

**Improving the Quality of
Abnormal Test Result Follow-up in the
Ambulatory Setting:
Implementation of an Electronic Results
Manager at Partners Healthcare**

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A Risk Management Time Bomb

‘Failure to diagnose’ has been a rapidly rising cause of legal action

1/4 of diagnosis related malpractice lawsuits can be attributed to some failures in the followup system

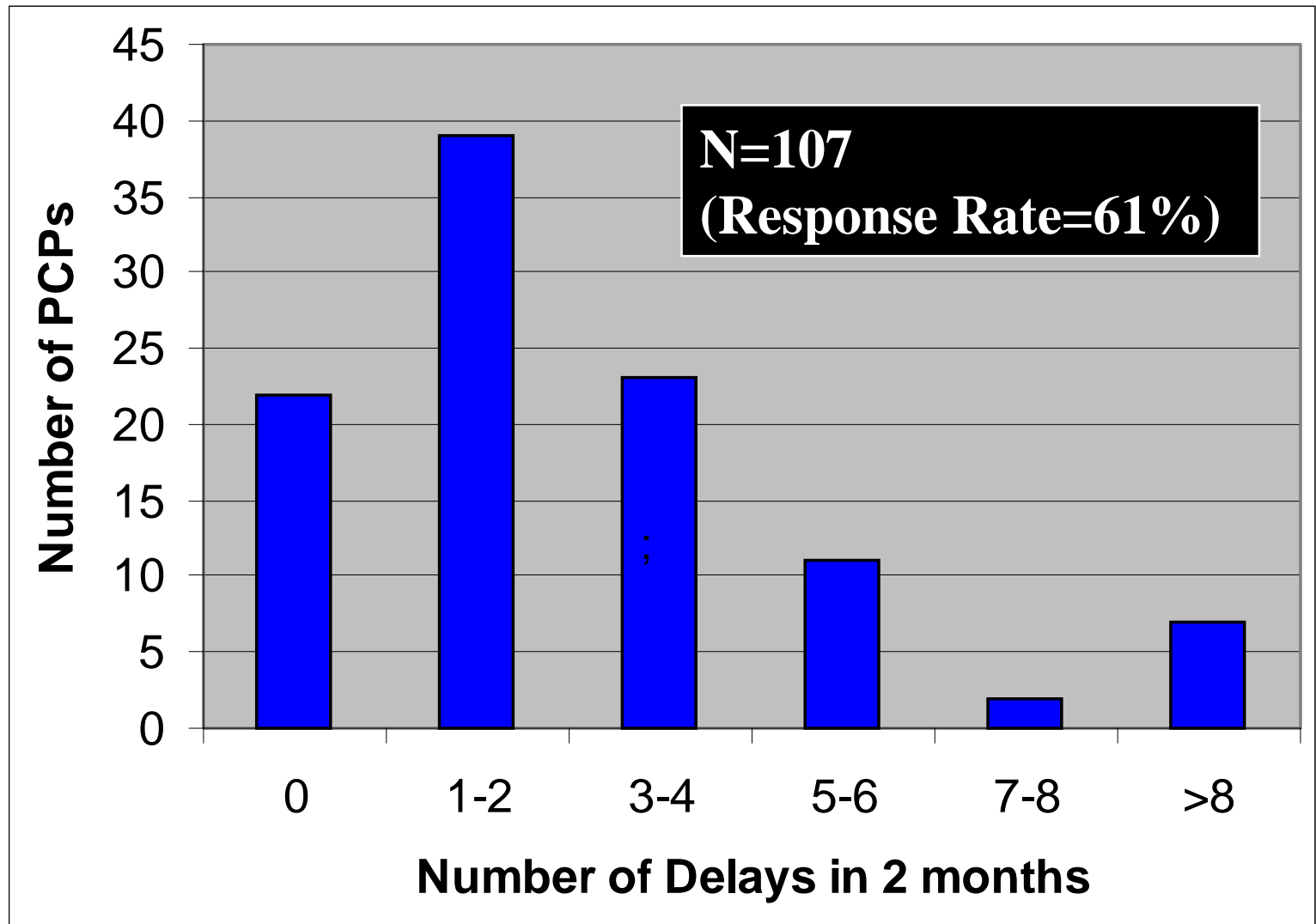
Quality of Abnormal Test Result Follow-up: Room for Improvement

31% of women with abnormal mammograms do not receive care consistent with established guidelines (Haas, 2000)

39% of abnormal TSH at BWH not followed up within 60 days (Solomon, 1996)

35% of abnormal pap smear are 'lost' to follow-up (Marcus, 1998)

Q: How many times over the past 2 months have you reviewed test results you wish you had reviewed earlier?



Burden of Outpatient Test Result Management

Per week, full-time PCP needs to review:

- 360 chemistry results (SMA7 = 7)
- 460 hematology results
- 12 pathology reports
- 40 radiology reports

Average time spent managing test results per clinic-day = 72 minutes (SD = 46)

57% of attending physicians surveyed report being *not* satisfied with the way they manage test results

A brief look at the intervention

The Longitudinal Medical Record

LMR OMA26 - Microsoft Internet Explorer

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Address <http://ppd.partners.org/scripts/phsweb.swl?PKG=0&ZXSOPT=PFWEB&SESS=u5873327001705389&SERVICE=Choose&ID=100790895> Go

Oetest, George Herbert Walker PG PE010
 11489887 (BWH) 10/01/1921 (81 yrs.) M BIMA CM

Select Desktop Patient Chart: Summary Custom Reports Admin Sign Results Resource

Sticky Notes

VITAL SIGNS: 09/30/2002 BP N/A P N/A RR N/A Temp N/A Ht 63 in. Wt 300 lb

Medications	Problems	Procedures	Allergies
Ibuprofen Alternating	Shortness of breath		Strawberries [N]
Insulin regular SlidingSc...	Weakness		Baycol
Prednisone Taper	Myocardial infarction		Butalbital
Amoxicillin 250MG 1 TID	Hepatitis a		Codeine
Digoxin Variable	Urinary tract infection		
	S/p cardiac bypass gra...		
	S/p transient ischemic...		
	Asthma		
	Elevated glucose		


No Reminders for This Patient

Results Manager Home Page


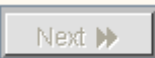
LMR QMA2 - Microsoft Internet Explorer

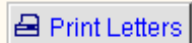
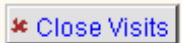
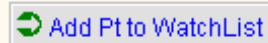
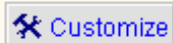
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PE010
BIMA 

Select Desktop: RM 2 Patient Chart Custom Reports Admin Sign Results Resource

View Options Open Visits Only   Provider Poon, Eric Gon-Chee, M.D.

  **View Ticklers** 4 Overdue, 1 Pending **View To Do** 0 Overdue, 50 Pending  

Visit Date	Patient Name / MRN	CDR Results	Abn	Ack	Visit Note	Patient Letter	User Flags/Comments	Test Arrived
<input type="checkbox"/> 11/06/2002	B	H	!!!				----	<input type="checkbox"/>
<input type="checkbox"/> 11/02/2002	H	H	!!!				----	<input type="checkbox"/>
<input type="checkbox"/> 11/04/2002	F	P	!!				----	<input type="checkbox"/>
<input type="checkbox"/> 11/02/2002	C	P	!!				----	<input type="checkbox"/>
<input type="checkbox"/> 11/04/2002	D	H	!			 P	----	<input type="checkbox"/>
<input type="checkbox"/> 11/04/2002	G	C	!				----	<input type="checkbox"/>
<input type="checkbox"/> 11/04/2002	B	P	!				----	<input type="checkbox"/>
<input type="checkbox"/> 11/03/2002	S	C	!	✓		 P 	----	<input type="checkbox"/>
<input type="checkbox"/> 11/02/2002	K	C	!		 F		----	<input type="checkbox"/>
<input type="checkbox"/> 11/02/2002	BROWN, MARY	C, R	!				----	<input type="checkbox"/>
<input type="checkbox"/> 11/02/2002	D	H					----	<input type="checkbox"/>
<input type="checkbox"/> 11/02/2002	H	H					----	<input type="checkbox"/>
<input type="checkbox"/> 11/02/2002	C	H					----	<input type="checkbox"/>
<input type="checkbox"/> 11/02/2002	R	H					----	<input type="checkbox"/>

Brown, Mary PE010
 08790800 (BWH) 06/22/1948 (54 yrs.) F BIMA

- Select Desktop Patient Chart: Results Custom Reports Admin Sign Results Resource

- Result Letter Tickler To Do Patient Called

- General Chem
- Mammogram !

Test Name	BWH 10/31/02 14:17	BWH 03/02/01 09:04	BWH 09/18/00 16:58	BWH 02/22/00 20:50	BWH 11/12/98 08:41
ALT/SGPT	16	19	15	16	19
AST/SGOT	18	16	14	17	15
ALKP	69	50	57	62	
TBILI	0.9	1.3 (*#)	0.5	0.4	
DBILI	0.3 (#)		0.1	0.1	

- Acknowledge Result
- Forward Result
- Add Result Interpretation
- Back to Result List

Copy

Alerts and Guidelines	Medications (Add New)	Problems (Add New)
	Mvi therapeutic QD	Marginally abn mammogr...
	Magnesium gluconate 1 QD	Cad
	Xanax 0.25 QD PRN	Ger
	Premarin 0.625 QD	Pvd

Brown, Mary

08790800 (BWH) 06/22/15

Select Desktop

- General Chem ✓
- Mammogram !

✓ Acknowledge Result

Forward Result

Add Result Interpretation

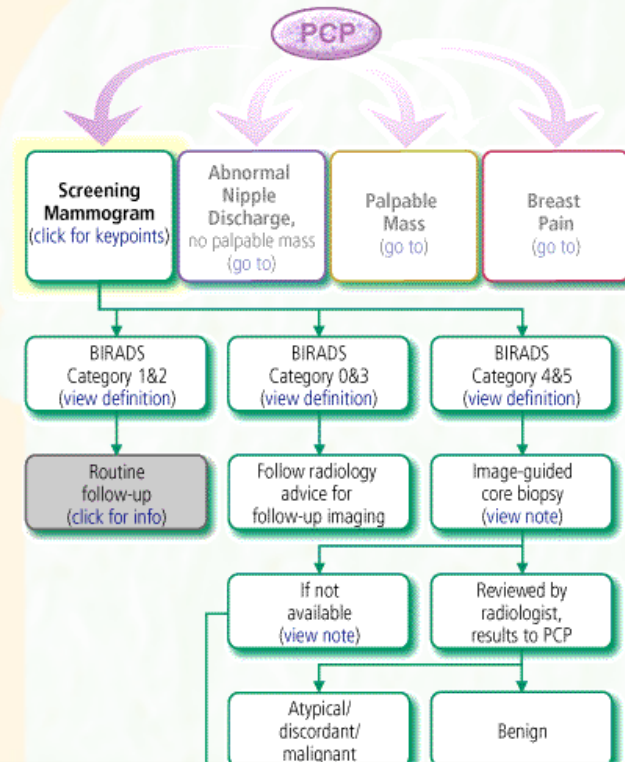
Back to Result List

Alerts and Guidelines

Incomplete assessment. Follow recommendations from radiologist. [More info...](#)

Breast Care Management Algorithm

Screening Mammogram



Magnesium gluconate 1 QD
Xanax 0.25 QD PRN
Premarin 0.625 OD

Ger
Pvd

Brown, Mary				PE010
08790800 (BWH)	06/22/1948 (54 yrs.) F			BIMA
Select	Desktop	Patient Chart: Results	Custom	Reports Admin Sign Results Resource

Result	Letter	Tickler	To Do	Patient Called
--------	--------	---------	-------	----------------

- General Chem ✓
- Mammogram !

BWH Rad Mammography Bilat/S/Add Views 07/08/2002 12:17

START _____ END _____

Calcifications are present in the lower inner quadrant; other scattered milk of calcium calcifications are present throughout the breast.

IMPRESSION:

LEFT BREAST - CATEGORY 0
 Grouped calcifications in the lower inner quadrant. Old films for comparison is recommended at this time to confirm stability; if these cannot be located, then needle biopsy would be recommended, as was discussed with the patient.

RIGHT BREAST - CATEGORY 0
 1. Grouped probable milk of calcium calcifications in the lower inner quadrant. Old films for comparison is recommended at this time; if these cannot be located, then 6 month followup would be recommended.

2. Ultrasound of the palpable finding is recommended at this time.

Acknowledge Result

Forward Result

Add Result Interpretation

Back to Result List

Alerts and Guidelines	Medications (Add New)	Problems (Add New)
Incomplete assessment. Follow recommendations from radiologist.. More info...	Mvi therapeutic QD Magnesium gluconate 1 QD Xanax 0.25 QD PRN Premarin 0.625 OD	Marginally abn mammogr... Cad Ger Pvd

Brown, Mary			PE010
08790800 (BWH)	06/22/1948 (54 yrs.) F		BIMA

Select Desktop Patient Chart: Results Custom Reports Admin Sign Results Resource

Result Letter Tickler To Do Patient Called

- General Chem ✓
- Mammogram !

-Paragraphs - Letter Templates - Import in Spanish [Add addr & salutation](#)

Arial 10 [font icons]

1000 BACON ST
BROOKLINE, MA 02446

Dear Ms. Brown,

I have just received your test results and I would like to review them with you.

The mammogram performed on 07/08/2002 showed no abnormalities. However, because of technical reasons, the images could not be fully evaluated. As a result our radiologist thought that additional imaging would be helpful. If arrangements for further imaging studies have not been made, please schedule an appointment with myself so that we can make the arrangements to do so.

Your chemistry results were entirely normal.

- Acknowledge Result
- Forward Result
- Add Result Interpretation
- Back to Result List

Alerts and Guidelines

Incomplete assessment. Follow recommendations from radiologist.. [More info...](#)

Medications (Add New)

- Mvi therapeutic QD
- Magnesium gluconate 1 QD
- Xanax 0.25 QD PRN
- Premarin 0.625 OD

Problems (Add New)

- Marginally abn mammogr...
- Cad
- Ger
- Pvd



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Brown, Mary PE010

08790800 (BWH) 06/22/1948 (54 yrs.) F BIMA

Select Desktop Patient Chart: Results Custom Reports Admin Sign Results Resource

Result Letter Tickler To Do Patient Called

- General Chem ✓
- Mammogram !

Please notify ▾

if patient

does not have a/an ▾

by T

Comments:

- Acknowledge Result
- Forward Result
- Add Result Interpretation
- Back to Result List

Alerts and Guidelines

Incomplete assessment. Follow recommendations from radiologist.. [More info...](#)

Medications (Add New)

- Mvi therapeutic QD
- Magnesium gluconate 1 QD
- Xanax 0.25 QD PRN
- Premarin 0.625 OD

Problems (Add New)

- Marginally abn mammogr...
- Cad
- Ger
- Pvd

Mary Brown's Results Ack'd

LMR QMA2 - Microsoft Internet Explorer

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PE010
BIMA

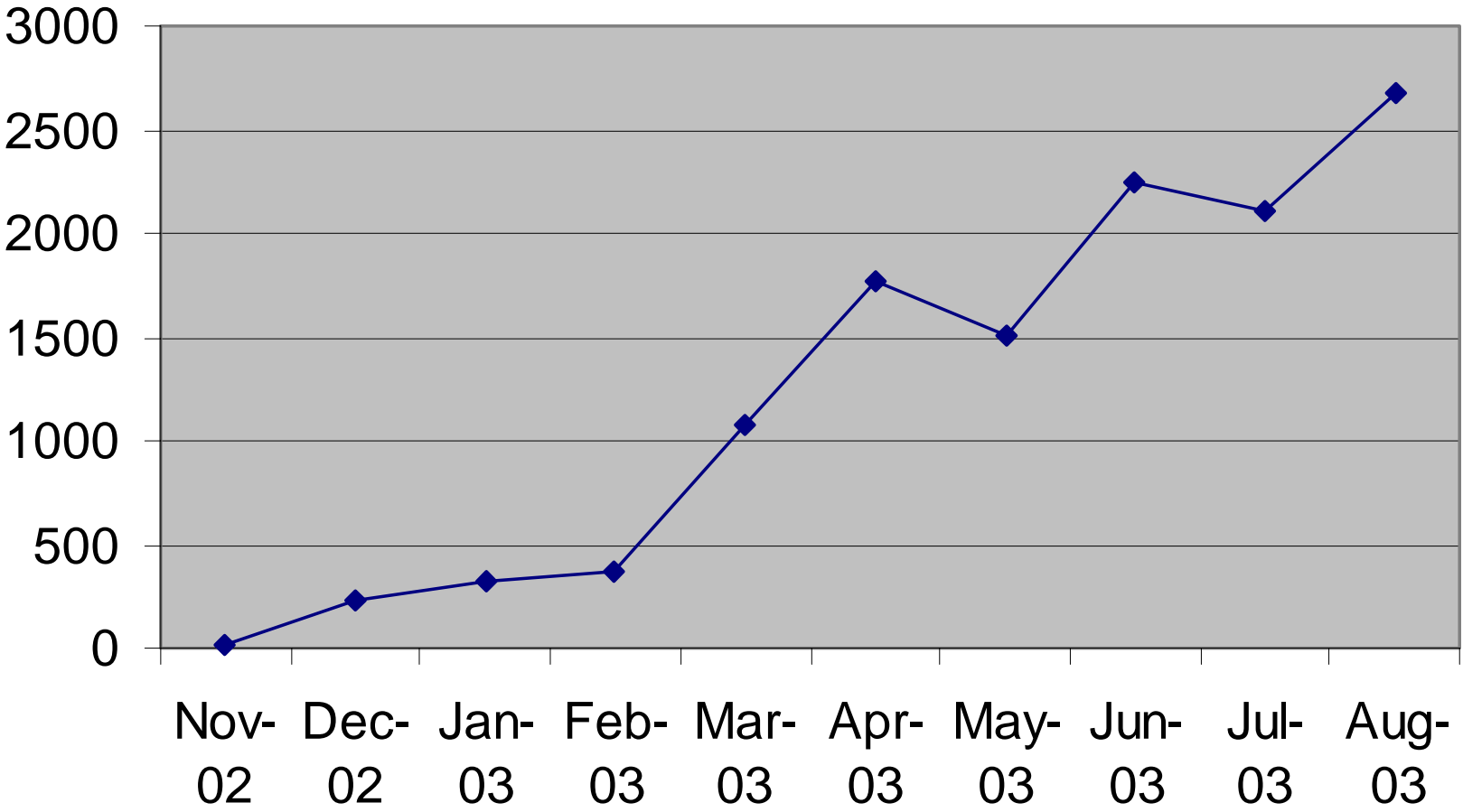
Select Desktop: RM 2 Patient Chart Custom Reports Admin Sign Results Resource

View Options Open Visits Only Provider Poon, Eric Gon-Chee, M.D.

View Ticklers 4 Overdue **2** Pending **View To Do** 0 Overdue, 50 Pending

Visit Date	Patient Name / MRN	CDR Results	Abn	Ack	Visit Note	Patient Letter	User Flags/Comments	Test Arrived
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<input type="checkbox"/> 11/02/2002	C	P	!!				---	<input type="checkbox"/>
<input type="checkbox"/> 11/04/2002	D	H	!			p	---	<input type="checkbox"/>
<input type="checkbox"/> 11/04/2002	G	C	!				---	<input type="checkbox"/>
<input type="checkbox"/> 11/04/2002	B	P	!				---	<input type="checkbox"/>
<input type="checkbox"/> 11/03/2002	S	C	!	✓		p	---	<input type="checkbox"/>
<input type="checkbox"/> 11/02/2002	K	C	!		F		---	<input type="checkbox"/>
<input type="checkbox"/> 11/02/2002	BROWN, MARY	C, R	!	✓		p	---	<input type="checkbox"/>
<input type="checkbox"/> 11/02/2002	D.	H					---	<input type="checkbox"/>
<input type="checkbox"/> 11/02/2002	H	H					---	<input type="checkbox"/>
<input type="checkbox"/> 11/02/2002	C.	H					---	<input type="checkbox"/>
<input type="checkbox"/> 11/02/2002	R	H					---	<input type="checkbox"/>

Monthly Usage of RM to Generate Patient Result Letters



Evaluating the Impact of RM on Patient Safety

6 month, clustered, randomized controlled trial in 12 clinics

Outcomes

- % of patients with timely follow-up
 - Abnormal cholesterol
 - Abnormal HbA1c
 - Abnormal Mammograms
 - Abnormal Pap smear
- Patient satisfaction regarding communication
- Physician satisfaction regarding result follow-up system

Lessons Learned

Engage the end-user at all stages of design and implementation

- Communicate and set expectations
- Focus on physician workflow

Don't underestimate support requirements

- Help at the elbow
- Rapid response to user feedback
- Gradual rollout helps

Challenges in automating detection of abnormal vs normal results

- Criteria differ across specialties/hospitals

Maintaining a control group is hard

Looking Beyond the Initial Phase

General Rollout to all LMR primary care practices (Winter 2003)

Inclusion of further data types

- Microbiology
- Cardiology Data

More Decision Support for abnormal results

- Better and richer letter templates

Integration with ACPOE (Summer 2004) for 100%-order tracking

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