Recommended Immunizations Rule

Rule: Conceptual Structure

Contract: VA118-16-D-1008, Task Order (TO): VA-118-16-F-1008-0007, CLIN0007CA

Department of Veterans Affairs (VA)

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

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Recommended Immunizations Rule: Rule: Conceptual Structure

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

Publication date 06/18/2018

B3 Group, Inc.

Cognitive Medical Systems, Inc.

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Preface

Table 1. Revision History

Date	Life Cycle Event
June 18, 2018	Published
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Table 2. Clinical White Paper Contributors

Name	Role	Affiliation
Denietolis Angela, MD	Reviewer	Primary Care Physician James A. Haley Veterans Hospital Tampa VA Medical Center (VAMC) Tampa, FL 33612
Dumas Pat, RN	Reviewer	Clinical Program Director VA Central Office (VACO) 810 Vermont Ave NW Washington, DL 20420
Merchant Manish, MD	Reviewer	https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6125a4.htm
Dresselhaus Timothy, MD	Reviewer	San Diego VAMC - MEDS 3350 La Jolla Village Drive San Diego, CA 92161
Jane Kim, NCP	Reviewer	Chief Consultant for Preventive Medicine Durham, NC

Table 3. Artifact Identifier

Domain	Artifact ID	Name
urn:va.gov:kbs:knart:artifact:r1	5dbcf08a-507a-5107-9b38-170377cb334d	O12

Artifact Applicability

Table 4. Applicability Foci, Description and Codes

Focus	Description	Code System	Code	Value Set	Value Set Version
TargetUser	All clinical providers			N/A	N/A
PatientAgeGroup	Adult patients	SNOMED CT	133936004 |Adult (person)|	N/A	N/A
ClinicalFocus	All			N/A	N/A
ClinicalVenue	Any clinical setting (ambulatory, inpatient, etc.), including employees of the VA who are treated as patients of the VA.			N/A	N/A

Models

Table 5. Model References

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

Chapter 1. External Data Definitions

Definitions

Table 1.1. HadSevereAllergicReactionToAnInfluenzaVaccine

Expression: type=elm:Query
Annotation:
Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)|]elm:value[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)]- ->(363702006 |Has focus (attribute))->[416093006 |Allergic reaction caused by drug (disorder)]- ->(246075003 |Causative agent (attribute))->[396425006 |Influenza virus vaccine (substance)]- ->(246112005 |Severity (attribute))->[24484000 |Severe (severity modifier) (qualifier value)];]

Table 1.2. ReceivedAnyInfluenzaImmunizationAfterAugust1LastYear

Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement, codeProperty=topic, dateProperty=dateTime	
Annotation:	
Codes: elm:element[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[86198006 |Influenza vaccination (procedure)]]	
dateRange[elm:Interval]	low: elm:Add(elm:DateTime() elm:Quantity(-12 Month))
	high: elm:Today()

Table 1.3. ReceivedAnyInfluenzaImmunizationAfterAugust1ThisYear

Expression: type=elm:Retrieve , dataType=anf:ClinicalStatement, codeProperty=topic, dateProperty=dateTime	
Annotation:	
Codes: elm:element[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[86198006 |Influenza vaccination (procedure)]]	
dateRange[elm:Interval]	low: elm:DateTime()
	high: elm:Today()

Triggers

Table 1.4. AccessOfPatientRecord

Trigger: type=DataEventTrigger, DataElementAccessed
Expression: type=elm:Instance
Annotation: Access of the patient record
Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)|]elm:value[elm:Code]: [TSR-NoCode]

Table 1.5. Day150TimeBasedRuleProcessing

Trigger: type=PeriodicEventTrigger,
Expression: type=elm:Instance

Annotation: 150-day time-based rule processing refers to a whole system run looking every 150 days for any patient meeting the conditions defined below whose record may not have been accessed and who satisfies initial ECA criteria, to determine which patients are due for immunizations
Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)|]elm:value[elm:Code]: [TSR-NoCode]

Chapter 2. Expression Definitions

Table 2.1. PatientAge

Expression: type=elm:SingletonFrom
Annotation:
Codes: elm:value[elm:Code]: [398166005 |Performed (qualifier value)|]elm:value[elm:Code]: [[a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[105726004 |Age AND/OR growth finding (finding)]]

Table 2.2. CurrentYear

Expression: type=elm:DateTimeComponentFrom
Annotation:
Codes:

Chapter 3. Influenza Immunization: General

Conditions
Condition:elm:Or (elm:After(elm:Today() elm:DateTime()) elm:Before(elm:Today() elm:DateTime()))
Condition:elm:Not (elm:Exists(HadSevereAllergicReactionToAnInfluenzaVaccine))
Condition:elm:And (elm:Before(elm:Today() elm:DateTime()) elm:Not(elm:Exists(ReceivedAnyInfluenzaImmunizationAfterAugust1LastYear)))
Condition:elm:And (elm:After(elm:Today() elm:DateTime()) elm:Not(elm:Exists(ReceivedAnyInfluenzaImmunizationAfterAugust1ThisYear)))

Identify the patient as an influenza vaccine candidate

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

statementType: Precoordinated Expression 398166005 |Performed (qualifier value)|

topic: Postcoordinated Expression [a997cc03-3e99-40eb-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[86198006 |Influenza vaccination (procedure)]

result.status: Precoordinated Expression 410525008 |Needed (qualifier value)|

Ensure that the Immunization guidelines for Influenza Vaccination are available to the clinical care team

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

statementType: Precoordinated Expression 398166005 |Performed (qualifier value)|

topic: Precoordinated Expression TSR-NoCode

Chapter 4. Tabular List

Terminology Service Request (TSR) Mappings

Table 4.1. Terminology Versions

Name	Identifer	Version
SNOMED CT	2.16.840.1.113883.6.96	United States Edition 20180301

Table 4.2. Terminology References

System	Code	Display Text[a]	References[b]
SNOMED CT	133936004 |Adult (person)|	Adult patients	1
SNOMED CT	398166005 |Performed (qualifier value)|	Precoordinated Expression	6
SNOMED CT	410525008 |Needed (qualifier value)|	Precoordinated Expression	1
SNOMED CT	TSR-NoCode[c]	Precoordinated Expression	3
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[105726004 |Age AND/OR growth finding (finding)]	Postcoordinated Expression	1
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation procedure (procedure)] ->(363702006 |Has focus (attribute))->[86198006 | Influenza vaccination (procedure)]	Postcoordinated Expression	3
SNOMED CT	[a997cc03-3e99-40e-b-833a-6374c7750a3a |Observation procedure (procedure)]- ->(363702006 |Has focus (attribute))->[416093006 |Allergic reaction caused by drug (disorder)]- ->(246075003 | Causative agent (attribute))->[396425006 |Influenza virus vaccine (substance)]- ->(246112005 |Severity (at-	Postcoordinated Expression	1

System	Code	Display Text[a]	References[b]
	tribute))->[24484000 |Severe (severity modifier) (qualifier value)];		

[a]If a code is used multiple times in the KNART, only the display text of the first instance is shown.

[b]Count of the number of times the given code system and code pair is used in the KNART.

[c]TSR-NoCode is a placeholder indicating a code was requested, but was not provided.

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.

Table 5.7. Read Only Behavior

Symbol	Name	Definition
#	true	For a particular action or action group, specifies whether the elements are read only.

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] *Recommended Immunizations Clinical Content White Paper*

[CSD] *Recommended Immunizations Rule Conceptual Structure Document*

[KVRpt] *Recommended Immunizations Rule KNART Validation Report*

Supporting Evidence

[Immunization 2017a] *Advisory Committee on Immunization Practices. Recommended Immunization Schedule for Children and Adolescents Aged 18 Years or Younger, UNITED STATES, 2017. https://www.cdc.gov/vaccines/schedules/downloads/child/0-18yrs-child-combined-schedule.pdf. Published February 6, 2017* (link [https://www.cdc.gov/vaccines/schedules/downloads/child/0-18yrs-child-combined-schedule.pdf])

[Immunization 2017b] *Advisory Committee on Immunization Practices. Recommended Immunization Schedule for Adults Aged 19 Years or Older, United States, 2017. https://www.cdc.gov/vaccines/schedules/downloads/adult/adult-combined-schedule.pdf. Published February 2017.* (link [https://www.cdc.gov/vaccines/schedules/downloads/adult/adult-combined-schedule.pdf])

[CDC 2012a] *Centers for Disease Control and Prevention (CDC). "Updated recommendations for use of tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis (Tdap) vaccine in adults aged 65 years and older - Advisory Committee on Immunization Practices (ACIP), 2012". MMWR Morb Mortal Wkly Rep. 2012 Jun 29. 61. 25. 468-70* (link [https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6125a4.htm])

[CDC 2010a] *Centers for Disease Control and Prevention (CDC). Updated recommendations for use of tetanus toxoid, reduced diphtheria toxoid and acellular pertussis (Tdap) vaccine from the Advisory Committee on Immunization Practices, 2010. MMWR Morb Mortal Wkly Rep. 2011 Jan 14;60(1):13-5* (link [https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6001a4.htm])

[CDC 2013] *Centers for Disease Control and Prevention (CDC). Use of 13-valent pneumococcal conjugate vaccine and 23-valent pneumococcal polysaccharide vaccine among children aged 6-18 years with immunocompromising conditions: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR Morb Mortal Wkly Rep. 2013 Jun 28;62(25):521-4* (link [https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6225a3.htm])

[CDC 2012b] *Centers for Disease Control and Prevention (CDC). Use of 13-valent pneumococcal conjugate vaccine and 23-valent pneumococcal polysaccharide vaccine for adults with immunocompromising conditions: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR Morb Mortal Wkly Rep. 2012 Oct 12;61(40):816-9.* (link [https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6140a4.htm])

[CDC 2011] *Centers for Disease Control and Prevention (CDC). Use of hepatitis B vaccination for adults with diabetes mellitus: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR Morb Mortal Wkly Rep. 2011 Dec 23;60(50):1709-11* (link [https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6050a4.htm])

[CDC 2010b] *Centers for Disease Control and Prevention (CDC); Advisory Committee on Immunization Practices. Updated recommendations for prevention of invasive pneumococcal disease among adults using the 23-valent pneumococcal polysaccharide vaccine (PPSV23). MMWR Morb Mortal Wkly Rep. 2010 Sep 3;59(34):1102-6.* (link [https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5934a3.htm])

[Greenwood 2014] *Greenwood B. The contribution of vaccination to global health: past, present and future. Philos Trans R Soc Lond B Biol Sci. 2014 May 12;369(1645):20130433* (link [https://doi.org/10.1098/rstb.2013.0433])

[Kobayashi 2015] *Kobayashi M, Bennett NM, Gierke R, et al. Intervals Between PCV13 and PPSV23 Vaccines: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR Morb Mortal Wkly Rep. 2015 Sep 4;64(34):944-7.* (link [https://doi.org/10.15585/mmwr.mm6434a4])

[McNamara 2017] *McNamara LA, Topaz N, Wang X, Hariri S, Fox L, and MacNeil JR. High Risk for Invasive Meningococcal Disease Among Patients Receiving Eculizumab (Soliris) Despite Receipt of Meningococcal Vaccine. MMWR Morb Mortal Wkly Rep. 2017 Jul 14;66(27):734-737* (link [https://doi.org/10.1111/ajt.14426])

[Meites 2016a] *Meites E, Kempe A, and Markowitz LE. Use of a 2-Dose Schedule for Human Papillomavirus Vaccination - Updated Recommendations of the Advisory Committee on Immunization Practices. MMWR Morb Mortal Wkly Rep. 2016 Dec 16;65(49):1405-1408* (link [https://doi.org/10.1111/ajt.14206])

[NCH 2017a] *National Center for Health Promotion and Disease Prevention. Get Recommended Screening Tests and Immunizations for Men. National Center for Health Promotion and Disease Prevention website. https://www.prevention.va.gov/Healthy_Living/Get_Recommended_Screening_Tests_and_Immunizations_for_Men.asp. Accessed August 23, 2017.* (link [https://www.prevention.va.gov/Healthy_Living/Get_Recommended_Screening_Tests_and_Immunizations_for_Men.asp])

[NCH 2017b] *National Center for Health Promotion and Disease Prevention. Get Recommended Screening Tests and Immunizations for Women. National Center for Health Promotion and Disease Prevention website. https://www.prevention.va.gov/Healthy_Living/Get_Recommended_Screening_Tests_and_Immunizations_for_Women.asp. Accessed August 23, 2017.* (link [https://www.prevention.va.gov/Healthy_Living/Get_Recommended_Screening_Tests_and_Immunizations_for_Women.asp])

[Schillie 2018] *Schillie S, Vellozzi C, Reingold A, et al. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. MMWR Recomm Rep 2018 Jan 12;67(No. RR-1):1–31.* (link [none])

[VA 2017a] *U.S. Department of Veterans Affairs/Veterans Health Administrations. VA PC Immunizations. webpage. Received July 26, 2017. Accessed September 18, 2017.* (link [https://www.publichealth.va.gov/vaccines.asp])

[NLM 2016a] *U.S. National Library of Medicine. BEXSERO- neisseria meningitidis serogroup b nhba fusion protein antigen, neisseria meningitidis serogroup b fhbp fusion protein antigen and neisseria meningitidis serogroup b nada protein antigen injection, suspension [GlaxoSmithKline Biologicals SA]. DailyMed website. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=f70cf2fc-6e6d-4a74-9f7a-db8fec072fd7. Updated September 2016.* (link [https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=f70cf2fc-6e6d-4a74-9f7a-db8fec072fd7])

[NLM 2016b] *U.S. National Library of Medicine. BOOSTRIX- tetanus toxoid, reduced diphtheria toxoid and acellular pertussis vaccine, adsorbed suspension [GlaxoSmithKline Biologicals SA]. DailyMed website. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=cd98bff9-4602-4268-d68d-029a14a5513b. Updated October 2016.* (link [hhttps://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=cd98bff9-4602-4268-d68d-029a14a5513b])

[NLM 2016c] *U.S. National Library of Medicine. ENGERIX-B - hepatitis b vaccine (recombinant) injection, suspension [GlaxoSmithKline Biologicals SA]. DailyMed website. https://dailymed.nlm.nih.gov/dailymed/drugIn-*

fo.cfm?setid=2ec65f7e-4aa2-4b41-b578-885ea59d6e9d. Updated May 2016. (link [https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=2ec65f7e-4aa2-4b41-b578-885ea59d6e9d])

[NLM 2016d] *U.S. National Library of Medicine. FLUAD- influenza a virus a/california/7/2009 x-181 (h1n1) antigen (formaldehyde inactivated), influenza a virus a/hong kong/4801/2014, nymc-x-263b (h3n2) hemagglutinin antigen (formaldehyde inactivated) and influenza b virus b/brisbane/60/2008 - wild type hemagglutinin antigen (formaldehyde inactivated) injection, suspension [Seqirus, Inc.]. DailyMed website. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=d4757710-d9ac-45ea-82d0-71cb1ec32a4e. Updated July 2016.* (link [https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=d4757710-d9ac-45ea-82d0-71cb1ec32a4e])

[NLM 2017a] *U.S. National Library of Medicine. FLUBLOK- influenza vaccine injection, solution [Protein Sciences Corporation]. DailyMed website. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=ce88cc84-b4ed-4d59-8897-10cb53dc2edf. Updated July 2017.* (link [https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=ce88cc84-b4ed-4d59-8897-10cb53dc2edf])

[NLM 2017b] *U.S. National Library of Medicine. FLULAVAL QUADRIVALENT 2017/2018- influenza virus vaccine suspension [ID Biomedical Corporation of Quebec]. DailyMed website. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=a9806027-8323-4abf-849f-46fb10984f13. Updated July 2017.* (link [https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=a9806027-8323-4abf-849f-46fb10984f13])

[NLM 2017c] *U.S. National Library of Medicine. FLUZONE HIGH-DOSE- influenza a virusa/michigan/45/2015 x-275 (h1n1) antigen (formaldehyde inactivated), influenza a virus a/hong kong/4801/2014 x-263b (h3n2) antigen (formaldehyde inactivated), and influenza b virus b/brisbane/60/2008 antigen (formaldehyde inactivated) injection, suspension [Sanofi Pasteur Inc.]. DailyMed website. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=81758772-80b1-4e76-8f50-e68d1fb4e9ee. Updated July 2017.* (link [https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=81758772-80b1-4e76-8f50-e68d1fb4e9ee])

[NLM 2017d] *U.S. National Library of Medicine. FLUZONE INTRADERMAL QUADRIVALENT- influenza a virus a/michigan/45/2015 x-275 (h1n1) antigen (formaldehyde inactivated), influenza a virus a/hong kong/4801/2014 x-263b (h3n2) antigen (formaldehyde inactivated), influenza b virus b/phuket/3073/2013 antigen (formaldehyde inactivated), and influenza b virus b/brisbane/60/2008 antigen (formaldehyde inactivated) injection, suspension [Sanofi Pasteur Inc.]. DailyMed website. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=bc006704-bcdd-4416-9cbc-9cfa76145c7b. Updated July 2017.* (link [https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=bc006704-bcdd-4416-9cbc-9cfa76145c7b])

[NLM 2017e] *U.S. National Library of Medicine. GARDASIL 9- human papillomavirus 9-valent vaccine, recombinant injection, suspension [Merck Sharp & Dohme Corp.]. DailyMed website. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=bc006704-bcdd-4416-9cbc-9cfa76145c7b. Updated July 2017.* (link [https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=a21f4f4b-b891-4f25-b747-cb9ec7d865d6])

[NLM 2016e] *U.S. National Library of Medicine. HAVRIX- hepatitis a vaccine injection, suspension [GlaxoSmithKline Biologicals SA]. DailyMed website. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=f9499a4d-1288-4bd3-9d59-1d72092c38cd. Updated May 2016.* (link [https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=f9499a4d-1288-4bd3-9d59-1d72092c38cd])

[NLM 2017f] *U.S. National Library of Medicine. MENOMUNE - A/C/Y/W-135 COMBINED- neisseria meningitidis group a capsular polysaccharide antigen, neisseria meningitidis group c capsular polysaccharide antigen, neisseria meningitidis group y capsular polysaccharide antigen and neisseria meningitidis group w-135 capsular polysaccharide antigen [Sanofi Pasteur Inc.]. DailyMed website. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=4621a820-c776-4be5-abf5-018e45682770. Updated February 2017.* (link [https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=4621a820-c776-4be5-abf5-018e45682770])

[NLM 2017g] *U.S. National Library of Medicine. MENVEO- meningococcal (groups a, c, y and w-135) oligosaccharide diphtheria crm197 conjugate vaccine [Novartis Vaccines and Diagnostics s.r.l.]. DailyMed web-*

site. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=89dde472-1efb-4630-88bc-41cde216fb3a. Updated October 2016. (link [https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=89dde472-1efb-4630-88bc-41cde216fb3a])

[NLM 2017h] *U.S. National Library of Medicine. M-M-R II- measles, mumps, and rubella virus vaccine live injection, powder, lyophilized, for suspension [Merck Sharp & Dohme Corp.]. DailyMed website. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=0a9e384f-e717-436b-b9a0-15e53cef0862. Updated May 2017.* (link [https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=0a9e384f-e717-436b-b9a0-15e53cef0862])

[NLM 2015a] *U.S. National Library of Medicine. PNEUMOVAX 23- pneumococcal vaccine polyvalent injection, solution [Merck Sharp & Dohme Corp.]. DailyMed website. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=bb362a20-6d91-4ae8-bebb-9ee8b2591814. Updated July 2015.* (link [https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=bb362a20-6d91-4ae8-bebb-9ee8b2591814])

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