Patient Matching for PDMPs

Addressing challenges to support the interoperability of prescription data

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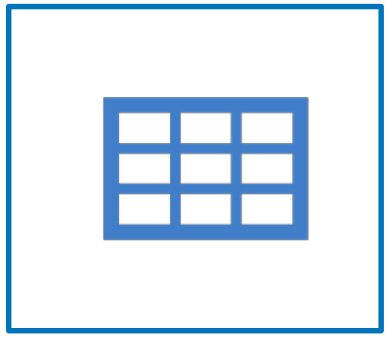
Why is accurate patient matching important?

- Supports patient safety
- Promotes data integrity
- Improves analytics, risk assessment
- Improves prescribing practices
- Allows for greater efficiency
- Improves fraud detection
- Reduces inappropriate data exposure

Challenges to accurate patient matching

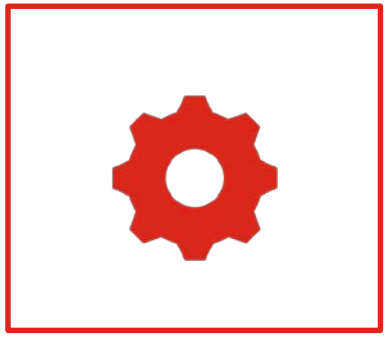


Minimum Demographics

Little to no agreement on which elements to use for query/request, response, or exchange and for matching algorithms to rely on

Technical Standards

Lack of alignment between standards used across the ecosystem, requiring translation of data between standards



Patient Matching Algorithms

Most are proprietary, with no transparency on their performance, and may not be tuned to population or context

Data Quality

Poor data quality limits the effectiveness of standards and technology, including patient matching algorithms

Minimum Demographics

US Core Data For Interoperability v1

Allergies and Intolerances *NEW

- Substance (Medication)
- Substance (Drug Class) *NEW
- Reaction *NEW

Assessment and Plan of Treatment

Care Team Members

For more info:

HealthIT.gov/USCDI

Clinical Notes *NEW

- Consultation Note
- Discharge Summary Note
- History & Physical
- Imaging Narrative
- Laboratory Report Narrative
- Pathology Report Narrative
- Procedure Note
- Progress Note

Goals

Health Concerns

Immunizations

Laboratory

- Tests
- Values/Results

Medications

Patient Demographics

- First Name
- Last Name
- Previous Name
- Middle Name (incl. middle initial)
- Suffix
- Birth Sex
- Date of Birth
- Race
- Ethnicity
- Preferred Language
- Current Address *NEW
- Previous Address *NEW
- Phone Number *NEW
- Phone Number Type *NEW
- Email Address *NEW

Problems

Procedures

Provenance *NEW

- Author Time Stamp
- Author Organization

Smoking Status

Unique Device Identifier(s) for a Patient's Implantable Device(s)

Vital Signs

- Diastolic Blood Pressure
- Systolic Blood Pressure
- Body Height
- Body Weight
- Heart Rate
- Respiratory Rate
- Body Temperature
- Pulse Oximetry
- Inhaled Oxygen Concentration
- BMI Percentile (2-20 Years) *NEW
- Weight-for-length Percentile (Birth - 36 Months) *NEW
- Occipital-frontal Head Circumference Percentile (Birth - 36 Months) *NEW

Patient Element	USCDI demographics	HL7 FHIR R4	NCPDP v2017071	ASAP 4.2B	PMIX	Surescripts
Patient ID(s)						
Prefix/Title						
First/Given name						
Last/Surname						
Previous name						
Middle name/Initial						
Suffix						
Birth/Administrative sex/gender						
Date of Birth						
Race		ext				
Ethnic group/ethnicity		ext				
Current Address	NEW					
Previous Address	NEW					
Phone number	NEW					
Phone number type/designation	NEW					
E-mail address	NEW					
Language						
Emergency/Alternate contact						
Multiple birth indicator						

Patient Element	USCDI demographics	HL7 FHIR R4	NCPDP v2017071	ASAP 4.2B	PMIX	Surescripts	PDMP 1	PDMP 2	PPDMP 3	PDMP 4	PDMP 5	PDMP 6	PDMP 7	PDMP 8	PDMP 9	PDMP 10	PDMP 11	PDMP 12
Patient ID(s)																		
Prefix/Title																		
First/Given name																		
Last/Surname																		
Previous name																		
Middle name/Initial																		
Suffix																		
Birth/Administrative sex/gender																		
Date of Birth																		
Race		ext																
Ethnic group/ethnicity		ext																
Current Address	NEW																	
Previous Address	NEW																	
Phone number	NEW																	
Phone number type/designation	NEW																	
E-mail address	NEW																	
Language																		
Emergency/Alternate contact																		
Multiple birth indicator																		

Technical Standards

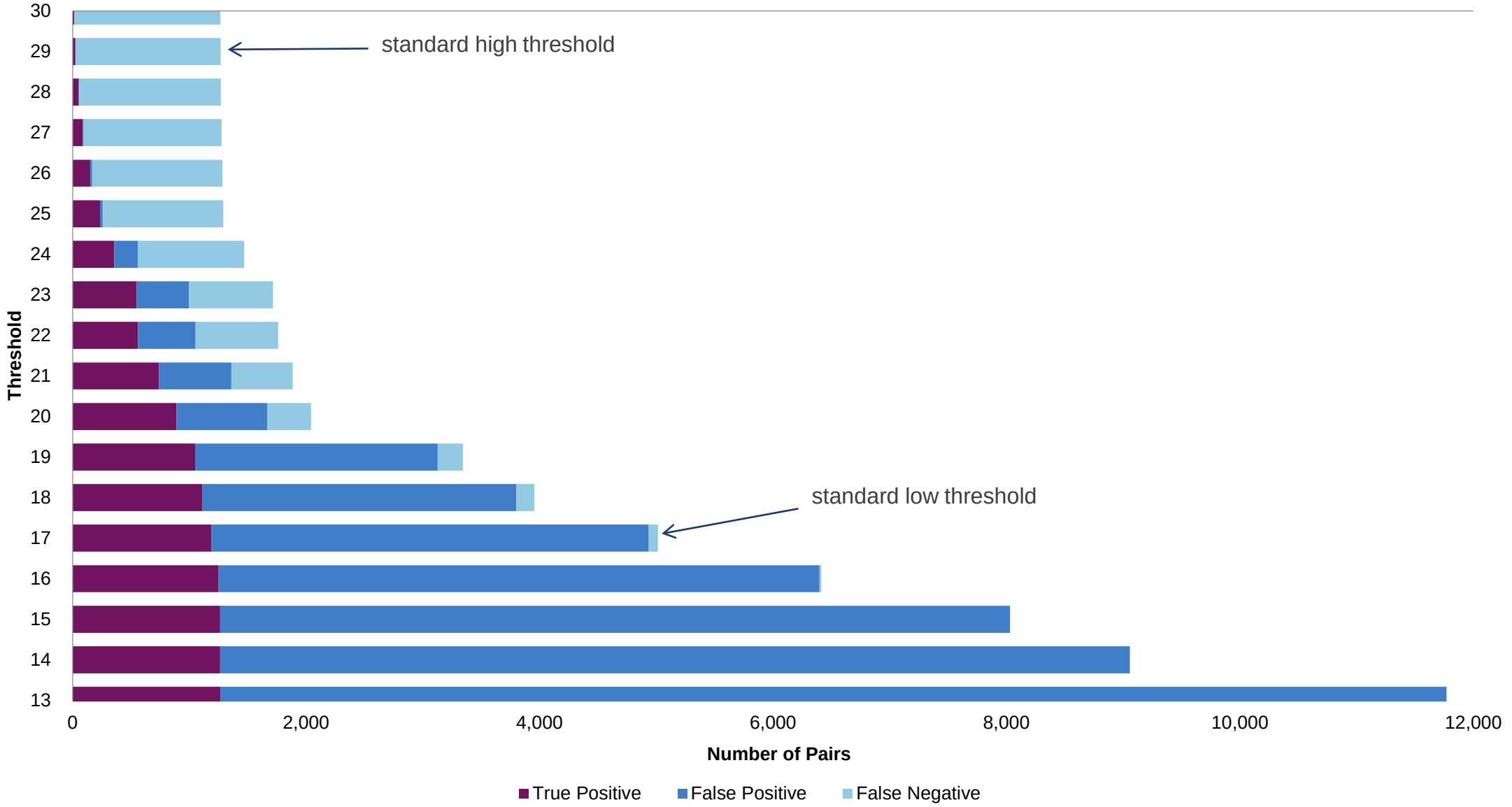
PDMP standards on the Interoperability Standards Advisory (ISA)

Allows for the Exchange of State Prescription Drug Monitoring Program (PDMP) Data

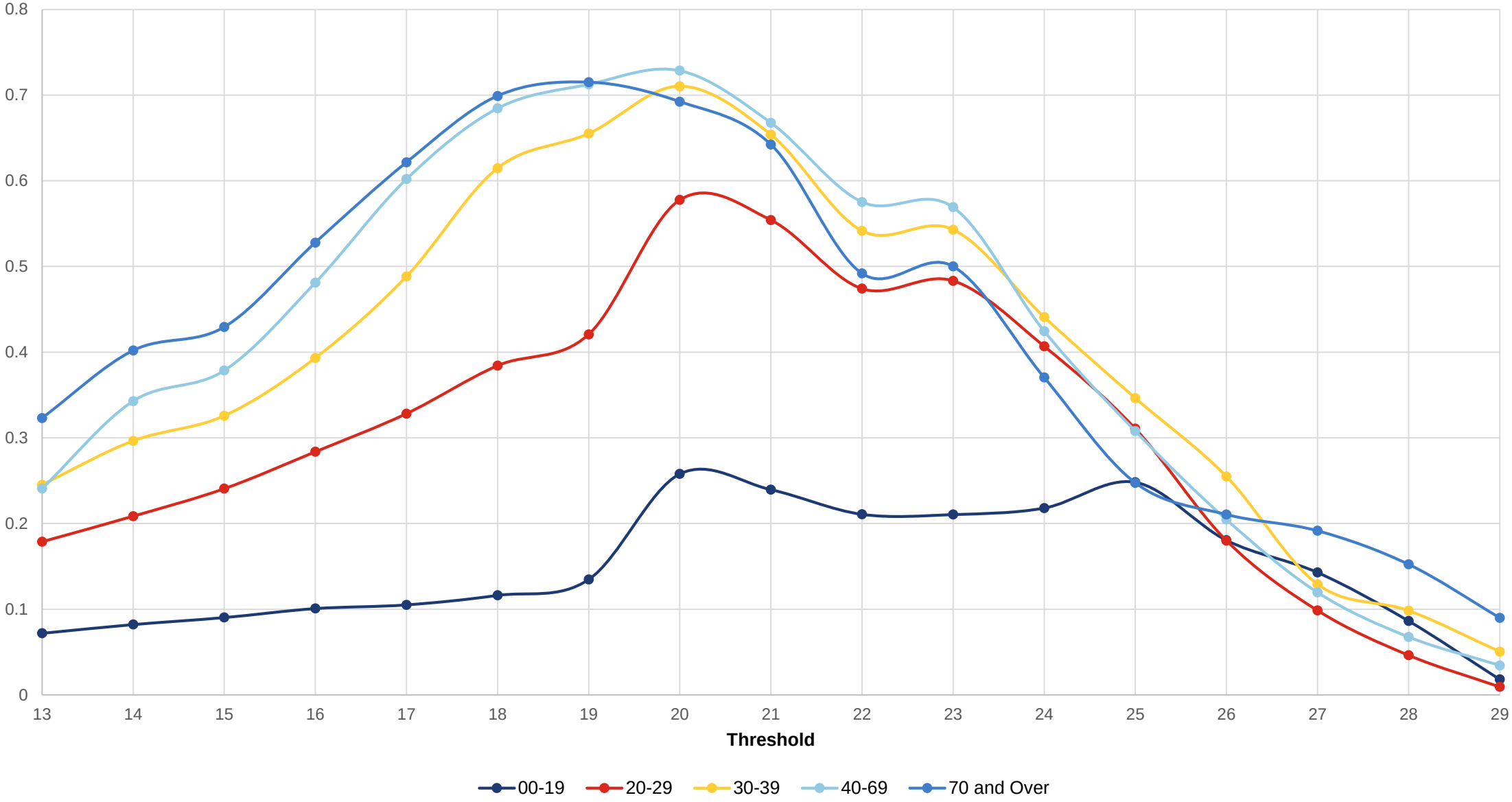
Type	Standard / Implementation Specification	Standards Process Maturity	Implementation Maturity	Adoption Level	Federally required	Cost	Test Tool Availability
Implementation Specification	NCPDP SCRIPT Standard, Implementation Guide, Version 2017071	Final	Production	Feedback Requested	No	$	No
Implementation Specification	NCPDP SCRIPT Standard, Implementation Guide, Version 10.6	Final	Production	●○○○○	No	$	No
Implementation Specification	NCPDP Prescription Drug Monitoring Programs Reporting Standard, Implementation Guide, Version 11	Final	Pilot	Feedback Requested	No	$	No
Standard	NCPDP Telecommunication Standard, Version D	Final	Production	Feedback Requested	No	$	No
Implementation Specification	NIEM, Version 3.2	Final	Production	●●●●●	No	Free	No
Standard	PMIX, Version 2	Final	Production	●●●●○	No	Free	No
Standard	2020 ASAP Version 4.2B Standard for Prescription Monitoring Programs	Final	Pilot	Feedback Requested	Yes	Free	No
Standard	2017 ASAP Version 4.2A Standard for Prescription Monitoring Programs	Final	Production	●●●○○	No	Free	No
Standard	2011 ASAP Version 4.2 Standard for Prescription Monitoring Programs	Final	Production	●●●●●	No	Free	No
Standard	2015 ASAP Prescription Monitoring Program Web Service Standard 2.1A	Final	Production	●●●●●	No	Free	No
Standard	2010 ASAP Prescription Monitoring Program Standards Versions 1.0 for PMP Zero Reports and Error Reports	Final	Production	●●●○○	No	Free	No
Standard	HL7, Version 2	Final	Production	Feedback Requested	No	Free	No
Emerging Standard	*HL7 FHIR Implementation Guide: US Meds STU2*	*Balloted Draft*	*Pilot*	*Feedback Requested*	*No*	*Free*	*No*

Patient Matching Algorithms

Example results: algorithm testing
True positives, false positives, and false negatives



Example results: algorithm testing
F-score for each threshold by age category



Example results: ONC Patient Matching Algorithm Challenge
Test data quality and approach

- Winners include:
  - Best F-score (a measure of accuracy that factors in both precision and recall):
    - First Place: Vynca
    - Second Place: PICSURE
    - Third Place: Information Softworks
  - Best First Run: Information Softworks
  - Best Recall: PICSURE
  - Best Precision: Ocuvera

	Team Name	Best F-Score	Algorithm / Manual review
1st	Vynca	0.975028	• 2nd-level model, combining 8 predictors • Some confirmatory manual review
2nd	PICSURE	0.974902	• Fellegi-Sunter • Significant amount of manual review
3nd	Information Softworks	0.974632	• Fellegi-Sunter • Minimal confirmatory manual review

Data Quality

Sources of error and data quality issues

Poor data quality significantly inhibits the ability to accurately match patients

Sources of error and responsibility

- Who is responsible for data quality issues?
  - PDMPs?
  - Pharmacists and staff?
  - Prescribers and staff?
  - Patient registration/scheduling?
  - HIEs?
  - PBMs?
  - Other intermediaries?
  - Others?

Data quality issues

- Typos
- Truncations
- Misspellings
- Transpositions
- Transliterations
- Permutations
- Empty or incomplete fields
- Fields filled with false data
- Particle or element segmentation or omission

Example results: dimensions of data quality

Dimensions of data quality

- Completeness
- Uniqueness
- Comparability
- Distinctiveness
- Validity
- Consistency
- Accuracy
- Timeliness

Example from the Sequoia Framework for Cross-Organizational Patient Identity Management

Sequence	Combination of Elements	Completeness	Uniqueness
1	FN+LN+DoB	98.20%	95.70%
2	FN+LN+DoB+Sex	98.20%	95.90%
3	FN+LN+DoB+Sex+ZIP(first 5)	91.10%	99.20%
4	FN+LN+DoB+Sex+Phone	76.20%	99.50%
5	FN+LN+DoB+Sex+MN	59.90%	98.90%
6	FN+LN+DoB+Sex+MN(initial)	60.00%	97.70%
7	FN+LN+DoB+Sex+SSN(last 4)	61.90%	99.70%

Addressing data quality challenges with technology

Addressing the challenges

- Translation
- Transformation
  - Normalization
  - Standardization
  - Validation

➢ BEFORE matching occurs

- Align translation, transformation, and algorithm tuning (if accessible)

Available technology

- 3rd party software services
  - Accuracy?
  - ROI?
- PDMP vendor services
- Homegrown efforts

The Office of the National Coordinator for Health Information Technology

Contact ONC

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