Interoperability Analysis: Updated Hospital Databases

1. Structural Interoperability

This is achieved through consistent use of relational database structures with normalized tables across departments.
Examples include:

- patients, visits, and medicalhistories in the Reception DB.
- imagingrecords and imagingresults in the Radiology DB.
- labtests and labtestresults in the Laboratory DB.
- medicalprocedures and vitals in the Internal Medicine DB.
- diagnoses and cardioprocedures in the Cardiology DB.

Each table uses primary keys (e.g., visit_id, patient_id, procedure_id) ensuring referential integrity.

2. Syntactic Interoperability

This is achieved using standardized coding systems and structured formats:

- SNOMED codes used in medicalhistories, patientsymptoms, and diagnoses.
- ICD-10 used in imagingresults (e.g., 'I77.1' for mesenteric artery stricture).
- LOINC codes in labtests (e.g., '2093-3' for Cholesterol).

These codes ensure all systems interpret the data fields correctly and uniformly.

3. Semantic Interoperability

This ensures a shared clinical understanding between systems:

- 'High' cholesterol from labtestresults semantically maps to 'Hyperlipidemia' (SNOMED: 55822004).
- Imaging finding 'Stricture of superior mesenteric artery' (ICD-10: I77.1) leads to diagnosis 'Chronic mesenteric ischemia' (SNOMED: 111354009).
- Prescribed drugs such as 'Aspirin 81 mg daily' reflect consistent cardiovascular therapy aligned with

procedures in cardioprocedures and surgeryresults.

Such semantic mapping supports continuity of care and unified clinical interpretation.

Summary

The hospital databases - spanning reception, radiology, lab, internal medicine, cardiology, and surgery - collectively demonstrate:

- Structural Interoperability: via relational schemas and foreign keys.
- Syntactic Interoperability: through standards like SNOMED, LOINC, and ICD-10.
- Semantic Interoperability: ensuring clinical data carries consistent meaning across departments.

This design promotes integrated, high-quality patient care across all hospital units.