

# Data Types in EHR

## Demographics

- Patient name, DOB, gender
- Address, contact information
- Insurance details
- Emergency contacts

## Diagnoses/Procedures

- ICD-10 coded diagnoses
- CPT procedure codes
- Problem lists
- Surgical history

## Medications

- Current medications
- Prescription history
- Allergies & adverse reactions
- Dosage and frequency

## Laboratory Results

- Blood tests, imaging
- Pathology reports
- Vital signs
- LOINC coded values

## Clinical Notes

- Progress notes
- Consultation reports

- Discharge summaries
- Nursing documentation

## 1 Demographics

Demographic data forms the foundation of every EHR, containing essential patient identification and contact information. This structured data enables accurate patient identification, prevents medical errors, facilitates communication, and supports administrative processes like billing and insurance verification. Demographic information must be kept current and accurate throughout the patient's care journey.



### Patient Demographics Example

**Full Name:** Sarah Michelle Johnson

**Date of Birth:** March 15, 1985 (38 years old)

**Gender:** Female

**Medical Record #:** MRN-2024-789456

**Address:** 1245 Oak Street, Apt 3B, Seattle, WA 98101

<b>Phone:</b>	Mobile: (206) 555-0147   Home: (206) 555-0148
<b>Email:</b>	sarah.johnson@email.com
<b>Primary Insurance:</b>	Blue Cross Blue Shield   Policy #: BCBS-8547961
<b>Emergency Contact:</b>	Michael Johnson (Spouse) - (206) 555-0149
<b>Preferred Language:</b>	English



### Key Importance of Demographics

- ✓ **Patient Identification:** Prevents medical errors by ensuring correct patient matching across healthcare systems
- ✓ **Contact & Communication:** Enables appointment reminders, test results delivery, and emergency notifications
- ✓ **Billing & Insurance:** Facilitates claims processing and insurance verification for healthcare services
- ✓ **Population Health:** Supports epidemiological studies and public health reporting based on demographic patterns
- ✓ **Legal & Regulatory:** Meets HIPAA requirements and maintains accurate healthcare records for legal purposes

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## Diagnoses & Procedures

Diagnoses and procedures represent the clinical conditions affecting patients and the medical interventions performed.

These are systematically coded using standardized classification systems like ICD-10 (International Classification of Diseases) for diagnoses and CPT (Current Procedural Terminology) for procedures. This standardization enables accurate billing, clinical research, quality measurement, and interoperability between healthcare systems.



## Diagnosis & Procedure Coding Example

### Active Problem List

**Primary Diagnosis:** Type 2 Diabetes Mellitus (ICD-10: E11.9)

**Secondary Diagnosis:** Essential Hypertension (ICD-10: I10)

**Chronic Condition:** Hyperlipidemia (ICD-10: E78.5)

**Recent Diagnosis:** Acute Bronchitis (ICD-10: J20.9) - Date: Nov 2024

**ICD-10 Code Structure:** E11.9 - Type 2 Diabetes Mellitus  
└ E: Endocrine, nutritional and metabolic diseases  
└ 11: Type 2 diabetes mellitus  
└ .9: Without complications

### Procedure History

**Recent Procedure:** Colonoscopy (CPT: 45378) - Oct 15, 2024

**Surgical History:** Laparoscopic Cholecystectomy (CPT: 47562) - March 2022



### Importance of Standardized Coding

- ✓ **Interoperability:** Enables seamless data exchange between different healthcare systems and providers
- ✓ **Billing & Reimbursement:** Required for insurance claims processing and determining payment amounts
- ✓ **Clinical Research:** Facilitates large-scale studies by providing standardized disease classification
- ✓ **Quality Measurement:** Supports tracking of treatment outcomes and healthcare quality metrics
- ✓ **Public Health Surveillance:** Enables monitoring of disease trends and outbreak detection at population level
- ✓ **Clinical Decision Support:** Powers alert systems and evidence-based treatment recommendations

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## Medications

Medication data is critical for patient safety and clinical decision-making. EHR systems maintain comprehensive medication records including current prescriptions, historical medications, allergies, adverse reactions, dosing information, and drug interactions. This information helps prevent medication errors, supports clinical decision-making, and enables drug safety monitoring across the healthcare continuum.



### Medication Management Example

Medication Name	Dosage	Frequency	Route	Start Date	Status
<b>Metformin</b> For Type 2 Diabetes	500 mg	Twice daily	Oral	Jan 2022	Active
<b>Lisinopril</b> For Hypertension	10 mg	Once daily	Oral	March 2022	Active
<b>Atorvastatin</b> For Hyperlipidemia	20 mg	Once at bedtime	Oral	June 2023	Active
<b>Amoxicillin</b> For Acute Bronchitis	500 mg	Three times daily	Oral	Nov 10, 2024	Active (7 days)

**Drug Allergies & Adverse Reactions:**

- Penicillin - Severe rash and hives (documented 2015)
- Sulfa drugs - Difficulty breathing (documented 2018)

**Prescription Details - Metformin****Generic Name:**

Metformin Hydrochloride

**Brand Name:**

Glucophage

**NDC Code:**

0093-7214-01

**Prescriber:**

Dr. Emily Martinez, MD (Endocrinology)

**Pharmacy:**

Walgreens #5847, Seattle, WA



### Critical Medication Safety Features

- ✓ **Drug Interaction Checking:** Automated alerts warn clinicians about potential dangerous drug combinations
- ✓ **Allergy Alerts:** System prevents prescribing medications to which patient has known allergies
- ✓ **Dosing Guidance:** Clinical decision support provides age, weight, and renal function-adjusted dosing
- ✓ **Medication Reconciliation:** Ensures accurate medication lists during care transitions to prevent errors
- ✓ **E-Prescribing:** Electronic transmission to pharmacies reduces errors from handwritten prescriptions
- ✓ **Adherence Monitoring:** Tracks refill patterns to identify potential medication non-adherence issues

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## Laboratory Results

Laboratory results include diagnostic test outcomes from blood work, imaging studies, pathology reports, and vital signs measurements. These results are often coded using LOINC (Logical Observation Identifiers Names and Codes) for standardization. Laboratory data is essential for diagnosis, treatment monitoring, disease prevention, and clinical decision-making. EHR systems typically display results with reference ranges, trending graphs, and flags for abnormal values.



## Laboratory Results Example

### Complete Blood Count (CBC) - November 18, 2024

#### White Blood Cell Count

Reference Range:  $4.5\text{-}11.0 \times 10^3/\mu\text{L}$

$7.2 \times 10^3/\mu\text{L}$

Normal

#### Hemoglobin

Reference Range: 12.0-16.0 g/dL (Female)

13.8 g/dL

Normal

#### Platelet Count

Reference Range:  $150\text{-}400 \times 10^3/\mu\text{L}$

$245 \times 10^3/\mu\text{L}$

Normal

### Metabolic Panel - November 18, 2024

#### Glucose (Fasting)

Reference Range: 70-100 mg/dL

128 mg/dL

High

#### HbA1c (Glycated Hemoglobin)

Target Range: <5.7% (Non-diabetic)

7.2%

Elevated

## Creatinine

Reference Range: 0.6-1.2 mg/dL

0.9 mg/dL

Normal

### Vital Signs - Today's Visit

**Blood Pressure:** 134/86 mmHg (Slightly elevated)

**Heart Rate:** 76 bpm (Normal)

**Temperature:** 98.4°F (36.9°C) - Normal

**Respiratory Rate:** 16 breaths/min (Normal)

**Oxygen Saturation:** 98% on room air (Normal)

**BMI:** 28.5 kg/m<sup>2</sup> (Overweight - Height: 5'6", Weight: 176 lbs)

**LOINC Coding Example:** Test: Hemoglobin A1c ┌ **LOINC Code:** 4548-4 ┌ **Component:** Hemoglobin A1c/Hemoglobin.total ┌ **Property:** Mass Fraction ┌ **Time:** Point in time ┌ **System:** Blood ┌ **Scale:** Quantitative



Value of Laboratory Data in EHR

- ✓ **Clinical Decision Support:** Results automatically trigger alerts for critical values requiring immediate action
- ✓ **Trend Analysis:** Historical results displayed graphically help identify disease progression or treatment response
- ✓ **Standardized Coding:** LOINC codes enable consistent interpretation across different laboratory systems
- ✓ **Reference Ranges:** Context-specific normal ranges adjusted for age, gender, and pregnancy status
- ✓ **Automatic Flagging:** Abnormal results highlighted for quick clinician attention and follow-up
- ✓ **Quality Control:** Integration with laboratory information systems ensures result accuracy and timeliness

## 5 Clinical Notes

Clinical notes represent the narrative documentation of patient encounters, capturing the clinical reasoning, assessment, and plan of healthcare providers. These include progress notes, consultation reports, discharge summaries, nursing documentation, and operative reports. While structured data provides quantitative information, clinical notes offer essential qualitative context, clinical thinking, and the story of the patient's care journey. Modern EHR systems support both structured data entry and free-text documentation.



### Clinical Documentation Examples

#### Progress Note - Primary Care Visit

November 18, 2024 | 10:30 AM

**Provider:** Dr. Emily Martinez, MD (Internal Medicine)

**Chief Complaint:** Follow-up for Type 2 Diabetes and Hypertension management; persistent cough for 5 days

**History of Present Illness:** 38-year-old female with established Type 2 Diabetes (diagnosed 2022) and Essential Hypertension presents for routine follow-up. Patient reports good medication adherence but notes elevated home glucose readings averaging 140-160 mg/dL fasting. Also reports productive cough with yellow sputum, low-grade fever (100.2°F), and fatigue for past 5 days. Denies chest pain, shortness of breath at rest, or hemoptysis.

**Physical Examination:**

- General: Alert, oriented, mild respiratory distress
- Vital Signs: BP 134/86, HR 76, Temp 100.8°F, RR 18, SpO<sub>2</sub> 98% RA
- Respiratory: Bilateral decreased breath sounds in lower lobes, scattered rhonchi, no wheezes
- Cardiovascular: Regular rate and rhythm, no murmurs
- Extremities: No edema, pedal pulses intact

**Assessment & Plan:**

1. **Acute Bronchitis (ICD-10: J20.9)** - Likely viral but consider bacterial superinfection given productive sputum and fever duration

- Prescribed Amoxicillin 500mg PO TID x 7 days
- Recommended increased fluid intake and rest
- Follow-up if symptoms worsen or persist beyond 7 days

2. **Type 2 Diabetes Mellitus (ICD-10: E11.9)** - Suboptimal control with HbA1c 7.2% (target <7%)

- Increase Metformin to 1000mg PO BID (from 500mg BID)
- Reinforce dietary counseling and refer to diabetes educator
- Recheck HbA1c in 3 months

3. **Essential Hypertension (ICD-10: I10)** - Adequately controlled on current regimen

- Continue Lisinopril 10mg daily
- Encourage DASH diet and sodium restriction

#### 4. Hyperlipidemia (ICD-10: E78.5) - Continue Atorvastatin 20mg at bedtime

**Follow-up:** Return to clinic in 2 weeks for bronchitis reassessment and diabetes medication adjustment review.

Schedule 3-month follow-up for diabetes management and lab work.



#### Nursing Documentation

November 18, 2024 | 10:15 AM

**Nurse:** Sarah Thompson, RN

##### Patient Education Provided:

- Explained proper use of glucometer and importance of daily glucose monitoring
- Reviewed signs/symptoms of hypoglycemia and hyperglycemia
- Discussed dietary modifications for diabetes management (limit refined carbohydrates, increase fiber intake)
- Provided written materials on blood pressure self-monitoring techniques
- Patient demonstrated understanding and ability to teach-back all education points

**Medication Reconciliation:** Reviewed all current medications with patient. Patient confirmed adherence to all prescribed medications. Updated allergy list (confirmed Penicillin and Sulfa drug allergies).

**Patient Response:** Patient expressed concern about elevated blood sugars and motivated to improve dietary habits. Scheduled appointment with diabetes educator for next week.



#### Discharge Summary (Example)

October 17, 2024

##### Hospital Course Summary - 3-Day Admission

**Admission Diagnosis:** Acute Cholecystitis

**Discharge Diagnosis:** Acute Calculous Cholecystitis, status post Laparoscopic Cholecystectomy

**Procedures:** Laparoscopic Cholecystectomy performed October 16, 2024

**Hospital Course:** Patient admitted with 24-hour history of severe right upper quadrant pain, nausea, and low-grade fever. Ultrasound confirmed gallstones with gallbladder wall thickening consistent with acute cholecystitis. Patient underwent successful laparoscopic cholecystectomy without complications. Postoperative recovery unremarkable. Pain well-controlled with oral analgesics. Tolerating regular diet. Ambulating independently.

**Discharge Medications:**

- Acetaminophen 500mg PO Q6H PRN pain
- Ibuprofen 400mg PO Q6H PRN pain (avoid aspirin due to surgical site)
- Resume all home medications (Metformin, Lisinopril, Atorvastatin)

**Discharge Instructions:**

- Keep incision sites clean and dry; may shower but no bathing for 1 week
- No heavy lifting (>10 lbs) for 2 weeks
- Gradually resume normal activities as tolerated
- Follow low-fat diet for 2-4 weeks post-surgery
- Watch for signs of infection: fever >101°F, increased redness, drainage, or severe pain

**Follow-up:** Surgical follow-up appointment scheduled for October 31, 2024 at 2:00 PM with Dr. Robert Chen (Surgery). Call office if any concerns arise before then.



### Clinical Notes Best Practices & Importance

- ✓ **Comprehensive Documentation:** Notes capture clinical reasoning, differential diagnoses, and decision-making processes not found in structured data
- ✓ **Legal Protection:** Detailed documentation protects providers legally by demonstrating appropriate standard of care
- ✓ **Care Coordination:** Progress notes facilitate communication among multiple providers caring for the same patient
- ✓ **Continuity of Care:** Historical notes provide context for understanding patient's care trajectory over time

- ✓ **Quality & Safety:** Documentation supports quality improvement initiatives and patient safety reporting
- ✓ **Billing & Compliance:** Notes justify medical necessity for procedures and support appropriate reimbursement coding
- ✓ **Template Integration:** Modern EHRs use smart templates that combine structured data entry with narrative flexibility



## Integration & Interoperability

All five data types work together in modern EHR systems to create a comprehensive patient record. Standardized coding systems (ICD-10, CPT, LOINC, NDC) enable data exchange between different healthcare organizations through standards like HL7 FHIR. This interoperability is essential for coordinated care, population health management, clinical research, and value-based healthcare delivery. The combination of structured data and narrative documentation provides both computational analysis capabilities and the rich clinical context necessary for optimal patient care.