

Recommended Immunizations Order Set Order Set: Conceptual Structure

**Contract: VA118-16-D-1008, Task Order
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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 Order Set: Order Set: Conceptual Structure

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

Publication date 06/22/2018

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Preface

Table 1. Revision History

Date	Life Cycle Event
June 22, 2018	Published
June 18, 2018	Published
June 8, 2018	Published
June 8, 2018	Reviewed
April 13, 2018	Created
April 13, 2018	Pre-published

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	4d362567-c693-5541-a2b0-fb1fa7eb9d1e	O15

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 in any clinical setting (ambulatory, inpatient, etc.), including employees of the VA who are treated as patients of the VA.	SNOMED CT	133936004 Adult (person)	N/A	N/A
ClinicalFocus	All			N/A	N/A
ClinicalVenue	Any clinical setting			N/A	N/A
WorkflowTask	Routine Population-level Immunizations Recommendations			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

No externalData expression definitions and no trigger definitions are present.

Chapter 2. Expression Definitions

No expression definitions are present.

Chapter 3. Hepatitis Immunizations

Hepatitis A Vaccine (0 and 6 to 18 Months)

Hepatitis A vaccine 1 mL solution intramuscular 1 time give injection in the deltoid region now

Combined Hepatitis A and B Vaccine Series (0, 1, and 6 Months)

Hepatitis A and hepatitis B (recombinant) vaccine 1 mL solution intramuscular 1 time give injection in the deltoid region now

Hepatitis B Vaccine (0, 1, and 6 Months) for Age < 20 Years

Hepatitis B vaccine (recombinant) 10 micrograms/mL formulation 0.5 mL solution intramuscular 1 time give injection in the deltoid region now

Hepatitis B vaccine (recombinant) 20 micrograms/mL formulation 0.5 mL solution intramuscular 1 time give injection in the deltoid region now

Hepatitis B Vaccine Series (0, 1, and 6 Months) for Age ≥ 20 Years

Adults in the following settings are assumed to be at risk for hepatitis B virus infection and should receive a HepB series: sexually transmitted disease treatment facilities, HIV testing and treatment facilities, facilities providing drug-abuse treatment and prevention services, healthcare settings targeting services to persons who inject drugs, correctional facilities, healthcare settings targeting services to men who have sex with men, hemodialysis facilities and end-stage renal disease programs, and institutions and nonresidential day care facilities for developmentally disabled persons

Hepatitis B vaccine (recombinant) 10 micrograms/mL formulation 1 mL solution intramuscular 1 time give injection in the deltoid region now

Hepatitis B vaccine (recombinant) 20 micrograms/mL formulation 1 mL solution intramuscular 1 time give injection in the deltoid region now

Hepatitis B Vaccine Series (0, 1, and 6 Months or 0, 1, 2, and 6 Months) for Dialysis Patients

Hepatitis B vaccine (recombinant) 40 micrograms/mL formulation 1 mL solution intramuscular 1 time give injection in the deltoid region now

Hepatitis B vaccine (recombinant) 20 micrograms/mL formulation 2 mL solution intramuscular 1 time give injection in the deltoid region now

Chapter 4. Herpes Zoster (Shingles)

Immunization

The new version released January 2018 by the CDC <https://www.cdc.gov/mmwr/volumes/67/wr/mm6703a5.htm>

Zoster vaccine live injection, powder, lyophilized 0.65 mL solution subcutaneous 1 time give injection in deltoid region now

Chapter 5. Human Papillomavirus (HPV) Vaccine Series (0, 2, and 6 Months)

Human Papillomavirus (HPV) Vaccine CDC guidelines <https://www.cdc.gov/hpv/index.html>

HPV 9-valent vaccine, recombinant injection 0.5 mL solution intramuscular 1 time give injection in the deltoid region now

Chapter 6. Influenza Immunization

Please see ACIP's 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>).

Standard-Dose Inactivated Influenza Vaccine (IIV)

Influenza inactivated virus vaccine 0.5 mL solution intramuscular 1 time give injection in the deltoid region now.

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

statementType: Precoordinated Expression 385644000 |
Requested (qualifier value)|

topic: Postcoordinated Expression [416118004 |Administration
(procedure)] ->(260686004 |Method (attribute))->[129326001
|Injection - action (qualifier value)]- ->(363701004 |Direct
substance (attribute))->[408752008 |Inactivated influenza
split virion vaccine (product)]- ->(410675002 |Route of
administration (attribute))->[78421000 |Intramuscular route
(qualifier value)]- ->(405813007 |Procedure site - Direct
(attribute))->[37622008 |Deltoid region structure (body
structure)];

requestedResult.lowerBound: 0.5

requestedResult.upperBound: 0.5

requestedResult.includeLowerBound: true

requestedResult.includeUpperBound: true

requestedResult.measureSemantic: Precoordinated Expression
258773002 |Milliliter (qualifier value)|

priority: Precoordinated Expression 50811001 |Routine
(qualifier value)|

Recombinant Influenza Vaccine (RIV)

Influenza virus vaccine (recombinant) 0.5 mL solution intramuscular 1 time give injection in the deltoid region now

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

statementType: Precoordinated Expression 385644000 |
Requested (qualifier value)|

topic: Postcoordinated Expression [416118004 |Administration
(procedure)] ->(260686004 |Method (attribute))->[129326001
|Injection - action (qualifier value)]- ->(363701004 |Direct
substance (attribute))->[46233009 |Influenza virus vaccine
(product)]- ->(410675002 |Route of administration (attribute))-
>[78421000 |Intramuscular route (qualifier value)]- -
>(405813007 |Procedure site - Direct (attribute))->[37622008 |
Deltoid region structure (body structure)];

unstructured[0]: recombinant

requestedResult.lowerBound: 0.5

requestedResult.upperBound: 0.5

requestedResult.includeLowerBound: true

	<pre> requestedResult.includeUpperBound: true requestedResult.measureSemantic: Precoordinated Expression 258773002 Milliliter (qualifier value) priority: Precoordinated Expression 50811001 Routine (qualifier value) </pre>
Intradermal IIV	
# Intradermal influenza inactivated virus vaccine 0.1 mL solution intradermal 1 time give injection in the deltoid region now	
actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]	<pre> statementType: Precoordinated Expression 385644000 Requested (qualifier value) topic: Postcoordinated Expression [416118004 Administration (procedure)] ->(260686004 Method (attribute))->[129326001 Injection - action (qualifier value)]- ->(363701004 Direct substance (attribute))->[46233009 Influenza virus vaccine (product)]- ->(410675002 Route of administration (attribute))->[372464004 Intradermal route (qualifier value)]- ->(405813007 Procedure site - Direct (attribute))->[37622008 Deltoid region structure (body structure)]; unstructured[0]: inactivated requestedResult.lowerBound: 0.1 requestedResult.upperBound: 0.1 requestedResult.includeLowerBound: true requestedResult.includeUpperBound: true requestedResult.measureSemantic: Precoordinated Expression 258773002 Milliliter (qualifier value) priority: Precoordinated Expression 50811001 Routine (qualifier value) </pre>
High-Dose or Adjuvanted IIV	
# Influenza high-dose inactivated virus vaccine 0.5 mL solution intramuscular 1 time give injection in the deltoid region now	
actionSentence[type=elm:Instance, classType=anf:ClinicalStatement]	<pre> statementType: Precoordinated Expression 385644000 Requested (qualifier value) topic: Postcoordinated Expression [416118004 Administration (procedure)] ->(260686004 Method (attribute))->[129326001 Injection - action (qualifier value)]- ->(363701004 Direct substance (attribute))->[408752008 Inactivated influenza split virion vaccine (product)]- ->(410675002 Route of administration (attribute))->[78421000 Intramuscular route (qualifier value)]- ->(405813007 Procedure site - Direct (attribute))->[37622008 Deltoid region structure (body structure)]; unstructured[0]: high-dose requestedResult.lowerBound: 0.5 requestedResult.upperBound: 0.5 </pre>

<p>requestedResult.includeLowerBound: true requestedResult.includeUpperBound: true requestedResult.measureSemantic: Precoordinated Expression 258773002 Milliliter (qualifier value) priority: Precoordinated Expression 50811001 Routine (qualifier value) </p>

Chapter 7. Meningococcal Immunizations

Meningococcal vaccines should be used during pregnancy only if clearly needed. Health care providers are encouraged to register women who receive a meningococcal vaccine during pregnancy. See package inserts at: <https://www.fda.gov/BiologicsBloodVaccines/Vaccines/ApprovedProducts/default.htm>.

Serogroups A, C, W, and Y Conjugate Vaccine (MenACWY) Series and Boosters

CDC newly published this recommendation regarding eculizumab and meningococcal vaccination in the July 7, 2017 <https://www.cdc.gov/meningococcal/clinical/eculizumab.html>.

Meningococcal (groups a, c, y, and w-135) oligosaccharide diphtheria crm197 conjugate vaccine 0.5 mL solution intramuscular 1 time give injection in the deltoid region now

Serogroup B Meningococcal Vaccine: MenB-4C Series (0 and 1 Month)

Neisseria meningitidis serogroup b-4c protein antigen vaccine 0.5 mL solution intramuscular 1 time give injection in the deltoid region now

Serogroup B Meningococcal Vaccine: MenB-FhbP Series (0, 1 to 2, and 6 Months or 0 and 6 Months, Based on Indications)

Neisseria meningitidis serogroup b-FHbp protein antigen vaccine 0.5 mL solution intramuscular 1 time give injection in the deltoid region now

Chapter 8. Measles, Mumps, and Rubella (MMR) Immunizations

Please note that ACIP published updated guidance on MMR immunizations <https://www.cdc.gov/mmwr/volumes/67/wr/mm6701a7.htm>

Measles, Mumps, and Rubella Vaccine Series (0 and 28 Days)
Measles, mumps, and rubella virus vaccine live injection, powder, lyophilized 0.5 mL solution subcutaneous 1 time give injection in the deltoid region now
Measles, Mumps, and Rubella Vaccine
Measles, mumps, and rubella virus vaccine live injection, powder, lyophilized 0.5 mL solution subcutaneous 1 time give injection in the deltoid region now

Chapter 9. Pneumococcal Immunization

Pneumococcal Immunization CDC guidelines <https://www.cdc.gov/vaccines/vpd/pneumo/hcp/recommendations.html>. Both Pneumococcal Polysaccharide Vaccine (PPSV23) and Pneumococcal Conjugate Vaccine (PCV13) should be given to a pregnant woman only if clearly needed. Pregnancy is not an absolute contraindication.

13-Valent Pneumococcal Conjugate Vaccine
Pneumococcal 13-valent conjugate vaccine 0.5 mL solution intramuscular 1 time give injection in the deltoid region now
23-Valent Pneumococcal Polysaccharide Vaccine
Pneumococcal polyvalent-23 vaccine 0.5 mL solution intramuscular 1 time give injection in the deltoid region now

Chapter 10. Tetanus, Diphtheria, and Pertussis Immunization

Tetanus, Diphtheria, and Pertussis Immunization CDC Guidelines <https://www.cdc.gov/vaccines/vpd/dtap-tdap-td/hcp/recommendations.html>

Tetanus, Diphtheria, and Pertussis Vaccine
Tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine 0.5 mL solution intramuscular 1 time give injection in the deltoid region now
Tetanus and Diphtheria Vaccine
Tetanus and diphtheria toxoids vaccine 0.5 mL solution intramuscular 1 time give injection in the deltoid region now

Chapter 11. Varicella Immunization

Varicella Immunization CDC Guidelines <https://www.cdc.gov/vaccines/vpd/varicella/hcp/index.html>

Varicella live virus vaccine 0.5 mL solution subcutaneous 1 time give injection in the deltoid region now

Chapter 12. Patient and Caregiver Education

Vaccine education (patient-appropriate material regarding ordered vaccines) now

Chapter 13. Tabular List

Terminology Service Request (TSR) Mappings

Table 13.1. Terminology Versions

Name	Identifier	Version
SNOMED CT	2.16.840.1.113883.6.96	United States Edition 20180301

Table 13.2. Terminology References

System	Code	Display Text ^a	References ^b
SNOMED CT	133936004 Adult (person)	Adult patients in any clinical setting (ambulatory, inpatient, etc.), including employees of the VA who are treated as patients of the VA.	1
SNOMED CT	258773002 Milliliter (qualifier value)	Precoordinated Expression	4
SNOMED CT	385644000 Requested (qualifier value)	Precoordinated Expression	4
SNOMED CT	50811001 Routine (qualifier value)	Precoordinated Expression	4
SNOMED CT	[416118004 Administration (procedure)] ->(260686004 Method (attribute))->[129326001 Injection - action (qualifier value)]->(363701004 Direct substance (attribute))->[408752008 Inactivated influenza split virion vaccine (product)]- ->(410675002 Route of administration (attribute))->[78421000 Intramuscular route (qualifier value)]- ->(405813007 Procedure site - Direct (attribute))->[37622008 Deltoid region structure (body structure)];	Postcoordinated Expression	2
SNOMED CT	[416118004 Administration (procedure)] ->(260686004 Method (attribute))->[129326001 Injection - action (qualifier value)]->(363701004 Direct substance (attribute))-	Postcoordinated Expression	1

System	Code	Display Text ^a	References ^b
	>[46233009 Influenza virus vaccine (product)]- ->(410675002 Route of administration (attribute))- >[372464004 Intradermal route (qualifier value)]- - >(405813007 Procedure site - Direct (attribute))- >[37622008 Deltoid region structure (body structure)];		
SNOMED CT	[416118004 Administration (procedure)] ->(260686004 Method (attribute))- >[129326001 Injection - action (qualifier value)]- ->(363701004 Direct substance (attribute))- >[46233009 Influenza virus vaccine (product)]- ->(410675002 Route of administration (attribute))- >[78421000 Intramuscular route (qualifier value)]- - >(405813007 Procedure site - Direct (attribute))- >[37622008 Deltoid region structure (body structure)];	Postcoordinated Expression	1

^aIf a code is used multiple times in the KNART, only the display text of the first instance is shown.

^bCount of the number of times the given code system and code pair is used in the KNART.

Chapter 14. Behavior Symbols

Table 14.1. 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 14.2. 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 14.3. 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.
◇	Could	An action with this behavior may be included in the set of actions processed by the end user.

Symbol	Name	Definition
➤	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 14.4. 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 14.5. 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 14.6. 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 14.7. 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 Order Set Conceptual Structure Document*

[KVRpt] *Recommended Immunizations Order Set KNART Validation Report*

Supporting Evidence

[ACIP 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>])

[ACIP 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 2016] 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>])
- [NCHPDP 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])
- [NCHPDP 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])
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- [VA 2017] 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>])
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