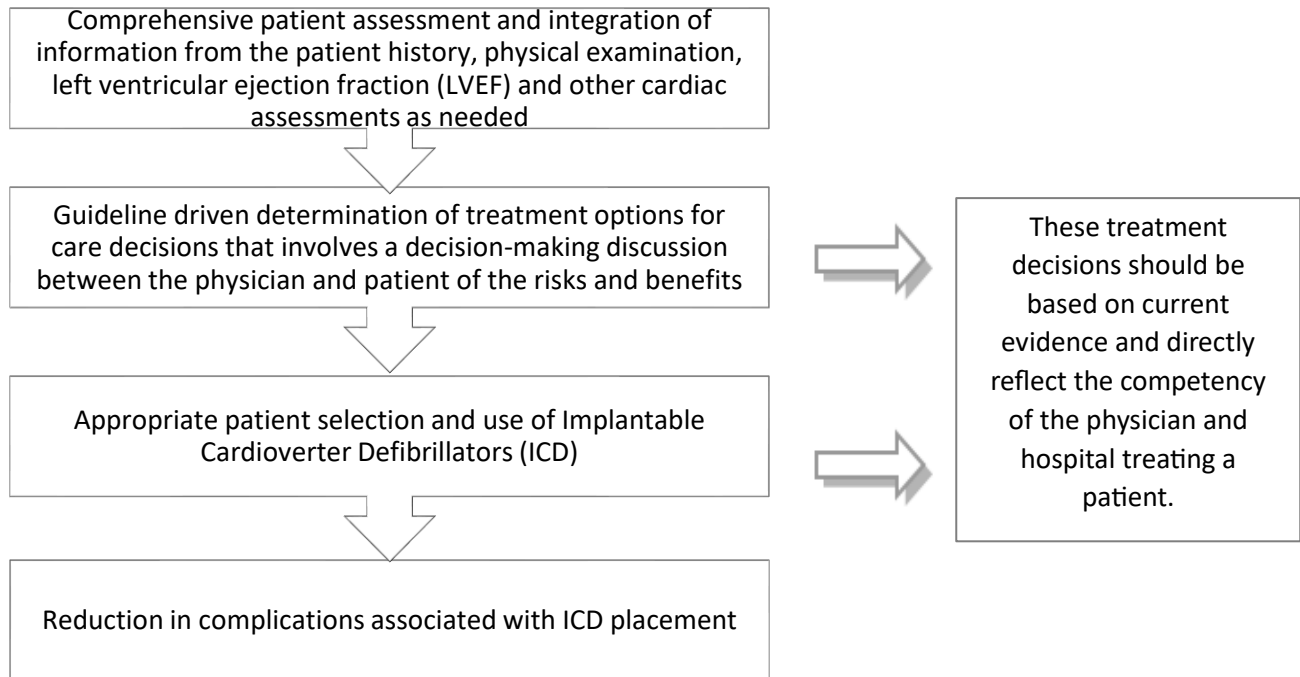


CBE #0694 Hospital Risk-Standardized Complication Rate Following Implantation of Implantable Cardioverter-Defibrillator (ICD)

Logic Model

A complication following placement of an Implantable Cardioverter Defibrillator (ICD) is an undesirable outcome. Comprehensive, personalized risk assessment and competency of the physician and hospital treating the patient can lead to decreased complications in the ICD patient population.

Figure 1. Logic Model



Descriptive Characteristics

Table 1. Patient Characteristics, 30/90 Day Complications

Description	Total	
	#	%
ALL	43711	100.00
Admission Characteristics		
Female	12123	27.73
Hospital Reason		
Admitted for this Procedure	26658	60.99
Hospitalized-Cardiac heart failure	5173	11.83
Hospitalized-Other	11880	27.18
History and Risk Factors		
NYHA Class - Current Status		
Class I	5060	11.58
Class II	14450	33.06
Class III	22765	52.08

CBE #0694 Hospital Risk-Standardized Complication Rate Following Implantation of Implantable Cardioverter-Defibrillator (ICD)

Class IV	1436	3.29
Previous CABG	16691	38.18
Diagnostics		
Abnormal conduction		
Normal	18513	42.35
LBBB	13671	31.28
Other	11527	26.37
Sodium		
<135	4583	10.48
135 to 145	38656	88.44
>145	472	1.08
Hemoglobin (5 g/dl)	2.55	0.40
BUN (10 mg/dl)	2.56	1.35
ICD Procedure(s)		
ICD Type		
Single Chamber	7716	17.65
Dual Chamber	17527	40.10
Biventricular	18468	42.25

Reliability testing results

Table 2. Distribution of RSCR within random split samples

Description	First (RAND= 1)	Second (RAND= 0)
N	1254	1246
Mean	17.43	17.54
Std. Deviation	18.01	17.99
100% Max	0.0839	0.0836
75% Q3	0.0713	0.0676
50% Median	0.0697	0.0653
25% Q1	0.0684	0.0634

CBE #0694 Hospital Risk-Standardized Complication Rate Following Implantation of Implantable Cardioverter-Defibrillator (ICD)

Method of Validity Testing

Figure 2. Number of Patients with Complication Identified by Charts and/or Claims

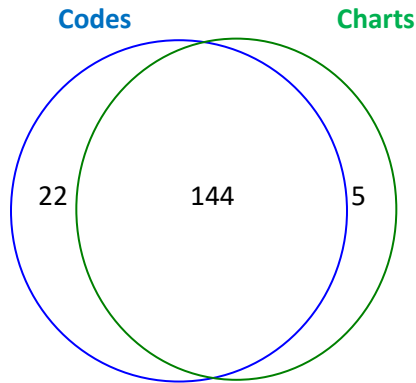


Table 3. Number of Cases of Disagreement and Agreement for Patients with Complication Identified by Charts and Claims

		<u>CHARTS</u>	
		Yes	No
<u>CODES</u>	Yes	144	22
	No	5	145

Table 4. 30 / 90 Day Complications Model Performance: Results Based on the GLM

Indices	Derivation Sample	Validation
Year	2010-11	2010-11
RR Calibration (γ_0, γ_1) ¹	(0.00, 1.00)	(0.03, 1.02)
Discrimination- Adjusted R-Square ²	0.07	0.06
Discrimination -Predictive Ability ³ (lowest decile %, highest decile %)	(4.05, 25.08)	(3.80, 23.80)
Discrimination – ROC	0.64	0.642
Residuals Lack of Fit (Pearson Residual Fall %)		
<-2	0.00	0.00
[-2, 2)	93.19	93.43
> 2	6.81	6.57
Model χ^2 [Number of Covariates] ⁴	328 [9]	355 [9]

CBE #0694 Hospital Risk-Standardized Complication Rate Following Implantation of Implantable Cardioverter-Defibrillator (ICD)

Conceptual Model Rationale

Model type: Hierarchical Logistic Regression model

Table 5. Model Coefficients/Weights

Variable	Odds Ratio (95% CI)
Sex	
Male	Reference
Female	1.101 (0.966 - 1.218)
Reason for admission	
Admitted for procedure	Reference
Cardiac heart failure	1.733 (1.485 - 2.023)
Other	1.211 (1.988 - 1.459)
NYHA class	
I/II	Reference
III	1.388 (1.254 - 1.536)
IV	2.286 (1.866 - 2.802)
Prior CABG	0.797 (0.712 - 0.892)
Abnormal conduction	
No	Reference
Yes-left bundle	1.334 (1.183 - 1.504)
Yes-other	1.181 (1.049 - 1.329)
ICD type	
Single chamber or S-ICD	Reference
Dual chamber	1.372 (1.206 - 1.560)
CRT-D	1.304 (1.136 - 1.497)
Sodium	
<135	1.182 (1.025 - 1.363)
135-145	Reference
>145	1.174 (1.330 - 2.339)
Hemoglobin (5 g/dl)	0.617 (0.547 - 0.696)
BUN (10 mg/dl)	1.134 (1.102 - 1.167)

CBE #0694 Hospital Risk-Standardized Complication Rate Following Implantation of Implantable Cardioverter-Defibrillator (ICD)

Risk Factor Statistical Results

Table 6. ICD Complication Model Variables

Description (n) Variable	NCDR ICD Item Number (V2.1)
1. Sex	2060
Male	
Female	
2. Reason for Admission	3010
Admitted for procedure	
Cardiac Heart Failure	
Other	
3. NYHA Class	4020
I/II	
III	
IV	
4. Prior CABG	4190
5. Abnormal Conduction	5090
No	
Yes- left bundle	
Yes- other	
6. ICD Type	6130
Single Chamber	
Dual Chamber	
CRT-D	
7. Sodium	5125
<135	
135-145	
>145	
8. Hemoglobin (5g/Dl)	5120
9. BUN (10mg/Dl)	5115

Table 7. ICD Complication Model

Effect	9 variables		Derivation cohort		Validation cohort	
	Odds Ratio (95% CI)	P value	Odds Ratio (95% CI)	P value	Odds Ratio (95% CI)	P value
Sex						
Male			Reference		reference	
Female	1.203 (1.068 - 1.354)	0.0022	1.218 (1.080 - 1.373)	0.0013		
Reason for admission						
Admitted for procedure			Reference		reference	
Cardiac heart failure	1.826 (1.560 - 2.137)	<.0001	1.559 (1.326 - 1.832)	<.0001		
Other	1.967 (1.737 - 2.226)	.	1.932 (1.705 - 2.189)	.		
NYHA class						
I/II			Reference		reference	
III	1.183 (1.043 - 1.341)	0.0049	1.187 (1.045 - 1.349)	<.0001		
IV	1.448 (1.112 - 1.885)	.	2.059 (1.618 - 2.620)	.		
Prior CABG	0.839 (0.748 - 0.940)	0.0025	0.834 (0.743 - 0.936)	0.002		
Abnormal conduction						
No			Reference		reference	

CBE #0694 Hospital Risk-Standardized Complication Rate Following Implantation of Implantable Cardioverter-Defibrillator (ICD)

9 variables	Derivation cohort		Validation cohort	
Effect	Odds Ratio (95% CI)	P value	Odds Ratio (95% CI)	P value
Yes-left bundle	0.976 (0.837 - 1.137)	0.5575	0.962 (0.823 - 1.124)	0.462
Yes-other	1.054 (0.918 - 1.209)	.	1.055 (0.919 - 1.211)	.
ICD type				
Single chamber	Reference		reference	
Dual chamber	0.877 (0.731 - 1.051)	0.3377	0.945 (0.785 - 1.139)	0.129
CRT-D	0.965 (0.833 - 1.117)	.	1.101 (0.950 - 1.277)	.
Sodium				
<135	1.300 (1.116 - 1.514)	0.0034	1.211 (1.037 - 1.415)	0.0301
135-145	Reference		reference	
>145	1.011 (0.612 - 1.671)	.	0.758 (0.430 - 1.336)	.
Hemoglobin (5 g/Dl)	0.752 (0.646 - 0.876)	0.0003	0.719 (0.618 - 0.837)	<.0001
BUN (10 mg/Dl)	1.104 (1.065 - 1.144)	<.0001	1.130 (1.090 - 1.171)	<.0001

Calibration and Discrimination

Figure 3. Risk Decile Plot, 2010Q2-2011Q4 study sample.

