WELCOME TO THE CRISP SEMINAR SERIES

ALLISON KEMPE, MD, MPH
## 2014 Upcoming Events

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sept 15 &amp; 16</td>
<td>CRISP Pragmatic Trials Workshop</td>
<td>Pre-registration closed, wait list available</td>
</tr>
<tr>
<td>Oct/Nov</td>
<td>mHealth Tools and Strategies Workshop</td>
<td>Tentative dates 10/20-10/21 – Pre-registration still open</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="https://www.surveymonkey.com/s/UCDImplementationmHealth">https://www.surveymonkey.com/s/UCDImplementationmHealth</a></td>
</tr>
<tr>
<td></td>
<td>New CRISP D&amp;I Seminar Series</td>
<td>To be announced in Fall</td>
</tr>
</tbody>
</table>

For more information see our website: [www.ucdenver.edu/implementation](http://www.ucdenver.edu/implementation)
How Do We Increase Immunization Rates for Populations of Children?

Novel Approaches

Allison Kempe, MD MPH
Director, CRISP
Population-Based Prevention: Principles Underlying Approach

- Focuses on entire populations, rather than exclusively focusing on practice-based interventions

- Collaboration between primary care and public health is a central component (Institute of Medicine “Primary Care and Public Health: Exploring Integration to Improve Population Health”)

- Emphasizes feasibility, efficiency and cost-effectiveness to promote sustainability
Themes to listen for….

- The importance of input from relevant COMMUNITIES
- The importance of PUBLIC-PRIVATE collaborations in delivering preventive care
- The concepts of EFFICACY vs. EFFECTIVENESS
- The importance of REACH in measuring implementation effectiveness
- Considerations of COST for sustainability
- How lessons learned with young children might be applied to prevention in other populations (e.g., adolescents, adults)
## 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

- Diphtheria
- Tetanus
- Pertussis
- Polio
- Measles
- Mumps
- Rubella

Graph shows a significant decrease in reported cases of these diseases over time.
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
Community Preventive Services Task Force recommends the use of reminder/recall (R/R).

- R/R is the use of mail, phone, e-mail or texts to remind patients of need for upcoming immunizations or recall them for overdue immunizations.

- R/R conducted by practices for childhood immunizations has been shown to be effective at increasing immunization rates (generally 5-20%).

- R/R difficult to implement even within highly motivated practices using an Immunization Information System (IIS).
Reminder/Recall Implementation

- Estimated that 16% of physicians nationally are conducting practice-based R/R.

- Data from our group and others have demonstrated multiple barriers to practice-based R/R, especially:
  - Competing demands and lack of personnel
  - Lack of expertise with IIS and IT systems
  - Cost

- R/R conducted centrally by public health departments, may:
  - Reduce burden of conducting R/R by practices
  - Reach children without a usual source of primary care
  - Maintain central role of primary care home
Overall Aim of Projects

- To increase immunization rates in populations of children before they enter Kindergarten
- To answer research questions important locally and nationally
  - Is IIS (immunization information system)-based recall more effective and cost-effective if conducted by practices or centrally by state health departments?
  - Is centralized IIS-based recall more effective if done in collaboration with practices?
  - Is centralized IIS-based recall acceptable to providers and families?
COLLABORATIVE CENTRALIZED VS. PRACTICE-BASED REMINDER/RECALL:

A PRAGMATIC COMPARATIVE EFFECTIVENESS TRIAL
Primary Objective

To compare the *effectiveness* and *cost effectiveness* of R/R in increasing immunization rates in 19-35 month old children at the population level using two methodologies:

1. **Centralized Collaborative R/R:** conducted by the state health department using the Colorado Immunization Information System (CIIS) in collaboration with practices

2. **Practice-based R/R:** R/R conducted at the level of the primary care practice using CIIS
Secondary Objective

Within the Centralized R/R counties:

To compare effectiveness of R/R within practices that chose to include their name on mailed R/R or in auto-dialer message ("practice endorsement") vs. those that did not endorse R/R
Methods: Populations and Setting

- All children 19-35 months who were not UTD for immunizations according to CIIS in 15 Colorado counties

- 15/64 counties selected based on inclusion criteria:
  - No on-going existing county-wide R/R
  - Not “Frontier” (less than 6 people per sq mi)
  - ≥75% CIIS saturation (19-35 mo with ≥2 immunizations)
  - Not county with <10,000 people classified as urban
Randomization Procedures

- Counties first stratified into Urban or Rural based on Colorado Rural Health Center Designation
- Within these strata, covariate constrained randomization used to optimize balance between study arms with respect to baseline variables of counties including:
  - % 19-35 month olds UTD at baseline
  - % Minority race and ethnicity
  - Median income
  - % 19-35 month olds with ≥2 Iz in IIS
  - # Children 19-35 months
  - # Pediatricians, # FM, Pediatric/FM ratio
  - # Community Health Centers
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”
15 Colorado Counties

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

- 4 counties Practice-based R/R
- 3 counties Centralized R/R

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

- 4 counties Practice-based R/R
- 4 counties Centralized R/R

Rural and urban determined by Colorado Rural Health Center
http://www.coruralhealth.org/resources/library.htm
Randomized Counties for the 2012-2014 Trial

KEY: **GREEN** = Population-based Counties; **PURPLE** = Practice-based Counties

* Indicate population-based counties in previous trial.
Study Populations for Both Study Arms

- Patient names, addresses and immunization data automatically uploaded from Birth Vital Statistics to
- Colorado Immunization Information System (CIIS)
- Download names and addresses of children 19-35 months old needing $\geq 1$ immunization within all 15 counties
Community Engagement

- Structured interviews with providers, parents and public health officials to inform collaborative aspect of intervention in the intervention counties
- Collaborative Intervention Advisory Committee composed of subset of interviewees to design intervention
- Community Advisory Committee to review outcomes and aid in dissemination
Methods: Development of Collaborative Approach

- Perform key informant interviews with:
  - 12 providers (randomly selected within 3 strata—FM urban, FM rural and Peds from the 16 counties)
  - 12 parents (one from each practice of physicians selected) and 6 local public health department officials

- Consensus development by Collaborative Intervention Advisory Committee to discuss discrepancies and finalize collaboration plan.
  - 3 providers in leadership roles, 3 PH officials, 3 parents and investigator team
Collaborative Interventions

- Private physicians who participate in CIIS can choose to “endorse” the R/R by having their name included on the collaborative recall notifications.

- For practices that can upload to CIIS, update addresses and telephone numbers electronically in CIIS prior to any R/R’s.

- Update addresses and telephone numbers manually after recall begins for any bad contacts with last service provider in CIIS.
Methods: Intervention Strategies

- Centralized Collaborative recall counties:
  - Centralized recall effort conducted by State Public Health Department September 2012 - January 2013
  - R/R notices included county health department logo
  - Practice’s name included if practice chose to endorse
  - Up to 4 contact attempts made
    - 50% assigned to protocol involving auto-dialer + mail
    - 50% assigned to protocol involving mail only
Sample Postcard

Reminder

Based on state immunization records in the Colorado Immunization Information System (CIIS) we show that your child may be due for one or more of the following immunizations:

- Hepatitis B
- Polio (IPV)
- Varicella (chicken pox) (Varicela)
- Hib (influenza type B) (influenza tipo B)
- Prevnar (pneumonia) (neumonia)
- MMR (measles/mumps/rubella) (sarampión/paparás/rubéola)
- Dtap (diphtheria/tetanus/pertussis) (difteria/tétano/tosferina)

Basado en los registros de inmunización del estado en el Sistema de Información de Inmunización de Colorado muestra que su niño/a debe de recibir uno o más de estas vacunas.

Please call your doctor or Alamosa County Public Health Department to find out what your child may need. Alamosa County Public Health Department has walk-in clinics on Tuesday’s from 1 – 5 p.m. Call 719-589-6639 for more information.

If you believe that your child has already received all required immunizations, please return a copy of the certificate of immunization record or call your doctor or the Alamosa County Public Health Department at 719-589-6639 so we may update our records.

Por favor llame a su doctor o contacte al Departamento de Salud Pública del condado de Alamosa para averiguar que vacunas necesita su niño/a. El Departamento de Salud Pública del condado de Alamosa atiende sin necesidad de citas los días martes de 1:00 a 5:00 PM. Si necesita más información, por favor llame al 719-589-6639.

Si usted piensa que su niño/a ya ha recibido todas las vacunas necesarias, por favor mande una copia del registro de inmunización o llame a su doctor o al Departamento de Salud Pública del condado de Alamosa al 719-589-6639 para poder actualizar nuestros registros.
Methods: Intervention Strategies

- Practice-based recall counties:
  - All practices participating in CIIS invited to attend web-based CIIS R/R trainings
  - R/R methodology suggested same as for Population-based approach
  - **Financial support for mailings offered to practices**
Methods: Statistical Analysis

➢ To account for clustered nature of the data, used generalized linear mixed models
  ➢ Two models conducted to assess association between intervention group and whether or not 1) 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, and study arm
  ➢ Random effect in both models was type of site of care
Methods: Cost Assessment

- Centralized Collaborative R/R
  - Staff time for training and implementation
  - Mailing and printing costs for up to 4 mailings
  - Updating bad mailing addresses

- Practice-based R/R (method determined by practice)
  - Average staff time among practices conducting R/R
  - Average mailing costs or phone calls
RESULTS!
**Comparison of Reach of Intervention**

**Centralized R/R Reach**
- 268 practice sites; n=9,049 eligible children
- 7,873 children received ≥1 R/R Notice

**Practice-based R/R Reach**
- 308 practice sites; n=9,186 eligible children
- 77 children received ≥1 R/R Notice

Reach assumes at least one contact, phone or mail over a 6 month time period.
Percent Receiving Any Vaccine of those not UTD (within 6 months)

- Centralized R/R
  - N=9,049
  - 27%

- Practice-Based R/R
  - N=9,186
  - 22%

Absolute Effect Difference
5%
P < .0001
Percent Brought UTD (within 6 months)

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Absolute Effect Difference</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centralized R/R N=9,049</td>
<td>13%</td>
<td>4%</td>
</tr>
<tr>
<td>Practice-Based R/R N=9,186</td>
<td>9%</td>
<td></td>
</tr>
</tbody>
</table>

- Centralized R/R N=9,049
- Practice-Based R/R N=9,186

- P <.0001
Within Practice-Based R/R Counties: Percentage Becoming UTD
R/R vs. no R/R

Practice-based Recall
N=2 Practices

- 29% (n = 77)

No Practice-based Recall
N=255 Practices

- 9% (n = 9,109)

Absolute Effect Difference: 20%
Within Practice-Based R/R Counties: Percentage Becoming UTD
R/R vs. no R/R

- Practice-based Recall N=2 Practices
  - 29% (n = 77)
  - Pop-based n = 9,049
- No Practice-based Recall N=255 Practices
  - 13% (n = 9,109)

Absolute Effect Difference: 20%
Cost of R/R Per Child Receiving Any Vaccine

<table>
<thead>
<tr>
<th>Cost of R/R Per Child Receiving Any Vaccine</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0</td>
</tr>
<tr>
<td>$10</td>
</tr>
<tr>
<td>$20</td>
</tr>
<tr>
<td>$30</td>
</tr>
<tr>
<td>$40</td>
</tr>
<tr>
<td>$50</td>
</tr>
<tr>
<td>$60</td>
</tr>
<tr>
<td>$70</td>
</tr>
</tbody>
</table>

Centralized R/R: $13
Practice-Based R/R: $62

Difference: $49
Cost of R/R Per Child Brought UTD

<table>
<thead>
<tr>
<th>Cost of R/R Per Child Brought UTD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centralized R/R</td>
</tr>
<tr>
<td>Practice-Based R/R</td>
</tr>
</tbody>
</table>

- Centralized R/R: $27
- Practice-Based R/R: $104

Difference: $77
### Association of Intervention Group with Two Outcomes

<table>
<thead>
<tr>
<th>Outcomes Modeled</th>
<th>Estimate</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receiving any vaccine in population-based versus practice-based county</td>
<td>1.31 (1.22-1.41)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Becoming up-to-date in population-based versus practice-based county</td>
<td>1.36 (1.23-1.50)</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

Other variables included in the model were baseline county UTD rate and rural/urban status of county.

Rural/Urban status was not statistically different for becoming UTD; baseline UTD rate was statistically significant for becoming UTD. Both variables were statistically different for receiving any new shot.
EFFECT OF PRACTICE
ENDORSEMENT OF R/R
Subanalysis of Population-based R/R: Percentage Receiving any Vaccine

Practice name not included on R/R
N=5,982
24%

Practice name included on R/R
N=3,067
32%

Absolute Effect Difference
8%
P = 0.02
Subanalysis of Population-based R/R: Percentage Brought UTD

Practice name not included on R/R
N=5,982

Practice name included on R/R
N=3,067

Absolute Effect Difference
9%
P < .0001
Limitations

- Population impossible to accurately denominate in all counties—but same method of approximation used in both intervention arms.

- Centralized R/R hampered by many inaccurate addresses from vital statistics.

- If time-frame had been longer, more practices may have conducted R/R.

- Costs were based on personnel report, rather than direct observation.
Conclusions

- Overall, although both methods increased immunization rates, county level centralized R/R was more effective than practice-based R/R primarily due to unwillingness of practices to perform R/R, even when incentivized (low “Reach”)
- Costs per practice or per child vaccinated were much lower for collaborative centralized R/R
- Endorsement by practice may increase effectiveness, but some selection bias possible
Effectiveness and Cost of Mail versus Auto-Dialer/Mail Methods for Conducting Centralized Reminder/Recall for Immunizations
Objectives

Current study is RCT embedded within the larger trial that compared two R/R protocols

Within 7 counties in which centralized and IIS-based R/R was conducted by the Health Department to compare:

1) Cost per contact and marginal cost for auto-dialer and mail contact types

2) Effectiveness and cost/effectiveness of two protocols for R/R:
   - Auto-dialer/mail (2 auto-dialer calls and 2 postcards)
   - Mail only (1 letter and 3 postcards)
Methods: Population and Setting

- Children 19-35 months not UTD for immunizations in 7 CO counties (4 rural, 3 urban) randomized to centralized R/R as part of pragmatic trial involving 15 counties

- Inclusion criteria for CO counties (15/64)
  - No on-going existing county-wide R/R
  - Not classified as “Frontier” (<6 people per sq mi)
  - ≥75% CIIS saturation (19-35 mo with ≥2 immunizations)
  - Not urban counties with <10,000 people
Methods: R/R Intervention

- Centralized R/R by State Public Health Department September 2012 - January 2013
- All 19-35 month olds needing immunizations according to IIS randomized at the patient level to receive mail-only or auto-dialer/mail protocol
- R/R notices included county health department logos and private physician information if practice chose to endorse
- Up to 4 contact attempts in each group
Randomization Scheme

All eligible children in 7 Counties

Auto-dialer/Mail Group
- Phone calls x 2
- Postcards x 2

Mail-only Group
- Letter x 1
- Postcards x 3

Without a Phone Number
- Letter x 1
- Postcards x 3

With a Phone Number
- Phone calls x 2
- Postcards x 2

Note: Groups were randomized at the patient level regardless of if patient had telephone number in CIIS
Methods: Statistical Analysis

- To account for clustered nature of the data, used generalized linear mixed models
  - Two models conducted to assess association between protocol arm and whether or not 1) child received any shot during the study period or 2) became UTD
  - Fixed effects for both models included county baseline UTD rate and rural/urban status
  - Random effect in both models was type of site of care
- Primary analysis was intention to treat
Methods: Cost Assessment

- State Public Health Department perspective
- Costs directly related to implementation (not start-up) of mail or auto-dialer/mail protocols

Costs included:
- Staff time related to identifying patients to contact and creating the messages (phone, letter and postcard)
- Supplies such as printing and postage
- Pro-rated cost for auto-dialer software
- Staff time related to updating bad patient contact information (phone and mailing address)
Cost per Contact by Contact Type

- Cost per contact calculated for auto-dialer and mail contact type

- Marginal costs = additional variable costs associated with one more contact estimated by contact type
Cost and Cost-effectiveness by Protocol

- Total cost per protocol
  - # Contacts in each arm x relevant cost per contact type
  - Intent to treat analysis within each protocol

- Cost effectiveness per protocol: Total cost for each protocol divided by outcomes in each arm
  - Cost per Child
  - Cost Per Any Immunization Received
  - Cost Per Child Brought Up-to-Date
RESULTS: COST AND MARGINAL COST PER CONTACT TYPE
## Costs per Contact Type
*(irrespective of protocol arm)*

<table>
<thead>
<tr>
<th>Function</th>
<th>Auto-dialer Cost Only</th>
<th>Mail Cost Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Number of Contacts</td>
<td>4,703</td>
<td>24,342</td>
</tr>
<tr>
<td>Mail Merge/Inclusion of Practice Name</td>
<td>$496</td>
<td>$1,000</td>
</tr>
<tr>
<td>R/R Management</td>
<td>$300</td>
<td>$300</td>
</tr>
<tr>
<td>Printing/Postage (Mail) and Auto-dialer Contract (Auto-dialer)</td>
<td>$1,203</td>
<td>$14,057</td>
</tr>
<tr>
<td>Updating Bad Mail/Phone Contacts</td>
<td>$771</td>
<td>$3,084</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td><strong>$2,769</strong></td>
<td><strong>$18,441</strong></td>
</tr>
</tbody>
</table>
Auto-dialer vs. Mail Contact Type

Cost Per Contact

Difference: $0.20

$0.53 (Auto-dialer Contact) vs. $0.73 (Mail Contact)
Auto-dialer vs. Mail Contact Type: Marginal Cost (Per Additional Contact)

- **Auto-dialer Contact**: $0.15
- **Mail Contact**: $0.68

Difference: $0.54
RESULTS: EFFECTIVENESS
All eligible children in Centralized R/R Counties (n=9,049)

Auto-dialer/Mail Group
50% (n=4,517)
Phone calls x 2
Postcards x 2

Without a Phone Number
42% (n=1,910)
Letter x 1
Postcards x 3

With a Phone Number
58% (n=2,607)
Phone calls x 2
Postcards x 2

Mail-only Group
50% (n=4,589)
Letter x 1
Postcards x 3

Note: Groups were randomized at the patient level regardless of if patient had telephone number in CIIS
Auto-dialer/Mail vs. Mail: Percentage Receiving any Vaccine

- Auto-dialer/Mail: 26.93% (N=4,517)
- Mail Only: 26.89% (N=4,589)
Auto-dialer/Mail vs. Mail: Percentage Becoming UTD

- Auto-dialer/Mail: 12.88% (N=4,517)
- Mail Only: 12.72% (N=4,589)
RESULTS: COST EFFECTIVENESS
### Average Number of Contacts by Arm

<table>
<thead>
<tr>
<th>Contact Type</th>
<th>Auto-dialer-Mail Arm</th>
<th>Mail Only Arm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any Contact</td>
<td>3.4</td>
<td>3.2</td>
</tr>
<tr>
<td>Auto-dialer Contact</td>
<td>1.1</td>
<td>0</td>
</tr>
<tr>
<td>Mail Contact</td>
<td>2.3</td>
<td>3.2</td>
</tr>
</tbody>
</table>
## Cost Effectiveness per Protocol Arm

<table>
<thead>
<tr>
<th>Costs</th>
<th>Auto-dialer/Mail Arm N=4,517</th>
<th>Mail-Only Arm N=4,589</th>
</tr>
</thead>
<tbody>
<tr>
<td>N Cost</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Cost per child</td>
<td>4,517</td>
<td>4,589</td>
</tr>
<tr>
<td>$2.24</td>
<td>$2.31</td>
<td></td>
</tr>
<tr>
<td>Cost per child receiving any vaccine</td>
<td>1,217</td>
<td>1,218</td>
</tr>
<tr>
<td>$8.31</td>
<td>$8.71</td>
<td></td>
</tr>
<tr>
<td>Cost per child brought UTD</td>
<td>582</td>
<td>576</td>
</tr>
<tr>
<td>$17.38</td>
<td>$18.43</td>
<td></td>
</tr>
</tbody>
</table>
Strengths and Limitations

- Lots of statistical power due to inclusion of entire populations w/in 7 counties
- Randomization at the patient level decreases potential bias related to clustering within practices or geographic areas
- Costs were based on personnel report, rather than direct observation
- Mixed protocols to maximize effectiveness made it difficult to directly compare auto-dialer vs mail costs
Conclusions

- Auto-dialer/Mail and Mail protocols were equally effective at increasing immunization rates
- Auto-dialer/Mail protocol slightly less expensive
- Auto-dialer alone would be much less expensive, but likely less effective (42% w/o phones)
- If accuracy and completeness of phone information in the IIS could be increased, costs would be markedly reduced
ACCEPTABILITY OF CENTRALIZED REMINDER/RECALL FOR IMMUNIZATIONS FOR PROVIDERS AND FAMILIES
What do Providers Think?

- Survey of all primary care providers from the 14 counties (7 population-based, 7 practice-based)
- Survey Response Rate: 74% (282/383)
- 56% of providers in population-based counties were aware of R/R
- Respondent Specialty
  - 24% Pediatrics
  - 74% Family Medicine
  - 2% Other
PARENT SURVEY
Methods: Study Population

- Within 4 rural and 3 urban Colorado counties in which centralized R/R was conducted, parents of children 19-35 month olds who needed ≥ 1 immunization six months prior to survey identified.

- A stratified random sample of 840 parents was identified with rural counties oversampled to achieve approximately equal numbers in rural (420) and urban (420) counties.
Survey Methods

- Conducted from January - May 2011
- Modified Dillman technique
  - Pre-letter sent out 4 weeks prior to the survey in order to update bad mail
  - Paper-based, self-administered survey sent 4 weeks later and a reminder postcard a few days after that
  - Up to 3 mailed survey reminders to non-responders for 8 more weeks
- $5 was included with 1st and 4th survey
Methods: Analysis

- Descriptive Statistics for combined counties
- Chi Square Tests and Mantel-Haenszel tests to determine preference and attitude differences between urban and rural counties
Results: Characteristics of Responders

- Response rate 55%
- 89% female
- Education:
  - ≤ HS 28%
  - Some College 28%
  - ≥ College Graduation 44%
- Child’s Insurance
  - Private 54%
  - Public 41%
  - None 5%
Attitudes About Sources of R/R Notices

- I support the HD sending reminders for children who need shots: Agree Strongly 58%, Agree Somewhat 31%, Disagree Strongly/Somewhat 11%
- I believe my child's doctor is responsible for making sure my child gets shots: Agree Strongly 89%, Agree Somewhat 50%, Disagree Strongly/Somewhat 11%
- It is not a good use of public money for the HD to send reminders to parents about their child's shots: Agree Strongly 31%, Agree Somewhat 59%, Disagree Strongly/Somewhat 11%
- I believe it is the HD's responsibility to make sure my child gets needed shots: Agree Strongly 61%, Agree Somewhat 29%, Disagree Strongly/Somewhat 10%
**Attitudes About Sources of R/R Notices**

- **Agree Strongly**
  - My child's doctor does a good job of reminding me when my child is in need of shots: 79%
  - I think it is okay for my doctor to share information with the HD about my child, as long as it is kept private and confidential: 70%
  - I don't think my doctor or the HD should remind me when my child needs a shot: 18%

- **Agree Somewhat**
  - My child's doctor does a good job of reminding me when my child is in need of shots: 51%
  - I think it is okay for my doctor to share information with the HD about my child, as long as it is kept private and confidential: 44%
  - I don't think my doctor or the HD should remind me when my child needs a shot: 11%

- **Disagree Strongly/Somewhat**
  - My child's doctor does a good job of reminding me when my child is in need of shots: 21%
  - I think it is okay for my doctor to share information with the HD about my child, as long as it is kept private and confidential: 30%
  - I don't think my doctor or the HD should remind me when my child needs a shot: 82%
Attitudes About Sources of R/R Notices (Rural and Urban differed)

- **I think reminders sent by the HD might help remind parents who do not have a doctor**
  - Agree Strongly: 68%
  - Agree Somewhat: 26%
  - Disagree Strongly/Somewhat: 5%

- **If I had a choice, I would prefer to get a reminder from my child's doctor than from the HD**
  - Agree Strongly: 95%
  - Agree Somewhat: 55%
  - Disagree Strongly/Somewhat: 20%
  - Rural > Urban

- **I would be more likely to get shots for my child if I was reminded by my child's doctor rather than the HD**
  - Agree Strongly: 80%
  - Agree Somewhat: 31%
  - Disagree Strongly/Somewhat: 46%
  - Urban > Rural
Overall, if your child needs a shot, who would you like to contact you?

- 40% Child's doctor
- 50% Either child’s doctor OR public health department
- 7% Parents should NOT be reminded about immunizations
- 4% Health Department
PROVIDER SURVEY
Survey Methods

- Surveys distributed to 383 practices within 14 study counties
- Followed the Dillman technique for mailed surveys: pre-letter, survey, postcard and up to 2 surveys to non-respondents
- $10 cash incentive enclosed in the survey
Survey Methods

- 74% response rate n=282
- Among respondents 253 (71%) provided immunizations to children under the age of 3 years old were retained
- Respondents were self-identified as the “person who makes policy decisions about immunization delivery at the practice”
Attitudes about Practice-based R/R

- **It costs too much money to conduct practice-based R/R**
  - Strongly Agree: 16%
  - Somewhat Agree: 43%
  - Somewhat/Strongly Disagree: 41%

- **I would prefer to conduct R/R for my patients**
  - Strongly Agree: 12%
  - Somewhat Agree: 31%
  - Somewhat/Strongly Disagree: 57%

- **It is not feasible to do practice-based R/R**
  - Strongly Agree: 13%
  - Somewhat Agree: 35%
  - Somewhat/Strongly Disagree: 52%

It is not feasible to do practice-based R/R.
Attitudes about Population-based R/R conducted by Health Departments

I would be bothered if the health department conducted R/R
- Strongly Agree: 15%
- Somewhat Agree: 10%
- Somewhat/Strongly Disagree: 85%

I believe population-based R/R might help patients without a usual source of care
- Strongly Agree: 98%
- Somewhat Agree: 61%
- Somewhat/Strongly Disagree: 37%

I believe population-based R/R is the best way to reach the most people
- Strongly Agree: 67%
- Somewhat Agree: 47%
- Somewhat/Strongly Disagree: 33%
Experiences with Population-based Recall

- 128 surveyed practices had experienced centralized R/R
  - Only 56% of practices in population-based reminder/recall counties indicated they were aware of the effort
  - Of those, most (79%) did not report any parents being upset
  - 67% reported that R/R sent by the health department did not result in a high volume of patients
  - 49% reported that at least patients expressed confusion
When asked to take into account feasibility, financial issues, privacy issues and beliefs about provider responsibility, providers prefer...

- Practices conduct R/R: 46%
- Health Departments conduct R/R: 51%
- No involvement of the practice: 16%
- Collaborate - letter from the Health Department: 20%
- Collaborate - letter from the practice: 15%
- Parents NOT be reminded about immunizations: 3%
PROVIDER INTERVIEWS
Provider Interviews

- Random selection of practices (in urban, rural, population-based and practice-based counties)
  - 82 interviews stratified by urban/rural, office type, population-based or practice-based counties
  - 1-3 people per practice: 21 physicians, 13 nurses, 16 office managers, and 32 other staff members.

- $99 Visa Card incentive

- Interviews conducted by trained personnel

- Qualitative analysis conducted using Atlas.ti software
Preferences for Collaboration

- Rural interviewees indicated more support for collaborative opportunities with the health department on reminder/recall efforts in part because their practices had often worked with the health departments in the past to achieve other health goals. As one rural physician said:

  “Our health department, they also give immunizations and it gives the families an option to either do it at the health department or through us. It’s actually good. It enhances our different practices and immunization rates.”
Preferences for Collaboration

- Collaboration was seen by many interviewees, particularly those located in rural areas, as a welcome opportunity to better their practice. As one provider put it:

“I think [collaboration] would be great. Because sometimes we don’t necessarily have all the resources or we don’t exactly know how best to run something, so when you are collaborating with the state…[the state] knows what works and what doesn’t, and [they] can give suggestions as to how best to make something like this work.”
Attitudes towards Practice-based Recall

- Others emphasized the intertwined nature of cost, time, and staffing issues. In the words of one family medicine provider:

  “It’s not like we can afford to have a whole bunch of people working on extra projects… vaccines are not necessarily something that we make money on. I think if [reminder/recall] could be done without a tremendous amount of, you know, hours spent, then I think it would actually be a nice thing.”
Attitudes towards Population-based Recall

- Some interviewees expressed the belief that population-based reminder/recall would not respect or work well with patients’ communication or vaccination preferences, thus angering and alienating them. One physician in an urban family medicine practice predicted that,

  “Some families would find it offensive… if they started immunizations and then decided to stop for some reason and then when they get the reminder they are like ‘well, I’m working with my doctor about this so why is the health department involved?’”
Experiences with Population-based Recall

- Staff reported that the population-based reminder/recall experience seemed to be effective and did not substantially increase their workload. Rural practices were particularly in support of population-based recall.

- As one rural physician put it, health department involvement meant additional voices “trying to advocate for the idea of the kids needing these immunizations. I think the more parents can hear it from different angles the better our acceptance rate will be.”
Conclusions

- A majority of providers were supportive of a centralized approach although some had concerns about patient confusion with why public health involved or why R/R didn’t take their previous preferences into account.

- Rural providers more open to this sort of collaboration than urban providers.
Next Steps

- AHRQ-funded R-18 Grant focusing on R/R methods in low-income patients in a Medicaid regional accountable care organization (RCCO)
- Will conduct pragmatic trials comparing practice-based vs. centralized IIS-based methods for:
  - 19-35 month children
  - Adolescents (never been done….)
  - Adults (never been done….)
- Final year will develop plans for joint funding for sustainability
Next Steps

- Two NIH grants under review for examining centralized approaches for

  - HPV reminder/recall among adolescents
  - Influenza reminder/recall among children
Study Team

Center for Research in Implementation Science and Prevention (CRISP) University of Colorado Denver

Principal Investigator – Allison Kempe, MD, MPH
- Alison Saville, MSPH, MSW
- L. Miriam Dickinson, PhD
- Brenda Beaty, MSPH
- Sheri Eisert, PhD
- Karen Albright, PhD
- Sarah McCauley, MPA
- Michelle Lee, MPH
- Dennis Gurfinkel, MPH

CDPHE & CIIS Collaborators
- Rachel Herlihy, MD
- Joni Reynolds, RN, MSN
- Diana Herrero, MS
- CIIS Coordinators
Let’s talk amongst ourselves....

Discuss.....