



**Real-time AI-based disease diagnosis with  
advanced powered hybrid-based health analysis includes organ donor,  
recipient,  
and optimized medical equipment usage, Maintenance System.**

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# Case Study:

The healthcare organization manages a comprehensive patient support infrastructure comprising several **hospita** across different regions.

Each **hospital branch** is uniquely identified and handles **multiple departments** such as cardiology, neurology, nephrology, and more.

## **Patient**

**Attributes:** PatientID (PK), Name, Age, Gender, ContactInfo, BloodType, Weight, Height, Allergies, ChronicConditions, FamilyHistory, LifestyleFactors

### **Relationships:**

- Patient to PhysicalPatientData: one-to-one
- Patient to MentalPatientData: one-to-one
- Patient to donor information: one to one
- Patient to PhysicalHealthMonitoring: one-to-many
- Patient to recipient information: one to many
- Patient to medical equipment inventory: one to many
- Patient to medical consumabale inventory: one to many
- Patient to MentalHealthMonitoring: one-to-many
- Patient to PhysicalSymptomTracking: one-to-many
- Patient to organ matching system: one to one
- Patient to mental cognitive and behavioral analysis: one to one
- Patient to organ storage and logistics : one to one
- Patient to sterilization and safety: one to many
- Patient to MentalSymptomTracking: one-to-many
- Patient to MedicalTest: one-to-many
- Patient to MedicalImage: one-to-many
- Patient to Diagnosis: one-to-many
- Patient to Prescription: one-to-many
- Patient to UsageDispensingRecord: one-to-many
- Patient to PhysicalAIModelPrediction: one-to-many
- Patient to MentalAIModelPrediction: one-to-many
- Patient to Surgery: one-to-many

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## **PhysicalPatientData**

**Attributes:** PatientID (PK, FK), Name, Age, Gender, ContactInfo, BloodType, Weight, Height, Allergies, ChronicConditions, FamilyHistory, LifestyleFactors, MedicalHistory

### **Relationships:**

- PhysicalPatientData to Patient: one-to-one

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## **MentalPatientData**

**Attributes:** PatientID (PK, FK), Name, Age, Gender, ContactInfo, FamilyHistoryOfMentalIllness, PastMentalHealthConditions, CurrentMedications

### **Relationships:**

- MentalPatientData to Patient: one-to-one

### Doctor

**Attributes:** DoctorID (PK), Name, Specialization, LicenseNumber, HospitalName, ContactInfo, ExperienceYears

**Relationships:**

- Doctor to MedicalTest: one-to-many
  - Doctor to Diagnosis: one-to-many
  - Doctor to Prescription: one-to-many
  - Doctor to Surgery: one-to-many
  - Doctor to OrganTransplantProcedure: one-to-many
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### Symptoms

**Attributes:** SymptomID (PK), PatientID (FK), SymptomName, Severity, Duration, OnsetDate, AssociatedConditions

**Relationships:**

- Symptoms to Patient: many-to-one
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### PhysicalHealthMonitoring

**Attributes:** MonitoringID (PK), PatientID (FK), HeartRate, BloodPressure, OxygenSaturation, BloodSugar, BodyTemperature, ActivityLevel, SleepDuration, ExerciseFrequency, Timestamp

**Relationships:**

- PhysicalHealthMonitoring to Patient: many-to-one
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### MentalHealthMonitoring

**Attributes:** MonitoringID (PK), PatientID (FK), StressLevel, AnxietyLevel, DepressionScore, MoodPatterns, SleepQuality, CognitiveFunction, SocialInteractionFrequency, WorkProductivityScore, SuicidalRisk, Timestamp

**Relationships:**

- MentalHealthMonitoring to Patient: many-to-one
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### PhysicalSymptomTracking

**Attributes:** SymptomID (PK), PatientID (FK), SymptomName, Severity, Duration, OnsetDate, AdditionalNotes

**Relationships:**

- PhysicalSymptomTracking to Patient: many-to-one
- 

### MentalSymptomTracking

**Attributes:** SymptomID (PK), PatientID (FK), SymptomName, Severity, Duration, OnsetDate,

AdditionalNotes

**Relationships:**

- MentalSymptomTracking to Patient: many-to-one
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**MentalCognitiveBehavioralAnalysis**

**Attributes:** AnalysisID (PK), PatientID (FK), AttentionSpan, MemoryRetentionScore, DecisionMakingAbility, EmotionalResponsiveness, BehavioralTrends, TherapyProgressScore

**Relationships:**

- MentalCognitiveBehavioralAnalysis to Patient: many-to-one
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**MedicalTest**

**Attributes:** TestID (PK), PatientID (FK), TestName, Description, ResultValue, ResultStatus, TestDate, LabName, PerformedBy (DoctorID)

**Relationships:**

- MedicalTest to Patient: many-to-one
  - MedicalTest to Doctor: many-to-one
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**MedicalImage**

**Attributes:** ImageID (PK), PatientID (FK), ImagePath, ScanType, ImageDate, Findings, AIFindings

**Relationships:**

- MedicalImage to Patient: many-to-one
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**Diagnosis**

**Attributes:** DiagnosisID (PK), PatientID (FK), DiseaseName, DiagnosisDate, Probability, DoctorID (FK), Recommendations

**Relationships:**

- Diagnosis to Patient: many-to-one
  - Diagnosis to Doctor: many-to-one
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**PhysicalAIDiagnosis**

**Attributes:** DiagnosisID (PK, FK), AIConfidenceScore, DoctorVerified, RecommendedTests, TreatmentSuggestions

**Relationships:**

- PhysicalAIDiagnosis to Diagnosis: one-to-one
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### **MentalAIDiagnosis**

**Attributes:** DiagnosisID (PK, FK), AIConfidenceScore, TherapistVerified, RecommendedTreatment, TherapySuggestions

**Relationships:**

- MentalAIDiagnosis to Diagnosis: one-to-one
- 

### **Prescription**

**Attributes:** PrescriptionID (PK), PatientID (FK), DoctorID (FK), MedicineName, Dosage, Duration, Frequency, PrescriptionDate

**Relationships:**

- Prescription to Patient: many-to-one
  - Prescription to Doctor: many-to-one
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### **MedicalConsumablesInventory**

**Attributes:** ConsumableID (PK), Name, Category, SizeOrQtyPerUnit, Manufacturer, BatchNumber, ExpiryDate, StockQuantity, StorageConditions

**Relationships:**

- UsageDispensingRecord to MedicalConsumablesInventory: many-to-one
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### **MedicalEquipmentInventory**

**Attributes:** EquipmentID (PK), Name, ModelNumber, Manufacturer, PurchaseDate, WarrantyExpiryDate, CurrentStatus, AssignedDepartment

**Relationships:**

- SterilizationSafetyCompliance to MedicalEquipmentInventory: many-to-one
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### **MedicineInventory**

**Attributes:** MedicineID (PK), Name, Category, ActiveIngredients, Manufacturer, BatchNumber, ExpiryDate, StockQuantity, StorageConditions

**Relationships:**

- UsageDispensingRecord to MedicineInventory: many-to-one
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### **UsageDispensingRecord**

**Attributes:** UsageID (PK), ItemID (FK), PatientID (FK), DoctorID (FK), QuantityUsed, UsageDate, AdministrationMethod

**Relationships:**

- UsageDispensingRecord to Patient: many-to-one
- UsageDispensingRecord to Doctor: many-to-one
- UsageDispensingRecord to Consumable or MedicineInventory: many-to-one

### Donor

**Attributes:** DonorID (PK), Name, Age, Gender, BloodType, ContactInfo, MedicalHistory, OrganAvailable, OrganHealthStatus, DonationStatus, MatchStatus

**Relationships:**

- Donor to OrganMatch: one-to-many
  - Donor to DonorRecipientFollowUp: one-to-many
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### Recipient

**Attributes:** RecipientID (PK), Name, Age, Gender, BloodType, ContactInfo, MedicalCondition, RequiredOrgan, UrgencyLevel, WaitingListStatus

**Relationships:**

- Recipient to OrganMatch: one-to-many
  - Recipient to DonorRecipientFollowUp: one-to-many
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### OrganMatch

**Attributes:** MatchID (PK), DonorID (FK), RecipientID (FK), BloodCompatibility, TissueMatchScore, PriorityLevel, MatchStatus

**Relationships:**

- OrganMatch to Donor: many-to-one
  - OrganMatch to Recipient: many-to-one
  - OrganTransplantProcedure to OrganMatch: one-to-one
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### OrganTransplantProcedure

**Attributes:** TransplantID (PK), MatchID (FK), HospitalName, SurgeryDate, SurgeonID (FK), ProcedureStatus, PostTransplantCondition

**Relationships:**

- OrganTransplantProcedure to OrganMatch: one-to-one
  - OrganTransplantProcedure to Doctor: many-to-one
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### OrganStorageLogistics

**Attributes:** StorageID (PK), OrganType, StorageTemperature, TransportStatus, StorageLocation, HandlingTeam

**Relationships:**

- (No direct foreign-key relationships; tracks organ storage independently)
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### SterilizationSafetyCompliance

**Attributes:** SterilizationID (PK), ToolID (FK), LastSterilizedDate, NextSterilizationDue, Method,

SterilizationStatus

**Relationships:**

- SterilizationSafetyCompliance to MedicalEquipmentInventory: many-to-one
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**DonorRecipientFollowUp**

**Attributes:** FollowUpID (PK), RecipientID (FK), DonorID (FK), HealthStatusAfterTransplant, ComplicationsDetected, FollowUpDate, AdditionalTreatments

**Relationships:**

- DonorRecipientFollowUp to Donor: many-to-one
  - DonorRecipientFollowUp to Recipient: many-to-one
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**PhysicalDiseaseKnowledgeBase**

**Attributes:** DiseaseID (PK), DiseaseName, Causes, SymptomsList, RiskFactors, TreatmentOptions, PreventionTips

**Relationships:**

- (Read-only reference table; no relationships)
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**MentalDiseaseKnowledgeBase**

**Attributes:** DiseaseID (PK), ConditionName, Causes, SymptomsList, RiskFactors, TreatmentOptions, TherapyTechniques

**Relationships:**

- (Read-only reference table; no relationships)
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**PhysicalAIModelPrediction**

**Attributes:** PredictionID (PK), PatientID (FK), PredictedDisease, ProbabilityScore, AIAlgorithmUsed, Timestamp

**Relationships:**

- PhysicalAIModelPrediction to Patient: many-to-one
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**MentalAIModelPrediction**

**Attributes:** PredictionID (PK), PatientID (FK), PredictedCondition, ProbabilityScore, AIAlgorithmUsed, Timestamp

**Relationships:**

- MentalAIModelPrediction to Patient: many-to-one
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**Surgery**

**Attributes:** SurgeryID (PK), PatientID (FK), SurgeryName, SurgeryDate, SurgeonID (FK), HospitalName, Outcome

**Relationships:**

- Surgery to Patient: many-to-one
- Surgery to Doctor: many-to-one

**Entity Relationship Diagram (ERD).**