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Implementation of a Novel Order Set to Improve Baseline Pulmonary, Hepatic, and Thyroid Function Testing at Time of Inpatient Amiodarone Initiation

Amiodarone is a chemically-unique class III antiarrhythmic drug and is commonly-prescribed by internists and cardiologists alike.[1] In addition to its

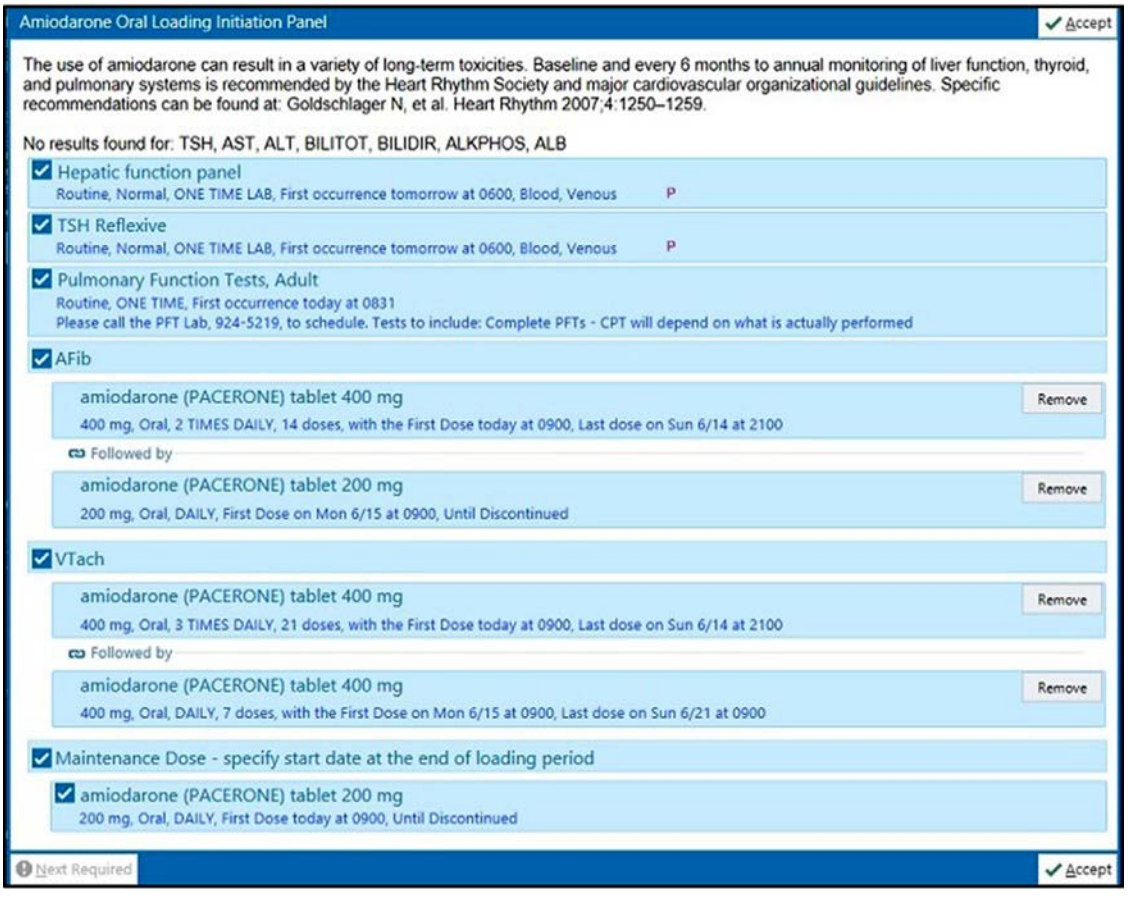

Figure 1. Oral amiodarone initiation order set. Searches for available thyroid, hepatic, and pulmonary function testing over the past six months, and provides orders for each. Also provides dosing and duration for common amiodarone indications.

known blockade of myocardial outward potassium channels and resultant class III properties, amiodarone is pharmacologically complex and exhibits class I, II, and IV effects as well. Thus, it is a common choice in the management of both supraventricular and ventricular arrhythmias, especially in patients with underlying structural heart disease.[1,2]

Unfortunately, the lipophilic properties of amiodarone potentiate adverse systemic effects when the drug is administered chronically, including pulmonary, thyroid, and hepatic toxicity.[1–4] Though current guidelines recommend a baseline evaluation before initiating chronic oral amiodarone therapy, including pulmonary, thyroid, and liver function tests,[4,5] adherence to these guidelines is poor.[6] Given our sense that our institution was not meeting baseline testing guidelines for inpatients initiated on chronic oral amiodarone therapy, we developed a multidisciplinary team to construct and implement a guideline-based amiodarone initiation order set.

We retrospectively reviewed electronic medical record (EMR) data at our institution from May 2018 to May 2019 and identified all patients (n = 610) initiated and later discharged on oral amiodarone therapy. Of these patients, we recorded the percentage of patients who had been ordered individual and composite baseline pulmonary, thyroid, and hepatic function testing before hospital discharge. As a multidisciplinary team, we then created a novel amiodarone oral loading initiation order set designed to automatically generate (1) appropriate amiodarone dosing and duration by indication (atrial fibrillation, ventricular tachycardia, and maintenance dosing), (2) most recent thyroid and hepatic function laboratory data available by date, and (3) option for pulmonary, thyroid, and hepatic function testing ordering with recommendation to pursue if no available results within the last 6 months (Figure 1). The integration of this order set into our EMR was coupled with an internal advertising campaign led by a resident physician team. Finally, ordering data for patients discharged from May 2019 to March 2020 (n = 495) were reviewed in a similar fashion to baseline data.

We found that in the 12 months before implementation of this order set, 610 patients were discharged who had been newly prescribed oral amiodarone during their admission. Of these patients, 24.4%, 12.3%, and 23.3% received pulmonary, thyroid, and hepatic function testing, respectively, before hospital discharge. A total of 46.4% of patients received at least 1 of the aforementioned tests. Overall, 1.5% of patients received all recommended testing. Following the implementation of our order set, we used an interrupted time-series analysis and found no significant change in the percentage of eligible patients receiving orders for baseline testing before to hospital discharge (26.3% TFT, net change 9.4%, p = 0.168, 12.3% LFT, net change 5.9%, p = 0.150, 15.8% PFT, net change −0.3%, p = 0.956, Figure 2).

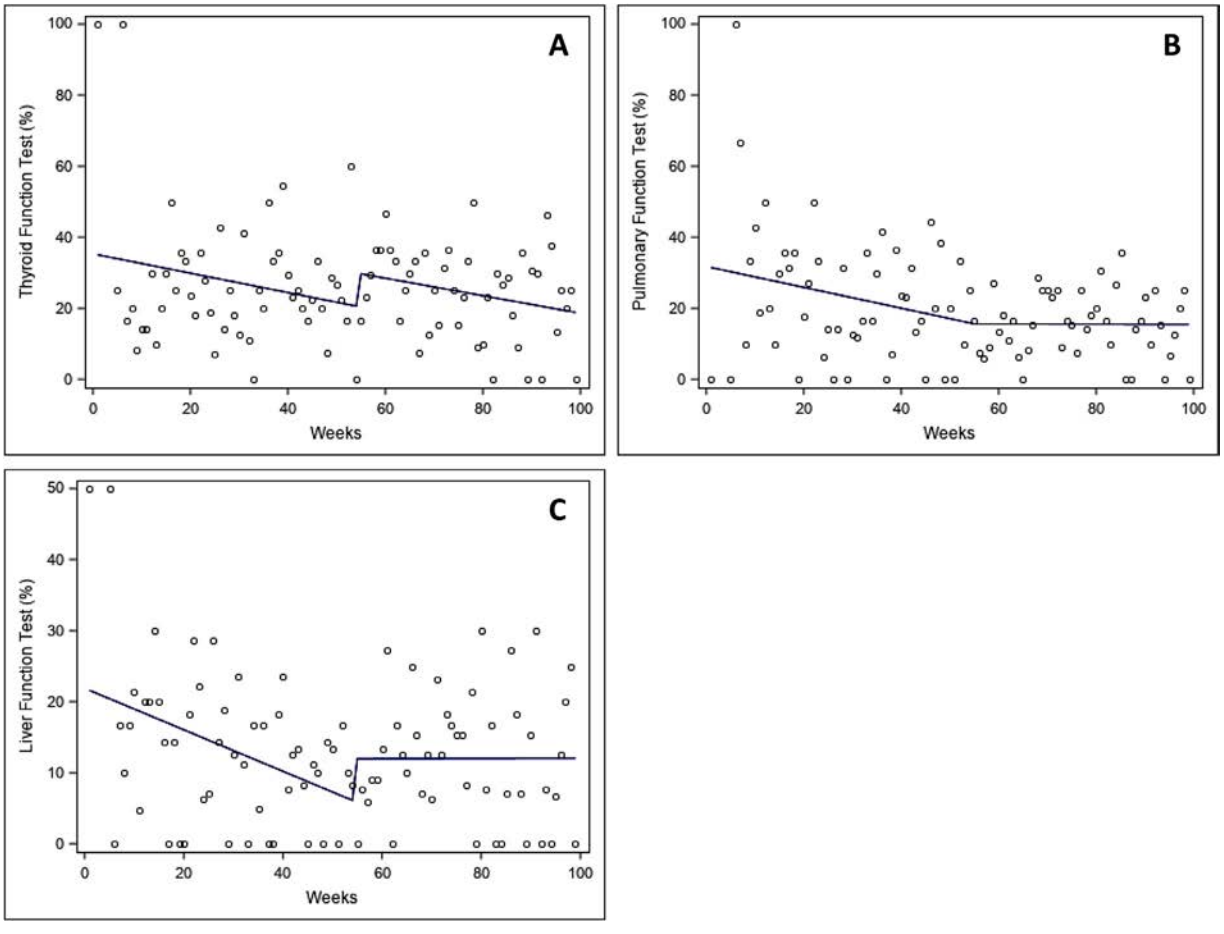

Figure 2. Change in thyroid (A), pulmonary (B), and liver (C) function testing over time.

We also found the order set was utilized in only 8.2% of eligible patients.

Our results demonstrate that implementation of a novel, evidence-based order set for inpatient oral amiodarone loading did not have a significant impact on ordering of recommended baseline screening tests. This was unexpected, as the implementation of standardized order sets has consistently been shown to improve quality of care whereas reducing healthcare costs, medical error, and length of stay.[7] One potential explanation for the order set's inefficacy is poor utilization, which may be attributable to alert fatigue. For example, it has been observed that 44% to 96% of EMR alerts are overridden,[8] which may be due to some combination of both cognitive overload and desensitization.[9] There is also a paucity of data describing the intervention- and practice-specific features which predict success of EMR alerts and clinical decision support systems, which may explain the high degree of variability in their reported effectiveness.[10]

With regard to amiodarone drug monitoring specifically, one intervention which does have an increasing body of supporting evidence is the development of multidisciplinary amiodarone monitoring clinics (AMCs). A comprehensive review of such programs suggested improved adherence to amiodarone monitoring guidelines.[11] Similarly, the pharmacy literature on postintervention strategies for concomitant amiodarone and warfarin management has yielded encouraging results.[12] One can speculate that amiodarone is often prescribed across a wide range of medical and surgical practices in both the inpatient and outpatient settings, where the primary prescriber may not follow the patient long-term. This raises support for longitudinal outpatient amiodarone management in multidisciplinary AMCs.

In conclusion, we developed and implemented a novel order set in an attempt to improve ordering of baseline screening for inpatients started on oral amiodarone therapy. However, the order set did not have a significant impact and was poorly-utilized. These results may suggest growing EMR alert fatigue in clinicians, and there may be a larger role for dedicated AMCs to protect patients from potential toxicities.

Disclosures

The authors declare no conflict of interest.

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