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Rural School Employees' Awareness and Perceptions
of Adult Vaccinations: A District-Wide Study

Eli Thornton

A thesis submitted to the faculty of
Brigham Young University
in partial fulfillment of the requirements for the degree of

Master of Science

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ABSTRACT

Rural School Employees' Awareness and Perceptions of Adult Vaccinations: A District-Wide Study

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Master of Science

As key members of the school environment, it is important for school employees to be vaccinated. Employees are in direct contact with children in close quarters for long periods of time and such an environment can easily serve as an outbreak center for vaccine-preventable communicable diseases such as measles. Despite the fact that most school employees believe vaccines are safe and effective and many school employees report they are up-to-date with their vaccines, a closer examination reveals discrepancy between belief and behavior. As a vaccine advocate, the school nurse can be influential in providing adult vaccination education for school employees, thus increasing awareness of the importance of adult vaccines and knowing one's vaccination status. Additionally, school nurses might need to meet with school district policymakers to promote vaccine mandates for school employees and to assist in the creation of containment plans in the event of a measles outbreak at school.

Keywords: immunization, vaccination, school employee, vaccination mandate, vaccination perceptions, rural

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Rural School Employees' Awareness and Perceptions of Adult Vaccinations: A District-Wide Study

One of the most important issues in healthcare today is the issue of vaccinations and whether or not compulsory vaccination mandates should exist (Colgrove, 2006; Gostin, 2012). For decades, childhood vaccinations have been required prior to school entry in the United States and closely tracked after enrollment to control the spread of communicable diseases among children (Myers & Pineda, 2008). Although all 50 states have enacted mandates regarding childhood vaccinations before enrollment in school (Centers for Disease Control and Prevention [CDC], 2011a; Ciolli, 2008), the specific vaccines required for these children differ from state to state (Myers & Pineda, 2008; National Network for Immunization Information, 2010). Notwithstanding these variations in state vaccine mandates, the vaccination compliance rates of school-age children are closely monitored (Stokley, Stanwyck, Avey, & Greby, 2011).

In addition to school children, another population at risk for spreading communicable diseases includes healthcare workers. The health care environment is ideal for the spread of vaccine-preventable and communicable diseases (Goldstein, Kincade, Gamble, & Bearman, 2004; Harris, Maurer, Black, Euler, & Kadiyala, 2011). For example, communicable diseases such as influenza and pertussis are highly contagious and can be easily transmitted by a health care worker via droplet exposure to at-risk patients (Alexander et al., 2008; Philadelphia Immunization Coalition [PIC], 2009; Sandora, Gidengil, & Lee, 2008). Low vaccination rates, especially among health care workers, can have devastating effects leading to increased morbidity and mortality among patients (Alexander et al., 2008; Berger, 2008; PIC, 2009).

Although state-based childhood vaccinations and facility-based health care worker vaccinations are closely monitored, and in many cases mandated, there are other key members of

the community who might also benefit from similar vaccination awareness and support, particularly school personnel. In the United States, an estimated 7 million people are employed in more than 130,000 public and private schools, environments that could easily serve as outbreak centers for communicable infection (CDC, 2012a; Gargano et al., 2011). Because school personnel are in direct contact with children in close quarters for long periods of time, it is important to evaluate their vaccination status (CDC, 2011b; Utah Department of Health, 2011). Surprisingly, this area of investigation involving school personnel and vaccination status has yet to be researched, despite the fact that increasing adult vaccinations would lead to reduced disease transmission and health care costs, if an outbreak were to occur (American Academy of Microbiology [AAM], 2012).

One study reports that United States adults are 100 times more likely to die from a vaccine-preventable illness than children (Children's Hospital of Philadelphia [CHOP], 2010), resulting in over 40,000 deaths each year (AAM, 2012). Unfortunately, most adults either are unaware of their vaccination status or are inadequately vaccinated against highly virulent and communicable diseases (Johnson, Nichol, & Lipczynski, 2008), such as measles, pertussis and influenza (CHOP, 2010). In fact, only 8.2% of American adults are up to date on vaccinations such as tetanus with pertussis (Tdap) (CDC, 2012b).

This low level of vaccination rates in the adult population can have a costly effect, especially among school personnel. For example, during recent outbreaks of measles in Utah urban schools, many teachers were either unaware of their vaccination status or were inadequately vaccinated against measles. To help control the spread of the measles virus in the school population these teachers were temporarily quarantined, thus necessitating the hiring of several substitute teachers which cost the school district approximately \$10,000 (Stewart, 2011).

Consequently, a thorough evaluation of communicable disease susceptibility among other Utah school personnel is prudent. Therefore, the purpose of this study is to evaluate school employees' awareness and perceptions of adult vaccinations in a rural school district in Utah.

Research Questions

1. Are rural Utah school employees aware of their personal vaccination status?
2. Are rural Utah school employees up-to-date on their measles, mumps, and rubella vaccination?
3. Are rural Utah school employees up-to-date on their tetanus and pertussis vaccination?
4. Are rural Utah school employees up-to-date on their influenza vaccination?
5. What are rural Utah school employees perceptions of vaccination?

Methodology

Subjects

Following Institutional Review Board (IRB) approval, a convenience sample of 1,400 employees of a Utah rural school district were informed of the study. To be eligible for participation, subjects needed to be currently employed by the school district. All employees of the school district, including those who worked both part-time and full-time, were eligible to participate. Subjects included both faculty and support staff from all preschools, elementary schools, junior high schools, and high schools within the rural school district. Excluded subjects consisted of those in non-paid positions such as volunteers, classroom aids and volunteers.

Setting

The rural school district selected for inclusion was located in ranching and farming communities in northern Utah. This district was selected because of the diversity of both isolated, rural schools and midlevel-sized high schools. The district included only two

population concentrations or urbanized clusters greater than 2,500 people, the population size required to be considered urban (United States Department of Agriculture, 2007). The remainder of the district had no community population concentrations greater than 2,500 making them rural by definition (United States Department of Agriculture, 2007).

Design

The research was approved by the school district superintendent after a review of the questionnaire and IRB approval, and the superintendent continued to be engaged as the gatekeeper for further resources as needed. On the initial encounter, potential subjects received an email from a school district secretary describing the study. One week following the email notification from the secretary, small packets were distributed by school secretaries to each subject's mailbox. Each packet included the informed consent document, questionnaire, self-addressed and pre-paid return envelope, and a \$1.00 incentive for participation. Two weeks after the distribution of the questionnaires, the school secretaries sent a follow-up email, reminding the subjects to complete and return the questionnaire, if they had not already done so. Return of the questionnaire implied the subject's consent. Regardless of participation in the study, the school employee retained the \$1.00 incentive.

Instrument

The questionnaire was an adaptation of a previously piloted instrument used in a small scale study in an urban Utah school district. The adapted two page questionnaire included 10 yes/no, 7 multiple choice, 2 open-ended, and 7 demographic questions.

The yes/no items measured subject knowledge about vaccinations and current vaccination status. Specific questions included whether or not the subject was fully immunized, whether his or her primary health care provider had discussed adult vaccinations with the subject, and the

subject's current status of four vaccinations: influenza; measles, mumps, and rubella (MMR); tetanus (Td); and Tdap. Those who did not receive the MMR vaccination, but instead had experienced the measles, mumps, or rubella diseases, could specify which disease they had and record this response as part of the corresponding yes/no question. If subjects were not sure of their influenza, Td and Tdap vaccination status, they were able to mark the response "I don't know."

Multiple choice questions were included to measure perceptions of vaccinations. For the influenza and MMR vaccinations, subjects could select the reason why they had not received the vaccine and could mark all that applied. Those subjects who could not find their reason(s) for inadequate vaccination against influenza and MMR among the provided list could instead choose the "other" category and record an independent response.

Demographic questions included identification of the subject's gender, age, and employment status (i.e. full-time or part-time). Subjects were also asked to report the number of years employed in their current school district, as well as to categorize their position (teacher, support staff, administrator etc.). Finally, subjects were asked to identify their ethnicity and the type of school for which they worked (i.e. elementary, junior high, or high school).

There were two open-ended questions, which asked why or why not school employees should have mandatory vaccinations prior to or during employment. Lastly, any additional written comments could be provided by the subject at the conclusion of the questionnaire.

Data Analysis

Data analysis was accomplished by entering the survey responses into an SPSS (SPSS Inc., Chicago, IL) database. Two independent researchers then checked the accuracy of the entered data; one researcher read the marked responses from each questionnaire while the second

researcher verified that the data was entered correctly. When there was a question about a marked response, the primary investigator examined the item to determine the correct response. Frequencies and measures of central tendency and dispersion were calculated for quantitative items. The two open-ended questions and the two multiple choice items regarding the subject's rationale for being unvaccinated for influenza and MMR will be reported in a separate academic study.

Results

A total of 1,346 questionnaires were delivered to full-time and part-time subjects of the rurally located school district. Of the distributed questionnaires, 835 were returned with a response rate of 62%. Of those reporting gender, there were 631 (78.6%) females and 172 (21.4%) males. Ages ranged from 19 – 80 years old, with a mean of 49 years old. Subjects had worked at this school district with a range 1 year to 43 years, and for an average of 12.9 years. The remaining demographic data are reported in Table 1.

Current Vaccination Status

When reporting on their personal vaccination status, 533 (65.0%) subjects believed themselves to be fully vaccinated despite the fact that 579 (70.6%) subjects reported they had not discussed adult vaccinations with their health care provider. Another 143 (17.4%) subjects believed themselves to be inadequately vaccinated, and 144 (17.6%) were unsure or did not know whether they were fully vaccinated. Although the majority of subjects believed themselves to be fully vaccinated, 538 of the respondents (65.6%) either confirmed that they could not locate their vaccination records or that they were not certain whether they could locate their vaccination records, if asked to do so (see Table 2).

Subjects were also allowed to free-write commentary on the item of whether or not they considered themselves to be fully immunized. Eighty-nine subjects included comments, which were then categorized into three major themes: a) lack of knowledge regarding adult vaccinations; b) belief that all needed vaccinations are administered during childhood; and c) concern regarding the cost of adult vaccinations. The lack of knowledge regarding adult vaccinations was commonly expressed by subjects, including comments such as, “Because of my age I’m not sure if I should get booster shots,” and “I really don’t know what it means to be fully immunized.” In addition to the lack of knowledge regarding adult vaccinations, subjects also communicated the belief that all their needed vaccinations were received during childhood with statements such as “[I] had it done when I was young,” and, “Growing up in the U. S. I have received all of my immunizations,” and, “[My] last ones were when I was 12.” Finally, concerns regarding vaccine costs were exemplified by comments such as, “There are immunizations I would like but insurance won’t pay for them and they are too costly” and, “[We] can’t afford health insurance on my pay alone.”

When specifically asked regarding their current state of vaccination against influenza, slightly over half of the subjects (51.5%) reported they had not received the vaccination during the current influenza season. Slightly less than half of the subjects (48.5%) indicated they had received the influenza vaccination during the current season (see Table 2).

Subjects were also questioned on whether or not they had received the MMR vaccination as a child and as an adult. When asked if they had received the MMR vaccination as a child, 561 (71.7%) subjects affirmed that they had; however, 221 school employees (28.3%) either did not know their childhood MMR status or confirmed that they had not received the MMR vaccination during childhood. When asked if they had received the MMR vaccination as an adult, 328

subjects (51.8%) denied receiving the vaccine during adulthood. Another 170 (26.9%) subjects reported that, indeed, they had received the MMR vaccination as an adult, although an additional 135 (21.3%) employees did not know whether or not they had been vaccinated against MMR as an adult (see Table 2).

When employees were questioned about the status of their tetanus vaccination, 438 (53%) confirmed they had received a tetanus booster during the last 10 years. However, 256 (31%) employees reported that they had not received a tetanus booster during the past 10 years, and another 132 (16%) were unsure whether they had updated their tetanus booster since 2002. Subjects were also queried about whether or not the last tetanus booster, received during the past decade, included protection against pertussis (whooping cough). Over two-thirds of respondents (68.1%) either stated that their last tetanus booster did not include pertussis or that they were unsure whether their tetanus vaccination included protection against pertussis. Almost one-third of the subjects (31.9%) affirmed that the tetanus booster they received during the past decade included vaccination for pertussis.

Vaccination Perceptions

Subjects were asked about their personal perceptions regarding vaccinations, specifically the safety, efficacy, and importance of vaccinations for adults and school-aged children. In addition, respondents were asked to share their opinions on whether or not vaccinations should be mandated for all school employees. Finally, the subjects were questioned about their perception of any existing vaccination mandate for specific school employees.

When invited to share their perceptions regarding vaccine safety, the vast majority of subjects (89.6%) agreed or strongly agreed that vaccinations were, in fact, safe. Collectively,

only 44 (5.4%) employees disagreed or strongly disagreed with the statement that vaccinations were safe. A mere 30 (3.7%) of subjects had no opinion regarding vaccine safety (see Table 3).

For the item concerning vaccine safety perceptions, subjects could forego selecting any of the choices ranging from strongly agree to strongly disagree, and could instead select the “other” category, giving them the option of free-writing a personalized response. There were 11 (1.3%) subjects that chose the “other” category and added their own commentary. The prevailing theme among these responses was that the subjects were unsure of what to believe regarding vaccination safety. As expressed by one of the subjects, “I worry. [I] don’t know what to believe.” Other subjects made comments such as, “Not sure” and “The jury is still out.”

When questioned about their perceptions regarding vaccine effectiveness, 773 subjects (94.2%) agreed or strongly agreed vaccinations were efficacious when it came to preventing disease. In contrast, only 25 (3%) employees disagreed or strongly disagreed with this statement. An additional 14 (1.7%) subjects had no opinion regarding the ability of vaccines to prevent disease (see Table 3). Free-write responses associated with the “other” choice for this item were included by 9 (1.1%) employees and centered on the idea that although some vaccinations were indeed effective, the subjects could not definitively state that *all* vaccinations were equally efficacious. This common theme was captured in comments such as, “Depends on [the] vaccine,” and, “Most immunizations [but] not flu,” and, “Some do and some do not.”

Subjects were also questioned about the perceived importance of vaccinations for adults and school-aged children. Almost three-quarters of respondents (73.2%) either strongly agreed or agreed that it was important for adults to receive vaccinations. Another 46 (5.6%) subjects disagreed or strongly disagreed that vaccinations were important for adults. Among respondents, 41 (5%) selected the “other” category (see Table 3). Emerging as the predominant theme from

the free-write responses in the “other” category was that the subjects needed more information before making a determination, a theme captured in comments such as, “I don’t know enough,” and, “I need more info about this.” In contrast, when asked if vaccinations were important for school-aged children, 778 (94.3%) employees strongly agreed or agreed and 21 (2.5%) disagreed or strongly disagreed. There were another 16 (1.9%) employees that had no opinion on the subject and 11 (1.3%) that opted to free-write their response (see Table 3). Written responses often involved commentary on respecting personal freedom. This theme was captured in the response of one subject who stated, “Parents should choose.”

When asked regarding their perception of whether vaccinations should be mandatory for school employees, 376 (45.7%) agreed, whereas 199 (24.2%) of subjects disagreed. An additional 248 (30.1%) of subjects were not sure of their opinion regarding mandatory immunizations for school employees (see Table 3). Those in support of mandatory vaccination requirements for school employees included free-write responses such as, “I think if the children have to, why not the adults too?” and, “[A good idea] to protect myself and those I work with.” Those in opposition to mandatory vaccination requirements made statements such as, “Big brother should never take away our rights to choose as adults,” and, “Everything is mandatory, let us think for ourselves.”

The majority ($n = 676$, 82.2%) of school employees were either unaware or did not know of any current vaccination requirements for employees of their school district. A small percentage ($n = 146$, 17.8%) believed that there was, in fact, a mandatory school district vaccination requirement (see Table 3) but differed regarding which required vaccinations would be for whom. For example, some commented that they believed there was an influenza vaccination requirement for some employees, and others believed there might be a requirement

for the hepatitis series for select employees. The employees most often cited as having mandatory vaccination requirements were those working with “special ed.” students.

Predicted Behavior

Vaccination awareness and perceptions often have real-world implications. Because of this, we attempted to identify the planned personal actions in the event of a measles outbreak at school. Subjects were asked to predict how they would respond in such an event. The highest percentage of respondents (20.1%) reported that they would stay at work because they had already had the measles disease. Another 148 (18.6%) subjects reported that they were up-to-date on their MMR booster and would plan on staying at work during a measles outbreak. Interestingly, 151 subjects (18.9%) were unsure of their MMR status but planned on remaining at work during a measles outbreak and another 96 employees (12%) planned on staying at work despite the fact that they had not received an MMR booster. Another 164 (20.5%) employees reported they would plan on staying home from work in the event of a measles outbreak because they were not up-to-date on their MMR booster or were not certain of their MMR booster status. A small percentage (3.1%) reported they would stay home from work during a measles outbreak, despite the fact that they were adequately vaccinated with the MMR (see Table 4). Overwhelmingly, employees who wrote in additional comments expressed their uncertainty on what would be the correct course of action, making comments such as, “[I’m] really not sure.”

Discussion

With an overall response rate of 62%, the topic of adult vaccinations seemed to be of interest to the Utah school employees in the rurally located school district, and although it was interesting to note that over half considered themselves to be fully vaccinated, it seems highly unlikely that this was the case. For example, in this study about half of subjects had not received

the influenza vaccination for the current year. Moreover, most of school employees denied having an MMR booster in adulthood or simply did not know whether or not they had received an MMR booster as an adult. Another portion of subjects were either unsure of their current tetanus status or reported that their tetanus booster was out-of-date. Finally, the majority of the subjects did not know if they were adequately vaccinated against pertussis or were certain they were inadequately vaccinated against this disease. Thus, although the majority of school employees might have *thought* they were fully vaccinated, a closer examination of records revealed that they were likely not as protected as initially believed. Such discrepancies between what subjects believed to constitute full vaccination and their actual status warrants further investigation.

When examining the vaccination perceptions of the subjects, most strongly agreed or agreed that vaccinations were safe and an overwhelming majority strongly agreed or agreed that vaccinations were effective at preventing diseases. Additionally, a majority of study subjects strongly agreed or agreed that it was important for adults to receive vaccinations. In stark contrast, parents who refuse vaccinations for their children or who are late having their children vaccinated often do so because of concerns regarding vaccine safety and the belief that vaccinations are ineffective at preventing diseases (Luthy, Beckstrand, & Callister, 2010; Luthy, Beckstrand, Callister, & Cahoon, 2012; Smith et al., 2011). School personnel, therefore, have different barriers to adequate vaccination, the most common of which are lack of knowledge and concerns regarding vaccine cost. Although the school nurse might not be able to combat the barrier of vaccine cost, the nurse could most certainly help overcome the barrier of knowledge deficit regarding appropriate vaccinations for adults.

Moreover, the school nurse might want to help facilitate the mandate of school personnel vaccinations. Because the school is an ideal environment for the spread of communicable diseases (CDC, 2012a; Gargano et al., 2011), vaccination mandates for employees as well as school children seems a practical and highly effective solution. Interestingly, almost half of the rural subjects in this study were in support of mandatory vaccination requirements for school employees. Another additional one-third of the sample was undecided on whether or not adult vaccinations should be mandated, although perhaps some of these undecided subjects could be educated on the topic of vaccine importance and persuaded to support vaccine mandates.

In another study, school personnel were uncertain about whether or not they had suffered from the measles disease or had been adequately vaccinated with the MMR vaccine (Ichinohe & Ogawa, 2011). In consideration of these data, we also found that there were subjects who stated they planned on remaining at work despite the fact that they were unsure of their MMR status, and others planned on staying at work even though they knew they were inadequately vaccinated against MMR. These responses seem to further underscore the need for adult vaccination education because it is extremely unlikely these employees would be permitted to remain at work in the event of a measles outbreak.

Recommendations for School Nurses

Adult vaccination education programs can be highly successful, significantly improving adult vaccination rates (Kruspe et al., 2003). Not only do vaccinations protect against the spread of communicable diseases, a vaccination for a single disease, such as influenza, can result in up to 45% fewer work days lost and up to 28% fewer presenteeism days (work days with reduced effectiveness due to illness) (Lin et al., 2010). As strong vaccination advocates, school nurses can be influential in improving vaccination rates of not only school children, but school

personnel as well. Vaccination education and vaccination promotion can be accomplished through the use of several available resources. For example, reinforcing the importance of pertussis vaccination among the adult population could be communicated by sharing the *Sounds of Pertussis* website information via school email or by showing the short video on the website in a school staff meeting. Also, sharing stories from the *Shot by Shot* website, perhaps one story per month during the school year, could help focus attention on a particular vaccine every month.

Employer vaccine mandates have been proven to increase vaccination uptake among employees in the health care setting (Harris et al., 2011). When considering that almost half of the subjects in this study supported vaccine mandates for adults, the school nurse might want to lead the cause of school personnel vaccination mandates with the school districts. Furthermore, with additional education on the importance of adult vaccinations, perhaps the subjects who were undecided about vaccine mandates could be provided rationale for enacting such policies and convinced to support these mandates for school personnel.

Finally, the findings in this study of confusion over whether or not school personnel are currently and adequately protected against measles, mumps, and rubella diseases were worrisome, especially given the fact that measles outbreaks occur in American communities every year. When coupled with the fact that so many school employees planned on attending work despite being inadequately vaccinated with MMR or being unsure of their MMR status, it might be helpful for school nurses to preemptively clarify policy guidelines in the event of a school measles outbreak. For example, communicating the containment plans of local and state health departments for school measles outbreaks with school personnel and district leadership could be beneficial. Furthermore, clear-cut school policies should be enacted regarding the quarantine of inadequately vaccinated school personnel during a measles outbreak. These

policies would ideally delineate whether or not the quarantined individual is assigned to paid leave or non-paid leave during the quarantine period. Although school nurses might not actually enact these school district policies, they can be instrumental in educating policymakers on the issue so they can make informed decisions.

Limitations

The subjects in this study compose a convenience sampling and might not represent the entire population. Another limitation is that only paid subjects were included in the study. Because this study was conducted in a rural community, the findings might not apply to school employees working in urban or suburban communities. Finally, the respondents in this study were all public school personnel and, thus, might not accurately represent those employed by charter schools or private schools.

Recommendations for Future Research

As additional members of the school community, it might be valuable to also survey school volunteers to evaluate their vaccination statuses and beliefs regarding adult vaccinations. Because there could be differences in adult vaccination perceptions of school personnel between urban, suburban, and rural communities, replication studies would be helpful in identifying differences between these groups. Also, it might be interesting to characterize vaccination beliefs in those employed in the charter and private school sectors. The identification of such differences between groups would further assist in the creation of tailor-made vaccination messages.

Conclusion

One of the most concerning issues in health care today continues to be the issue of vaccinations and although the vaccination of school-aged children is often the area of intense

focus, vaccination of school personnel is also important to consider. Many school personnel report that they are fully vaccinated; however, a closer examination of individual vaccines reveals this is unlikely, even though the majority of school personnel believe vaccinations are safe and effective. School nurses can be instrumental in providing adult vaccination information for school personnel, as well as education for policymakers regarding vaccination mandates for school district employees and containment plans in the event of a measles outbreak.

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