

Triage nurse perceptions of the use, reliability and acceptability of the Toowoomba Adult Triage Trauma Tool (TATTT)

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Summary

Objective: The 'Toowoomba Adult Triage Trauma Tool' (TATTT) is a computerised clinical decision support tool developed to provide an evidence-based, valid and consistent method of triage assessment and categorisation. The objective of this study was to determine the most appropriate training and testing strategy for implementing the TATTT and to evaluate its acceptability for assisting in the triage prioritisation process.

Methods: Triage nurses (15) from two hospitals underwent training in the TATTT and were tested on its application. Semi-structured interviews gathered their perceptions of the training, the methods for testing and the acceptability of the TATTT for assisting in triage.

Results: The TATTT was viewed positively by all but one of the nurses. Participants believed that it provided clear direction in the triage assessment process, increased their confidence in reaching a decision and would be comfortable in adopting the TATTT in clinical practice.

Conclusions: The study has shown that the TATTT is acceptable to users and is viewed as a viable alternative to current triage practice.

Keywords: Triage; Toowoomba Adult Triage Trauma Tool (TATTT); Nurses perceptions; Computerised decision support systems

Introduction

Triage in an Emergency Department (ED) context constitutes the formal process of assessment and categorisation of all patients who present seeking medical attention (Commonwealth Department of Health and Family Services and the Australasian College for Emergency Medicine, 1997 and The Australasian College for Emergency Medicine, 2000). In Australia the Australasian Triage Scale (ATS) has been widely adopted to facilitate this process. Table 1 presents the five categories of the ATS.

Table 1 The Australasian Triage Scale (ATS)

ATS Code	Time to treatment (min)	Description of category
1	Immediate	Immediately life threatening
2	≤10	Imminently life threatening/time critical/very severe pain
3	≤30	Potentially life threatening/situational emergency
4	≤60	Potentially serious/situational emergency/significant complexity/severity
5	≤120	Less urgent/clinic/administrative problem

Since the inception of the ATS and its predecessor, the national triage scale (NTS), more than 10 years ago, there have been a number of experimental studies suggesting a lack of standardisation in the application of the scale. For example, Doherty (1996) conducted a study into the uniformity of triage between medical and nursing staff between four different hospitals using written scenarios. The results showed that no one scenario was triaged the same by all participants and 10 of the 12 scenarios received triage scores that encompassed three or more categories. Dilley and Standen (1998) assessed the level of uniformity among 188 Victorian hospital triage nurses using the NTS on 20 written patient scenarios. Their study found that no one patient scenario was triaged to the same category by all 188 nurses and 75% were triaged to four different triage categories. Likewise Considine et al. (2000) and Dorojaiye and O'Meara (2002) found considerable variability in similar studies that assessed triage categorisation.

The implications of this variability are numerous and significant. The decision made by the triage nurse determines the timeliness of the initiation of emergency care. Therefore these decisions can have a profound effect on the health outcomes of the patient (Considine et al., 2000). Failure to categorise patients appropriately may result in these patients receiving medical attention that is unacceptably delayed or unnecessarily expedited (Gerdtz and Bucknall, 2001 and Goodacre, 1999). This situation has implications for both the patient being triaged and the ability of the ED to function effectively. Lack of consistency may lead to patient dissatisfaction, staff stress, unnecessary and avoidable morbidity and even mortality (Considine et al., 2000, Gerdtz and Bucknall, 1999 and Gerdtz and Bucknall, 2001).

The procedural significance of triage indicates a clear need for accuracy and consistency in its performance. The Toowoomba Adult Triage Trauma Tool (TATTT) seeks to address this need through the provision of an evidence-based valid and consistent method of triage assessment and categorisation, albeit in a select group of patients (adult trauma). The TATTT is a computerised algorithmic decision support tool designed for use on a hand held pocket personal computer (PC). It incorporates the existing nomenclature of the ATS but largely replaces the associated clinical indicators.

Systems of this nature are worth exploring as there is now good evidence that clinical decision support systems can make a significant contribution to the consistency of patient care. Their proliferation is in response to the recognition that human error in the delivery of patient care is a major source of avoidable mortality and morbidity (Fox and Thompson, 2003).

As the TATTT is a new tool, clinical validation and user acceptance needs to be evaluated. As the tool has not been clinically proven, it is difficult to apply it to real-life triage decision making. Traditionally the performance of triage systems has been assessed with the aid of written scenarios of patient presentations. Unfortunately, written scenarios provide a very unrealistic simulation of real-life triage decision making. As a consequence alternative options for the simulation of patient presentations and testing of the TATTT in a clinical capacity were also explored as part of the study. These included the production of video- and computer-based simulations and the simultaneous parallel triaging of actual patient presentations using both the ATS and TATTT.

The details of the TATTT's quantitative validation appear elsewhere (Wollaston et al., 2004). This paper presents the findings from the qualitative methods employed to further validate the TATTT. The qualitative methods comprised semi-structured interviews with all participants and sought: their perceptions of the TATTT as a clinical decision support tool for triage undertaken with the ATS; their perceptions of the suitability of the various simulations developed for testing the TATTT; and their perceptions of the educational material and training provided to prepare users to effectively utilise the tool.

Method

A convenience sample of volunteers was sought among triage nurses employed at the two hospitals involved in this study. Ten triage nurses from Toowoomba Health Service (THS), located in Toowoomba Queensland, and five from Princess Alexandra Hospital (PAH), located in Brisbane Queensland participated in the study.

Each of these participants had been involved in:

- (1) The use of a self-directed training package on the TATTT and Pocket PC application; and
- (2) The use of the TATTT to rate nine written, five video and one computer simulated scenarios.

Eight of the 10 triage nurses from Toowoomba had also been involved in parallel triaging whereby one member of the research team used the TATTT to triage adult trauma patients presenting to the Toowoomba Hospital ED at the same time that a study participant triaged the patient by conventional means. This component of the study occurred prior to the participants receiving training in the TATTT and they were blinded to the results of the TATTT triage.

A semi-structured interview tool was developed. The questions asked of each participant were:

- (1) What were their experiences of the simulations?
- (2) What were their perception of the TATTT as a tool to aid triage decisions (including its strengths and limitations)?
- (3) What they thought of the training package/programme and any improvements that could be made to it?
- (4) What were their perceptions of being involved in the study? And, for nurses at THS only, what were their experiences during the parallel coding element of the study?

Data analysis

Qualitative data were produced from each individual participant interview. Each interview was tape recorded and following transcription, the tape was checked against the transcription to ensure its accuracy. The aim of the data analysis was to identify common themes emerging from the data using six cycles; content analysis, coding of interview texts; comparison through indexing; re-analysis through further text search; re-interpretation of the data and reconfirming preliminary analysis (Bryman, 2001).

Results

The use of the semi-structured questions to a certain extent determined the data analysis. However, in many cases the nurses added other information to the interview, and therefore all data were analysed regardless of their relationship to a particular question to determine the main themes of the study. In some cases, these themes did relate to the interview questions outlined previously, but in other cases themes emerged from unsolicited data.

Experiences of simulations

Eighty percent of nurses from THS made positive comments on all the simulations. In contrast, sixty percent of nurses from PAH made positive comments on the video simulations, forty percent on the paper simulations and twenty percent on the computer simulations. Overall, however, the majority of the participants believed that the three methods all had advantages and disadvantages but that '*... I think a mixture's good.*' One respondent noted that there should be many more scenarios developed than the 15 available for this project.

Video simulations

On the whole, the respondents believed that the video simulations reflected what they would do as a triage nurse. For example: '*The video one is more realistic*'; and, '*I suppose the video is good in the fact that you don't get all the information, you actually have to glean some of the information from looking at the patients*'.

All of the negative comments on the video simulations related to the fact that the skin assessment was difficult. For example: '*I guess with the circulation, skin pale, warm, clammy and all that sort of stuff ... it's hard to assess ... without touching the patient.*'

Several nurses believed that a 'voice over' on the videos where one person could discuss the skin assessment would overcome this problem. One respondent believed that the patient's blood pressure should also be shown on the video simulations. However, when asked, three other respondents believed that this was not necessary in the triage environment.

Computer simulations

All participants believed that the computer simulation was '*... very easy to use as well*'. They noted that it took '*a couple of seconds to figure it out, to work your way around it. Once you've got the gist, I found that quite simple to use*'. Another nurse noted that the computer simulations were '*... more of a hands-on sort of thing*'.

The negative comments about the computer simulation related to the level of the nurse's computer skills. For example: *'not being computer literate it was hard, initially, hard to ...'* and *'I found it quite confusing ... I found I got a lot more information than I wanted by the time [I had worked out how to use it] ... but I guess in the real world that's what happens too'*.

Written simulations

The majority of the participants noted that the written simulations were what they were used to working with. They particularly noted that with the written simulations *'... everything you need is just there and you don't really have to think about it'*. This was seen both as a positive aspect of written simulations as well as a negative aspect, particularly in training situations. For example: *'because if you're trying to train somebody in triage, you don't want them to go through every little bit of information when there's airway obstruction, you just want them to stop where they are'*. One participant noted that *'cost wise and resource wise ... you don't have to worry about finding somewhere that has a television, a computer and a video'*.

The simulations and the Pocket PC as a triage teaching tool

All of the participants at both hospitals believed that the Pocket PC and the simulations were excellent teaching tools for people learning to triage. A participant new to triage explained: *'... It helps me to get into that whole process of thinking what to look for. What sort of things I should be concentrating on, what not to concentrate on ... It helps to get me into a system'*.

Other more experienced triage nurses noted that they *'probably would be good actually as a teaching tool. It would make people think more about how they triage'*. Others were more enthusiastic. For example: *'Fabulous. I think it's a great learning tool. I think we could get people into a triage role a lot more quicker than we do now.'*

Perceptions of the TATTT

Ten nurses from THS and three from PAH made overall positive comments about the tool. These related to the ease of use: *'It was very easy to use once I got used to it'*, as well as overall very positive comments about the tool itself. For example: *'I actually think it's a fabulous tool and that it has such great potential'*.

For more experienced triage nurses the fact that the tool came up with what they saw as the 'right' answer, increased their confidence in the tool. For example: *'I thought it was good because in my mind it seemed to come up with the right categories for me ... I would have questioned it had my feelings about the certain triage category ... varied considerably from what the tool came up with. ... It appears to be an accurate assessment tool'*.

Three nurses from THS and two from PAH noted that the tool increased their confidence. These comments were from both experienced and inexperienced triage nurses. For the less experienced nurses, the tool was seen to be able to guide them through decision making. As one nurse noted: *'Just to give a guideline ... not support, but an idea of what to look for and where to look for it, I think that's probably where I like the tool more than anything'*. Another inexperienced nurse believed that it would give *'... a bit more confidence in what category you have given someone ... you feel like you can explain a bit better why they have got that category'*. A more experienced triage nurse noted that *'you can triage eighty people per*

shift ... you're saying that [a] person can wait for an hour. Sometimes that doesn't sit comfortably with me ... It gives me something extra to fall back on'.

The TATTT as an adjunct to normal triage

The tool, therefore, was seen by some to be an adjunct which would assist them to validate their triage rating. This was particularly important as triage at present is seen as very subjective and often more senior nurses or medical practitioners will question the nurses triage score. The tool, they felt would assist them to validate their score with others. For example: *'I have found [validating my own triage score] to be extremely difficult. I am not saying that I came to the wrong decision, but when I'm told to validate [the score] ... I get uncomfortable as I am not used to doing that'.*

Several participants also mentioned that they would use the TATTT's triage rating as long as it related to the score they would arrive at using the previous system. They spoke about this as a safety mechanism until they felt confident that the TATTT was rating at the same level they would expect. For example: *'Although obviously if you weren't happy with the category that came up using the tool, you would override that because I think you need to feel comfortable with the triage category that you give your patient'.*

In all cases, the nurses noted that they would go with the higher score, regardless of whether it came from the TATTT or an independent assessment. As one nurse explains: *'... Just to be on the safe side, I need to go for that higher category because I'm not sure whether this is going on or that's going on'.*

TATTT and benchmarking

Another major aspect about the use of the tool was that it could be used to benchmark practice from one hospital to another. For example: *'we are benchmarked between hospitals the same size, bigger and smaller than us ... on our waiting times ... but there is nothing to say that those categories [are the same from one hospital to another]'.*

In contrast, other nurses noted that the tool could be used to audit the performance not of the facility, but of the individual nurse. For new nurses this was a negative aspect of the tool in that it could be used to, *'show whether someone is sufficiently capable to function as a triage nurse'.* In other cases, the nurses were happy to use the tool to ascertain their own performance over time and they believed that the tool could then be used almost as continuing professional education.

Use of TATTT at the triage desk

The participants were asked if they would use the TATTT at the triage desk. The majority of nurses stated that they would, *'I'd probably use it 99% of the time'.*

Four nurses noted that if they used the tool, 'often enough' it would become part of their normal working environment and were concerned that *'... because [it became] normal, you'd tend to rely on it more'.* Other nurses were more enthusiastic stating, *'I think it's wonderful, you can take it to a private area and you can have your computer with you and record what you need'.*

Parallel coding

Parallel coding is a triage testing method whereby two nurses independently record triage scores on a patient using different methods of coding. Parallel coding was used to further evaluate the TATTT and was carried out with eight of the ten nurses from THS against an experienced triage nurse who is a member of the research team. All of the nurses commented positively on the feasibility of parallel coding as a research strategy. *'You are always a bit on edge when someone is beside you, but you concentrate on what you are doing anyway ... Probably ... if anything ... made me think a bit more about what you were doing.'*

Role erosion caused by the TATTT

One nurse raised the issue of role erosion. This aspect of the TATTT was then explored with all of the other participants. The main concern was that if the TATTT was universally used it could mean that people who were not nurses could triage. However, other nurses believed that the TATTT could not be used by non nurses. For example:

'you would still need training and I mean you are calling upon years of assessment techniques and you know, to make these quick decisions ... you would still need a nurse using the tool to be comfortable with the decision'. There was one concern, however that the experience in assessment that nurses had developed would be eroded by the TATTT. As one nurse said, *'I guess the only problem with the TATTT is that you wouldn't be ... maybe you wouldn't develop the triage skills that you would without it'*.

Involvement in the study

Nurses were asked how they felt about being involved in the study. Whilst the majority noted that it *'was fun'* or that they felt it *'had been good'*, one nurse noted that it had been quite time consuming.

Opinions of the training package and areas of improvement

The majority of participants (four from the PAH and all from THS) believed that the training package was *'good'*. For example, *'as a packet of criteria if nothing else alone it's very good ... I think it's valuable'*. Several respondents believed that it was preferable just having someone *'sit down with the little Palm and [go] ... through it with me ... Just show me how to do it and let me do it'* than reading the pre session written material provided on the use of the Pocket PC as well.

The TATTT is constructed from 12 component items (including level of pain, pulse, mechanism of injury, etc.). There were several areas where the nurses believed that the TATTT could be improved. The major area was in the mechanisms of injury where one participant believed that the age of the person would change the category given. Others noted that what they ... *'struggled with ... was [deciding on whether it was] a high risk injury or not. That is always the question'*. Another noted that they would want to know ... *'just little bits of detail ... if it was a penetrating injury or if it was a motorbike accident or a car accident, the speed it was at, where the patient was hit' ...*

Some suggestions were also provided for improving the coding of the respiration and the bleeding components of the TATTT. There was also a request for an early stopping rule on the TATTT algorithm if the patient was clearly triage category 2. (Such a rule was already built in for triage category 1, Wollaston et al., 2004).

Finally the participants had mixed feelings about the rating of pain and its use in the TATTT. It was apparent that some nurses would give an initial triage scale and then, using nurse initiated analgesia, would provide pain relief then re-triage the patient. With regard to the parameters for the TATTT seven of the nurses commented that they could not suggest any improvements. The main areas as previously mentioned for consideration were the mechanism of injury, bleeding and respiration.

Discussion

This study set out to determine the most appropriate training and testing strategy for implementing the TATTT and to evaluate its acceptability as a consistent method of triage assessment and categorisation. Although this represents only the initial evaluation of the TATTT and the TATTT training package, our investigations proved to be productive in gaining the perceptions and evaluations of nurses involved regarding the acceptability and feasibility of the TATTT in triage practice.

Regarding the nurses' feedback on the TATTT we found that the majority of the perceptions were positive. Firstly they found the TATTT easy to use. This included not only the operation of the Pocket PC itself but also the procedural use of the tool that provided clear direction in the triage assessment process. This suggests that the descriptors and defining concepts were logical to the nurses as illustrated by their comments to the effect that the TATTT agreed with their own opinions. This finding is important because it lends credibility to the TATTT and gives the nurses confidence in the tool. This confidence would also extend to the use of the TATTT as a training device for triage assessment. Likewise, the fact that the tool contained short circuit mechanisms for occasions when a category 1 triage code was obvious was an aspect that showed the TATTT was also a practical device. These practical aspects of the TATTT are necessary in order to win the confidence and respect of experienced triage nurses.

Probably the most negative feedback stemmed from the opinion that using the TATTT could undermine the triage role. Some nurses felt that universal use of the TATTT might mean that anyone – even non nurses – could triage. This perception could be interpreted as both a criticism and a compliment of the TATTT in the sense that they are saying that the tool works so well that it could be used by anyone. Although this was a concern expressed by a few nurses it was generally felt that substantial training and considerable experience would still be necessary to perform the triage role. Another concern raised was that in using the TATTT some of the triage skills that develop through experience might be eroded due to a reliance on the TATTT.

Regarding the nurses' feedback on the testing mechanisms, opinions were mixed. Although the majority of the nurses are most familiar with the traditional written scenarios, and felt that these worked well, most felt the video simulations were best. The computer simulations were also good albeit more difficult to use and at the same time they recognised that the cost and time to

create these made their large scale use impractical. In general, a mixture of written and video simulations was viewed as being most useful to triage testing. Likewise the majority of the nurses felt that the parallel coding procedures were feasible for research. It was noted that although this was a potentially uncomfortable situation they felt it was a way to make them concentrate more on what they were doing.

Limitations of the study

The limitations of this study primarily relate to its scope; 15 coders from only two hospitals participated. Furthermore the coders were not randomly selected and possibly had an interest in research and thus it is possible were more open to new ideas and innovations. However, the feedback has been sufficiently encouraging to warrant further testing on a wider cross-section of triage nurses.

There was no measurement of long-term behaviour of users of the TATTT. It is impossible to tell whether satisfaction would increase with increased familiarity or whether there are some aspects of the TATTT which could become annoying with long-term use. Of course, the team is committed to ongoing monitoring and refinement of the tool, so we believe that any such unforeseen annoyances can be addressed as they arise.

Conclusions

This study has provided initial evidence to suggest that the TATTT is an acceptable and useful method of triage assessment. The findings of this study also support the continued testing of the TATTT on wider user groups as well as expanding its use to other non-traumatic patient presentation groups. The various testing procedures suggest that it is worthwhile to pursue the written and video simulations but computer simulations are likely to be too expensive and difficult for staff to become comfortable with. Valuable information was also received from participants regarding the TATTT training package and training process which will be used for refinement of the package/training for future implementation. The findings of this preliminary study suggest that the TATTT system is acceptable to users and can be viewed as a viable alternative to current triage training and practice worthy of further investigation.

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