PHILIPS

Lead Management

Using electronic medical records in the fight against CIED infection

Background

Despite improvements in cardiovascular implantable electronic device (CIED) design, application of timely infection control practices, and administration of antibiotic prophylaxis at the time of device placement, CIED infections continue to occur and are a life-threatening complication. The Nationwide Inpatient Sample[1] (NIS) found a 96% increase in the number of new CIED implantations in the United States between 1993-2008. The NIS similarly showed the incidence of infection increased by 210% between 1993-2008. The annual rate of infections remained fairly constant until 2004, when it increased significantly from 1.53% in 2004 to 2.41% in 2008 ($p<0.001$). Moreover, in-hospital mortality associated with CIED infection increased from 2.91% in 1993 to 4.69% in 2008.

CIED infection can present in a variety of ways. Positive blood cultures, particularly due to staphylococcal species, provide a strong indication of possible CIED infection.[2]

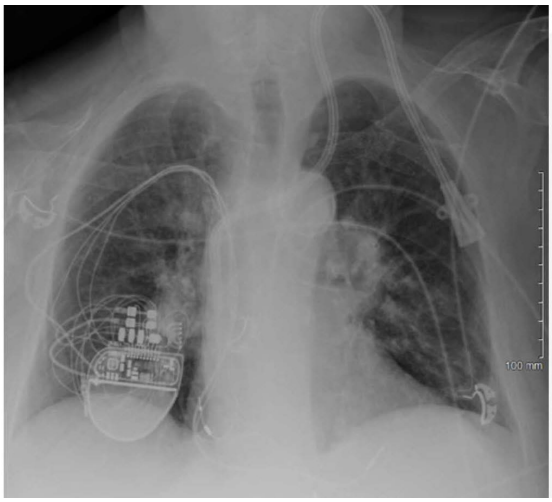
Case description

In November 2016, Dr. Arnold Giedrimas and his IT Team at Charlton Memorial Hospital in Fall River, MA, developed a clinical program using Epic EMR to better identify and treat these patients. Any patient in the Southcoast Health system (three Acute Care hospitals totaling 800+ beds) with a positive blood culture entered in their medical record is cross referenced to determine if the patient has a cardiac implantable device. Dr. Giedrimas is immediately notified of any positive results via his Epic "In Basket". The system does this seamlessly with no disruption to hospital staff.

One of the first patients the system flagged illustrates the importance of the program:

- 71 year old female with a history of:
  - HTN, Hyperlipidemia, DM, CAD, and TIA w/ no residual neurological symptoms
  - ESRD on dialysis
  - Left arm fistula placed in 2009 for dialysis
- Right-sided dual chamber placed in 2015 for paroxysmal AV block.

Due to suspected lead fracture (increased RV lead impedances and pacing thresholds), increased pacing requirements, as well as worsening cardiomyopathy, the patient's RV lead was capped and upgraded to a CRT-P in January 2016.



The ACC, AHA, HRS and EHRA Cardiac Societies agree: The presence of a systemic infection, pocket infection, or endocarditis is a Class I indication to remove all hardware. Despite this, 65% of patients with CIED infection may be under-treated and at risk for recurring infection, endocarditis or death.[3]

"I think there's a perception, even in the cardiology community, that extraction is a very high risk, very morbid procedure. Some don't realize how much riskier untreated infection is, and I think there's still not enough realization that extraction can really lower patient's mortality risk."

- Arnold Giedrimas, MD

Results from this case study are not predictive of future results. While lead extraction is clinically proven to be safe and effective, in rare cases serious complications, including death, can occur. For Important Safety Information and to understand the potential risks of lead extraction, visit http://www.spectranetics.com/resources/ifu-library/

Around the time of upgrade, the patient started having issues with her fistula including small scabbing and bleeding. She underwent stenting, surgical interventions and, ultimately, resection of the fistula in February 2016. A central catheter was placed for her dialysis. Beginning in April 2016 this patient began a series of hospital admissions and ER visits for infection, exhibiting typical symptoms of fever, chills and fatigue.

Discussion

Over the course of 10 months there were nine hospital visits or admissions for infection or infection- related symptoms totaling more than $400,000 in direct hospital costs.[4]

More than 5200 patients died in 2017 due to complications from their CIED infection that did not undergo complete system removal.[5] In addition to continued education and recognition of the importance of complete device infection treatment, leveraging the possibilities of modern EMR systems offers a potential to further improve patient care.

22	749	82
Facilities	Alerts	Cases

Numbers as of January 2020[6]

"Given the fact that there was no further recurrence after the pacemaker system was removed, you certainly believe that a lot of this could have been avoided ..."

-Arnold Giedrimas, MD

"Very simple systematic changes can lead to significant improvements ... it was fairly easy to implement, and I think anybody, where it's compatible with their electronic system, should think strongly about implementing this."

-Arnold Giedrimas, MD

1. Greenspan AJ, Patel JD, Lau E, et al. 16-year trends in the infection burden for pacemakers and implantable cardioverter-defibrillators in the United States: 1993 to 2008. J Am Coll Cardiol. 2011;58(10):1001-6.
2. Baddour LM, Epstein AE, Erickson CC, Knight BP, Levison ME, Lockhart PB, Masoudi FA, Okum EJ, Wilson WR, Beerman LB, Bolger AF, Estes NA, 3rd, Gewitz M, Newburger JW, Schron EB, Taubert KA. Update on cardiovascular implantable electronic device infections and their management: a scientific statement from the American Heart Association. Circulation. 2010;121 :458-47 7.
3. D021403-03 Infection Infographic. Philips data on file, 2017.
4. Sohail, M Rizwan, et al. Incidence, Treatment Intensity and Incremental Annual Expenditures for Patients Experiencing a cardiac Implantable Electronic Device Infection : Evidence From a Large US Payer Database 1-Year Post Implantation. Cir Arrhythm Electrophysiol. 2016: 9(8).
5. Data on file, see D021462-04. Data is an equation using: 30,820 total infections * 65% undertreated * 26% 6-month mortality rate.
6. Philips data on file. January 8, 2020, "EMR Tracking Document," Philips field representatives with facilities that have implemented EPIC EMR systems are asked to give updated alert and case numbers, taken directly from the EPIC software system on a quarterly basis.

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