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United States Senate Committee on Health, Education, Labor, and Pensions
"Vaccines Save Lives: What is Driving Preventable Disease Outbreaks?"
March 5th, 2019

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Good Morning Chairman Alexander, Ranking Member Murray, other members of the committee, and interested parties. I am Dr. Jon McCullers, the Chair of the Department of Pediatrics at the University of Tennessee Health Science Center and the Pediatrician-in-Chief at Le Bonheur Children's Hospital in Memphis. As someone who has devoted his career to the child health sphere, I firmly believe that there is no more precious resource than our children, and that they should be protected by all means available to us. They truly are the future of this nation. As the lead pediatrician for one of our nation's top Children's Hospitals, I feel it is my duty and privilege to advocate on behalf of children everywhere. The declining rates of childhood vaccination in this nation and, indeed, worldwide, now prove to be a threat to this future.

The childhood vaccination program of the United States has proven to be one of the most powerful public health achievements in our history. In the first half of the 20th century, there were more than 1 million infections and more than 10,000 deaths every year from diseases which are now preventable by childhood vaccines. To put that into perspective in the current day, without childhood vaccines the States of Tennessee and Washington would be dealing with between 24,000 and 37,000 vaccine preventable diseases in an average year, and between 250 and 275 children would die, most of them under the age of 5. Measles alone caused more than a half million illnesses every year in the first half of the last century, and between 450 and 500 children died annually. Measles is a viral respiratory disease, characterized by fever, cough, sore throat, and a rash. It is a very dangerous disease – about 1 in a thousand infected persons develop encephalitis, an infection of the brain, 1 in a thousand develop severe pneumonia, and about half of those with these severe complications die. Measles is also highly contagious - while some individuals infected with some severe infectious agents like influenza only infect 1-2 other persons on average, a person infected with measles infects 20-30 other people on average if they are unvaccinated. There is no specific treatment for measles, so vaccination is the only

means of preventing these outcomes. With the introduction of a safe and effective vaccine for measles in 1963 and improved public health efforts to see that nearly every child received it, new cases of measles arising in the United States were entirely eliminated by the year 2000. 2006 saw our lowest case number with only 55 illnesses, all imported from other countries, and no deaths.

Unfortunately, the issues of vaccine opposition and vaccine hesitancy are now impairing our ability to effectively insure appropriate vaccine coverage, aided by State laws that make it easier to avoid vaccination. The last decade has brought numerous outbreaks in the United States, including several that are ongoing at present. These outbreaks are strongly linked to vaccine refusal, and in particular to clustering of unvaccinated individuals in specific communities or regions. Cases are introduced from

unvaccinated individuals traveling here from other countries, and spread rapidly through communities with vaccination rates under the level needed for herd immunity. 372 persons contracted measles during 17 different outbreaks in the United States in 2018, and 159 have been infected in the first 7 weeks of 2019. This problem is not limited to the US...many countries worldwide are dealing with similar outbreaks. As a single example, there were 0 cases of measles in Brazil in 2017, but more than 10,000 cases occurred in 2018 when infected travelers brought measles into that country.

The vaccine against measles is very safe and very effective. One dose provides complete protection in about 93% of individuals, while a second dose raises that level of protection to 97%. Very few side effects occur. About 1 in 10 children experience fever for 1-2 days, and about 1 in 3000 to 1 in 4000 have a simple seizure associated with fever with no lasting effects. Allergic reactions are very rare and typically very mild. No reactions or adverse effects of a more severe nature have been associated with the vaccine, despite extensive use, monitoring, and study for many decades. When compared to the outcomes of the disease itself, it is easy to see why doctors and public health officials universally recommend on time and complete vaccination.

Unfortunately, vaccine refusal is high and getting worse in many states. This issue is complicated by the variety of state based policies regarding exemption from vaccination and the methods of counseling about vaccines. Three states currently only allow medical exemptions from vaccination – California, Mississippi, and West Virginia. These states all have vaccination rates for measles at the age of school entry at 97% or better – above the 96% level needed for herd immunity. Thirty states allow for religious exemptions to vaccines, and 17 allow both religious and personal exemption. The rate of parents claiming non-medical exemptions to vaccines is 2.5 times higher in states that allow both religious and philosophical exemptions compared to religious exemptions alone – evidence that allowing multiple pathways to exemption worsens this problem. Of the 5 states that have less than 91% vaccination rates, Colorado, Idaho, Indiana, Kansas, and Washington, three allow both types of exemption. Although some states such as Tennessee have reasonable rates currently (97%) while allowing religious exemptions only, the rate of non-medical exemptions has nearly tripled under this policy in the past decade, and it can be predicted that this will continue to rise. California is an illustrative case...that state allowed both types of exemptions earlier in the decade, but non-medical exemptions rose to 3.3% in 2013, the overall level of vaccination dropped below the level needed for herd immunity, and the state experienced a

large outbreak of measles in 2014-2015 with spread of the disease in Disneyland the park theme parks. California subsequently eliminated non-medical exemptions and the vaccination rate has returned to 97%. The American Academy of Pediatrics has suggested that the practice of delaying or spacing out childhood vaccines contributed to that outbreak.

Opposition to vaccines began in England in the early 19th century after introduction of Jenner's cowpox vaccine for the dangerous disease smallpox. People objected on religious grounds and due to the irrational fear of becoming a cow. Opposition in the United States became common in the 1850s, resulting in lawsuits against states that mandated vaccination, culminating in a Supreme Court opinion in 1905 that found in favor of states' right to enforce mandatory vaccination as a public health tool. Although the concept of vaccination opposition is not new, the rise in frequency and ease of rapid international travel has made it much more dangerous today than it was a century ago when vaccine refusers may have been isolated from others. The reasons for refusing vaccination have historically been

very heterogeneous. In 1998 the Wakefield Hoax unified many vaccine refusers by providing a single platform for them using a false narrative – that childhood vaccines caused unsuspected, long term medical problems that had been missed by scientists. In response, a great deal of scientific work was done to prove that there is no link between vaccines and conditions such as autism. The Institute of Medicine has now declared that the evidence is thorough and convincing on this point. The anti-vaccination movement at this time, therefore, no longer has a platform or any credibility and has returned to a more heterogeneous group of objections.

In the present day, however, social media and the amplification of minor theories through rapid and diffuse channels of communication, coupled with instant reinforcement in the absence of authoritative opinions, is now driving a new phenomenon somewhat distinct from vaccine opposition, termed vaccine hesitancy. When parents get much of their information from the internet or social media platforms such as twitter and Facebook, reading these fringe ideas in the absence of accurate information can lead to understandable concern and confusion. These parents may thus be hesitant to get their children vaccinated without more information. The role of the pediatrician is very important with these families – we must do a better job of communicating at many levels, but particularly at the point of contact in the well child visit when vaccination should take place. Half of the time when counseled appropriately, those with vaccine hesitancy will agree to have their children vaccinated on time. In the other half, little seems to help at that stage, so the solution must be earlier, in the form of policy or broader educational efforts.

In closing, I would like to thank the Committee for addressing this important issue. Vaccine refusal is one of the growing public health threats of our time. If we continue to allow non-medical exemptions to vaccination, rates of vaccination will continue to fall and more outbreaks will undoubtedly follow. As a leader at a Children's Hospital, I have a unique perspective on this, as Children's Hospitals are regional and sometime national resources. Le Bonheur Children's Hospital sits in the corner of Tennessee next to Arkansas and Mississippi, and serves a large number of children from 7 different states as well as providing high level specialty care for select diseases to children across the United States. Tennessee, Arkansas, and Mississippi all have different policies for granting exemptions to vaccines, which creates a tremendous problem to us and a threat to the children we serve, many of whom are too young to be

vaccinated or are immunocompromised and more prone to severe diseases. I urge the Committee to consider solutions that will both harmonize public health policy in this area and will also protect children as they grow up to become the next generation.