VA Health Information Exchange Content Testing

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July 21, 2015
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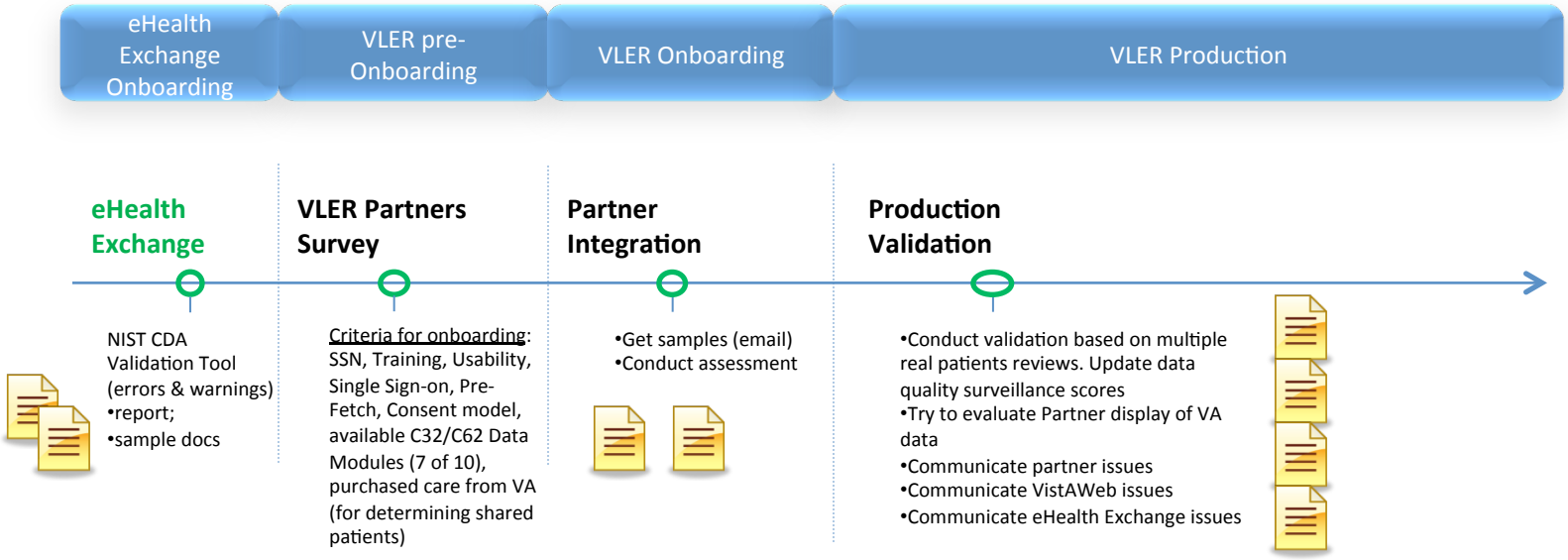
Use Cases and Content Types

	USERS	PURPOSE of USE	CONTENT
Exchange	Providers	Treatment, Payment, Operation, Emergency, Coverage	C32, C62s, CCDAs
Direct	Providers, Patients, Staff	Treatment, Payment, Operation	CCDAs, PDF, text, images, others
Patient portal	Patients	Request for self	Blue Button, PDF, C32, CCDA
Business, benefits	Staff	Coverage	PDF, text, images, X12, others

VA Content Testing Process



Fully populated samples

What is tested?
- C32
- Bridge C32
- C-CDA
- C62s

What does Pass mean?

Request samples & eHealth Exchange content testing report

Does partner have data quality surveillance (what is the quality index?)

Confirm that sample is fully populated or request additional samples

Review eHealth Exchange content testing report

Automated tools, larger samples scored

Data quality surveillance

Relevant data

Criteria for onboarding with VA (business survey)

- eHealth Exchange participant Certified on **2010** and/or **2011 specifications**
- Ability to exchange Continuity of Care Document (**C32 or C-CDA**)
- Ability to send available **identity traits** in the patient discovery message, such as patient name, date of birth, birth sex, SSN, address, and phone number
- **C32 or CCDA content** includes: Allergy, Problems, Labs and other Results, Immunizations, Medications, and Vital signs..
- **Clinical notes** are very desirable, either embedded in CCD or as unstructured documents C62s, e.g., Consults/Referrals, Discharge Summaries, History and Physical, Procedure Reports, Results of diagnostic studies, Progress notes, etc.

Criteria for onboarding with VA (business survey) – cont.

- **Providers training** on how to access VA data
- EHR **alerts** clinicians that **VA data is available**
- **Single sign-on** between EHR and HIE portal
- Ability for EHR to **pre-fetch** Veteran health data prior to patient encounter

Partner Integration Milestones

Milestone	Partner Milestones	Standard or Fast Track
PARTNER: eHealth Exchange On-boarding Process Completed	**1**	**S, F**
PARTNER and VA: VLER Health Business Survey Completed and Reviewed	**2**	**S, F**
PARTNER and VA: VA Partner Testing begins between Partner and VLER Health Partner Integration Team	**3**	**S**
PARTNER and VA: VLER Health Partner Integration Testing Completed	**4**	**S**
VA: Partner Business Survey and Testing Results (if required) Reviewed by VLER Health Leadership for Approval	**5**	**S, F**
PARTNER: If Not Approved: Address the Issues, Re-Test, Review the Results with VLER Health Leadership, and Return to Milestone 3	**5a**	**S, F**
PARTNER and VA: VA and Partner Move Software Capability to Production	**6**	**S, F**
PARTNER and VA: Partner and VLER Health Team Perform Production Software Validation	**7**	**S, F**
PARTNER and VA: VLER Health Program Office and Partner Meet with Local VA Medical Center Leadership to Present VLER Health Exchange New Partner	**8**	**S, F**
PARTNER and VA: Partner and VA to Implement Training Education and Support Programs	**9**	**S, F**
PARTNER and VA: Partner and VA Monitor Performance and Sustain Operations and Maintenance	**10**	**S, F**

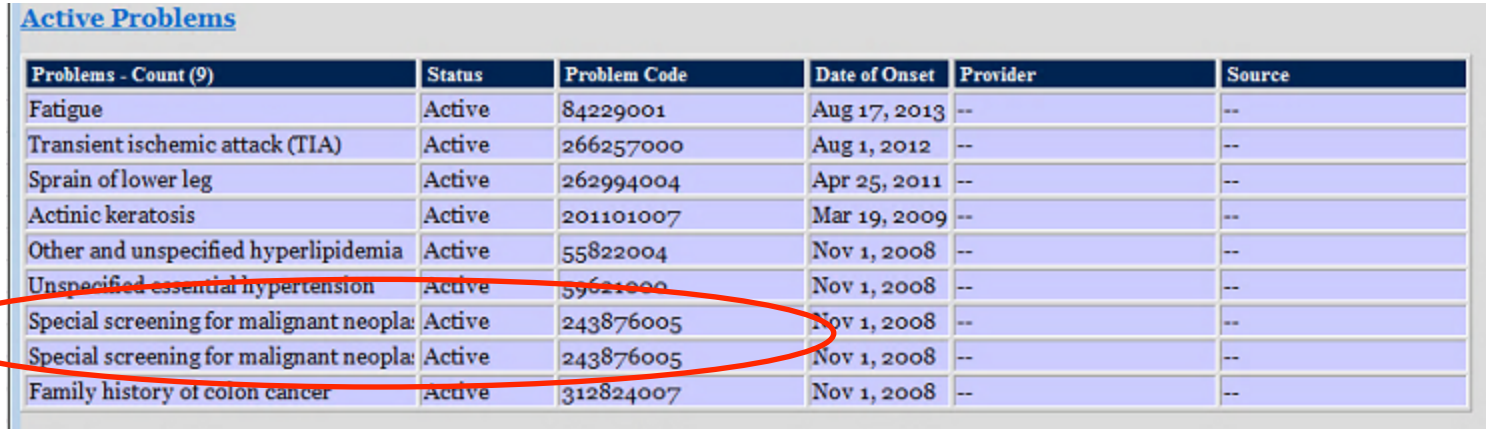
For more information, e-mail VAExchangeInformation@va.gov

Data quality criteria are different for human readable and computable data

- Just because it looks right in the GUI doesn't mean the CCD is correct.

- Just because the CCD is valid doesn't mean it's computable and useful.

Problems: Issue #4



Active Problems

Problems - Count (9)	Status	Problem Code	Date of Onset	Provider	Source
Fatigue	Active	84229001	Aug 17, 2013	--	--
Transient ischemic attack (TIA)	Active	266257000	Aug 1, 2012	--	--
Sprain of lower leg	Active	262994004	Apr 25, 2011	--	--
Actinic keratosis	Active	201101007	Mar 19, 2009	--	--
Other and unspecified hyperlipidemia	Active	55822004	Nov 1, 2008	--	--
Unspecified essential hypertension	Active	59621000	Nov 1, 2008	--	--
Special screening for malignant neopla:	Active	243876005	Nov 1, 2008	--	--
Special screening for malignant neopla:	Active	243876005	Nov 1, 2008	--	--
Family history of colon cancer	Active	312824007	Nov 1, 2008	--	--

The SNOMED concept ID = 243876005 has the following text: "Screening Status (finding)“. This is not the same as "Special screening for malignant neoplasm, colon". The SNOMED CT concept is more general and does not specify that the screening is done for ‘malignant neoplasm, colon’.

Excessive abbreviations

Problem List

Problems - Count (4)	Status	Problem Code	Date of Onset	Provider	Source
250.01/790.06/V70.0/278.0	completed	--	Jan 29, 2013	--	Roper Hospital
250.01/790.06/V70.0/278.0	completed	--	Jan 29, 2013	--	Roper Hospital
DMII WO CMP NT ST UNCNTR	completed	250.00	Aug 7, 2012	--	Roper Hospital
DMII WO CMP NT ST UNCNTR	completed	250.00	Aug 7, 2012	--	Roper Hospital

Entries 3-4: Problem Name has excessive abbreviations.
Status “completed” is not a valid status for Problems (per the specifications).

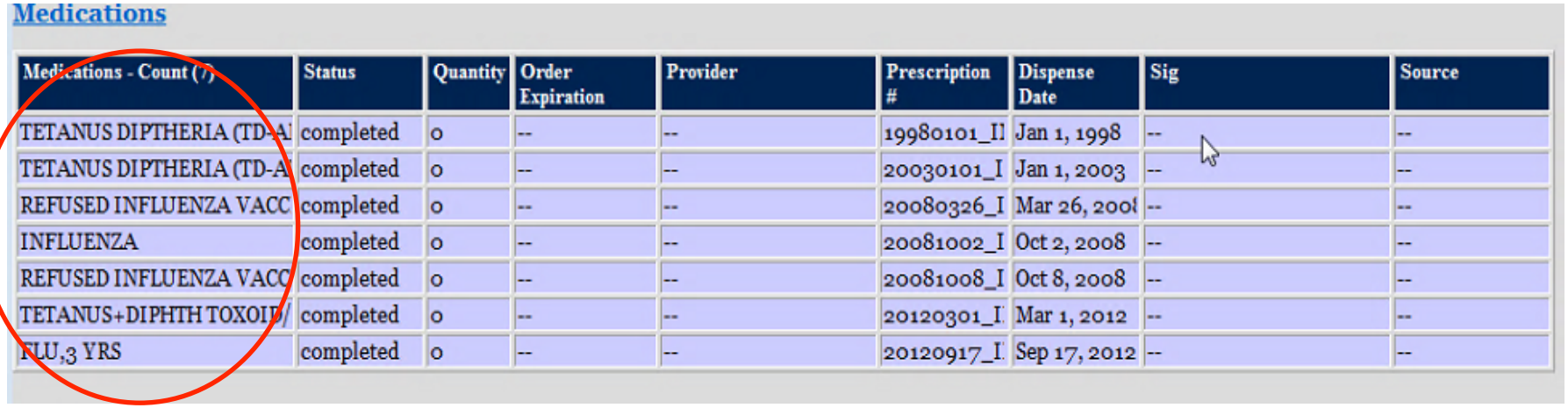
Reference range missing

Relevant diagnostic tests/laboratory data

Date/Time - Count (59)	Result Type	Source	Result - Unit	Interpretation	Reference Range	Status
Jan 29, 2013	MICROALBUMIN-CREATININE RATIO	--	--	--	--	F
--	M/C RATIO	--	2.3 mg/gcreat	None	0.0-30.0	completed
--	MICROALBUMIN	--	3.3 ug/mL	None	0.0-17.0	completed
--	CREATININE URINE	--	145.2 mg/dL	None	22.0-328.0	completed
Jan 29, 2013	PSA SCREEN	--	--	--	--	F
--	PSA SCREEN	--	1.517 ng/mL	None	--	completed
Jan 29, 2013	HEMOGLOBIN A1C	--	--	--	--	F
--	HEMOGLOBIN A1C	--	9.3 %	H	4.2-6.3	completed

Reference Range: Missing/no data for some entries

Immunizations include in Meds section



Medications

Medications - Count (7)	Status	Quantity	Order Expiration	Provider	Prescription #	Dispense Date	Sig	Source
TETANUS DIPTHERIA (TD-A	completed	0	--	--	19980101_I	Jan 1, 1998	--	--
TETANUS DIPTHERIA (TD-A	completed	0	--	--	20030101_I	Jan 1, 2003	--	--
REFUSED INFLUENZA VACC	completed	0	--	--	20080326_I	Mar 26, 200	--	--
INFLUENZA	completed	0	--	--	20081002_I	Oct 2, 2008	--	--
REFUSED INFLUENZA VACC	completed	0	--	--	20081008_I	Oct 8, 2008	--	--
TETANUS+DIPHTH TOXOID/	completed	0	--	--	20120301_I	Mar 1, 2012	--	--
FLU,3 YRS	completed	0	--	--	20120917_I	Sep 17, 2012	--	--

Immunizations/vaccines reported in the Medications section instead of the immunizations section.
Can they be moved to the Immunizations section?

Units of measurement

	%BASO	--	0.4 %	Normal	0.2 - 1.0
	#LYMPH	--	1.1 10	Low	1.3 - 2.9
	#MONO	--	0.4 10	Normal	0.3 - 0.8
	#GRAN	--	4.0 10	Normal	2.2 - 4.8
	#EOSIN	--	0.1 10	Normal	0.00 - 0.20
	#BASO	--	0.0 10	Normal	0.00 - 0.10
	Erythrocytes [#/volume] in Blood by Automated count	--	4.68 10	Normal	4.00 - 6.00

Result Values with a Unit of Measure that is '10' factor - 10 to power of 1, 10 to power of 2, etc, - is difficult to identify as the not part of the Result Value.
It could be read as "0.410".
Have VW display add spacing between the Result Value and Unit of Measure:

0.4	%
1.1	10
0.4	10

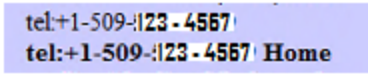
Ambiguous data

Sep 10, 2012	Unknown Battery	VETERAN'S ADMINISTRATION	--	--	--	
	Prot SerPl-mCnc	--	7.3 g/dL	--	6.4-8.2	
	Calcium SerPl-mCnc	--	9.7 mg/dL	--	8.4-10.6	
	Misc Esoterix Endocrine Amb Test	--	11 mg/dL	--	7-26	
	Misc Esoterix Endocrine Amb Test	--	73.5 mL/min	--	-	
	Misc Esoterix Endocrine Amb Test	--	7.0 mmol/L	--	5.0-15.0	
	Misc Esoterix Endocrine Amb Test	--	26 Iu/L	--	22-65	
	Misc Esoterix Endocrine Amb Test	--	87 Iu/L	--	50-136	
	Misc Esoterix Endocrine Amb Test	--	0.2 mg/dL	--	0.0-1.0	
	Misc Esoterix Endocrine Amb Test	--	3.8 g/dL	--	3.4-4.7	
	Misc Esoterix Endocrine Amb Test	--	30 mmol/L	--	21-32	
	Misc Esoterix Endocrine Amb Test	--	99 mmol/L	--	98-107	
	Misc Esoterix Endocrine Amb Test	--	4.7 mmol/L	--	3.5-5.5	
	Misc Esoterix Endocrine Amb Test	--	136 mmol/L	--	135-145	
	Misc Esoterix Endocrine Amb Test	--	1.0 mg/dL	--	0.8-1.4	
	GLU (SMA)		88 mg/dL	--	70-99	

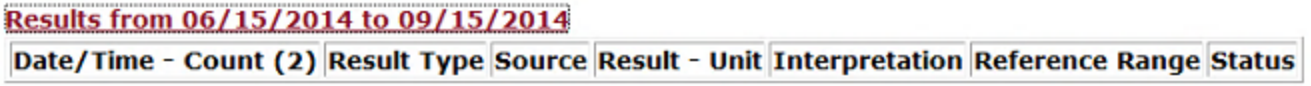
The test name 'Misc Esoterix Endocrine …' seems to be used by default to replace distinct test names, associated with different results & units??

More examples

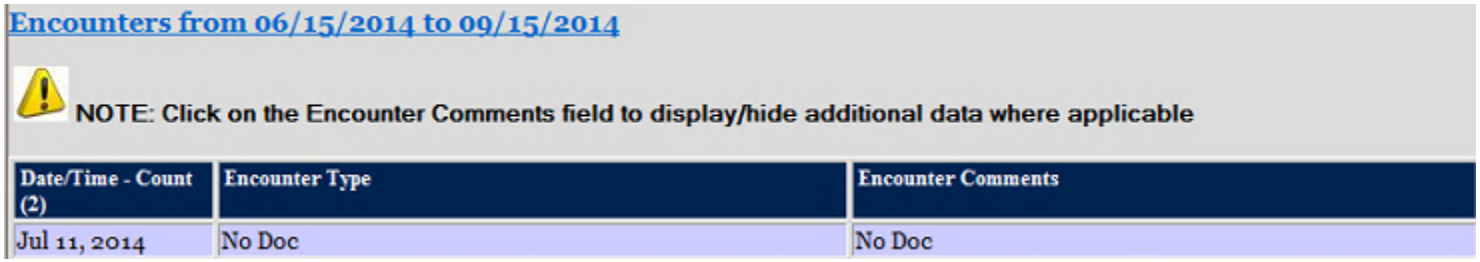
- Repetition



- Values that are recorded in heterogeneous ways that the user interface does not anticipate

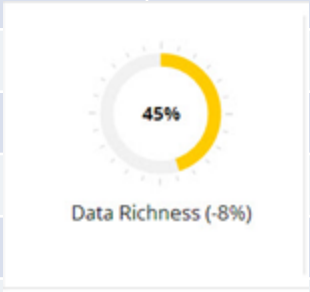


- Values that are not meaningful



C32 content completeness

C32 Module	Percent of C32s Populated	Range Populated by Partner
Demographics	100%	100%
Providers	86%	71% ~ 99%
Problems	84%	52% ~ 99%
Allergies	74%	13% ~ 99%
Encounters	74%	35% ~ 94%
Medications	63%	<1% ~ 97%
Vital Signs	53%	1% ~ 80%
Laboratory Results	46%	9% ~ 81%
Procedures	42%	9% ~ 61%
Immunizations	35%	2% ~ 63%



Source: Based on a sample of 250 C32s for nine VA exchange partners (including VA) at the time of the evaluation, plus VA, retrieved July 2012. (n=2,250)

Note: Tests were conducted in July 2012 as a VLER Health quality assurance/operations study. The disclosures are for the period 10/13/2011 - 7/25/2012.

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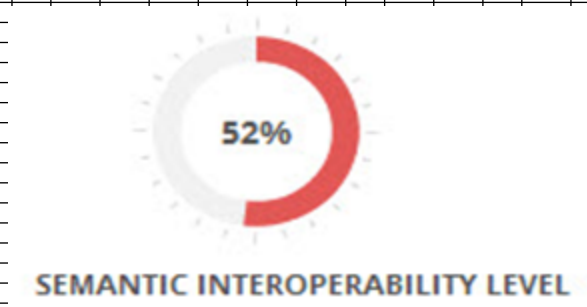
Data Quality: terminology compliance

HITSP C32 Data Element	VA	DoD	1	2	3	4	5	6	7	8	9	10	11	12	13	Standard Terminology requirement
0.04-Document Code	x	x	x	x	x	x	x	x	x	x	x	x		x	x	LOINC
1.06-Gender	x	x	x	x	x	x	x	x	x	x	x	x		x	x	HL7 Administrative Gender Codes
1.08-Marital Status	x					x		x	x			x		x		HL7 MaritalStatus code set
1.10-Race						x		x	x							CDC Race and Ethnicity Codes
1.11-Ethnicity						x		x	x							CDC Race and Ethnicity Codes
Religious Affiliation								x								HL7 ReligiousAffiliation code set
3.03-Contact Type																HL7 Role Class
3.03-Contact Relationship		x			x	x		x								HL7 Role Code
2.01-Language					x											value set is defined by IETF RFC 3066.
4.02-Provider role coded					x											HL7 Provider Role
4.04-Provider Type																National Uniform Claim Committee Provider Codes
5.02-Health Insurance Type		x														HL7-defined value set.
5.09-Patient Relationship to Subscriber		x														
6.02-Adverse Event Type	x	x			x	x		x	x		x	x			x	SNOMED CT Subset
6.04-Product Coded						x										RxNorm
6.06-Reaction Coded									x							SNOMED CT Subset
6.08-Severity Coded																Subset of SNOMED CT
7.04-Problem Code																Subset of SNOMED CT
Problem Type																
7.12-Problem Status	x															Subset of SNOMED CT
8.19-Type of Medication	x															Subset of SNOMED CT
8.20-Status of Medication	x															Subset of SNOMED CT
Medication coded Product Name																RxNorm,
Route																HL7-defined value set.
Dose																UCUM for units
Site																
Product Form																FDA dosage form
Indication																
Reaction																Subset of SNOMED CT
Vehicle																
Quantity Ordered																UCUM for units
Quantity Dispensed																UCUM for units
Fill Status									x							HL7 ActStatusNormal (Completed, Aborted)
13.06-Immunization coded Product Name																CVX
13.10-Refusal reason																HL7 ActReason
14.03-Result Type (Vital signs)	x					x		x								LOINC
14.05-Results Value (Unit of Measure)																UCUM for units of measure
Result Status								x								HL7 ActStatus
15.03-Result Type (Lab)	x			x			x	x	x		x			x		LOINC
15.05-Results Value (Unit of Measure)																UCUM for units of measure
15.06-Result Interpretation				x	x		x									
Result Status																HL7 ActStatus
Encounter Type		x														CPT-4
Admission Type																UB-04/NUBC , UB-04 FL14
Admission Source																UB-04/NUBC , UB-04 FL14
17.02-Procedure type									x					x		CPT4
Advanced Directive																SNOMED CT Subset
COUNT	9	7	3	6	9	15	6	18	14	2	5	7	0	7	4	
PERCENTAGE (total = 47)	20%	15%	7%	13%	20%	33%	13%	39%	30%	4%	11%	15%	0%	15%	9%	



PS: Based on small sample - 2013

Data quality issues categorization

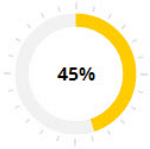
- **Misplaced data** – inappropriate or variable XML organization or identifiers
  - Procedure in Problems section, panel name in analyte
- **Incorrect use of terminology** – terminology misuse or omission
  - Codes that are semantically nonsensical or incorrect
- **Invalid data/data not understandable** – incorrect data within XML elements
  - Unreadable values, text in dates
- **Missing values**
  - Variable strictness for now
- **Format problems**
- **Duplicate entries**
- **Inconsistent entries**

Data Quality Surveillance (dashboard)

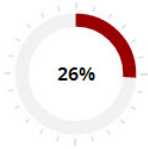
VLER Health Data Quality and Interoperability Analysis

- Based on analyses of C32 samples provided by VLER Health Exchange Partners

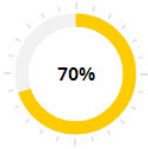
Data Quality and Interoperability Levels



Data Richness (-8%)



Semantic Interoperability (+3%)



Data Quality (+3%)

VLER Health C32 Data Samples Analyzed Across 11 Partners

Clinical Module	Partners Sending	Fields Analyzed	% of Issues Found
Allergies	8	6,624	3.3%
Problems	8	117,576	<1%
Encounters	7	5,764	1%
Immunizations	7	8,360	2%
Vital Signs	7	2,960	<1%
Medications	9	178,200	2.1%
Test Results	10	107,148	<1%

Analysis Overview

Overview:

Investigation of level of quality of the data sent by VLER Health Partners. C32 document samples are analyzed to identify issues that could cause difficulties in effectively interpreting the data received.

Limitations:

Samples analyzed are not uniform and the frequency of issues found depend on the amount of data in the partner C32 sample and the types of clincial content being exchanged by the Partner. This study is under development and reflects a relatively small sample of C32s analyzed.

VLER Health Exchange Interoperability Measure Descriptions

Data Richness: Scored by the total number of data elements populated in the partner C32 over the total 17 clinical modules in the C32.

Semantic Interoperability: Scored by the number of data elements within the C32 that conform to standardized terminology requirements (e.g.,LOINC, SNOMED CT, RxNORM) over the total standardized data elements able to be coded.

Data Quality: Scored by the number of issues identified divided by the number of data fields populated in each module within the partner C32.