Quality, Cost and Value of Public Health
Wednesday, February 4, 2015  12:00-1:00pm ET

Centralized Reminder/Recall to Increase Immunization Rates for Populations of Young Children: A Comparative Effectiveness Trial

Conference Phone: 877-394-0659
Conference Code: 775 483 8037#
Please remember to mute your phone and computer speakers during the presentation.
Agenda

Welcome: Rick Ingram, DrPH, National Coordinating Center

Presenter:
“Centralized Reminder/Recall to Increase Immunization Rates for Populations of Young Children: A Comparative Effectiveness Trial”
Allison Kempe, MD, MPH, Director, Children's Outcomes Research Program, Children’s Hospital Colorado, and U. of Colorado School of Medicine
Allison.Kempe@childrenscolorado.org

Commentary:
Rick Ingram, DrPH, MEd, Assistant Professor, University of Kentucky College of Public Health
Richard.Ingram@uky.edu
Lisa VanRaemdonck, MPH, MSW, Executive Director, Colorado Association of Local Public Health Officials
Lisa@calpho.org

Questions and Discussion
Future Webinar Announcements
Presenter

Allison Kempe, MD, MPH

Allison.Kempe@childrenscolorado.org

Professor of Pediatrics, University of Colorado
School of Medicine & Colorado School of Public
Health

Director, Children's Outcomes Research Program,
Children’s Hospital Colorado (COR)

Co-Director, Colorado Health Outcomes Program
(COHO)

Director, AHRQ-funded Center for Research in
Implementation Science and Prevention (CRISP)
Increasing Vaccination Among Young Children

Allison Kempe, MD, MPH
Director, Children’s Outcomes Research (COR) Program
Center for Research in Implementation Science and Prevention (CRISP)
## Immunizations
Second Only to Clean Water!

<table>
<thead>
<tr>
<th>Disease</th>
<th>Pre-Vaccine Era Estimated Annual Morbidity*</th>
<th>Most Recent Estimates† of U.S. Cases</th>
<th>Percent decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diphtheria</td>
<td>21,053</td>
<td>0†</td>
<td>100%</td>
</tr>
<tr>
<td>H. influenzae (invasive, &lt;5 years of age)</td>
<td>20,000</td>
<td>243†§</td>
<td>99%</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>117,333</td>
<td>11,049‡</td>
<td>91%</td>
</tr>
<tr>
<td>Hepatitis B (acute)</td>
<td>66,232</td>
<td>11,269‡</td>
<td>83%</td>
</tr>
<tr>
<td>Measles</td>
<td>530,217</td>
<td>61†</td>
<td>&gt;99%</td>
</tr>
<tr>
<td>Mumps</td>
<td>162,344</td>
<td>982†</td>
<td>99%</td>
</tr>
<tr>
<td>Pertussis</td>
<td>200,752</td>
<td>13,506†</td>
<td>93%</td>
</tr>
<tr>
<td>Pneumococcal disease (invasive, &lt;5 years of age)</td>
<td>16,069</td>
<td>4,167‡</td>
<td>74%</td>
</tr>
<tr>
<td>Polio (paralytic)</td>
<td>16,316</td>
<td>0†</td>
<td>100%</td>
</tr>
<tr>
<td>Rubella</td>
<td>47,745</td>
<td>4†</td>
<td>&gt;99%</td>
</tr>
<tr>
<td>Congenital Rubella Syndrome</td>
<td>152</td>
<td>1†</td>
<td>99%</td>
</tr>
<tr>
<td>Smallpox</td>
<td>29,005</td>
<td>0†</td>
<td>100%</td>
</tr>
<tr>
<td>Tetanus</td>
<td>580</td>
<td>14†</td>
<td>98%</td>
</tr>
<tr>
<td>Varicella</td>
<td>4,085,120</td>
<td>449,363‡</td>
<td>89%</td>
</tr>
</tbody>
</table>

* CDC. JAMA, November 14, 2007; 298(18):2155–63
† CDC. MMWR, January 8, 2010; 58(51,52):1458–68
‡ 2008 estimates, *S. pneumoniae* estimates from Active Bacterial Core Surveillance
§ 25 type b and 218 unknown
Immunizations
Second Only to Clean Water!

Reported Cases of Vaccines Preventable Diseases,
United States, 1950-2010
Routinely recommended vaccines: ≥4 doses of DTaP/DT/DTP, ≥3 doses of poliovirus vaccine, ≥1 doses of measles-containing vaccine, full series of Hib (3 or 4), ≥3 doses of HepB, ≥1 dose of varicella vaccine, ≥4 doses of PCV

So How Are We Doing?

Healthy People 2020 Goal 80%

2011 National rates* for 19-35 month olds

68.50%

*Routinely recommended vaccines: ≥4 doses of DTaP/DT/DTP, ≥3 doses of poliovirus vaccine, ≥1 doses of measles-containing vaccine, full series of Hib (3 or 4), ≥3 doses of HepB, ≥1 dose of varicella vaccine, ≥4 doses of PCV
What’s the Problem?!

Barriers to optimal immunization delivery

– Financial
– Access to care issues
– Lack of awareness
– Infrastructure and regulatory issues
– Complexity and expansion of vaccination schedule
  • # of vaccines more than doubled in past 25 years
  • By 18 months of age U.S. children recommended to receive vaccines against 14 different diseases, requiring up to 26 different vaccine doses

– Vaccine hesitancy
  • Misinformation
  • Safety concerns
Population-based vs Practice-based Reminder/Recall: a Pragmatic Comparative Effectiveness Trial

Allison Kempe, MD, MPH
Background

- Reminder/recall (R/R): postcards, letters or telephone calls to inform patients they are due or overdue for immunizations

- The Task Force on Community Preventive Services recommends R/R as one of the most evidence-based method of increasing Izs

- R/R can be automated using Immunization Information System (IIS)
Background

- R/R conducted in practice settings shown effective in increasing rates but only 16% of physicians nationally are conducting

- Population-based R/R if conducted centrally by public health departments could offer advantages:
  - Reducing burden of conducting R/R by practices
  - Reaching children without usual source of primary care
Objectives

To compare the *effectiveness* and *cost-effectiveness* of conducting R/R using two methodologies:

1. *Population-based R/R*: conducted centrally by the State Health Department using the Colorado Immunization Information System (CIIS)

2. *Practice-based R/R*: conducted at the level of the primary care practice using CIIS
Methods: Randomization of Counties

14 Colorado Counties

6 Urban counties with similar income, race-ethnicity, population & CIIS saturation

3 counties \textit{practice-based} R/R
3 counties \textit{population-based} R/R

8 Rural counties with similar income, race-ethnicity, population & CIIS saturation

4 counties \textit{practice-based} R/R
4 counties \textit{population-based} R/R
Covariate Constrained Randomization

- Baseline data on relevant contextual variables used to generate all possible randomizations of units into study groups
- A balance criterion (B), defined as the sum of squared differences between study groups on relevant standardized variables, is calculated for each randomization
- Criterion for maximum allowable difference between study groups established and set of “acceptable randomizations” in which the differences between treatment groups on covariates are minimized defined
- A single randomization is then chosen from the set of “acceptable randomizations”
Study Populations for Both Intervention Arms

Patient names, addresses and immunization data automatically uploaded from Birth Vital Statistics to Colorado Immunization Information System (CIIS)

Downloaded names and addresses of children 19-35 months old needing ≥1 immunization within all 14 counties
Methods: Intervention Strategies

- Population-based recall counties:
  - Centralized R/R conducted by the State Public Health Department June – September 2010
  - Up to 3 mailings to children 19-35 months needing immunizations
  - R/R notices suggested patients go to primary care provider for immunization or, if they did not have one, to public health immunization site
Practice-based recall counties:
- All practices invited to attend web-based R/R training in May/June 2010
- R/R methodology suggested
  - 3 mailings to children 19-35 months needing immunizations
  - June – September 2010
- Financial support for mailings offered to practices who did R/R in this timeframe
Methods: Statistical Analysis

- To account for clustered nature of the data, mixed effects models were used.
  - Two models were conducted to assess the association between the intervention group and whether or not:
    1) the child became UTD or
    2) received any shot during the study period.
  - Fixed effects for both models included county baseline UTD rate, rural/urban status of county, and whether or not the site of last service did R/R.
  - The random effect in both models was the site of last service.
Methods: Cost Assessment

- Population-based R/R (performed centrally)
  - Staff time for training and implementation
  - Staff time for updating bad mailing addresses
  - Mailing and printing costs for up to 3 mailings

- Practice-based R/R (performed differently at each practice)
  - Average staff time among practices conducting R/R
  - Average mailing costs or costs of phone calls
Comparison of “Reach” of Intervention

**Practice-based R/R Reach**
195 practice sites; 10 conducted recall

- Received >=1 Reminder (assuming 100% received R/R)
- Did not receive R/R notice

- n=17,848 eligible children
- 95%
- 5%

**Population-based R/R Reach**
188 practice sites

- Received >=1 Reminder Notice (assuming 85% received R/R)
- Did not receive a R/R notice

- n=10,907 eligible children
- 85%
- 15%
- n=1,925 eligible children
Percent Receiving Any Vaccine within 6 months
(of those needing vaccines at baseline)

- **Pop-R/R counties**: 32%, n=12,832
  - Absolute Effect Difference: 9%, p<.0001
- **Practice-based R/R**: 23%, n=18,735
Percent Brought Up-to-Date within 6 months
(of those needing vaccines at baseline)

19% for Pop-R/R counties
13% for Practice-based R/R

Absolute Effect Difference: 6%
p<.0001
Subgroup Analysis within Practice-based Counties

Percent Brought Up-to-Date

R/R vs no R/R

Practice-based Recall (n=10 practices):
- 24%
  - n = 887

No Practice-based R/R (n=185 practices):
- 12%
  - n = 17848
Subgroup Analysis within Practice-based Counties

Percent Brought Up-to-Date

R/R vs no R/R

24% vs 19%

p = .0001

Practice-based Recall (n=10 practices)

- Practice-based Recall: n = 887
- Population Based: n = 12832

No Practice-based R/R (n=185 practices)

- Population Based: n = 17848
- No Practice-based R/R: 12%
### Results: Multivariable Models

#### Association of Intervention Group with Two Outcomes

<table>
<thead>
<tr>
<th>Outcomes Modeled</th>
<th>Adjusted OR (95% CI)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Becoming up-to-date in population-based versus practice-based county</td>
<td>1.24 (1.11-1.38)</td>
<td>.0002</td>
</tr>
<tr>
<td>Receiving any vaccine in population-based versus practice-based county</td>
<td>1.27 (1.15-1.39)</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

Other variables included in the model were baseline county UTD rate, rural/urban status of county, site of last service and whether or not site of last service did R/R, all of which were not statistically significant.
Cost of Conducting R/R per Practice

- Population-based R/R (n=188 practices $40,367): $215
- Practice-based R/R (n=10 practices $13,153): $1,315
Cost of R/R Per Child who Received ≥1 Vaccine

- Population-based R/R: $10, n = 4,083
- Practice-based R/R: $38, n = 348
Cost of R/R Per Child Brought Up-to-Date

- Population-based R/R: $17, n = 2,394
- Practice-based R/R: $62, n = 212
Limitations

- Population impossible to accurately denominate in all counties—but same method of approximation used in both intervention arms
- Population-based R/R hampered by many inaccurate addresses from vital statistics
- Practices may have conducted R/R after the 6 month period of F/U despite incentives
- Costs were based on personnel report, rather than direct observation
Conclusions

- Both practice-based and population-based R/R effective—practice-based slightly more effective when practices participated

- Overall, at a county level population-based R/R was more effective than practice-based R/R because of lack of participation of practices even when incentives provided

- Costs per practice or per child vaccinated were much lower for population-based R/R
Implications

- Centralized population-based R/R conducted by Public Health Departments more effective and less costly alternative to practice-based R/R

- Optimal approach might involve collaboration between practices and public health
  - R/R notices could appear to come from practice and public health department
  - Could be less costly if practices helped in updating of addresses

- More information needed regarding acceptability from practices’ and patients’ perspectives
Study Team

University of Colorado Denver
Principal Investigator – Allison Kempe, MD, MPH

- Alison Saville, MSPH, MSW
- L. Miriam Dickinson, PhD
- Brenda Beaty, MSPH
- Sheri Eisert, PhD

CDPHE & CIIS Collaborators

- Karen Albright, PhD
- Eva Dibert, MHA
- Vicky Koehler, MPH

- Ned Calonge, MD
- Joni Reynolds, RN, MSN
- Diana Herrero, MS
Funding

Study supported by a Challenge Grant from the National Institutes of Health (Award Number RC1LM01513 from the National Library of Medicine)

The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Library of Medicine or the National Institutes of Health.
DOES PRACTICE “ENDORSEMENT” OF POPULATION-BASED R/R INCREASE EFFECTIVENESS?
Methods: Intervention Strategies

- Population-based recall counties:
  - Centralized recall effort conducted by State/County Public Health Departments September-November, 2012
  - R/R notices printed with county health department logos and private physician information if practice opts-in
  - R/R methodology same as recommended in practice-based counties
Percent Receiving Any Vaccine

Practice name not included on R/R
N=6,368

Practice name included on R/R
N=3,306

24%

31%

Absolute Effect Difference
7%
P < .0001
Percent Brought UTD

Practice name not included on R/R
N=6,368
15%

Practice name included on R/R
N=3,306
25%

Absolute Effect Difference
10%
P < .0001
Let’s talk amongst ourselves....

Discuss.....
Commentary

Research:
Richard Ingram, DrPH, MEd
Assistant Professor, Dep’t of Health Management and Policy
University of Kentucky College of Public Health
Richard.Ingram@uky.edu

Public Health Practice:
Lisa VanRaemdonck, MPH, MSW
Executive Director, Colorado Assn. of Local Public Health Officials & Public Health Alliance of Colorado
Co-director, Colorado Public Health PBRN
Lisa@calpho.org

Questions and Discussion
Upcoming PHSSR Research in Progress Webinars
February 2015

Wednesday, February 11 (12-1pm ET)
*Cross-Jurisdictional Shared Service Arrangements in Local Public Health: Research in Progress*
Susan Zahner, MPH, DrPH, University of Wisconsin-Madison
Kusuma Madamala, PhD, MPH, Public Health Systems Consultant and Faculty Associate

Thursday, February 19 (1-2pm ET)
*Identifying & Learning from Positive Deviant Local Public Health Departments in Maternal and Child Health*
Tamar A. Klaiman, PhD, MPH, University of the Sciences, Philadelphia

Archives of all Webinars available at:
[http://www.publichealthsystems.org/phssr-research-progress-webinars](http://www.publichealthsystems.org/phssr-research-progress-webinars)
<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Topic</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wednesday, March 4</td>
<td>12-1pm ET</td>
<td>Leveraging Electronic Health Records for Public Health:</td>
<td>Brian Dixon, PhD, Indiana University</td>
</tr>
<tr>
<td></td>
<td></td>
<td>From Automated Disease Reporting to Developing Population Health Indicators</td>
<td></td>
</tr>
<tr>
<td>Wednesday, March 11</td>
<td>12-1pm ET</td>
<td>Evaluating the Quality, Usability, and Fitness of Open Data for Public Health Research</td>
<td>Erika G. Martin, PhD, MPH, State University of New York- Albany</td>
</tr>
<tr>
<td>Thursday, March 19</td>
<td>1-2pm ET</td>
<td>Cross-sector Collaboration Between Local Public Health and Health Care for Obesity Prevention</td>
<td>Eduardo J. Simoes, MD, University of Missouri and Katherine A. Stamatakis, PhD, MPH, Washington University in St. Louis</td>
</tr>
</tbody>
</table>
### Upcoming PHSSR Research in Progress Webinars
**April 2015**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Topic</th>
<th>Presenters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wednesday, April 1</td>
<td>12-1pm ET</td>
<td><strong>Restructuring a State Nutrition Education and Obesity Prevention Program: Implications of a Local Health Department Model</strong></td>
<td>Helen W. Wu, PhD, U. California Davis</td>
</tr>
<tr>
<td>Wednesday, April 8</td>
<td>12-1pm ET</td>
<td><strong>Public Health Services Cost Studies: Tobacco Prevention, Mandated Public Health Services</strong></td>
<td>Pauline Thomas, MD, New Jersey Medical School and Nancy Winterbauer, PhD, East Carolina University</td>
</tr>
</tbody>
</table>

**Tuesday and Wednesday, April 21-22**

**2015 PHSSR KEENELAND CONFERENCE, Lexington, KY**
For more information contact:
Ann V. Kelly, Project Manager
Ann.Kelly@uky.edu

111 Washington Avenue #212
Lexington, KY 40536
859.218.2317

www.publichealthsystems.org