NCPDP FOUNDATION

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Evaluating the NCPDP/HL7® FHIR® Specialty Medication Enrollment Implementation Guidance for Data Quality and Usefulness

Grant Funded to:

University of Minnesota College of Pharmacy
Surescripts

NCPDP Integration:

WG11 | ePrescribing & Related Transactions
WG10 | Professional Pharmacy Services
-Patient Consent TG

NCPDP/HL7® FHIR® Specialty Medication Enrollment Implementation Guide

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Abstract

This study analyzed four primary data sources, each of which utilized the NCPDP/HL7® Specialty Medication Enrollment Standard, for completeness, plausibility, concordance, and currency. The goal was to evaluate the frequency and quality of the data received by the specialty pharmacy. Results showed a high degree of completeness in the data received with areas for improvement noted to improve interoperability and use of Electronic Health Records. Specifically, physiologically implausible data, lack of standardization in units of measurement, and data too old to be meaningful were all found within the analyzed data sets. Recommendations include improvement of data quality through standardization of units, alerts on physiologically implausible values and outdated data, and omitting incomplete data.

Background

Patient healthcare data accessed through electronic health records continues to be developed and utilized throughout the healthcare industry. Baseline data quality can provide benchmarks for comparison to determine if data quality efforts within electronic records are effective. Data quality audits and feedback from clinician reports, compared to benchmarks, have shown to improve data quality (van der Bij et al., 2017). One study found that among pediatric medication errors dosing errors are most common, inferring that patient data accuracy is a vital component for the safe use of medications (Wong et al., 2004).

Three areas of data quality have been identified during efforts to create a data quality framework: conformance to data standards, data completeness, and data plausibility (Kahn et al., 2016). The Weiskopf clinical data quality framework was utilized for this study. This framework provides a general approach for data quality assessment that aids in identifying measurable dimensions of data quality and incorporates elements of data context (Weiskopf & Weng, 2013; Weiskopf et al., 2013). This study analyzed four primary data sources which utilized the specialty medication gateway and included information on allergies, medications, laboratory observations, and diagnostic data for completeness, plausibility, concordance, and currency.

Research Objective

This study had two research aims:

1. **Evaluate the frequency which information received by the specialty pharmacy from EHRs is populated.**
2. **Evaluate the quality of the information received by the specialty pharmacy.**

Research Findings

The study provides insight on the data exchanged with the NCPDP/HL7® Specialty Medication Enrollment Standard within the Surescripts gateway. Results found that data quality varies by the type of data assessed. Overall, a high quality of data was found though there were areas for improvement in coded, standardized, complete, and unit information data.

Data Completeness

A high degree of completeness was notated in the data analyzed. Complete tables for each four sets of information researched (allergies, medications, laboratory observations, and diagnostic data) are below.

Allergy Table Column Names	% Complete
date	100
msg_id	100
patient_hash	100
gender	99.65
zip_3_cd	100
age_bracket	100
requested_medication_ndc_code	100
request_medication_name	100
allergy_desc	97.54
allergy_code	99.12
allergy_code_system	99.15
allergy_onset_date	91.58
reaction_manifestation_code	69.37
reaction_manifestation_system	79.42
reaction_manifestation_display	79.09
clinical_status_code	100
verification_status_code	99.89
allergy_note	16.77
allergy_recorded	98.87
reaction_substance_text	0
reaction_severity	0.18

Medication Table Column Names	% Complete
date	100
msg_id	100
patient_hash	100
gender	99.54
zip_3_cd	100
age_bracket	100
requested_medication_ndc_code	100
request_medication_name	100
medication_name	100
medication_code	97.29
medication_code_system	97.47

Observation Table Column Names	% Complete
date	100
msg_id	100
patient_hash	100
gender	99.58
zip_3_cd	100
age_bracket	100
requested_medication_ndc_code	100
request_medication_name	100
observation_desc	99.68
observation_code	78.56
observation_code_system	90.38
observation_code_display	79.9
observation_category	19.09
observation_value	100
observation_uom	78.48
observation_start_date	99.9
observation_end_date	99.91

Diagnosis Table Column Names	% Complete
date	100
msg_id	100
patient_hash	100
gender	99.5
zip_3_cd	100
age_bracket	100
requested_medication_ndc_code	100
request_medication_name	100
diagnosis_desc	97.97
diagnosis_code	99.95
diagnosis_code_system	99.95
diagnosis_date_onset	89.95

Data Plausibility

Using body height and weight measurements, research found issues around height, weight, and other measures. More specifically, there was a lack of consistency in units of measure. Researchers noted the lack of clarification on the unit of measure could cause issues in medication dosing and found ambiguous units of measure for both height and weight such as “246”, “271”, “Cel”, and “1”. These units of measure are unusual with no clear meaning for either height or weight.

Implausible data was noted in the height category with .087% of all instances of height being less than 9 inches and .005% of all instances of height being more than 272 centimeters (about 8.92 ft). In the weight category, there were ambiguous units of measure.

Data Concordance

Researchers assessed allergy values for concordance based on the counts of allergies per unique patient and message. After analysis, data showed 1% of the subject identifier/message combinations were within message variation. However, further analysis revealed large differences between the average and median values with a much lower median than average indicating skewed results due to outliers.

Data Currency

Researchers analyzed data for currency using the difference between the date of the medication request and the date of four observations: body height, body weight, BMI, and creatinine. Median information currency was 1-2 months old for body height, weight, and BMI with upper quartiles in excess of 4 months old. Creatinine showed less current data with a median information currency of 6 months, 30% of values being more than 1 year old, and an upper quartile over 22 years old.

Recommendations to Move Forward

Future research could evaluate drugs dispensed by specialty pharmacies to develop specific measures. This approach would determine information needed by pharmacists reviewing the medications and identify data quality measures pertaining to laboratory parameters such as pharmacogenomics and clinical indication. Researchers provided several recommendations to enhance data quality for improved interoperability and use of EHR data by pharmacists.

Improve Data Quality. Increase the value of exchanged data.

1. Standardize data based on units to a single accepted unit of measure. This could be implemented in the workflow on the data generation side or via the exchange of data.
2. Exclude data via information exchanges rules that limits data without standard units.
3. Infer the meaning of data provided without standard units. Researchers notated the substantial amount of testing needed to ensure inference accuracy due to the effect on clinical decision making.
4. Create data checks for physiologically improbable values. Add flags or alerts to these data sets to guide pharmacists in obtaining clarification during the dispensing process. This could add to and be impacted by alert fatigue.

Notate Data Currency. Identify data too old to be relied upon.

1. Utilize automatic checks on result dates to flag data too old for use and alert the pharmacist that an intervention for additional testing may be needed. This is supported by a research study which found the highest rate of provider action on pharmacist recommendations was for 'laboratory tests for evaluation' (NCPDP Foundation, 2024). Researchers notated two implementation options:
    a. Identify these values and flag those out of currency with integrated ePrescribing and clinical decision support to address the issue at the time of prescribing.
    b. Identify these values and flag those out of currency with clinical decision support and ePrescribing rules.

NCPDP Integration

WG11	ePrescribing & Related Transactions
WG10	Professional Pharmacy Services

- **Patient Consent Task Group**
  The goal of this task group is to allow for the electronic exchange of patient consent information necessary to fulfill prescribed therapy and/or devices for the purpose of transmitting such information in DME and Specialty Pharmacy related transactions for entities or circumstances that have additional regulatory requirements related to consent.

Disclosures

Research was performed by the Grantee, the University of Minnesota College of Pharmacy, with participation by Surescripts, was funded by the NCPDP Foundation, and final results were provided to the NCPDP Foundation by the Grantee.

The University of Minnesota College of Pharmacy did not indicate whether AI was utilized in the drafting and writing of the report provided to the NCPDP Foundation. This abridged results paper did not utilize AI.

As of the publication of this abridged report, and to the best knowledge of the NCPDP Foundation, the original report(s) generated by the University of Minnesota College of Pharmacy are not available online.

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