

# CPRS Notifications/View Alerts and Primary Care Workflow: Results of a Preliminary Evaluation

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VISN 6 Patient Aligned Care Team Demonstration Lab

Mehdi Kazemi, MD

Joe Gieck, PhD

Joe Plott, MBA, MEd

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# Project Overview

- Today's presentation is part of a tiered, multiple phase VISN 6 PACT Demonstration Laboratory Evaluation Project to evaluate the impact of **CPRS Notifications/View Alerts** on PACT across 3 levels of evaluation:
  - 1) Workflow and job-related stress, burnout
  - 2) Quality, patient safety, and PACT outcomes monitoring
  - 3) ***Identify variability of setup across facilities and current best practices to improve operator efficiency***

## **Agenda**

- Present data on site variability of notification/view alert parameters among 14 medical centers in VISN 6, 7, and 8 of Region 1 and 2
- Review outcomes of a small scale project designed to better understand how modifications to notification/view alert parameters impact workload
- Review findings that illustrate the extent of staff education and training in management of notifications/view alerts
- Discuss implications and future directions

## Poll Question #1: Your Role

Getting to know our audience... What is your role?

- a) Primary Care PACT Provider (MD/DO, NP, PA)
- b) PACT Team Member (RN, LPN, Psychologist, SW, PharmD)
- c) Specialty Care Provider (MD/DO, NP, PA)
- d) Administrator, Researcher, or Program Analyst/Electronic Health Record Support
- e) Other



# INTRODUCTION / BACKGROUND

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# Introduction and Background

## General Trends and Findings

- VA operates a fully integrated electronic health record (EHR)
- Medical systems and clinics employing a form of EHR increased from 13% to 72% between 2008 and 2012<sup>1,2</sup>
- Integrated EHRs are integral to efficient synthesization of health factors.
  - Automation is necessary to improve response to critical patient care needs<sup>3</sup>
  - Allows for decreased response time to critical results<sup>3</sup>
  - EHR promotes improved coordination of care

## Important Quality/Safety Findings

- Potential for “information chaos”<sup>4,12</sup>
- Survey of VA PCPs (N=106):<sup>5</sup>
  - 37% reported at least one patient with a missed test result during the previous 2-week period leading to a diagnostic delay
  - 15% reported 2+ events in the same time period
- A review of VA EHR-related investigations: 94% of noted safety concerns were related to the equivalent of information chaos<sup>6</sup>.
- VA facilities demonstrating lower risk of missed results use specific strategies to prevent view alerts from being lost to followup<sup>7</sup>

## Background (cont.)

- CPRS and notifications
  - Hysong et al.<sup>8</sup>: 57 notifications/daily/provider
  - Murphy et al.<sup>9</sup>: 63 alerts/daily/provider
- 2010 survey of VA PCPs (N=2,590): nearly 50% of notifications were perceived as irrelevant to day-to-day patient care<sup>10</sup>.
- 46% of VA PCPs (N=28) reported a personal “work-around” strategy to reduce the burden of CPRS notifications<sup>8</sup>.
- Only one non-VA study investigated the impact of EHR utilization on burnout, stress, and job satisfaction<sup>11</sup>.
  - Physicians (N=379) exposed to moderately-high EMR requirements reported significantly more job-related stress and lower job satisfaction.
  - Time pressure as an increasing function of EMR complexity and workload demand was significantly associated burnout and intent to leave one’s current employment.

The screenshot displays the VistA CPRS interface. At the top, it says "VistA CPRS in use by: (10.129.130.22)". Below this is the "Patient Selection" window. On the left, under "Patient List", there are radio buttons for "Default: Combination", "Providers", "Clinics", "Team/Personal", "Wards", "Specialties", and "All". The "Patients (Combination)" area on the right contains a text box that says "Patient Data Base Listed Alphabetically will be seen here." Below this is a "Save Patient List Settings" button. At the bottom of the window is a "Notifications" table with columns: Info, Patient, Location, Urgency, Alert Date/Time, Message, and Forwarded B.

Info	Patient	Location	Urgency	Alert Date/Time	Message	Forwarded B
	BHIEPatient, One (B0001)		HIGH	04/20/2010@16:05	Order requires electronic signature.	
	BHIEPatient, Three (B0003)		Moderate	04/26/2010@07:56	UNSIGNED PHARMACY REFILL REQUEST av...	
	CPRSPatient, Eight (C0008)		Moderate	04/26/2010@07:52	UNSIGNED PRIMARY CARE-BLUE TEAM avail...	
	CPRSPatient, Five (C0005)		HIGH	04/26/2010@07:53	Order requires electronic signature.	
	CPRSPatient Three (C0003)		Moderate	04/26/2010@07:53	UNSIGNED PRIMARY CARE-BLUE TEAM avail...	
	CPRSPatient, Two (C0002)		Moderate	04/26/2010@08:01	UNSIGNED PC-BLUE TELEPHONE NOTE avail...	
	MHVPatient, Four (M0004)		Moderate	04/26/2010@08:21	UNSIGNED Adverse React/Allergy available for...	
	MHVPatient, One (M0001)		HIGH	04/26/2010@08:23	Order requires electronic signature.	
	MHVPatient, Six (M0006)		Moderate	04/26/2010@08:25	UNSIGNED PC-BLUE TELEPHONE NOTE avail...	
	VehUPatient, Two (V0002)		Moderate	04/26/2010@08:29	UNSIGNED PHARMACY REFILL REQUEST av...	

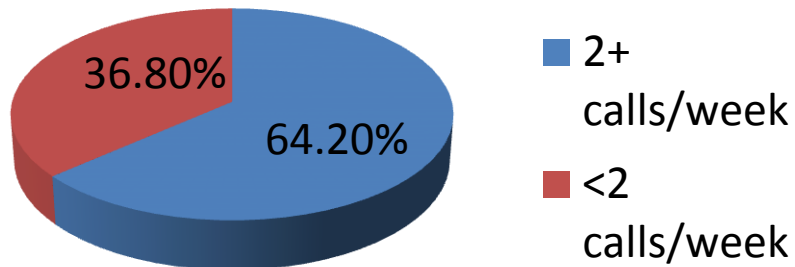
At the bottom of the interface are buttons for "Process Info", "Process All", "Process", "Forward", "Show Comments", and "Remove".

# Method

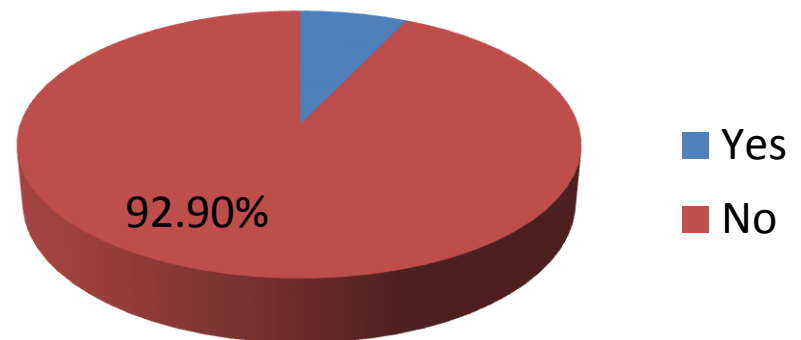
- Survey to Program Analysts in VISNs 6, 7 and 8; N = 14 medical centers
  - 19 items, 8 domains<sup>7</sup>
    - Hardware and software
    - Clinical content and data
    - User interface
    - People
    - Organizational Policy
    - State and Federal Policy
    - Workflow and Communication
    - Monitoring and measurement
- Pre-Post, site-based case study examining the impact of changes to notification set up; N = 26 PACTs
- Analyses
  - Frequency and qualitative content analysis
  - Parametric analyses

# Initial Outcomes: People, and Hardware and Software

**Requested Support for Missed or Lost Notifications**



**Use of Supplemental Software to Support Management of Notifications**

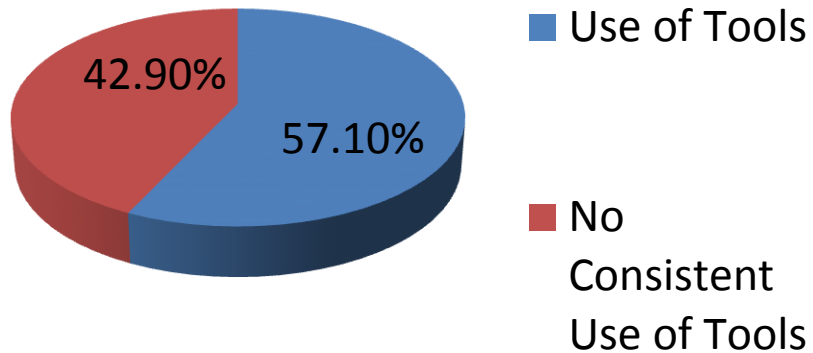


- One site reported use of a grandfathered modification/software that turns off notifications for procedure orders that are entered; ability to modify for each consulting service's needs.

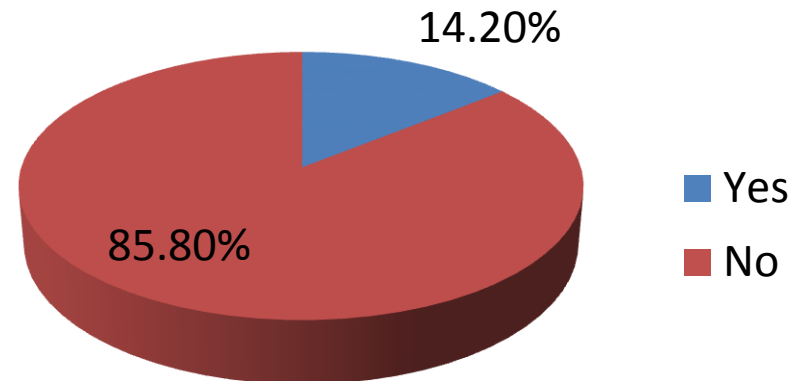


# Initial Outcomes: Monitoring and Measurement

## Use of Pre-Existing VISTA Tools to Ensure Processing of Notifications



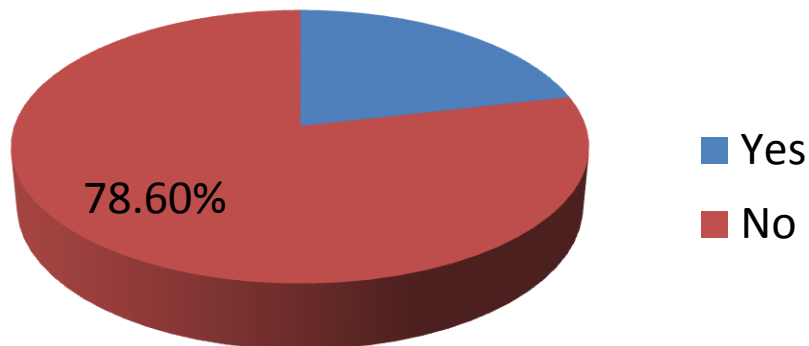
## Use of VISTA notification management tools to notify supervisors/providers about outstanding notifications



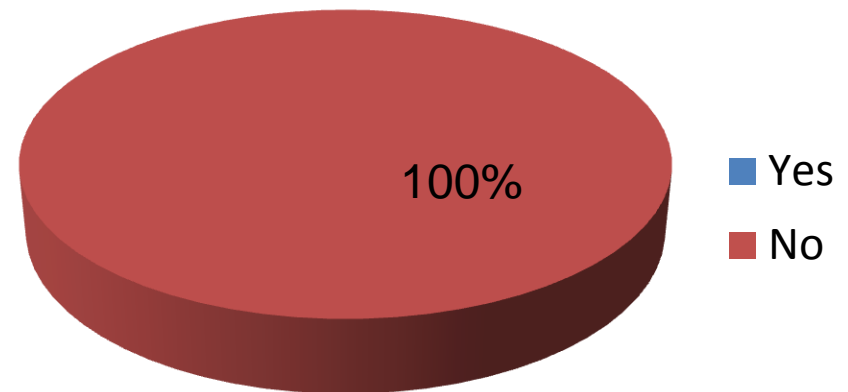
- Multiple sites report use of the XQAL Backup Reviewers parameter to monitor unprocessed notifications; automatic auto-forward to a backup reviewer within 21 days.
- One site assigns admin staff to receive XQAL UNPROCESSED ALERTS notifications, upon which a supervisor is notified to designate a surrogate.

# Initial Outcomes: Organizational Policy, Workflow and Communication

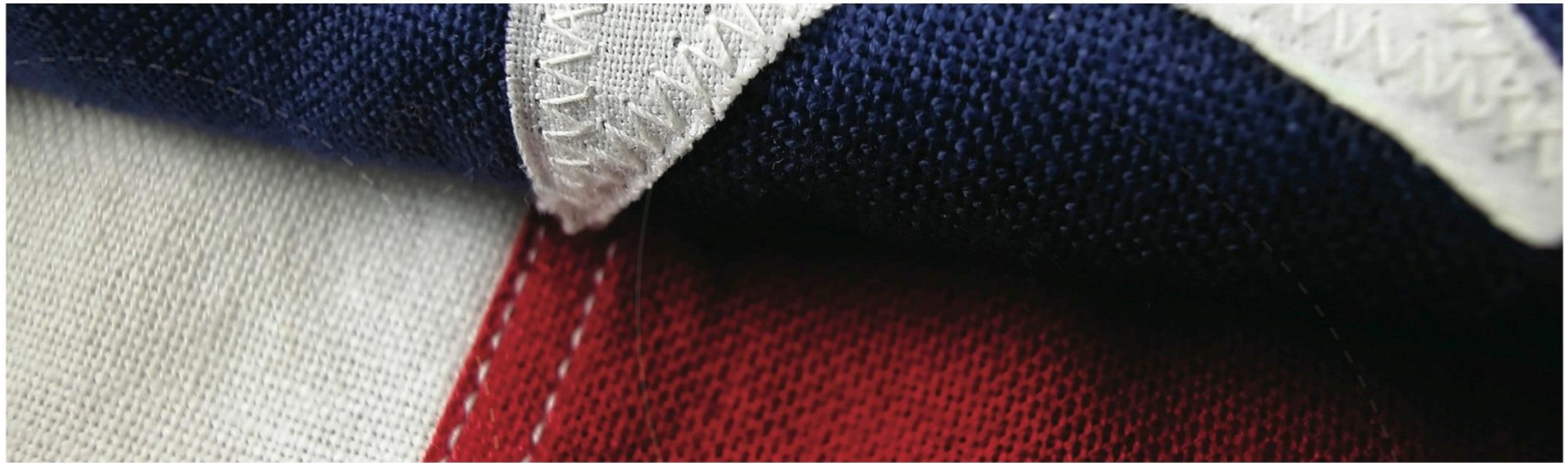
## Use of a Committee or Quality Assurance Staff to Monitor Notifications Related to Critical/Abnormal Results



## Methods to Monitor Notifications and Workload/Workflow



- One site reported use of an oversight committee to review notifications not processed within 13 days; findings are forwarded to the designated service chief.
- One site reported that notifications are tracked through the Compliance Committee.
- One site reported that a quality assurance person within each service monitors unprocessed notifications.



# Site-to-Site Variability in Notification Setup and a Single Site Project to Determine How Parameter Modifications Impact Workload

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## Poll Question #2: Perceived Burden of Notifications/View Alerts

For those who frequently utilize CPRS, how would you respond to the following statement?

***The volume of CPRS notifications/view alerts I receive is burdensome to my clinical duties.***

- a) Strongly agree
- b) Agree
- c) Disagree
- d) Strongly disagree

# Understanding Notifications/View Alerts

## ■ TIU Alerts

- Unsigned documents
- Uncosigned documents
- Documents for additional signature
- Overdue for signature

## ■ Vista Notification Categories

Lab orders	Lab results
Imaging orders	Imaging results
Medications	Consults
Orders	Other Packages
Patient Movement(s)	

The screenshot displays the Vista CPRS interface. The top window is titled "Patient Selection" and contains a "Patient List" section with radio buttons for "Default Combination", "Providers", "Team/Personal", "Specialties", "Clinics", "Words", and "All". The "Patients (Combination)" section shows a list of patients with the text "Patient Data Base Listed Alphabetically will be seen here." and a "Save Patient List Settings" button. Below this is a "Notifications" table with columns: Info, Patient, Location, Urgency, Alert Date/Time, Message, and Forwarded B.

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	MHVPatient, One (M0001)		HIGH	04/26/2010@08:23	Order requires electronic signature.	
	MHVPatient, Six (M0006)		Moderate	04/26/2010@08:25	UNSIGNED PC-BLUE TELEPHONE NOTE avail...	
	VeHUPatient, Two (V0002)		Moderate	04/26/2010@08:29	UNSIGNED PHARMACY REFILL REQUEST av...	

At the bottom of the interface are buttons for "Process Info", "Process All", "Process", "Forward", "Show Comments", and "Remove".



# Notifications/View Alerts: A Brief Review

- Significant differences in use of notifications were reported across VA medical centers<sup>7,14</sup>.
- There is a general lack of consistent best practices for setup that promote operator efficiency.

Notification	Value
-----	-----
LAB RESULTS	Disabled

Notification	Value
-----	-----
ORDER REQUIRES CHART SIGNATURE	Notification
FLAG ORDER FOR CLARIFICATION	-----
ORDER REQUIRES ELEC SIGNATURE	-----
ABNORMAL LAB RESULTS (ACTION)	ORDER REQUIRES CHART SIGNATURE
ADMISSION	FLAG ORDER FOR CLARIFICATION
UNSCHEDULED VISIT	ORDER REQUIRES ELEC SIGNATURE
DECEASED PATIENT	ADMISSION
IMAGING PATIENT EXAMINED	IMAGING RESULTS, NON CRITICAL
IMAGING RESULTS, NON CRITICAL	CONSULT/REQUEST RESOLUTION
CONSULT/REQUEST RESOLUTION	CRITICAL LAB RESULT (INFO)
CRITICAL LAB RESULT (INFO)	ABNL IMAGING RESULT, NEEDS ATT
ABNL IMAGING RESULT, NEEDS ATT	IMAGING REQUEST CANCEL/HELD
IMAGING REQUEST CANCEL/HELD	NEW SERVICE CONSULT/REQUEST
NEW SERVICE CONSULT/REQUEST	SERVICE ORDER REQ CHART SIGN
SERVICE ORDER REQ CHART SIGN	CONSULT/REQUEST CANCEL/HELD
CONSULT/REQUEST CANCEL/HELD	NPO DIET MORE THAN 72 HRS
NPO DIET MORE THAN 72 HRS	FLAGGED OI RESULTS - INPT
FLAGGED OI RESULTS - INPT	ORDERER-FLAGGED RESULTS
ORDERER-FLAGGED RESULTS	

Notification	Value
-----	-----
ORDER REQUIRES CHART SIGNATURE	Individ
FLAG ORDER FOR CLARIFICATION	Individ
ORDER REQUIRES ELEC SIGNATURE	Individ
ADMISSION	Individ
IMAGING RESULTS, NON CRITICAL	Individ
ABNL IMAGING RESULT, NEEDS ATT	Individ
NEW SERVICE CONSULT/REQUEST	Individ
SERVICE ORDER REQ CHART SIGN	Individ
ORDER REQUIRES CO-SIGNATURE	Individ
DNR EXPIRING	Individ
MEDICATIONS EXPIRING - INPT	Individ
UNVERIFIED MEDICATION ORDER	Individ
NEW ORDER	Individ
FOOD/DRUG INTERACTION	Individ
UNVERIFIED ORDER	Individ
MEDICATIONS EXPIRING - OUTPT	Individ

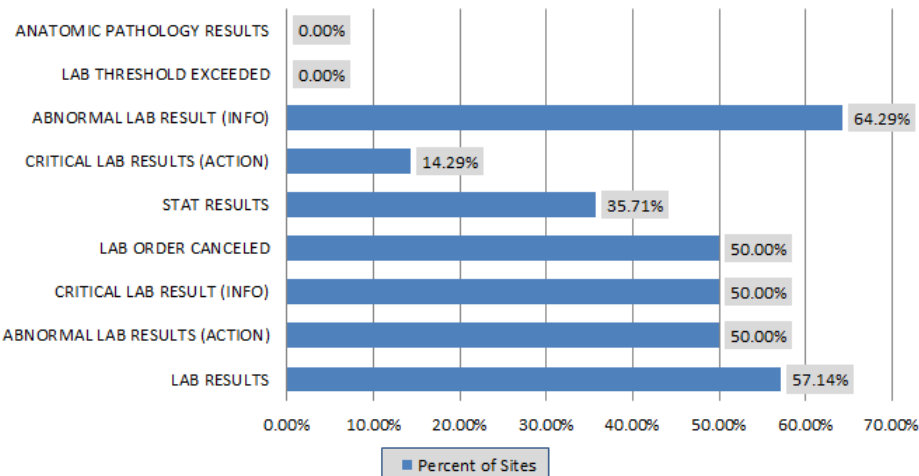
Notification	Value
-----	-----
LAB RESULTS	Low
ORDER REQUIRES CHART SIGNATURE	High
FLAG ORDER FOR CLARIFICATION	Moderate
ORDER REQUIRES ELEC SIGNATURE	High
ABNORMAL LAB RESULTS (ACTION)	Moderate
ADMISSION	Low
UNSCHEDULED VISIT	Low
DECEASED PATIENT	Low
IMAGING PATIENT EXAMINED	Low
IMAGING RESULTS, NON CRITICAL	Low
CONSULT/REQUEST RESOLUTION	Low
CRITICAL LAB RESULT (INFO)	Moderate
ABNL IMAGING RESULT, NEEDS ATT	High
IMAGING REQUEST CANCEL/HELD	Low
NEW SERVICE CONSULT/REQUEST	Low
SERVICE ORDER REQ CHART SIGN	High
NPO DIET MORE THAN 72 HRS	Low
FLAGGED OI RESULTS - INPT	Moderate
ORDERER-FLAGGED RESULTS	Moderate
DISCHARGE	Low

# Site-to-Site Variability: Lab Result Category Parameters

Category = Lab Results  
Level = System  
MANDATORY

Category = Lab Results  
Level = System  
Enabled

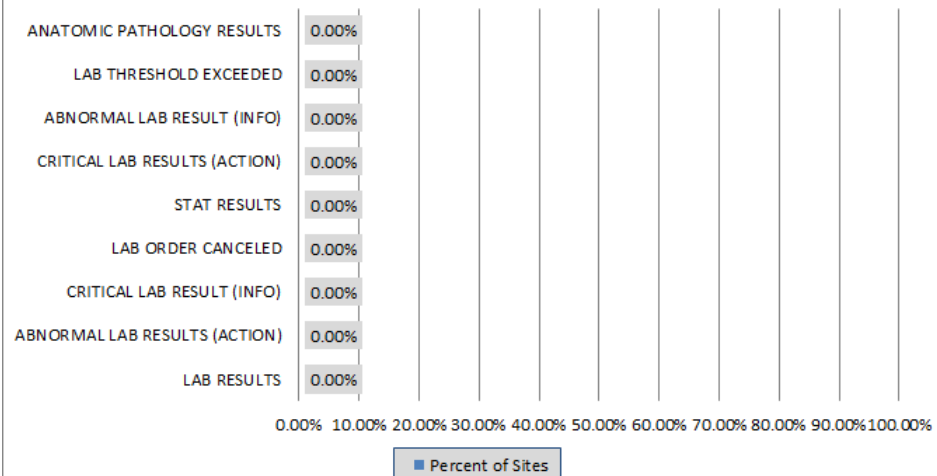
Category = Lab Results  
Level = System  
Disabled



Category = Lab Results  
Level = Team  
MANDATORY

Category = Lab Results  
Level = Team  
Enabled

Category = Lab Results  
Level = Team  
Disabled



# Site-to-Site Variability: Orders Category Parameters

Category = Orders  
Level = System  
MANDATORY

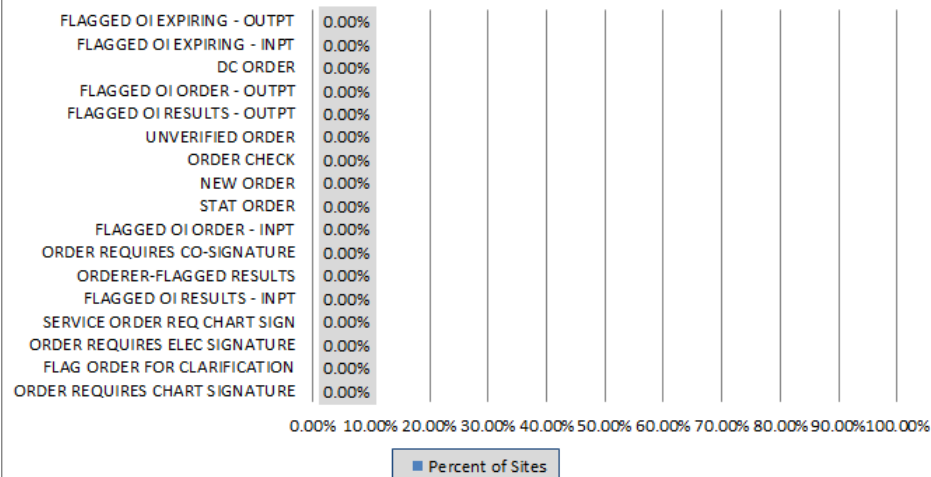
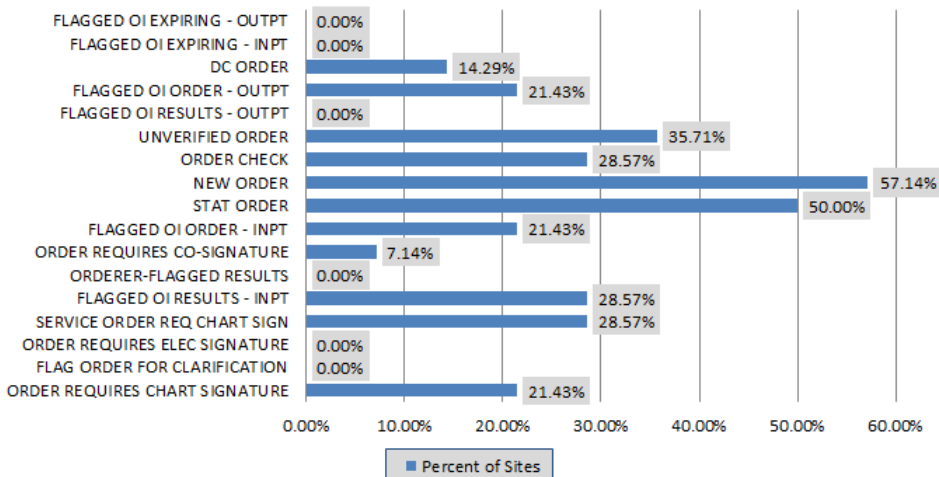
Category = Orders  
Level = System  
Enabled

Category = Orders  
Level = System  
Disabled

Category = Orders  
Level = Team  
MANDATORY

Category = Orders  
Level = Team  
Enabled

Category = Orders  
Level = Team  
Disabled




# Single Site Project: How Modifications to Parameters Impact Workload

- Two modifications to notification parameters; April and November 2015
- Pre-Post analysis to examine:
  - Change in Notifications pending
  - Change in the ratio of notifications/encounters

BASELINE					
#	Notification	Value	#	Notification	Value
1	LAB RESULTS	Disabled	26	STAT ORDER	Disabled
2	ORDER REQUIRES CHART SIGNATURE	Mandatory	27	STAT RESULTS	Disabled
3	FLAG ORDER FOR CLARIFICATION	Mandatory	28	DNR EXPIRING	Disabled
4	ORDER REQUIRES ELEC SIGNATURE	Mandatory	29	FREE TEXT	Disabled
5	ABNORMAL LAB RESULTS (ACTION)	Disabled	30	MEDICATIONS EXPIRING - INPT	Mandatory
6	ADMISSION	Disabled	31	UNVERIFIED MEDICATION ORDER	Disabled
7	UNSCHEDULED VISIT	Disabled	32	NEW ORDER	Disabled
8	DECEASED PATIENT	Disabled	33	STAT IMAGING REQUEST	Disabled
9	IMAGING PATIENT EXAMINED	Disabled	34	URGENT IMAGING REQUEST	Disabled
10	IMAGING RESULTS, NON CRITICAL	Disabled	35	IMAGING RESULTS AMENDED	Mandatory
11	CONSULT/REQUEST RESOLUTION	Mandatory	36	FOOD/DRUG INTERACTION	Mandatory
12	CRITICAL LAB RESULT (INFO)	Mandatory	37	ERROR MESSAGE	Disabled
13	ABNL IMAGING RESLT, NEEDS ATTN	Mandatory	38	CRITICAL LAB RESULTS (ACTION)	Disabled
14	IMAGING REQUEST CANCEL/HELD	Disabled	39	ABNORMAL LAB RESULT (INFO)	Disabled
15	NEW SERVICE CONSULT/REQUEST	Mandatory	40	FLAGGED OI ORDER - OUTPT	Enabled
16	SERVICE ORDER REQ CHART SIGN	Mandatory	41	CONSULT/REQUEST UPDATED	Enabled
17	CONSULT/REQUEST CANCEL/HOLD	Mandatory	42	CONSULT/PROC INTERPRETATION	Mandatory
18	NPO DIET MORE THAN 72 HRS	Disabled	43	ANATOMIC PATHOLOGY RESULTS	Mandatory
19	FLAGGED OI RESULTS - INPT	Disabled	44	OP RX RENEWAL REQUEST	Enabled
20	ORDERER-FLAGGED RESULTS	Mandatory	45	SUICIDE ATTEMPTED/COMPLETED	Enabled
21	DISCHARGE	Disabled	--	-----	-----
22	TRANSFER FROM PSYCHIATRY	Disabled	--	-----	-----
23	ORDER REQUIRES CO-SIGNATURE	Disabled	--	-----	-----
24	FLAGGED OI ORDER - INPT	Mandatory	--	-----	-----
25	LAB ORDER CANCELED	Disabled	--	-----	-----

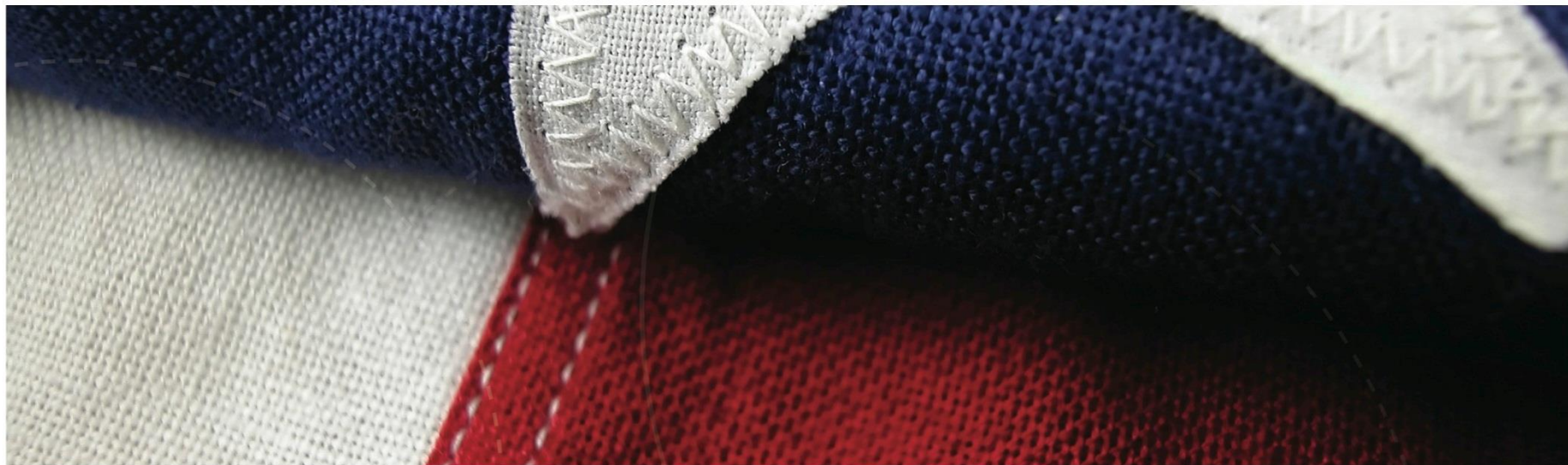


ORB PROCESSING FLAG	
CRITICAL LAB RESULT (INFO)	Disabled
NEW SERVICE CONSULT/REQUEST	Enabled
CONSULT/REQUEST CANCEL/HOLD	Disabled
MEDICATIONS EXPIRING - INPT	Enabled
CRITICAL LAB RESULTS (ACTION)	Mandatory
IMAGING RESULTS AMENDED	Enabled
FOOD/DRUG INTERACTION	Disabled
CONSULT/PROC INTERPRETATION	Enabled
ANATOMIC PATHOLOGY RESULTS	Enabled
<div>  <p>PROCESSING PARAMETERS WERE MODIFIED ON NINE (9) NOTIFICATION TYPES</p> </div>	

## Outcomes: Single Site Project

	Pre Intervention (Mean)	Post Intervention (Mean)	Change	t	Sig.	Eta Square
Total notifications	4,121.15	2,660.19	-1,463.96	-7.01	.000	.67
Ratio of notifications/ encounters	9.83	8.03	-1.80	-3.22	.004	.30





# EDUCATION AND TRAINING OF STAFF

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## Poll Question #3: Education and Training

For those who frequently utilize CPRS, please select the **primary method** by which you were trained (educated) to manage notifications:

- a) Video training
- b) Assigned personal mentor / trainer
- c) Simulation-based scenarios
- d) Instructor-based course
- e) Self-taught (on your own)

## Education and Training of Staff: A Brief Review

- In a 2010 national survey of VHA PCPs (N=2590)<sup>10</sup>:
  - 66% primary care providers found education to CPRS inadequate.
  - 35% could identify an assigned contact for technical assistance.
  - 60% reported receiving the majority of EHR assistance from a colleague.
- Nearly 50% VA primary care providers (N =28) in two large VA facilities were completely unaware of existing CPRS functions that may improve efficiency for processing notifications<sup>8</sup>. Use of functions produced:
  - More timely completion of notifications.
  - 28% received fewer notifications.

## Initial Outcomes: Education and Training Specific to Notification Management

	MD/DO	NP/PA	RN/Nursing	Admin Personnel	Medical Residents	Students
Specific Education Offered	38.6%	38.6%	0.0%	0.0%	14.3%	7.1%

- Mean reported time devoted specifically to notifications education: 15 minutes
- Program Analysts report receiving a mean of 8.45 requests from PACT providers/week specific to management of notifications



# IMPLICATIONS, LIMITATIONS AND FUTURE DIRECTIONS





# Implications

## Operator Development

- Investment in EHR education/training
  - PACT Staff
  - Trainees (Residents and Students)
- Emphasis on User Control Management (at a minimum)

## SITE TO SITE VARIABILITY

- Decrease Variability
- Best Practice(s) ID to optimize workflow and decrease admin burden

## WORKFLOW AND QUALITY/SAFETY

- Workload burden
- System vs Team parameters
- Improved design of monitors and tools
- Methods for monitoring stress and burnout related to Information Chaos
- AWARE<sup>14</sup>

## eHMP

- Future design and workflow

# Limitations and Future Directions

## LIMITATIONS

- Sample: Size and Region
- Reliance on Preliminary Data
- Case Study for Workflow

## FUTURE DIRECTIONS

- Connection to PACT Staff stress and burnout
- Identity best practices and perform impact evaluations
- Mapping algorithm as applied to workload and operational efficiency
- Coordinate with eHMP updates



## TOOLS

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## Suggested Tools:

### Tool #1 - Strategies for Managing Notifications

#### ■ 10 Strategies for managing notifications<sup>15</sup>



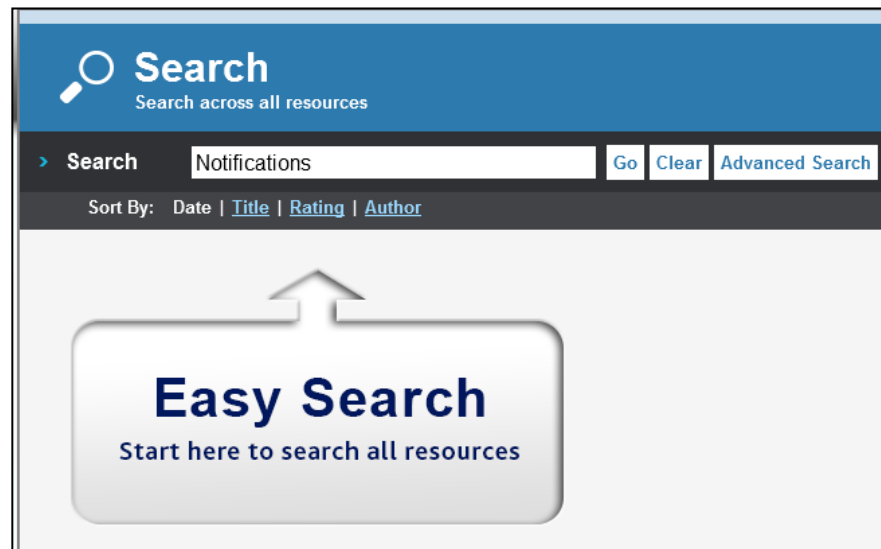
10 Strategies

- 1. Create a strategy to prioritize
- 2. Sort your notifications for easier processing
- 3. Resize the notification window to see more alerts
- 4. Don't miss critical information due to small column size
- 5. Make the Process All feature work for you
- 6. Prevent alerts from disappearing from CPRS
- 7. Adjust your notifications according to your preferences
- 8. Get your notifications to other providers
- 9. Assign a Surrogate Provider when you are going to be away
- 10. Remain “alert” about your responsibility

# Suggested Tools:

## Tool #2 - VEHU courses

- [Go to MyVeHU Campus](#)
- Search by
  - “Alerts”
  - “Notifications”
- Suggested Courses:
  - [102 - Alerts and Notifications](#)
  - [13068 - Back to Basics – Notifications](#)
  - [310 - Notifications / Surrogates / Alerts](#)



The screenshot shows the VEHU Search interface. At the top, there is a blue header with a magnifying glass icon and the word "Search" in white. Below the header, the text "Search across all resources" is displayed. A search bar contains the word "Notifications". To the right of the search bar are three buttons: "Go", "Clear", and "Advanced Search". Below the search bar, there is a "Sort By:" section with links for "Date", "Title", "Rating", and "Author". In the center of the page, there is a large, light gray button with a white upward-pointing arrow and the text "Easy Search" in bold, followed by "Start here to search all resources" in a smaller font.



# Suggested Tools:

## Tool #3 -CPRS User Control Management Options

VistA CPRS in use by: [ ]

File Edit View **Tools** Help

Info and Training Menu  
Patient Safety Alerts Menu  
Specialty Apps Menu  
Web Links Menu  
EDIS 2.0  
Event Capture Interface  
GroupNotes  
iMed Consent  
Secure Messaging  
Vista Imaging (Capture)  
Vista Imaging (Display)  
Graphing... Ctrl+G  
Lab Test Information...  
**Options...**  
Digital Signing Setup...

Active Problems

- Benign Essential Hypertension
- \* Diabetes Insipidus
- \* Lumbago With Sciatica
- Acute Ischemic Heart Disease
- Abscess Of Heart
- Abscess Of Heart
- Chronic Obstructive Pulmonary Disease
- Abscess Of Heart
- Acute Otitis Media
- Coronary Arteriosclerosis
- \* Galactorrhea Not Due To A Prolactin Secreting Pituitary Tumor
- Bipolar Affective Disorder
- \* Priapism (MST) (See Notes)
- Leptospirosis (SC)
- Benign Hypertension
- \* Aneurysm Of Head And Neck Arteries

Active Medications

- Baclofen 10mg Tab
- Lisinopril 20mg Tab
- Non-VA Naproxen 250mg Tab

Recent Lab Results

Bnp Blood (lavender) Plasma Wc Lb #657652

Vitals

T	98.7 F	Oct 13, 2015	10:40 Sam
P	88	Oct 13, 2015	10:40 Sam
R	22	Oct 13, 2015	12:41 Sam
BP	150/80	Oct 15, 2015	12:30 Sam
HT	60 in	Sep 29, 2015	10:40 Sam
WT	100 lb	Sep 29, 2015	07:45 Sam
PN	6	Oct 13, 2015	10:40 Sam
POX	99	Oct 13, 2015	10:40 Sam
CVP	Unavailable	Oct 18, 2015	10:40 Sam
CG	36 in	May 22, 2015	10:40 Sam

Appointments/Visits/Admissions

Dec 08, 2015	09:00 Sam		
Nov 14, 2015	00:00 Rec		
Oct 31, 2015	12:41 Sam		
Oct 30, 2015	12:30 Sam		
Sep 15, 2015	10:40 Sam		
Sep 10, 2015	07:45 Sam		

Options

General **Notifications** Order Checks Lists/Teams Notes Reports Graphs

Notifications

Change your notification options.

☐ Send me a MailMan bulletin for flagged orders

Surrogate Settings... Remove Pending Notifications...

Surrogate: <no surrogate designated>

You can turn on or off these notifications except those that are mandatory.

Notification	On/Off	Comment
<input checked="" type="checkbox"/> Abnl Imaging Reslt, Needs Attn	On	Mandatory
<input type="checkbox"/> Abnormal Lab Result (info)	Off	
<input type="checkbox"/> Abnormal Lab Results (action)	Off	
<input type="checkbox"/> Admission	Off	
<input checked="" type="checkbox"/> Anatomic Pathology Results	On	Mandatory
<input checked="" type="checkbox"/> Consult/Proc Interpretation	On	
<input type="checkbox"/> Consult/Request Cancel/Hold	Off	
<input checked="" type="checkbox"/> Consult/Request Resolution	On	Mandatory

OK Cancel Apply

# References

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# Questions?

## Contact Information:

Mehdi Kazemi, MD

[Mehdi.kazemi@va.gov](mailto:Mehdi.kazemi@va.gov)

Joe Gieck, PhD

[Donald.gieck@va.gov](mailto:Donald.gieck@va.gov)

Joe Plott, MBA, MEd

[Joseph.plott@va.gov](mailto:Joseph.plott@va.gov)

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