

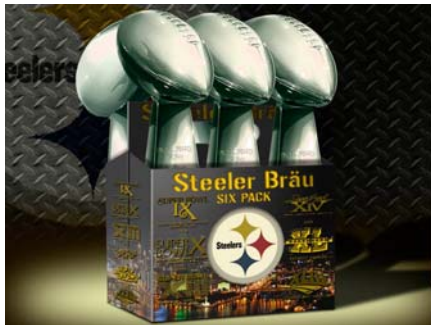
THE ROLE OF NON-PHARMACEUTICAL INTERVENTIONS AND SCHOOL CLOSURE IN PANDEMIC INFLUENZA

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Sixburgh, PA Home of the Steelers



Center For Public Health Practice

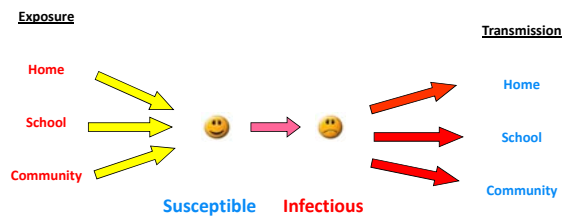
- At the University of Pittsburgh Graduate School of Public Health

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Presentation Outline

- Issues of Pandemic Flu and School Closure
 - CDC school closure plans
 - The “School Closure Game”
- Non-pharmaceutical Interventions and PIPP
 - Acceptability of NPIs
 - Adoption of NPIs
- Working with Schools
 - Lessons learned from PIPP
 - Audience shared experiences

Influenza Spread in Kids



Pandemics and NPIs



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Pandemic Response: School Closure

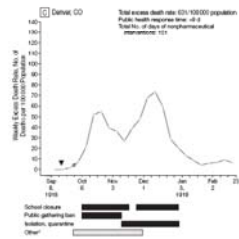
School	Generally not recommended	Consider: < 4 weeks	Recommend: < 12 weeks
Child social distancing -dismissal of students from schools and school-based activities, and closure of child care programs	Generally not recommended	Consider: < 4 weeks	Recommend: < 12 weeks
-reduce out-of-school contacts and community mixing	Generally not recommended	Consider: < 4 weeks	Recommend: < 12 weeks

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Rationale for School Closure

- “The fires of the epidemic are carried by healthy school-age children” – Glezen 1996
- Data from Markel et al Reviewing 1918 – 1919 Data

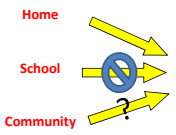


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Influenza Spread in Kids

Exposure



Susceptible

Transmission



Infectious

School Closure Game



School Closure

- ROUNDTABLE: WHAT DO YOU THINK?



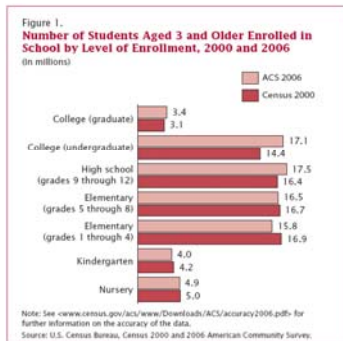
Challenges

- Extent of Closure
 - # of sites
 - Duration of closure
 - Information from Markel study
- Risks of Re-mixing
- Disruption of Adults' Lives
 - Adults w/ kids
 - Adults w/ jobs involving kids
 - CDC NC Study from 2006
- Disruption of the Economy and Critical Functions
- Disruption in Kids' Lives
 - Education
 - Meals
 - Internet
 - Other unexpected effects

How Many Sites?

- More Than 100,000 Public Schools Serving 48 Million Children in Grades K – 12
- In Addition
 - Private and parochial schools (6 million)
 - Pre-schools and daycares (12 million – out of 24 million total 0 – 5)
 - Colleges and universities

Number of Students Involved



Alternatives to School Closure

- Mass Vaccination
- Mass Prophylaxis
- Non-pharmaceutical Interventions
 - Respiratory protection
 - Masks (Surgical vs. N-95)
 - “Cover your cough”
 - Filters and/or UV light
 - Hand hygiene
 - Washing and/or alcohol-based sanitizer use
 - Keep hands away from mucous membranes
 - Don’t share food/utensils
 - Isolation and quarantine
 - i.e. kids stay at home if sick or if family member sick
 - Environmental protection



- CDC Funded Project: 2006 – 2009
 - One of 8 such studies looking at Non-pharmaceutical Interventions (NPIs) around the world (6 in the US, 1 in Hong Kong, 1 in New Zealand)
- Assess Effectiveness of Hand Sanitizer and Infectious Disease/hygiene Training in 4000 Elementary School Children in Pittsburgh, PA



Acceptability of NPIs

- Problem: What NPIs Will Be Feasible?
 - Acceptable to parents and teachers
 - Increase likelihood of compliance with regimen
 - Nothing in literature
 - Multilayered intervention
 - Acceptability
 - Compliance

Parent & Teacher Attitude Survey

- 137 Teachers from 6 Schools
- 156 Parents from 9 Schools
- Convenience Sample
 - Time
 - Cost
- Teachers Survey Left in Mailboxes and Gathered by Principals
- Parent Surveys Gathered at PTO, PSCC, etc.

Parent & Teacher Attitude Survey

- Likert Scale
 - 1 = “Can’t or won’t do this”
 - 2 = “Probably wouldn’t do this to prevent flu”
 - 3 = “Might do this to prevent flu”
 - 4 = “Would do this to prevent flu”
 - 5 = “Do this usually, regardless of flu”

Teacher Responses

- High Acceptability (5 is highest)
 - Send a sick child home **4.60**
 - Washing hands 2-4 times/day **4.15**
 - Insist that students cover coughs and sneezes **4.13**
 - Use hand sanitizer **3.65**
 - Willing to teach about practices to prevent flu **3.47**

Teacher Responses

- Low Acceptability
 - Cleaning and sanitizing desks 2.94
 - Screen students for illness 2.62
 - Teachers and staff wear masks 2.37
 - Perform simple tests for flu 2.29
 - Students wear masks 2.01
 - Take students' temperatures daily 1.65

Parent Responses

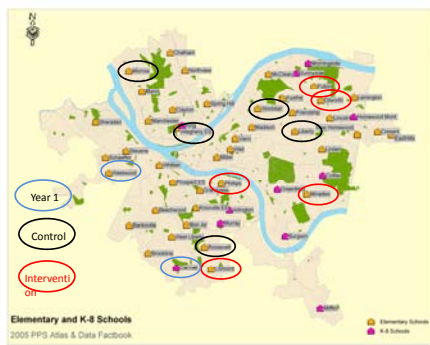
- High Behavior Acceptability (5 is highest)
 - Covering sneezes and coughs 4.25
 - Check children and other family members for signs of the flu 3.94
 - Insist that family members not share eating and drinking utensils 3.93
 - Keep your child home when the child is sick 3.92
 - Clean kitchen counters, door knobs, and other commonly touched surfaces daily 3.83
 - Use a hand sanitizer daily 3.7
 - Stay home with a sick family member who has the flu 3.7

Parent Responses

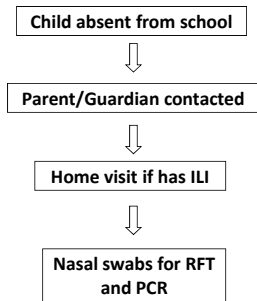
- Low Behavior Acceptability
 - Stay home when you're sick 3.2
 - Keep family members, who are sick with the flu, separated from others in the home 3.13
 - Keep all the family at home when one or more people have the flu 3.04
 - Call a hotline if you suspect that your child is sick with the flu 2.96
 - Wear gloves when caring for a sick family member 2.64
 - Wear a mask to cover your mouth and nose 2.47

Conclusions

- **Acceptable: General Etiquette Practices**
 - Typical day to day behavior
 - Hand washing, sanitizing, cover your cough, keeping sick children home
- **Not acceptable**
 - Intrusive; Not typical
 - Masks, gloves, keeping family members home



PIPP Algorithm



NPI Intervention

- Educational
 - Influenza 101
- Behavioral – School
 - Hygiene
 - Hand Sanitizer
 - “WHACK” the flu
- Behavioral – Home
 - Isolation



Pittsburgh
Influenza Prevention Project
Healthy Schools, Healthy Kids

W.H.A.C.K. THE FLU!

Wash or sanitize your hands often

Home is where you stay when you are sick

Avoid touching your eyes, nose and mouth

Cover your coughs and sneezes

Keep your distance from sick people

Pittsburgh Influenza Prevention Project

If your child develops
**FEVER
COUGH
SORE THROAT**

www.pitpp.pitt.edu
Call 412-383-5347

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Sanitizer Intervention

- Intervention – Sanitizer Use 4 x Day
 - Arrival at school
 - Before lunch
 - After lunch
 - Leaving school
- Stations Placed to Facilitate Compliance
- Stations Placed in All Classrooms, Cafeterias, and Common Areas

Year 2: Teacher Observation Survey

- Three Identical Surveys
 - Pre / during / post flu season
- Questions on NPI Behaviors Observed in Classroom
- Surveys Linked by Teacher
- >95% of Home Room Teachers Completed
- Also - Control vs. Intervention for Post Flu Season

Year 2: Teacher Observation Survey

- Most Questions Used 1-5 Likert Scale
 - 1: Almost none do
 - 2: Few do
 - 3: About half do
 - 4: Most do
 - 5: Almost all do
- Some Asked for a Numerical Response
 - How many times/day do you use hand sanitizer?

Pre-Season vs. Flu Season

Pretest (Prior to Intervention - Oct) versus Test (During Flu Season - Jan)	Pre Test Mean	Test Mean	Difference	P Value*
Wash hand more than 3 times/day	2.7	3.9	-1.2	< 0.001
Teacher Wash/sanitize per day	7.65	7.17	0.39	0.6786
Parents keep child home when sick	3.07	3.37	-0.29	0.0091
Student cover coughs/sneezes	3.17	3.69	-0.49	< 0.001
Students pick noses	2.35	2.35	0	0.7739
Student hand sanitizer twice/day	2.71	4.56	-1.84	< 0.001
Ill student report to class	3.01	3	0.01	0.962
Students cough/sneeze into shirt	2.25	3.14	-0.89	< 0.001
Student rub eyes	3.03	3.08	-0.05	0.751
Students Sneeze into bare hand	3.58	2.78	0.81	< 0.001
Send ill student to nurse	3.44	3.4	0.04	0.6376
Students coughing/sneezing in class in flu season	3.24	3.27	-0.01	0.8434
Students hand sanitizer 4 times per day	1.93	3.72	-1.88	< 0.001
Student put hands in mouth	2.76	2.63	0.14	0.1866
Students was/sanitize hands/day	2.79	3.87	-1.07	< 0.001
Cough/Sneeze into air	2.65	2.35	0.32	0.0221
Students understand how to stop spread of germs	2.85	3.9	-1.02	< 0.001
Student care about preventing germs	2.79	3.74	-0.93	< 0.001
Everyone concerned about spreading germs	4.38	4.46	-0.1	0.3394

Flu Season vs. Post-Season

	Test (During Flu Season – Jan) versus Posttest (After Flu Season - May)		Difference	P Value*
	Test Mean	Post Test Mean		
Wash hand more than 3 times/day	3.9	3.76	0.14	0.3327
Teacher Wash/sanitize per day	7.17	6.31	0.9	0.0659
Parents keep child home when sick	3.37	3.28	0.09	0.3924
Student cover coughs/sneezes	3.69	3.73	-0.06	0.6192
Students pick noses	2.35	2.35	0	0.8689
Student hand sanitizer twice/day	4.56	4.38	0.18	0.0588
Ill student report to class	3	3.32	-0.32	0.0008
Students cough/Sneeze into shirt	3.14	3.94	-0.8	0.0009
Student rub eyes	3.08	3.01	0.07	0.5793
Students Sneeze into bare hand	2.78	2.8	-0.01	0.8128
Send ill student to nurse	3.4	3.55	-0.19	0.0587
Students coughing/sneezing in class in flu season	3.27	3.39	-0.13	0.2133
Students hand sanitizer 4 times per day	3.72	3.22	0.49	0.0033
Student put hands in mouth	2.63	2.66	-0.03	0.7237
Students was/sanitize hands/day	3.87	3.96	-0.08	0.3705
Cough/Sneeze into air	2.35	2.39	-0.03	0.9023
Students understand how to stop spread of germs	3.9	3.97	-0.06	0.6076
Student care about preventing germs	3.74	3.8	-0.06	0.6282
Everyone concerned about spreading germs	4.46	4.56	-0.1	0.2031

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Control vs. Intervention (Post-season)

	Intervention vs. Control		Difference	P Value*
	Intervention Mean	Control Mean		
Wash hand more than 3 times/day	3.76	3.4	-0.36	0.0396
Teacher Wash/sanitize per day	6.31	6.49	0.18	0.7689
Parents keep child home when sick	3.28	3.23	-0.05	0.7029
Student cover coughs/sneezes	3.73	3.25	-0.48	0.0018
Students pick noses	2.35	2.65	0.3	0.0793
Student hand sanitizer twice/day	4.38	2.78	-1.6	< 0.0001
Ill student report to class	3.32	2.74	-0.58	< 0.0001
Students cough/Sneeze into shirt	3.94	2.36	-1.58	0.0005
Student rub eyes	3.01	3.04	0.03	0.8892
Students Sneeze into bare hand	2.8	3.33	0.53	0.0024
Send ill student to nurse	3.55	3.1	-0.45	0.001
Students coughing/sneezing in class in flu season	3.39	3.45	0.06	0.7171
Students hand sanitizer 4 times per day	3.22	1.86	-1.36	< 0.0001
Student put hands in mouth	2.66	2.9	0.24	0.1861
Students was/sanitize hands/day	3.96	3.08	-0.88	0.0118
Cough/Sneeze into air	2.39	2.74	0.35	0.0263
Students understand how to stop spread of germs	3.97	3.14	-0.83	< 0.0001
Student care about preventing germs	3.8	2.99	-0.81	< 0.0001
Everyone concerned about spreading germs	4.56	4.15	-0.41	0.0043

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Analysis

- Wash or Sanitize Your Hands Often
 - Students were able to significantly increase hand washing/sanitizing
 - Students averaged 2.30 sanitizer uses per day, every day, over 6 months
 - Student use dropped off slightly, but not significantly at the end of the year
 - Significant difference between Intervention and Control

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Isolation

- Home is Where You Stay When You Are Sick
 - No real change in behavior
 - No real difference between schools

Avoid Mucous Membranes

- Avoid Touching Your Eyes, Nose, and Mouth
 - No real change in behavior
 - No real difference between schools

Cover Your Coughs and Sneezes

- Students improved good behaviors
 - Cough into fabric
- Students decrease bad behaviors
 - Cough into hand/air
- Students Maintained Behaviors
- Intervention students significantly and substantially better than Control.
- Student coughing/sneezing equivalent

Cover Your Coughs and Sneezes

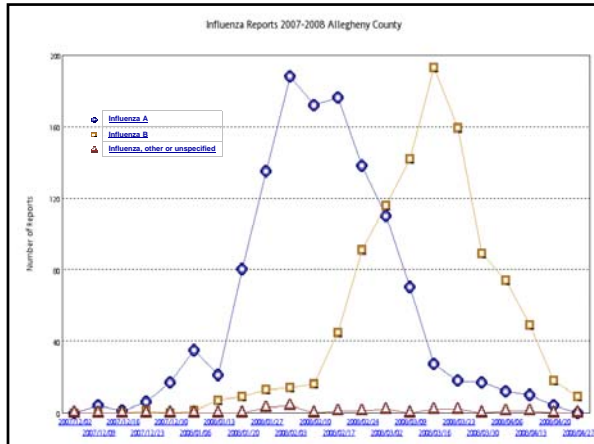
	Pretest vs Test				Test vs Posttest				Intervention vs Control			
	Pre Mean	Test Mean	Diff.	P value	Test Mean	Post Mean	Diff.	P value	Int Post Mean	Cont Post Mean	Diff.	P value
Student cover coughs/sneezes	3.17	3.69	-0.49	< 0.001	3.69	3.73	-0.06	0.6192	3.73	3.25	-0.48	0.0018
Students cough/Sneeze into shirt	2.25	3.14	-0.89	< 0.001	3.14	3.94	-0.8	0.0009	3.94	2.36	-1.58	0.0005
Students Sneeze into bare hand	3.58	2.78	0.81	< 0.001	2.78	2.8	-0.01	0.8128	2.8	3.33	0.53	0.0024
Students coughing/sneezing in class in flu season	3.24	3.27	0.01	0.8434	3.27	3.39	-0.13	0.2133	3.39	3.45	0.06	0.7171
Cough/Sneeze into air	2.65	2.35	0.32	0.0221	2.35	2.39	-0.03	0.9023	2.39	2.74	0.35	0.0263

Home Isolation

- Keep Away from Sick People
 - Not part of survey
 - Illness investigation with parents of positive flu cases (104) indicated that roughly equal numbers kept sick children away from family members
 - 52% Intervention vs 46% Control

Education – Influenza 101

- Student Understanding and Concern Regarding Spread of Germs
 - Students increase understanding and concern about germs with intervention
 - Student understanding and concern persisted
 - Significant difference between Intervention and Control





Overall Results

- Reduction in Absenteeism
 - Before, during, and after flu season
 - From 3.8 to 3.28 days per student
- Reduction in Overall Illnesses
- Reduction in Influenza-like Illness
- Not Statistically Significant
- Reduction in Influenza A; but Effects Eliminated by Influenza B Part of the Season

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Working With Schools

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What You Need

- Understand School's Mission and Priorities
- Understand School's Organization and Operating Environment

Mission Of Schools

- The Primary Mission of the School Is Education
- Intervention Should Contribute to the Educational Mission of the School
- Intervention Should Complement This Mission of the School
 - Integrate with science/health curriculum
- The Best Intervention Will Be One Where the Intervention Team and the School Are Partners

Schools Already Have Health Problems

- Asthma
- Cardiovascular Disease
- Diabetes
- Obesity

School Organization

- School Board
- Superintendent
 - Pupil Services
 - Health Coordinator
 - Asst. Superintendent
 - Principal
 - School nurse
 - Teachers
 - Support staff

Key School Personnel

- Principal
 - Instructional leader of the school
- Assistant Principal
 - Implements and enforces the conduct, attendance, and discipline policies
- Informational Processing Specialist (IPS)
 - Maintains accurate student permanent record files
- School Secretary
 - Administrative support for the Principal
- School Nurse
 - Many functions – however, almost never full-time at a single school

Building Trust

- Be Seen as Much as Possible
 - Fall “Meet & Greet” events and other school-wide events
 - Team meeting with key school staff
 - PTO/PSCC meetings
 - Periodic teacher meetings
 - Training for school nurses
- This Is Especially True for Senior Staff

Educating Students



Challenges

- Parent Phone Numbers and Contact Information
- Bad Weather
 - Snow days
 - Two hour delays
- Traveling in the Community

Summary of Operating Environment

- Simple basic...Basic simple
- Don't Complicate the Situation
- Embrace the Atmosphere of the Environment
- Ensure Administration That You Are There to Help Them Achieve Their Mission While Keeping Their Children Safe from Flu
- Always Use a Very Practical Common Sense Approach

School Closure and NPIs

- ROUNDTABLE: WHAT DO YOU THINK?
 - School closure
 - NPIs
 - Working with schools