Supplementary Data

Sample FHIR and CDS-Hooks instances are shown below:

1. Sample XML-formatted FHIR Observation, containing an HGVS-encoded variant of the TPMT gene, along with allelic state.
2. Sample XML-formatted FHIR Observation, representing a TPMT 2 star allele.
3. Sample XML-formatted FHIR Observation, representing a TPMT 1/2 genotype.
5. Sample JSON-formatted CDS-Hooks suggestion card.


   <Observation xmlns="http://hl7.org/fhir">
   <id value="Connectathon_ObservationGeneticsExample1"/>
   <extension url="http://hl7.org/fhir/StructureDefinition/observation-geneticsDNASequenceVariantName">
     <valueCodeableConcept>
       <text value="NM_000367.4(TPMT):c.238G&gt;C (p. Ala80Pro)"/>
     </valueCodeableConcept>
   </extension>
   <extension url="http://hl7.org/fhir/StructureDefinition/observation-geneticsGenomicSourceClass">
     <valueCodeableConcept>
       <text value="NM_000367.4(TPMT):c.238G&gt;C (p. Ala80Pro)"/>
     </valueCodeableConcept>
   </extension>
   <coding>
     <code value="12721"/>
     <display value="NM_000367.4:c.238G&gt;C"/>
   </coding>
   </Observation>


   <Observation xmlns="http://hl7.org/fhir">
   <id value="Connectathon_HaplotypeObservationExample1"/>
   <extension url="http://hl7.org/fhir/StructureDefinition/observation-geneticsGene">
     <valueCodeableConcept>
       <text value="TPMT"/>
     </valueCodeableConcept>
   </extension>
   <extension url="http://hl7.org/fhir/StructureDefinition/observation-geneticsHaplotypeCall">
     <valueCodeableConcept>
       <text value="Haplotype Call"/>
     </valueCodeableConcept>
   </extension>
   <coding>
     <system value="http://loinc.org"/>
     <code value="12014"/>
     <display value="TPMT"/>
   </coding>
   </Observation>

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3. Sample XML-formatted FHIR Observation, representing a
  <Observation xmlns="http://hl7.org/fhir">
    <id value="Connectathon_DiplotypeObservationExample1"/>
    <extension url="http://hl7.org/fhir/StructureDefinition/observation-geneticsGene"/>
    <valueCodeableConcept>
      <coding>
        <system value="http://www.genenames.org"/>
        <code value="2018-09-28"/>
        <display value="TPMT"/>
      </coding>
    </valueCodeableConcept>
    <context>
      <reference value="Patient/4542"/>
    </context>
    <subject>
      <reference value="Patient/4542"/>
    </subject>
    <author>
      <reference value="Patient/4542"/>
    </author>
    <related>
      <type value="derived-from"/>
      <reference value="Connectathon_HaplotypeObservationExample1"/>
    </related>
    <status value="final"/>
  </Observation>

4. Sample JSON-formatted CDS-Hooks hook instance (based on https://cds-hooks.org/specification/1.0/).
{
  "hookInstance": "e7a70d1e-8f41-4b68-b531-468c8dcafd57",
  "hook": "medication-prescribe",
  "fhirServer": "https://sapphire-demo.meliorix.com/sapphire-fhir/baseDstu2",
  "user": "Practitioner/COREPRACTITIONER1",
  "patient": "4542",
  "context": {
    "patientId": "4542",
    "medications": {
      "resourceType": "Bundle",
      "entry": [
        {
          "resource": {
            "resourceType": "MedicationOrder",
            "dateWritten": "2018-09-14",
            "status": "draft",
            "medicationCodeableConcept": {
              "coding": [
                {
                  "display": "Azathioprine 100 MG Oral Tablet",
                  "system": "http://snomed.info/sct",
                  "code": "359228"
                }
              ],
              "text": "Drug-Gene Interaction Alert, Rheumatoid arthritis (SNOMEDCT Code: 156471009)"
            }
          }
        }
      ]
    }
  }
}

5. Sample JSON-formatted CDS-Hooks suggestion card (based on https://cds-hooks.org/specification/1.0/).
{
  "cards": [
    {
      "summary": "Drug-Gene Interaction Alert, Rheumatoid arthritis (SNOMEDCT Code: 156471009)"
    }
  ]
}
Azathioprine Alert!! Patient is heterozygous for an inactivating allele of the TPMT gene. Reduce the typical starting dose by 50%.

Indicator: warning

Suggestions: 

- Reduce Dose,

{
  "resource": {
    "extension": [
      {
        "valueString": "pharmacogenomics-dosage-suggestion",
        "url": "http://cip.elimu.io/pharmacogenomics"
      }
    ],
    "dosageInstruction": [
      {
        "timing": {
          "repeat": {
            "period": 1,
            "periodUnits": "d",
            "boundsPeriod": {
              "start": "2018-09-10",
              "end": "2018-09-28"
            },
            "frequency": 1
          }
        },
        "doseQuantity": {
          "system": "http://unitsofmeasure.org",
          "code": "(pill),"
          "value": 1.5
        }
      }
    ],
    "patient": {
      "reference": "Patient/4591"
    },
    "medicationCodeableConcept": {
      "coding": [
        {
          "code": "359229",
          "display": "Azathioprine 75 MG Oral Tablet"
        }
      ],
      "text": "Azathioprine 75 MG Oral Tablet"
    },
    "dateWritten": "2018-09-14",
    "resourceType": "MedicationOrder",
    "status": "draft"
  },
  "description": "Reduce the typical starting dose by 50%,"
  "type": "update"
}
}

Source: Clinical Pharmacogenomics Implementation Consortium,

"url": "https://cpicpgx.org/guidelines/guideline-for-thiopurines-and-tpmt/"