Electrophysiology (EP) Pacemaker/ Implantable Cardioverter- defibrillator (ICD) Follow Up Order Set

Order Set: Conceptual Structure

Contract: VA118-16-D-1008, Task Order (TO): VA-118-16-F-1008-0007, CLIN0004AE

Department of Veterans Affairs (VA)

Electrophysiology (EP) Pacemaker/Implantable Cardioverter-defibrillator (ICD) Follow Up Order Set: Order Set: Conceptual Structure

by Knowledge Based Systems (KBS), Office of Informatics and Information Governance (OIIG), and Clinical Decision Support (CDS)

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Preface

Table 1. Revision History

Date	Life Cycle Event
March 28, 2018	Published
March 28, 2018	Reviewed
February 8, 2018	Created

Table 2. Clinical White Paper Contributors

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Table 3. Artifact Identifier

Domain	Artifact ID	Name
urn:va.gov:kbs:knart:artifact:r1	c9ea7de5-6287-5165-bf86-200e32cc4107	B10

Artifact Applicability

Table 4. Applicability Foci, Description and Codes

Focus	Description	Code System Name	Code System	Code	Code System Version	Value Set	Value Set Version
PatientAgeGroup	Adult patients						
ClinicalVenue	Outpatient						
ClinicalFocus	Previously received an ICD, CRT, or a similar device						
ClinicalFocus	Not currently followed by electrophysiology						

Models

Table 5. Model References

Referenced Model	Description
urn:solor.io:anf-model:1.0	VA Analysis Normal Form Model

Chapter 1. Electrophysiology Follow-up Consult Order

EP Follow-up Referral

Electrophysiology follow-up consult order.

☐ Referral to Electrophysiology

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

"statementType:Postcoordinated Expression topic:Postcoordinated Expression , purpose[0]:Postcoordinated Expression"

(Codes: 385644000 |Requested (qualifier value)| 1241000205102 |Electrophysiology service consultation and report (procedure) [281036007 |Follow-up consultation (procedure)] ->(363702006 |Has focus (attribute))->[395218007 | Implantation of internal cardiac defibrillator (procedure)])

Reason for Consultation

Reason for Electrophysiology consultation.

✦ prompt:	Reason for Electrophysiology consultation:
response:	Code (Single)
response range:	EnumerationConstraint (List)
item:	Follow-up for ICD.([281036007 |Follow-up consultation (procedure)] ->(363702006 |Has focus (attribute))->[395218007 |Implantation of internal cardiac defibrillator (procedure)])
item:	Follow-up for CRT device.([281036007 |Follow-up consultation (procedure)] ->(363702006 |Has focus (attribute))->[1301000205107 |Implantation of cardiac resynchronization therapy implantable pacemaker (procedure)])
item:	Follow-up for pacer device.([281036007 |Follow-up consultation (procedure)] ->(363702006 |Has focus (attribute))->[307280005 |Implantation of cardiac pacemaker (procedure)])
prompt:	Procedures report for device placement
response:	String (Single)

Goal of Consult

Specific goal of the electrophysiology consultation (e.g., electrophysiology to manage patient, cardiology to evaluate and recommend management, etc.).

✦ prompt:	Consult Goal:
response:	Code (Single)
response range:	EnumerationConstraint (List)
item:	Provide recommendation and return to Primary Care Provider (PCP) for therapy.
item:	Start treatment and return to PCP for follow up and maintenance.
item:	Start treatment, monitor for effect and when on stable therapy return to PCP.
item:	Provide recommendations and treat as long as necessary (or indefinitely).
	Consult Specialty: Electrophysiology
	Priority: Routine

☐ prompt: Ordering Physician/Provider Name
response: String (Single)

☐ prompt: Ordering Physician/Provider Service/Section
response: String (Single)

☐ prompt: Ordering Physician/Provider Telephone Number
response: String (Single)

☐ prompt: Ordering Physician/Provider Pager
response: String (Single)

☐ prompt: Information required by receiving facility
response: String (Single)

Chapter 2. Imaging and Electrocardiogram

Consider ordering prior to the electrophysiology consultation. Resting 12-lead electrocardiogram is required if it has not been obtained within the past two months. Resting echocardiogram and chest x-ray are required if they have not been obtained within the past six months.

☐ Resting 12-lead electrocardiogram to evaluate for antiarrhythmic benefit of previously implanted ICD device.

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

> "statementType:Postcoordinated Expression topic:Postcoordinated Expression , purpose[0]:Postcoordinated Expression , purpose[1]:Postcoordinated Expression"
>
> (Codes: 385644000 |Requested (qualifier value)| 447113005 |12 lead electrocardiogram at rest (procedure)| [386053000 |Evaluation procedure (procedure)] ->(363702006 |Has focus (attribute))->[698247007 |Cardiac arrhythmia (disorder)] [386053000 |Evaluation procedure (procedure)] ->(363702006 |Has focus (attribute))->[395218007 |Implantation of internal cardiac defibrillator (procedure)])

☐ Resting 12-lead electrocardiogram to evaluate for antiarrhythmic benefit of previously implanted pacer device.

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

> "statementType:Postcoordinated Expression topic:Postcoordinated Expression , purpose[0]:Postcoordinated Expression , purpose[1]:Postcoordinated Expression"
>
> (Codes: 385644000 |Requested (qualifier value)| 447113005 |12 lead electrocardiogram at rest (procedure)| [386053000 |Evaluation procedure (procedure)] ->(363702006 |Has focus (attribute))->[698247007 |Cardiac arrhythmia (disorder)] [386053000 |Evaluation procedure (procedure)] ->(363702006 |Has focus (attribute))->[307280005 |Implantation of cardiac pacemaker (procedure)])

☐ Resting 12-lead electrocardiogram to evaluate for antiarrhythmic benefit of previously implanted CRT device.

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

> "statementType:Postcoordinated Expression topic:Postcoordinated Expression , purpose[0]:Postcoordinated Expression , purpose[1]:Postcoordinated Expression"
>
> (Codes: 385644000 |Requested (qualifier value)| 447113005 |12 lead electrocardiogram at rest (procedure)| [386053000 |Evaluation procedure (procedure)] ->(363702006 |Has focus (attribute))->[698247007 |Cardiac arrhythmia (disorder)] [386053000 |Evaluation procedure (procedure)] ->(363702006 |Has focus (attribute))->[1301000205107 |Implantation of cardiac resynchronization therapy implantable pacemaker (procedure)])

☐ Echocardiogram to evaluate for antiarrhythmic benefit of previously implanted ICD device.

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

> "statementType:Postcoordinated Expression topic:Postcoordinated Expression , purpose[0]:Postcoordinated Expression , purpose[1]:Postcoordinated Expression"
>
> (Codes: 385644000 |Requested (qualifier value)| 40701008 |Echocardiography (procedure)| [386053000 |Evaluation procedure (procedure)] ->(363702006 |Has focus (attribute))->[698247007 |Cardiac arrhythmia (disorder)] [386053000 |Evaluation procedure (procedure)] ->(363702006 |Has focus (attribute))->[395218007 |Implantation of internal cardiac defibrillator (procedure)])

☐ Echocardiogram to evaluate for antiarrhythmic benefit of previously implanted pacer device.

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

> "statementType:Postcoordinated Expression topic:Postcoordinated Expression , purpose[0]:Postcoordinated Expression , purpose[1]:Postcoordinated Expression"

> (Codes: 385644000 |Requested (qualifier value)| 40701008 |Echocardiography (procedure)| [386053000 |Evaluation procedure (procedure)] ->(363702006 |Has focus (attribute))->[698247007 |Cardiac arrhythmia (disorder)] [386053000 |Evaluation procedure (procedure)] ->(363702006 |Has focus (attribute))->[307280005 |Implantation of cardiac pacemaker (procedure)])

☐ Echocardiogram to evaluate for antiarrhythmic benefit of previously implanted CRT device.

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

> "statementType:Postcoordinated Expression topic:Postcoordinated Expression , purpose[0]:Postcoordinated Expression , purpose[1]:Postcoordinated Expression"

> (Codes: 385644000 |Requested (qualifier value)| 40701008 |Echocardiography (procedure)| [386053000 |Evaluation procedure (procedure)] ->(363702006 |Has focus (attribute))->[698247007 |Cardiac arrhythmia (disorder)] [386053000 |Evaluation procedure (procedure)] ->(363702006 |Has focus (attribute))->[1301000205107 |Implantation of cardiac resynchronization therapy implantable pacemaker (procedure)])

☐ X-ray chest to evaluate for antiarrhythmic benefit of previously implanted ICD device.

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

> "statementType:Postcoordinated Expression topic:Postcoordinated Expression , purpose[0]:Postcoordinated Expression"

> (Codes: 385644000 |Requested (qualifier value)| 399208008 |Plain chest X-ray (procedure)| [386053000 |Evaluation procedure (procedure)] ->(363702006 |Has focus (attribute))->[395218007 |Implantation of internal cardiac defibrillator (procedure)])

☐ X-ray chest to evaluate for antiarrhythmic benefit of previously implanted CRT device.

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

> "statementType:Postcoordinated Expression topic:Postcoordinated Expression , purpose[0]:Postcoordinated Expression"

> (Codes: 385644000 |Requested (qualifier value)| 399208008 |Plain chest X-ray (procedure)| [386053000 |Evaluation procedure (procedure)] ->(363702006 |Has focus (attribute))->[1301000205107 |Implantation of cardiac resynchronization therapy implantable pacemaker (procedure)])

☐ X-ray chest to evaluate for antiarrhythmic benefit of previously implanted pacer device.

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

> "statementType:Postcoordinated Expression topic:Postcoordinated Expression , purpose[0]:Postcoordinated Expression"

> (Codes: 385644000 |Requested (qualifier value)| 399208008 |Plain chest X-ray (procedure)| [386053000 |Evaluation procedure (procedure)] ->(363702006 |Has focus (attribute))->[307280005 |Implantation of cardiac pacemaker (procedure)])

Chapter 3. Laboratory Tests

Consider the following tests to be completed prior to the electrophysiology consultation.

☐ Comprehensive metabolic panel

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

"statementType:Postcoordinated Expression topic:Postcoordinated Expression"

(Codes: 385644000 |Requested (qualifier value)| 1411000205104 |Comprehensive metabolic panel (procedure))

☐ Complete blood count

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

"statementType:Postcoordinated Expression topic:Postcoordinated Expression"

(Codes: 385644000 |Requested (qualifier value)| 26604007 |Complete blood count (procedure)|)

☐ Brain natriuretic peptide

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

"statementType:Postcoordinated Expression topic:Postcoordinated Expression"

(Codes: 385644000 |Requested (qualifier value)| 390917008 |Brain natriuretic peptide measurement (procedure)|)

☐ Digoxin level

actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]

"statementType:Postcoordinated Expression topic:Postcoordinated Expression"

(Codes: 385644000 |Requested (qualifier value)| 25514001 |Digoxin measurement (procedure)|)

Chapter 4. Tabular List

Terminology Service Request (TSR) Mappings

Table 4.1. Terminology References

System	Code	Display Text	References
SNOMED CT	1241000205102 |Electro-physiology service consultation and report (procedure)	Postcoordinated Expression	1
SNOMED CT	1411000205104 |Comprehensive metabolic panel (procedure)	Postcoordinated Expression	1
SNOMED CT	25514001 |Digoxin measurement (procedure)|	Postcoordinated Expression	1
SNOMED CT	26604007 |Complete blood count (procedure)|	Postcoordinated Expression	1
SNOMED CT	385644000 |Requested (qualifier value)|	Postcoordinated Expression	14
SNOMED CT	390917008 |Brain natriuretic peptide measurement (procedure)|	Postcoordinated Expression	1
SNOMED CT	399208008 |Plain chest X-ray (procedure)|	Postcoordinated Expression	3
SNOMED CT	40701008 |Echocardiography (procedure)|	Postcoordinated Expression	3
SNOMED CT	447113005 |12 lead electrocardiogram at rest (procedure)|	Postcoordinated Expression	3
SNOMED CT	[281036007 |Follow-up consultation (procedure)] ->(363702006 |Has focus (attribute))->[1301000205107 |Implantation of cardiac resynchronization therapy implantable pacemaker (procedure)]	Follow-up for CRT device.	1
SNOMED CT	[281036007 |Follow-up consultation (procedure)] ->(363702006 |Has focus (attribute))->[307280005 |Implantation of cardiac pacemaker (procedure)]	Follow-up for pacer device.	1
SNOMED CT	[281036007 |Follow-up consultation (procedure)] ->(363702006 |Has focus	Follow-up for ICD.	1

System	Code	Display Text	References
	(attribute))->[395218007 |Implantation of internal cardiac defibrillator (procedure)]		
SNOMED CT	[281036007 |Follow-up consultation (procedure)] ->(363702006 |Has focus (attribute))->[395218007 |Implantation of internal cardiac defibrillator (procedure)]	Postcoordinated Expression	1
SNOMED CT	[386053000 |Evaluation procedure (procedure)] ->(363702006 |Has focus (attribute))->[1301000205107 |Implantation of cardiac resynchronization therapy implantable pacemaker (procedure)]	Postcoordinated Expression	3
SNOMED CT	[386053000 |Evaluation procedure (procedure)] ->(363702006 |Has focus (attribute))->[307280005 |Implantation of cardiac pacemaker (procedure)]	Postcoordinated Expression	3
SNOMED CT	[386053000 |Evaluation procedure (procedure)] ->(363702006 |Has focus (attribute))->[395218007 |Implantation of internal cardiac defibrillator (procedure)]	Postcoordinated Expression	3
SNOMED CT	[386053000 |Evaluation procedure (procedure)] ->(363702006 |Has focus (attribute))->[698247007 | Cardiac arrhythmia (disorder)]	Postcoordinated Expression	6

Chapter 5. Behavior Symbols

Table 5.1. Group Organizational Behavior

Symbol	Name	Definition
▶	Sentence Group	A group of related alternative actions is a sentence group if the item referenced by the action is the same in all the actions, and each action simply constitutes a different variation on how to specify the details for that item. For example, two actions that could be in a SentenceGroup are "aspirin, 500 mg, 2 times per day" and "aspirin, 300 mg, 3 times per day". In both cases, aspirin is the item referenced by the action, and the two actions represent two different options for how aspirin might be ordered for the patient. Note that a SentenceGroup would almost always have an associated selection behavior of "AtMostOne", unless it's a required action, in which case, it would be "ExactlyOne".
▷	Logical Group	A group with this behavior logically groups its sub-elements, and may be shown as a visual group to the end user, but it is not required to do so.
➤	Visual Group	Any group marked with this behavior should be displayed as a visual group to the end user.

Table 5.2. Group Selection Behavior

Symbol	Name	Definition
□	Any	Any number of the items in the group may be chosen, from zero to all.
⊙	All	All the items in the group must be selected as a single unit.
◎	AllOrNone	All the items in the group are meant to be chosen as a single unit: either all must be selected by the end user, or none may be selected.
○	ExactlyOne	The end user must choose one and only one of the selectable items in the group. The user may not choose none of the items in the group.
✪	AtMostOne	The end user may choose zero or at most one of the items in the group.
☀	OneOrMore	The end user must choose a minimum of one, and as many additional as desired.

Table 5.3. Required Behavior

Symbol	Name	Definition
✦	Must	An action with this behavior must be included in the actions processed by the end user; the end user may not choose not to include this action.

Symbol	Name	Definition
✧	Could	An action with this behavior may be included in the set of actions processed by the end user.
➢	MustUnlessDocumented	An action with this behavior must be included in the set of actions processed by the end user, unless the end user provides documentation as to why the action was not included.

Table 5.4. Precheck Behavior

Symbol	Name	Definition
▲	Yes	An action with this behavior is one of the most frequent actions that is, or should be, included by an end user, for the particular context in which the action occurs. The system displaying the action to the end user should consider "pre-checking" such an action as a convenience for the user.
▽	No	An action with this behavior is one of the less frequent actions included by the end user, for the particular context in which the action occurs. The system displaying the actions to the end user would typically not "pre-check" such an action.

Table 5.5. Cardinality Behavior

Symbol	Name	Definition
◆	Single	An action with this behavior may only be completed once.
❖	Multiple	An action with this behavior may be repeated multiple times.

Table 5.6. Item Flags

Symbol	Name	Definition
☞	fillIn	This item, in a list entry, allows the user to enter a fill in value that is not present in the set of presented choices.

Appendix A. References

This appendix contains the list of related resources and supporting documents used in creating this KNART.

List of References

Related Resources

[CCWP] *Cardiology: Electrophysiology (EP) Implanted Cardiac Devices Clinical Content White Paper*

[CSD] *Electrophysiology (EP) Pacemaker/Implantable Cardioverter-defibrillator (ICD) Follow Up Conceptual Structure Document*

[KVRpt] *Electrophysiology (EP) Pacemaker/Implantable Cardioverter-defibrillator (ICD) Follow Up KNART Validation Report*

Supporting Evidence

[Al-Khatib 2011] *Al-Khatib SM, Hellkamp A, Curtis J, et al. Non–Evidence-Based ICD Implantations in the United States. JAMA. 2011;305(1):43-49* (link [https://doi.org/10.1001/jama.2010.1915])

[Epstein 2008] *Epstein AE, DiMarco JP, Ellenbogen KA, et al. ACC / AHA / HRS 2008 Guidelines for Device-Based Therapy of Cardiac Rhythm Abnormalities: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines [Writing Committee to Revise the ACC / AHA /National Association for Sport and Physical Education (NASPE) 2002 Guideline Update for Implantation of Cardiac Pacemakers and Antiarrhythmia Devices]: developed in collaboration with the American Association for Thoracic Surgery and Society of Thoracic Surgeons. Circulation. 2008;117(21):e350-e408* (link [https://doi.org/10.1016/j.hrthm.2008.04.014])

[Hess 2013] *Hess PL, Grau-Sepulveda MV, Hernandez AF, et al. Get with The Guidelines Steering Committee and Hospitals. Age differences in the use of implantable cardioverter-defibrillators among older patients hospitalized with heart failure. J Cardiovasc Electrophysiol. 2013;24(6):664-671* (link [https://doi.org/10.1111/jce.12100])

[Hess 2016] *Hess PL, Hernandez AF, Bhatt DL, et al. Sex and Race/Ethnicity Differences in Implantable Cardioverter-Defibrillator Counseling and Use Among Patients Hospitalized with Heart Failure: Findings from the Get with The Guidelines-Heart Failure Program. Circulation. 2016;134(7):517-526* (link [https://doi.org/10.1161/CIRCULATIONAHA.115.021048])

[Owens 2011] *Owens DK, Qaseem A, Chou R, Shekelle P, Clinical Guidelines Committee of the American College of Physicians. A High-value, cost-conscious health care: concepts for clinicians to evaluate the benefits, harms, and costs of medical interventions. Ann Intern Med. 2011;154(3):174-180* (link [https://doi.org/10.7326/0003-4819-154-3-201102010-00007])

[Russo 2013] *Russo AM, Stainback RF, Bailey SR, et al. American College of Cardiology Foundation (ACCF)/ HRS / AHA / ASE / HFSA / SCAI / SCCT / SCMR 2013 appropriate use criteria for implantable cardioverter-defibrillators and cardiac resynchronization therapy: a report of the American College of Cardiology Foundation appropriate use criteria task force, Heart Rhythm Society, American Heart Association, American Society of Echocardiography, Heart Failure Society of America, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, and Society for Cardiovascular Magnetic Resonance. J Am Coll Cardiol. 2013;61(12):1318-1368* (link [https://doi.org/10.1016/j.hrthm.2013.01.008])