



Effect of introduction of nurse triage on waiting times in a South African emergency department

S R Bruijns, L A Wallis and V C Burch

Emerg. Med. J. 2008;25;395-397
doi:10.1136/emj.2007.049411

Updated information and services can be found at:
<http://emj.bmj.com/cgi/content/full/25/7/395>

These include:

References

This article cites 11 articles, 2 of which can be accessed free at:
<http://emj.bmj.com/cgi/content/full/25/7/395#BIBL>

1 online articles that cite this article can be accessed at:
<http://emj.bmj.com/cgi/content/full/25/7/395#otherarticles>

Rapid responses

You can respond to this article at:
<http://emj.bmj.com/cgi/eletter-submit/25/7/395>

Email alerting service

Receive free email alerts when new articles cite this article - sign up in the box at the top right corner of the article

Notes

To order reprints of this article go to:
<http://journals.bmj.com/cgi/reprintform>

To subscribe to *Emergency Medicine Journal* go to:
<http://journals.bmj.com/subscriptions/>

Effect of introduction of nurse triage on waiting times in a South African emergency department

S R Bruijns,¹ L A Wallis,¹ V C Burch²

¹ Division of Emergency Medicine, University of Cape Town and Stellenbosch University, South Africa;

² Department of Medicine, University of Cape Town, South Africa

Correspondence to: Dr S R Bruijns, 31 Tovey Crescent, Plymouth PL5 3US, UK; srbuijns@googlemail.com

Accepted 22 July 2007

ABSTRACT

Background: In a resource poor setting with poverty, a high burden of disease and critically low medical staff numbers, triage could potentially improve the long waiting times experienced at South African public hospital emergency departments (ED) and render timely emergency care to those in most need.

Aim: To evaluate the impact of introducing nurse triage (using the Cape Triage Score (CTS)) on waiting times for patients presenting to a South African public hospital ED.

Methods: Pre-triage waiting times were collected retrospectively through accessing hospital records of four randomly chosen months of the preceding year. This was compared with data collected prospectively over a 3 month period using nurse triage and the CTS triage tool. Captured data included CTS priority category, time of nurse triage and time of attendance by ED doctor.

Results: Waiting times were significantly reduced in all but the lowest priority category. The introduction of nurse triage, using the CTS, resulted in an overall reduction in waiting time from 237 min to 146 min ($p < 0.001$).

Patients triaged "red" (highest priority) demonstrated a mean reduction in waiting time from 216 min to 38 min ($p < 0.001$).

Conclusions: The results demonstrate that use of the CTS, as implemented by trained nurses, dramatically reduced the waiting time of patients attending a busy public hospital ED in South Africa.

Triage prioritises a person's need for medical care on arrival at the emergency department (ED). It aims to expedite emergency treatment for patients with life-threatening conditions and ensures that all persons requiring emergency care are categorised according to severity.¹ The French physician Baron Larré, who served as Napoleon's Chief Surgeon, already recognised the need to decrease the time soldiers spent waiting for surgeons in 1792.² Doctor Jonathan Letterman, head of medical services of the Army of Potomac, reorganised emergency services in the American Civil War (1861), and reduced the retrieval time of injured soldiers from the battlefield to field dressing stations.^{2,3} The biggest benefit for those injured was to get to an area where wounds could be attended to within the shortest possible time.

In evaluating the efficiency of triage systems, researchers have measured patient waiting time or time to treatment as an important variable directly impacting upon patient outcomes.^{1,4-7} Walk-out rate and total length of stay are also frequently evaluated but do not generally impact on patient outcomes.⁸ Table 1 lists the most recent literature on the impact of triage on waiting times.

There is currently no formal triage system in use in South Africa.⁹ Still, the benefits of introducing triage to patients accessing South African state EDs are potentially much greater than those demonstrated in the developed world. The need to streamline emergency services in a setting where patient numbers are vast and the pathology often more advanced is clear.⁹

The Cape Triage Group (CTG) convened April 2004, as part of the Joint Emergency Medicine Division of the University of Cape Town and Stellenbosch University, in order to design a triage system suitable for use in a busy, resource-constrained setting.⁹ The first draft of the Cape Triage Score (CTS) was produced by June 2004, and the tool was finalised in 2005. The CTS prioritises into the following categories: (1) red—immediate care needed; (2) orange—very urgent care needed; (3) yellow—urgent care needed; (4) green—routine care needed; and (5) blue—dead. The most important expected benefit of the proposed triage system was the rapid sorting of patients, separating those requiring immediate medical care from those who could wait before being evaluated and treated.¹⁰

In our related paper, we have described part of the CTS development process. The purpose of this study was to determine the impact on patient waiting times following the introduction of nurse triage using the CTS in the ED of a South African public health service hospital.

METHODS

Setting

GF Jooste Hospital, a 200 bed acute hospital situated in Cape Town, South Africa, serves more than 1.3 million people with a disease profile representative of the country's quadruple burden of disease. Approximately 43% of this population are unemployed, 41% live in informal dwellings and 65% live below the poverty margin.¹¹ The ED of this hospital deals with approximately 4500 consultations per month and about 13% of patients require inpatient treatment.

Study design

A retrospective and prospective, cross-sectional study was conducted in the ED of GF Jooste Hospital in order to evaluate the introduction of nurse triage on patient waiting times. The study was approved by the Research Ethics Committee of the University of Cape Town.

Selection of subjects

Prospective data were collected over a 4 month period from 1 December 2004 to 31 March 2005 and, to compare, a retrospective data arm from

Table 1 The impact of triage on waiting times

Date	Country	Intervention	Result
2001	Israel ⁴	Introduction of nurse triage	Waiting time for all reduced from 4.5 h to 1.5 h
2002	Canada ¹³	Redesigning an existing triage system to enable triage nurses to initiate diagnostic protocols	Reduction of 46 min for all patients. Reduction of 76 min for urgent cases
2004	UK ⁶	Using a triage nurse with a physician between 09:00 and 12:00 for an 8 day period	Reduction in median waiting time to see a doctor from 32 min to 2 min

four randomly selected months (March, June, August and November). Given the facility's under resourced and overloaded central records library and the lack of electronic record keeping, retrospective data had to be adopted from the ED arm of a 10 month audit of medical inpatient flow from the ED to the ward.¹² This was allowed as all patients entered into this audit were ED patients. The "first contact" data (arrival time and observations) reflected in the audit was gained from ED records before filing. Patient records still needed to be accessed in order to capture additional ED information not included in the audit. Staffing numbers, facilities available and patient loads were comparable for both prospective and retrospective periods, with the unavoidable exception that all retrospective cases ended in admission. An enrolled nursing auxiliary performed triage using the CTS. Data capture was performed between 08:00 and 17:00 on weekdays. Cases were included in the study if the following data were available: (1) time of first contact at the ED; (2) physiological parameters and clinical information required to calculate the CTS and determine the colour coded priority of the patient; and (3) the time at which the patient was attended to by the medical officer on duty in the ED.

Outcomes

The outcomes measured in this study were the waiting times before and after introduction of a nurse triage system in the ED. Waiting time was defined as the time that elapsed between the first contact in the ED to the time attended to by the doctor on duty in the ED. The CTS colour code assigned to patients was also recorded.

Data analysis

Data were entered into a Microsoft Access database. Descriptive statistics were obtained using Statistica version 7 (Tulsa Inc, USA) software. The student t test was used to compare continuous variables and the χ^2 test was used to compare categorical data. A value of $p \leq 0.05$ was regarded as significant.

Sample size

An on-line calculator was used to calculate sample sizes (with a 5% margin of error and 95% confidence interval (CI)).¹³ The

Table 2 Population estimates and sample size

Population estimate over 4 months for:	Prospective component	Retrospective component
Medical admissions from ED	n/a	2400
ED consultations	18 000	n/a
Required sample size ¹³	377	332

ED, emergency department; n/a, not applicable.

population estimates were calculated by hand and are presented in table 2 with the respective sample sizes.

RESULTS

The sample size for the cohort studied after implementation of the triage system (prospective) was 823; 9 of 832 patients were excluded because of incomplete data capture. The sample size of the study cohort before implementation of the triage system (retrospective) was 323; 396 of 719 patients were excluded because of incomplete data capture.

Waiting times

As shown in table 3, waiting times were significantly reduced in all but one category. The most dramatic reduction in waiting time was observed in the red category. The waiting time for green category patients was reduced but did not reach significance.

DISCUSSION

Reducing the waiting time for critically ill patients presenting to an ED is the most important reason for introducing triage systems worldwide. This study demonstrates the dramatic reduction in waiting times that can be achieved by introducing a nurse driven triage system in a grossly overcrowded public hospital ED in South Africa. The introduction of triage appears to be the single largest contributor to the reduced waiting times as staffing numbers, facilities available, patient loads and medical and nursing skill level were comparable for the two periods. Only one unavoidable difference between the prospective and retrospective groups, besides the introduction of triage, is notable: patients from the retrospective group were all referred for admission following ED treatment. As both groups were managed in the ED on arrival, waiting times can be compared with minor bias. The dramatic reduction in waiting time in fact becomes more relevant when one considers that patients from the retrospective group were presumably more ill for requiring admission (compared to the mixed cohort of the prospective group) though still waited significantly longer for all priority groups. Reducing the waiting time of priority colour code red patients from 216 min to 38 min without increasing the human resources in the ED is a considerable achievement. A similarly significant reduction was seen for priority colour code

Table 3 Mean waiting times and 95% confidence intervals (CI) for both the retrospective and the prospective group; difference (mean, %) and significance (p) (in min)

Colour priority	Retrospective group		Prospective group		Mean difference (%)	p Value
	n	Mean (95% CI)	n	Mean (95% CI)		
Red	31	216 (143 to 289)	60	38 (28 to 48)	178 (82)	<0.001
Orange	116	213 (170 to 256)	194	119 (105 to 133)	94 (44)	<0.001
Yellow	116	258 (218 to 298)	407	155 (143 to 167)	103 (40)	<0.001
Green	60	246 (173 to 317)	162	199 (172 to 226)	46 (19)	0.13
All patients	323	235 (210 to 260)	823	146 (137 to 155)	91 (38)	<0.001

Table 4 Desired waiting time outcome targets set for the CTS as a triage tool

Outcomes measured	Red	Orange	Yellow	Green
Target as set by the principal investigator	Immediate	<30 min	<120 min	>120 min
Target as set by the CTG	Immediate	<10 min	<60 min	<240 min

orange and yellow patients. The reduction in waiting time for priority colour code green patients was not significantly reduced. This was not an unexpected finding since the available human and infrastructural resources were not increased during the study. Of interest is that the waiting time for these patients did not increase, as might have been expected. Indeed, there was an overall trend toward reduced waiting times for all patients, suggesting that the introduction of an effective triage system may have improved the overall efficiency of service delivery in the ED.

The sample size of data captured before the implementation of the triage system was slightly smaller than calculated. The difference in outcome was, however, much larger than predicted, allowing for significant results despite the sample size limitation.

The principal investigator set waiting time targets based upon available best practice^{4,6,14}; these were longer than those set by the CTG for the roll out of the CTS in the state health sector (table 4).⁹

Only the waiting time target for green priority patients was reached. None of the other priority groups met any of the waiting time targets set by the principal investigator or those proposed by the CTG. Despite not reaching ideal targets, the significant reduction in waiting time for the higher priority colour codes represents a major success of the implementation of a nurse driven triage system in a busy public hospital.

This study only looked at the effect of triage on waiting times. Other factors that may have had an impact include: number and training of medical staff; acuity of the patients seen; total case load; delays in patient transfers and delays in special investigations (both contributing to overcrowding). Except for a steady increase in annual caseload, there has been no recent restructuring of any of the services governing other factors that would account for the significant changes seen. Further study is required to determine whether waiting times could be further reduced by minimising the impact of these variables. The external validity of this study requires

investigation in a separate health care setting. This is currently underway.¹⁵⁻¹⁷

The pronounced reduction in patient waiting times following the introduction of a triage system is extremely encouraging. Although these times may still raise concern in developed countries, the impact of triage in a developing country such as South Africa should not be underestimated.

Acknowledgements: The authors wish to acknowledge the central committee of the CTG as well as GF Jooste Hospital's executive committee for their support of this project.

Contributors: SRB had the original idea, collected the data and wrote the first draft. All authors contributed to the final draft. SRB is the guarantor of this paper.

Funding: None.

Competing interests: None.

REFERENCES

1. **Gerdts M**, Bucknall T. Triage nurses' clinical decision making. An observational study of urgency assessment. *J Adv Nurs* 2001;**35**:550-61.
2. **Blagg CR**. Triage: Napoleon to the present day. *J Nephrol* 2004;**17**:629-32.
3. **Whitman W**. *The wound dresser. Letters written to his mother from the hospitals of Washington during the Civil war*. Ed RM Bucke. New York: Bodley Press, 1949:39.
4. **Hay E**, Bekerman L, Rosenberg G, *et al*. Quality assurance of nurse triage: consistency of results over three years. *Am J Emerg Med* 2001;**19**:113-7.
5. **Grant S**, Spain D, Green D. Rapid assessment team reduces waiting time. *Emerg Med* 1999;**11**:72-7.
6. **Subash F**, Dunn F, McNicoll B, *et al*. Team triage improves emergency department efficiency. *Emerg Med J* 2004;**21**:542-4.
7. **New TD**. Clinical decision support tools in A&E nursing. A preliminary study. *Nurs Stand* 2000;**14**(34):32-9.
8. **Bhimani M**, Li G, Chanmugam A, *et al*. The impact of physician rapid assessment program at triage on ED overcrowding. *Acad Emerg Med* 2001;**8**:578.
9. **Gottschalk SB**, Wood D, DeVries S, *et al*. The Cape Triage Score: a new triage system for South Africa. Proposal from the Cape Triage Group. *Emerg Med J* 2006;**23**:149-53.
10. **Gilboy N**, Travers D, Wuerz RC. Re-evaluating triage in the millennium: a comprehensive look at the need for standardization and quality. *J Emerg Nurs* 1999;**25**:468-73.
11. **School Of Public Health**. *Equity in health: Cape Town 2002*. University of the Western Cape: School of Public Health, 2004.
12. **Burch VC**, Benatar SR. Rational planning for health care based on observed needs. *S Afr Med J* 2006;**96**:796-802.
13. **Raosoft**. Database web survey software for gathering information. <http://www.raosoft.com/sampleize.html>.
14. **Cheung WW**, Heeny L, Pound JL. An advanced triage system. *Accid Emerg Nurs* 2002;**10**:10-16.
15. **Gottschalk S**. Evaluation of the modified early warning score as a triage instrument in the Western Cape private health care setting. MPhil [dissertation]. Cape Town: University of Cape Town; in progress.
16. **Twomey M**. Determination of a paediatric version of the Cape Triage Score. PhD [dissertation]. Cape Town: University of Cape Town; in progress.
17. **Wallis LA**, Twomey M. Workload and casemix in Cape Town emergency departments. *S Afr Med J* (in press).