

SF Community Medicine and Health

Do Restrictions of Exemptions for Immunizations Laws Work?

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Abstract

Purpose: The race for a vaccine for Covid-19 is on, but will everyone use it? The purpose of this study is to identify if the law that restricted the use of exemptions for immunizations passed in 2015 had an impact in increasing the immunization rates.

Methods: This study used a retrospective, longitudinal analysis of the of the state's vaccination coverage and the type of exemptions among the state's school districts from School Year before the law (SY) 2008 to SY 2019 after the law passed in 2015. A liner regression analysis was used to determine if there was a significant difference in the number of immunization's overall, and a reduction in the use of religious and or medical exemptions since the law was enacted.

Results: There was a slight, but not significant increase in the immunization rate from 94 to 95% overall. A significant change in the type of exemptions was found with an increase ($r=98$) to the use of religious ($t=29.6$, $p=0.01$) but not for medical exemptions ($t=-1.66$, $p=0.14$) for the four years after the law was enacted.

Conclusion: The use of legal structures to get wide vaccinations illustrates lessons for Covid-19. The passage of a law that restricted how medical and religious exemptions could be obtained resulted in reduction of medical and an increase in religious exemptions. It did not significantly increase the overall immunization rate of the state. A more restrictive law that makes it more difficult to use religious exemptions might be needed.

Keywords: Immunization; Laws; Exceptions; Religious exemptions

Background

The race to develop and distribute a vaccine for Covid-19 is going full speed. However, the history of vaccine development and usage of said vaccine has had mixed and varied results, especially in the United States. The 2015 National Immunization Survey stated that only 72.2% of children aged 19 to 35 months in the United States were on target for their vaccine schedule [1]. This might help to explain why in 2014, the United States (U.S.) had a record high number (668) of measles cases [1]. According to Center for Disease Control, in some areas in the U.S., the rate of vaccinations had fallen below the 90 to 95 percent levels. This is the level that is required to achieve "herd immunity" which is the threshold where enough people are immune to a disease that transmission chains are broken [1-4]. This also protects those who have not been or cannot be immunized against exposure to the measles virus, which is one of the most contagious viruses with a 90% rate of exposure to contagion.

The state with the lowest levels of immunizations rates were California, Colorado, Connecticut, Kentucky, Arizona and Washington [1-10]. A secondary issue is that if those without immunization tended to live in close proximity to each other which will enable to virus to spread quickly. In 2014, Illinois has had an above 90% immunization rate for the state for most of the 2000's. However, across the state it was shown that over 300 schools in Illinois had 10% or more of children who were not vaccinated fully [1,6,7]. This meant that one in ten schools had children that exceed the states minimum standard [9-12].

Those 2014 findings coupled with outbreaks in the United States, of the measles virus meant that several states including Illinois enacted law which limited or discourage a range of vaccine exemptions. The exemptions by state are as follows: California was the strictest law which eliminated all nonmedical exemptions, Colorado: School exemption data will be posted, Connecticut: Religious exemption requests must be notarized; due annually, Illinois: For religious exemptions, a parent

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Received Date: 07 Jul 2020

Accepted Date: 28 Jul 2020

Published Date: 31 Jul 2020

Citation: Downey LV. Do Restrictions of Exemptions for Immunizations Laws Work?. *SF Community Med Health*. 2020; 1(1): 1002.

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needs a certificate signed by a health care provider saying that vaccine information has been provided, Utah: A parent must receive an in-person consultation with a health care professional or complete an online education requirement and Vermont: Philosophical exemption was eliminated; school immunization rates must be provided to parents annually [13-16].

The enactment of these exemptions did impact the number of cases for a few years. However, as of October of 2019, the CDC found that 1,095 people have been diagnosed with measles, which the country's biggest outbreak in decades [1].

However, only 55 people in California have come down with measles this year, in part because of the state's laws [1]. Despite the strict law that was enacted in 2015 recent studies have found that the kindergarten vaccination rate in California dropped to 94.8% in 2018-19 from 95.1% in 2017-18 and 95.6% the previous year [16].

This raises the question about what impact do these more restrictive laws actually have once they are passed. Some researchers found that in the repeal of nonmedical exemptions in California, it was only partially effective in improving vaccination coverage [17,18]. Instead parents seemed to have gamed the system and moved or changed their exemptions from a medical to a non-medical exemption [17,18].

The same phenomenon might be occurring in Illinois. In fact, around 19,000 Illinois school kids used religious exemptions for vaccines last year (2019), a 46 percent jump from years past. Meanwhile, nine people in the state have come down with measles so far this year. While not a large number, it's the most since 2015. A study by Dor and Mogdaderi illustrated that just passing restrictive laws was not enough as they found despite there being an increase in overall immunization rates by 2-5% there was also an increase of 2% in parents using alternatives to get around the new law [18].

This is a concern in part due to what a recent report has shown which is that Cook County Illinois has the highest risk for a major outbreak of any county in the nation [2]. Cook County is listed as the most at-risk, followed by Los Angeles County. While the number of confirmed measles cases remains low "because of the presence of major international airports," Cook County and Los Angeles County "could serve as the fulcrum of continuous importation of the measles virus into the USA," according to the study [2].

The purpose of this study is to identify if the change in the law passed in 2015 had the most impact in increasing the immunization rates. In looking at the entire state it is important to drill down to the county school district level as Non-Medical Exemptions (NME) may not be distributed evenly with the states both before and after passage and implementation of new laws. This is why it is important to look at changes before and after the passage of the law as several counties even in the states such as Illinois with the more restrictive laws have "hotspots", places with high levels of NMEs, even within larger metropolitan areas. The secondary purpose is to examine if there has been a change in the use of medical and religious exemptions before and after the law. This is measured to examine if there has been a change in which exemption parents are using and if that has had an impact on overall immunization rates. Thus it could illustrate where the change had and or is starting to have the least impact.

Methods

The study used a retrospective, longitudinal analysis of Illinois

state immunization records on vaccination coverage and exemptions among the states school districts from School Year (SY) 2008 to SY 2019 [19]. The outcome measures were school level entry vaccination coverage rates for 2-dose Measles, Mumps, and Rubella (MMR) and 4-dose DTaP vaccines. The study focused on vaccination coverage for MMR and DTaP due to the high communicability of the diseases targeted by these vaccines, and the burden of recent measles and pertussis outbreaks across the US and in Illinois. Secondary outcome measures included rate of school level exemptions (i.e., medical, religious, philosophical) to school immunization requirements. The use of school level data allowed the study to examine the location and type of school where so called "hot spots" of low levels of immunization exists before and after the law was passed. Those results indicated where the reduction in exemptions has had the largest impact and where the outliers exist. A linear regression analysis was used to see if there has been any significant difference in the immunizations rate overall, and the reduction in the use of religious and or medical exemptions since the law was enacted in 2015-16 academic school year to the 2018-2019 academic school year.

Results

The law passed in Illinois did produce some changes however, like was seen in California, the change has not been shown to be permanent. Prior to the enactment of the more restrictive law there was a trend. For non-public schools since 2009-10 to 2013-14 the compliance rate has remained stable at 98%. In 2009-10 the compliance rate for public schools was 96% and rose to 97% for 2013-14. The lowest rate of compliance was in 2012-13 when 2.5% of all public-school students were not in compliance.

The five-year trend in public schools from years 2010 to 2014-15 saw an upward trajectory with 0.3% in 2010-11 non-compliance with a religious objection to 0.06 % by 2014-15. The five-year trend for nonpublic schools for religious exemptions was in years 2010-11 of 1% to 1.2% by 2014-15. This was highest in nonpublic schools for the MMR at 1.2% of the total. The year 2014-15 was the highest percentage of students in non-public schools citing religious objections for MMR over the previous five years. The five-year trend from 2010-2015 for non-compliance for medical reason for public schools was 0.2% of the total in 10-11 which was the percentage for the next five years. This was not the case for nonpublic schools with the highest percentage of students with medical exemptions in 2014-15 of 0.2 to 0.3% of the totals. This was an increase from the 0.1% of the totals in 2010-11.

There was a possible reason as to why non-compliance rates did see changes in the year after the law was enacted. Using a linear regression analysis there was a significant relationship with an ($r=98$) to the use of religious ($t=29.6$, $p=0.01$) but not for medical exemptions ($t=-1.66$, $p=0.14$) for the four years after the law was enacted. This was in part due to a drop initially in the numbers of both religious and medical exemptions. However, the number of religious exemptions soon rose. In academic year 2015-16 religious objections were down to 15,652 and medical were 3,496. In 2017-18, with 2,192,648 students over all there started to be a slight increase in religious exemptions to 16,444 and medical at 3,790. In 2017-18 this increased despite a slight drop in the number of students overall at 2,171,075. The number of religious exemptions increased to 17,697 and medical dropped to 3,156. The numbers of religious exemptions increased even more in 2018-19 again despite a slight reduction in the number of students at 2, 131,685. The religious objections grew to 19,169 and medical dropped to 2,967. As of July 2019, about 19,000 Illinois school kids

used religious exemptions for vaccines. This was a 46 percent jump from previous year. At the end of 2019 a total of nine people in the state have come down with measles, which was the most since 2015.

Discussion

Restrictive vaccine laws in Illinois had an impact. It reduced and slowed the growth of the number of medical exemptions in the state. It did not however, have a robust and long impact on the number of religious exemptions. One year after the law was enacted in academic year 2015-16 there was a slight drop in religious exemptions. This was similar to what California saw in the years after it enacted its law [16]. The next year 2016-17 saw an increase in the number of religious exemptions which has continued to climb for every successive year. Similar to what was seen by Dor and Mogdaderi, there was a move from using one type of exemption, medical to substituting it with the other remaining exemption [17-18].

The impact of the law on overall immunization rates was also less than expected. Despite the law's enactment, the rate remained in the 96-97 for public schools and 97-98 rate for private schools. This was a similar range for the immunization rate for both public and private schools prior to the law. The two findings of a change from usage of medical to an increase to religious exemptions and no significant impact on overall state immunization rates might indicate the law had a limited if any impact. This again is similar to what was seen even in states such as California who had even more restrictive laws that did not allow for religious exemption [16-18]. This would indicate that a law is not enough to increase overall immunizations rates to provide the protection they would provide.

Limitations

This study only looked at one state that passed a restrictive exemption law. Illinois is only one of six states in the United States to pass a law restricting the type of exemptions against immunizations. A comparison to those other states might have given the study more external validity. However, each state has its own particular set of exemption rules, thus a direct comparison could not be done.

The use of state public health data could be impacted by the way in which each school reports its data. Depending on how the school interprets the required reporting may have resulted in an under or over counting of the actual immunization rates.

Conclusion

The results of this study illustrates some of the challenges that will lay ahead in reaching local and global Covid-19 vaccinations. The passage of a law that restricted the way in which medical and religious exemptions resulted in reduction of medical and an increase in religious exemptions. Although, that occurred the state did not see a significant drop or increase in the rate of immunization within public and private schools in the state. This means that a more restrictive law might have to be put in place. Studies have shown however, in states that have passed such laws, that other interventions might be needed to increase the immunization rates across the state. This indicated that a two-prong approach might be needed, one that is legislatively based and one that has a community-based education program. Together, these approaches might increase immunizations rates and provide the protection that children need against numerous preventable diseases that can cause death and disability. This is important to understand as it can help identify where the States Public Health Department should use its resources to protect the wider community. This is

because studies have shown that it is critical to achieve community buy-in through targeted education campaigns, engaging healthcare providers and community organizations in order to see a continued reduction in NME and a subsequent increase in vaccination rates [3,4,18]. This is the only way to reduce the risk of these preventable diseases.

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