

# Pain Care Quality and Integrated and Complementary Health Approaches

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# Goals of Presentation

- Background and Rationale
- Research Questions/Hypotheses
- Design and Methods
- Study Progress
- Next Steps

# Study Background and Rationale

- Limited availability of reliable Pain Care Quality (PCQ) indicators and metrics
  - Efforts to improve quality of pain management hinge on efforts to identify reliable quality of care indicators and metrics to assess them
  - Promote their utilization in systematic quality improvement efforts

# Study Background and Rationale

- VHA's National Pain Management Strategy can benefit from an automated approach to measuring pain care quality (PCQ)
  - Leverage the power of the VHA electronic health record (EHR) to do this
  - Investigate the relationship of this new measure of quality with the utilization of complementary and integrated care

# Key Dimensions of Pain Care Quality

- In 2009, VHA specified key dimensions for “Evaluation of Outcomes and Quality of Pain Management.”
  - “Once pain symptoms are recognized, the following key dimensions should be documented: a timely and appropriate **comprehensive pain assessment**, development and enactment of a **pain treatment plan**, and **reassessment of the effectiveness of the plan**. **Patient and family education** regarding pain and pain management should also be documented.”
- VHA’s pain management policy further states that high quality pain management requires patient participation in the development of individually tailored, integrated, and team-based treatment that incorporates the broad array of evidence-based therapies including **complementary and integrative health approaches**.

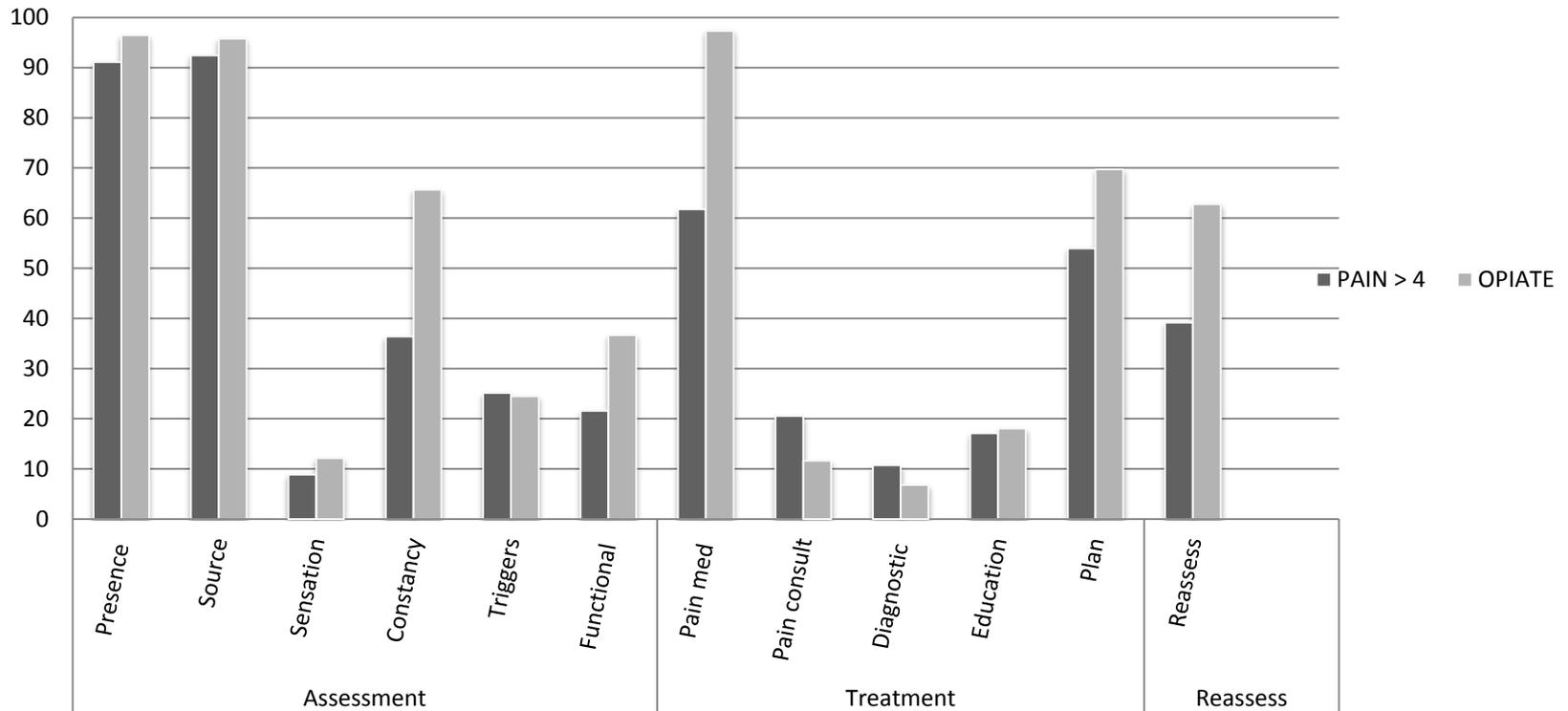
# Study Background and Rationale

- Prior development of manual approach for extracting PCQ Indicators
- Random sample of PCP provider notes for 200 patients at two facilities

Development and application of an electronic health record information extraction tool to assess quality of pain management in primary care. Dorflinger et al. *Transl Behav Med*. 2014 Jun. 4(2):184-9. doi: 10.1007/s13142-014-0260-5.

# Study Background and Rationale

Chart Review 2012: Presence of 12 PCQ Indicators in Percentages



# Study Background and Rationale

- **Study extends previous work with text in EHR**
  - Using Knowledge Discovery Strategies to Identify Fall-related Injuries, VA HSR&D 2008-2011
  - Using Text Mining to Differentiate Between PTSD and Mild TBI in OEF/OIF Veterans, VA HSR&D 2008-2009
  - **The Consortium For Healthcare Informatics Research, VA HSR&D 2009-2013**
  - Ontology-Enhanced Information Retrieval to Improve Clinical Practice, VA HSR&D 2011-2013
  - Using Information from the EHR to Monitor Adherence to mTBI Practice Guidelines, VA QUERI 2012-2013
  - Pilot Test of tag line to Identify Sections within Progress Notes VA NCPS 2012
  - Leveraging Information in the EHR to Measure Pressure Ulcer Risk in Veterans with SCI, VA HSR&D 2012-2017
  - **Pain Care Quality and Integrated and Complementary Health Approaches, VA/NIH 2014-2019**

# Research Questions/Hypotheses

**Overall Aim.** To develop a method to assess quality, state-of-the-art pain care (Pain Care Quality - PCQ) in an integrated healthcare system (employing the Stepped Care Model of Pain Management (SCM-PM)).

**Aim 1.** To identify and quantify empirically-derived, key dimensions of PCQ in veterans with musculoskeletal pain.

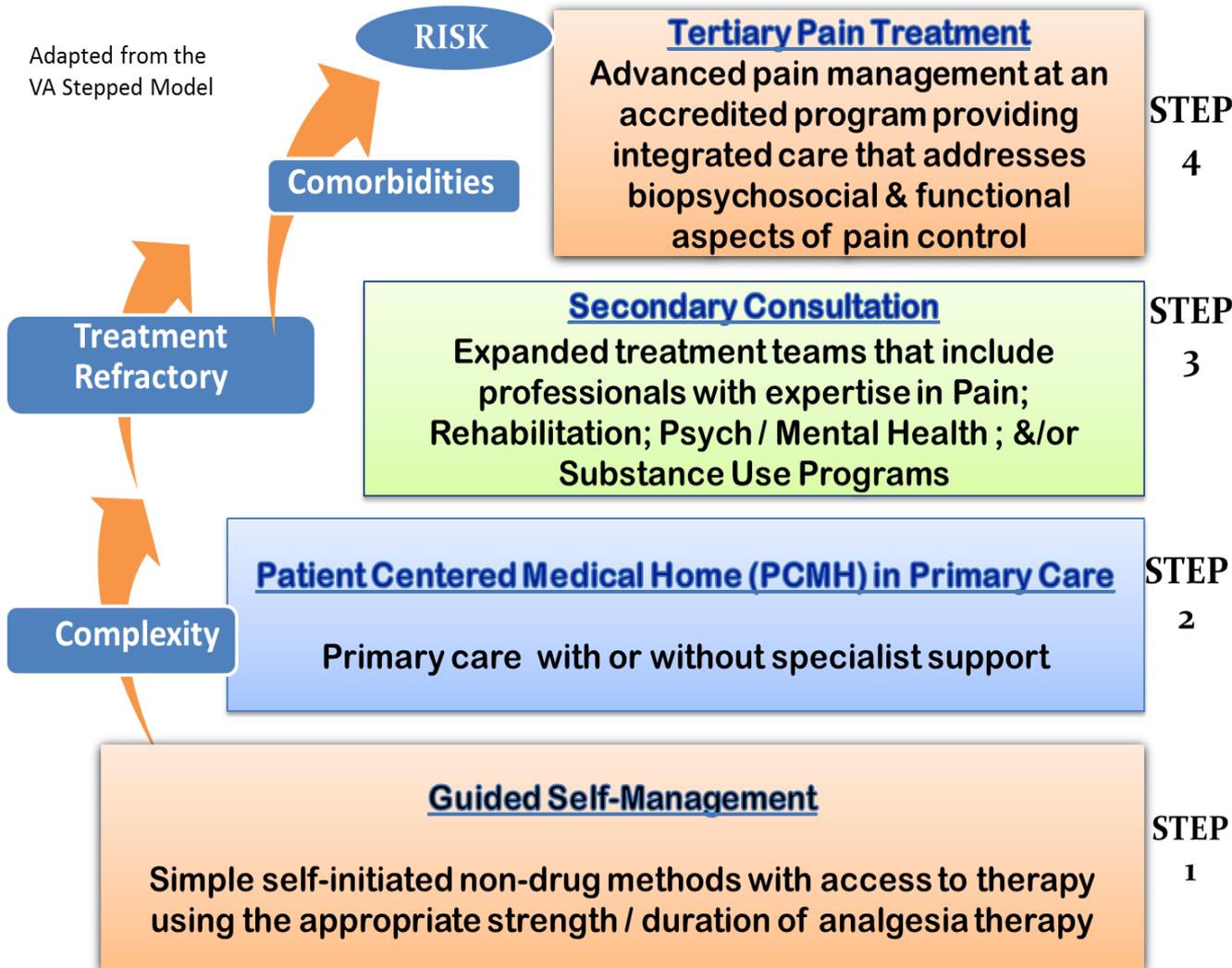
**Aim 2.** To assess factors associated with PCQ in a nationally representative sample of veterans with musculoskeletal pain.

*H1: Veterans receiving complementary and integrative health approaches (CIH) will be significantly more likely to receive key dimensions of PCQ than those not receiving CIH.*

*H2: Veterans with comorbid mental health and substance abuse disorders will be significantly less likely to receive key dimensions of PCQ, than those without those comorbidities.*

# VA's Stepped Care Model of Pain Management

Adapted from the  
VA Stepped Model



Rosenberger, P.H., Philip, E., Lee, A. & Kerns, R.D. (2011). VHA National Pain Management Strategy: Implementation of stepped pain management. *Federal Practitioner*, 28, 39-42.

# Research Questions/Hypotheses

**Aim 3.** To determine whether VHA facilities that have adopted the SCM-PM provide higher PCQ.

*H1: Veterans receiving care at facilities that have adopted the SCM-PM will be significantly more likely to receive high PCQ compared to veterans receiving care at facilities that have not adopted the SCM-PM.*

*H2: Veterans receiving care at facilities that have adopted the SCM-PM will be significantly more likely to receive CIH compared to veterans receiving care at facilities that have not adopted the SCM-PM.*

# Design and Methodology

## **Secondary analysis of data from the Veterans Health Administration (VHA) electronic health record**

- Available in structured data (ICD-9-CM codes, etc.)
  - Extract, clean and analyze using methods common to large secondary database studies
- Text-based data (progress notes, etc.)
  - Natural language processing (NLP) and machine learning (ML) methods reliably extract information on PCQ
- Structured and text data will be combined to conduct statistical analyses

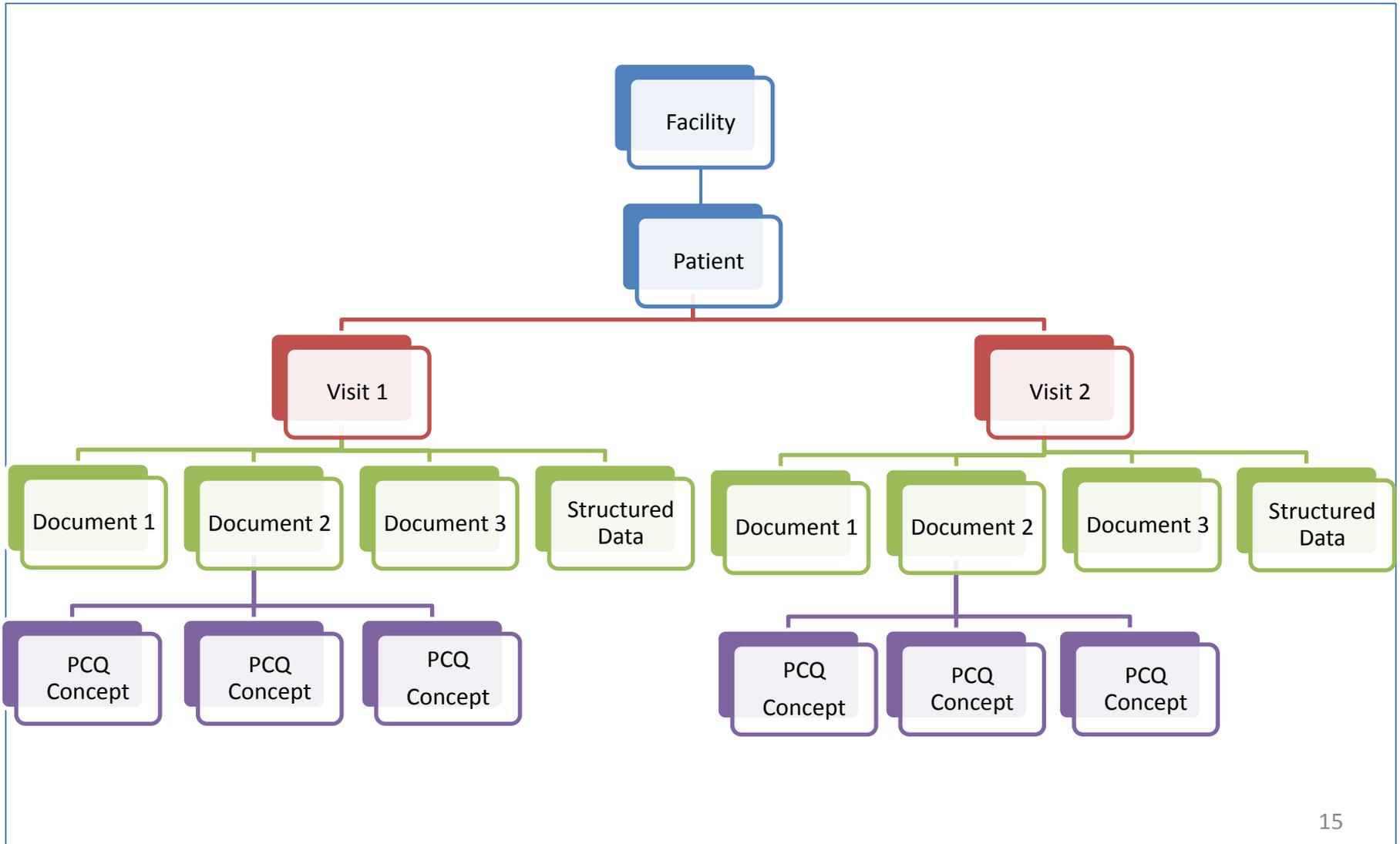
# Design and Methodology

## **Natural language processing (NLP)**

- To support text analyses a reference standard set of documents is created
  - Sample of approximately 2,000 documents
  - Specialized chart review (annotation) by two independent reviewers with expert adjudication
  - Detailed annotation guidelines and schema are developed and iteratively pilot tested
- NLP systems are trained and iteratively refined on these data
- The NLP systems are then applied to the data for all patients in the large cohort

**Develop and apply statistical models for Aims 2 and 3**

# Expanded Data Hierarchy



# Study Progress

## Develop reference standard

- Initial cohort of 2,769,312 with musculoskeletal pain with 309,277 intensity rating  $\geq 4$
- Random sample of patients - 64 males and 13 females from each of 130 corporate facilities
  - 8,268 males and 1,672 females
  - 376,487 documents
  - 2,172 unique document titles
- Narrowed to primary care provider notes
  - 99,481 documents
  - 101 unique document titles
- Selected documents for annotation
  - Because of number of concepts divided into 2 passes

# Study Progress

## Pass 1: Pain mention/ assessment /re-assessment

- **Assertion**
  - Future
  - Historical
  - Hypothetical
  - Negation
  - Not Patient
  - Uncertain
- **Assessment**
  - Aggravators
  - Alleviators
  - Diurnal Variation
  - Functional
  - Intensity
  - Persistence
  - Persistence
  - Sensation
- **Pain Diagnostics**
- **Pain Etiology**
- **Pain Intervention**
- **Pain Mention**
- **Pain Reassessment**
- **Pain Site**
- **Treatment**

## Pass 2: Treatments

- **Assertion**
  - Hypothetical
  - Historical
  - Not Patient
  - Negation
  - Uncertain
  - Non VA
  - Patient-initiated
  - Allergies
- **Pain Intervention**
  - Pharmacologic
  - Injection
  - Implantable
  - CAM
  - Mental Health
  - Self-Management
  - Education
  - Chiropractic
  - Assistive Device
  - Other
- **Consult Referral**
- **Physical Diagnostic**
- **Pain Reassessment**
- **Side Effect**
- **Education**
- **Education Topic**
- **Consult Discipline**

# E-Host Software

The screenshot displays the eHOST software interface, which is used for managing and annotating medical documents. The interface is divided into several main sections:

- Top Menu Bar:** Contains icons for Result Editor, NLP Assisted, Pin Extractor, Dictionary Manager, SYSTEM Setting, Sync Assignments, and EXIT.
- NAVIGATOR (Left Panel):** Shows a tree view of document classes and annotations. The 'Classes' section includes Header, ItemLabel [1/1], ItemValue [1/1], TextSpan, TotalLabel, TotalValue, and WholeTemplate. The 'Public Attributes' section is empty, and 'Relationships' shows 0/0.
- Document Viewer (Center Panel):** Displays the text of a document titled 'L442--N800113307483.txt'. The text includes sections for 'Braden Scale - For Predicting Pressure Sore Risk', 'SKIN PATCHES', 'MAJOR RISK FACTORS / SPECIAL POPULATIONS', 'CURRENT SKIN ASSESSMENT', and 'SKIN PROBLEMS'. The word 'Moisture' is highlighted in red, and a yellow box highlights the text 'Sensory Perception: = No Impairment'.
- Annotation Editor (Right Panel):** Shows the details of the selected annotation. The 'Selected Annotations' list contains 'Moisture'. The 'Span' field shows '87 | 95 : Moisture'. The 'Class' is set to 'ItemLabel'. The 'Comment' field is empty. The 'Relationships' section shows a relationship: '(LabelValue) --> "4"'. The 'Attributes' section is empty.
- Bottom Status Bar:** Shows the current project path, 'Current Project: P:\ORD\_Luther\_201308073D\CURRENT-TEMPLATE-ANNOTATIONS\YourName\YourName-Workspace\Training1', and the current mode, 'Annotation Mode'.

# Study Progress (Build a Vocabulary)

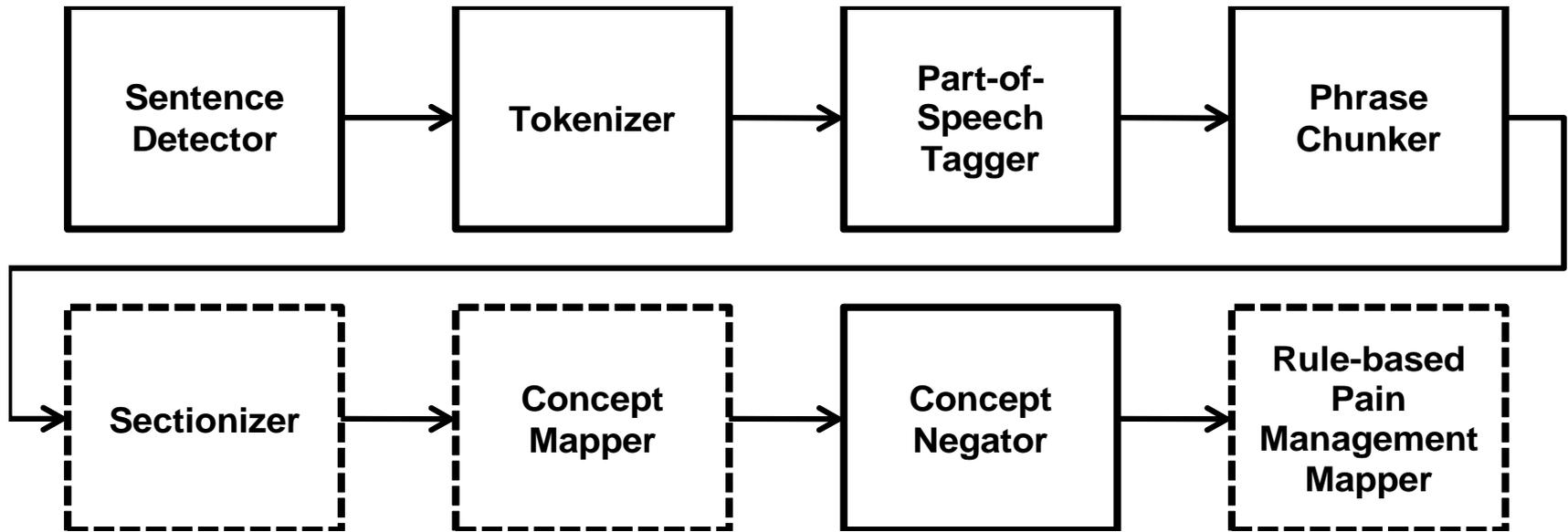
- Acupressure
- Acupuncture
- Advitha kriya- dhanwantraï prakriya
- Affirmative prayer
- Alexander technique
- Allspice
- Aloe Vera
- Alternative cancer treatments
- Anthroposophical medicine
- Apitherapy
- Applied kinesiology
- Aquamin
- Arnica
- Aromatherapy
- Ashtanga vinyasa yoga
- Ashtanga yoga
- Ashwagandha
- Astrology
- Attachment therapy
- Auriculotherapy
- Autogenic training
- Autosuggestion
- Ayurveda
- Bach flower therapy
- Balneotherapy
- Bates method
- Bikram yoga.....
- Tai Chi
- Tantric yoga
- Thai massage
- Therapeutic horseback riding
- Therapeutic touch
- Thunder God Vine
- Tibetan eye chart
- Traditional Chinese medicine
- Traditional Japanese medicine
- Traditional Korean medicine
- Traditional Mongolian medicine
- Traditional Tibetan medicine
- Trager approach
- Transcendental meditation
- Trigger point
- Turmeric
- Unani medicine
- Urine therapy
- Uroopathy
- V[edit]
- Valerian root
- Viniyoga
- Vinyasa yoga
- Vipassana
- Visualization (cam)
- Water cure (therapy)
- White willow

# Next Steps

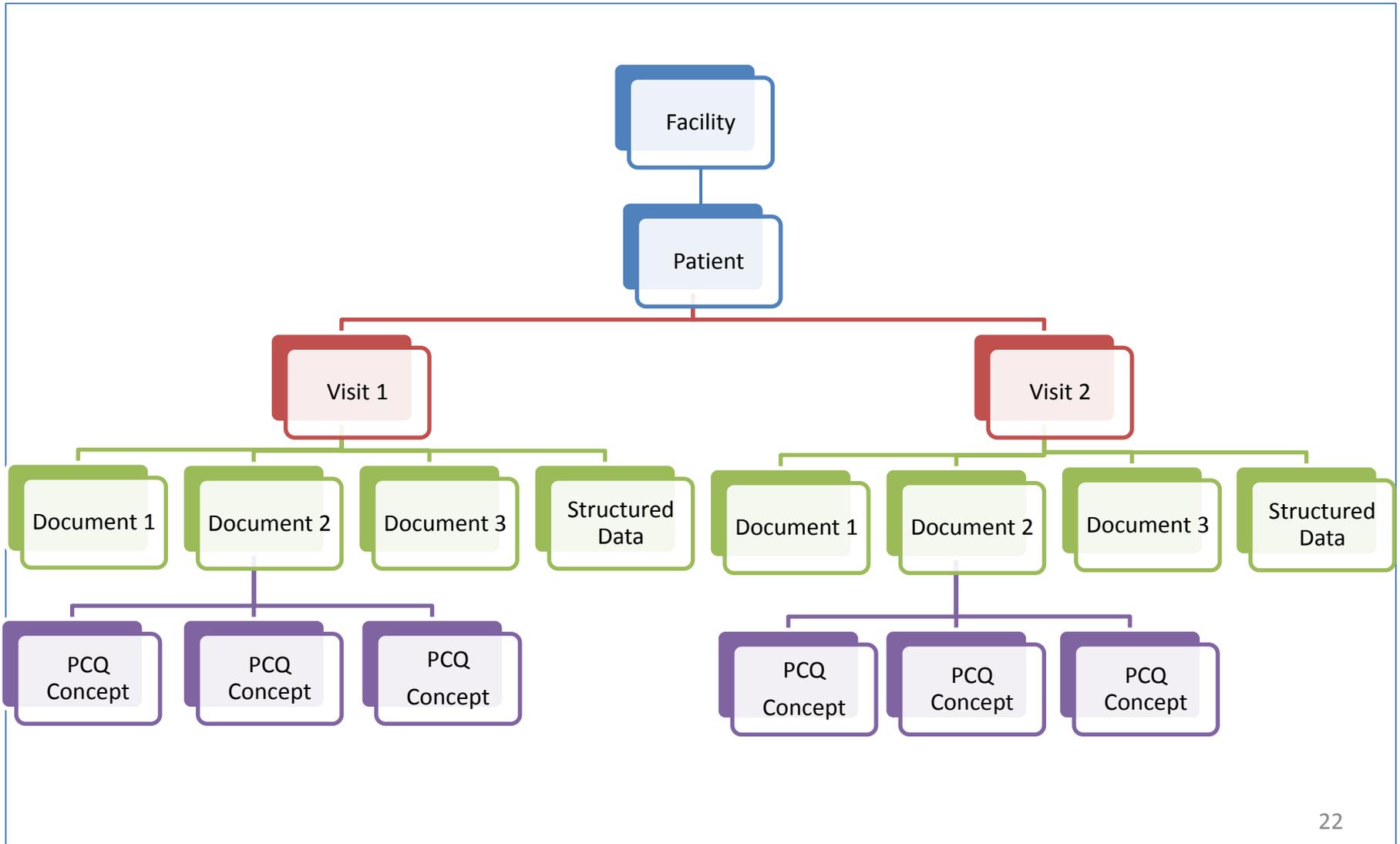
## **Next steps NLP**

- As we complete the annotation of the first sample of documents, we will begin to develop natural language processing systems

# Next Step Build NLP System



# Expanded Data Hierarchy



# Study Progress

## Statistical models for Aim 2 and 3

- A propensity model was developed using 3 years coded data – visits, diagnoses, treatments, pain intensity ratings, medications, demographics (n = 309,277).
  - Visits coded for acupuncture, massage and chiro used to define two groups (for each treatment type).
  - Propensity score (PS) of receiving CIH was estimated for each veteran and used to match one control to each CIH recipient.
  - A generalized estimating equation normal model was used to estimate average treatment effect of CIH on pain intensity accounting for potential confounders and correlations among repeated assessments.

# Thank You

- We have made a lot of progress in this study but we have “miles to go before we rest”
- If I haven't scared everyone off perhaps I can come back in a year or so and provide an update.
- Questions?