

## What are the pre-requisites/pre-conditions for ETAT to be beneficial?

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The World Health Organization has produced guidelines for the management of common illnesses in hospitals with limited resources. This series reviews the scientific evidence behind WHO's recommendations. The WHO guidelines, and more reviews are available at: [http://www.who.int/child-adolescent-health/publications/CHILD\\_HEALTH/PB.htm](http://www.who.int/child-adolescent-health/publications/CHILD_HEALTH/PB.htm)

This review addresses the question: *What are the pre-requisites/pre-conditions for ETAT to be beneficial?*

The **WHO Pocketbook of Hospital Care for Children** summarises the steps involved in initial emergency triage and treatment (ETAT) of sick children, including an outline of clinical signs to be sought and emergency treatment to be instituted if particular signs are identified.

### Introduction:

Deficits in the quality of hospital care for children in developing countries have been recognized. [1] In many settings, this includes deficiencies in emergency care in relation to initial triage and treatment, staff training and numbers, facility organization, access to guidelines and availability of basic emergency drugs. As part of the WHO IMCI strategy, ETAT guidelines were developed to improve triage and delivery of timely, appropriate treatment to sick children presenting to hospital.[2] ETAT uses an approach based on advanced paediatric life support courses with a rapid assessment of airway, breathing, circulation and disability, but differs in its recognition of resource limitations, epidemiology of paediatric illness in developing countries and higher rates of mortality.

In the ETAT approach a simplified triage system classifies patients as having emergency signs that require immediate treatment, priority signs that require early assessment or, non-urgent signs which can wait. It uses a minimal number of clinical signs that are intended to be easily taught and recognised, and requires minimal equipment.

Implementation of ETAT is closely linked to, and often accompanied by a more general process of assessing and improving quality of care in hospitals. Furthermore, introduction of a structured approach to treatment and triage may lead to recognition of deficits in service delivery and drive organizational changes. While ETAT has potential to improve patient outcome, particularly as part of a broader intervention for hospital care, its individual impact is difficult to assess. In a developing country setting where patients tend to present late for treatment, mortality is likely to be influenced as much by severity of illness on presentation as by early implementation of appropriate treatment.

This review addresses the question "What are the pre-requisites/pre-conditions for ETAT to be beneficial?" It considers "beneficial" to include improving the accuracy and efficiency of triage and administration of early and appropriate treatment and patient outcome while acknowledging the difficulties in interpretation discussed above.

### Methodology

A search of the Pub Med database was conducted using the search strategy: (Emergency care OR triage) AND (Developing countr\* OR Developing world) AND (child\* OR infant\* OR child[MeSH] OR infant[MeSH]). The search

strategy found 62 articles of which nine were found to be relevant after reading all abstracts. Complete references were obtained for the nine articles which included four editorial comments and one descriptive article on the development of ETAT guidelines. These were not included in the review analysis.

The articles included in the review were two initial validation studies of the ETAT guidelines and two studies reporting outcome following the introduction of ETAT in Malawi. Both validation studies represent Level 1b evidence, according to the Oxford Centre for Evidence-based Medicine Levels of Evidence (May 2001), as examples of a clinical decision rule validated in a single population. The two studies of outcome in Malawi represented Level 4 evidence.

## Results

Both validation studies were conducted in centres which previously did not have a formal triage process and compared the ETAT-based assessment and treatment decisions of nurses with those of APLS-trained doctors. In both, nurses received, 20 hours of combined clinical and theoretical training.

The first of the validation studies was carried out in Recife, Brazil [3] where the epidemiology of disease is consistent with that of many developing countries with the exception that malaria is uncommon. The study looked at the triage and treatment of 3837 patients, 7 days to 5 years old, who presented to the emergency department during a 10 week period. Six nurses and two paediatricians working in the department participated. The sensitivity of the assessment by ETAT-trained nurses was 96.7% (95%CI 94.4-98) with respect to APLS-trained doctor's assessment, 91.7%(95%CI 88.7-93.9) with respect to the paediatrician's recognition of a patient requiring priority treatment regardless of designation according to guidelines and 85.7% (80.3-89.8) with respect to patients requiring admission. Of 102 patients identified by the guidelines as requiring emergency treatment, 94 (92.2%) were appropriately treated by nurses and only 8 required the intervention of a paediatrician for treatment. There was good concordance between doctors and nurses in classification of signs and need for treatment (kappa value 0.96).

The second validation study was conducted in

Blantyre, Malawi [4] where malaria is endemic. It included 2281 children presenting to an under-5 years hospital clinic over a two month period, where eight nurses and two clinical officers were ETAT-trained. 1581 patients were followed through to admission or discharge. Of the 2281 patients triaged by nurses, only 6.2% had priority reassigned by doctors. There was correlation between the triage category and subsequent need for admission. Of 1581 patients followed to admission or discharge, 236 were admitted including 90% of patients with emergency signs, compared to 32% of those with priority signs and 3.5% of patients without either. There was however large variation in the allocation of emergency or priority signs between nurses and doctors, with twice as many children having increased capillary refill and 50% more being cold or lethargic according to doctors.

Two studies in Malawi looked at outcomes in patients following the implementation of ETAT. The first study [5] described the outcomes of the 1581 patients triaged and followed through to admission or discharge in the validation study, including limitations to treatment implementation or patient processing. There were 31 deaths among 236 admitted patients, including four deaths at triage and 27 post-admission (12%). Two thirds of admitted patients received no treatment and the mortality rate in this group was 26%. Among patients who received treatment mortality was 31%. Malaria and anaemia were responsible for over half (54%) of all early deaths. All early deaths in patients with emergency signs occurred in patients who received treatment, possibly reflecting recognition of the severity of illness by nursing staff. The main limitations to emergency treatment were lack of rapid and safe access to blood for transfusion and insufficient clinic staffing. In addition, improved triage led to flow on effects in the inpatient unit to which sick patients were referred earlier, requiring restructuring of how inpatients are assessed and managed.

A more recent study from Malawi [6] reports on the fall in inpatient case fatality from 10-18% to 6-8% after implementation of ETAT in conjunction with other changes to hospital infrastructure, organisation and staffing. The proportion of deaths within 24 hours of admission fell from 36% to 12.6%. Though inpatient admissions increased the number of attendances at the outpatient clinic went from 90,000 to

50,000 per year due to referral of non-urgent problems to other centres. Other changes within the hospital included improved layout of physical building, improved patient flow and communication between emergency and admitting units, increased access to laboratory services and improved staffing.

## Discussion

There is evidence that ETAT is a valid, rapid algorithm for triage and treatment by nurses of children presenting to hospital that performs well against the standard of APLS-trained doctors, using either APLS or ETAT guidelines or their own clinical recognition of the need for priority treatment. In addition, priority allocation according to ETAT correlates well with the need for admission to hospital. This has been shown in two different resource-poor settings, one where malaria is endemic and one where it is not.

The validation studies differ in the correlation of the classification of signs between APLS-trained doctors and ETAT-trained nurses, with good correlation in the study from Brazil and wide variation in Malawi. Many clinical signs are subjective and some variation is to be expected. More importantly, the variation in classification in Malawi did not translate into a larger discrepancy in allocation of triage priority, although this may not have been the case in the hands of less experience nurses. The authors of the Malawian study suggest the difference in the studies could be accounted for by use of locally-based doctors in Brazil and, in Malawi, use of doctors from the United Kingdom with different perceptions of the severity of signs such as pallor and wasting. Alternatively, the nurses in Brazil had comparatively high levels of education and may have had more familiarity with recognition of specific signs or training such as IMCI.

There is limited evidence regarding the impact of ETAT on patient outcome. Use of ETAT by nurses in Brazil lead to appropriate and timely treatment of a high proportion of children but the study was not designed to evaluate the impact on patient mortality, due to the relative rarity of events. Though mortality was included as an outcome in the study from Malawi, the interpretation of these results is complicated. That mortality rates among admitted children who received treatment were higher than those who did not most likely indicates that more severely ill

children were more likely to receive treatment, and were therefore being appropriately prioritized. In the more recent study from Malawi the contribution of ETAT to the reduction in case fatality for admitted patients cannot be separated from changes that accompanied ETAT implementation. However, the study reflects that the use of ETAT was an important component of improvements in hospital care that lead to better patient outcomes. The fall in patient attendances in this study suggests ETAT may have the additional benefit in alleviating demand for acute services if appropriate alternate care facilities are available for less urgent patients.

The pre-conditions for ETAT to be beneficial can only be extrapolated from the conditions that existed in studies included in the review. Broadly they can be classified as training, facility organisation and access to drugs, supplies and equipment for emergency treatment.

ETAT training is delivered as a standard course but its delivery may be influenced by local factors, such as times when trainees are available to attend and the need to reinforce specific skills or knowledge that are unfamiliar in a particular setting. In Brazil the nurses had relatively high levels of education compared to many health workers who would undergo ETAT training and, while the education levels of nurses in Malawi were not specified, it was suggested they were relatively experienced. The effect of training may be different in settings with lower levels of staff education and experience.

Though not part of the ETAT guidelines, facility reorganisation is important for emergency care and accompanied the introduction of ETAT in Malawi to allow better patient observation and movement through the facility, access to investigation and treatment and coordination between early management and inpatient care. No comment was made regarding the necessity for this in Brazil, and it may not always be required if a review of facilities available deemed they were adequate. Similarly, any limitations to treatment implementation, such as the problems with access to blood and sufficient staff in Malawi, need to be identified and addressed.

## Summary

There is evidence that ETAT is beneficial as an algorithm for triage and institution of appropriate early treatment in two different developing country settings, as well as in identifying patients requiring admission. There is no direct evidence to define the preconditions/pre-requisites that are necessary for ETAT to be beneficial but appropriate training with access to guidelines is a clear requirement, and existing studies point to the importance of facility organization and access to emergency treatments to facilitate implementation of emergency care.

There is minimal evidence to define what the benefits of ETAT are in terms of patient outcome, and difficulties in interpreting this outcome which is influenced by patient factors and improving quality of hospital care for children in general. One study addressing this indicates that use of ETAT was an important component of broader improvements in hospital care that lead to reduced case fatality.

Given the large number of variables that may affect implementation of ETAT and the reproducibility of results, further studies are required to better define the preconditions that are needed for ETAT to be beneficial in a range of different settings. Such studies should try to address what the benefits are in terms of patient

outcome, quality of care and mortality rates once appropriate emergency treatment has been provided, whether in a single hospital pre- and post-implementation or in comparable hospitals within a region.

## References

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