Improving the Status of Status Epilepticus

BACKGROUND:

- Status epilepticus, defined as prolonged seizures with incomplete return to baseline, is a neurological emergency. Though relatively rare with an incidence of 20-40 per 100,000 population, the impact of status epilepticus for affected patients is substantial.
- Status epilepticus requires prompt and effective treatment with anti-epileptic medication. Phenytoin or fosphenytoin are the first-line drugs of choice for status epilepticus. Prescribing less effective medications increases the potential for poor outcomes in these patients. Given the high mortality of status epilepticus and the challenge of delivering appropriate and timely therapy, our standardized status epilepticus treatment protocol is to administer phenytoin.
- Fosphenytoin has fewer infusion-related side effects, and acts even more rapidly, but it is not currently on our formulary as it is more expensive than phenytoin.

Problem Statement:

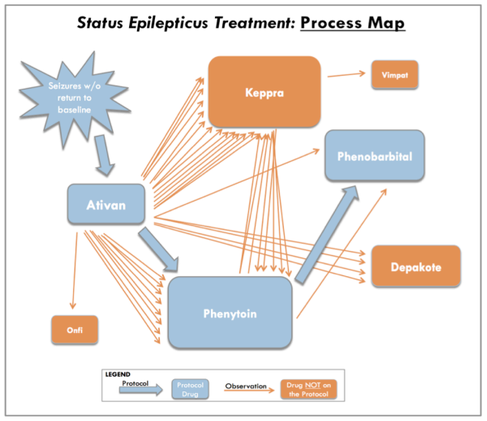
In the last two fiscal years, only 26% of patients presenting to Hospital of the University of Pennsylvania (HUP) for initial treatment of unremitting seizures were treated with phenytoin in accordance with the status epilepticus anti-epileptic drug (AED) treatment protocol. Poor adherence to this protocol leads to unnecessary variations in care and delayed, less effective treatment.

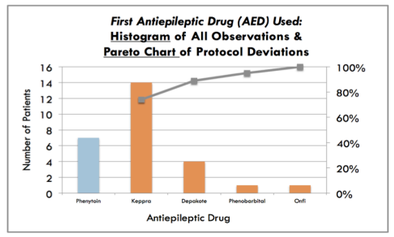
CURRENT CONDITION:

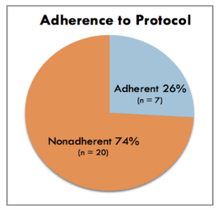
Baseline Data:

Query of patients with a *primary diagnosis* of status epilepticus by ICD-9 code treated at HUP in FY14 and FY15 yielded 83 patients in total

➔ ***retrospective chart review of the 27 patients with treatment initiated at HUP showed:***





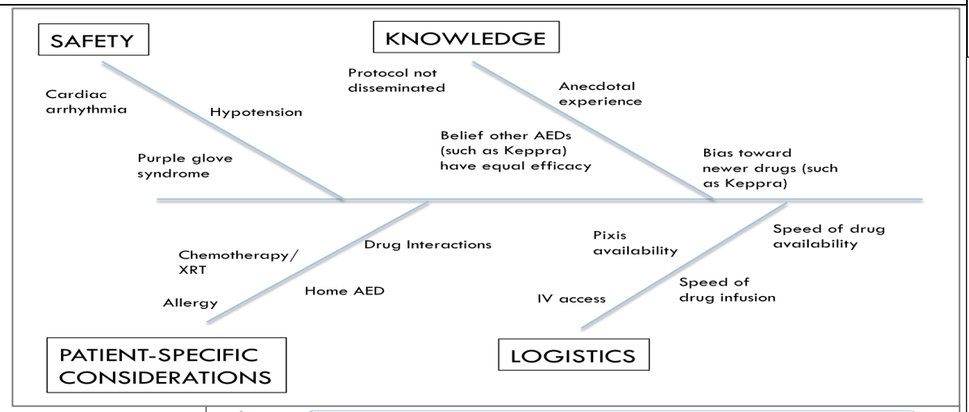


ROOT CAUSE ANALYSIS:

Fishbone Diagram for Nonadherence to the Anti-Epileptic Drug Treatment Protocol

Summation of input from:

- epileptologists
- neurology
- neurosurgery



Four Why's for Most Commonly Observed Protocol Deviation – use of keppra instead of phenytoin (recommended):

1	WHY?	The first step of the protocol is unappealing
2	WHY?	Phenytoin is difficult to administer
3	WHY?	Specifications regarding IV access and slow speed of drug infusion
4	WHY?	Risks of hypotension, arrhythmia, and purple glove syndrome
	ALTERNATIVE?	***Fosphenytoin***- more $$* but equal efficacy and decreased risk at faster infusion rates

* *Average wholesale price for 500 mg IV about $4.10 for Phenytoin and $73.36 for Fosphenytoin*

TARGET CONDITION:

Aim: To improve adherence to the status epilepticus anti-epileptic drug treatment protocol from 26% to 80%* for patients with unremitting seizures presenting to HUP for initial treatment in the year following countermeasure implementation.

** allowing ~20% deviation for patient-specific considerations*

	METRIC	BASELINE	GOAL
PROCESS	Adherence to Status Epilepticus Protocol	26%	80%
OUTCOME	Time to cessation of seizures	*needs to be assessed*	< 30 minutes
	Length of Stay	Average 16 days	Average <16 days
	Mortality	*needs to be assessed*	0%
BALANCING	Cost of AED therapy	*needs to be assessed*	

PROPOSED COUNTERMEASURES:

Root Cause	Countermeasures
Logistical and safety concerns regarding the use of phenytonin	• Develop an updated Status Epilepticus treatment protocol with fosphenytoin as the preferred drug because of its logistical and safety advantages.
Knowledge about the Status Epilepticus treatment protocol and drug efficacy	• When new protocol is approved, disseminate information about the Status Epilepticus protocol hospital-wide, emphasizing fosphenytoin as the new first step and its logistical and safety advantages. • Develop a relevant curriculum for the Neurology Department

ACTION PLAN – Implement the first two countermeasures.

(Address the neurology curriculum next year after the new protocol and its explanatory material are available.)

1. **Develop and disseminate an updated Status Epilepticus treatment protocol with fosphenytoin as the preferred drug because of its logistical and safety advantages.**
   a. **Petition UPHS pharmacy administration to obtain fosphenytoin**
   Katherine to present rationale for purchasing fosphenytoin to the hospital's Pharmacy & Therapeutics Committee at their in January 2017 meeting, with goal to obtain this drug by early spring. Dr. Knox to check on subsequent pharmacy administration discussions.
   b. **Rewrite status epilepticus anti-epileptic treatment protocol**
   First draft completed by 2/1/17.
2. **When the new protocol is approved, develop plan to disseminate the updated Status Epilepticus protocol hospital-wide.**
   Katherine and Dr. Patrick will complete this spring with plans to roll-out this summer.

FOLLOW-UP

- TBD