Implementation of an EMR-based continuous electrocardiographic monitoring (CEM) order to reduce inappropriate utilization

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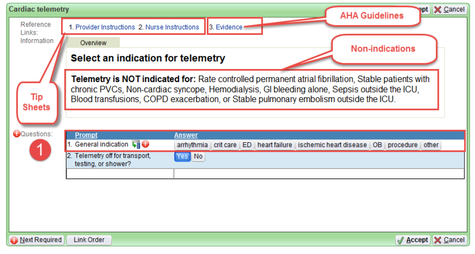
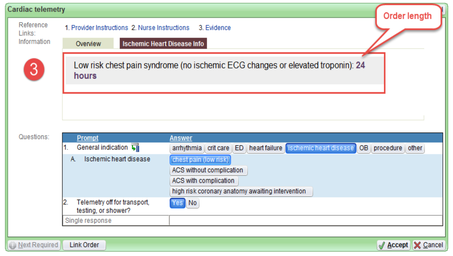
Background

- Continuous electrocardiographic monitoring (CEM) outside of the intensive care unit (ICU) represents an over-utilized resource that increases the cost of care.
- A retrospective chart review at our largest hospitals in Oregon found that approximately 35-40% of patients on CEM did not have a recommended indication for its continued use.

Methods

- A new time-defined order was built within our electronic medical record (EMR) system to reduce the initiation and duration of CEM in adults.
- Diagnoses for which CEM is commonly ordered, but not recommended, were listed.
- The order prompts providers to select a general and specific indication for CEM. Depending upon the indication, the order duration may be indefinite or time defined (24-72 hours). The order does not expire for patients residing in the ICU, obstetrics unit, or emergency department. Time-defined orders automatically discontinue after the specified period, without the need for a separate order.
- For patients with a time-defined indication, a nursing best practice advisory (BPA) was created to provide an alert of the impending order expiration; the BPA makes recommendations about the likelihood that CEM could be safely stopped based on the patient's vital signs in the preceding 8 hours.





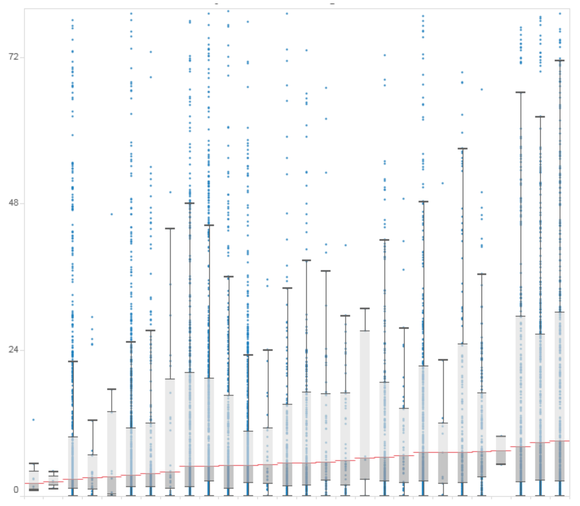
Results

- In October 2016, 22 hospitals within our health system (Providence Health & Services) went live with the new CEM order. Over 1.3 years, 147,909 patients spent 9,242,330 hours on CEM.
- Over this period, CEM decreased modestly overall (-8.6%) with notable variability between hospitals (+2.0% to -20.2%). Significant overlap for time spent on CEM was observed for hospitals without the ability to perform cardiac catheterization or cardiac surgery and those that could perform one or both.
- For 7,773 patients in whom a nursing BPA had fired to facilitate removal of CEM, there were appreciable removal delays (23% with a 4-12 hour delay, 14% with a 12-24 hour delay, and 18% with a >24 hour delay).

Facility-Level Change in CEM

Number of Records	Tele Time Encounter	% Tele Time in Encounter PRE	% Tele Time in Encounter POST	% Tele Time in Encounter CHG
8,191	596,078	45.4%	38.1%	-15.9%
262	9,586	54.2%	43.2%	-20.2%
112	2,868	55.8%	46.7%	-16.4%
102	3,623	60.5%	61.7%	1.9%
8,667	**612,155**	**45.6%**	**38.3%**	**-16.0%**
6,104	397,659	51.8%	46.5%	-10.2%
11,916	820,411	60.8%	61.9%	2.0%
17,177	994,756	69.9%	62.6%	-10.4%
13,926	1,048,922	66.3%	65.2%	-1.6%
10,428	693,399	67.9%	65.7%	-3.2%
59,551	**3,955,147**	**64.3%**	**61.5%**	**-4.3%**
2,134	95,342	46.0%	42.0%	-8.6%
15,193	985,516	58.3%	53.9%	-7.6%
17,327	**1,080,858**	**57.1%**	**52.5%**	**-8.1%**
353	7,711	28.5%	26.2%	-8.1%
481	15,473	53.4%	47.6%	-10.9%
4,443	232,982	55.7%	49.8%	-10.5%
1,541	61,054	55.8%	52.2%	-6.4%
6,456	386,721	61.7%	52.0%	-15.7%
1,798	74,479	61.7%	52.5%	-14.8%
1,675	74,092	57.9%	54.7%	-5.6%
12,957	897,901	64.0%	58.6%	-8.5%
29,704	**1,750,413**	**61.0%**	**54.7%**	**-10.3%**
17,919	888,031	49.4%	41.1%	-16.8%
10,178	735,801	60.7%	50.9%	-16.2%
4,563	219,925	58.6%	52.0%	-11.4%
32,660	**1,843,757**	**54.2%**	**45.8%**	**-15.5%**
147,909	**9,242,330**	**58.6%**	**53.5%**	**-8.6%**

Distribution of Hours to Remove CEM After the BPA



Conclusions

- CEM represents an over-utilized resource that increases health care costs. While implementation of a time-defined EMR order reduced the duration of time spent on CEM, substantial opportunity to reduce its initiation and duration still persists.

Disclosures for Ty J Gluckman:
Consultant, Boehringer-Ingelheim (Modest)