

Bringing Data to Life with Simulation

Modeling the Economic Value of Procedure Efficiency

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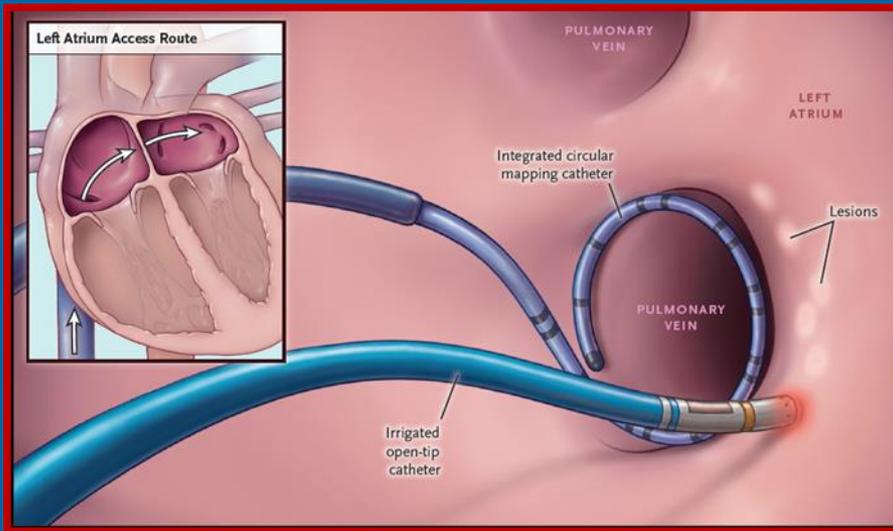
CRHF Economics, Reimbursement and Evidence

May 11th, 2017

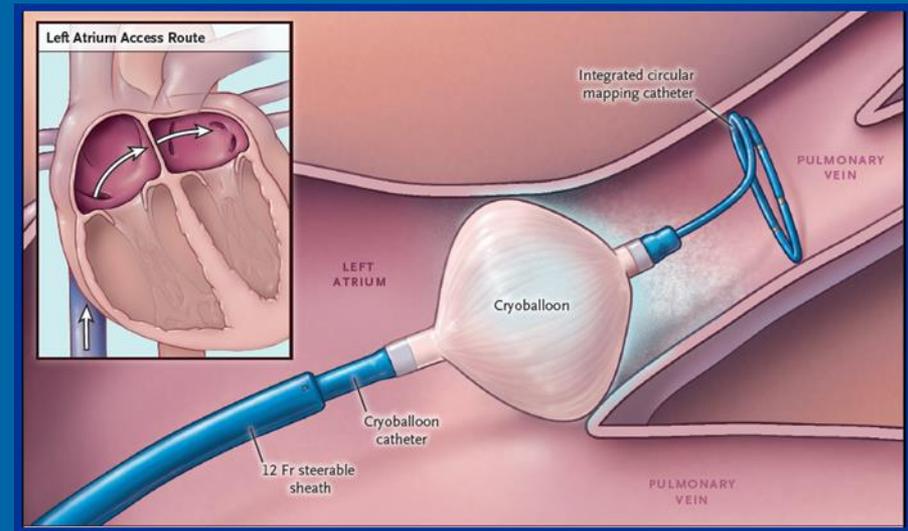


Modeling the Economic Value of Procedure Efficiency

Background – Radiofrequency (RF) vs Cryoballoon



**RF Ablation Catheter
(point by point approach)**



**Cryoballoon Ablation Catheter
(anatomical approach)**

Modeling the Economic Value of Procedure Efficiency

Cryoballoon vs. RF Catheter Ablation Procedure Efficiency Comparison

- Retrospective chart collection study
- 348 patient charts were examined (220 cryoballoon and 128 RF procedures)
- Hospital resource utilization compared in several categories.

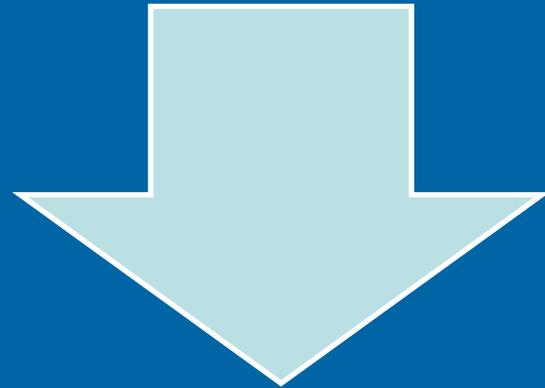
In this study Cryoballoon ablation procedures were found to be statistically faster on average than point-by-point RF ablation in four categories: Lab occupancy, procedure time, LA dwell time, and fluoro time.

	Cryoballoon mean +/- SEM (N)	Irrigated RF mean +/- SEM (N)	Average Time Savings with Cryoballoon procedure	% reduction by Cryoballoon procedure	P-Value
<u>EP Lab Occupancy Time</u> (minutes) "patient-in to patient-out"	246.8 ± 3.1 (N=213)	283.1 ± 4.7 (N=125)	36.3 minutes	13%	<.001
<u>Procedure Time</u> (minutes) "skin to skin"	173.5 ± 3.1 (N=214)	199.8 ± 4.3 (N = 127)	26.3 minutes	13 %	<.001
LA Dwell Time (minutes) "transeptal to last catheter out"	147.9 ± 3.2 (N=143)	166.7 ± 4.4 (N=101)	18.8 minutes	11%	<.001
Fluoroscopy Time (minutes)	33.3 ± 1.0 (N=210)	42.4 ± 1.8 (N=118)	9.1 minutes	21%	<.001
Length of hospital stay (hours)	26.6 ± 0.6 (206)	27.6 ± 1.4 (116)	NS	NS	>.05 (NS)

DeVile JB, Comparison of Resource Utilization of Pulmonary Vein Isolation: Cryoablation versus RF ablation with Three-Dimensional Mapping in the Value PVI Study. *JIC*. June 2014

Modeling the Economic Value of Procedure Efficiency

Background – Why Should an EP Lab Manager Care?



More Effective

- Overtime Avoidance, Time for Additional Cases
- “Lab Occupancy Time”
- Detailed Distribution
- Accounting for Real World Complexity



Somewhat Effective

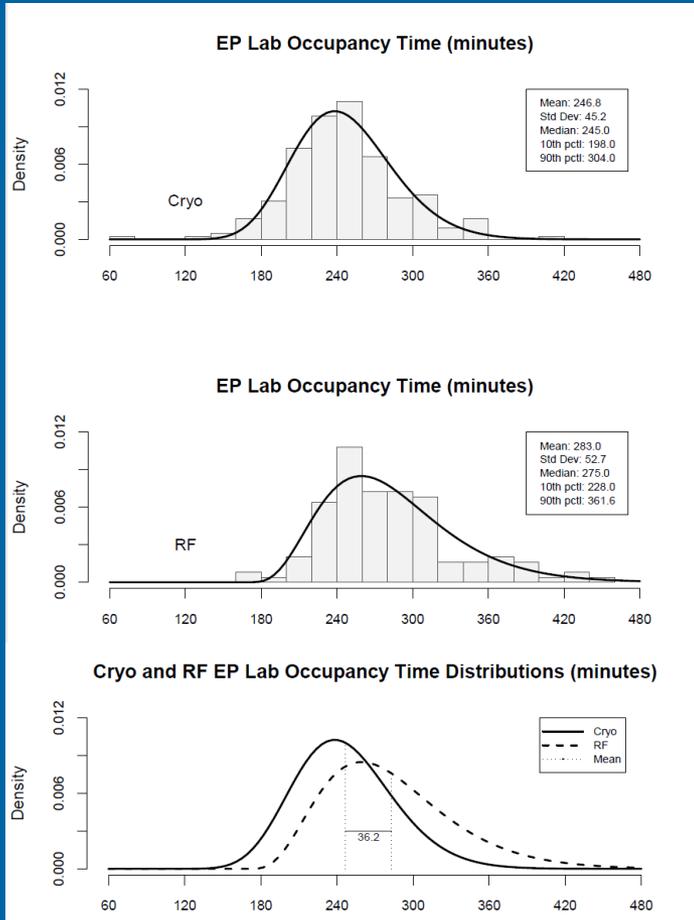
- Cost per Minute
- “Procedure Time”
- Average Only
- Assuming Only This Data Point Matters



Modeling the Economic Value of Procedure Efficiency

Methods

Detailed Lab Occupancy from VALUE PVI



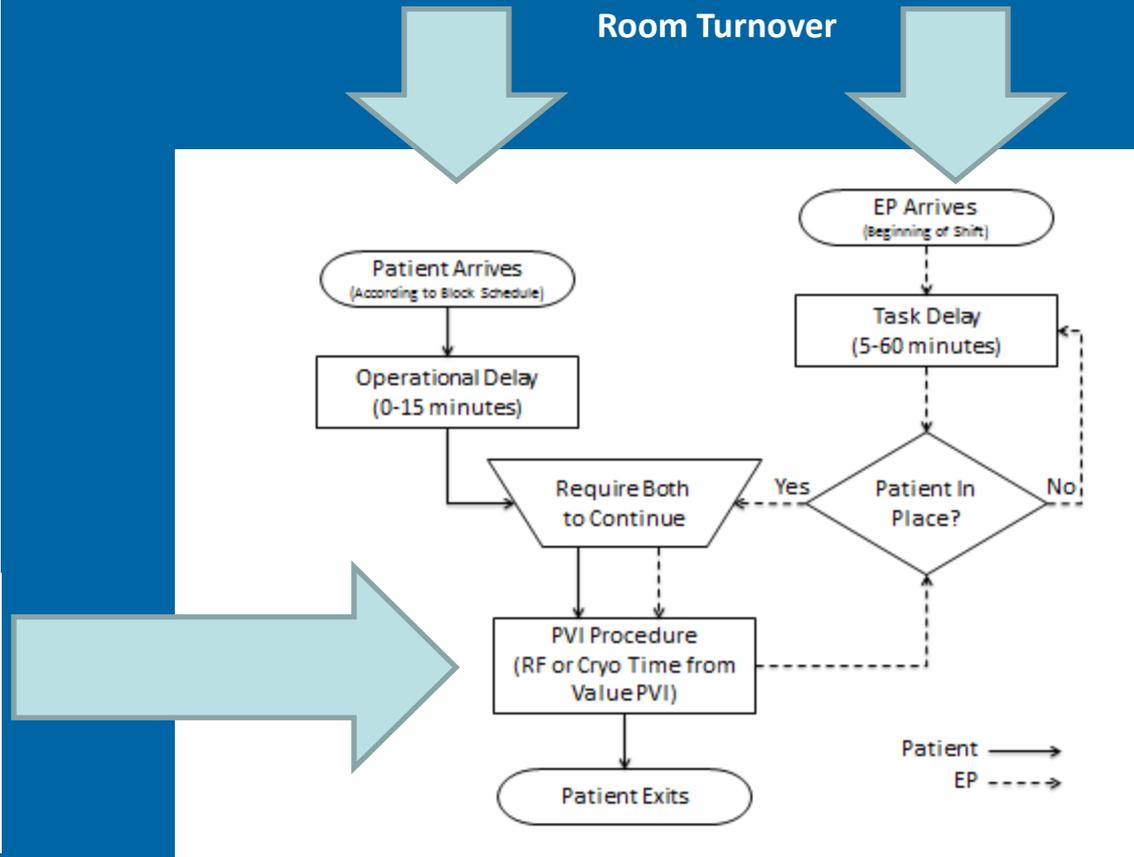
Real World Complexity from Administrators

EP Late Lab Results Delayed

Block Schedule

No Nurse to Move Patient

Room Turnover



Modeling the Economic Value of Procedure Efficiency

Sample Model Run

RF Line

RF Begin Time per Block Schedule 0

RF Setup 0

RF Operational Delays 0

Wait for RF EP 0

RF Ablation Case 0

RF Recovery 0

RF Patient Leaves 0

RF EP: RF Scrub Nurse, RF Technician, RF Anesthesiologist, RF EP Other Tasks

Cryoballoon Line

Cryo Begin Time per Block Schedule 0

Cryo Setup 0

Cryo Operational Delays 0

Wait for Cryo EP 0

Cryo Ablation Case 0

Cryo Recovery 0

Cryo Patient Leaves 0

Cryo EP: Cryo Scrub Nurse, Cryo Technician, Cryo Anesthesiologist, Cryo EP Other Tasks

	Days Where First Case Overlaps Second	Days with Overtime	Cumulative Hours of Overtime	Days with Time for Additional Case
RF	0	0	0	0
Cryo	0	0	0	0

Block Schedule*	RF	Cryo
Shift Begins	7:00:00 AM	7:00:00 AM
First Case Begins	8:00:00 AM	8:00:00 AM
Second Case Begins	12:30:00 PM	12:00:00 PM
Latest Time for Additional Case	5:00:00 PM	5:00:00 PM
Shift Ends	6:00:00 PM	6:00:00 PM

* Default block schedule times are set to best represent the results of the Value PVI data (see start and end time)

Cumulative Overtime

No data available

Room setup time (from patient out of lab to next patient in lab) is 15 minutes.

EPs delayed to start case by 5-60 minute (most common is 15 minutes).

Patient related operational delays (independent from EP delays) are most commonly zero minutes (no delay), but can be up to 15 minutes due to:

- lab work delay
- INR adjustments
- consent issues
- incomplete chart
- transport unavailable
- anesthesiologist delay

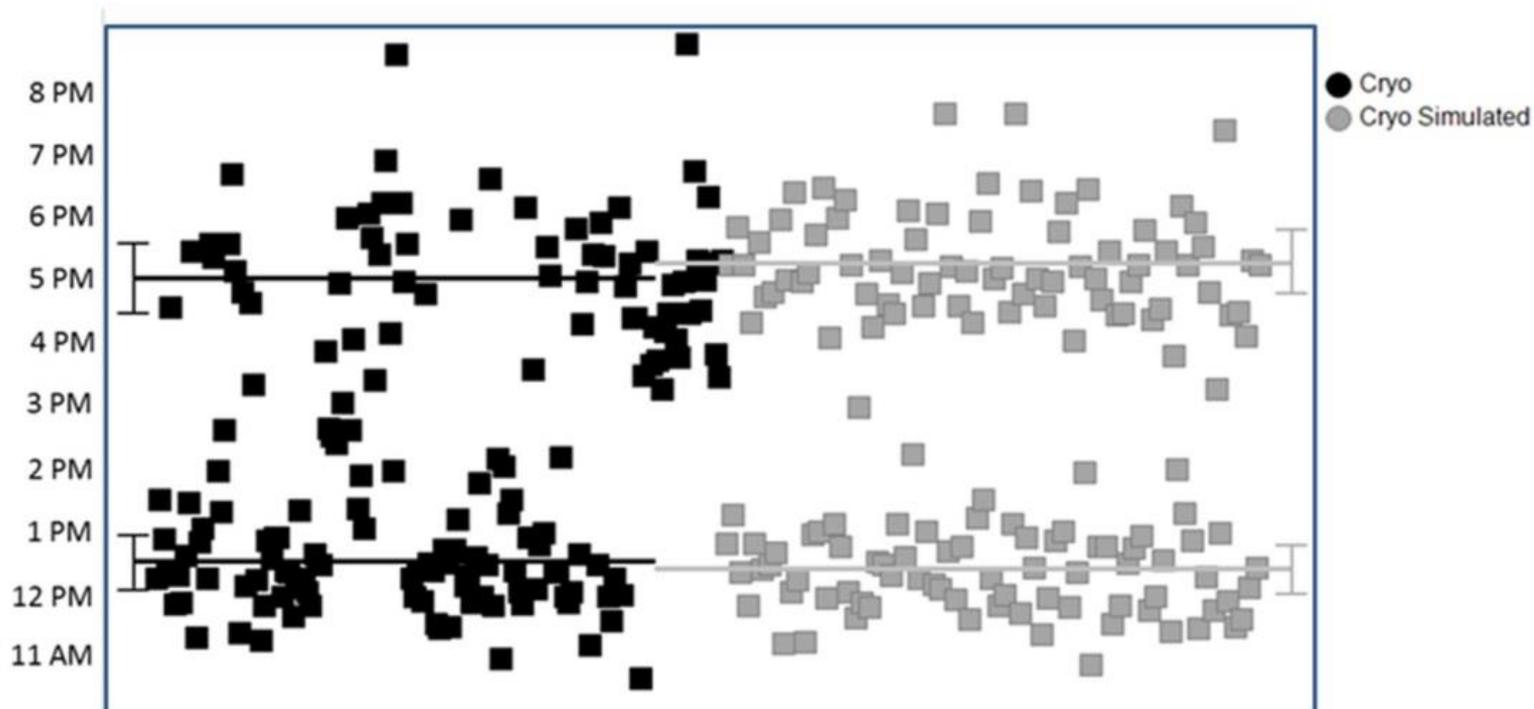
Buttons: Edit Simulation Inputs, View Output Log

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Model Validation

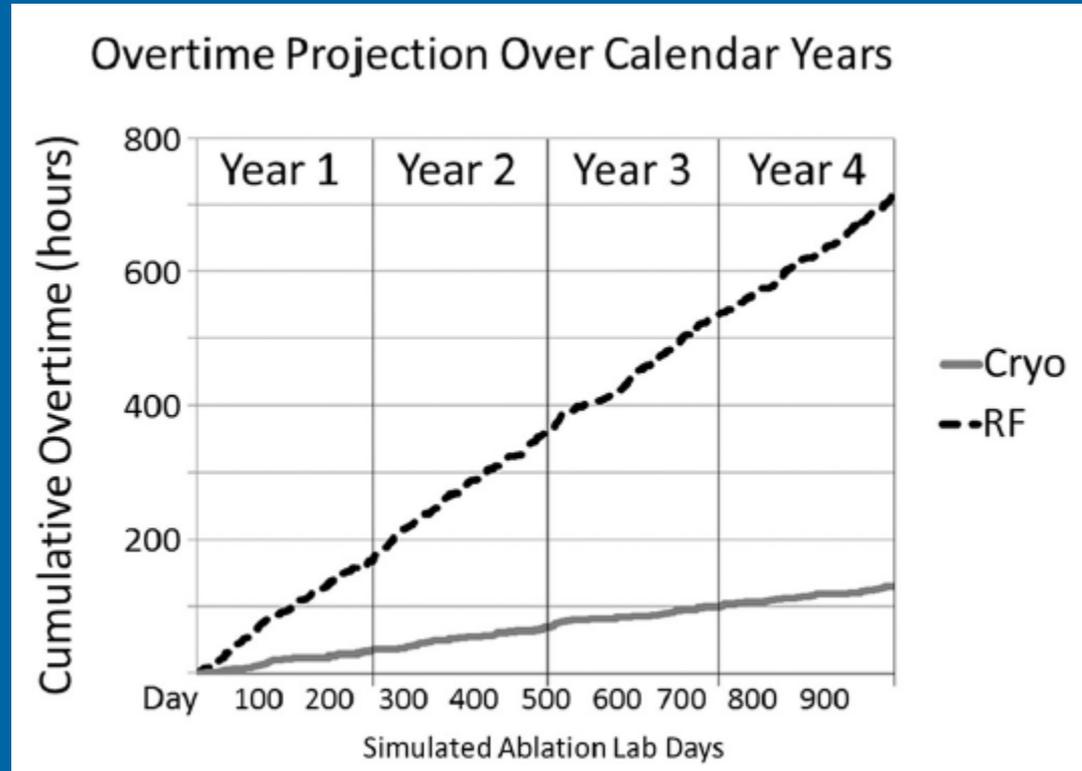
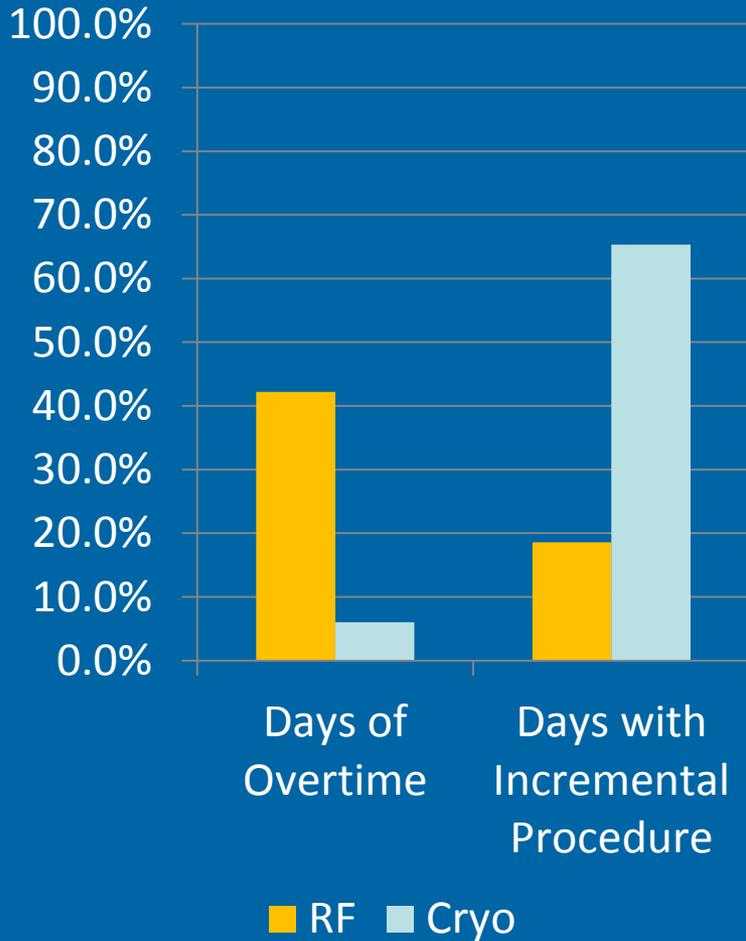
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Cryo - Time of Patient Exit from EP Lab



Modeling the Economic Value of Procedure Efficiency

Results



Modeling the Economic Value of Procedure Efficiency

Publication

ORIGINAL CONTRIBUTION

Using Discrete Event Simulation to Model the Economic Value of Shorter Procedure Times on EP Lab Efficiency in the VALUE PVI Study

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ABSTRACT: Background. The VALUE PVI study demonstrated that atrial fibrillation (AF) ablation procedures and electrophysiology laboratory (EP lab) occupancy times were reduced for the cryoballoon compared with focal radiofrequency (RF) ablation. However, the economic impact associated with the cryoballoon procedure for hospitals has not been determined. **Objective.** Assess the economic value associated with shorter AF ablation procedure times based on VALUE PVI data. **Methods and Results.** A model was formulated from data from the VALUE PVI study. This model used a discrete event simulation to translate procedural efficiencies into metrics utilized by hospital administrators. A 1000-day period was simulated to determine the accrued impact of procedure time on an institution's EP lab when considering staff and hospital resources. The simulation demonstrated that procedures performed with the cryoballoon catheter resulted in several efficiencies, including: (1) a reduction of 36.2% in days with overtime (422 days RF vs 60 days cryoballoon); (2) 92.7% less cumulative overtime hours (370 hours RF vs 27 hours cryoballoon); and (3) an increase of 46.7% in days with time for an additional EP lab usage (186 days RF vs 653 days cryoballoon). Importantly, the added EP lab utilization could not support the time required for an additional AF ablation procedure. **Conclusions.** The discrete event simulation of the VALUE PVI data demonstrates the potential positive economic value of AF ablation procedures using the cryoballoon. These benefits include more days where overtime is avoided, fewer cumulative overtime hours, and more days with time left for additional usage of EP lab resources.

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KEY WORDS: electrophysiology, cryoballoon, atrial fibrillation, pulmonary vein isolation, cryoablation, radiofrequency ablation

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