

High Level Clinical Information Models

The high level clinical information models were derived from electronic health record data to support mappings of flowsheet data for use by researchers.

Cardiovascular Clinical Information Model

Class/ Concept	Cardiovascular Concept Name
Concepts	Cardiovascular WDL
Concepts	CV Conditions
Concepts	Cardiac Conditions
Concepts	JVD (Jugular Venous Distention)
Concepts	Heart Sounds
Concepts	Heart rate (BPM)
Concepts	Heart Rate Source
Concepts	Cardiac (Heart Rate) Rhythm
Concepts	Heart Rate Location (artery)
Concepts	Heart Disease Risk Factors
Class	Blood Pressure Systolic
Concepts	Blood Pressure
Concepts	Blood Pressure Cuff Mean (mmHg)
Concepts	Blood Pressure Location
Concepts	Blood Pressure Method
Concepts	Blood pressure Cuff Size
Concepts	Blood Pressure Patient Position
Concepts	Usual Blood Pressure
Class	Heart Murmur
Concepts	Heart Murmur Location
Concepts	Heart Murmur Intensity, Quality, Pitch
Concepts	Cardiac Murmur Intensity
Concepts	Heart Murmur Timing Within Cycle
Class	Risk Factors Decreased Cardiac Output
Concepts	Treatment Related
Concepts	Physiological Related
Concepts	Environmental Related
Concepts	Personal Related

Class	Signs & Symptoms (S&S) Problems Present
Concepts	Cardiovascular S&S
Concepts	Cardiac S&S
Concepts	Decreased Cardiac Output S&S
Concepts	Acute Coronary Syndrome S&S
Concepts	Aortic Aneurysm-Dissection
Concepts	Arrhythmia-Dysrhythmia (Symptomatic)
Concepts	Cardiac Rhythm Management Device S&S
Concepts	Cardiac Surgery
Concepts	Carotid Endarterectomy
Concepts	Heart Failure
Concepts	Hypertensive Disease-Crisis
Concepts	Hypertensive Disorders In Pregnancy
Concepts	Intra-Aortic Balloon Pump
Concepts	Persistent Pulmonary Hypertension
Concepts	Stroke (Hemorrhagic)
Concepts	Stroke (Ischemic or TIA)
Concepts	Stroke
Concepts	Ventricular Assist Device
Class	Problems Assessed
Concepts	Cardiac Rhythm Management Device
Concepts	Potential Surgery S&S
Concepts	Acute Coronary Syndrome
Concepts	Persistent Pulmonary Hypertension S&S
Concepts	Aortic Aneurysm/Dissection
Concepts	Arrhythmia-Dysrhythmia (Symptomatic)
Concepts	Heart Failure
Concepts	Hypertensive Disease-Crisis
Concepts	Hypertensive Disorders In Pregnancy
Concepts	Intra-Aortic Balloon Pump
Concepts	Persistent Pulmonary Hypertension
Concepts	Stroke (Hemorrhagic)
Concepts	Stroke (Ischemic or TIA)
Concepts	Stroke

Class	Rehabilitation Therapy Assessment
Concepts	Type of Rehabilitation Therapy
Concepts	Cardiovascular Response
Concepts	Exercise Details
Concepts	Rate of Perceived Exertion
Concepts	Duration (minutes)
Concepts	Symptoms
Concepts	Tolerance
Concepts	Workload
Class	Device Data
Concepts	Ventricular Assist Device
Concepts	ECG Assessment Data
Concepts	Hemodynamic Monitoring Data
Concepts	Intra-aortic Balloon Pump (IABP) Assessment Data
Concepts	Transducer Data
Concepts	Pacemaker
Class	CV Interventions
Concepts	Thrombus Prevention Measures
Concepts	Energy Conservation Interventions
Concepts	Autonomic Dysreflexia Management
Concepts	Cooling Thermoregulation Maintenance
Concepts	Contrast Induced Nephropathy Management
Concepts	Dysrhythmia Management
Concepts	Hemodynamic Stabilization
Concepts	Hemostasis Promotion
Concepts	Hypertensive Management
Concepts	O2 Consumption Minimization
Concepts	Syncope Management
Concepts	Warming Thermoregulation Maintenance
Concepts	Cardiology Consult

Falls Clinical Information Model

Class/ Concept	Concept Name
Class	Risk Factors for Falls
Concept	Presence for Risk for Falls
Concept	Personal/Patient Risks for Falling
Concept	Environment Risk
Concept	Physiological Risk
Concept	Treatment-related Risk
Concept	Acuity-related Risk
Concept	Medication-related risk
Concept	CNS Risk Factors
Concept	Musculoskeletal Risk Factors
Concept	Signs and Symptoms
Concept	Impulsiveness
Concept	Fear of Falling
Concept	History of Falling
Concept	Fall Prevented/No Fall
Class	Johns Hopkins Falls Assessment
Concept	Age
Concept	Fall History
Concept	Elimination
Concept	Medications
Concept	Equipment
Concept	Assist
Concept	Gait
Concept	Visual or Auditory Impairment Affecting Mobility
Concept	Altered awareness
Concept	Impulsive
Concept	Lack of Physical and Cognitive Understanding
Concept	Total Score
Concept	Scoring Not Completed for the Following Reason

Class	Fall Risk intervention
Concept	Falls Prevention Band Applied
Concept	Safety Precautions/Fall Reduction Interventions
Concept	Acuity-based Falls Interventions
Concept	Moderate Fall Risk Interventions
Concept	High Fall Risk Interventions
Concept	Peds Falls Interventions
Concept	Objects within arms reach
Concept	medication intervention--lengthy pick list
Concept	Elimination intervention
Concept	mobility intervention
Concept	Cognition intervention
Concept	Additional Fall Risk Issue Interventions
Class	Minnesota Hospital Association Tool
Concept	Presence of Fall Risk Factors
Concept	CNS Risk Factors
Concept	Altered Neuro exam
Concept	High risk medications
Concept	Abnormal labs
Concept	Pain
Concept	Fever
Concept	Agitation
Concept	History of confusion or dementia
Concept	Weakness
Concept	ICU stay > 24 hours
Concept	Pre-existing neuromuscular disease
Concept	Depression
Concept	Antidepressants prior to admit
Concept	Environment devices
Concept	Lines
Concept	Ventilator
Concept	Left ventricular assist device (LVAD) / Right ventricular assist device (RVAD)

Gastrointestinal Clinical Information Model

Class/ Concept	Concept Name
Concept	Gastrointestinal WDL
Concept	GI Conditions
Concept	Abdominal S&S
Concept	Gastrointestinal S&S
Concept	Passing Flatus
Concept	Abdominal Circumference (cm)
Class	Bowel Function Assessment
Concept	Inflammatory Bowel Disease - Problems Assessed/Present
Concept	Bowel Obstruction S&S - Assessed
Concept	Bowel Obstruction S&S - Present
Concept	Bowel Sounds
Concept	Bowel Sounds Location
Concept	Date Last BM
Concept	Usual Pattern
Class	Stool Assessment
Concept	Stool Amount Choice List
Concept	Stool Amount (ml)
Concept	Stool Appearance
Concept	Stool Color
Concept	Stool Consistency
Concept	Stool Drainage Method
Concept	Mixed Urine and Stool (g)
Concept	Mixed Urine and Stool: Diaper Weight (g)
Concept	Occurrence
Concept	Stool Source

Class	Bowel Function Intervention
Concept	Bowel Function Promotion
Concept	Colostomy Promotion
Concept	Ileostomy Promotion
Concept	Stool Collection Container
Concept	StoolCollector Securement

Genitourinary (including CAUTI) Clinical Information Model

Class/ Concept	Concept Name
Class	Catheter Assessment
Concept	Genitourinary WDL
Concept	Genitourinary Conditions
Concept	Bladder Symptoms
Concept	Voiding Symptoms
Concept	Voiding Characteristics
Class	Genitalia Assessment
Concept	Male Genitalia WDL
Concept	Male Genitalia Symptoms
Concept	Male Genitalia Characteristics
Concept	Female Genitalia WDL
Concept	Female Genitalia Symptoms
Concept	Female Genitalia Characteristics
Class	Catheter Assessment
Concept	Pre-existing Urinary Catheter Present
Concept	Ureter Location
Concept	Urinary Catheter Status
Concept	Urethral Site Assessment
Concept	Suprapubic Site Assessment
Concept	Urinary Catheter Urine Returned
Class	Urine Assessment
Concept	Urine Content
Concept	Urine Color
Concept	Urine Odor
Concept	Urine Output
Concept	Urine Specimen Collection Source
Class	Catheter Intervention
Concept	Urinary Catheter Care
Concept	Urinary Catheter Inserted By
Concept	Urinary Catheter Securement Method
Concept	Urinary Catheter Insertion Reason
Concept	Urinary Catheter Rationale for Continued Use
Concept	Urinary Catheter Balloon Size
Class	Incontinence Intervention
Concept	Incontinence Present
Concept	Incontinence Product Type

Class	Urine Intervention
Concept	Urine Elimination Promotion
Class	Catheter Device Characteristics
Concept	Catheter Device Type
Concept	Straight Catheter (Fr or mm?)
Concept	Catheter Tube size (Fr)
Concept	Urethral Catheter Type
Concept	Urine Collection Container

Musculoskeletal Clinical Information Model

Class/ Concept	Concept Name
Class	General Musculoskeletal
Concept	Musculoskeletal WDL
Concept	Conditions/ S&S
Concept	Motor Response
Concept	Symptoms Noted During/After Treatment
Concept	Weightbearing
Class	Joint Status
Concept	Joint Swelling
Concept	Joint Tenderness
Class	Range of Motion
Concept	WFL/WNL
Concept	Range of Motion Impairment
Concept	Degree Range of Motion
Concept	Type Range of Motion (ROM, AROM, Unspecified)
Concept	Activity Level Assistance
Class	Coordination
Concept	Motor Coordination Deficits
Concept	Functional Limitations
Concept	Fine Motor Coordination WFL
Concept	Hand Strength Pinch
Concept	Hand Strength Grip
Concept	Hand Strength Grip Description
Concept	Finger to Nose Coordination
Concept	Finger to Nose Impairment
Concept	Diadochokinesis Skills
Concept	Thumb/Finger Opposition Skills
Concept	Manipulation of Objects
Class	Muscle Strength
Concept	Muscle Strength Grading
Concept	Muscle Strength Movement
Concept	Manual Muscle Testing Results
Concept	Muscle Strength Presence
Class	Muscle Tone
Concept	Muscle Tone WFL
Concept	Muscle Tone Symptoms

Class	Berg Balance Scale
Concept	Sit To Stand
Concept	Stand to Sit
Concept	Sitting Unsupported
Concept	Standing Unsupported
Concept	Standing Unsupported, Feet Together
Concept	Standing with Eyes Closed
Concept	Transfers
Concept	Turning to Look Behind
Concept	Unsupported Tandem Stand (Demonstrate to Subject)
Concept	One Leg Stand
Concept	Placing Alternate Foot on Stool (4-6 inches)
Concept	Reach Forward With Outstretched Arm
Concept	Retrieve Object From Floor
Concept	Turn 360 Degrees
Class	Musculoskeletal Equipment
Concept	Treatment/Device/Implant
Concept	Assistive Equipment for Safe Patient Handling
Concept	Mobility device used
Concept	Ortho Devices
Concept	Other Equipment
Concept	Currently Uses Equipment At Home

Class	Musculoskeletal Interventions
Concept	Activity Promotion
Concept	Activity/Level of Assistance
Concept	Equipment
Concept	Brace/Orthotic/Orthosis Location/Type - Lower Extremity
Concept	Continuous Passive Movement (CPM)
Concept	Continuous Passive Movement (CPM) Degrees
Concept	Splints
Concept	Elastic Bandages
Concept	Immobilization Device
Concept	Instructed on Device
Concept	Fine Motor Coordination Interventions
Concept	Muscle Strengthening Exercises
Concept	Muscle re-education
Concept	Orthotic/ Prosthetic
Concept	Restorative Nursing Musculoskeletal Care
Concept	Positioning
Concept	PT Therapy Treatment
Concept	Range of Motion
Concept	Restricted Activity Management
Concept	Spasticity Management
Concept	Traction Direct Pull
Concept	Traction Type
Concept	Traction Management

Pain Clinical Information Model

Class/ Concept	Concept Name
Concept	Current Pain
Concept	Pain Type (i.e. acute, chronic, referred)
Concept	Pain Rating 0 - 10 Scale
Concept	Context of Pain Rating (i.e. activity, rest)
Concept	Pain Assessment Tool Used
Concept	Preferred Pain Assessment Tool
Concept	Pain Descriptors
Concept	Pain quality (narrative)
Concept	Nonverbal Pain Indicator Descriptions
Concept	Expression of Pain
Concept	Pain Onset
Concept	Pain Duration
Concept	Pain Frequency
Concept	Pain Fluctuation
Concept	Pain progression (narrative)
Concept	Pain History (narrative)
Concept	Body Location
Concept	Body Orientation
Concept	Location - multiple sites
Concept	Factors That Aggravate Pain
Concept	Factors That Relieve/ Alleviate Pain
Class	Pain Risk Factors
Concept	Acute Pain Risk Factors - Treatment Related
Concept	Acute Pain Risk Factors - Physiological Related
Concept	Acute Pain Risk Factors - Personal Related
Concept	Acute Pain Risk Factors - Environmental Related
Class	Physiological Pain Indicator
Concept	Physiological Pain Indicator - BP
Concept	Physiological Pain Indicator - Resp
Concept	Physiological Pain Indicator - HR
Class	Clinically Aligned Pain Assessment (CAPA)
Concept	Comfort
Concept	Change in Pain
Concept	Pain Control
Concept	Functioning
Concept	Sleep

Class	Neonatal Infant Pain Scale (NIPS)
Concept	Arms
Concept	Breathing Pattern
Concept	Cries
Concept	Facial Expression
Concept	Legs
Concept	State of Arousal
Concept	NIPS Score
Class	N-PASS (Neonatal Pain, Agitation, & Sedation Scale)
Concept	Behavior State
Concept	Crying/Irritability
Concept	Extremities Tone
Concept	Facial Expression
Concept	Vital Signs
Concept	Score
Class	FLACC Pain Assessment
Concept	Context for Rating FLACC (Activity, Rest, Not specified)
Concept	FLACC Face
Concept	FLACC Cry
Concept	FLACC Legs
Concept	FLACC Activity
Concept	FLACC Consolability
Concept	FLACC Score
Class	rFLACC Pain Assessment
Concept	Context for Rating FLACC (Activity, Rest, Not specified)
Concept	rFLACC Face
Concept	rFLACC Legs
Concept	rFLACC Cry
Concept	rFLACC Activity
Concept	rFLACC Consolability
Concept	rFLACC Score
Concept	FACES (Wong-Baker) RATING SCALE
Class	PAIN Advanced Dementia (PAINAD)
Concept	PAIN Advanced Dementia (PAINAD) Body Language
Concept	PAIN Advanced Dementia (PAINAD) Facial Expression
Concept	PAIN Advanced Dementia (PAINAD) Consolability
Concept	PAIN Advanced Dementia (PAINAD) Breathing
Concept	PAIN Advanced Dementia (PAINAD) Negative Vocalization
Concept	PAIN Advanced Dementia (PAINAD) Score

Class	Pain /Tolerance for Handling (NICU)
Concept	Handling Appears Comfortable
Concept	Tolerates Being Positioned And Held
Concept	Pain Tolerance Problems Identified
Concept	Overall Arousal State
Concept	Techniques Observed to Calm
Concept	Pain Tolerance for Handling (narrative)
Class	Pain Goals
Concept	Pain Goal/ Acceptable Comfort Level
Class	Pain Interventions
Concept	Pain medication (free text)
Concept	Pain medication date last dose
Concept	Pain Interventions
Concept	Electrode Placement (TENS)
Class	Pain Outcomes
Concept	Response to Intervention
Concept	Response to Pain Education

Pressure Ulcer Clinical Information Model

Class/ Concept	Concept Name
Class	Skin Inspection
Concept	Skin WDL
Concept	Inspection Type
Concept	Body site Inspected
Concept	Skin Color
Concept	Skin Temperature
Concept	Skin Moisture
Concept	Skin Turgor
Concept	Skin Integrity
Concept	Skin Characteristics
Concept	Skin Signs Symptoms / Conditions
Class	Pressure Ulcer Assessment
Concept	Pressure Ulcer Present
Concept	Pressure Ulcer Problems Assessed
Concept	Pressure Ulcer Location
Concept	Drainage Amount
Concept	Drainage Color or Characteristics
Concept	Site Assmnt Wnd Base
Concept	Pressure Ulcer Description
Concept	Anatomical Site . anatomical location
Concept	Pressure Ulcer Stage
Concept	Wound Size
Concept	Wound Skin Edges
Concept	Pressure Ulcer State of Healing
Concept	Wound Tunneling Length (cm)
Concept	Wound Undermining Length (cm)
Concept	Pressure Ulcer Dressing
Concept	Pressure Ulcer Dressing Status
Concept	Peri-wound Assessment
Class	Adult Braden Assessment
Concept	Braden Sensory Perception
Concept	Braden Moisture
Concept	Braden Physical Activity
Concept	Braden Mobility
Concept	Braden Nutritional Intake
Concept	Braden Friction and Shear
Concept	Braden Score

Class	Braden Q Scale
Concept	Mobility (Braden Q)
Concept	Activity (Braden Q)
Concept	Sensory Perception (Braden Q)
Concept	Skin Moisture (Braden Q)
Concept	Friction and Shear (Braden Q)
Concept	Nutrition (Braden Q)
Concept	Tissue Perfusion and Oxygenation (Braden Q)
Concept	Braden Q Score
Class	Neonatal Skin Condition Assessment
Concept	Neonatal Skin Condition Dryness
Concept	Neonatal Skin Condition Erythema
Concept	Neonatal Skin Condition Breakdown
Concept	Neonatal Skin Condition Total Score
Class	Skin Intervention
Concept	Pressure Ulcer Treatment
Concept	Pressure Redistribution Techniques
Concept	Pressure Reduction Devices
Concept	Skin Mucous Membrane Protection
Concept	Incontinence Protocol in Use
Concept	Incontinence Skin Appearance
Concept	Incontinence Product
Concept	Incontinence Product Application Frequency
Concept	Skin Hygiene Care
Concept	Skin Treatment / Device / Implant

Respiratory Clinical Information Model

Class/ Concept	Concept Name
Concept	Respiratory WDL
Concept	Respiratory Rate Choices
Concept	Respiratory (breaths/ min)
Concept	Respiratory Rhythm/pattern
Concept	Adventitious Breath Sounds
Concept	Breath Sounds Location
Concept	Oxygen saturation value
Concept	Oxygen saturation choices
Class	Signs and Symptoms
Concept	Respiratory Conditions
Concept	S&S of Respiratory Insufficiency
Concept	Skin Color
Concept	S&S Chest X-ray
Concept	Respiration Indicators of Pain
Concept	Neuro Respiratory Alterations
Class	Respiratory Risk Factors
Concept	Risk Factors: Physiological
Concept	Risk Factors: Personal
Concept	Risk Factors: Treatment Related
Class	Smoking
Concept	History of Smoking
Concept	Number of Yrs Smoked
Concept	Smoking safety
Concept	Exposure to Second Hand Smoke
Concept	Smoking Cessation counseling
Concept	Patient Receptive to Smoking Cessation Counseling
Concept	Smoking Cessation counseling time
Class	Sputum
Concept	Secretions Consistency
Concept	Color Sputum
Concept	Sputum Amount
Class	Respiratory Interventions
Concept	Chest high frequency oscillations (Metaned) Treatment
Concept	CPAP/BiPAP Treatment
Concept	Chest Physiotherapy

Class	Nebulizer
Concept	Nebulizer Device Type
Concept	Timing of Nebulizer
Class	Suctioning
Concept	Device Type
Concept	Frequency
Concept	Suctioning required before/ after cuff deflation
Concept	Respiratory Airway Suction Method
Concept	Respiratory Insufficiency Patient Response
Concept	Positive Expiratory Pressure Therapy Patient Response
Class	Mechanical Ventilation Settings/ Alarms
Concept	Mechanical Ventilation Settings/ Alarms
Concept	Ventilation Management
Concept	Mechanical Ventilation Start Date
Concept	Mechanical Ventilation End Date
Concept	Mechanical Ventilation Type
Class	Incentive Spirometry
Concept	Incentive Spirometry Level (mL)
Concept	Incentive Spirometry Administration
Concept	Incentive Spirometry Number of Repetitions
Class	Chest Tube Assessment
Class	Chest Tube Device Characteristics
Concept	Chest Tube Drain Size (fr)
Concept	Chest Tube Drain Size Number
Concept	Chest Tube Drainage System Type
Concept	Chest Tube Drainage Suction Pressure
Concept	Chest Tube Clamps at Bedside
Concept	Chest Tube Patient Assessment
Concept	Chest Tube Drainage Color/Consistency
Concept	Chest Tube Drainage Volume (ml)
Concept	Chest Tube Dressing Care
Concept	Chest Tube Site Assessment
Concept	Chest Tube Location
Concept	Chest Tube Orientation
Concept	Chest Tube Patency Intervention
Concept	Chest Tube Dressing Change Due
Concept	Chest Tube Inserted by
Concept	Chest Tube Air Leak Air /Fluctuation Present

Venous Thrombosis Embolism Clinical Information Model

Class/ Concept	Concept Name
Class	VTE Assessment
Concept	Peripheral Neurovascular WDL
Concept	Extremity Temperature (Peripheral Neurovascular Assessment)
Concept	Extremity Color
Concept	Extremity Sensation
Concept	Capillary Refill
Concept	Calf Tenderness
Concept	Pulse Location
Concept	Pulse Quality
Concept	PNV Problems Assessed
Concept	VTE Problems Present
Concept	Problems/ S&S Present
Concept	Peripheral Neurovascular Risk Factors
Class	VTE Intervention
Concept	Mechanical VTE Prevention Interventions
Concept	Venous Thromboembolism Prevent/Manage
Concept	Sensation Impairment Protection
Concept	Neurovascular Pressure Management
Concept	Peripheral Neurovascular Interventions

Vital Signs / Anthropometrics Clinical Information Model

Class/ Concept	Concept Name
Class	Blood Pressure
Concept	BP
Concept	BP Position
Concept	BP Site
Concept	Mean Arterial Pressure - Cuff
Concept	Mean Arterial Pressure - Monitor
Concept	Mean Arterial Pressure - A-Line
Concept	Mean Arterial Pressure - ANES
Concept	Arterial Line Pressure - BP
Concept	Arterial Line Pressure - ANES
Concept	Cuff Size
Concept	BP Mode
Concept	IABP Assisted Systolic
Concept	IABP Pump Mean
Concept	IABP Assisted Diastolic
Concept	IABP Augmented Diastolic
Concept	IABP Unassisted Systolic
Concept	IABP Unassisted Diastolic
Class	Temperature
Concept	Temp
Concept	Fever Score
Concept	Source
Class	Respiration
Concept	Respiration Rate
Concept	Respiration Pretreatment Rate
Concept	Respiration Posttreatment Rate
Concept	Respiration Ventilator Rate
Class	Blood Oxygen
Concept	SpO2
Class	Heart Rate
Concept	Pulse BPM
Concept	Source

Class	Weight
Concept	Weight
Concept	Pre-Pregnancy
Concept	OT Seated and Wheeled
Concept	Change Percent
Concept	Change Since Last Visit
Concept	Weight Method
Class	Newborn Weight
Concept	Birth Weight
Concept	Percent Birth Weight
Concept	Estimated Fetal Weight
Concept	Breastfeeding Weight
Concept	Estimated Dry Weight
Concept	Change Percent Since Birth
Class	Height
Concept	Height
Concept	Height Method
Concept	Height Seated and Wheeled
Class	Body Mass Index (BMI)
Concept	BMI
Concept	Pre-pregnancy BMI
Concept	Last Visit BMI
Concept	Last Visit Change in BMI
Concept	Last Visit Percent Change in BMI
Class	Body Surface Area (BSA)
Concept	BSA