surgical Score, was developed. This categorised patients in a traffic light system as 'red', 'amber' or 'green' in order of decreasing priority, according to the process detailed in [figure 1](#).

N.B. The higher code takes priority. This means, for example, that if a patient is referred as a possible testicular torsion or acutely ischaemic limb and coded



**Figure 1** Flow chart for surgical triage.

as 'red' at that point, but are not septic, have a NEWS <5 and nursing staff are not concerned on their arrival, they remain 'red'. The system is flexible in that it allows one to escalate a patient, based solely on user discretion, but prevents the de-escalation of categorised patients. The decision of what presenting complaint should be triaged as a 'red' relies on the experience and opinion of the accepting doctor (who is the core surgical trainee). Our aim with this triage system was to combine both a nationally recognised scoring system and user discretion. Fully triaged is defined as patients who had their referral criteria documented, NEWS calculated and assessed for whether they meet the criteria for sepsis.

The whole process was carried out according to the 'plan-do-study-act' (PDSA) cycle model for quality improvement.

### STRATEGY PDSA cycle 1

Two months after the initiation of the redesigned take sheet and implementation of the triage tool, we carried out the first data collection. We retrospectively collected data on 286 patients over a 3-week period, including weekdays, nights and weekends. NEWS had been documented for 76% of patients and 69% were 'fully triaged'. However, although patients were being recognised by the nursing staff as being 'at risk', this was not being communicated to the surgical team on call. Our initial data collection suggested that only 5% of 'red' and 'amber' patients had been discussed with an appropriate doctor.

Although documentation of the NEWS had improved, if a potentially unwell patient had not been flagged to the treating team then initiation of investigations and treatment would still be delayed and outcome unchanged.

We decided to lead educational sessions for all nursing staff, healthcare assistants and doctors detailing the layout of the take sheet, its correct use and ultimately ensuring awareness of change among staff. We made ourselves available during the working day to answer any questions and encourage communication within the team.

### PDSA cycle 2

A re-audit of the take sheet was carried out 2 months after our educational sessions, over a 2-week period, again, including day, night and weekend use of the sheet. The presentation of 149 patients were reviewed. Following staff education, documentation of NEWS had increased to 85%. Eighty per cent were 'fully triaged' and 80% of 'red' and 'amber' patients were recorded as being communicated to the on call surgical team.

A questionnaire was provided to all surgical and nursing staff regarding the new take sheet and triage tool. Eighty-seven per cent felt that the new take sheet was an improvement on the previous system with 89% feeling confident with its use. Zero per cent felt that it added significantly to their workload and 50% felt communication had improved within the MDT as a result of this

**Table 1** PDSA cycles

	Time point		
	Baseline	PDSA 1	PDSA 2
Number of patients audited	37	286	149
NEWS recorded	0%	76%	85%
Triage documented	N/A	69%	80%
'Red' and 'amber' patients communicated to doctors	N/A	5%	80%

NEWS, National Early Warning Score; PDSA, plan-do-study-act.

triage tool. Perhaps most importantly, 75% felt patient safety had improved as a result. See [table 1](#) for a summary of outcomes related to PDSA cycle.

The focus of our next intervention would be to sustain and build on the improvement in compliance.

### PDSA cycle 3

We improved the layout of the take sheet with the addition of a section to document communication by nursing staff to the doctor.

The triage system was developed further with the latest intervention being to introduce a tiered escalation policy with a time scale to determine the urgency of assessment and intervention in line with the Royal College of Surgeons of England's report on the perioperative care of the higher risk general surgical patient.<sup>4</sup> The take sheet incorporates the recommended review times by the surgical team depending on their triage ([figure 2](#)) with the hope that prompt recognition, treatment and early involvement of senior staff improves patient outcomes.

See the online supplementary appendix 1 for a copy of our take sheet after our final PDSA cycle.

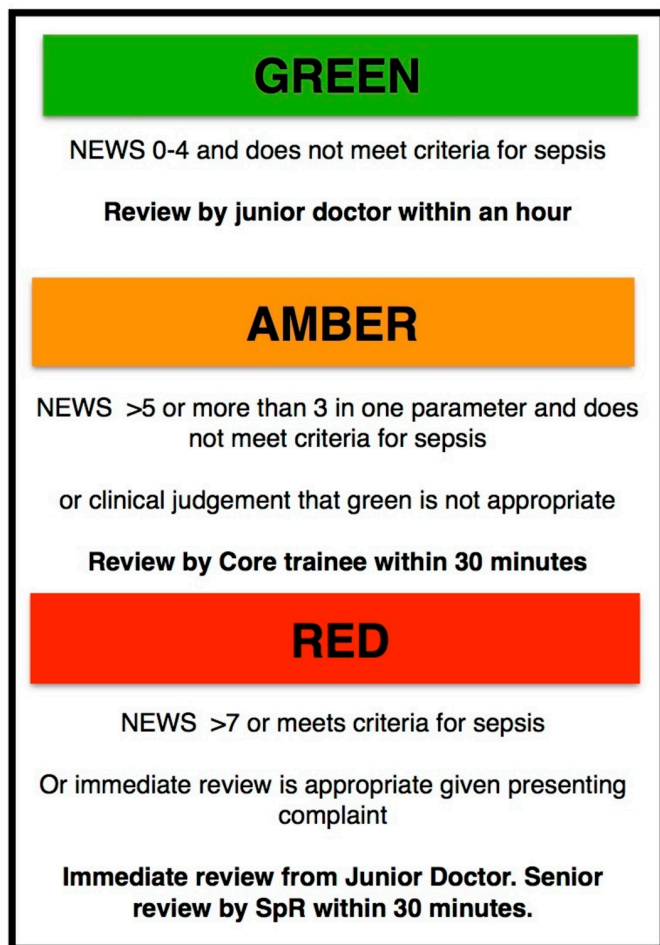
## RESULTS

After the adoption of our escalation strategy, data was collected again over a 2-week period. Of the 191 patients audited, 10% were triaged as 'red' and the remainder as 'green'. Seventy-nine per cent of patients triaged as 'green' were seen within the suggested time, with average time to review of 43.8 min. Due to the demands on the surgical team, only 30% of patients triaged as 'red' were seen by a registrar within the suggested review time, with the average time of 37 min.

## LESSONS AND LIMITATIONS

There have been limitations to what has been able to be achieved. Unfortunately, we were not able to collect data on time to assessment and treatment prior to introduction of our changes. We also do not have any data to suggest what impact our triage tool has had on patient outcomes.

Interventions rely heavily on the support and commitment of the people who are to use the tool. We only



**Figure 2** Tiered escalation policy. NEWS, National Early Warning Score.

noticed significant change in practise when we educated and encouraged communication within the team. There is always a concern that an audit effect may partially explain our results and a retrospective audit at a later point should hopefully show sustainability of this project.

There are limits to the generalisability of this study, given that this was carried out in district general hospital and other specialities such as orthopaedics and gynaecology were not included.

## CONCLUSION

We acknowledge that we do not have the data to suggest what impact our triage tool has had on patient outcomes. What we do know based on others' data is that prompt recognition and treatment is essential to minimise morbidity and mortality, with a delay in treatment leading to worse outcomes.<sup>5</sup> We can confidently conclude that a systematic redesign of the 'take sheet', combined with an

objective triage tool for stratification of surgical patients, enables quicker identification of critically unwell surgical patients and facilitates communication within the MDT, ultimately allowing the surgical team to safely manage patient flow when clinical need far exceeds capacity. This is all achieved without increasing workload and with zero additional cost to the department to implement this improvement.

In the future, the plan is to introduce this triage tool to other surgical assessment units, as well as evaluating its applicability to other specialities—medical, orthopaedic and gynaecological. When introducing it to new centres, the aim is to assess its impact on time to assessment and treatment, particularly achievement of the 'sepsis six' and review patient outcomes. The publication of the latest sepsis guidelines<sup>6</sup> will require an alteration to the tool, however the method with which most trusts choose to implement these is still to be clarified. In the meantime, our tool utilises criteria with which most healthcare staff are well acquainted.

**Contributors** SHo, SH and HIM: all involved in the planning and actioning of this quality improvement project. SHo: wrote the publication. PM: oversaw and supervised the project.

**Funding** The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

**Competing interests** None declared.

**Patient consent** Not required.

**Ethics approval** Via the Musgrove Park Quality Improvement Network.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Open Access** This is an Open Access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>

© Published by the BMJ Publishing Group Limited. For permission to use (where not already granted under a licence) please go to <http://www.bmj.com/company/products-services/rights-and-licensing/>

## REFERENCES

1. Society of Critical Care Medicine. Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock: 2016. <http://survivingsepsis.org/Guidelines/Pages/default.aspx>
2. National Confidential Enquiry into Patient Outcome and Death. [http://www.ncepod.org.uk/2012report1/downloads/CAP\\_fullreport.pdf](http://www.ncepod.org.uk/2012report1/downloads/CAP_fullreport.pdf)
3. Triage.net. Related links. <http://www.triage.net/en/Overview>
4. The Royal College of Surgeons of England. <https://www.rcseng.ac.uk/library-and-publications/rcs-publications/docs/the-higher-risk-general-surgical-patient/>
5. Levy MM, Dellinger RP, Townsend SR, et al. The Surviving Sepsis Campaign: results of an international guideline-based performance improvement program targeting severe sepsis. *Crit Care Med* 2010;38:367–74.
6. Singer M, Deutschman CS, Seymour CW, et al. The third international consensus definitions for sepsis and septic shock (Sepsis-3). *JAMA* 2016;315:801–10.