Practice-based Evidence: Clinical IT Innovation as an Organizational Knowledge Asset

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Key Points

- Disciplines such as medicine, nursing, and respiratory therapy are practice-based, therefore, evidence should be generated from practice (i.e., practice-based evidence) as well as applied to practice from research studies
- IT has facilitated decision support for evidence-based practice
- Decision support can occur through IT artifacts other than alerts and reminders – these include smart documentation templates, order sets, and configurable user interfaces
- Clinical expertise is an essential element in the creation of such artifacts which can be viewed as a source of organizational knowledge
- Strategies needed for collecting, storing, and sharing of organizational knowledge assets

Outline

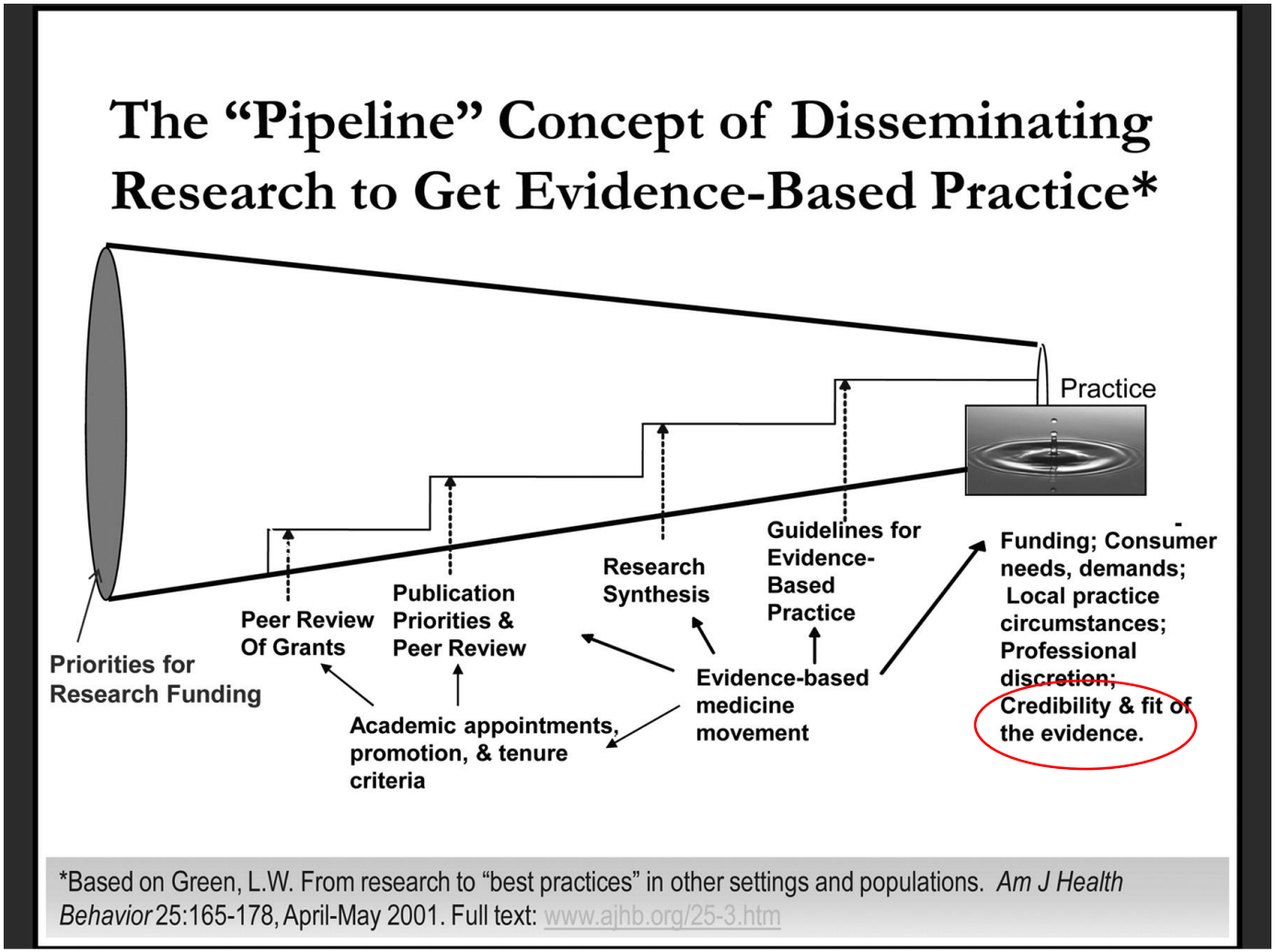
- Evidence-based practice
- Decision support for evidence-based practice
- Case study of decision support for evidence-based practice and practice-based evidence generation
- Informatics support for practice-based evidence generation

What is Evidence-based Practice?

- Evidence-based medicine is the practice of making medical decisions through the judicious identification, evaluation, and application of the most relevant informatio

Estimated to take 17 years to implement 30% of research-based recommendations (IOM, 2001)

The pipeline conceptualization and implementation of transferring research to practice results in successive constrictions of the flow of knowledge and an 'evidence-based guideline' product at the practitioner end of the pipeline that has a poor fit with practice circumstances such as funding, time constraints and patient demands.



Green L W Family Practice 2008;25:i20-i24

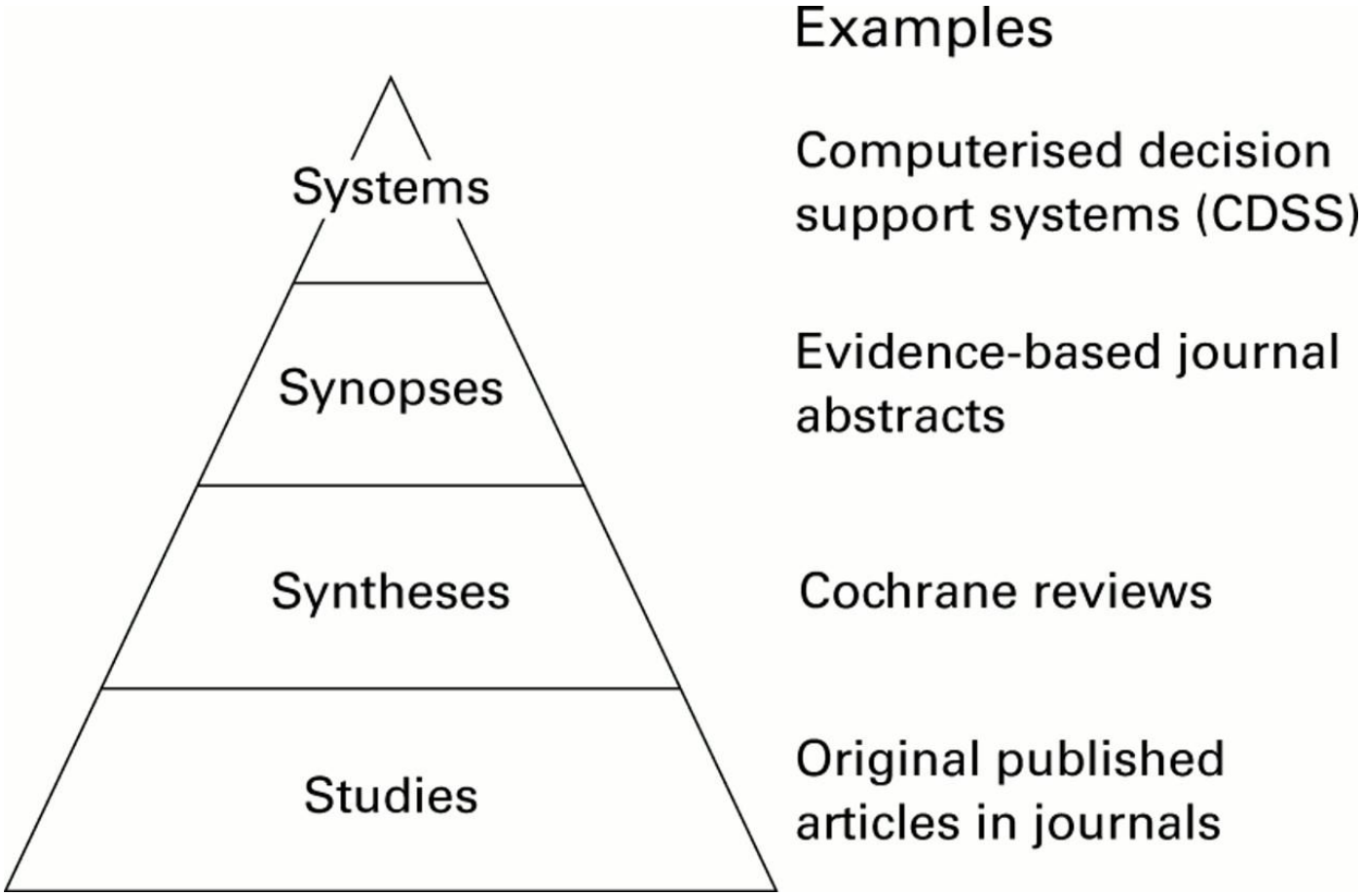
What is Evidence-based Practice?

- Traditional conceptualizations
  - Research utilization
  - Clinical trials-based
  - Clinical practice guidelines
- Application of domain knowledge to patient care
  - Evidence as a continuum
  - Increasing respect for practice-based evidence

What Are the Steps of EBP?

- Convert an information need into an answerable question
- Efficiently track down the best evidence
- Critically appraise the evidence for its validity (closeness to the truth) and usefulness (clinical applicability
- **Apply the results in practice**
- Evaluate the impact of the practice implementation

"4S" levels of Organisation of Evidence from Research



Haynes, R B. Evid Based Ment Health 2001;4:37-38

Clinical Decision Support Systems

A clinical decision support system is any computer program designed to help health care professionals make clinical decisions (Shortliffe, 1987).

- Information management
- Focusing attention
- Patient-specific consultation

Integration of Evidence into Clinical IT for Clinical Decision Support Also a Continuum

- Referential
- Executable
- Actionable

Types of Decision Support Functions

- Tools for information management - provide data and knowledge needed by the clinician, but do not help apply that information to the task (e.g., Medline, Drug Reference Database, Infobuttons)

3131313 · **SANDIEGO , CARMEN** · 1951-05-26 · 52y F · (--) · (No attending) MRN · Name · List · Add to list

Logout

Lab summary
Lab update
12h | 36h | 72h | Days
Admin summary

All results
Before date

Laboratory	Feb 12
Radiology	Nov 12
Pathology	Nov 14
Disch Sum	2002
Op/Clinical	
Operative	Oct 30
Consult	1997
Clin Sum	
Neurophys	1995
Ob/Gyn	Nov 17
GI Endo	2002
Cardiology	2003
HEENT	1997
Pharmacy	2001
PFT	Nov 18
Non-chart	
Alerts	Oct 20
Signout	Mar 12
Notes	Mar 16
DOP notes	1999
Self Rep Lab	Nov 16

Pharmacy · (2001-09-21 to 2000-12-02) · Newer · Older

Ordered on	Order	Dose	Freq	Route	Status
2001-09-21 09:27	ERYTHROPOIETIN INJ 40000 U/ML CF	40000 U	TODAY	SC	DC
2001-09-21 09:27	ERYTHROPOIETIN INJ 40000 U/ML CF	40000 U	TODAY	SC	DC
2001-09-21 09:26	POTASSIUM CL IVPB-PMIX 10 MEQ/100ML	10 MEQ	1DOSE	IV	DC
2001-05-22 22:03	CAPTOPRIL TAB 12.5 MG	6.25 MG	1DOSE	ORAL	DC
2000-12-02 15:00	COLYTE SOLN 4000 ML	1 EA	5XDAY	ORAL	DC
2000-12-02 15:00	COLYTE SOLN 4000 ML	1 EA	5XDAY	ORAL	DC

Infobutton Manager - Netscape

File Edit View Go Communicator Help

Back Forward Reload Home Search Netscape Print Security Shop Stop

Bookmarks Netsite: x.cpmc.columbia.edu/webcisdev13/wc_infomanage2.cgi What's Relate

Questions of Interest

From the Columbia University Infobutton Manager©

Concept of Interest: **CAPTOPRIL TAB 12.5 MG**
Preferred Name for Searching: **Captopril**
Date of Patient Data: **2001-05-22-22.03**

Frequently Asked Questions:

- What is the patient information from Lexi-Comp?
- What is the Spanish patient information from Lexi-Comp?
- What does it look like? (from Lexi-Comp)
- What are the forms and strengths according to Micromedex?
- What is the dosing and administration information from Micromedex?
- How do I treat overdosage according to Micromedex?
- What does this drug interact with according to Micromedex?
- What are the contraindications according to Micromedex?
- What are the adverse reactions according to Micromedex?

Other Common Questions:

- What does RxList say?

Search Other Resources:

- UpToDate
- Harrisons Principles of Internal Medicine

Document: Done

Lexi Online Patient Education Leaflet...

Back Forward Reload Home Search Netsca

Bookmarks Location: 800.htm What's Related

LEXI-PALS™

Adult Patient Advisory Leaflet System

Captopril (KAP toe pril)

Marcas estadounidenses Capoten®

Marcas canadienses Alti-Captopril; Apo®-Capto; Capoten™; Gen-Captopril; Novo-Captopril; Nu-Capto®; PMS-Captopril®

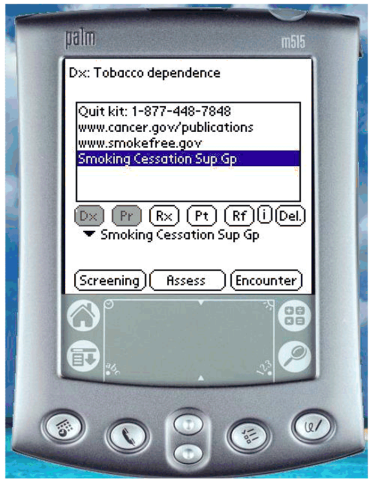
Marcas mexicanas Capitral®; Capoten®; Capotena; Captral®; Cardipril®; Cryopril®; Ecapresan; Ecaten®; Kenolan®; Lenpryl®; Precaptil; Romir®

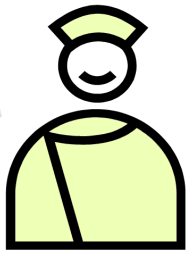
Categoría terapéutica Inhibidor de la enzima conversora de la angiotensina (ECA)

¿Qué advertencias debo tener en cuenta antes de tomar este medicamento?

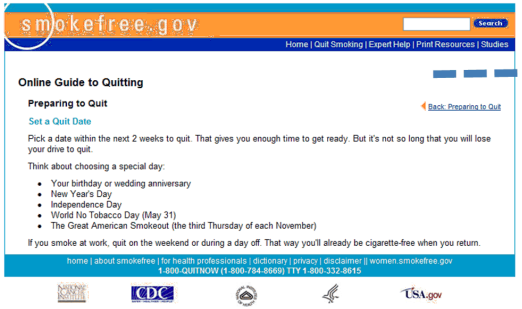
- No tome este medicamento si está embarazada. El consumo de este medicamento durante el segundo y tercer trimestre puede causar defectos de nacimiento. Si queda embarazada mientras está tomando este medicamento

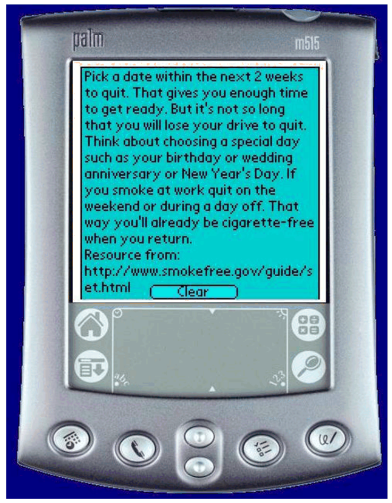
mHealth Infobuttons





Information Resources





R21 CA126325, Bakken

E 003280234 W 3131313 SANDIEGO, CARMEN 75F 1933-01-03

MedWISE 3

Hello testuser | add widgets | My CHIA | search | Options | Help | Logout

Home | MyMedPage | [new]CHIApage | Dump page | New items | OutPatient Info | + New page

open10012 open10105 Lab Composer Get Web page

Lab

MAGNESIUM(ALLEN) 2008-03-29 12:22

Test	Result	Range	Unit
MAGNESIUM	2.3	1.5-2.3	mg/dl

Collection time: 2008-03-29 12:22 Received time: 2008-03-29 13:23

Last updated: 2008-03-29 14:01

Status: Final, Accno: S23611MGZ 083T

DSUM

CPMC Report: Discharge Summary Note 2008-03-31 16:30

CHIEF COMPLAINT SOB

HISTORY OF PRESENT ILLNESS This is a 78 yo F with a h/o COPD, still smoking 1ppd, who presents with SOB and wheezing, onset the am PTA. She noted a slow increase in DOE over the last 3 days, but on the am PTA felt more SOB at rest and noted increasing cough productive of whitish sputum and tightness in her chest. She denies any Chest pain but reports some left lower back discomfort with cough or movement. She reports that this am she noted

Lab

BASIC METABOLIC PNL(ALLEN) 2008-03-29 12:22

Test	Result	Range	Unit
SODIUM	139	136-146	mM/l
POTASSIUM	4.4	3.6-5.0	mM/l
CHLORIDE	101	102-109	mM/l
CO2	24	25-33	mM/l
BUN	17	7-20	mg/dl
GLUCOSE	86	70-110	mg/dl
CREATININE	1.0	0.5-0.9	mg/dl
CALCIUM	9.1	8.4-9.8	mg/dl

Collection time: 2008-03-29 12:22 Received time: 2008-03-29 13:23

Last updated: 2008-03-29 14:01

Status: Final, Accno: S23611BMETZ 083T

ABC(ALLEN) 2008-03-31 08:36

ABC(ALLEN) 3-31

ABC(ALLEN) 2008-03-31 08:36

Test	Result	Range	Unit
WBC	11.1	3.54-9.06	10*9/l
RBC	4.09	4.00-5.20	10*12/l
HEMOGLOBIN	12.9	12.0-15.8	g/dl
HCT	38.5	35.4-44.4	%
MCV	94.1	79.0-93.3	fl
MCH	31.5	26.7-31.9	pg
MCHC	33.5	32.3-35.9	g/dl

Lab

HEPATIC FUNC PANEL(ALLEN) 2008-03-28 01:15

Test	Result	Range	Unit
PROTEIN, TOT	7.3	6.7-8.6	g/dl
ALBUMIN	4.4	4.0-5.0	g/dl
T-BILIRUBIN	0.7	0.3-1.3	mg/dl
D-BILIRUBIN	0.1	0.0-0.4	mg/dl
AST	14	12-38	U/L
ALT	8	7-41	U/L
ALK PHOS	106	33-96	U/L

Collection time: 2008-03-28 01:15 Received time: 2008-03-28 01:43

Last updated: 2008-03-28 02:47

Orders

Amlodipine Oral 2007-08-13 09:48

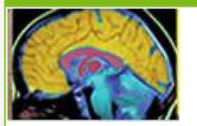
Order Name	Amlodipine Oral
Summaryline	10 MG PO Daily Routine
Requested Time	2007-08-13 09:48
Entered Time	2007-08-13 09:48
Stop Time	2007-08-14 18:24
Performed Time	
Type	Medication
Title	Pharmacy - Medication PO
Dosage	
Uom	
Frequency	Daily

Custom Alerts

Hb A1C > 6
See diabetes panel

CDC Lyme Alert
NYCDOH Hb A1c

Incoming results



Radiology available

Orders

(5) HubMed - COPD

- Positive Expiratory Pressure in Patients with Chronic Obstructive Pulmonary Disease - A Systematic R
- Alcoholic Beverage Intake and Risk of Lung Cancer: The California Men's Health Study.
- Pulmonary Vascular Involvement in COPD.
- Tracheobronchoplasty for severe tracheobronchomalacia: a prospective outcome analysis.
- A quick and easy method of measuring the hypercapnic ventilatory response in patients with COPD.

COAG PROFILE 2008-09-10 10:45

Test	Result	Range	Unit
PT	11.5	12.4-15.0	SEC
INR	2.00	0.88-1.12	
APTT	25.6	23.3-32.3	sec
FIBRINOGEN			
THROMBIN TIME			

Types of Decision Support Functions

- Tools for focusing attention - remind the user of problems that might otherwise be overlooked (e.g., abnormal lab values, potential drug interactions, guideline compliance)

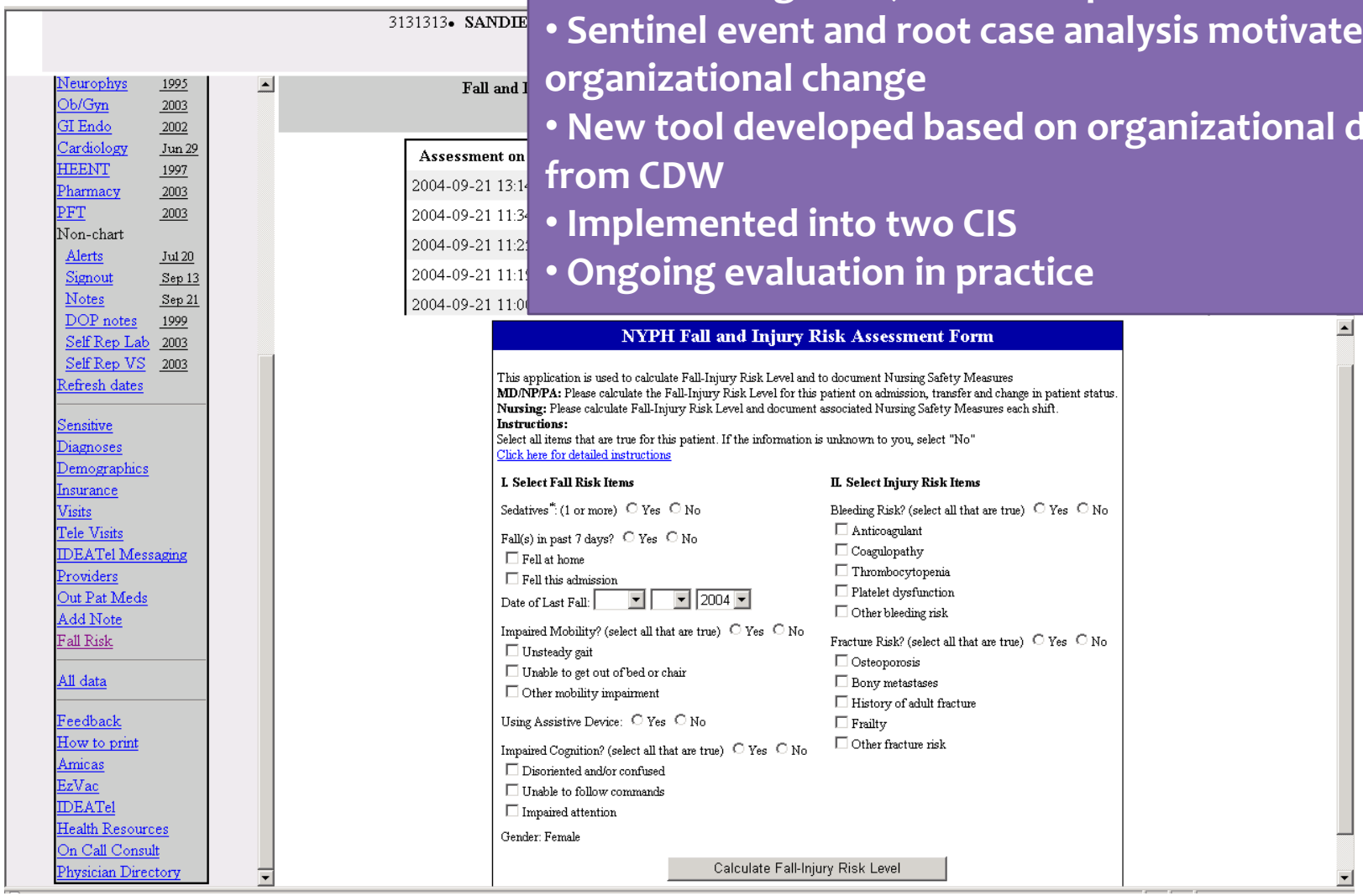
Alerts and Reminders

- Alerts
  - Notification of potential problem
  - Common application is adverse drug event prevention
    - Dosage
    - Drug-drug interaction
    - Allergy
    - Drug-laboratory value interaction
  - Frequently tied to computer-based)
- Reminders
  - Typically guideline-related
  - Preventive care
    - Mammograms
    - Immunizations
    - Diabetic care
    - Hypertension management

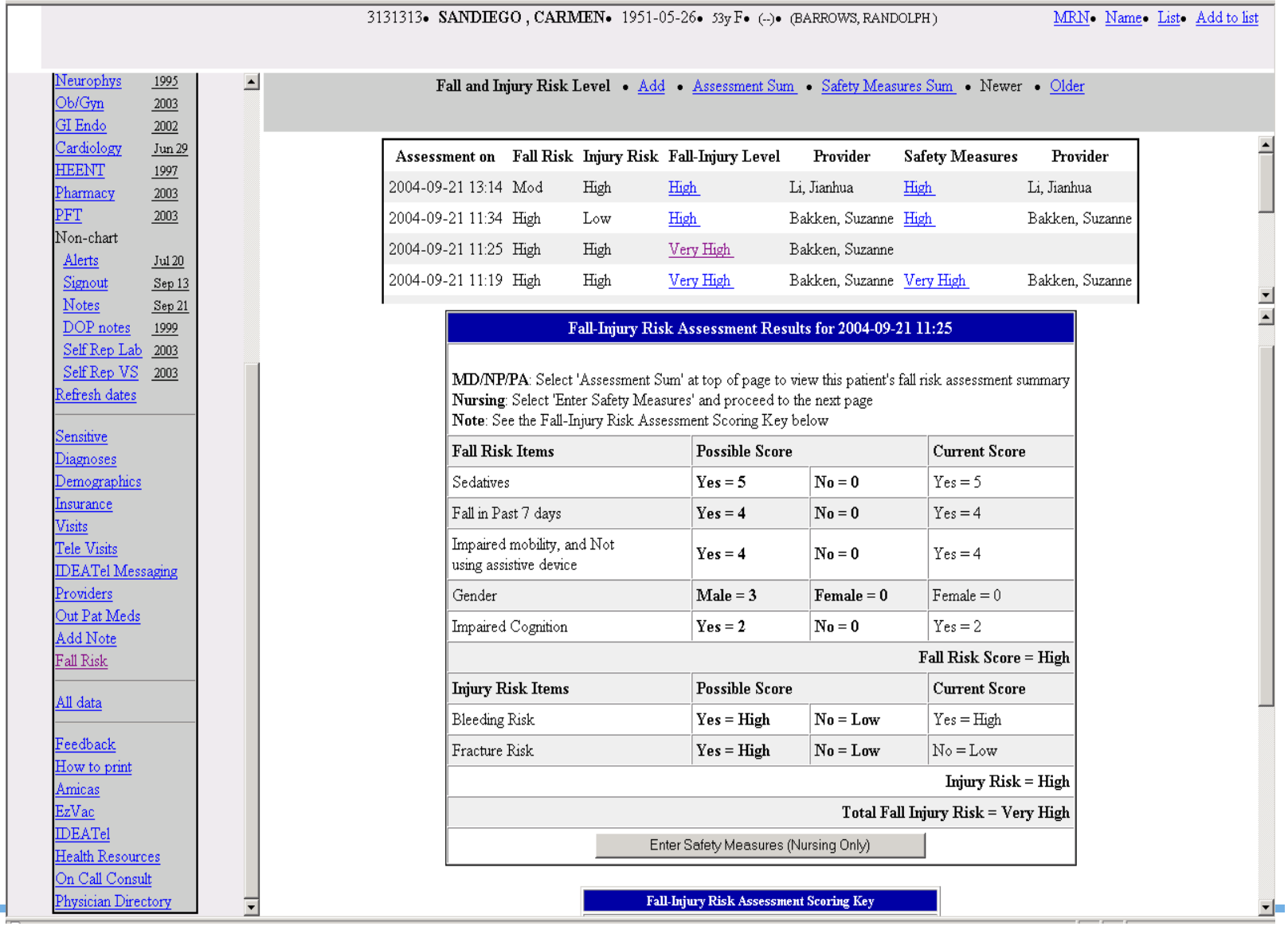
How disruptive?
Over ride rates?
Actionable in workflow?

Fall and Injury Risk

- With existing tools, almost all patients at risk
- Sentinel event and root case analysis motivated organizational change
- New tool developed based on organizational data from CDW
- Implemented into two CIS
- Ongoing evaluation in practice



Fall and Injury Risk Results Page



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MRN• Name• List• Add to list

Neurophys 1995
Ob/Gyn 2003
GI Endo 2002
Cardiology Jun 29
HEENT 1997
Pharmacy 2003
PFT 2003
Non-chart
Alerts Jul 20
Signout Sep 13
Notes Sep 21
DOP notes 1999
Self Rep Lab 2003
Self Rep VS 2003
Refresh dates

Sensitive
Diagnoses
Demographics
Insurance
Visits
Tele Visits
IDEATel Messaging
Providers
Out Pat Meds
Add Note
Fall Risk

All data

Feedback
How to print
Amicas
EzVac
IDEATel
Health Resources
On Call Consult
Physician Directory

Fall and Injury Risk Level • Add • Assessment Sum • Safety Measures Sum • Newer • Older

Assessment on	Fall Risk	Injury Risk	Fall-Injury Level	Provider	Safety Measures	Provider
2004-09-21 13:14	Mod	High	High	Li, Jianhua	High	Li, Jianhua
2004-09-21 11:34	High	Low	High	Bakken, Suzanne	High	Bakken, Suzanne
2004-09-21 11:25	High	High	Very High	Bakken, Suzanne		
2004-09-21 11:19	High	High	Very High	Bakken, Suzanne	Very High	Bakken, Suzanne

Fall-Injury Risk Assessment Results for 2004-09-21 11:25

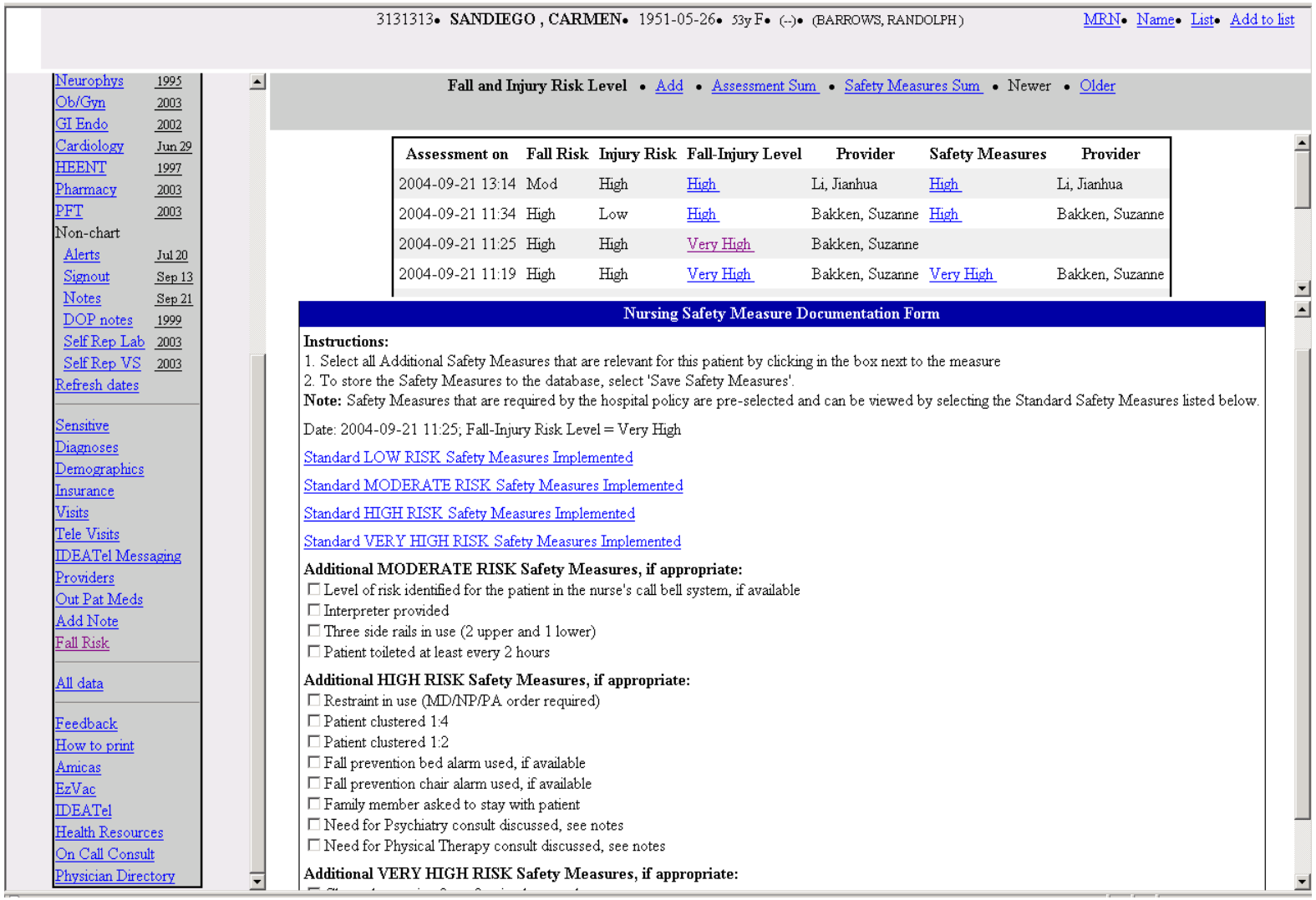
MD/NP/PA: Select 'Assessment Sum' at top of page to view this patient's fall risk assessment summary
Nursing: Select 'Enter Safety Measures' and proceed to the next page
Note: See the Fall-Injury Risk Assessment Scoring Key below

Fall Risk Items	Possible Score		Current Score
Sedatives	**Yes = 5**	**No = 0**	Yes = 5
Fall in Past 7 days	**Yes = 4**	**No = 0**	Yes = 4
Impaired mobility, and Not using assistive device	**Yes = 4**	**No = 0**	Yes = 4
Gender	**Male = 3**	**Female = 0**	Female = 0
Impaired Cognition	**Yes = 2**	**No = 0**	Yes = 2
			Fall Risk Score = High
Injury Risk Items	**Possible Score**		**Current Score**
Bleeding Risk	**Yes = High**	**No = Low**	Yes = High
Fracture Risk	**Yes = High**	**No = Low**	No = Low
			Injury Risk = High
			Total Fall Injury Risk = Very High

Enter Safety Measures (Nursing Only)

Fall-Injury Risk Assessment Scoring Key

Safety Measures Documentation



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Neurophys 1995
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Sensitive
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IDEATel Messaging
Providers
Out Pat Meds
Add Note
Fall Risk

All data

Feedback
How to print
Amicas
EzVac
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Fall and Injury Risk Level • Add • Assessment Sum • Safety Measures Sum • Newer • Older

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2004-09-21 11:19	High	High	Very High	Bakken, Suzanne	Very High	Bakken, Suzanne

Nursing Safety Measure Documentation Form

Instructions:
1. Select all Additional Safety Measures that are relevant for this patient by clicking in the box next to the measure
2. To store the Safety Measures to the database, select 'Save Safety Measures'.

Note: Safety Measures that are required by the hospital policy are pre-selected and can be viewed by selecting the Standard Safety Measures listed below.

Date: 2004-09-21 11:25; Fall-Injury Risk Level = Very High

Standard LOW RISK Safety Measures Implemented

Standard MODERATE RISK Safety Measures Implemented

Standard HIGH RISK Safety Measures Implemented

Standard VERY HIGH RISK Safety Measures Implemented

Additional MODERATE RISK Safety Measures, if appropriate:
- ☐ Level of risk identified for the patient in the nurse's call bell system, if available
- ☐ Interpreter provided
- ☐ Three side rails in use (2 upper and 1 lower)
- ☐ Patient toileted at least every 2 hours

Additional HIGH RISK Safety Measures, if appropriate:
- ☐ Restraint in use (MD/NP/PA order required)
- ☐ Patient clustered 1:4
- ☐ Patient clustered 1:2
- ☐ Fall prevention bed alarm used, if available
- ☐ Fall prevention chair alarm used, if available
- ☐ Family member asked to stay with patient
- ☐ Need for Psychiatry consult discussed, see notes
- ☐ Need for Physical Therapy consult discussed, see notes

Additional VERY HIGH RISK Safety Measures, if appropriate:

Types of Decision Support Functions

- Tools for patient-specific consultation - provide custom-tailored assessments or advice based on sets of patient-specific data
- Focus of early research in artificial intelligence and expert systems
  - Iliad, DxPlain, Quick Medical Reference, Consider, Reconsider
  - Mycin, Oncocin
- Alternate approaches
  - Smart documentation templates
  - Evidence-based, condition-specific order sets
  - User-configurable interfaces

Case Study: Mobile Decision Support for Advanced Practice Nurses (MODS-APN)

- Decision support for evidence-based practice
- Evidence-based practice generation
- Advanced practice n
  - Registered Nurse
  - Master's or doctoral degre
    - Nurse Practitioner – pedia
    - Certified Nurse Midwife
    - Nurse Anesthetist
  - Scope of practice – medical and nursing
    - Prescriptive authority in all states
    - Must work with a physician in some states
    - Independent practice in New York State

Standalone system
Encounter-based
Registered Nurses in APN training under supervision of a preceptor
Generalizable lessons

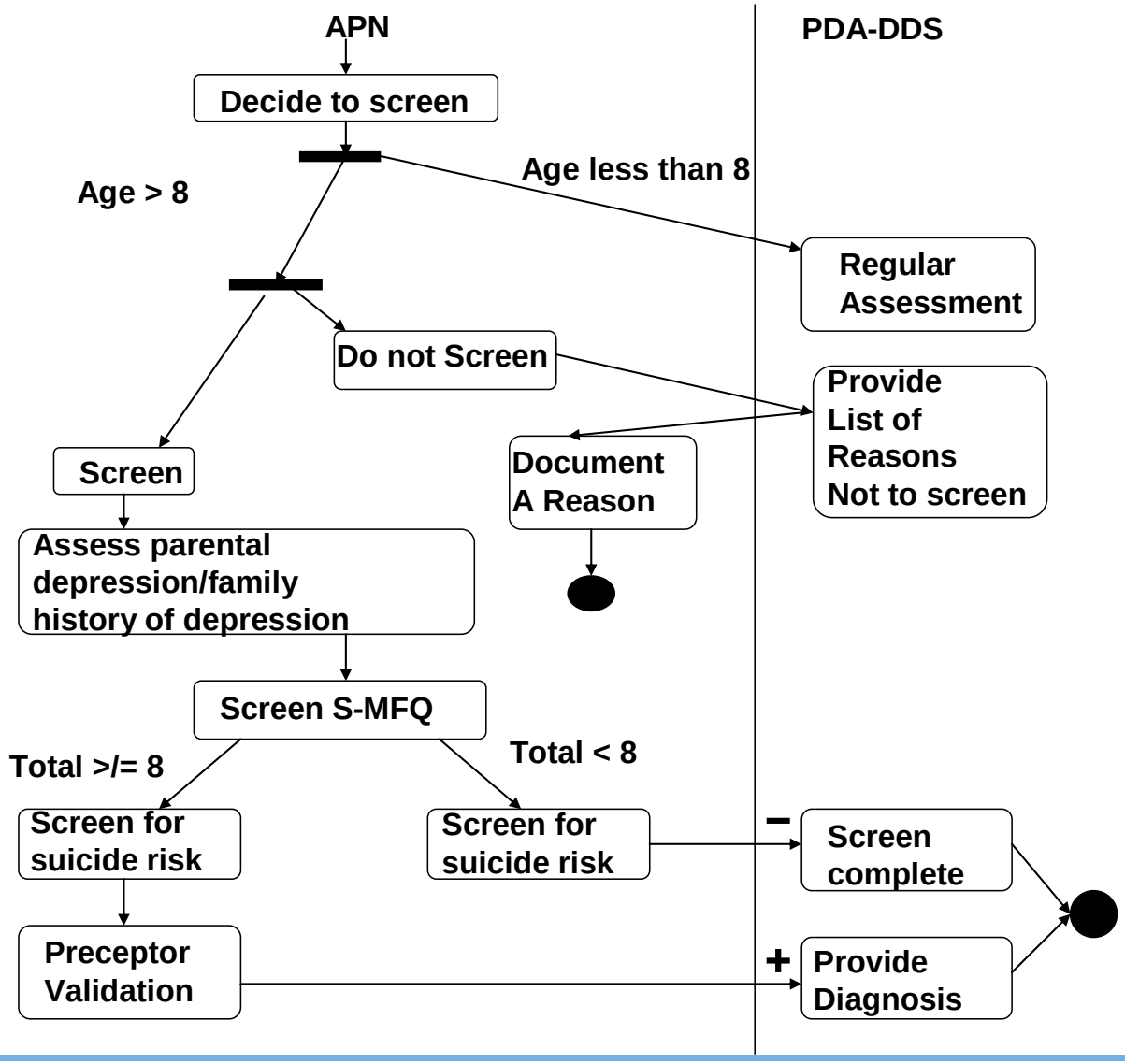
MODS-APN: Decision Support for Evidence-based Practice

- Practice guideline decomposition
  - Algorithm development for screening and management
  - Creation of smart documentation template based upon conceptual model
- Representation of concepts in standardized terminologies
- Knowledge-based approach with two-way synchronization

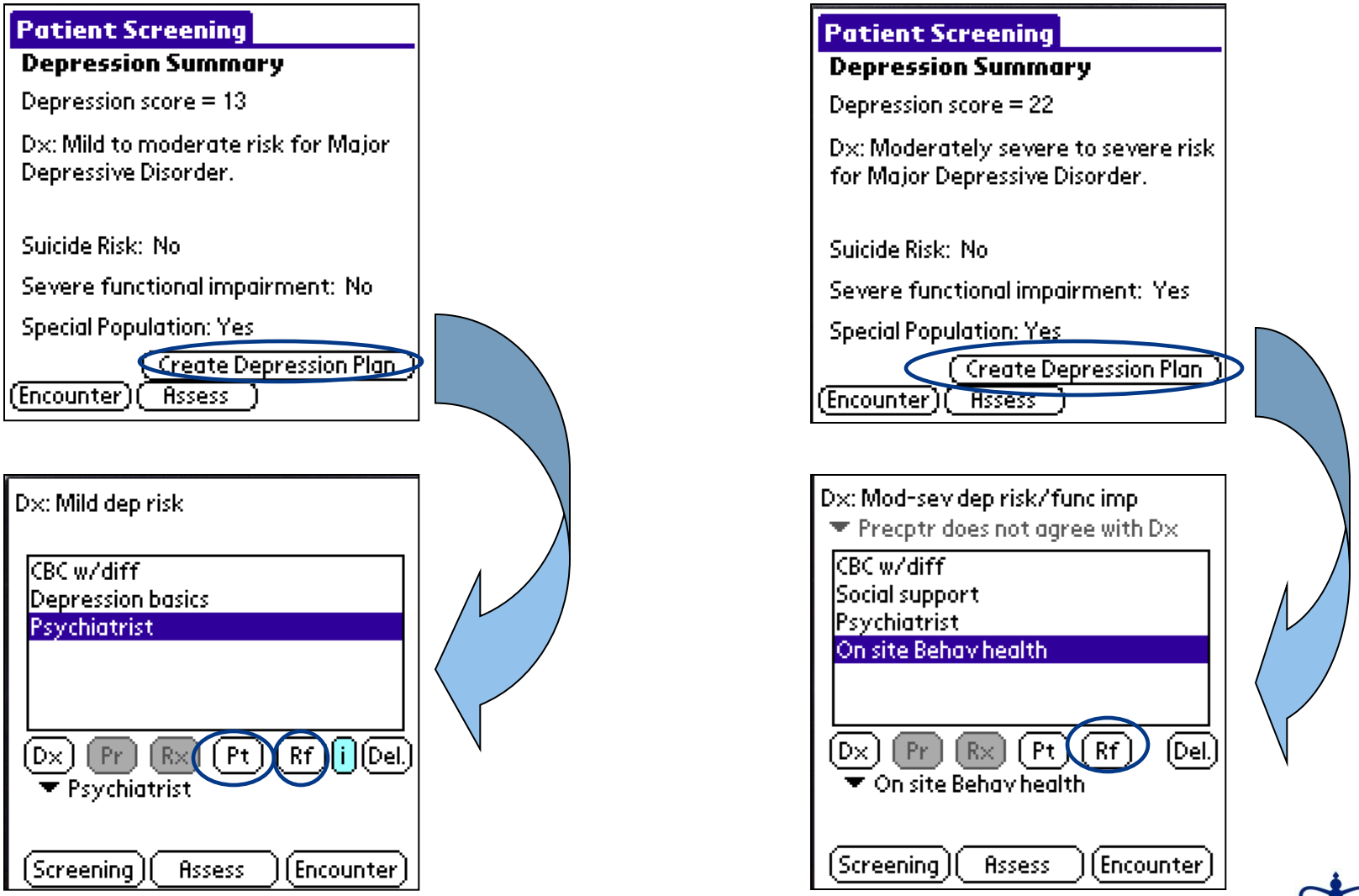
MODS-APN: Depression

- Pediatrics
  - Mood and Feeling Questionnaire -> at risk for mood disorder
  - Additional questions related to family history of depression and to suicide -> at risk for suicide
- Adult
  - Patient Health Questionnaire (PHQ) 2
  - PHQ 9

MODS-APN Pediatric Depression Algorithm



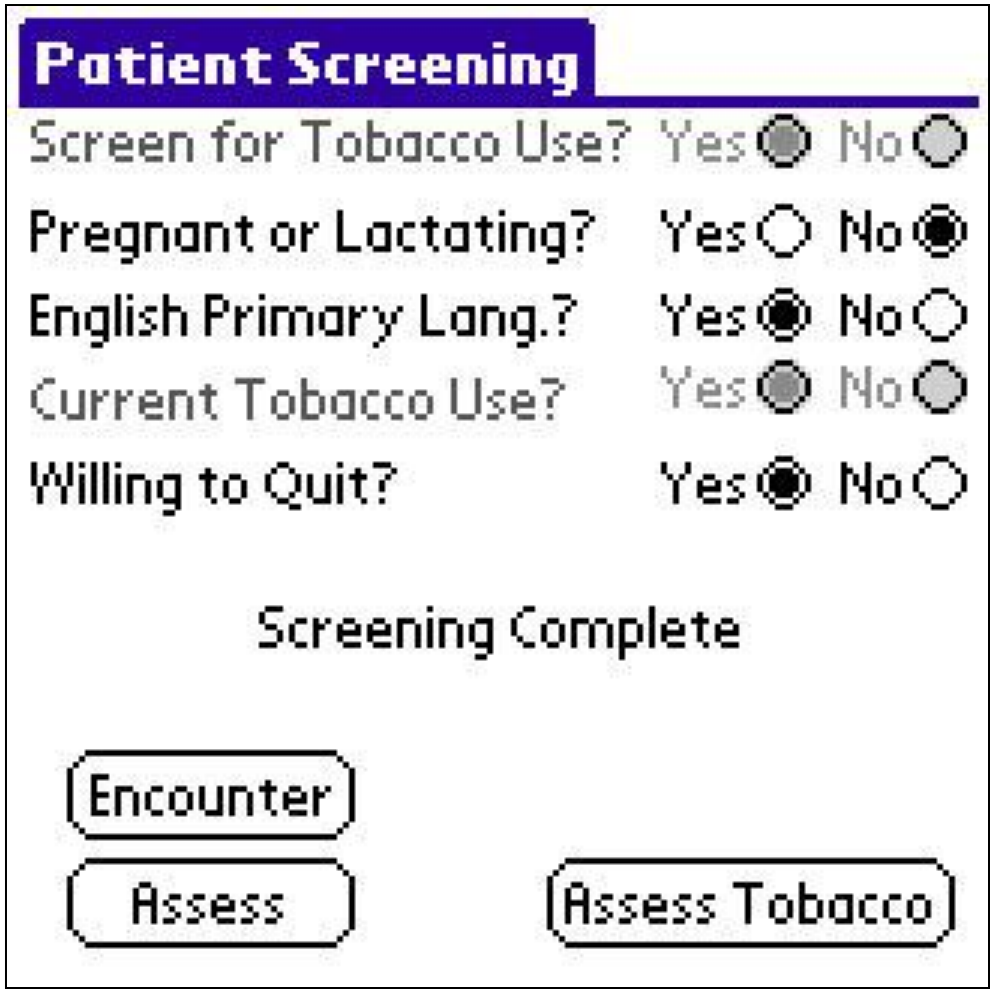
MODS-APN Depression Summary and Plan Documentation-based Clinical Decision Support



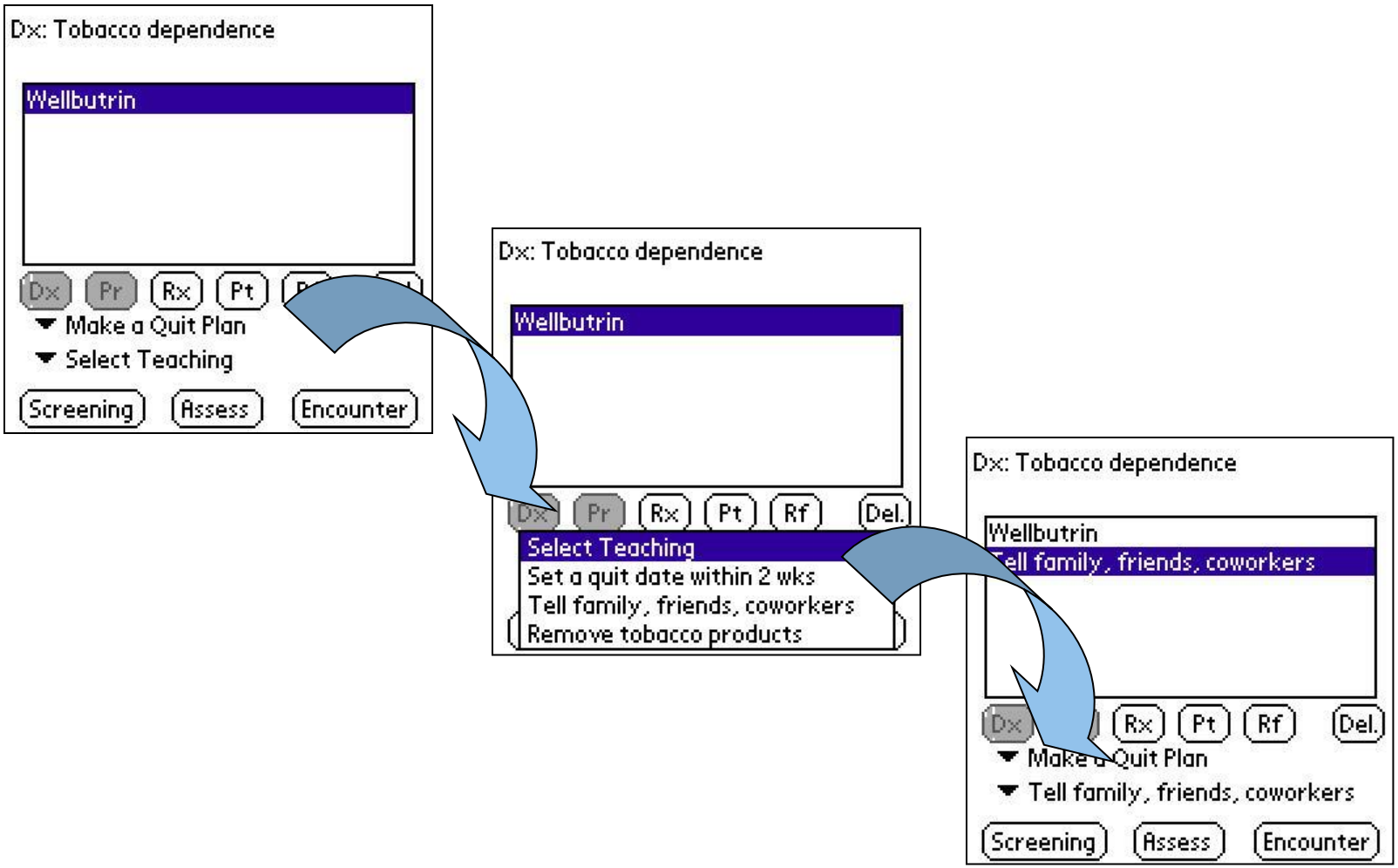
MODS-APN Conceptual Model

- Columbia APN Plan of Care documentation
  - Diagnostics
  - Procedures
  - Prescriptions
  - Teaching
  - Referrals
- 5 A's of behavior change
  - Ask
  - Advise
  - Assess
  - Assist
  - Arrange

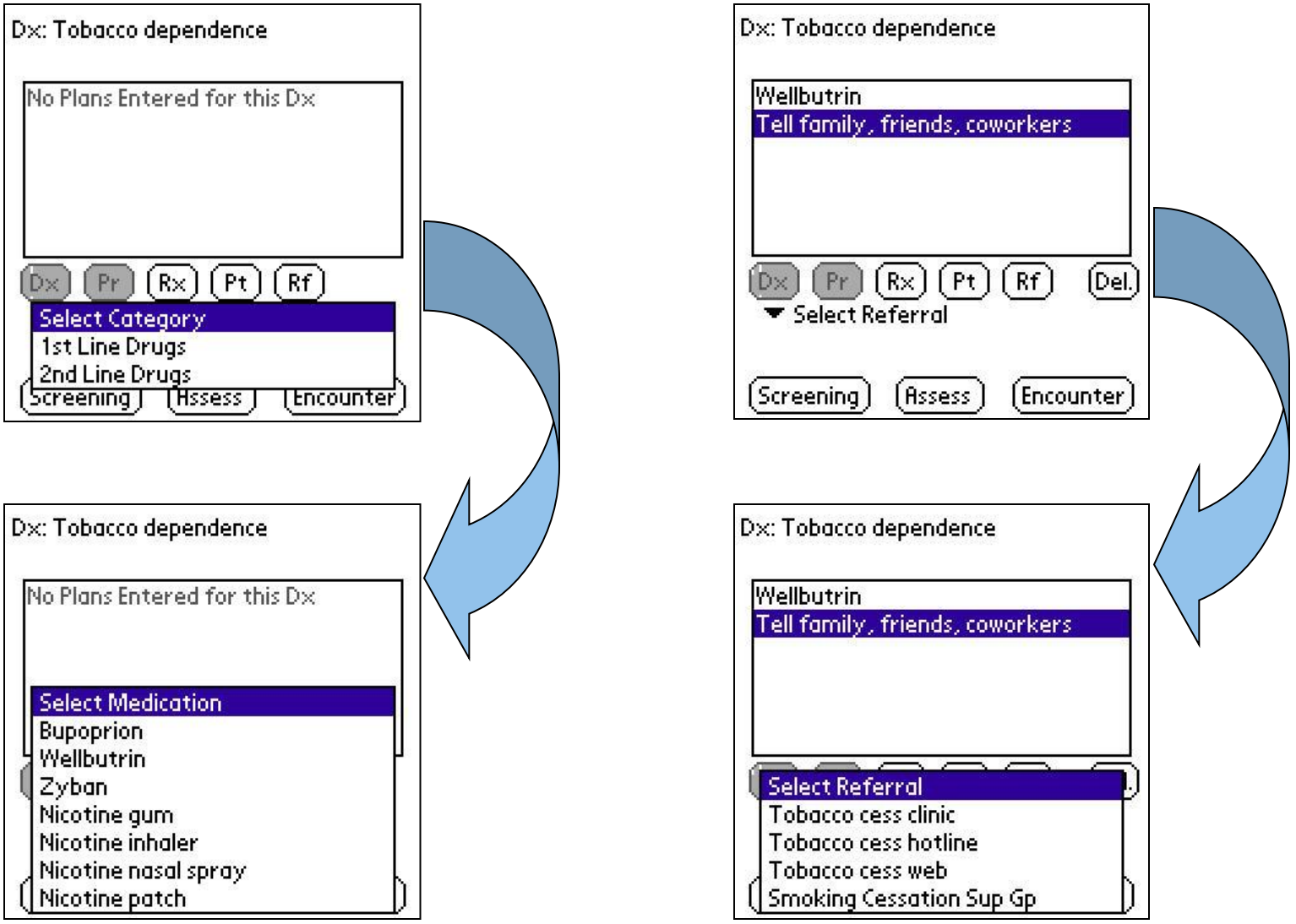
MODS-APN Smoking Cessation: Ask/Advise/Assess



MODS-APN Smoking Cessation: Assist



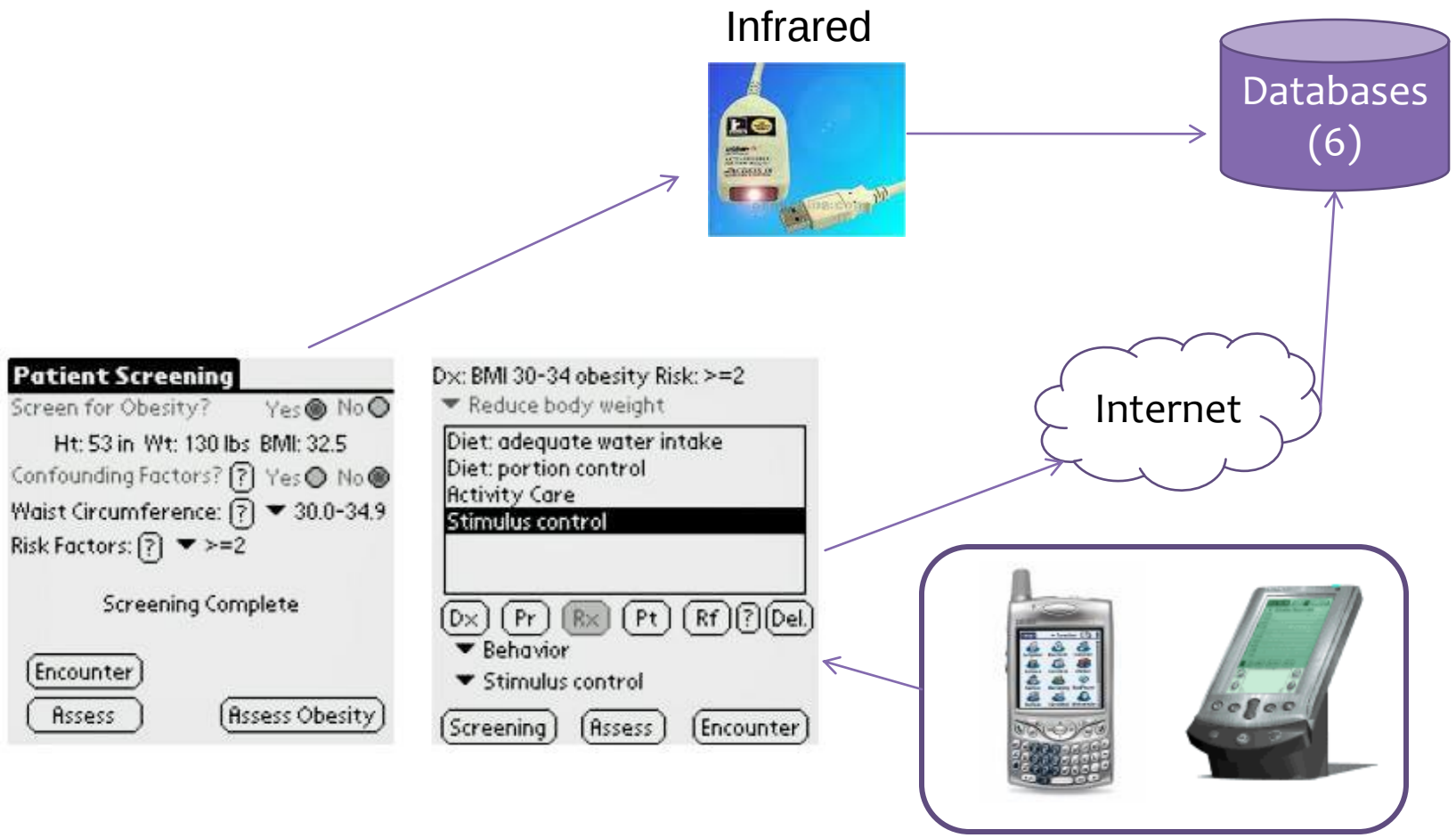
MODS-APN Smoking Cessation: Arrange



MODS-APN: Standardized Terminologies

- Medical diagnoses – International Classification of Diseases
- Medical procedures – Current Procedural Terminology
- Nursing diagnoses, patient teaching, and referrals – Clinical Care Classification
- Medications – Unified Medical Language System

MODS-APN: Technical Approach



Organizational Knowledge Assets and Generalizable Lessons

- Algorithms, smart documentation templates, knowledge base for three topics (depression, obesity, smoking cessation)
- Decomposition approach including conceptual model
- Concepts coded in standardized terminology
- Clinical domain expertise essential since many judgments required in translating practice guideline into executable, actionable evidence for decision support application

MODS-APN: Practice-based Evidence

- Randomized controlled trial (R01NR008903)
  - 3 arms – decision support for screening and guideline-based management of depression, obesity, or smoking cessation
  - Unit of analysis is clinical encounter
  - Subjects – nurses in APN training
  - Hypothesis – decision support as compared to no decision support will result in greater adherence to guideline
- Post-hoc application of an implementation science framework (RE-AIM)

MODS-APN: RCT Results

- Obesity
  - N=30,845 encounters (E=10,938, C=19,907)
  - Screening rate = 43.7% (>age 2)
  - Missed diagnosis – 24.5% E vs. 66.5% C
  - Number of diagnoses – significantly greater E>C
  - Number of interventions - significantly greater E>C
- Smoking Cessation
  - N=23,625 encounters (E=7,874, C=15,751)
  - Screening rate = 75.6% (>age 8)
  - Number of diagnoses – significantly greater E>C
  - Number of interventions – no significant differences
- Adult Depression
  - N=10,779 encounters (E=4,343, C=6,436)
  - Screening rate = 51.5% (>age 17)
  - Number of diagnoses – significantly greater E>C (only 13 diagnoses in control group)
  - Interventions – no significant differences; influenced by small number of diagnoses in the control group
- Pediatric Depression
  - N=7,085 encounters (E=2,832, C=4,253)
  - Screening rate = 22.5% (age 8-17)
    - 20% of screened at risk for mood disorder
    - 4% of screened at risk for mood disorder and suicide
  - Number of diagnoses – significantly greater E>C
  - Number of interventions - significantly greater E>C

Dissemination and Implementation Scien

Did program achieve key targeted outcomes?
Did it produce unintended adverse consequences?
How did it affect quality of life?
What did the program cost as implemented and what would it cost in your setting?
*Did the intervention produce unintended positive consequences?
*How did the intervention affect quality of care?

- Reach, Efficacy/Effecti tion
  Maintenance (RE-AIM

  - Reach - absolute number, pr ividuals who are willing to participate in a g
  - Efficacy/Effectiveness ding potential negative effe
  - Adoption - absolute nu d intervention agents (p e a program
  - Implementation - Setti arious elements of an intervention's pr ended and the time and cost of the in intervention strategies
  - Maintenance - Setting level - extent to which a program or policy becomes institutionalized or part of the routine organizational practices and policies; individual level - long-term effects of a program on outcomes for 6 or more months after the most recent intervention contact

W with or began program?
Di
W

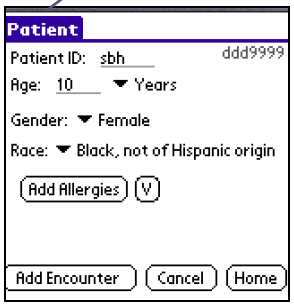
How many staff members delivered the program?
Did different levels of staff implement the program successfully?
Were different program components delivered as intended?
*What barriers to implementation (predisposing factors at individual, setting/organizational levels) were identified and how were they addressed?
re required to

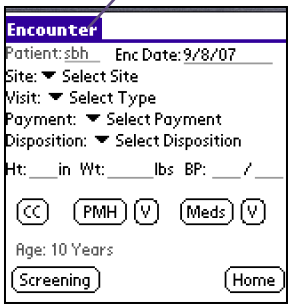
Did program produce lasting effects at the individual level?
Did organizations sustain the program over time?
How did the program evolve?
Did the individuals and settings that showed most maintenance include those most in need?
*What reinforcing factors (individual, setting/organizational level) were required to maintain the intervention?

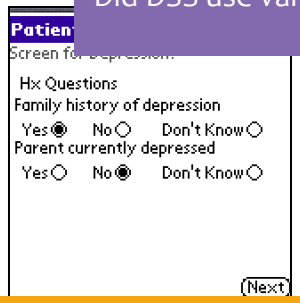
Automated data captu

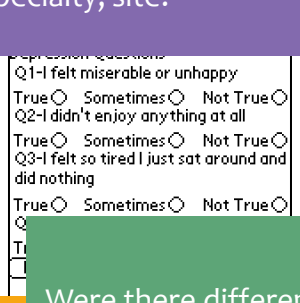
What proportion of
In what proportion
Were nurses who us
Were the patient en
the eligible patient e

What proportion of encounters in DSS vs. no DSS groups involved those who were Hispanic, African-American, or lacked private health insurance?
In what proportion of eligible encounters did screening for depression, obesity, or smoking occur?
Did DSS use vary by guideline?
Did DSS use vary by specialty, site?



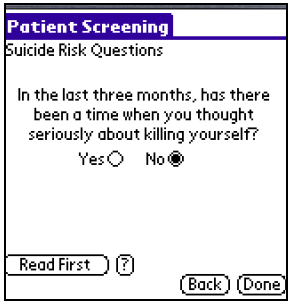


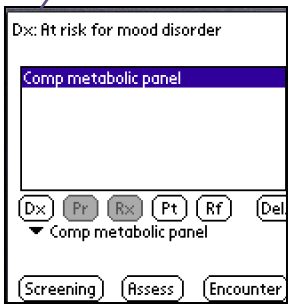


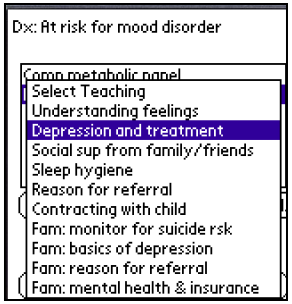


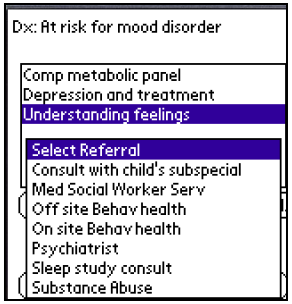
Were there differences in number of guideline-related diagnoses in DSS vs. no DSS groups?
Were DSS functions used as intended?

Were there differences in number of guideline-related interventions in DSS vs. no DSS groups?
Were DSS functions used as intended?









+ surveys, focus groups

Pediatric Depression Focus Group: Screening Benefits and Barriers

- Prevent suicide
- Enables sharing of feelings
- Opportunity to give holistic care
- Helps to pick up depression
- Improved quality of care

- Time
- Perceived/real lack of referral resources
- Lack of preceptor knowledge and support
- Lack of knowledge of interventions
- PDA format
- Student discomfort with screening
- Cultural barriers

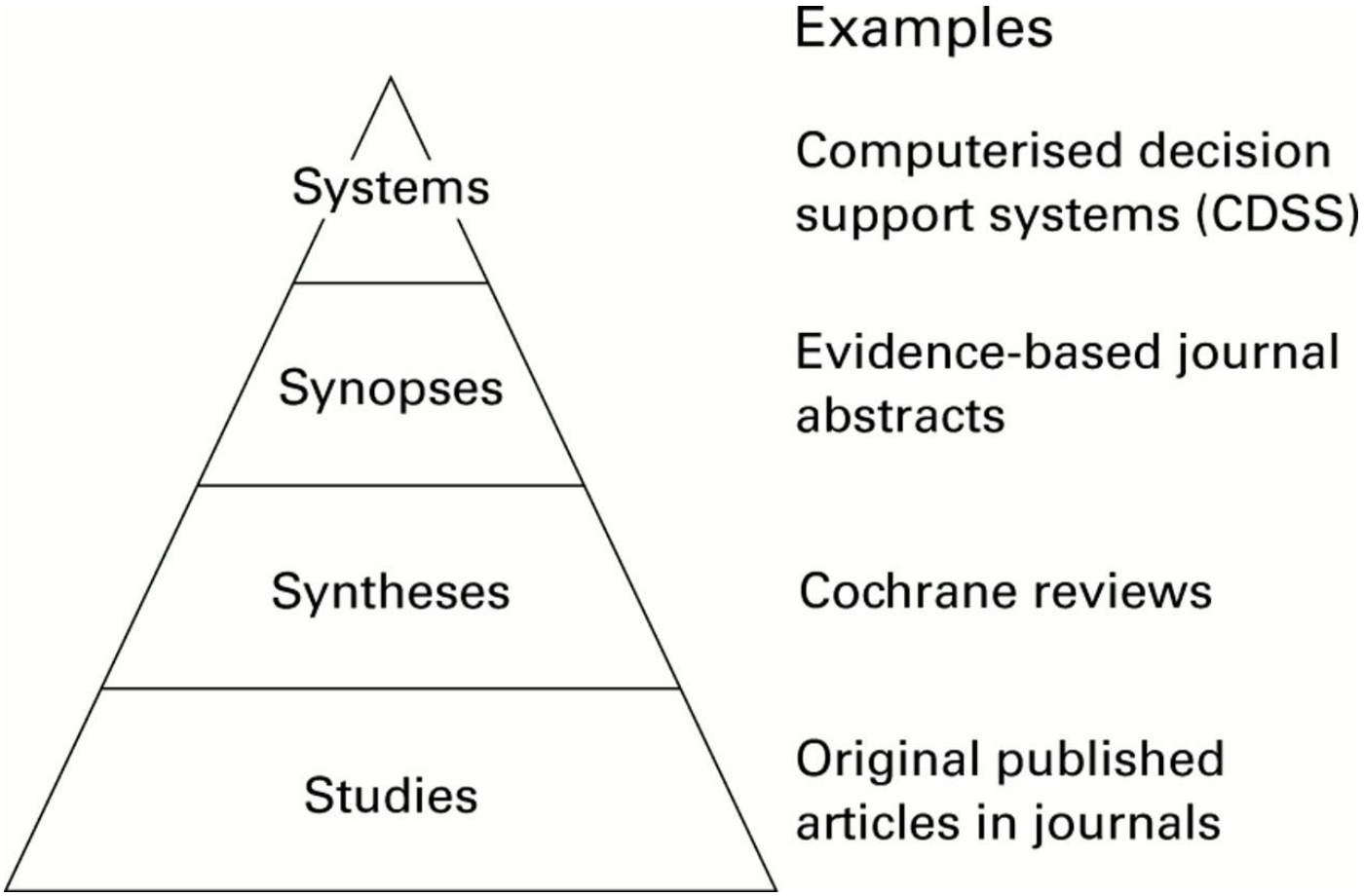
Generalizable Lessons

- Efficacy/effectiveness - Evidence for approach in terms of screening and diagnosis; mixed results for interventions
- Automated capture of some RE-AIM dimensions facilitated post-hoc analysis of Reach, Efficacy, Adoption, and Implementation
- Post-hoc analysis using RE-AIM dimensions and additional data collection identified issues related to predisposing and enabling factors

Enabling Health Care Decision Making through Health Information Technology
AHRQ Evidence Report – Late 2010

- What evidence-based study designs can be used to determine the clinical effectiveness of clinical decision support systems (CDSS)?
- **What contextual factors/features influence the implementation and use of electronic knowledge management and CDSS?**
- What is the impact of introducing electronic knowledge management and CDSS?
  - Changes in the organization of health care delivery
  - Changes in the workload and efficiency for the user
  - Changes in process and clinical outcomes
- What generalizable knowledge can be integrated into electronic knowledge management and CDSS to improve health care quality?

"4S" levels of Organisation of Evidence from Research



Haynes, R B. Evid Based Ment Health 2001;4:37-38

Generation of Evidence from Practice

- 4th "S" – "Systems" also required, for example:
  - Concept-oriented data dictionary
  - Clinical Data Warehouse
  - Data mining
  - Visualization and analytic tools
  - Clinical decision support systems

Washington Heights Initiative Comparative Effectiveness Research (WICER)

Traumatic Brain Injury Prediction Rules for Children Using Computerized Clinical Decision Support: An Interrupted Time Series Trial

MedWISE

Key Points

- Disciplines such as medicine, nursing, and respiratory therapy are practice-based, therefore, evidence should be generated from practice (i.e., practice-based evidence) as well as applied to practice from research studies
- IT has facilitated decision support for evidence-based practice
- Decision support can occur through IT artifacts other than alerts and reminders – these include smart documentation templates, order sets, and configurable user interfaces
- Clinical expertise is an essential element in the creation of such artifacts which can be viewed as a source of organizational knowledge
- Strategies needed for collecting, storing, and sharing of organizational knowledge assets

For Further Information

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