

Child Health Evaluation  
and Research Unit



University of Michigan



University of Michigan  
C.S. Mott Children's Hospital

# Adolescent Vaccination Reminders Using Email

## A Pilot Study

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AIRA IIS National Meeting

October 7, 2013

# Background

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Adolescent immunization coverage  
(NIS, 2012):

- Tdap: 89% (range: 57% - 99%)
- MCV: 74% (range: 38% - 94%)
- HPV (girls): 33% (range: 12% - 58%)

# Background

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- Reminders are an effective method to increase vaccination rates
- Parent preferences are evolving – many only want electronic reminders
- Some parents prefer email reminders
- Little is known regarding the feasibility and effectiveness of email reminders for vaccinations

# Objective

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- Pilot test the feasibility of using email reminder / recall notifications to parents of adolescents

# Methods

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- Partnered with:
  - Michigan Department of Community Health (MDCH)
  - 4 pediatric immunization practices in Michigan
- Pilot tested email reminders:
  - September, 2012 – September, 2013
- Email messages sent via ClientTell

# Getting Ready to Send Email Reminders

# Methods

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- Email addresses were:
  - obtained for patients 10-18 years
  - matched to the Michigan Care Improvement Registry (MCIR)
  - randomized into email vs. no email groups
- Vaccination status was determined through MCIR

## Collect Emails

- Four practices
- Paper patient intake forms



**PEDIATRIC PATIENT INFORMATION SHEET**

**2013**

Please put a checkmark in the box(es) below if this is a change or new information

**IMPORTANT: YOU MUST LIST ALL INSURANCES THAT COVER EACH CHILD**

Child's Last Name: \_\_\_\_\_ Middle Initial: \_\_\_\_\_ First Name: \_\_\_\_\_ Birth date: \_\_\_\_\_

Male / Female Social Security # \_\_\_\_\_ Race\*: \_\_\_\_\_ Child's School: \_\_\_\_\_

Preferred Pharmacy: \_\_\_\_\_ Preferred Language: \_\_\_\_\_ ☐ Hispanic ☒ Non-Hispanic

+++++  
**Father's name:** \_\_\_\_\_ Birth date: \_\_\_\_\_

☐ Address: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

☐ Soc Security #: \_\_\_\_\_ Employer: \_\_\_\_\_ Work Ph #: \_\_\_\_\_

☐ Insurance Co (if children are covered): \_\_\_\_\_ Preferred language: \_\_\_\_\_

Email: \_\_\_\_\_ Race\*: \_\_\_\_\_ Home Ph#: \_\_\_\_\_ Cell #: \_\_\_\_\_

+++++  
**Mother's name:** \_\_\_\_\_ Birth date: \_\_\_\_\_

☐ Address: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

☐ Soc Security # \_\_\_\_\_ Employer: \_\_\_\_\_ Work Ph #: \_\_\_\_\_

☐ Insurance Co (if children are covered): \_\_\_\_\_ Preferred language: \_\_\_\_\_

Email: \_\_\_\_\_ Race\*: \_\_\_\_\_ Home Ph#: \_\_\_\_\_ Cell #: \_\_\_\_\_

+++++  
Parents: Married \_\_\_\_\_ Divorced \_\_\_\_\_ Separated \_\_\_\_\_ Single \_\_\_\_\_ With whom does your child/children live: \_\_\_\_\_

+++++  
**Responsible party if different from parent's name:** Relationship to child: \_\_\_\_\_

Name: \_\_\_\_\_ SS# \_\_\_\_\_ DOB: \_\_\_\_\_

Address: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Home phone #: \_\_\_\_\_ Cell#: \_\_\_\_\_ Email: \_\_\_\_\_

Employer: \_\_\_\_\_ Full/Part Time (circle) Work Phone: \_\_\_\_\_

+++++  
**Emergency Contacts:**

Name of Relative: \_\_\_\_\_ Home Ph#: \_\_\_\_\_ Cell #: \_\_\_\_\_

Name of Friend: \_\_\_\_\_ Home Ph#: \_\_\_\_\_ Cell #: \_\_\_\_\_

Name of Step Parent: \_\_\_\_\_ Home Ph#: \_\_\_\_\_ Cell #: \_\_\_\_\_

**Other sibling(s) name(s) and dates of birth:**

\* W-White, B-Black, H-Hispanic, A-Asian, O-Other

FACESHEET



1.6.12 sma

## Collect Emails

- Electronic files from administrative records

# Collect Emails

N = 5313

Collect Emails



Clean & Correct

- Remove invalid email addresses
  - (734)551-1234
  - na@na
  - susiegeorge@com

Collect Emails



```
graph TD; A[Collect Emails] --> B[Clean & Correct];
```

Clean & Correct

- Fix obvious errors
  - @gmial.com
  - @comcast
  - @yahoocom

Collect Emails



```
graph TD; A[Collect Emails] --> B[Clean & Correct]
```

Clean & Correct

- Fix obvious errors
  - @gmail.com
  - @comcast.com
  - @yahoo.com

# Collect Emails



## Clean & Correct

- Check for duplicates
  - individual

Smith	Jane	123 Main St.	jsmith@gmail.com
Smith	Jane	123 Main St.	jsmith@gmail.com

- household

Smith	Jane	123 Main St.	smithfamily@gmail.com
Smith	Jack	123 Main St.	smithfamily@gmail.com
Smith	Joanie	123 Main St.	smithfamily@gmail.com

Collect Emails



Clean & Correct

N = 4755 (89%)

Removed

N = 558 (11%)





Collect Emails



```
graph TD; A[Collect Emails] --> B[Clean & Correct]; B --> C[Verify age range];
```

Clean & Correct

Verify age range

- Focus on target age range
- Between 11-17 years within next 12 months

Collect Emails



Clean & Correct



Verify age range



Removed

N = 2140 (45%)

Clean & Correct

```
graph TD; A[Clean & Correct] --> B[Verify age range]; B --> C[Verify age range]; C --> D[ ];
```

Verify age range

Verify age range

- Create spreadsheet with cleaned email addresses

Clean & Correct

```
graph TD; A[Clean & Correct] --> B[Verify age range]; B --> C[Send confirmation email];
```

Verify age range

Send confirmation email

- Create script for email
  - Email text, graphics, subject

Clean & Correct

```
graph TD; A[Clean & Correct] --> B[Verify age range]; B --> C[Send confirmation email];
```

Verify age range

Send confirmation email

- Create email addresses for each practice to capture bounce backs

Clean & Correct



```
graph TD; A[Clean & Correct] --> B[Verify age range]; B --> C[Send confirmation email];
```

Verify age range

Send confirmation email

- Send a confirmation email
- Record bounce backs and opt outs in tracking file

**From:** Providence Medical Center - South Lyon [mailto:[providencemedicalsouthlyon@gmail.com](mailto:providencemedicalsouthlyon@gmail.com)]  
**Sent:** Wednesday, September 04, 2013 9:11 AM  
**To:** Dombkowski, Kevin  
**Subject:** Email confirmation



Dear Parent / Guardian,

You have previously provided this email address to Providence Medical Center. We are considering email as another option for sending appointment and vaccination reminders to parents and are in the process of updating our files.

If you are not interested in receiving these messages from us at this email address, please click here: [OPT OUT](#).

Thank you for your time.

Sincerely,  
**Providence Medical Center South Lyon**

*Please do not reply to this email address as we will not receive your response. To contact our office, please call (248) 437-1744.*

Mail Delivery Subsystem <MAILER-DAEMON@r04.cientell.net>

Thu, Nov 15, 2012 at 1:23 PM

To: providencemedicalsouthlyon@gmail.com

The original message was received at Thu, 15 Nov 2012 09:20:48 -0500 from r04 [127.0.0.1]

----- Transcript of session follows -----

<[REDACTED]@spanltd.com>... Deferred: Connection timed out with mail2.spanltd.com.

Warning: message still undelivered after 4 hours

Will keep trying until message is 5 days old

Final-Recipient: RFC822; [REDACTED]@spanltd.com

Action: delayed

Status: 4.4.1

Remote-MTA: DNS; mail2.spanltd.com

Last-Attempt-Date: Thu, 15 Nov 2012 13:23:16 -0500

Will-Retry-Until: Tue, 20 Nov 2012 09:20:48 -0500

----- Forwarded message -----

From: Providence Medical Center - South Lyon <providencemedicalsouthlyon@gmail.com>

To: [REDACTED]@spanltd.com

Cc:

Date: Thu, 15 Nov 2012 09:20:47 -0500

Subject: Vaccine Reminder



Dear Parent or Guardian,

As a reminder, we are encouraging all parents to keep their adolescent (11 through 17 years) up-to-date on recommended vaccines, including tetanus-diphtheria -acellular pertussis (Tdap), meningococcal conjugate (MCV4 or meningitis), human papillomavirus (HPV4), and seasonal influenza (flu). **Our records indicate that your child currently needs one or more of these vaccines.**

Vaccination is the best way to protect your child from getting many preventable diseases.

Please contact Providence Medical Center at (248) 437-1744 to schedule an appointment or to find out more information about what is recommended for your child.

Sincerely,

**Providence Medical Center - South Lyon**

*Please do not reply to this email address as we will not receive your response. To opt out of future emails please click here: [OPT OUT](#). To contact our office, please call (248) 437-1744.*



## Re: Vaccine Reminder

1 message

[REDACTED] <[REDACTED]@charter.net>

Thu, Sep 19, 2013 at 8:24 PM

To: "ProMedPedsReminders@gmail.com" <ProMedPedsReminders@gmail.com>

Which child? I have five children.

Sent from my iPad

On Sep 19, 2013, at 9:41 AM, ProMed Pediatrics <ProMedPedsReminders@gmail.com> wrote:



**Growing is their specialty. Healing is ours.**

**ProMed Physicians**  
BORGESS HEALTH

<b>Portage</b> 8001 Angling Road, Portage, MI 49024 (269) 329-0944 Monday-Friday, 8 am-6:30 pm Saturday 8 am - 12:30 pm Sunday 8 am - 12:30 pm	<b>Richland</b> 8450 North 32nd Street, Richland, MI 49083 (269) 552-2500 Monday-Friday, 8 am-6:30 pm Saturday, 8 am - 12:30 pm
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Dear Parent or Guardian,

As a reminder, we are encouraging all parents to keep their adolescent (11 through 17 years) up-to-date on recommended vaccines, including tetanus-diphtheria-acellular pertussis (Tdap), meningococcal conjugate (MCV4 or meningitis), and human papillomavirus (HPV4). **Our records indicate that your child currently needs one or more of these vaccines.**

Vaccination is the best way to protect your child from getting many preventable diseases. We are working with the University of Michigan to test a new educational tool available for parents who have questions about adolescent vaccines. Your participation will help us to understand if this information is useful to parents of teens. If you want to learn more about vaccines for your adolescent, we encourage you to check out this tool at [www.teenvaxscene.org](http://www.teenvaxscene.org).

Please contact ProMed Pediatrics at (269) 329-0944 for our Portage clinic or (269) 552-2500 for our Richland location to schedule an appointment or to find out more information about what is recommended for your child.

Sincerely,

**ProMed Pediatrics**

*Please do not reply to this email address as we will not receive your response. To opt out of future emails please click here: [OPT OUT](#). To contact our office, please call (269) 329-0944 for our Portage clinic or (269) 552-2500 for our Richland location.*

Clean & Correct



Verify age range



Send confirmation email

- Record bounce backs and opt outs in tracking file

CHILD_ID	Last Name	First Name	EBDate	Email notes	Email	Email notes
2000123546	Doe	Joe	9-Jun-99	doefamily@aol.com		1 = undeliverable
2000457434	Smith	Anna	13-Apr-02	birdzzrule@gmail.com	1	2 = opt-out
4000567234	Adams	Margaret	18-Mar-97	kadams@yahoo.com		9 = other
2000234741	Kelly	Susan	21-Nov-98	kellyokelly@hotmail.com		
2000586934	Brown	Gina	17-Jun-99	s.brown@work.com		
2000452347	Green	Shannon	25-Sep-96	ihateemails@comcast.net	2	

Clean & Correct



Verify age range



Send confirmation email



Bounce Back

N = 366 (14%)

Opt-out

N = 41 (2%)

Verify age range



```
graph TD; A[Verify age range] --> B[Send confirmation email]; B --> C[Match in MCIR]; C --> D[ ];
```

Send confirmation email

Match in MCIR

- **Match by:**
  - MCIR/patient ID
  - name and DOB (by practice)
  - street/phone, name, and DOB (statewide)
  - name and DOB (by county)
  - name and partial DOB (statewide)

Verify age range



Send confirmation email



Match in MCIR



No match

N = 27 (1%)

# Sending Email Reminders

# Email Reminders

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- Email messages sent via ClientTell:
  - confirm email address validity
  - notify parents of overdue or eligible vaccination status, every 60 days
  - opt-out option offered each email
- Primary outcomes measured:
  - children matched with MCIR
  - undeliverable emails
  - opt-outs

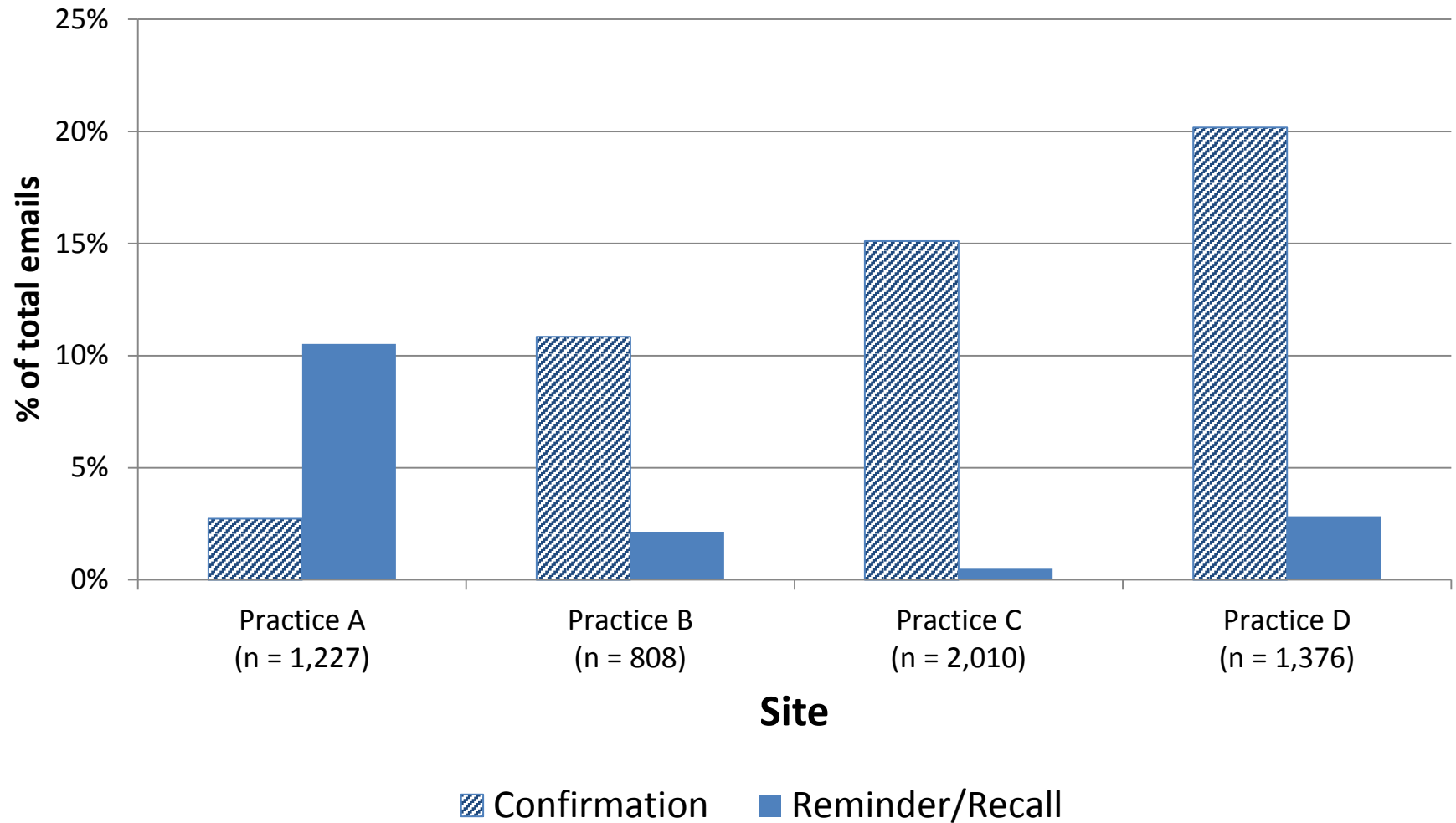
# Email Reminders

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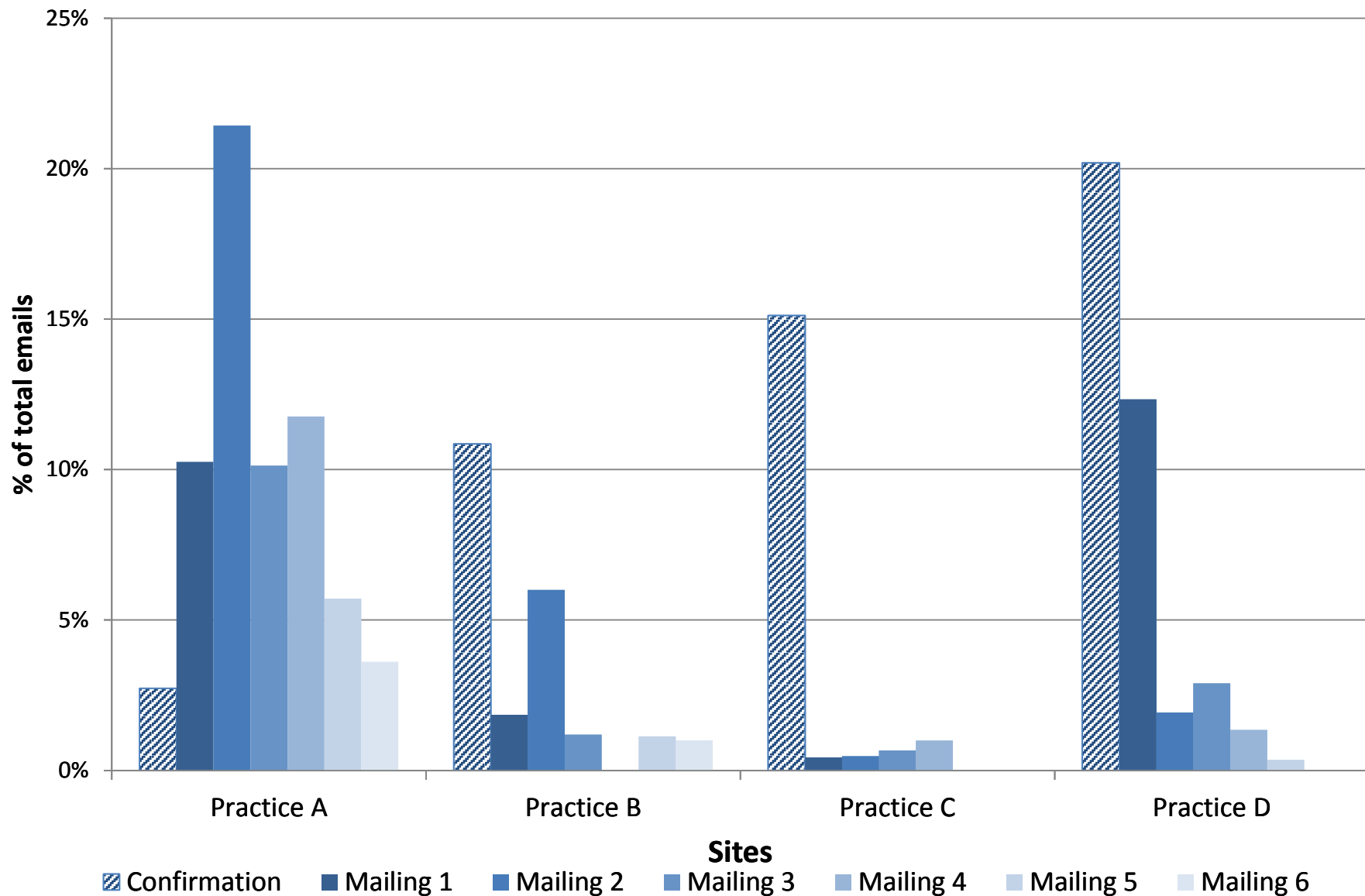
- 1,458 adolescents randomized to receive email reminders
- 5,421 emails sent
  - 1,920 confirmatory
  - 3,501 reminder / recall
- 7% bounced back
- 1% opted out



# Invalid emails by Site and Message Type



# Invalid emails by Site and Cycle



# Conclusions

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- Practice-based email vaccine notifications are feasible
- Vendor email systems can successfully be used in conjunction with a statewide IIS
- Undeliverable messages may vary substantially across practices

# Implications

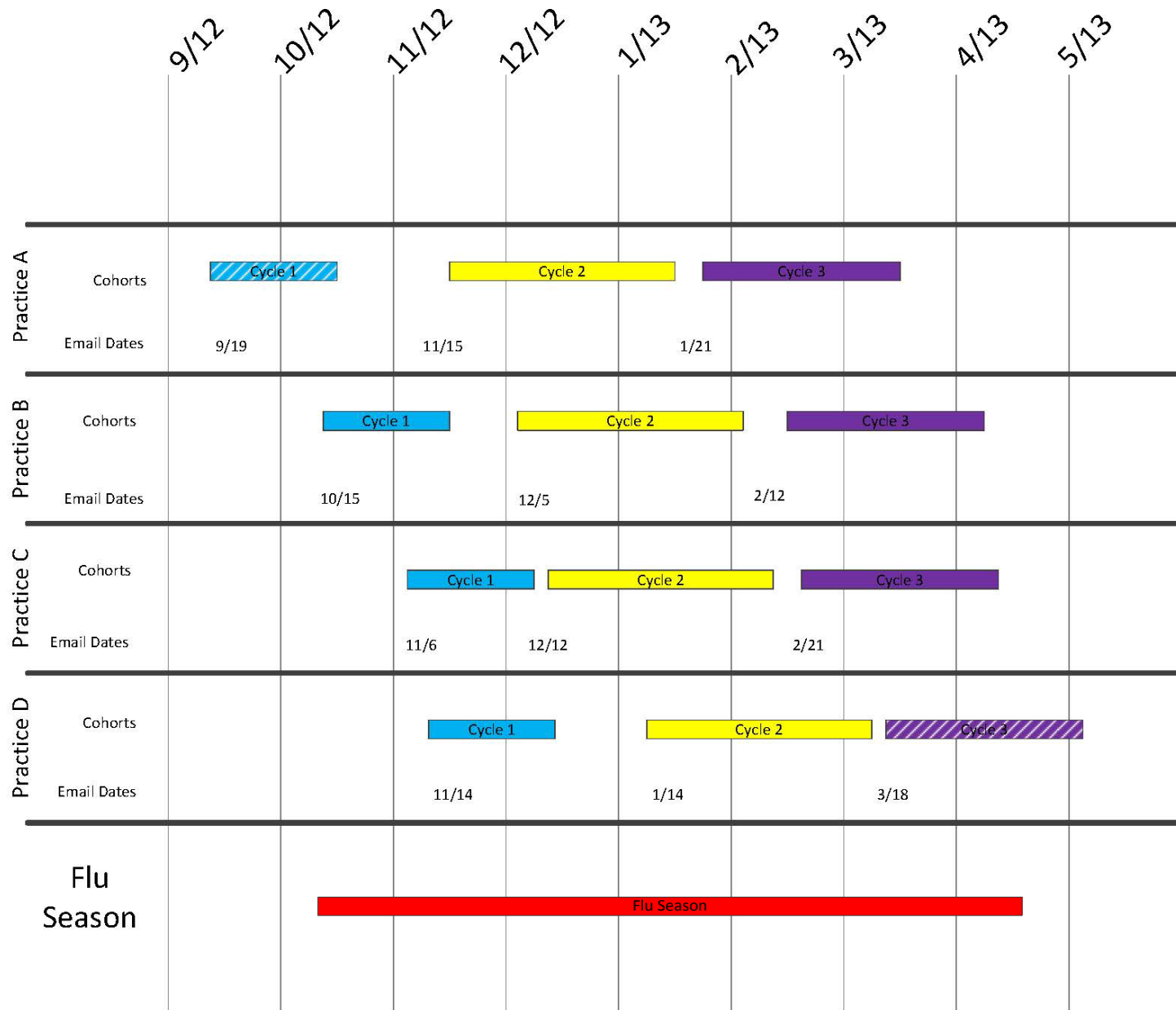
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- Potential benefit from tracking email contact information, regardless of reminder / recall capabilities of an IIS
- Need for improved business practices for collection and maintenance of emails
- IIS email addresses could potentially be populated through EHR/IIS interoperability enhancements

# Next Steps

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- Year 2 emailing cycles:
  - September 2013 – August, 2014
  - expanded email groups
- Evaluate vaccination outcomes:
  - notification vs. no notification



 Flu shot not included

# Collaborators

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- University of Michigan:
  - Bailey Waterman
  - Mamie Braun
- University of Colorado:
  - Amanda Dempsey
  - Julie Maertens
- Centers for Disease Control and Prevention

Kevin Dombkowski, DrPH, MS

Research Associate Professor

University of Michigan, Division of General Pediatrics

Child Health Evaluation and Research (CHEAR) Unit

[www.chear.org](http://www.chear.org)

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