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## State Requirements for Mandatory Vaccine Education Prior to Exemption

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State Requirements for Mandatory Vaccine Education Prior to Exemption

Chelsea Lynn Schult

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

### State Requirements for Mandatory Vaccine Education Prior to Exemption

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**Background:** To prevent the spread of Vaccine Preventable Diseases (VPD's), school-aged children in the United States are required to receive vaccinations. In certain states, parents have the option to exempt their child from becoming vaccinated due to medical, religious, or personal reasons. The purpose of this research was to identify which states require mandatory vaccination education prior to granting vaccine exemptions and to identify the various types of required vaccination education.

**Methods:** Immunization program managers from states requiring parents seeking exemptions to receive mandatory vaccination education were asked a series of open-ended questions. The interviews were conducted via telephone. The education-related questions identified: 1) which states require mandatory education prior to granting vaccine exemptions; 2) delivery methods for education; 3) standardization of materials; 4) renewal and evaluation of education; 5) the greatest obstacles to providing education; and 6) use of immunization registries to track vaccination education.

**Results:** Ten states reported mandatory vaccination education requirements prior to granting vaccine exemptions. Three methods of vaccination education delivery were identified: printed material, face-to-face education, and/or online technology-driven education. Seven states have standardized vaccination education and use state exemption rates as a means to evaluate the education. Half of states required parents to renew vaccination education, but the time period for renewals varied from state-to-state. There were two general obstacles to delivering vaccination education, namely, lack of resources and lack of parent involvement.

**Conclusion:** Parental education regarding vaccines impacts parents' decisions to vaccinate their children. The method of delivering mandatory vaccination education varies greatly between states. Each method for vaccination education delivery has inherent advantages and disadvantages, indicating the need for further research to determine which method of education delivery is most effective. A combination of delivery methods may, in fact, be the best option. Identifying the most effective delivery method for vaccination education, as well as the most optimal time period for renewing the education, will assist other states developing mandatory vaccination education materials.

**Keywords:** vaccination, exemption, immunization, state requirements, education, mandate

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### State Requirements for Mandatory Vaccine Education Prior to Exemption

Vaccines are vital to the health of individuals and the overall health of communities.

While medications provide direct benefit to individuals, vaccines are a unique form of medication that have both direct benefits for individuals and for communities at large (Doherty, Buchy, Standaert, Giaquinto, & Prado-Cohrs, 2016). Vaccines provide broad protection against infectious diseases to the larger community through herd immunity (Eichner, Schwehm, Eichner, & Gerlier, 2017).

Herd immunity occurs when vaccination rates for populations are at least 90%, especially for highly virulent diseases such as measles and pertussis (Simon, Byington, Diasio, Edwards, & Holmes, 2016). When vaccination rates are maintained at 90%, unvaccinated individuals are protected. Unfortunately, community immunity is compromised in specific communities where vaccination rates have fallen below the 90% threshold. For example, the Centers for Disease Control and Prevention (CDC) (2017a) reported vaccination rates against Diphtheria, Tetanus, and acellular Pertussis (DTaP) have fallen to 84.2% in the United States (U.S.). Similarly, vaccination rates for Haemophilus influenza type b (HIB) and pneumococcal diseases are also substandard at 82% and 82.9%, respectively. Additionally, the vaccination rates for measles, mumps, and rubella (MMR) rates have remained steady at about 91% for the past decade (Centers for Disease Control and Prevention [CDC], 2016a).

Unvaccinated individuals are usually geographically clustered within communities (Lieu, Ray, Klein, Chung, & Kulldorff, 2015) and, as a result, such communities are at increased risk of transmitting vaccine preventable diseases (VPDs), not exclusively to the unvaccinated population but the entire surrounding community (Blank, Caplan, & Constable, 2013). According to the Advisory Committee on Immunization Practices, it is important to adhere to the

vaccine schedule in order to prevent the spread of VPDs (Kurosky, Davis, & Krishnarajah, 2016). It is especially important for children to receive vaccinations in a timely manner because VPDs are more common and more deadly in infants and young children (Child Trends, 2015).

All 50 states require children to be up-to-date on vaccinations before attending school (CDC, 2016b), although which vaccinations are required for school entry varies slightly from state to state (National Conference of State Legislatures [NCSL], 2015). The overall purpose of school vaccination laws is to protect all persons from the spread of VPDs within the school setting (CDC, 2016b). Therefore, state legislatures have a significant role in developing vaccination laws that have the potential to increase vaccination rates (Hendrix, Sturm, Zimet, & Meslin, 2016).

While vaccines are required for school entry in the U.S., states allow parents to file vaccine exemptions, which excuses the child from receiving vaccines while still allowing the child to attend school (CDC's Public Health Law Program, 2017). There are four types of vaccine exemptions available including personal-belief, religious, temporary medical, and medical exemptions (Colgrove, 2016). According to the National Conference of State Legislatures (2017), 18 states allow parents to refuse childhood vaccinations based on personal beliefs. All states except Mississippi, California, and West Virginia allow religious exemptions. All states allow parents to claim temporary medical and medical exemptions (NCSL, 2017).

### **Reasons Parents Refuse Vaccinations**

Fear of potential vaccine side effects, whether realistic or perceived, is one of the most common reasons parents refuse vaccinations (Nutty, 2014). Parents perceive several potential side effects as legitimate threats to their children's health, which motivates parents' refusal of vaccinations. For example, some parents refuse vaccinations because of misperceptions



regarding causation of autism, mercury poisoning, and the threat that vaccines weaken their child's immune system, despite the fact that each of these myths have been thoroughly researched and dispelled in the literature (Luthy, Beckstrand, & Meyers, 2012; Nutty, 2014). In addition to these concerns, some parents refuse vaccinations because of non-life-threatening reactions to the vaccine, such as low-grade fever, redness and tenderness at the vaccination site, and headache (CDC, 2017a).

### **Vaccination Education**

In the U.S., vaccine exemption rates steadily increased from the late 1990s through the 2012-2013 school year at which point the number of exemptions plateaued (Omer, Porter, Allen, Salmon, & Bednarczyk, 2018). In order to reduce the number of vaccine exemptions, state legislatures and health departments employ a variety of strategies, one of which is to offer parents seeking vaccine exemptions education regarding the safety and efficacy of vaccines. It is, in fact, imperative parents receive reliable vaccination education when making vaccination decisions, especially vaccine exemption decisions (Luthy, Burningham, Eden, Macintosh, & Beckstrand, 2016; Suryadevara, Bonville, Ferraioli, & Domachowske, 2013). According to Eden et al. (2017), 13 states require parents to receive mandatory vaccine education prior to obtaining vaccine exemptions (Eden, Dunn, Luthy, Wells, Macintosh, & Beckstrand, 2017).

Although Eden et al. (2017) reported mandatory vaccination education requirements in 13 states, vaccination laws are updated every year and, therefore, it is unknown if these 13 states still mandate vaccination education. Additionally, no data are available on the process of delivering, recording, or renewing mandatory vaccination education in these states. Whether or not the education is standardized (meaning it is the same for all parents) or individualized (meaning it is tailored to fit the needs of each parent) is also unknown. The Association of

Immunization Managers (2014) recommends vaccination education for parents seeking vaccine exemptions; thus, gathering data on how states with mandatory vaccination education requirements have successfully implemented the vaccination policy could be beneficial for other states considering similar legislation. Therefore, the purposes of this research are to: 1) confirm how many of the 13 states in the Eden et al. (2017) study still require vaccination education prior to vaccine exemptions; 2) identify how states with mandatory vaccination education requirements deliver, standardize, renew, and evaluate vaccination education; 3) identify obstacles to providing vaccination education; and 4) verify whether or not state immunization registries are utilized to track vaccination education.

### **Research Questions**

1. Which states, since the Eden et al. (2017) study, still mandate vaccination education prior to granting vaccine exemptions?
2. How do states deliver mandatory vaccination education?
3. How is vaccination education standardized?
4. How often is the vaccination education renewed?
5. How is the effectiveness of mandatory vaccination education evaluated?
6. What are the greatest obstacles to providing mandatory vaccination education?
7. How do states utilize the immunization registry to track mandatory education for vaccine exemptions?

### **Methodology**

#### **Participants**

In a previous study, Eden et al. (2017) contacted all U.S. states/territories and identified 13 U.S. states/territories requiring parents to complete mandatory vaccination education prior to

granting vaccine exemptions. The Association of Immunization Managers (AIM), which is the professional organization for U. S. immunization program managers, provided contact information for each of the 13 state immunization managers identified in the Eden et al. (2017) study: Alabama (AL), American Samoa (AS), Arkansas (AR), California (CA), Delaware (DE), Florida (FL), Michigan (MI), Oregon (OR), South Carolina (SC), Texas (TX), Utah (UT), Vermont (VT), and Washington (WA). To be eligible for inclusion in this study, the participant needed to be a U.S. state/territory immunization program manager from one of the 13 states/territories with a mandatory vaccination education requirement, have knowledge regarding state/territory immunization policies, be able to provide information regarding mandatory vaccination education requirements, and speak English.

### **Design**

The study employed a descriptive design. Because the research involved the collection of data from experts regarding their special expertise, rather than personal opinions, the study was deemed exempt by the Institutional Review Board. State/territory immunization program managers were initially contacted via email to set up an appointment for a telephone interview. At the beginning of the telephone interview, interviewers read the consent document and informed potential participants about the \$50 VISA gift card incentive. At conclusion of the telephone interview, the participant's name and address were collected to mail the VISA gift card. All immunization managers were contacted a second time via telephone because further clarification was needed regarding their initial responses.

### **Instrument**

The questionnaire was designed by a group of researchers in collaboration with the AIM Research Committee, which includes state/territory immunization program managers,

immunization program staff, and staff from the Centers for Disease Control and Prevention. The questionnaire included seven structured interview guided questions, one follow-up question, and one question asking for any additional comments (see Table 1).

### **Data Analysis**

Data were verified by the primary investigator. Data were then analyzed for themes by two independent researchers. A descriptive content analysis was performed as described by Neuendorf (2002). Researchers convened and came to consensus on all themes and categories. For this study, reported data include responses on seven open-ended core questions and one open-ended follow-up question. The final question, “Do you have any other comments?” did not yield any identifiable themes due to limited responses.

### **Results**

The 13 state immunization managers (hereafter referred to as “state(s)”) identified from the Eden et al. (2017) study as requiring mandatory vaccination education prior to granting vaccine exemptions were contacted for inclusion in this study. Two states/territories (AS and VT) did not respond to several requests for an interview and, as a result, were excluded. California was no longer eligible to participate because state laws regarding vaccine exemptions had changed since the Eden et al. (2017) study. For example, in the Eden et al. (2017) study, CA reported a vaccination education requirement prior to granting personal exemptions. However, CA revoked vaccine exemption options for personal and religious reasons in 2016 (NCSL, 2017) and, therefore, there was no longer a need for mandatory vaccination education. Thus, 10 states completed interviews: AL, AR, DE, FL, MI, OR, SC, TX, UT and WA.

### **Mandatory Education Requirements**

Of the ten states reporting a mandatory vaccination education requirement, only Washington required mandatory education prior to granting religious vaccine exemptions. Six states (AR, MI, OR, TX, UT and WA) required mandatory education for personal exemptions. Four states (AR, DE, UT, and WA) provided mandatory vaccination education before allowing a parent to claim medical and/or temporary medical exemptions (see Table 2).

Although all 10 states reported mandatory vaccination education requirements, three states (AL, MI, and SC) permitted parents to refuse the education material presented. For all three states, the local health department (LHD) employee was required to offer the education; however, parents reserved the right to refuse the education (see Table 2).

### **Delivery of Mandatory Vaccination Education**

All 10 states reported on the delivery of state mandated vaccination education. States offered mandatory vaccination education using a variety of strategies. A face-to-face appointment with a LHD employee or health care provider (HCP) was required by four states (MI, OR, SC, and WA). Use of online technology was employed by three states (AL, OR, and UT) for delivery of vaccination education. Three states (AR, FL, and TX) utilized printed materials to deliver vaccination education. Delaware offered vaccination education by having exempting parents read a printed statement informing them of the importance of vaccinations and the risks associated with refusing vaccines (see Table 2 and Table 3).

The type of face-to-face appointment required (MI, OR, SC, and WA) differed between states. Parents seeking personal or religious exemptions in MI and SC were required to receive vaccination education from an employee of the LHD. Oregon authorized HCPs to conduct vaccination education for personal, religious, and temporary medical exemptions, although OR

also offered an alternative method to receive vaccination education, namely through the use of online technology. Washington required parents seeking personal, temporary medical, or medical exemptions to receive vaccination education directly from a HCP.

Three states (AL, UT, and OR) reported using an online technology medium to deliver mandatory vaccination education. Oregon allowed parents to choose to receive their vaccination education via online module or in a face-to-face appointment. Parents in Oregon completing the online module are educated about potential spread of VPDs in unvaccinated children, especially within the school environment, as well as how vaccines work, licensing, and benefits of vaccines (see Table 3). Interestingly, HCPs in Oregon often encourage parents seeking vaccine exemptions to complete online vaccination modules in addition to the education received in the face-to-face visit.

Utah's new immunization law went into effect in 2018, requiring all Utah parents seeking vaccine exemptions to complete an online education module regarding the risks of refusing vaccinations, including the risk of contracting VPDs, and how to recognize signs and symptoms of VPDs. Alabama delivers vaccination education through a 13-minute video which can be viewed at the LHD. The AL video includes information on vaccine safety, risks of refusing vaccinations, and consequences regarding school attendance during disease outbreaks for unvaccinated children (see Table 3).

Although three states (AR, FL, and TX) utilized print material to deliver vaccination education, the volume of print material (packet versus handout) varied. Arkansas delivered their vaccination education in a 29-page exemption information packet provided to all parents requesting any type of vaccine exemption. The exemption information packet included the risks of refusing vaccinations, responsibilities to the community when refusing vaccinations, rationale

for why vaccinations are safe, and why parents should choose to vaccinate their children (see Table 3). Two states, FL and TX, delivered their vaccination exemption education in the form of a printed handout. In FL, the one-page informational handout was specifically distributed to parents seeking religious vaccine exemptions and included instruction regarding which situations required a parent to notify others in the community that their child was not fully vaccinated, such as when visiting the HCP's office or visiting an emergency department. Additionally, FL's educational handout covered the risks of refusing vaccinations, including the risks to community members who are unable to be vaccinated for medical reasons (see Table 3). Texas distributed a handout for parents requesting religious and personal vaccination exemptions. The handout includes the effectiveness of vaccinations and the possible side effects for each vaccination.

### **Standardization of Vaccination Education**

When questioned about whether or not parental vaccination education was standardized (meaning all parents received the same educational information) or individualized (meaning each parent received educational information that fit his or her individual needs), all 10 states responded. Six states confirmed that their vaccination education was standardized (AL, AR, DE, FL, OR, and TX). Three of these states (AR, FL, and TX) were able to maintain standardization of education through printed materials. Two states (AL and OR) successfully standardized their educational messages by offering education through technological means (i.e. video or online module). Currently, OR has two paths to obtain vaccination education. The first option is for OR parents to complete an online module. Parents who opt to complete the online module receive standardized education. Conversely, OR also allows parents to receive vaccination education from their HCP, which is individualized. Interestingly, all four of the states (MI, OR, SC, and WA) whose mandatory education was not standardized required a face-to-face meeting with a

HCP or employee of the LHD. The educational conversations taking place during face-to-face meetings were either unstructured or semi-structured in nature because the vaccination education conversations were individualized according to parental need (see Table 2).

### **Education Renewal**

When asked if the vaccination education needed renewal, five of the ten states (AL, DE, FL, SC, and WA) reported there was no renewal requirement, meaning the initial vaccination education was accepted for the child's entire school career. The other five states (AR, MI, OR, TX, and UT) confirmed that vaccination education was, in fact, renewed at some point in the future. Arkansas required an annual renewal and, consequently, mailed the vaccine exemption packet and educational materials to the parent requesting an exemption. Michigan's renewal of vaccination education was variable because the renewal was determined by each individual LHD. Oregon required renewal of vaccination education only when the child transitioned from childcare into a school system and did not require additional renewal throughout remaining school career. Texas parents received an educational handout every 2 years in order to renew their vaccine exemption. Utah reported that mandatory education for vaccine exemption was first completed in kindergarten, then renewed when the child enrolled in 7<sup>th</sup> grade (see Table 2).

### **Evaluation of Mandatory Vaccination Education**

There were nine states (AL, DE, FL, MI, OR, SC, TX, UT, and WA) that responded to the question regarding how states evaluated the effectiveness of the vaccination education. Alabama evaluated effectiveness of mandatory vaccination education with a two-question survey that asked parents: 1) "Do you have any questions;" and 2) "Did the [vaccination education] video change your mind?" However, the majority of states (DE, FL, MI, OR, SC, and WA) utilized state exemption rates as a means for evaluating the vaccination education. Therefore, a



decline in vaccine exemption rates was attributed to the overall effectiveness of vaccination education. Although OR evaluated their vaccination education by tracking exemption rates, OR also intended to implement a parental survey to evaluate vaccination education at a future date. Texas reported no formal evaluation of vaccine exemption education in the state. Similar to AL, UT evaluated the effectiveness of mandatory vaccination education with surveys and quizzes dispersed throughout the online vaccination education module (see Table 2).

### **Obstacles to Providing Mandatory Vaccination Education**

States were questioned about obstacles to providing mandatory vaccination education to parents requesting vaccine exemptions. All 10 states responded to the question. Two main themes were identified, including a lack of adequate resources (AL, AR, MI, OR, and WA), and lack of parent engagement (DE and SC). There were also three miscellaneous responses regarding the need for stronger regulation through legislation (FL), difficulty adequately evaluating the effectiveness of vaccination education (TX), and accuracy of data when exemption certification is uploaded directly to the state registry (UT).

Five states (AL, AR, MI, OR, and WA) reported a lack of adequate resources as a major obstacle to providing vaccination education to parents. Limited resources included subcategories such as lack of time, limited computer access, and insufficient number of HCPs willing to provide vaccination education and complete documentation. The lack of time was reported by AL, AR, MI, and WA who stated delivery of mandatory vaccination education required a sizeable employee time commitment which stressed existing resources, resulting in a perceived need for additional manpower and, as a result, an increase in funding.

Oregon offered two education options – completing an online vaccination education module or receiving education from a HCP – both of which necessitated resources. In OR, some

parents seeking vaccine exemptions did not have access to a computer, resulting in a parental resource issue. Additionally, there was a perceived shortage of HCPs in OR who were willing to take the time to complete mandatory vaccination education with parents and finalize the documentation required by the state.

The second theme was the lack of parental engagement with vaccination education. While delivery of the vaccination education was mandatory, DE and SC reported parents were not always willing to listen or participate in the education process. Moreover, SC reported parents seeking vaccine exemptions had often conducted their own personal research on vaccines and, therefore, believed any additional vaccination education was unnecessary.

The third category included three miscellaneous responses from FL, TX, and UT. Florida reported a perceived lack of legislative and legal support when enforcing mandatory vaccination education. The lack of feedback from parents on existing vaccination education materials was reported by Texas as an obstacle.

In Utah, the greatest obstacle to providing vaccination education was how the education was recorded in the state immunization registry. While Utah's mandatory vaccination education law is new, a perceived obstacle already exists regarding how the vaccination education is recorded as part of the state immunization registry. When Utah parents input the exempted child's name into the online vaccination education module, the child's name is automatically uploaded into the state immunization registry where completion of the education is recorded. However, because there may be variance in how the child's name is logged (i.e. nickname versus given name) record duplication may become an obstacle.

### **State Immunization Registry**

States were asked if the state immunization registry system was utilized to track vaccine exemptions. All 10 states reported having a state immunization registry; however, only three states (DL, MI, and UT) recorded vaccine exemptions in the registry. Two states (AR and SC) shared plans to report vaccine exemptions in the state immunization registry at a future time.

### **Discussion**

Surprisingly, the definition of the word “mandatory” in the term mandatory vaccination education varied between the states. During interviews, all state immunization managers were asked to confirm their state required mandatory vaccination education prior to granting vaccine exemptions; however, additional interview questions revealed some states required the parent to receive education without exception, while others strongly encouraged parents to receive vaccination education before obtaining vaccine exemptions. Even though the majority of parents complied, ultimately parents still retained the right to refuse education in some states (see Table 2).

Requiring parents to undergo mandatory vaccination counseling prior to granting vaccine exemptions is a relatively new strategy to reduce exemption rates; however, the results appear promising since vaccine exemptions have decreased in some of the states who have instituted laws mandating vaccination education. For example, Washington’s 2011 law requiring parents to counsel with a HCP prior to obtaining vaccine exemptions has resulted in a significant decrease in exemption rates (Omer et al., 2017). These rates have plateaued since the implementation of legislation. Oregon has also seen a reduction in vaccine exemption rates since 2014 when mandatory vaccination education became law, from 7% in 2014 to 6.5% in 2017 (Oregon Health

Authority, 2017). Other states searching for strategies to reduce vaccination exemption rates may also want to explore mandatory vaccination education requirements for parents.

The type of vaccine exemption for which mandatory education was required also differed from state to state. Some states only required vaccination education for non-medical exemptions, such as religious or personal vaccine exemptions (see Table 2). Presumably, the rationale for requiring vaccination education only for non-medical exemptions was because parents seeking these types of vaccine exemptions do so based on misconceptions that could be corrected with education (Suryadevara et al., 2013). Medical exemptions, in contrast, originate from a HCP and are out of medical necessity. Thus, initially it may seem as though a parent whose child has a medical exemption would not benefit as much from vaccination education. However, parents exempting their children from vaccines for non-medical and medical reasons may need similar vaccination education. Indeed, vaccination education that includes information regarding school exclusion policies during VPD outbreaks would be applicable to all parents, regardless of exemption type.

Printed materials are the most common method for delivering patient education (Bastable, 2017) and may have a positive effect on parents making vaccination decisions on behalf of their children (CDC, 2017b), especially when parents have access to the printed information before the child's first vaccination visit (Vannice et al., 2011). There are, however, inherent disadvantages to utilizing printed materials to relay patient information. One sentinel study, by Yin et al. (2009), evaluated health literacy of American parents in a nationally representative study and reported a large proportion of American parents have impaired health literacy abilities (Yin et al., 2009). Therefore, inability to understand printed material is a

common issue in the U.S. (Bastable, 2017) and, consequently, could lessen the desired impact of printed vaccination education material.

Another disadvantage to providing parents with printed vaccination education resources is that they many not actually read the material. Currently, there is no information in the literature regarding how likely patients and caregivers are to read printed health-related materials. Finally, even if parents have high health-literacy skills and thoroughly read through printed materials, they do not have the immediate ability to ask questions about the printed material (Bastable, 2017). Therefore, solely utilizing printed materials to provide vaccination education may not be the most effective method of providing education for parents.

Face-to-face delivery of vaccination education was also utilized by some states with mandatory vaccination education requirements. Interacting directly with parents seeking vaccine exemptions also has advantages and disadvantages. Allowing parents to ask a HCP or LHD employee questions about vaccines may be a less structured approach, although this strategy also allows for individualization of vaccination education and, consequently, may be more effective at convincing vaccine-hesitant parents to vaccinate their children. Parents cite nurses and HCPs as reliable sources of trusted information (National Vaccine Advisory Committee, 2015; Robert Wood Johnson Foundation, 2010; Williams et al., 2013). As a result, nurses and HCPs have the ability to positively influence vaccination rates (Ames, Glenton, & Lewin, 2017; Chung, Schamel, Fisher, & Frew, 2017) and are seen as some of the most honest and ethical professions (Norman, 2017).

Face-to-face delivery of vaccination education also has disadvantages, such as the amount of time it takes to adequately address parental concerns regarding vaccines during a regularly scheduled clinic visit and the lack of standardized vaccination education. The time

required to provide quality vaccination education during a clinic visit is non-reimbursable through insurance companies, thus causing a financial disincentive for those working in healthcare to spend the time needed to thoroughly address parental vaccination concerns (Salmon, Dudley, Glanz, & Omer, 2015). Because face-to-face conversations about vaccinations lack standardization, the information provided to parents can differ drastically. In addition, the vaccination education may be delivered with bias or be incorrect due to lack of vaccine knowledge (Glanz et al., 2013).

The newest education delivery approach is technology-based, which includes various subcategories such as texting, apps, social media, websites, videos, and email methods that can effectively improve compliance with childhood immunizations (Abahussin & Albarrak, 2016). Similar to printed materials, videos and online vaccination education modules are *one-way* communication methodologies; however, online technology can be designed to provide a more interactive learning environment in which a measurable increase in vaccination knowledge and intent to vaccinate (Chou, Lin, Woung, & Tsai, 2012; Luthy et al., 2017; Odone et al., 2015). Such design may require parental interaction through the use of quiz questions and surveys.

The use of online technology for vaccination education is relatively new and little is known about its effectiveness, which is a disadvantage. However, Oregon has had a reduction in vaccine exemption rates since implementing the online module requirement (Oregon Health Authority, 2017). Another disadvantage to online technology-based vaccination education includes the inability to ask specific, individualized questions regarding vaccinations.

According to the National Vaccine Plan, it is important to evaluate the effectiveness of vaccination education materials to ensure the materials have the desired effect (United States Department of Health and Human Services, 2010). Most states with mandatory vaccination

education use indirect measures of evaluation, namely exemption rates, rather than directly measuring learning and intent to vaccinate after receiving the educational materials. While the ultimate goal of vaccination education is to decrease vaccine exemption rates, exemption rates are only one measure of the effectiveness of vaccination education. It is important to also evaluate parental learning following vaccination education and utilize parental feedback to improve educational materials.

Repetition is another model of learning that can be utilized to help retain information (Kenner & Weinerman, 2011) and influence parents to make sound decisions for their children. When combined with the need to constantly update vaccine information and VPD epidemiological data, periodic renewal of mandatory vaccination education is imperative. In this study, half of states with mandatory vaccination education required parents to renew the education, although the renewal periods differed (see Table 2). While the ideal time period for vaccination education renewal is unknown, vaccine-hesitant parents should be engaged in vaccination education at multiple points as they contemplate the benefits of vaccination and the consequences of refusing vaccinations (Glanz et al., 2013). If vaccination education is not presented on a consistent basis, parents may become misinformed on vaccination information and, as a result, refuse or delay vaccinations. Repeated presentation of vaccine education has a positive impact on parental attitudes and beliefs of vaccinations (Vannice et al., 2011).

### **Limitations**

There are several limitations to this study. While a team of vaccination experts developed the questionnaire for this study, this was the first time it was utilized. Furthermore, vaccination and vaccine exemption laws are regulated by state policy and, therefore, information regarding this topic are subject to change. Originally, Eden et al. (2017) reported 13 states/territories had

mandatory vaccination education prior to granting vaccine exemptions. Researchers were unable to contact two of the states/territories (VT and AS) for participation in this study. Inclusion of these two states/territories could affect the conclusions of this study. Additionally, there has been no follow-up on the 39 states that originally denied mandatory education prior to exemption since the data was initially collected.

Additionally, the interviewer questioned state immunization managers about how often parents needed to renew mandatory vaccination education. Researchers did not collect data, however, on who initiated the vaccination education renewal process. It is possible that in some states the parent initiates the renewal process, although some states may also initiate the renewal process by reminding parents it is time to renew the vaccination education. It is also possible that neither the parent nor the state initiated the renewal process as school districts or school nurses assumed responsibility. Because these data were not collected, it is impossible to know how the process of renewal is initiated. The difference in data across states challenges the content validity of the data, while the loose definition of mandatory education and the process of renewal challenges the face validity.

### **Recommendations for States**

State immunization managers and legislators should consider mandatory vaccination education as a strategy to reduce vaccine exemption rates. While implementing a mandatory vaccination education requirement is just one strategy to reduce vaccine exemption rates, WA and OR have already reported a decrease in exemption rates since implementing mandatory education. States should also consider extending vaccination education requirement to all types of vaccine exemptions, including information that would be applicable to all parents whose



children are exempt from vaccines since all unvaccinated children are at an increased risk for developing VPDs.

To offset disadvantages associated with print, face-to-face, and technologically-based vaccination education, perhaps the best approach to educating parents is a combination of delivery methods. Williams et al. (2013) implemented a vaccination education intervention that incorporated three learning methods: printed material, online technology, and face-to-face. The vaccination education consisted of an 8 minute video, a handout addressing common vaccine concerns, and an additional handout with written instructions for where parents could find accurate vaccination information on the Internet. Because the educational intervention was implemented at a pediatric clinic, parents also had the opportunity to have a face-to-face conversation with a HCP with whom they could discuss any questions. The combination approach improved parental attitudes regarding vaccinations, leading researchers to the conclusion that a multifaceted approach to vaccination education saves the HCP time but also allows parents to interact with the HCP (Williams et al., 2013).

### **Recommendations for Future Research**

Because the delivery of mandatory vaccination education varied so greatly between states, it is difficult to determine which delivery method is the most effective. Additional research is needed to identify which combination of methods (printed material, technological medium, or face-to-face encounters) is the most influential when educating vaccine-hesitant parents about vaccination decisions. The pilot study conducted by Williams et al. (2013) addressed the effectiveness of various methods of vaccination education. A replication of the Williams et al. (2013) study with a larger population would be helpful in identifying which

combination of methods is most effective at positively influencing parental vaccination decisions.

### **Conclusion**

Mandatory vaccination education prior to exemption is one strategy to prevent increase in vaccine exemptions. Currently, 10 states responded that they require parents to receive vaccination education prior to obtaining vaccine exemptions. Three vaccination education delivery methods were identified: printed material, face-to-face interaction, and online technology. Only half the states required parents to renew the vaccination education during the child's school career and most states evaluated the effectiveness of the vaccination education by measuring vaccine exemption rates. Two main obstacles to delivering mandatory vaccination education were identified, namely lack of resources and lack of parent engagement. Each method for vaccination education delivery has advantages and disadvantages, therefore, the most effective delivery is probably a combination of methods.

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## Appendix A

Table 1

*Interview Questions*

- 
1. Your state requires mandatory education prior to granting immunization exemption, is this correct?
  2. How is the immunization education delivered?
  3. Is the immunization education the same and standardized for all types of exemptions?
  4. How often is the immunization education renewed?
  5. How do you evaluate the effectiveness of the current immunization education?
  6. In your opinion, what is the greatest barrier to providing education prior to immunization exemption?
  7. Does your state track mandatory immunization education through the state registry?
  8. Would it be possible for us to get an electronic copy of your education materials?
  9. Do you have any other comments?
-

Table 2  
*Vaccination Education by State*

	Type of Exemption				Delivery Method	Standardized	Evaluation	Renewal
	Religious	Personal	Medical	T. Medical				
Alabama	✓*	--	N	N	Technology	Standardized	Quiz	None
Arkansas	✓	✓	✓	✓	Print material	Standardized	No response	Annually
Delaware	✓	--	✓	✓	Statement	Standardized	Exemption rates	None
Florida	✓	--	N	N	Print material	Standardized	Exemption rates	None
Michigan	✓*	✓	N	N	Face-to-face	Not standardized	Exemption rates	Variable by local health department
Oregon	✓	✓	N	N	Face-to-face	Standardized	Exemption rates	When moving from childcare to school
South Carolina	✓*	--	N	N	Face-to-face	Not standardized	Exemption rates	None
Texas	✓	✓	N	N	Print material	Standardized	No evaluation	Every 2 years
Utah	✓	✓	✓	N	Print material	Standardized	Exemption rates	Kindergarten and 7 <sup>th</sup> grade
Washington	N	✓	✓	✓	Face-to-face	Not standardized	Exemption rates	None

✓: Education required

N: Education not required for this type of exemption

\*: Required to offer but parent can refuse

--: Type of exemption not offered

Table 3  
*Vaccination Education Availability*

State	Education	Available
Alabama	Video	<a href="https://www.youtube.com/watch?v=hXc_ZEEghp4">https://www.youtube.com/watch?v=hXc_ZEEghp4</a>
Arkansas	Handout	<a href="https://www.healthy.arkansas.gov/images/uploads/pdf/2018-2019_Childcare-School_Immunization_Exemption_Application_Packet.pdf">https://www.healthy.arkansas.gov/images/uploads/pdf/2018-2019_Childcare-School_Immunization_Exemption_Application_Packet.pdf</a>
Delaware	Religious statement	<a href="https://www.doe.k12.de.us/cms/lib/DE01922744/Centricity/Domain/150/Immunization%20-%20Notarized%20Affidavit%20of%20Religious%20Belief.pdf">https://www.doe.k12.de.us/cms/lib/DE01922744/Centricity/Domain/150/Immunization%20-%20Notarized%20Affidavit%20of%20Religious%20Belief.pdf</a>
	Medical statement	<a href="https://www.doe.k12.de.us/cms/lib/DE01922744/Centricity/Domain/150/Immunization%20-%20Supplemental%20School%20Vaccine%20Exemption%20Form.pdf">https://www.doe.k12.de.us/cms/lib/DE01922744/Centricity/Domain/150/Immunization%20-%20Supplemental%20School%20Vaccine%20Exemption%20Form.pdf</a>
Florida	Handout	<a href="http://www.floridahealth.gov/programs-and-services/immunization/publications/_documents/vaccine-responsibilities-ltr-eng.pdf">http://www.floridahealth.gov/programs-and-services/immunization/publications/_documents/vaccine-responsibilities-ltr-eng.pdf</a>
Michigan	Health department employee	Not Available
Oregon	Online module	<a href="http://www.oregon.gov/oha/ph/PreventionWellness/VaccinesImmunization/GettingImmunized/Pages/non-medical-exemption.aspx">http://www.oregon.gov/oha/ph/PreventionWellness/VaccinesImmunization/GettingImmunized/Pages/non-medical-exemption.aspx</a>
	Health care provider	Not Available
South Carolina	Health department employee	Not Available
Texas	Handout	Contact Texas Department of State Health Services – Immunization Branch
Utah	Online module	Not Available
Washington	Health care provider	Not Available