

Remote Monitoring of Cardiovascular Electronic Implantable Devices

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Introduction

On May 13 of 2015, The Heart Rhythm Society published an Expert Consensus Statement on Remote Interrogations and Monitoring. The goal of the Pacemaker and Device Clinic is to comply with the Heart Rhythm Society guidelines to develop and maintain the highest standard of care for our patients. The published guidelines support our practice and brought to light further evidence of the efficacy of remote monitoring. In an effort to provide remote monitoring to every device clinic patient, many barriers exist. Remote monitoring targets each of the 6 Institute of Medicine's aims for improvement in the quality of care, but not without collaborative efforts.

- 1) Safe: Early identification of arrhythmias, delivered therapies, change in clinical status or device malfunction
- 2) Effective: Full diagnostic data and event storage readily available
- 3) Patient-Centered: While remote monitoring is the standard of care, participation is voluntary
- 4) Timely: Vital information can be transmitted in minutes from the patient's own home manually or automatically for alert conditions
- 5) Efficient: No additional equipment, clinic space or in-clinic scheduling is required
- 6) Equitable: All patients are encouraged to participate and not refused access to remote monitoring with the exception of the implanted device that is not currently compatible with remote monitoring technology

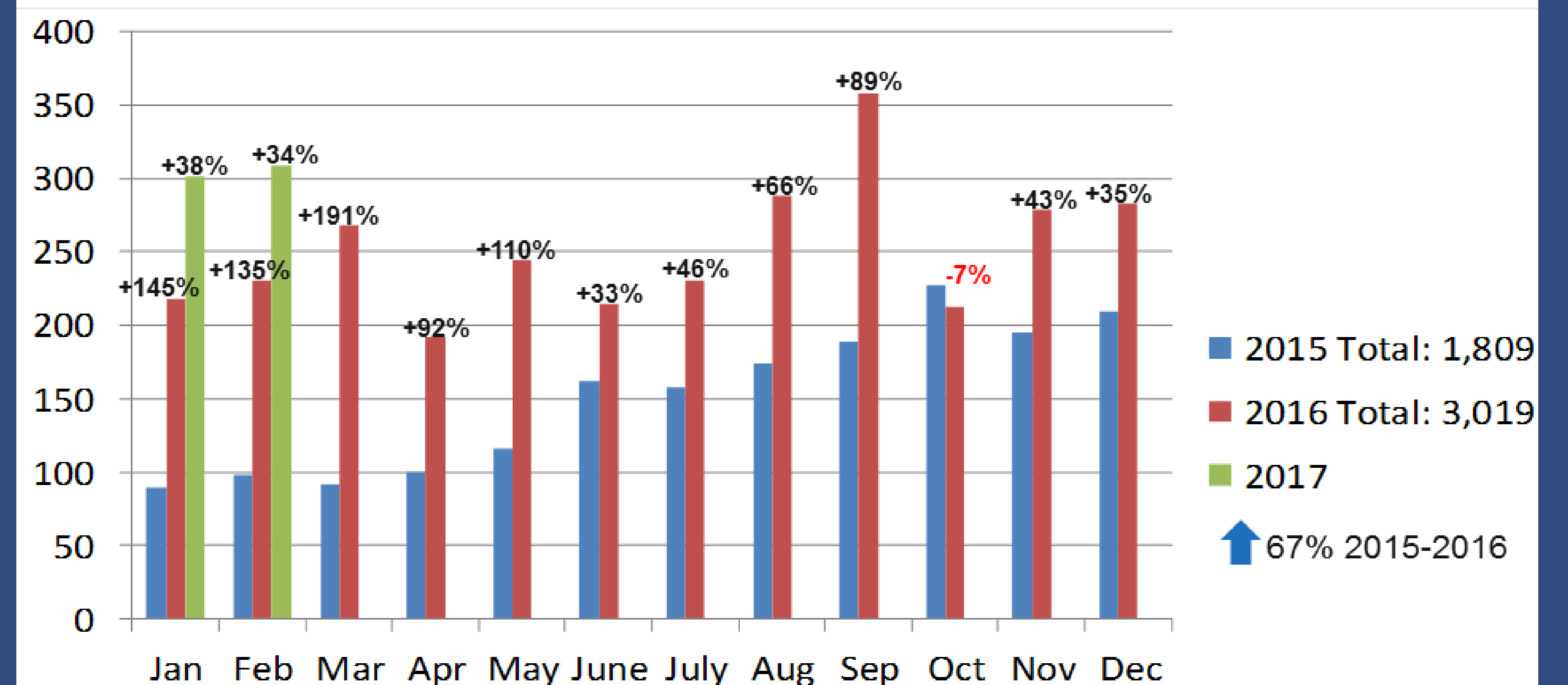
Goal

Introduce all applicable patients without remote monitoring to the technology and further evaluate compliance of patients currently enrolled.

The Interventions

- Calculation of device in-clinic & remote volume
- Identification of patients enrolled in remote monitoring, but not currently in compliance
- Discovering barriers to enrollment and compliance
- Implementing strategies to overcome remote monitoring obstacles
- Correlate increase remote volume to in-clinic scheduling

Billed Remote Monitoring Transmissions



The above chart shows the billed remote monitoring transmissions for 2015 and 2016. A noted and continued rise in volume began in May of 2015. The volume of remote transmissions displayed above, does not include alert or unscheduled transmission.

Alert or unscheduled transmissions can often include actionable items that affect patient management & clinical outcomes such as the following:

- Arrhythmias
- Delivered therapies
- Change in clinical status
- Device malfunction

Remote transmissions can be billed every 90 days for pacemakers and defibrillators. Implantable loop recorders may be billed every 30days in accordance with the Centers for Medicare and Medicaid

For more information, contact:

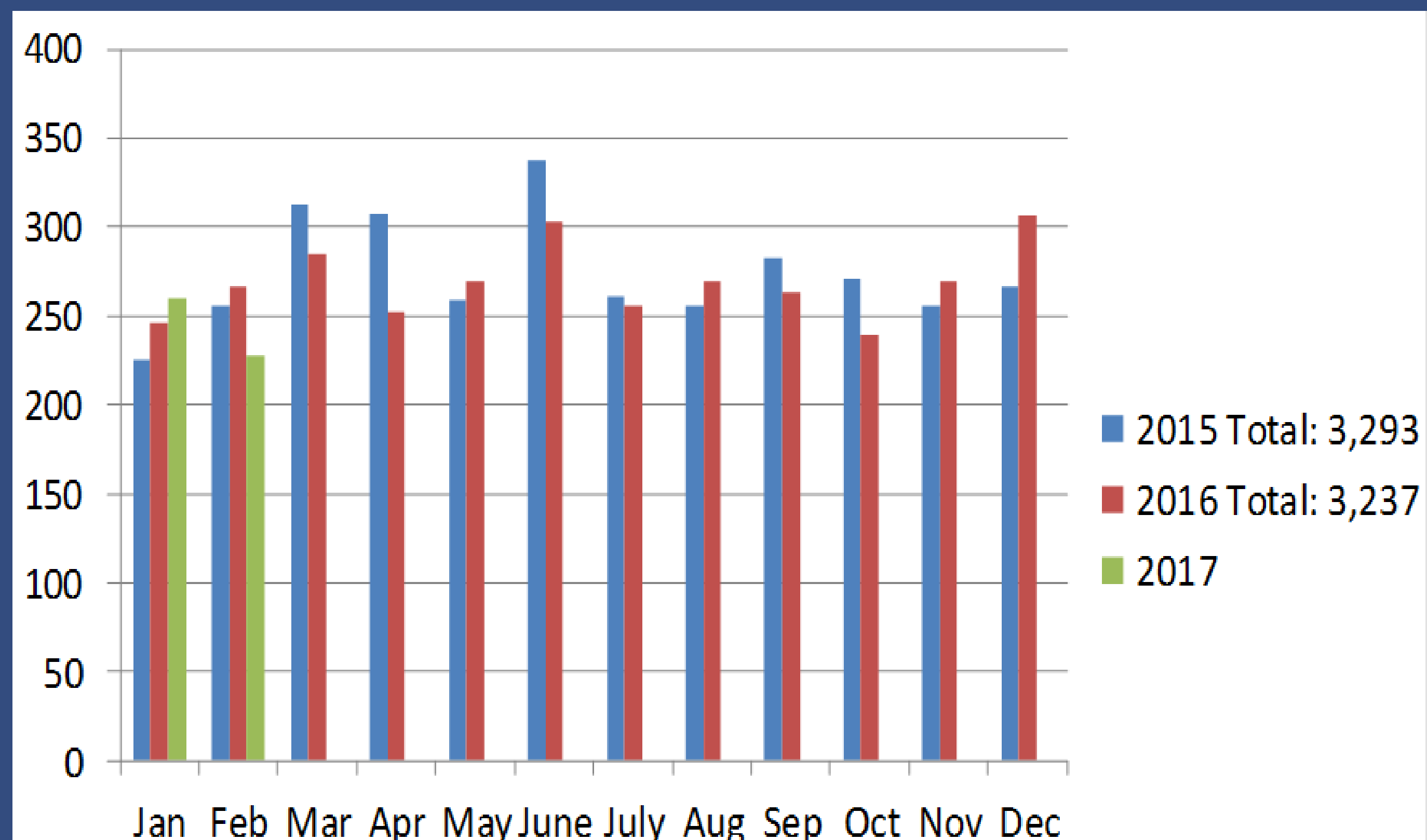
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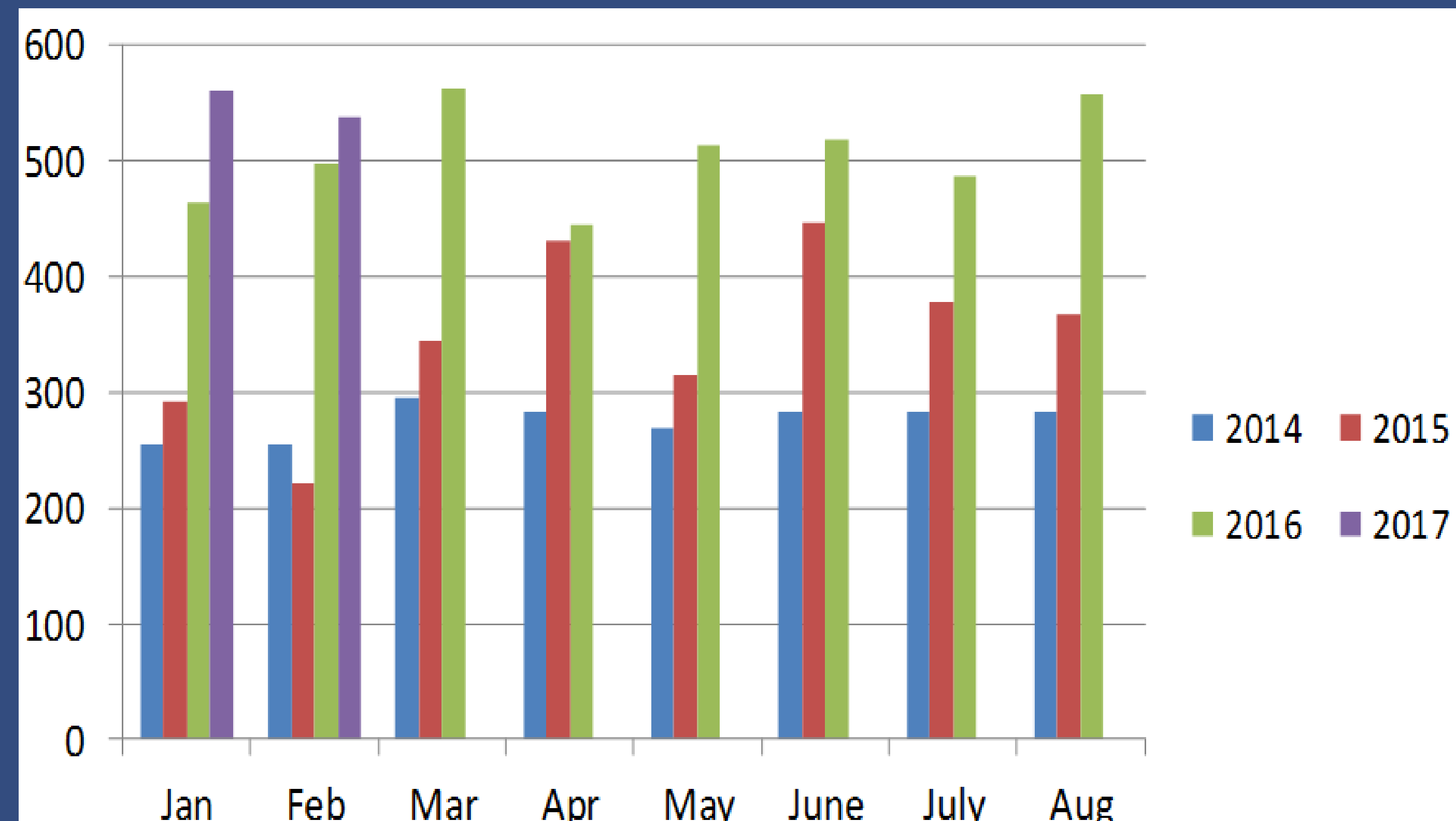
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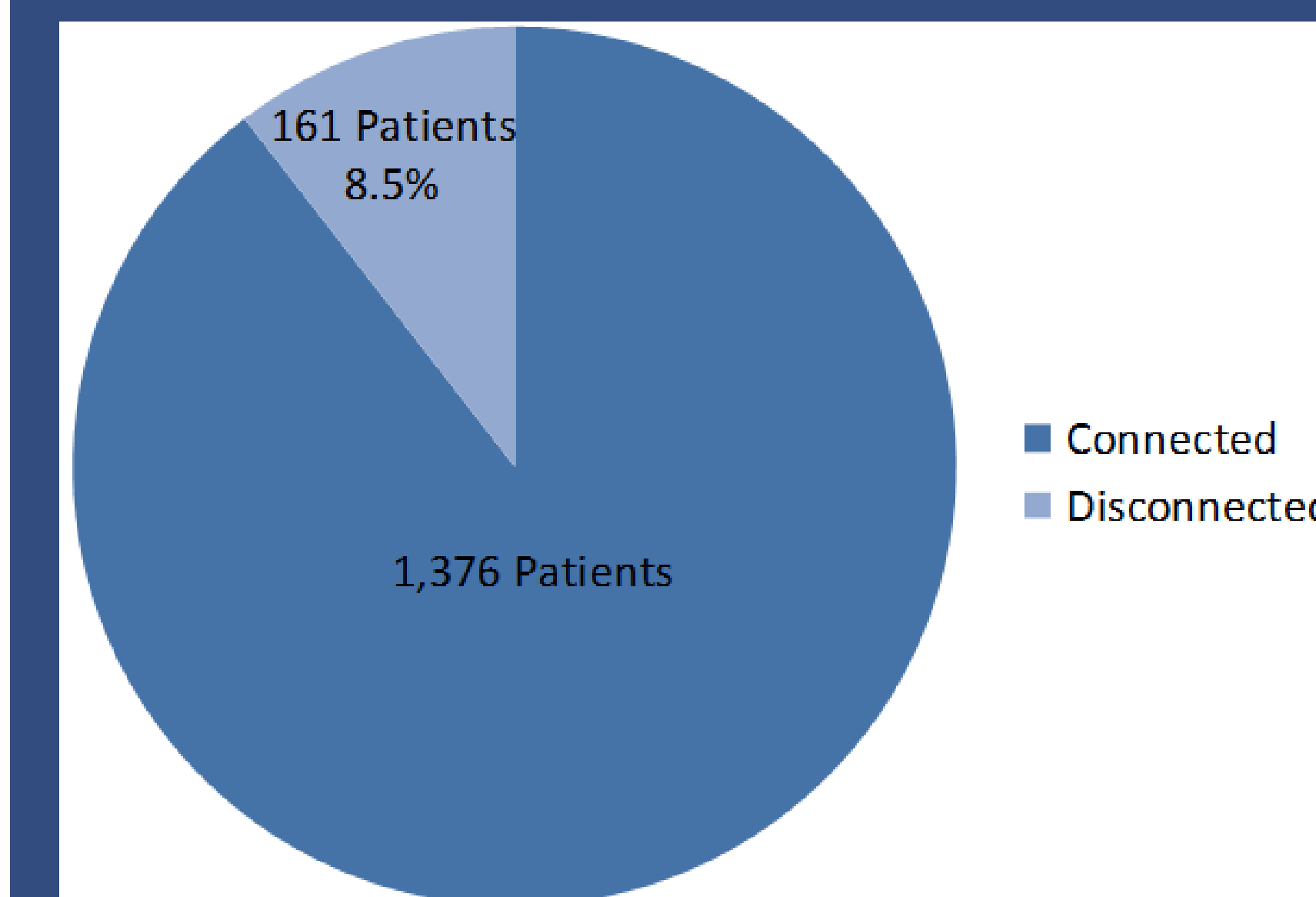
Device In-Clinic Visits



Combined Remote & In-Clinic Volume



Disconnected Remote Monitors



- The current disconnect rate could result in a yearly lost remote monitoring revenue of at least \$33,000 according to BIDMC current billing practice
- Unknown clinical events could occur that alter patient outcomes and plan of care

Lessons Learned

- Obstacles facing remote monitoring can be multifaceted and unique to each patient
- Phone lines are unreliable sources for connectivity and many patients no longer have land lines
- Education plays an enormous role in compliance
- Device in-clinic visits are unchanged with a 67% increase in billed remote monitoring transmissions for 2016 with continued growth for 2017 to date
- Disconnected remote monitor numbers are not static and change daily
- The maintenance of remote monitoring is greater than in-clinic visits, yet yields greater patient satisfaction and clinical benefits

- The Pacemaker & Device Clinic volume shows continual growth
- As the remote volume increases, a disproportionate decrease of in-clinic volume is likely to occur given physician preference and patient's clinical state.

Next Steps

- Continued trouble-shooting and resolution implementation to unenrolled and disconnected patients
- Further development and initiation of device clinic database system
- Education for the BIDMC staff and new education methods for patients including tablet based educational videos
- Reduction of in-clinic visits with proven successful remote monitoring and optimization of remote and in-clinic schedules
- Prevent lost revenue and continuous patient monitoring of disconnected patients with diligent surveillance to achieve and maintain a disconnect rate of <5%

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