2012 VIReC Database and Methods Cyber Seminar Series

VIReC
RESEARCHERS' GUIDE TO VA DATA

VIReC Database and Methods Cyber Seminar Series

Measuring Laboratory Use and Results using VA Decision Support System National Extract Data

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VA Information Resource Center

VIReC RESEARCHERS' GUIDE TO VA DATA

Session Outline

- Overview of VA DSS national lab data
- Finding information in VA DSS national lab data
- Measurement of laboratory use and results in VA studies
- Examples of VA studies that have used VA DSS national lab data
- Where to go for more help

Audience Poll

- **Are you currently conducting research that is using DSS LAB and/or LAR National Data Extracts (NDE)?**
  - Yes
  - No
- **Have you used lab data in CDW (other than DSS)?**
  - Yes
  - No

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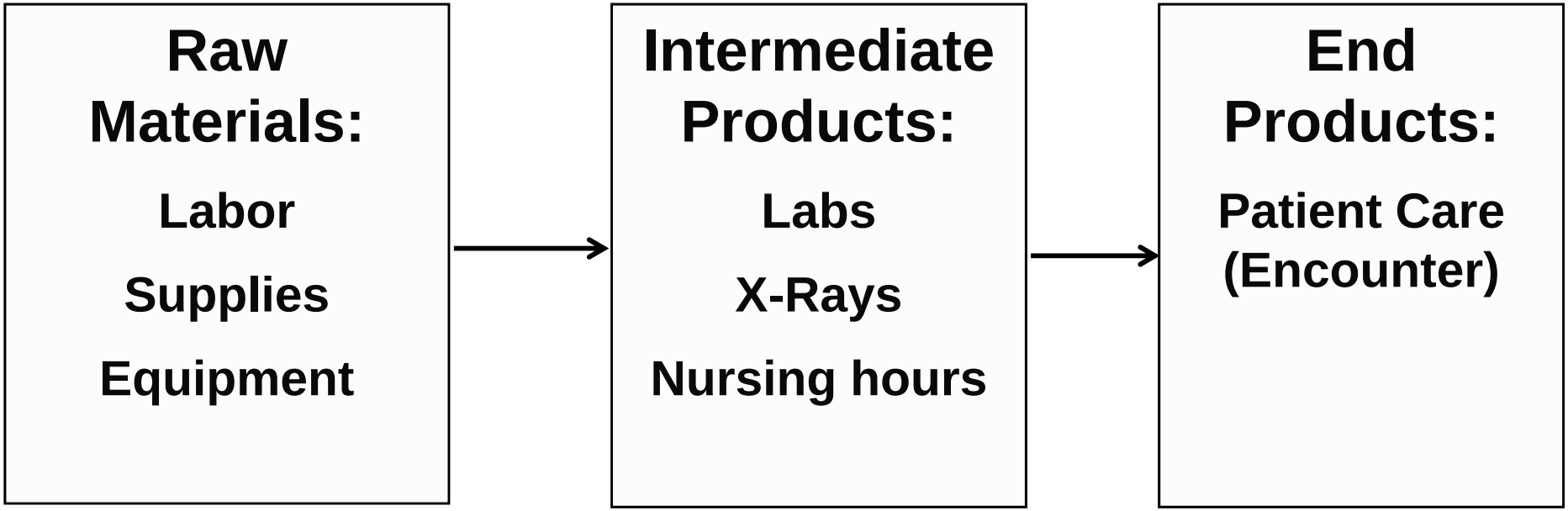
- **Where to go for more help**

DSS Overview

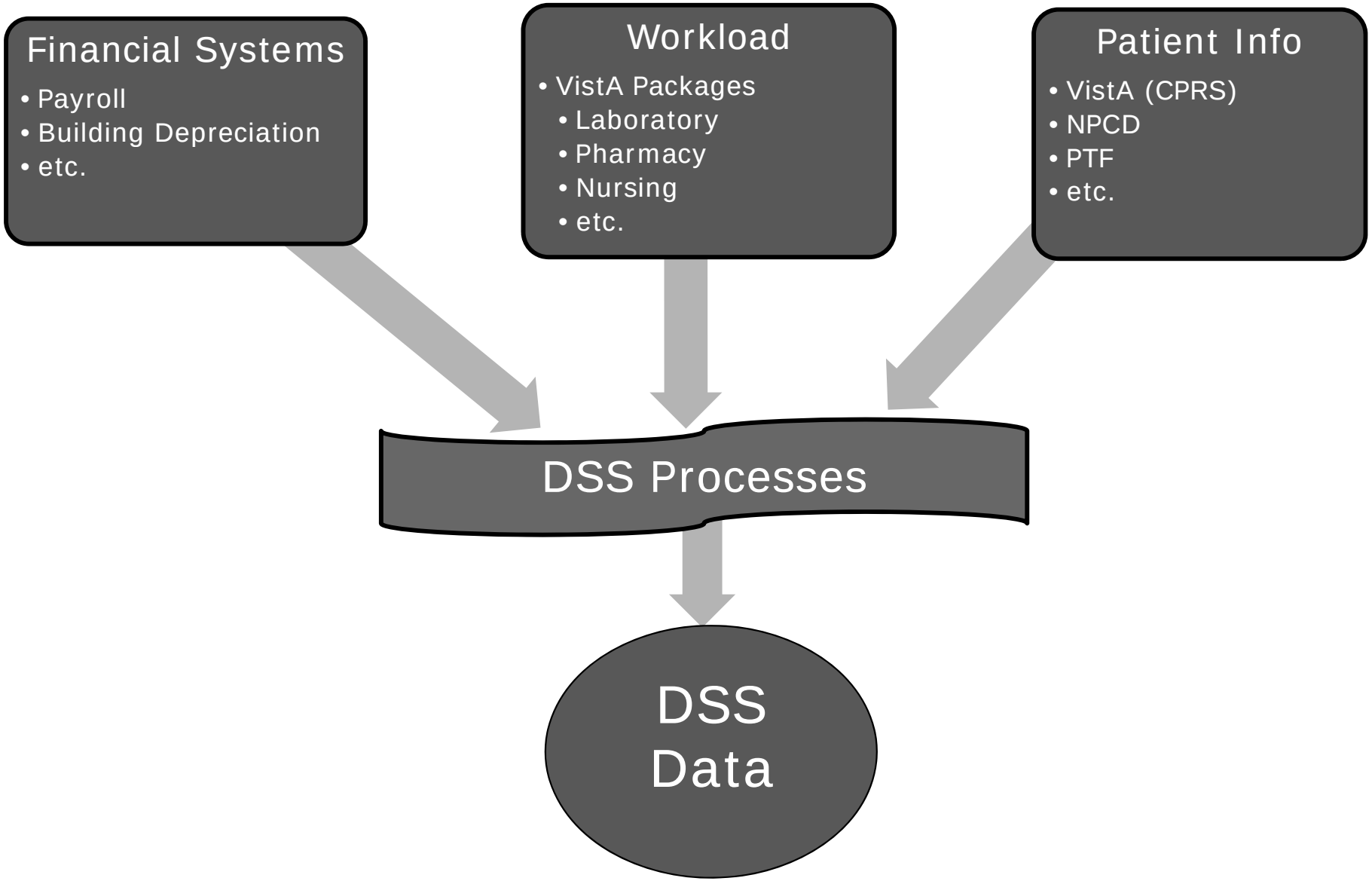
- **What is DSS?**
  - VA's managerial cost accounting and executive information system
- **What is its primary purpose?**
  - To provide managerially-useful information (e.g., productivity measures, costs per unit of work, quality assessment) to
    - Managers
    - Undersecretary for Health
    - Secretary
    - Congress

DSS Overview

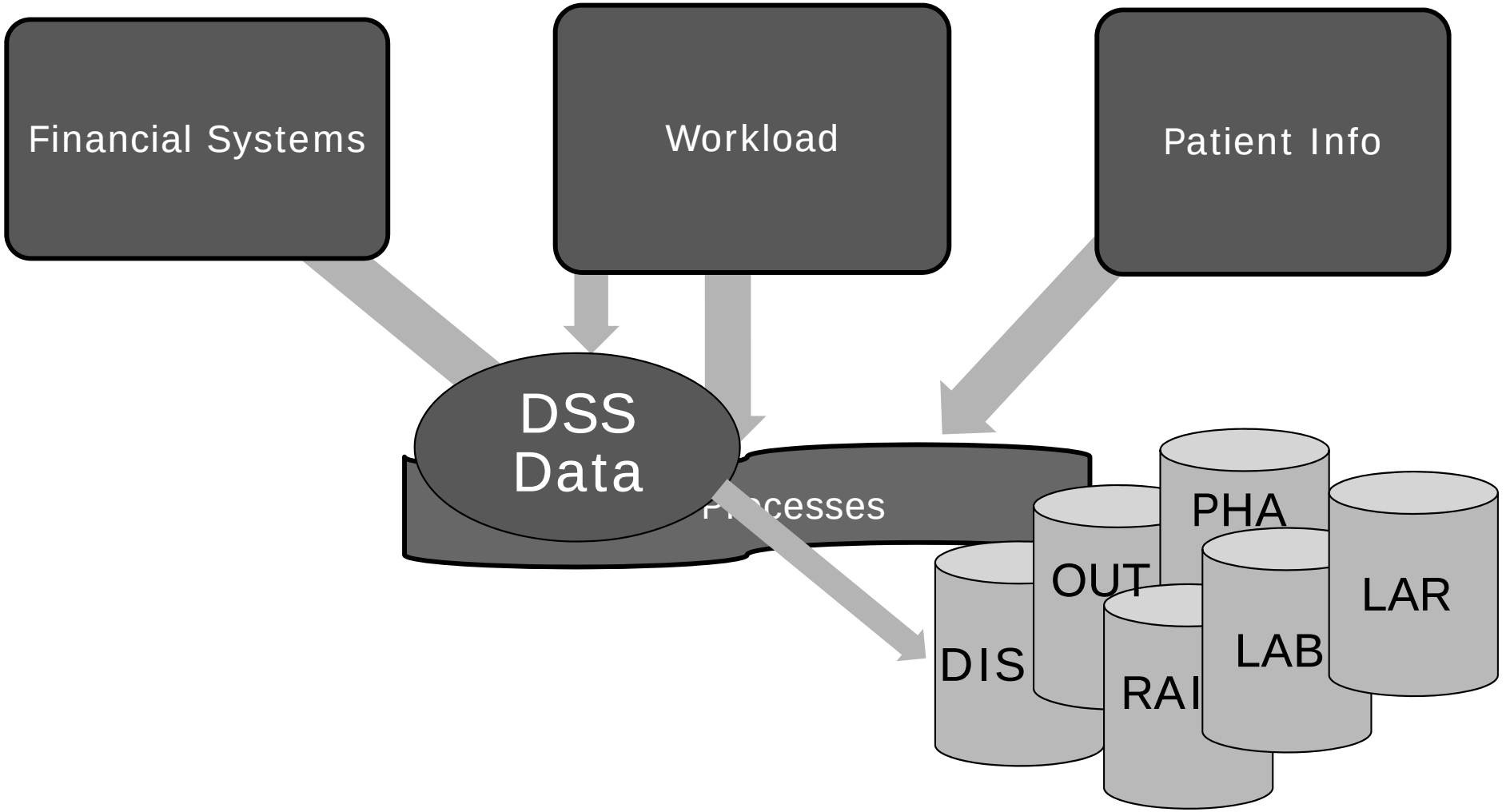
Health Care Production Process



DSS Source Data



DSS National Data Extracts (NDE)



National Data Extracts

National Data Extracts (NDEs)

Clinical NDEs

- **LAB**
  - Workload and costs
  - Test-level records
- **LAR**
  - Laboratory results for a defined list of tests (currently, 89)
  - Test-level records
- **PHA**
- **RAD**
- **ECS / ECQ**

National Data Extracts (NDEs)

Clinical NDEs

- LAB
- LAR
- PHA
- RAD
- **ECS/ECQ**

Other NDE Classifications

- **"Core" Extracts**
  - Inpatient and outpatient encounter-level data
- **Program Activity**
  - e.g., No-Show, RAI
- **Financial**

DSS NDEs

- **Schedule: Monthly or quarterly**
- **Cumulative year-to-date**
- **Lab data from 2000 (LAR) or 2002 (LAB)**

DSS NDE Data Formats

- **Reports, Data Cubes**
  - VISN Support Services Center (VSSC)
- **SAS Datasets**
  - Austin Information Technology Center (AITC) mainframe computer
  - To be discontinued 9/30/12
- **SQL tables**
  - Corporate Data Warehouse (CDW)

DSS NDE Data Formats

No lab data here

- **Reports, Data Cubes**
  - VISN Support Services Center (VSSC)
- **SAS Datasets**
  - Austin Information Technology Center (AITC) mainframe computer
  - To be discontinued 9/30/12
- **SQL tables**
  - Corporate Data Warehouse (CDW)

LAB & LAR NDE SAS Files (Mainframe)

File Organization

- **FY 2004 forward**
  - One file contains data for
    - 1 NDE,
    - 1 VISN, in
    - 1 fiscal year
    - inpatient *and* outpatient services
  - = 21 files for LAB, 21 files for LAR, each fiscal year

LAB & LAR NDE SAS Files (Mainframe) File Naming Convention*

RMTPRD.MED.DSS.SAS.FY**xx**.VISN**yy**.**ndename**

For example,

- RMTPRD.MED.DSS.SAS.FY09.VISN01.LAB
  - Contains FY 2009 inpatient and outpatient data from facilities in VISN 1

* Naming for FY2000 – FY2003 reflects different file organization – see VIReC website.

LAB & LAR NDE SAS Files (Mainframe)

File Organization

- **FY 2000 (LAR) – FY 2003**
  - One file contains data for
    - 1 NDE,
    - 1 year of inpatient *or* outpatient services,
    - in 4 - 6 VISNs
  - = 8 files for LAB, 8 files for LAR, each fiscal year

LAB & LAR NDE Data at CDW

- **SQL Tables**
  - FY 2005 forward
  - One table for each NDE contains
    - inpatient and outpatient data
    - for all VISNs
    - and all available years
  - New format, same data
    - Some variable names slightly different from SAS names
  - Same update schedule

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What information can I find in the LAB and LAR NDEs?

LAB

- Tests performed
  - One record for each completed billable test
  - Includes those performed at point-of-care and some research records
  - Identifies where and when performed
- Costs and other information pertinent to accounting
- Patient information

LAR

- Test results
  - Patient-specific results for 76 tests
  - For those 76, all records entered into VistA (i.e., all in LAB)
- Patient information

What information can I find in the LAB and LAR NDEs?

LAB

- Tests performed
  - One record for each completed billable test
  - Includes those performed at point-of-care and some research records
  - Where and when performed
- Costs and other information pertinent to accounting
- Patient information

LAR

- Test results
  - Patient-specific results for 91 tests
  - Extraction process selects records for those tests only, from VistA Laboratory package
- Patient information

NOT in the LAB and LAR NDEs

- Diagnoses, procedures, and other clinical information
- Gender, race/ethnicity
- Tests that are not patient-specific
  - e.g., tests done as lab controls or other standardization procedures
- Research records, unless considered VA patient and an encounter is generated in VistA PCE file

Selected Key Variables

LAB	LAR
Test identifier	Test identifier
Where performed	Result
Referral flag	Units reported
Clinic Stop Code	Dates
Dates	

Test Identifiers: How do I find records containing the test I'm interested in?

LAB NDE

- **VA_LMIP:** Laboratory Management Index Program
  - National list (aka NLT code)
  - Entered by lab staff
  - Assigned locally
  - Not standardized

- **FEED_KEY**
  - 5-digit character variable
  - Usually an LMIP code

Test Identifiers

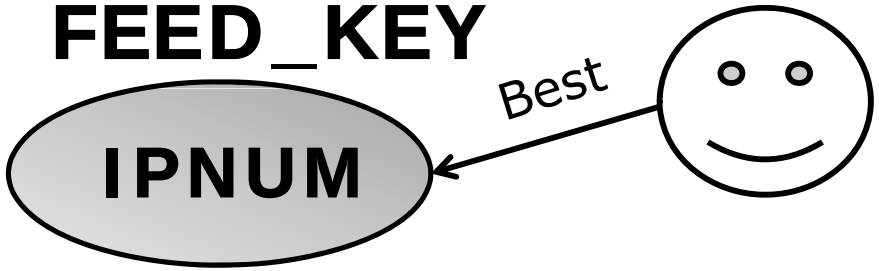
LAB NDE

- **IPNUM:** Intermediate Product Number
  - Assigned by DSS based on LMIP
  - One IPNUM may be assigned to >1 LMIP
- **TESTNAME**
  - DSS-derived IP description
  - Free-form text field
  - File maintained by individual site teams
  - Name assigned to same test can vary across stations

Test Identifiers

LAB NDE

- VA_LMIP
- FEED_KEY
- IPNUM
- TESTNAME



Test Identifiers

LAR NDE

- **DSSLARNO –** Result ID
  - Assigned by DSS, 1 – 89
  - List of available tests on VIReC and DSS websites (at end)
- **Logical Observation Identifier Names and Codes (LOINC)**

LOINC Codes
http://www.loinc.org

- Universal identifier
- Highly specific - Identifies test, method of analysis, specimen source
- Lab results records pulled based on LOINC
- Implemented nationwide for FY 2009
- Should result in better match between LAB and LAR records than previous method (based on test names)
- Currently, VistA LOINC file contains older version of LOINC code set

FY11 LAR TESTS (abridged)

LAR Test #	DSS Test Name	Reporting Units	LOINC Code
0001	Hemoglobin	G/DL	718-7
0002	Potassium (Serum)	MEQ/L or MMOL/L	2823-3
0003	Sodium (Serum)	MEQ/L or MMOL/L	2951-2, 2947-0
0004	Lithium (Serum)	MMOL/L	14334-7
0005	BUN (Blood Urea Nitrogen)	MG/DL	3094-0
0006	WBC (Total WBC Count)	K/UL or K/MM3	26464-8,6690-2, 804-5
0007	Digoxin	NG/ML	10535-3
0008	Theophylline	UG/ML	4049-3
0009	AST (Aspartate Transferase)	U/L	1920-8, 30239-8
0010	Glucose (Serum)	MG/DL	2345-7, 1558-6
0011	Creatinine Clearance	ML/MIN	2164-2
0013	GGTP (Gamma GT)	IU/L	2324-2
0014	Dilantin (Phenytoin)	MCG/ML	3968-5
0015	Valproic Acid	MCG/ML	4086-5
0016	Carbamazepine (Tegretol)	MCG/ML	3432-2
0017	Hemoglobin A1C (Glycohemoglobin)	%	17855-8, 17856-6, 4548-4, 4549-2
0018	Alpha 1 Antitrypsin	MG/DL	1825-9
0019	PSA (Prostatic Specific AG)	NG/ML	2857-1
0020	CD-4 (Absolute T Cell Count)	CELLS/CMM, CELLS/MM3, CELLS/UL	8127-3, 24467-3
0021	Prothrombin Time	SEC	5902-2, 5964-2
0022	Total Thyroxine (T-4)	MCG/DL	3026-2
0023	Total Triiodothyronine (T-3)	NG/DL	3053-6
0024	Thyroid Stimulating Hormone (TSH)	MCU/ML	11579-0, 11580-8 3016-3
0025	Folic Acid/Folate	NG/ML	2284-8
0026	Vitamin B12 Level	PG/ML	2132-9
…	…	…	…
0087	Hepatitis B Virus DNA	NEG-POS or NON-REACTIVE-REACTIVE	5007-0, 13126-8, 16934-2, 29610-3
0088	Hepatitis C Genotype	text	32286-7, 48574-8
0089	Hepatitis C (RIBA)	NEG-POS or NON-REACTIVE-REACTIVE	24011-9, 33462-3, 34162-8, 5199-5

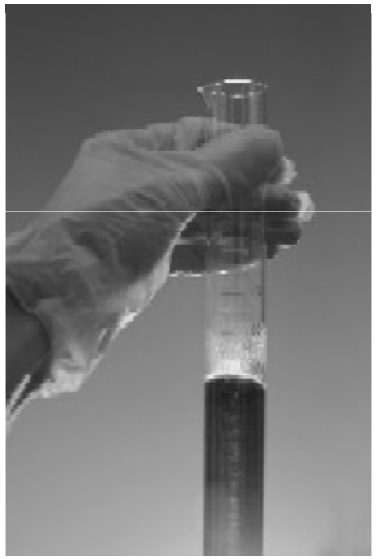
How do I find test results?

- **RESULT –** Test Result
  - Result of the test identified by DSSLARNO
  - Valid values -10000 to 10000
  - Up to 4 decimal digits
  - Some results are text/non-numeric
- **TESTUNIT –** Units in which the test is reported

DSSLARNO ⟹ RESULT + TESTUNIT = Test Result

Example: Total Thyroxine (T-4)

- DSSLARNO = 0022
- RESULT = 4.2
- TESTUNIT = mcg/dl



DSSLARNO 0022

⇩

4.2 + mcg/dl = **Thyroxine 4.2 mcg/dl**

What about Non-numeric Results?

For example: HIV Antibody

Translation Value	Test Result
0	Negative, Non-Reactive
1	Positive, Reactive
2	Borderline, Indeterminate
3	Test not performed, Quantity not sufficient or other reason
5	Result cannot be translated

Should I find a one-to-one correspondence between LAB and LAR records?

- **Not for**
  - Tests whose values are calculated from other test values (e.g., creatinine clearance)
    - Only the tests from which the calculated values are derived (i.e., serum creatinine), are costed and have an associated record in the LAB NDE.
  - "Send outs": Two records generated
    1) In-house labor cost of specimen collection, preparation and shipping
    2) Cost of performing the test (or cost charged by non-VA source)
    - REF_FLG = "Y", if sent to another VA source

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Case Scenario

Diabetes Quality of Care: Hgb A1c Frequency

Question:

We're conducting a retrospective cohort study of care quality among patients with diabetes. We'd like to measure frequency of Hemoglobin A1c testing among our cohort in FY 2010. Should we use the LAR file to obtain this information?

Case Scenario

Diabetes Quality of Care: Hgb A1c Frequency

Question:

We're conducting a retrospective cohort study of patients with Diabetes care quality. We'd like to measure frequency of Hemoglobin A1c testing among our cohort in FY 2008. Should we use the LAR file to obtain this information?

Answer:

No!

LAB NDE is the best source of information for "fact of lab."

Case Scenario

Diabetes Quality of Care: Hgb A1c Frequency

Goal:

Measure frequency of Hemoglobin A1c testing among our cohort in FY 2010.

Procedure:

Use the **LAB file**.

1. Obtain feeder key(s) or IPNUM for Hgb A1c test:
   - DSS Intermediate Products table (URL at end)
   - Search on name ("Description" field) *and all variants*.

     e.g., Glycohemoglobin, Glycosylated Hemoglobin, Glycated Hemoglobin, Hb A1c
   - Can double check by searching on IP numbers already found.

Case Scenario

Diabetes Quality of Care: Hgb A1c Frequency

DSS Intermediate Product Table

FdrSys	IP Num	FdrKey	CPT/HCPC/ LMIP/ECS Natl Code	Description
ASC	22273	83036	CPT	GLYCOSYLATED HEMOGLOBIN T
ASC	77318	83037	CPT	GLYCOSYLATED HB, HOME DEV
LAB	1148	85027	LMIP	Glycosylated HGB, total
LAB	1149	85051	LMIP	Glycohemogl...t Fraction
LAB	1150	85052	LMIP	GLYCOHEMOGLOBIN A(1) C
LAB	68820	82890	LMIP	GLYCOHEMOGLOBIN A1C POC
LAB	81947	82117	LMIP	GLYCOHEMOGLOBIN HBA 1C CA
LAB	91238	85053	LMIP	GLYCOHEMOGLOBIN HBA 1C

Case Scenario

Diabetes Quality of Care: Hgb A1c Frequency

Procedure (cont'd):

1. Obtain feeder key(s) or IPNUM for Hgb A1c test:
2. In **LAB** NDE: Identify study patients' records using SCRSSN, and
3. Keep only FY 2010 records:
   - Several date variables
   - SVC_DTE (service date)
   - YYYYMMDD
   - Default = Year and month that VistA extract was performed, concatenated with '01' for day

Case Scenario #1

Diabetes Quality of Care: Hgb A1c Frequency

Procedure (cont'd):

1. Obtain feeder key(s) or IPNUM for Hgb A1c test:
2. In LAB NDE: Identify study patients' records using SCRSSN
3. Keep only FY 2010 records
4. Pull records with Feed_Key = values identified in Step 1.

Case Scenario #1

Diabetes Quality of Care: Hgb A1c Frequency

Procedure (cont'd):

1. Obtain feeder key(s) or IPNUM for Hgb A1c test:
2. In LAB NDE: Identify study patients' records using SCRSSN
3. Keep only FY 2010 records
4. Pull records with IPNUMs identified in Step 1.
5. Wait! Eliminate 'duplicates' resulting from send-out or referral labs.
   - Drop if REF_FLG (referral flag) = 'Y'

Yield: All study cohort records for Hemoglobin A1c tests performed in FY 2010

Measurement Issues
Take Home Messages

- DSS Lab Data: Fabulous resource, complex database
- Careful examination is warranted
- Clinical advice is critical

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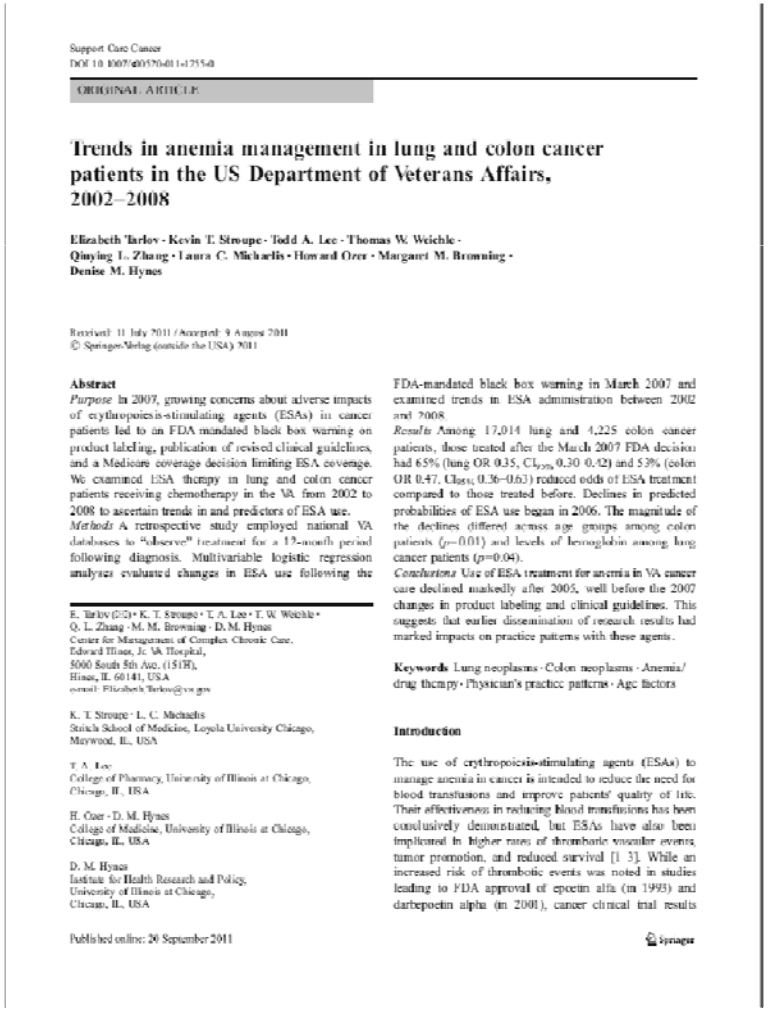
How have laboratory use and results been measured in VA studies?



Support Care Cancer
DOI 10.1007/s00520-011-1255-0

ORIGINAL ARTICLE

Trends in anemia management in lung and colon cancer patients in the US Department of Veterans Affairs, 2002–2008

Elizabeth Tarlov · Kevin T. Stroupe · Todd A. Lee · Thomas W. Weichle · Qinying L. Zhang · Laura C. Michaelis · Howard Ozer · Margaret M. Browning · Denise M. Hynes

Received: 11 July 2011 / Accepted: 9 August 2011

Abstract
Purpose In 2007, growing concerns about adverse impacts of erythropoiesis-stimulating agents (ESAs) in cancer patients led to an FDA mandated black box warning on product labeling, publication of revised clinical guidelines, and a Medicare coverage decision limiting ESA coverage. We examined ESA therapy in lung and colon cancer patients receiving chemotherapy in the VA from 2002 to 2008 to ascertain trends in and predictors of ESA use.
Methods A retrospective study employed national VA databases to "observe" treatment for a 12-month period following diagnosis. Multivariable logistic regression analyses evaluated changes in ESA use following the FDA-mandated black box warning in March 2007 and examined trends in ESA administration between 2002 and 2008.
Results Among 17,014 lung and 4,225 colon cancer patients, those treated after the March 2007 FDA decision had 65% (lung OR 0.35, $CI_{95\%}$ 0.30–0.42) and 53% (colon OR 0.47, $CI_{95\%}$ 0.36–0.63) reduced odds of ESA treatment compared to those treated before. Declines in predicted probabilities of ESA use began in 2006. The magnitude of the declines differed across age groups among colon patients ($p=0.01$) and levels of hemoglobin among lung cancer patients ($p=0.04$).
Conclusions Use of ESA treatment for anemia in VA cancer care declined markedly after 2005, well before the 2007 changes in product labeling and clinical guidelines. This suggests that earlier dissemination of research results had marked impacts on practice patterns with these agents.

Keywords Lung neoplasms · Colon neoplasms · Anemia/drug therapy · Physician's practice patterns · Age factors

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Introduction

The use of erythropoiesis-stimulating agents (ESAs) to manage anemia in cancer is intended to reduce the need for blood transfusions and improve patients' quality of life. Their effectiveness in reducing blood transfusions has been conclusively demonstrated, but ESAs have also been implicated in higher rates of thrombotic vascular events, tumor promotion, and reduced survival [1–3]. While an increased risk of thrombotic events was noted in studies leading to FDA approval of epoetin alfa (in 1993) and darbepoetin alpha (in 2001), cancer clinical trial results

Tarlov, et al., 2011

Trends in anemia management in lung and colon cancer patients in the US Department of Veterans Affairs, 2002-2008

Supportive Care in Cancer

How have laboratory use and results been measured in VA studies?

IIR 08-354-1: Clinical Guidelines for ESA Use in Cancer (D. Hynes, PI)

- Retrospective cohort study of VA patients newly diagnosed with cancer
- Evaluation of prescribing behavior change following FDA imposition of “black-box” warning on erythropoiesis-stimulating agents (ESAs)
- Identified cohort using VA Cancer Registry data

How have laboratory use and results been measured in VA studies?

Tarlov, et al., Trends in anemia management

- Lung and colon cancer patients
- Outcome measure: ESA use within 12 months after diagnosis
- **Hemoglobin (Hb) as covariate**

How have laboratory use and results been measured in VA studies?

Tarlov, et al.

- Measurement objective: lowest Hb in the first 12 months after diagnosis
- LAR NDE data, FY 2002-FY2009
- Mean of 2 lowest Hb values during study period

How have laboratory use and results been measured in VA studies?

Tarlov, et al.

- Measurement issues:
  1. Needed ≥2 values
     - Patients sometimes obtain lab services outside VA
     - Missing VA lab data?
  2. Out-of-range values (Hb <4.0 or >20.0 mg/dL)
     - Lab error or data entry/processing error?
  3. Potential for spurious values
  4. Switch to LOINC in FY2009
     - Discontinuity in data collection method

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VIReC Internet Website

- **DSS Research User Guide**
  - http://www.virec.research.va.gov/RUGs/RUGs-Index.htm
- **Data Transition to the Corporate Data Warehouse**
  - http://www.virec.research.va.gov/CDW/Data-Transition.htm
- **VHA Corporate Data Warehouse (CDW)**
  - http://www.virec.research.va.gov/CDW/Overview.htm#CDW_Guide

VIReC Help

- **HSRData Listserv**
  - Join at the VIReC website
  - Discussion among >650 data stewards, managers, and users
  - Past messages in archive (on intranet)
  - June 2012 messages include “Using DSS NDEs stored on the CDW”
- **VIReC Help Desk**
  - VIReC staff will answer your question and/or direct you to available resources on topics
  - VIReC@va.gov; 708-202-2413

VA Intranet Websites

- **Decision Support Office**
  - Intranet only
    - (URL on VIReC Intranet Website; click on “Data Sources” in left navigation pane, scroll down to “DSS”)
  - Multiple resources including
    - NDE Technical Guide, NDE Layout Specifications
    - Left navigation pane: National Reporting

VA Intranet Websites

- **CDW SharePoint Site**
  - Send va.gov email to VIReC@va.gov for URL
- **VINCI SharePoint Site**
  - Send va.gov email to VIReC@va.gov for URL

Questions?

Upcoming Seminar

- **August 6, 2012**
  - "Improving Mortality Ascertainment Using the VHA Vital Status File"
  - Elizabeth Tarlov, PhD, RN