Appendix E

The Evaluation FER Schema

This appendix contains the FER schema that I designed to model the clinical data set used in the evaluation experiment. The constructs of the FER data model are represented graphically as follows:

- Entity types appear in large bold-faced text; for example ,

  Patient.

- Relationship types appear in small plain text; For example,

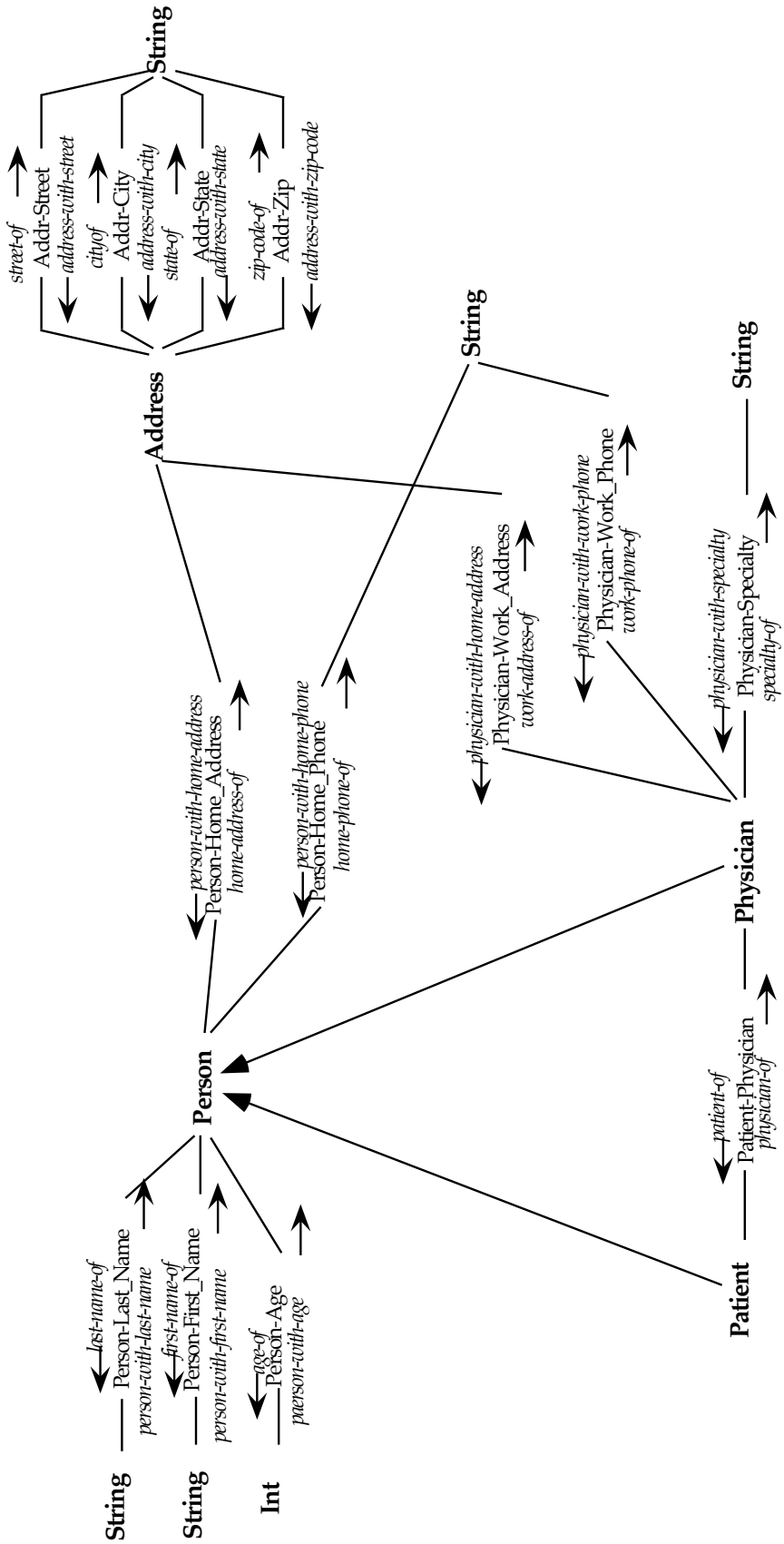
  Patient-Physician.

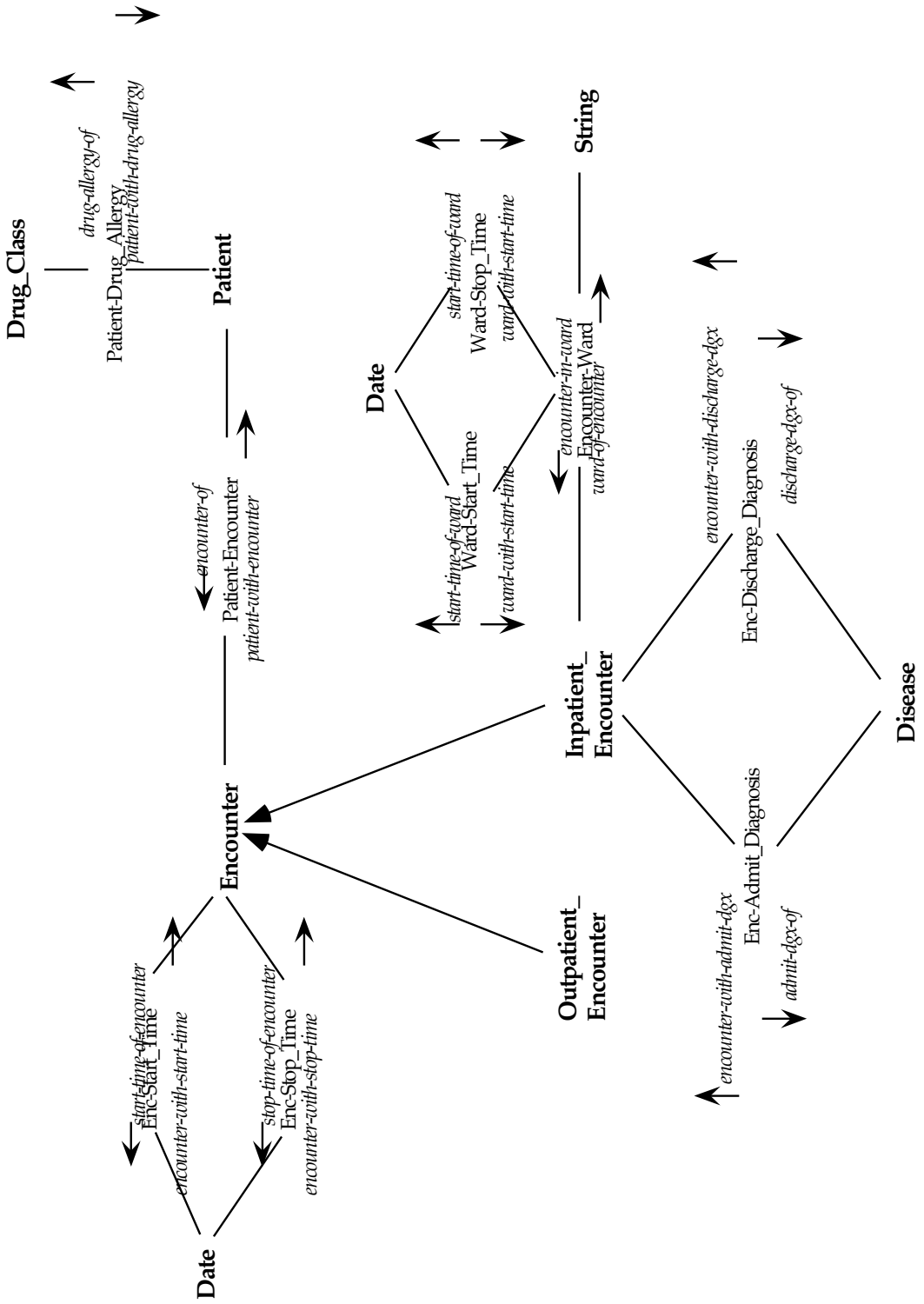
- Relationship functions appear in small italicized text; for example

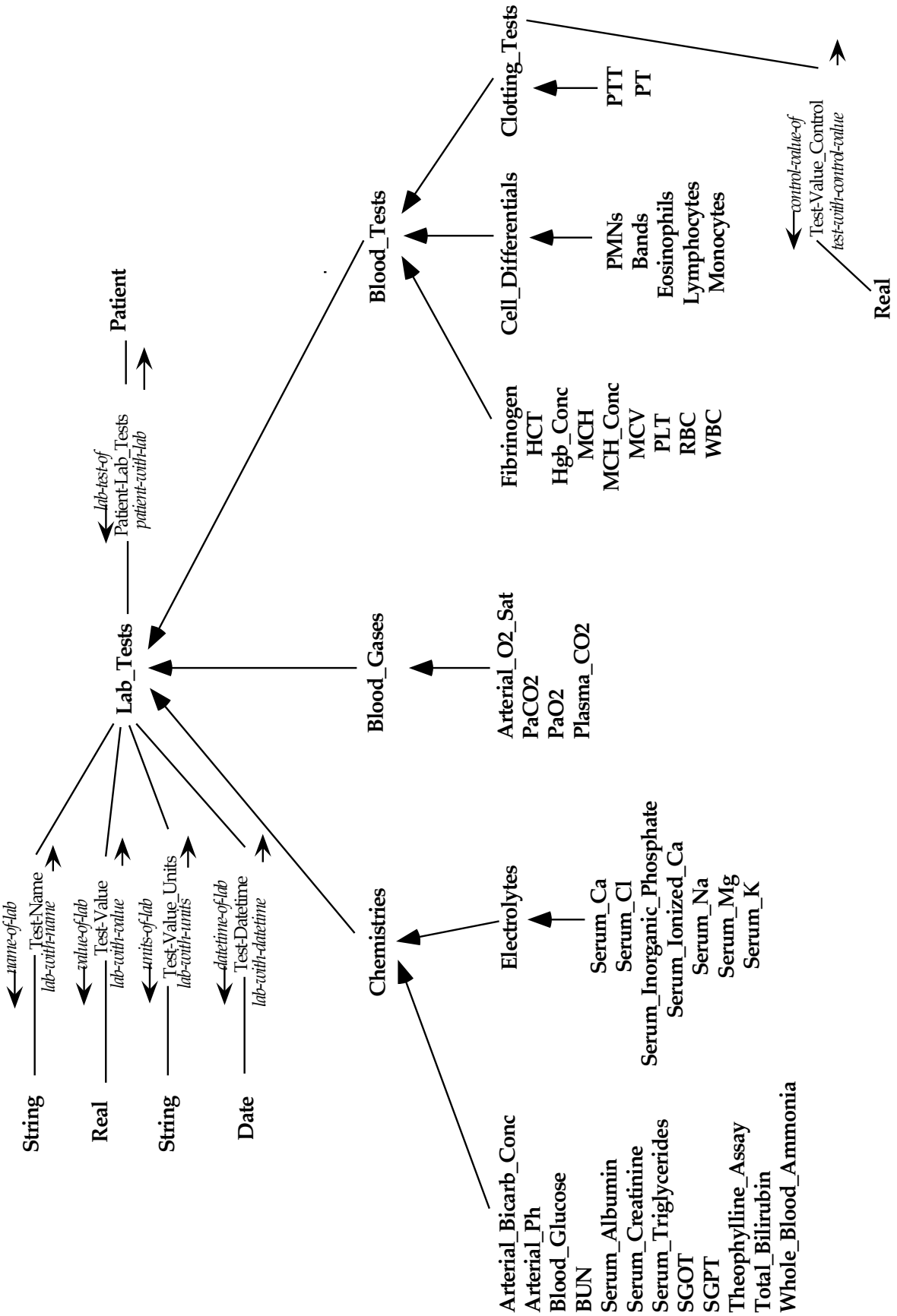
  patient-of.

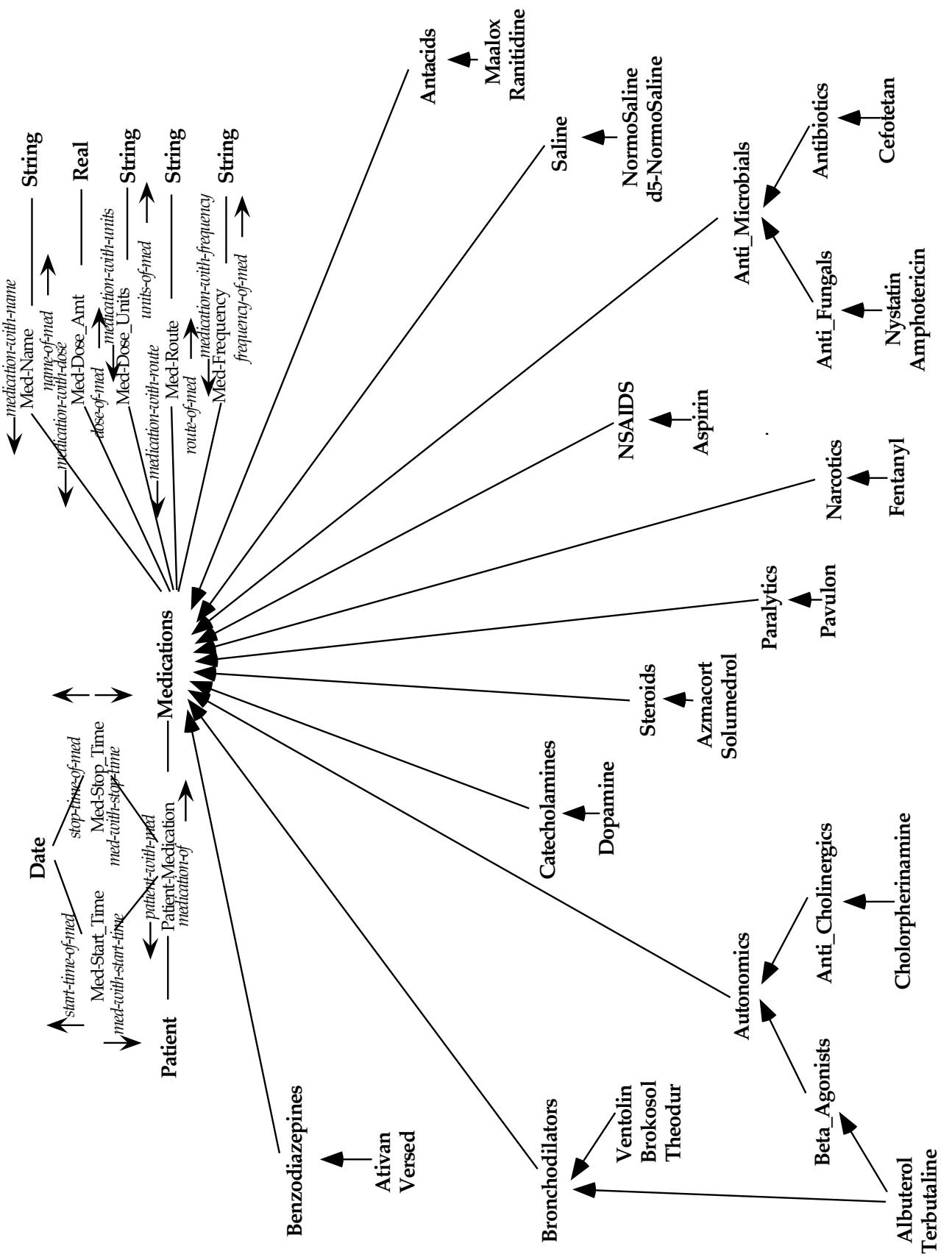
- IS-A connections appear as arrows with no annotations; for example, the arrow from the Patient to the Person entity type on the next page.

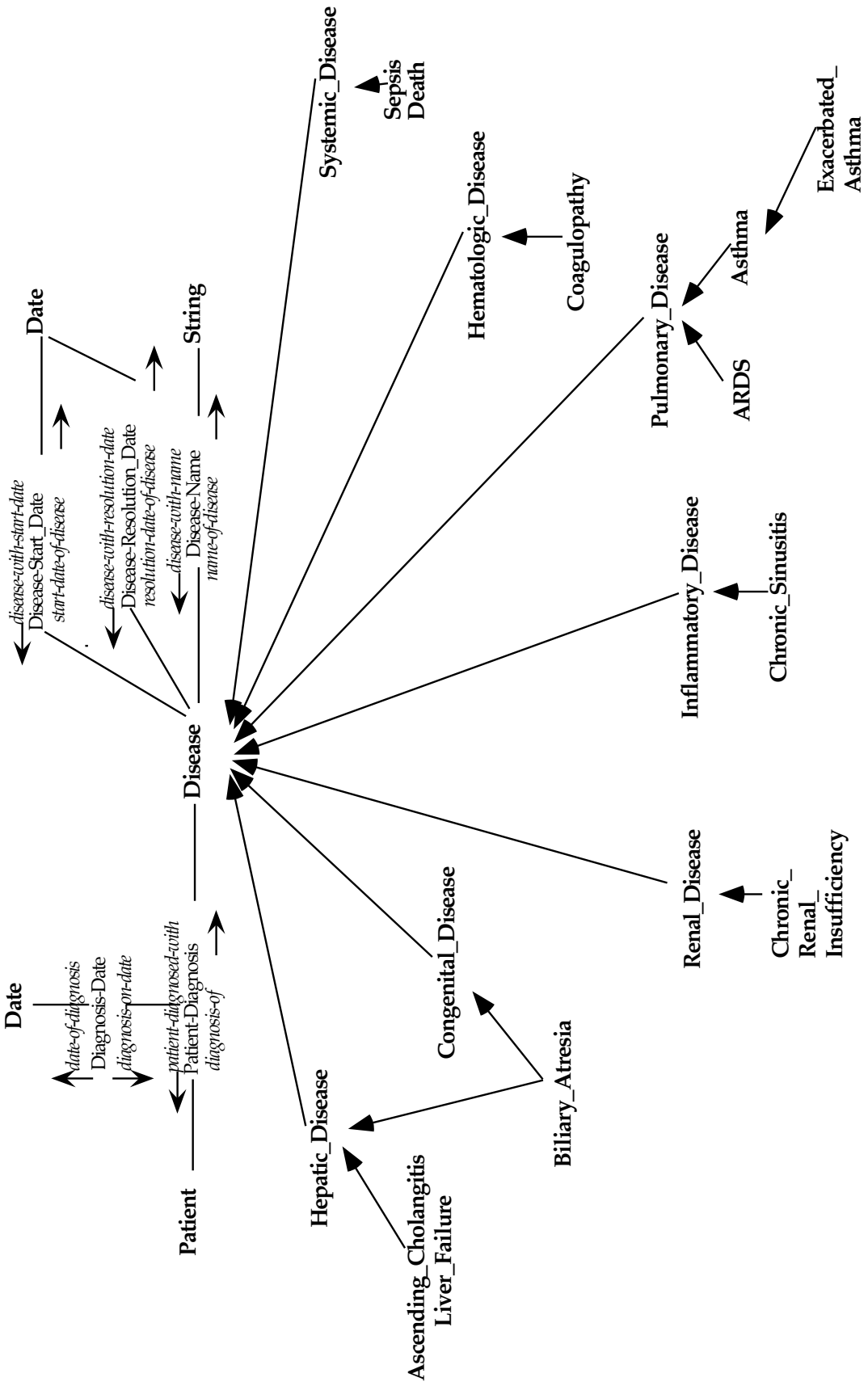
The FER schema represents one formal conceptualization of the real-world semantics represented by the clinical data set in Appendix C. Many other equally valid schemas for the same data set exist, none of which is necessarily "correct." It is important, however, for any conceptualization to have a clear and unambiguous description of its *meaning*. For example, in my conceptualization of the clinical data set, each instance of the entity type Lab_Tests represents a specific lab *result* for a particular patient at a particular time. It does not represent the *kinds* of lab tests that may exist, such as glucose, serum sodium, and PTT. The implication of this modeling decision is that Blood_Glucose, Serum_Na, and PTT are *not instances* of the entity type Lab_Tests, but rather *sub-types*. Any application developer who uses the FER schema and any database programmer who maps the FER schema must be aware of and agree upon this meaning; otherwise, the meanings of certain queries may change when the queries are translated by the TransFER methodology.

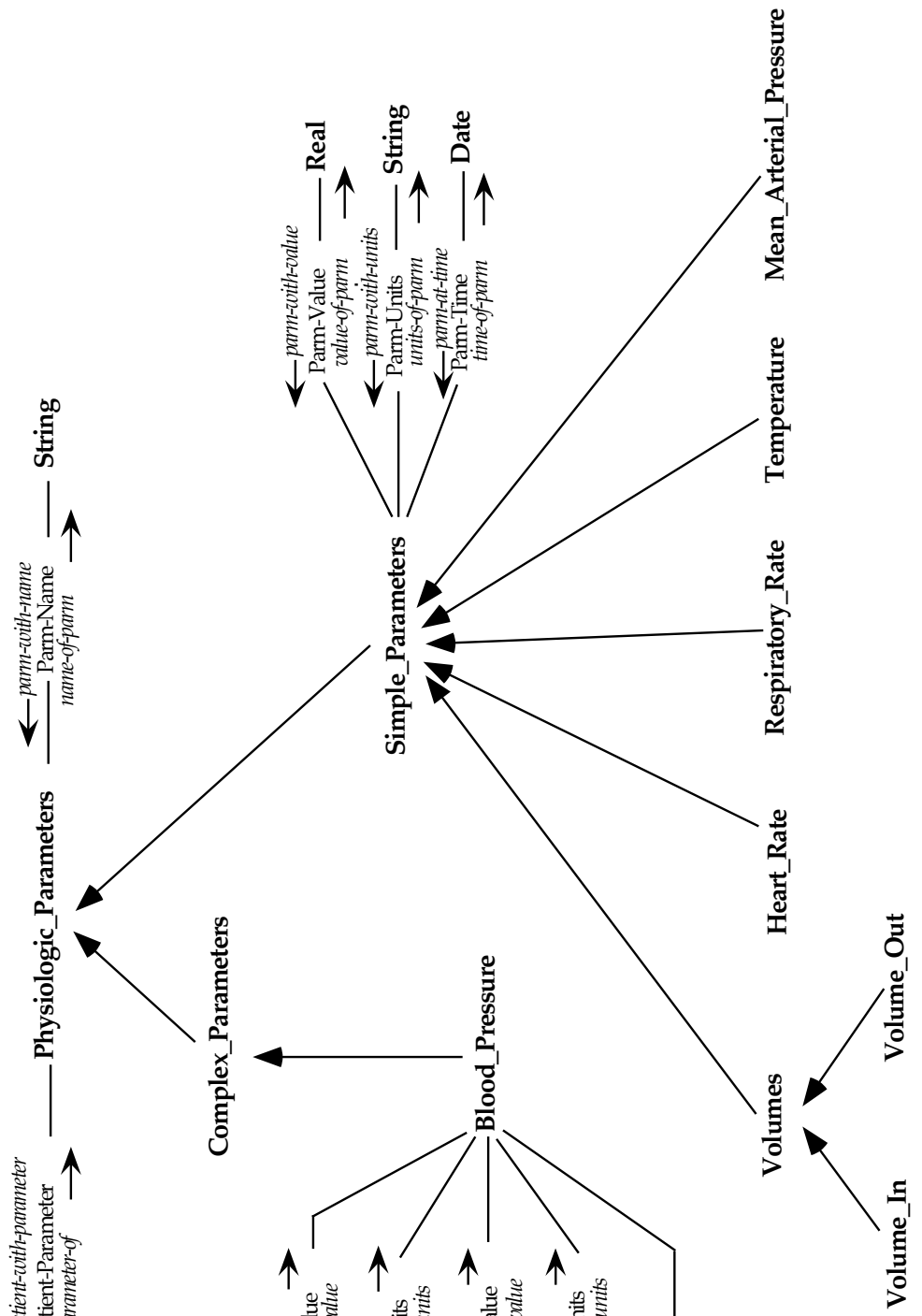

String
Addr-Street
street-of
address-with-street
Addr-City
city-of
address-with-city
Addr-State
state-of
address-with-state
Addr-Zip
zip-code-of
address-with-zip-code
Address
String
Person-Home_Address
person-with-home-address
home-address-of
Person-Home_Phone
person-with-home-phone
home-phone-of
Physician-Work_Address
physician-with-home-address
work-address-of
Physician-Work_Phone
physician-with-work-phone
work-phone-of
Physician-Specialty
physician-with-specialty
specialty-of
String
String
Person-Last_Name
last-name-of
person-with-last-name
Person-First_Name
first-name-of
person-with-first-name
Int
Person-Age
age-of
person-with-age
Person
Physician
Patient
Patient-Physician
patient-of
physician-of

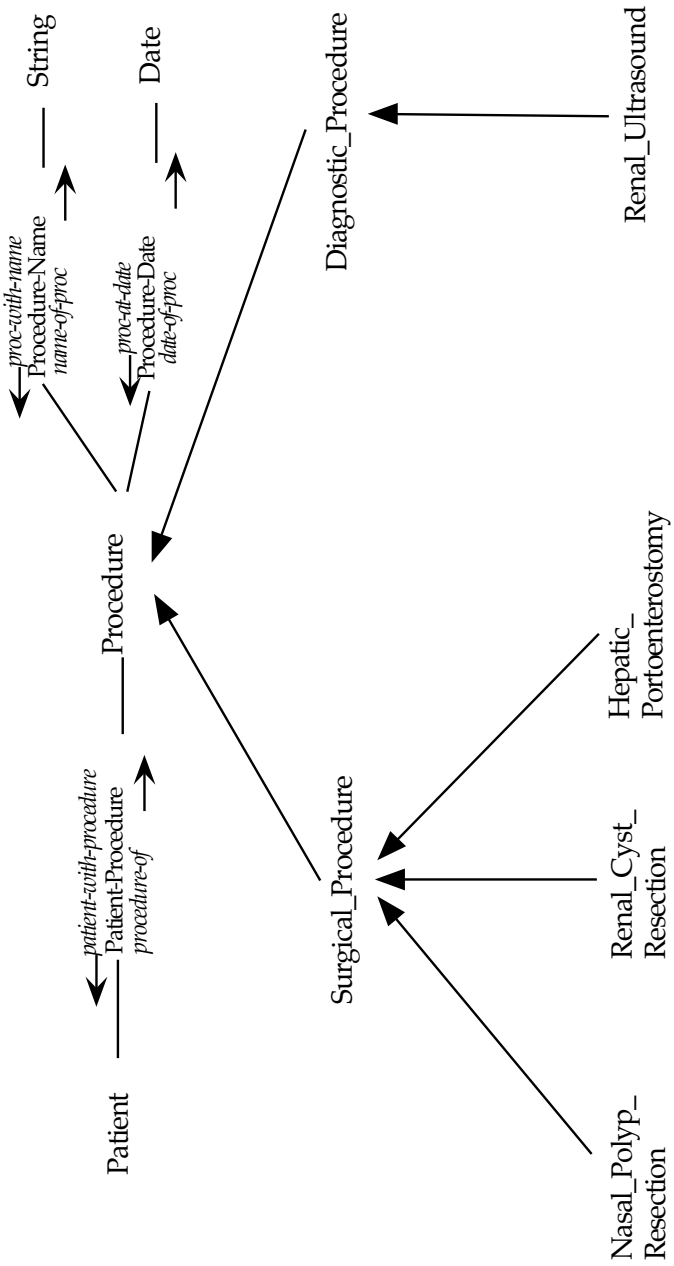

Drug_Class
drug-allergy-of
Patient-Drug_Allergy
patient-with-drug-allergy
Patient
encounter-of
Patient-Encounter
patient-with-encounter
Encounter
Date
start-time-of-encounter
Enc-Start_Time
encounter-with-start-time
stop-time-of-encounter
Enc-Stop_Time
encounter-with-stop-time
Outpatient_
Encounter
Inpatient_
Encounter
Date
start-time-of-ward
Ward-Start_Time
ward-with-start-time
start-time-of-ward
Ward-Stop_Time
ward-with-start-time
encounter-in-ward
Encounter-Ward
ward-of-encounter
String
encounter-with-discharge-dgx
Enc-Discharge_Diagnosis
discharge-dgx-of
encounter-with-admit-dgx
Enc-Admit_Diagnosis
admit-dgx-of
Disease


String
Test-Name
lab-with-name
name-of-lab
Real
Test-Value
lab-with-value
value-of-lab
String
Test-Value_Units
lab-with-units
units-of-lab
Date
Test-Datetime
lab-with-datetime
datetime-of-lab
Lab_Tests
Patient-Lab_Tests
patient-with-lab
lab-test-of
Patient
Chemistries
Blood_Gases
Blood_Tests
Arterial_Bicarb_Conc
Arterial_Ph
Blood_Glucose
BUN
Serum_Albumin
Serum_Creatinine
Serum_Triglycerides
SGOT
SGPT
Theophylline_Assay
Total_Bilirubin
Whole_Blood_Ammonia
Electrolytes
Serum_Ca
Serum_Cl
Serum_Inorganic_Phosphate
Serum_Ionized_Ca
Serum_Na
Serum_Mg
Serum_K
Arterial_O2_Sat
PaCO2
PaO2
Plasma_CO2
Fibrinogen
HCT
Hgb_Conc
MCH
MCH_Conc
MCV
PLT
RBC
WBC
Cell_Differentials
PMNs
Bands
Eosinophils
Lymphocytes
Monocytes
Clotting_Tests
PTT
PT
Real
Test-Value_Control
test-with-control-value
control-value-of


Medications
Date
Patient
Med-Start_Time
Med-Stop_Time
Patient-Medication
start-time-of-med
stop-time-of-med
med-with-start-time
med-with-stop-time
patient-with-med
medication-of
Med-Name
Med-Dose_Amt
Med-Dose_Units
Med-Route
Med-Frequency
String
Real
String
String
String
medication-with-name
name-of-med
medication-with-dose
dose-of-med
medication-with-units
units-of-med
medication-with-route
route-of-med
medication-with-frequency
frequency-of-med
Antacids
Maalox
Ranitidine
Saline
NormoSaline
d5-NormoSaline
Anti_Microbials
Antibiotics
Cefotetan
Anti_Fungals
Nystatin
Amphotericin
NSAIDS
Aspirin
Narcotics
Fentanyl
Paralytics
Pavulon
Steroids
Azmacort
Solumedrol
Catecholamines
Dopamine
Benzodiazepines
Ativan
Versed
Autonomics
Anti_Cholinergics
Cholorpherinamine
Beta_Agonists
Albuterol
Terbutaline
Bronchodilators
Ventolin
Brokosol
Theodur


Date
Disease-Start_Date
start-date-of-disease
disease-with-start-date
Disease-Resolution_Date
resolution-date-of-disease
disease-with-resolution-date
Disease-Name
name-of-disease
disease-with-name
String
Disease
Patient
Diagnosis-Date
date-of-diagnosis
diagnosis-on-date
Patient-Diagnosis
diagnosis-of
patient-diagnosed-with
Systemic_Disease
Sepsis
Death
Hematologic_Disease
Coagulopathy
Pulmonary_Disease
ARDS
Asthma
Exacerbated_
Asthma
Inflammatory_Disease
Chronic_Sinusitis
Renal_Disease
Chronic_
Renal_
Insufficiency
Hepatic_Disease
Ascending_Cholangitis
Liver_Failure
Congenital_Disease
Biliary_Atresia


Patient
patient-with-parameter
Patient-Parameter
parameter-of
Physiologic_Parameters
parm-with-name
Parm-Name
name-of-parm
String
Complex_Parameters
Simple_Parameters
parm-with-value
Parm-Value
value-of-parm
Real
parm-with-units
Parm-Units
units-of-parm
String
parm-at-time
Parm-Time
time-of-parm
Date
Mean_Arterial_Pressure
Temperature
Respiratory_Rate
Heart_Rate
Volumes
Volume_Out
Volume_In
Blood_Pressure
systolic-value-of-bp
BP-Systolic_Value
bp-with-systolic-value
Real
systolic-units-of-bp
BP-Systolic_Units
bp-with-systolic-units
String
diastolic-value-of-bp
BP-Diastolic_Value
bp-with-diastolic-value
Real
diastolic-units-of-bp
BP-Diastolic_Units
bp-with-diastolic-units
String
time-of-bp
BP-Time
bp-with-time
Date


String
Date
proc-with-name
Procedure-Name
name-of-proc
proc-at-date
Procedure-Date
date-of-proc
Diagnostic_Procedure
Renal_Ultrasound
Procedure
patient-with-procedure
Patient-Procedure
procedure-of
Surgical_Procedure
Hepatic_
Portoenterostomy
Patient
Renal_Cyst_
Resection
Nasal_Polyp_
Resection