



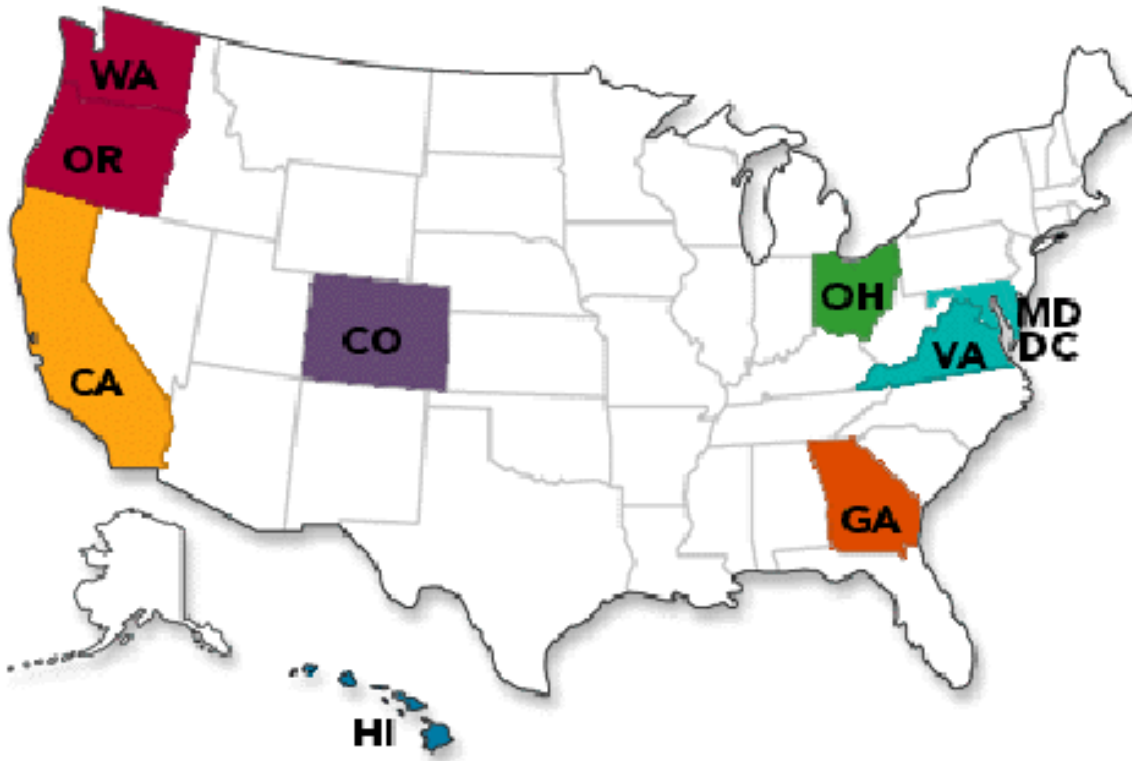
A Framework for Sharing Nursing Data: The Quality Jackpot

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Kaiser Permanente (KP)



- Integrated health care delivery system
- 8.8 million members
- 16,000+ physicians
 - 46,000+ nurses
- 170,000+ employees
 - 36 hospitals
 - 568 medical offices
- 44 billion annual revenues

Comprehensive Tool

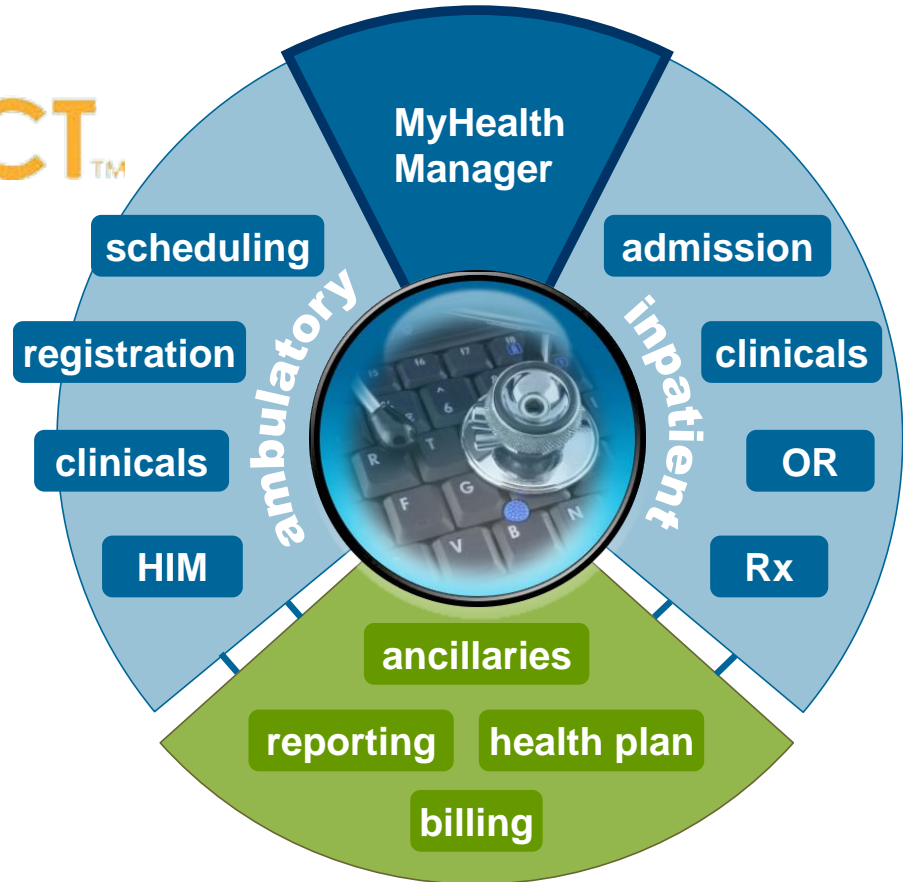
KAISER PERMANENTE
HEALTHCONNECT™

Not just an electronic
medical record

Program-wide system integrates
clinical record appointments, registration,
ancillaries, health plan

Highly-sophisticated information
management and delivery system

Member access to health information
and outcomes



Acronym Key:

HIM - Health Information Management

OR - Operating Room

RX - Pharmacy/Prescription



Sweeping the Stage

At the end of 2011 only 1.1% of U.S. hospitals had Electronic Health Records (EHR) at “Stage 7”

100% of Kaiser Permanente Hospitals (36) have achieved “Stage 7” recognition

More than any other health care system in the U.S.

US EMR Adoption ModelSM

Stage	Cumulative Capabilities	2011 Q2	2011 Q3
Stage 7	Complete EMR; CCD transactions to share data; Data warehousing; Data continuity with ED, ambulatory, OP	1.1%	1.1%
Stage 6	Physician documentation (structured templates), full CDSS (variance & compliance), full R-PACS	4.0%	4.4%
Stage 5	Closed loop medication administration	6.1%	7.1%
Stage 4	CPOE, Clinical Decision Support (clinical protocols)	12.3%	13.2%
Stage 3	Nursing/clinical documentation (flow sheets), CDSS (error checking), PACS available outside Radiology	46.3%	46.1%
Stage 2	CDR, Controlled Medical Vocabulary, CDS, may have Document Imaging; HIE capable	13.7%	12.6%
Stage 1	Ancillaries - Lab, Rad, Pharmacy - All Installed	6.6%	5.9%
Stage 0	All Three Ancillaries Not Installed	10.0%	9.6%

Data from HIMSS AnalyticsTM Database © 2011

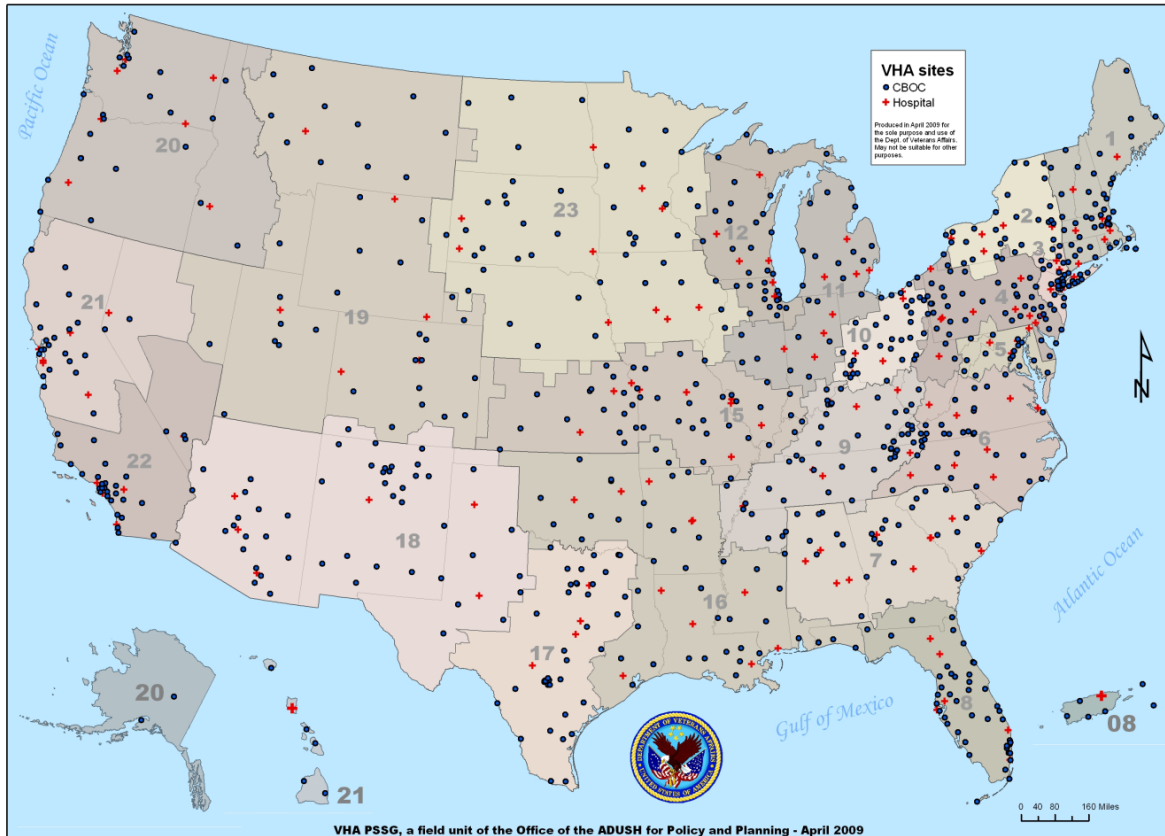
N = 5,310 N = 5,299

Acronym Key:

- CCD – Continuity of Care Document
- CDR – Clinical Data Repository
- CDS – Clinical Data Services
- CDSS – Clinical Decision Support System
- CPOE – Computerized Physician Order Entry
- ED – Emergency Department
- EMR – Electronic Medical Record
- HIE – Health Information Exchange
- HIMSS - Healthcare Information and Management Systems Society
- OP – Outpatient Pharmacy
- R-PACS – Radiology Picture Archiving and Communications System

Veterans Health Administration (VHA) Network

DEPARTMENT OF VETERANS AFFAIRS Veterans Integrated Service Networks



- Largest Integrated Health Care Delivery System
- 8.45 million enrollees
- 254,000 Employees
- 19,000 Physicians
- 70,000 Nurses
- 21 Regions
- 152 Hospitals & Medical Centers
- 802 Community Based Outpatient Clinics
- 293 Veteran Centers
- 133 Community Living Centers

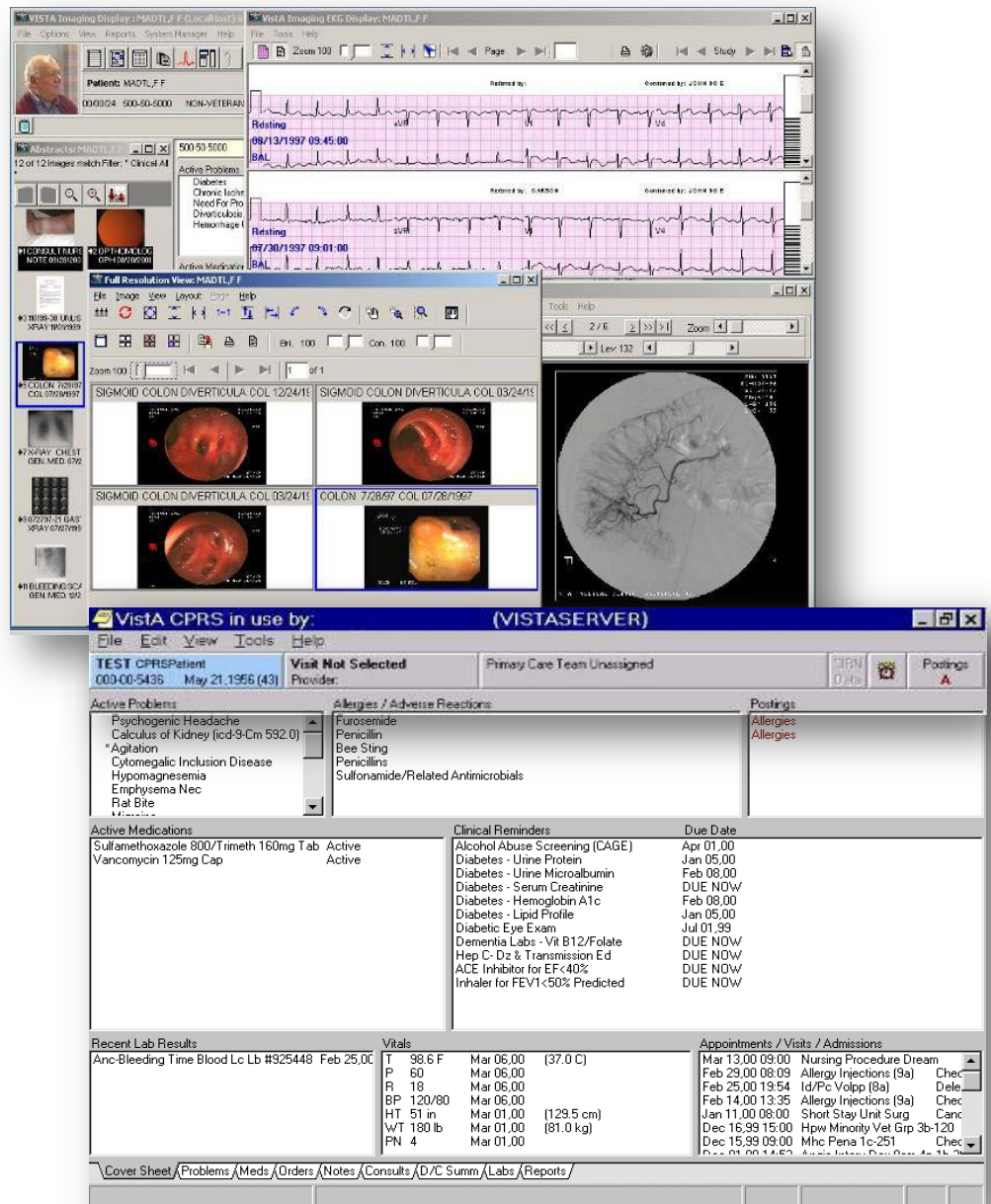
Sources:

http://www.va.gov/vetdata/docs/Quickfacts/4x6_fall_11_sharepoint_Final.pdf
http://www.va.gov/vetdata/docs/Quickfacts/Homepage_slideshow_FINAL.pdf
http://www.va.gov/vetdata/docs/Quickfacts/4x6_fall_11_sharepoint_Final.pdf

Vista*

Vista includes many components to deliver high-quality health care to our Nation's Veterans:

- Computerized Patient Record System (CPRS)
- Bar Code Medication Administration (BCRO)
- Personal Health Record, My Health eVet
- Used throughout the VA health care system:
 - Inpatient
 - Outpatient
 - Long-term care
 - Home care
 - Telemedicine



*Vista = Veterans Health Information Systems and Technology Architecture Imaging

Objectives

- Describe how nursing data collected during patient care can be used for quality reporting, research & real time clinical decision support
- Describe a prototype mobile health application for collecting, displaying and reporting skin assessment data
- Describe a future vision where patient-centered data informs the development of information models and results in interoperability and improved care

Setting the Context

- Kaiser Permanente and the Veterans Health Administration are comparable in size and geographic area
- KP & VHA have been working on similar paths in Health Information Exchange (HIE) and standardized data models
- KP & VHA formalized the relationship with the Nationwide Health Information Network (NwHIN) – 2009 - 2010
- We initiated a nursing-led project in 2010 to define a standard information model driven by nursing practice that enables:
 - Data capture
 - Data re-use
 - Data sharing within and outside organizations.
 - Facilitates the measurement and extraction of data for meaningful EHR use to support quality, safety, efficiency and decision support.

**** Nursing can lead this area that can yield better information exchange and better quality outcomes**

A Nursing Information Model

1. Evaluate the Evidence
2. Leverage Clinical Expertise
3. Develop Optimum Data Sets
4. Harmonize the Data
5. Map to Reference Terminologies
6. Formalize the Model in UML
7. Link to HL7
8. Validate the Model

Outcomes of the KP-VA Collaborative

- Balloted a Domain Analysis Model (DAM) at Health Level 7 (HL7) in May 2011 with ballot reconciliation in September 2011
- Engaged with various professional organizations to support and extend this work
- Increased the direct involvement of nursing in establishing and enforcing data standards for EHR use
- Collaborated with the ANA to support the addition of *Pressure Ulcers* to the proposed list of Stage 2 and 3 meaningful use quality measures
- Enabled the increasingly visible role of nursing in Health Information Technology (HIT) committees

The Quality Concern

- The current state of quality reporting is very manual & labor intensive within and across organizations
- KP – VA Collaborative selected Pressure Ulcer Risk as a prototype
- As many as 3 million patients are treated in U.S. health care facilities each year for pressure ulcers*
- Annual cost of pressure ulcers is \$3.2 billion**
- 60,000 patients die annually from pressure ulcer complications
- Most pressure ulcers are preventable
- Per standards of care, patients are assessed for pressure ulcer risk on admission and at prescribed intervals
- Quality data for pressure ulcers are already collected but reported in a variety of ways

* Dorner, Posthauer, & Thomas, 2009

** “The \$17 Billion Problem” : Health Affairs April 2011

Current State:

VA Nursing Outcomes Database (VANOD)

- Nurses document skin assessments in structured format on national VANOD template in legacy system (CPRS)
- Template may be an additional tool depending on local documentation practices (double documentation)
- Populates retrospective quality reports
- Missed opportunity to impact care at the bedside

Admission Skin Assessment

```
Braden Scale - For Predicting Pressure Sore Risk
Sensory Perception: 1 = Completely Limited
Moisture:          2 = Very Moist
Activity:          3 = Walks Occasionally
Mobility:         2 = Very Limited
Nutrition:        2 = Probably Inadequate
Friction:         1 = Problem
10-12    High Risk
Score: 11
```

CURRENT SKIN ASSESSMENT

```
Skin Color:
  Color: Flushed, Mottled
Skin Temperature
  Temp: Hot
Skin Moisture
  Moisture: Diaphoretic
Skin Turgor
  Turgor: Within normal limits
```

SKIN PROBLEMS

PRESSURE ULCER ASSESSMENT

```
Prior Pressure Ulcer Locations:
PRESSURE ULCER STAGE
  STAGE II
                Sacrum/coccyx
Current pressure ulcer assessment
  no change in the ulcer
```

In the electronic health record, information is stored and displayed as text.

It is useful to the creator, once.

It is not computable.

It is extremely difficult to re-use

- **in a consultation note**
- **in a patient transfer summary**
- **in creating a care plan**

VA Current State

Reminder Dialog Template: VANOD SKIN INITIAL ASSESSMENT

Stage IV - full thickness, with destruction of muscle, bone

Location(s): + Heel left

Sacrum/coccyx Trochanter right Trochanter left Ischium right
 Ischium left medial malleolus left medial malleolus right
 lateral malleolus left medial malleolus left Heel right
 Heel left Occiput Other

Size of pressure ulcer

Length, width & depth of the pressure ulcer - include site if more than

optional

Other comments (appearance, dressing, drainage, etc)

See wound care note

Visit Info Finish Cancel

Braden Scale (Skin Assessment)

Health Factors: AMPUTEE (Historical), BRADEN SCALE 15-18 (Historical), MEDICATION PATCHES, MULTIPLE SCLEROSIS (Historical), OTHER SCI (Historical), PARAPLEGIC (Historical), PRESSURE ULCER, PRESSURE ULCER PROTOCOL INITIATED, QUADRAPLEGIC/TETRAPLEGIC (Historical), SKIN - EDUCATION, SKIN - MAXIMAL REMOBILIZATION, SKIN - PRESSURE-

* Indicates a Required Field

VA moving to structured data collection
Use advanced analytics to link data to context due to the lack of an information model

KP Current State

		12/21/11	
		1400	1411
Braden Scale for Predicting			
Sensory Perception		3	3
Moisture		2	2
Activity		3	2
Mobility		2	2
Nutrition		2	2
Friction and Shear		2	1
Braden Scale Total		14	12
Skin Bundle (Pressure Ulcer)			
S: Support Surfaces		PRESSU...	PRESSU...
K: Keep Turning / Repositioning (30° Lateral)		Supine	Left
K: Keep Skin Protected		Maintain...	Bridged...
I: Incontinence / Moisture Management		Absorbe...	Absorbe...
N: Nutrition		Encoura...	Encoura...
Activity/Mobility			
Bedrest / Dangle / Out of Bed			
HOB Degrees Elevated			
Weight Bearing Status			
Exercises Completed			

- Nurses document in discrete fields
- Data is captured for reporting and data mining
- Limited by vendor's data structures and data model

Clinical Decision Support

Doc Flowsheets

File Add Row Add Group Add LDA Cascade Add Col Insert Col Device Compact Last Filed Graph Details Go to Date Refresh

Flowsheet: Shift Optimized Meds order entry Worklist Tasks Shift MS Opt Shift Optimized

Shift Optimized

BestPractice Advisory - Xxtestbx, Oscar

ADVISORY: Braden Scale is less than or equal to 18. ACTION: Turn patient q2 hours and document in the Shift Assessment flowsheet.

[Jump to Shift Assessment](#)

Accept Cancel

ASSESSMENT
SAFETY INTERVENTION
CARE
INTEGUMENTARY
BRADEN SCALE FOR SKIN BUNDLE
DEVICES
ACTIVITY/MOBILITY
APPARENT FALL
SCHMID FALL RISK
PSYCHOSOCIAL
NEUROLOGICAL
mNIHSS (Modified National...)

Linking it All Together

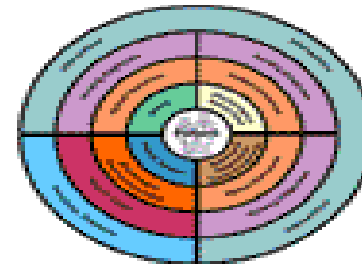
- **Reference Terminologies** ensure conceptual equivalency – they define the “words”
 - Stage I left heel and Stage III right hip
 - Stage I right heel and Stage III left hip
 - Stage III left hip and Stage I right heel
 - Stage III right hip and Stage I left heel
- **Information Models** – describes the “full sentence” with meaning. The order of the words impact the meaning
- The context of this patient and the patient’s story is still unknown with terminology alone

Desired Future State

- Documentation tools grounded in terminology and information models to be interoperable between:
 - Care settings and providers
 - Applications
 - Organizations
- EHRs that enable automatic extraction and reporting of quality data to enhance true interoperability and improved outcomes

American Nurses Association Recognition

- NANDA
- NIC
- NOC
- ABC Codes
- CCC
- OMAHA
- PNDS
- ICNP
- LOINC
- SNOMED CT



**Perioperative
Patient Focused
Model**



The Omaha System

Solving the Clinical Data-Information Puzzle

INTERNATIONAL HEALTH TERMINOLOGY
STANDARDS DEVELOPMENT ORGANISATION



The Quality Jackpot

- Development and adoption of an agreed upon data model that enhances the ability to share and compare information
- Transformation from nurses as the “human interface” between vendor applications to real time display of relevant information available at the point of care
- Utilization of common information models with new technology applications to improve care and reduce preventable adverse events

The Opportunity Is Now

- As health care providers, we have the opportunity to establish a leadership position with mobile health application vendors to build models in a collaborative, non-siloed manner.
- As nurses we have the opportunity to lead the way in developing clinical models that define our practice.
- To drive value, we need to build a set of detailed clinical models to promote interoperability and ease of use.
- In order to achieve interoperability, nurses should develop and adopt common data models, code sets, terminologies to promote interoperability.
- We need coherence in what the data means and how to get the data in and out of Electronic Health Records (EHRs).

Applications (Apps) from Other Industries

Smart Traveler



Science360

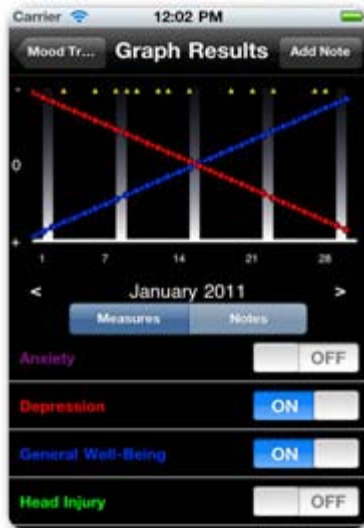


National Weather Service



Apps in Health Care

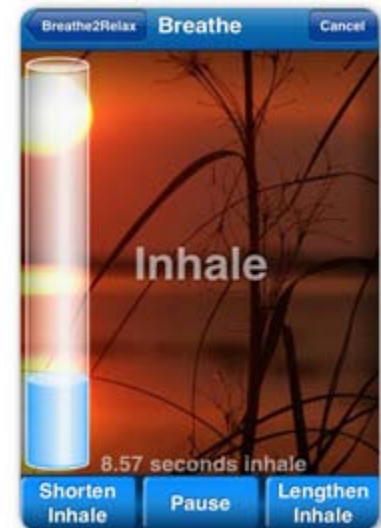
T2 Mood Tracker



My Dietary Supplements (MyDS)



Breathe2Relax



VA Post-Traumatic Stress Disorder (PTSD) Mobile App



Skin Risk Assessment Prototype

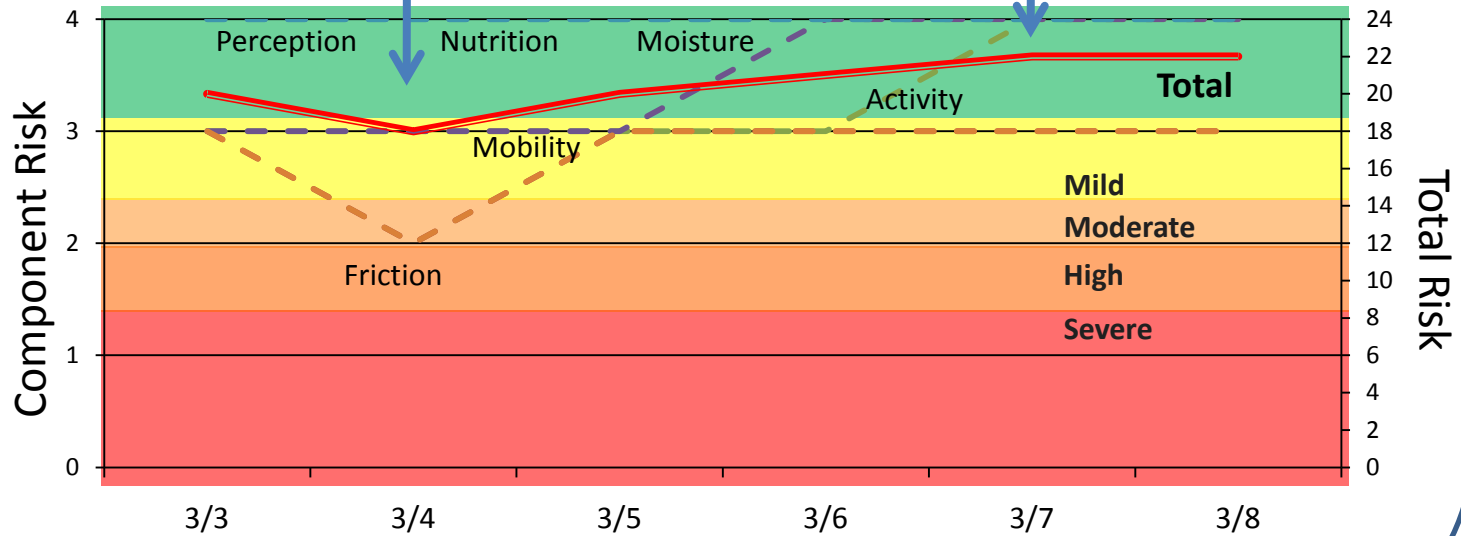
- Identify the scope: Skin risk assessment prototype within a mobile health “App”
 - Develop the common models and reference terminology to provide the framework
- Provide the infrastructure in which the open source community can work
 - Vendors can get off-the-shelf models and terminology that have been vetted by the clinical community
 - Identify a custodial agent who coordinates the open source community
 - Provide business requirements for building an “App” to be used by clinicians to assess risk of skin breakdown

Pressure Ulcer Risk

Score enters risk band:
DSS prompts clinician for protocol

Prednisone ordered; DSS will not take action on low-risk patient

The view shows scores from multiple sources in one view



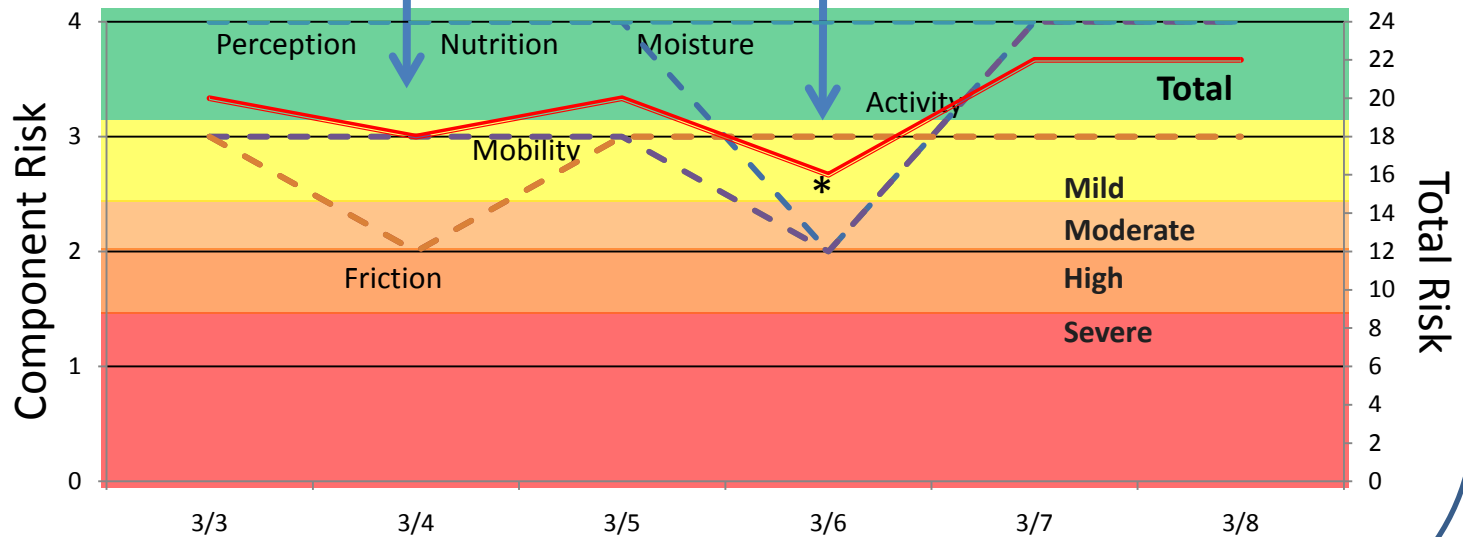
*DSS – Decision Support System

Pressure Ulcer Risk

Score enters risk band:
DSS prompts clinician for protocol

Patient unconscious;
readings **inferred**.

The view shows scores from multiple sources in one view.



*DSS – Decision Support System

Skin Observations

Note: BURS TEST CLINIC, Pickett, Pamela R

Braden Scale - For Predicting Pressure Sore Risk
 Sensory Perception: 1 = Completely Limited
 Moisture: 2 = Very Moist
 Activity: 3 = Walks Occasionally
 Mobility: 2 = Very Limited
 Nutrition: 2 = Probably Inadequate
 Friction: 1 = Problem
 10-12 High Risk
 Score: 11

CURRENT SKIN ASSESSMENT
 Skin Color:
 Color: Flushed, Mottled
 Skin Temperature
 Temp: Hot
 Skin Moisture
 Moisture: Diaphoretic
 Skin Turgor
 Turgor: Within normal limits

SKIN PROBLEMS
 PRESSURE ULCER ASSESSMENT
 Prior Pressure Ulcer Locations:
 PRESSURE ULCER STAGE
 STAGE II Sacrum/coccyx
 Current pressure ulcer assessment
 no change in the ulcer

INTERVENTIONS
 Education

SNOMED CT:
 399912005
 pressure sore
 (clinical
 finding)

Vista CPRS in use by: [User] (vista.salt-lake.med.va.gov)

ZZBEAR, YOGI (OUTPATIENT) PCM Aug 17, 11 10:51
 000-00-2931 Jun 12, 1932 (79) Provider: [User] Primary Care Team Unassigned

HBPC NURSING NOTE
 Vst: 08/17/11 PRIMARY CARE INTAKE CLINIC Aug 18, 2011@12:44

Anesthesia Pre-Op Note
 Care Coordination Home Teleh
 Chaplain Visit
 Dental Consult
 Dental Note
 Dermatology Clinic Note
 Discharge Instructions
 Eye Optometry Clinic Note
 Eye Optometry Consult
 Genetic Follow-Up Note
 Hip Medicine Resident Admiss
 Aug 18, 11 HBP MEDIC
 Hip Primary Care Provider New
 Ined Consent Document
 Ined Non-Consent Document
 Immunization Administration
 Letter
 Lvad Note-Inpatient
 Medication Reconciliation Note
 Medication Refill Request/Tip
 Mh 3a Medical Note
 Mh 3a Nursing 24-Hour Reasse
 Mh 3a Nursing Note
 Mh Access/Crisis General Note
 Mh General Note
 Mh Group Therapy Note
 Mhu Nurse Note
 Nursing Note
 Nutrition Note

Type of wound: ulcer
 Location:
 Tissue involvement:
 Full-Thickness:
 Wound is pressure induced
 - Yes
 Stage IV
 Full-thickness wound with extensive destruction: tissue necrosis; or damage
 to muscle, bone, or supporting structures (i.e. tendon, joint capsule)
 Dimension and depth
 Length: 4 cm
 Width: 3 cm
 Depth: 3 cm
 Undermining present: Yes
 Location: 6
 (Identify location by hours on the face of a clock, with
 client's head 12 o'clock)
 Wound Base in wound bed:
 Viable tissue 50% (Red: granulation, epithelialization, muscle,
 subcutaneous tissue)
 Nonviable tissue 70% (Slough/fibrinous = generally yellow-white,
 moist, loose to adherent necrotic tissue)
 Eschar 0% (Black, thick, dry, fibrin-containing necrotic tissue;
 leathery, hard adherent, brown to black in color)
 Wound Edges:
 Open [X] Closed []

Vista CPRS in use by: [User] (vista.salt-lake.med.va.gov)

ZZBEAR, YOGI (OUTPATIENT) PCM Aug 17, 11 10:51
 000-00-2931 Jun 12, 1932 (79) Provider: [User] Primary Care Team Unassigned

Visit: 08/17/11 HBP MEDICINE RESIDENT ADMISSION, PRIMARY CARE INTAKE CLINIC, [User] (Aug 18, 11)

PHYSICAL EXAMINATION:
 VITALS:
 Blood Pressure:
 Heart Rate:
 Respirations:
 Temperature:
 SAO2:
 Pain:
 GENERAL- alert, oriented X3, N/D
 HEENT- PERRL, hearing grossly intact, oral mucosa moist without lesions
 LUNGS- CTA bilaterally
 HEART- RRR, without M/R
 ABD- soft, non-tender
 NEURO- CN II-XIII intact, strength 5/5 symmetric
 EXT- without edema
 SKIN- red area on buttocks likely due to pressure/mobility

LABS:
 SODIUM - NONE FOUND
 POTASSIUM - NONE FOUND
 CHLORIDE - NONE FOUND
 CO2 - NONE FOUND
 UREA NITROGEN - NONE FOUND
 CREATININE - NONE FOUND
 GLUCOSE 7/28/10 08:06 canc
 MAG:
 LFT's:
 WBC - NONE FOUND
 HGB - NONE FOUND
 HCT - NONE FOUND

Template: Wound consult template

CLICK "ALL" TO BEGIN (lower left corner)

Type of wound: []
 Location: []
 Tissue involvement:
 Wound is pressure induced
 Dimension and depth
 Length: [] cm
 Width: [] cm
 Depth: [] cm
 Undermining present: Yes No
 Location: []
 (Identify location by hours on the face of a clock, with client's head 12 o'clock)
 Wound Base in wound bed:
 Viable tissue 0% []% (Red: granulation, epithelialization, muscle,
 subcutaneous tissue)
 Nonviable tissue 0% []% (Slough/fibrinous = generally yellow-white,
 moist, loose to adherent necrotic tissue)
 Eschar 0% []% (Black, thick, dry, fibrin-containing necrotic tissue;
 leathery, hard adherent, brown to black in color)
 Wound Edges:
 Open Closed
 Description: (i.e., rolled, fibrotic, viable, irregular, even, macerated)

All None * Indicates a Required Field Preview OK Cancel

Scenario: Order Logic

SCT 27242001
methylprednisolone
(pharmaceutical /
biologic product)
Is A
Adrenal Corticosteroid
[NDFRT HS050]

This patient is at mild risk for skin breakdown (Braden score = 18).

This drug is a risk factor for skin breakdown.

Order

View Assmt

Order Assmt

Order Protocol

Inpatient Medications

METHYLPREDNISOLONE NA SUCCIN INJ,SOLN

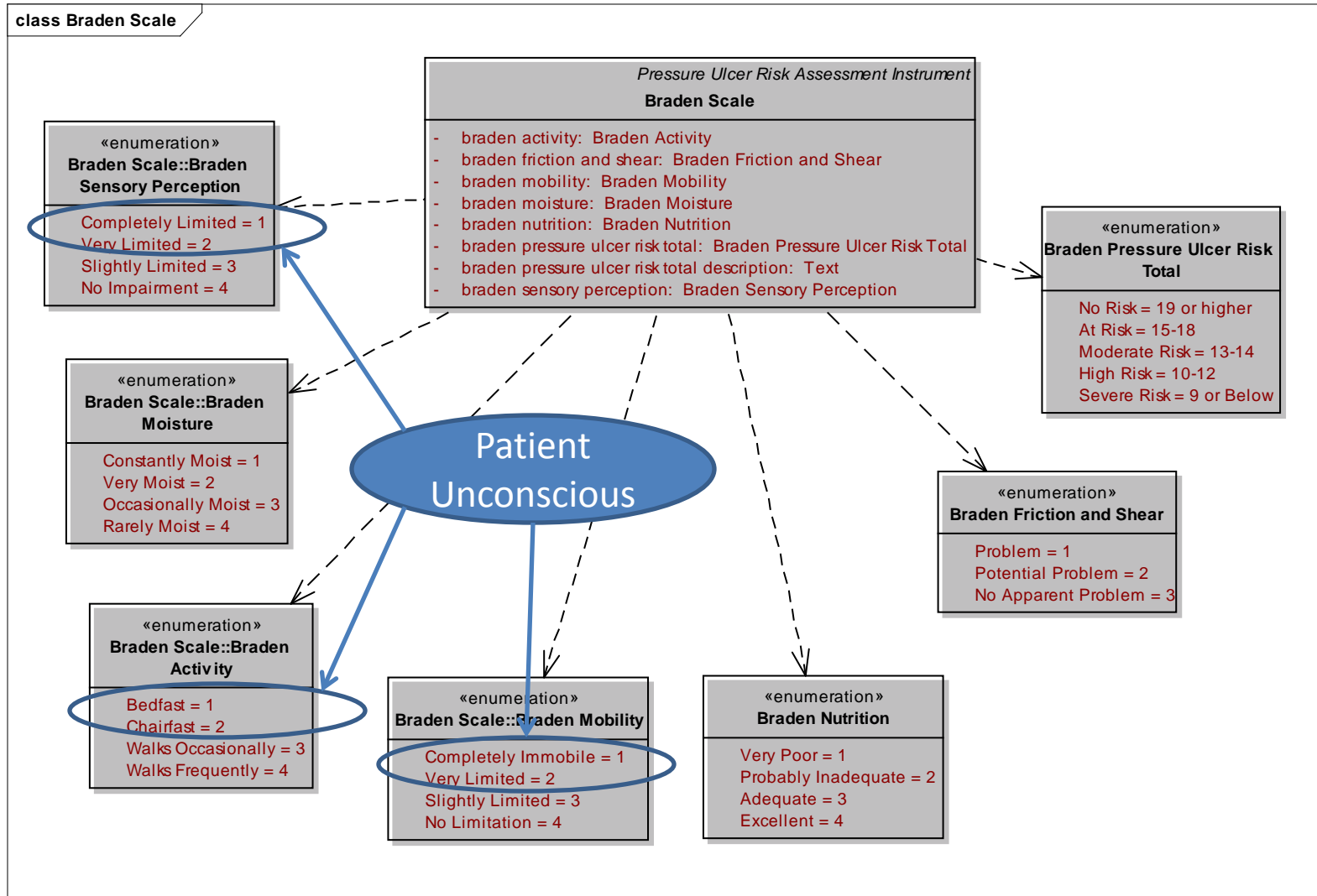
[Refer to Formulary/Protocol or Service Guidelines/Approval.](#)

Schedule (Day-Of-Week)

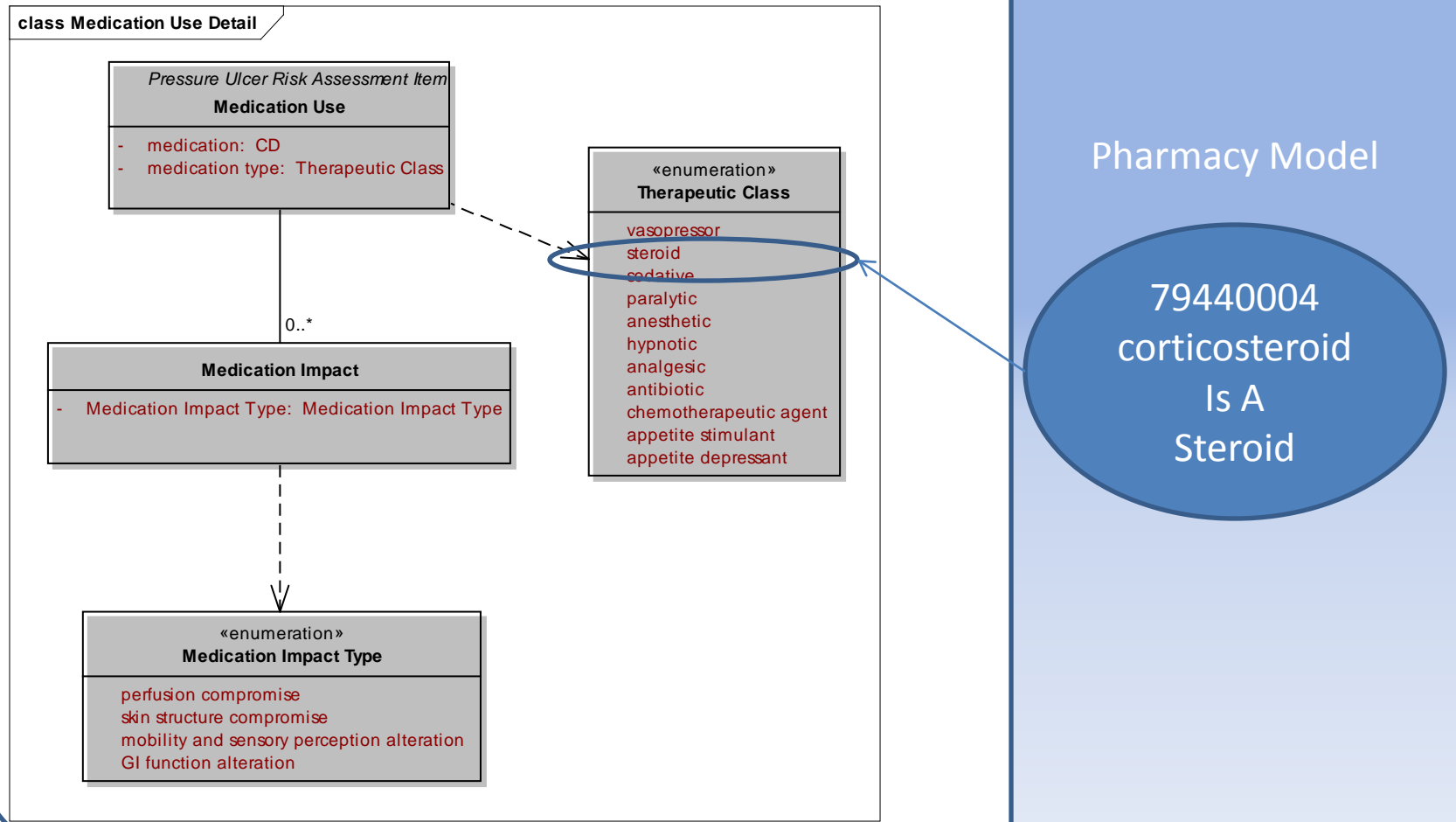
PRN

- QDAY
- Q8H
- Q8H-RT
- Q8HZ
- QAM
- QAM AC
- QAM W/FOOD
- QAM-D
- QAM-REMOVE HS
- QDAY
- QDAY AC
- QDAY PRN
- QDAY REMOVE-PM
- QDAY W/FOOD
- QDAY-D
- QDAY-RT

Reusable Components (Content and Structure) Provide the Framework



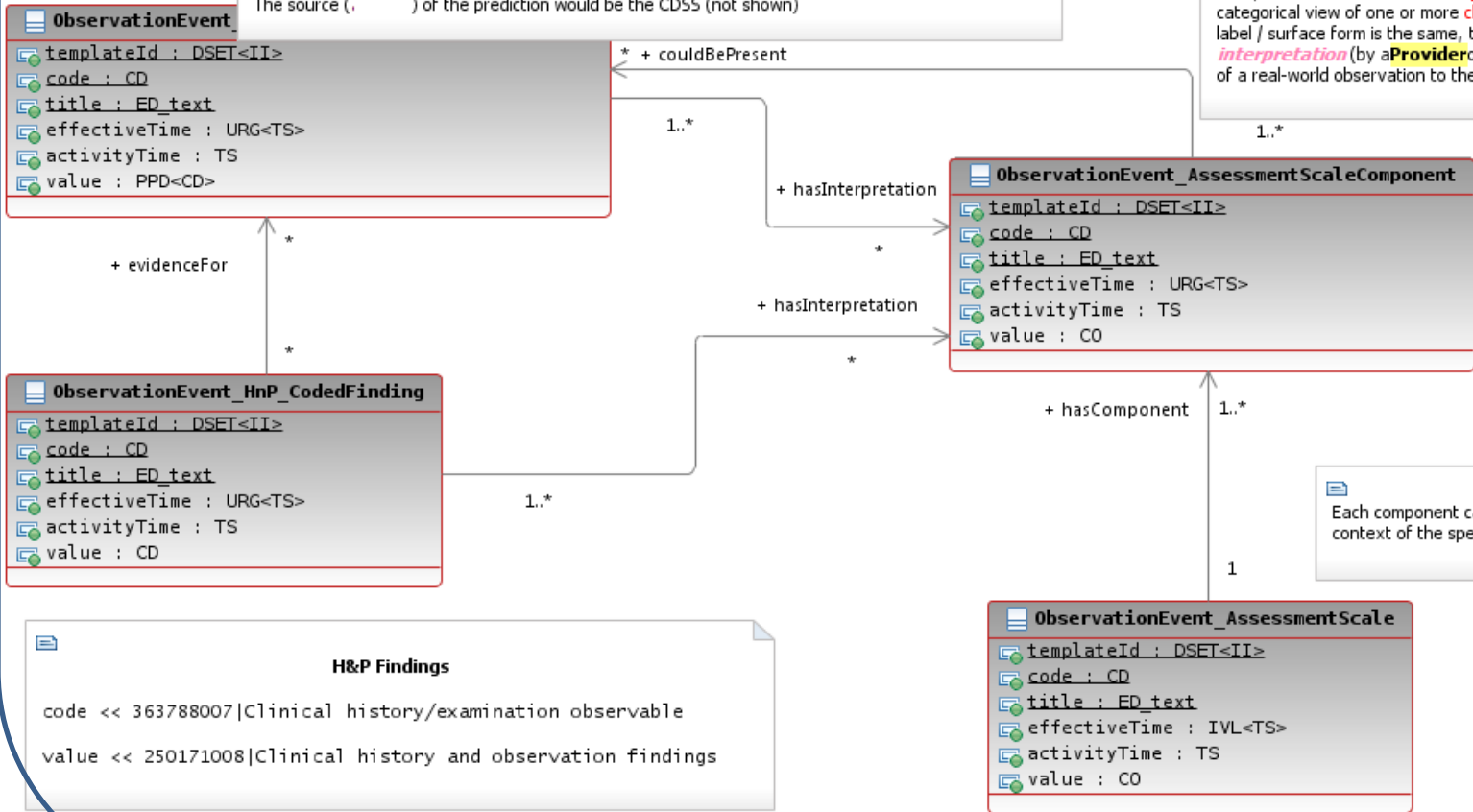
The Future: All Information is Described With Reusable Models and Terminology



Detailed Clinical Model Template

A clinical decision support system can be used to *infer* the presence or absence of a given clinical finding / disorder based upon multiple inputs, including those directly entered by a clinician. These can be used to populate an assessment scale component. Similarly, given an asserted assessment scale component, you can *infer* a range of things with a known risk of error (uncertainty).
The source () of the prediction would be the CDSS (not shown)

Every **assessment scale component** is a simplified categorical view of one or more **clinical findings**. Even when the label / surface form is the same, there is always an **interpretation** (by a **Provider** or **Decision Support System**) of a real-world observation to the more narrowly constrained



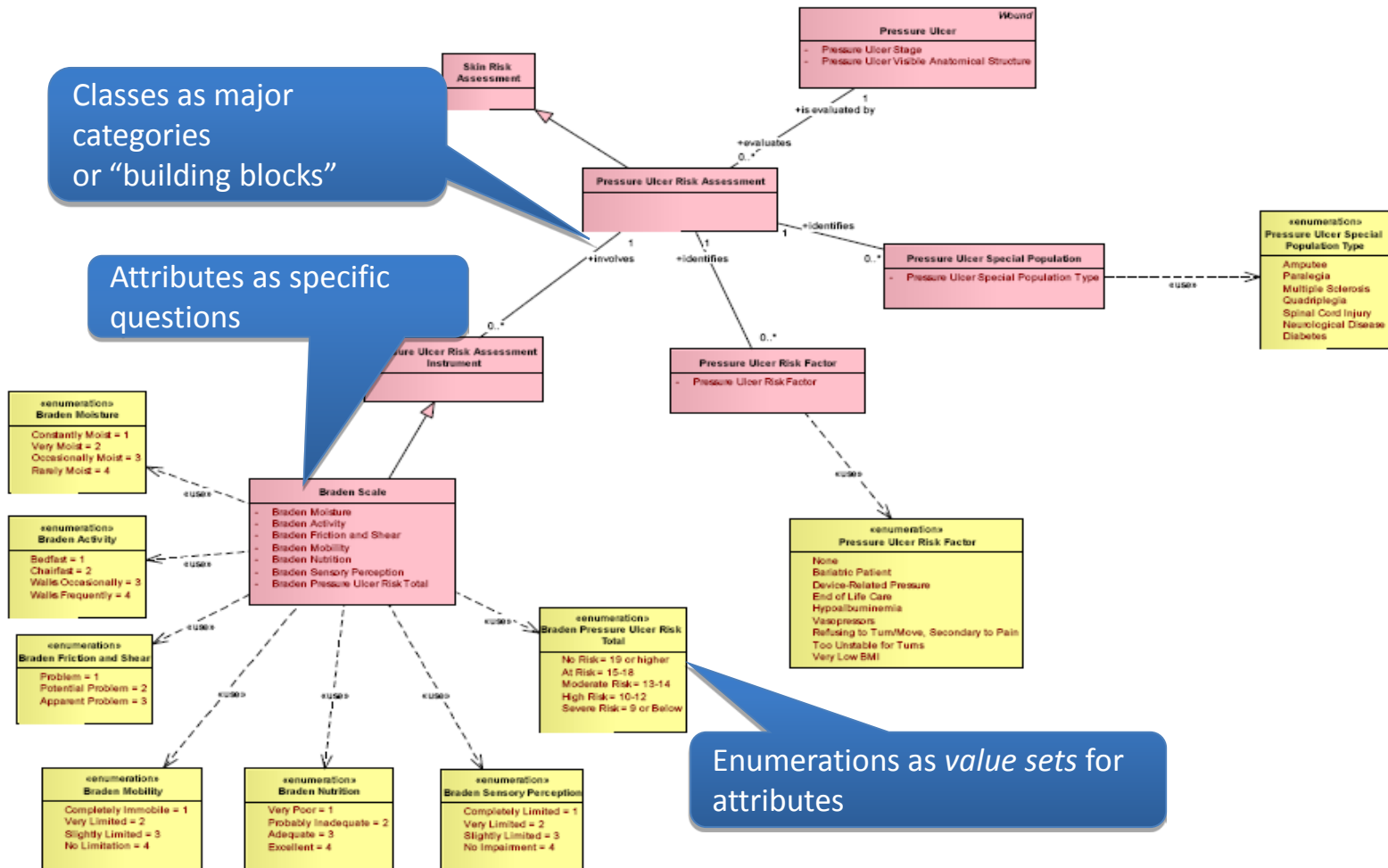
H&P Findings

```

code << 363788007|Clinical history/examination observable
value << 250171008|Clinical history and observation findings
  
```

Each component can only be used in the context of the specific assessment scale.

Method: Formalize the Model in Unified Modeling Language (UML)



Impact to National Database of Nursing Quality Indicators (NDNQI) and Other Current Quality Reporting

- We as health care providers have undesirable variation in the way we collect data for quality reporting
- We can reduce undesirable variation with standards for terminology and common models
- We can automate data collection and reporting when we implement standards for terminology and common models

What Nursing Leaders Need to Know

Three Key Questions to Ask Vendors:

- Is nursing documentation data structured in a discrete and standardized format to facilitate data capture, data re-use and data sharing?
- Is the nursing data mapped to a reference terminology?
- How do you demonstrate data portability between settings and organizations? -provide specific examples of nursing data

Summary

- **The imperatives are clear**
- **Nursing has a strong voice and a plan**
- **Nurses can leverage the EHR to improve practice**
- **Nursing leaders need to ensure that data is organized in a standardized way to make it accessible for clinical decision making, quality reporting and research**
- **Standardization of patient data exchange has the potential for improving patient safety and clinical outcomes**

QUESTIONS?