

Assess, Treat and Refer in the Breakthrough Seizure and Low-Risk Syncope Patient

A Literature Review

Michael Christian, EMT-P

Background

A steadily increasing call volume within the EMS system over the past decade has created an enormous need for innovative health care initiatives to be developed within the province of Alberta, as well as worldwide. A significant portion of annual EMS calls result in an unnecessary transport to the Emergency Department (ED). In many cases patient care suffers collectively because wait times at the ED remain high.

In a recent Alberta Health Services' document entitled, "Becoming the Best: Alberta's 5-Year Health Action Plan 2010-2011", strategy 1 is to "Improve Access and Reduce Wait Times." Point 1.8 states that EMS will have a role in reducing wait times in Emergency Departments by developing the ability to 1. Treat patients on-site instead of taking them to an emergency department as appropriate and 2. Identify older, at risk, individuals who may need screening for falls, home care, and other services.¹

One pioneering solution to this problem which has been implemented and is showing promise is that of Assess, Treat and Refer programs used by EMS services. A global leader in this regard who are presently utilizing this type of model is the United Kingdom's National Health Service (NHS). They have published a document entitled "*Taking Healthcare to the Patient: Transforming NHS Ambulance Services*". This paper outlines current research, statistics, trends and initiatives internationally into four focused areas:

- EMS Initiated Refusal of Transport and transport by alternative means
- Assess, treat and refer
- Paramedic integration with other health providers
- Expanded paramedic training and role

Much research on the topic has been conducted by K.W. Neely et al dating back to the early 1990s. A general summary can be found in the concept paper Managed Care and EMS: An Interrogatory Model to Assist Communities in Evaluating Innovative Partnerships.

Assess, Treat and Refer

¹ *Becoming the Best: Alberta's 5-Year Health Action Plan 2010-2015*, pp. 5-6.

Treat and Release protocols have historically permitted paramedics to leave a patient on scene after an initial assessment and or treatment was provided. Such protocols have been utilized for quite some time in EMS services around the world. In Alberta pre-hospital practitioners currently make use of this process for patients with a chief complaint of Hypoglycaemia and Supraventricular Tachycardia. The current paradigm has shifted away from treat and release in the pre-hospital setting and moved toward assess, treat and refer. A greater emphasis is being placed on the detailed exam and assessment portion of the patient's condition as well as referral for follow up purposes. Immediate treatments may also be provided by the EMS crew while with the patient. The end goal of assess, treat and refer programs are to provide and guarantee a continuum of care for the patients who do not require treatment in the ED.

The aim of this literature review is to identify two focused demographic groups with common medical conditions that may be suitable candidates to apply to the Assess, treat and refer model. Literature focusing on the low risk syncope patient and the breakthrough seizure patient will be explored in order to determine their feasibility to this application.

The Low Risk Syncope Patient

Syncope is defined as a self-limiting, loss of consciousness with an absence of postural tone followed by rapid recovery. The condition of syncope does not include seizure, coma, shock, or other states of altered consciousness.

Ouyang and Quinn (2010), classify syncope as a common disorder, accounting for 1-3% of emergency department (ED) visits and as many as 6% of hospital admissions each year in the United States. As much as 50% of the population may experience a syncopal event during their lifetime. Although many etiologies for syncope are recognized, categorization into reflex (neurally mediated), orthostatic, and cardiac (cardiovascular) may be helpful during the initial evaluation. Cardiac syncope is associated with increased mortality, whereas non-cardiac syncope is not. Syncope may result in significant morbidity due to falls or accidents that occur as a result. In the United States alone, an estimated \$2 billion annually is spent on patients hospitalized with syncope.²

The authors go on to state that determining the exact cause remains a diagnostic challenge, even with a hospital admission and comprehensive work-up. Studies have shown that the cause of syncope may be diagnosed with variable degrees of certainty in only about 50% of patients after an initial ED evaluation, and about 30% of patients remain undiagnosed on discharge from a hospital admission. Syncope is categorized into 5 major classifications. The frequencies determined by a retrospective analysis showed the classification of syncope as 21% reflex-mediated, 9% orthostatic, 4% neurological and 37% unknown/psychiatric. Reflex-mediated and orthostatic causes are typically benign causes of syncope. After initial evaluation, these patients rarely require admission. The exception is the elderly patient who may require

² Ouyang H, Quinn J., Emerg Med Clin North Am. 2010 Aug;28(3):471-85

admission to rule out more malignant mechanisms. However, repeat benign episodes that are very similar to past contexts by history usually do not require extensive work-up and admission to rule out other sinister conditions. Reflex mediated syncope is a mechanism of inappropriate neural control over the circulation resulting in vasodilation. There are several other classifications under reflex mediated syncope which include vasovagal, situational, and carotid sinus hypersensitivity. The authors found that patients diagnosed with vasovagal syncope had an excellent prognosis.³ Patients in the Framingham study had a lower long-term mortality compared with those patients followed who never had a syncopal episode before. One problem identified in the study was that physicians do not always agree on their diagnosis. Patients given the diagnosis however are clearly at low risk for mortality or significant morbidity.⁴

Cardiac syncope is considered to be the most dangerous type of syncope and has also been proven to result in the most syncope admissions. Most of these patients can be identified by risk determining methods such as complete history, physical examination and EKG. The basic premise of cardiac syncope is a temporary inadequate cardiac output needed to maintain cerebral perfusion. Many times the underlying cause of this is a structural abnormality of the heart or a pre-existing heart condition. Dysrhythmias are clearly the most common and the most dangerous cause of cardiac syncope. This is an important factor to incorporate in the inclusion/exclusion criteria as data suggests that patients with cardiac syncope are more likely to experience a poor outcome and therefore should always be transported to the ED. Most published decision tools for risk stratification take into account cardiac symptoms and risk factors. To further make that point that patients with cardiac syncope fair much worse than patients with non-cardiac syncope, Soteriades et al followed 7814 patients with syncope for 17 years and found a higher mortality rate for patients with cardiac syncope compared with non-cardiac syncope.⁵ Suzuki et al studied 912 patients with syncope for an average of 3 years and found the same result.⁶ Middlekauff et al tracked 491 patients with functional class III or IV heart disease and concluded that 45% of those with syncope died within 1 year, whereas 12% of those without syncope died during the same interval. Syncope in a patient with poor cardiac function consistently leads to a poor prognosis.⁷

Morbidity as it relates to syncope may be caused by recurrent episodes. This has been shown to occur in up to 20% of patients within one year of the initial episode. Additional consideration must be given to lacerations, fractures, head injuries, and motor vehicle collisions as they may occur as a secondary cause to syncope and should be considered as exclusion criteria in the ATR decision tool.

³ Ouyang H, Quinn J., *Emerg Med Clin North Am.* 2010 Aug;28(3):471-85

⁴ Chen L, Chen MH, Larson MG, Evans J, Benjamin EJ, Levy D. Risk factors for syncope in a community-based sample (the Framingham Heart Study). *Am J Cardiol.* May 15 2000;85(10):1189-93

⁵ Soteriades ES, Evans JC, Larson MG, et al. Incidence and prognosis of syncope. *N Engl J Med.* Sep 19 2002;347(12):878-85

⁶ Suzuki M, Hori S, Nakamura I, Soejima K, Aikawa N. Long-term survival of Japanese patients transported to an emergency department because of syncope. *Ann Emerg Med.* Sep 2004;44(3):215-21

⁷ Middlekauff HR, Stevenson WG, Stevenson LW, Saxon LA. Syncope in advanced heart failure: high risk of sudden death regardless of origin of syncope. *J Am Coll Cardiol.* Jan 1993;21(1):110-6

Age

Age is an important factor to consider when assessing a patient for syncope. Data compiled by the National Hospital Ambulatory Medical Care Survey (NHAMCS) shows that syncope does occur in all age groups, however is most prevalent among adult populations. Non-cardiac causes are more common in young adults, whereas cardiac syncope becomes much more frequent with increasing age. Decision tools should take into account this factor for identifying patients who are at risk. Martin et al developed a risk stratification guideline that predicts an increased incidence of death at 1 year based on the presence of an abnormal EKG, ventricular arrhythmia history, CHF history, and age > 45 years.⁸ Likewise, Sarasin et al shows a risk of arrhythmia that is proportionate to the number of cardiac risk factors, abnormal EKG, prior CHF, and age > 65 years.⁹ A third study conducted by Constantino et al found that 6.1% of patients had severe outcomes within 10 days of syncope evaluation. The mortality rate was determined to be 0.7%. 5.4% of patients in this study were readmitted and required some form of therapeutic intervention. Risk factors associated with severe short-term outcomes included abnormal ECG, CHF history, age > 65 years, dominantly male gender, COPD history, and presence of trauma.¹⁰

Age is an important risk factor for syncope as well as death. Many studies suggest categorizing patients older than 45 years, 65 years, and even up to as high as 80 years as high risk for adverse outcomes in relation to syncope. One main reason for this is that old age directly correlates with increasing frequency of coronary artery and heart disease, arrhythmia and physical instability,

The Breakthrough Seizure Patient

A seizure is defined as a period of neurologic dysfunction caused by abnormal neuronal activity that results in a sudden change in behavior, sensory perception, or motor activity. The clinical range of seizures types include simple and complex focal or partial seizures and generalized seizures. Epilepsy refers to recurrent, unprovoked seizures from known or unknown causes.. Epilepsy is a commonly occurring medical condition and is usually well managed with medication regimes. According to Orringer et al. (2010), epilepsy and seizures affect more than 3 million American of all ages. Approximately 200,000 new cases occur each year, of which 40-50% will recur be classified as epilepsy. Overall, approximately 50,000-150,000 cases will reach status epilepticus (SE). Incidence is highest in those younger than 2 years and in those older than 65 years. Prognosis depends both on the underlying etiology of seizures and on whether seizures can be effectively terminated before irreversible neurologic damage has occurred. The overall mortality rate is about 20% for those who reach status epilepticus (SE). The mortality

⁸ Martin TP, Hanusa BH, Kapoor WN. Risk stratification of patients with syncope. *Ann Emerg Med.* Apr 1997;29(4):459-66

⁹ Sarasin FP, Hanusa BH, Perneger T, Louis-Simonet M, Rajeswaran A, Kapoor WN. A risk score to predict arrhythmias in patients with unexplained syncope. *Acad Emerg Med.* Dec 2003;10(12):1312-7

¹⁰ Costantino G, Perego F, Dipaola F, et al. Short- and long-term prognosis of syncope, risk factors, and role of hospital admission: results from the STePS (Short-Term Prognosis of Syncope) study. *J Am Coll Cardiol.* Jan 22 2008;51(3):276-83.

rates are highest for those older than 75 years¹¹. This finding suggests that the elderly and very young population groups may not be suitable candidates for assess, treat and refer programs as it has been shown that these two groups have the highest incidence of seizures.

Known epileptics are placed on anticonvulsant medications which reduce the seizure threshold and allow the patient to live a more normal life. There are currently over 15 anticonvulsant medications approved by the US Food and Drug Administration. The basic goal of anticonvulsant therapy is to control seizures with a minimal amount of side effects. Many studies have documented the success of anti-seizure therapy in the epileptic cohort. Seizure control is the key to quality of life for an epileptic. Approximately 70% of patients with epilepsy will become seizure free with treatment and will remain seizure free when they are eventually weaned from anticonvulsant medicines. Another 10%-15% will remain controlled on medication. Unfortunately studies have shown 15%- 20% of patients with epilepsy will continue to have seizure despite the best anticonvulsant therapy. Kwan and Brodie (2000) found that seizures in 50% of their patients were controlled after the first line anticonvulsant medication was started. With the addition of a second drug, another 15% of patients achieved seizure controlled.¹² This finding highlights the fact that when medicated appropriately a majority of patients suffering from epilepsy have their seizures either eliminated or controlled effectively.

Seizure reoccurrence is something to be cognizant of when developing assess, treat and refer protocols. It may be counterproductive for the EMS system and poor patient care to refer a patient who had a seizure only to come back within hours and transport him/her to the ED after a reoccurrence. In the ED, a retrospective study found that seizure reoccurrence is of low probability over the short term in patients with a known seizure disorder. Tardy et al. report that the cumulative probability of seizure recurrence has found to be 18.5% at the 24 hour mark and 5.8% at the 72 hour mark in patients with known seizure disorder. The figure increases to 20% at the 1 month mark in patients after a first untreated tonic-clonic seizure. The second seizure usually occurs within 3 months after the first. The same study concluded that over 30% of alcohol-related seizure patients had a recurrent event within 24 hours. This is an important finding to consider when developing ATR inclusion/exclusion criteria as alcohol related seizure show to have a higher recurrence rate.

A study by Choquet et al. (2008) attempted to determine the frequency of, and predictive indicators for early seizure recurrence (ESR) in a large population group of patients after a convulsive seizure. A total of 73,770 patients visited the two hospital EDs in France during the study period. Of the 73,770, 1025 patients (1.4%) were admitted to the EDs after a seizure. A previous history of seizure was present in 679 (66.2%) patients. New onset of seizure was present in 346 patients (33.8%). Alcohol related seizures were determined in 439 patients (42.8%). The patients in the study were then followed up on at the 6 hour and 24 hour mark. Overall, 167 patients (16.3%) and 189 patients (18.4%) had developed ESR at the 6 and 24 hour mark after arrival in the ED. Of the total 679 patients with a past history of seizure or epilepsy 518 of them were being medicated with anticonvulsant medications.¹³ The main findings of this study concluded that easily determined clinical indicators on ED arrival (or in the

¹¹ Orringer CE, Eustace JC, Wunsch CD, Gardner LB. Natural history of lactic acidosis after grand-mal seizures. A model for the study of an anion-gap acidosis not associated with hyperkalemia. *N Engl J Med*. Oct 13 1977;297(15):796-9

¹² Kwan P, Brodie MJ. Early identification of refractory epilepsy. *N Engl J Med* 2000; 342:314-319

¹³ Choquet, Christophe., Depret-Vassal, J., Doumenc, B.m, Sarnel, S., Casalino. Predictors of early seizure recurrence in patients admitted for seizures in the Emergency Department. *European Journal of Emergency Medicine* 2008, 15:261-267.

pre-hospital setting) were associated with risk of ESR. These factors include age, alcoholism, mental state and BGL. When these factors are abnormal the risk of a recurrent seizure is greatly increased. The analytical tool was based on a five point scoring system for each category. The tool was ultimately deemed unsuccessful for predicting ESR with any significant measure of accuracy however, the baseline criteria serves as a good starting point to base inclusion/exclusion criteria from in an assess, treat and refer program. The study concluded that the ESR rate is only one factor in determining the overall probability as other important factors must be considered. Some of these include social status, practicality of outpatient follow-up, access to treatment and psycho-social evaluation.

Age

In regards to patient age and risk of recurrent seizure one study of interest by Sperber et al. (1999) found that patients over the age of 40 years had an increased risk of having a repeat seizure within 24 hours. Long term outcome in elderly epileptic patients was found to be adversely affected by late starting or stopping medication. The study indicated that this factor alone could be associated with recurrent seizure in at least 70% of patients.¹⁴ Age does appear to be a common factor in determining repeat seizure activity mainly due to a combination of pathophysiological mechanisms and poor medication compliance which is common in the > 40 year population. This is relevant to the development of Assess, treat and refer criteria moving forward.

Conclusion

Evidence supports the fact that in cases of low risk syncope and breakthrough seizure, patients may not always need medical attention at the ED. These two common medical conditions have both shown to be at times very low risk for adverse outcomes after the event. Many studies have suggested that with the right decision tool based risk factors such as age, level of consciousness, previous medical history and EKG findings a portion of these patient population groups may be strong candidates for an Assess, Treat and Refer program.

¹⁴ Sperber EF, Veliskova J, Germano IM, Friedman LK, Moshe SL. Age-dependent vulnerability to seizures. *Adv Neurol* 1999; 79:161-169

References