The Pharmacists' Role in Disease Outbreaks: Navigating the Dynamics of Uncertainty Before, During, and After Disease Outbreaks

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Vaccination rates are on the decline as parents avoid doctor's visits with their children. In addition, the antivaccination movement has led to a significant portion of the population remaining unvaccinated or undervaccinated. Outbreaks in the United States within the past year have highlighted the need for better education and communication regarding the efficacy and safety of vaccinations as well as important steps to reduce disease transmission. Patients may be fearful and have questions about how these outbreaks will affect themselves and their families, especially those in immunocompromised states and pregnant women. Pharmacists are poised to provide this education and start a dialogue with patients and other health care professionals with regard to disease outbreaks. Additionally, in times of outbreak, pharmacists encounter obscure questions from both healthy and at-risk populations that fear contraction of a particular disease. The purpose of this commentary is to describe previous outbreaks and to explore the pharmacists' role in disease prevention.

J Pediatr Pharmacol Ther 2020;25(5):384–389

DOI: 10.5863/1551-6776-25.5.384

Introduction

Pharmacists are consistently seen as the most accessible health care provider.¹ Prior to, during, and after an outbreak of a communicable disease, pharmacists are present and able to provide up-to-date information on transmission minimization, vaccination, and appropriate treatments. Pharmacists play a significant role in both advocating for proper vaccination and assisting in times of an outbreak. Community pharmacists have implemented programs that expand vaccination access to patients within their communities. Hospital pharmacists educate and recommend appropriate vaccine practices upon hospital admission, during a patient's length of stay, or upon discharge. Regardless of setting, all pharmacists can ensure they are providing continuous education on vaccinations during a patient encounter to proactively ensure patients are current with all recommended vaccines.

The Lancet's 1998 publishing of Wakefield and colleagues' investigation "Ileal-Lymphoid-Nodular Hyperplasia, Non-specific Colitis, and Pervasive Developmental Disorder in Children"² sent shockwaves that are still electrifyingly prevalent in the controversial debate on vaccinations. Despite the article's retraction in 2010, the article's implications that autism was linked to the measles, mumps, and rubella (MMR) vaccine augmented an antivaccination perspective among thousands.³ *The Lancet* commented that Wakefield and his colleagues were ultimately incorrect in their assertions.⁴ Even so, the article by Wakefield et al² catalyzed an antivaccination movement, and with

the current technologic innovations and rise of social media platforms, this antivaccination belief now has significant staying power. Since the 1998 publication, concerns about vaccines have persisted despite literature findings on the importance of vaccinations, and specifically, the lack of evidence from Wakefield and colleagues' conclusion. While measles was eliminated in the United States in 2000, recent outbreaks suggest that an increase in antivaccination practices has led to a resurgence of the disease.⁵ This can also be seen with other diseases that were once considered eliminated.^{6,7}

During disease outbreaks, pharmacists have a vital role to play as members of the health care team by ensuring individuals identified as having the disease are isolated and by providing recommendations on how individuals can safely and effectively protect themselves to mitigate transmission. As healthy patients and parents attempt to avoid health care settings, vaccination rates can drop. It is important for pharmacists to remain vigilant learners, especially as new diseases arise, and previous diseases resurge. Pharmacists educate the population on how vaccinations play an important role in safe public health practices as well as provide services to aid individuals in preparation for future, health-related uncertainties. Overall, the role of pharmacists is crucial when discussing immunizations and related, effective strategies to maintaining safe, healthy lifestyles. The purpose of this commentary is to describe previous outbreaks and the evolving pharmacist's role prior to, during, and following an outbreak of a communicable disease.

History of Outbreaks

Throughout history, vaccinations have increasingly aided in outbreak control, reduction, and sometimes eradication of a specific disease. This can be seen with 4 specific examples: the 1918 influenza pandemic, introduction in the United States of the first tetanus-toxoid containing vaccine in the 1940s, the rise of polio outbreaks in the 1950s prior to the creation of polio vaccine, and the substantial hepatitis B outbreaks prior to 1982.

Influenza, also referred to as the flu, is a contagious respiratory disease that caused one of the most severe pandemics in recent history. In 1918 the virus spread globally, with 3 waves of illness, and an estimated 500 million infected and at least 50 million deaths worldwide. Non-pharmacologic modalities were the only solutions, including quarantine procedures and limitations on public gatherings. Since then, innovations such as an annual vaccine and antiviral medications have been developed to mitigate continued complications with the flu.⁸ While influenza vaccine was developed in the 1940s, annual vaccination was not recommended by the US Surgeon General until 1960. Even then, it was only recommended for people with chronic debilitating disease, people 65 years or older, and pregnant women. Following several more severe influenza outbreaks, the Advisory Committee on Immunization Practices now recommends influenza vaccination yearly in those older than 6 months.⁹ Yearly vaccination is necessary owing to a reduced immune response over time by patients as well as acquired mutations by the influenza virus.^{10,11} Preliminary communications assessing the characteristics of the novel coronavirus, known as COVID-19, suggest this virus may similarly mutate and, if so, repeated vaccination may also be necessary. Such virus characteristics will be better defined over time and once an effective vaccine is discovered, administered widely, and after careful assessment for virus mutation(s) and duration of antiviral protection following a single vaccination.

Tetanus, another life-threatening disease, is not spread from person-to-person, but instead can infect a host through breaks in the skin by contaminated objects. In the 1940s, there were approximately 500 to 600 cases per year in the United States. The vaccination program created in the late 1940s successfully reduced the number of cases per year to approximately 30.¹² Although its specific mode of transmission is not person-to-person, this is a prime example of how a vaccination program aids in controlling a well-known, life-threatening disease.

As another example, polio is a deadly disease that is transmitted person-to-person and results in lifelong paralysis. Prior to the creation and availability of the trivalent inactivated poliovirus vaccine in 1955 along with the oral poliovirus vaccine in 1963, polio outbreaks caused more than 15,000 cases each year. Quarantines

were prevalent during this time to avoid transmission of this contagious disease. Since 1979, no cases of polio have been reported to originate within the United States.¹³ While polio still exists in other countries, this vaccination has protected and continues to protect against the virus.

While not fully eradicating the disease, hepatitis B vaccination shows a similar progression; over 1 billion doses of hepatitis B vaccine have been used worldwide and as a result, chronic infection has been reduced in children from rates between 8% and 15%, to a rate of less than 1%.¹⁴ Because this disease is spread through blood or other bodily fluids and is commonly transmitted from mother to baby during birth, vaccination has worked to prevent the ease of transmission. As a whole, these historical examples provide foundational support regarding the importance and effectiveness of vaccinations for outbreak prevention.

The Pharmacist's Role

Primarily seen as "medication experts," pharmacists have the unique ability to interact with patients in community practice sites on a regular basis with regard to immunization education for preventable diseases prior to an outbreak. The US Centers for Disease Control and Prevention (CDC) comments that, "pharmacists are a crucial community source of information on vaccinations for potentially life-threatening diseases, like measles." In 2009, pharmacists in all 50 states were allowed to obtain certification to administer the influenza vaccine, while 46 states allowed pharmacists to administer all adult vaccinations.¹⁵ Certain restrictions still exist in many states, specifically regarding administering vaccines to pediatric populations; however, the community pharmacist is an easily and readily accessible immunizer to proactively aid in prevention of outbreaks. Of note, it has been documented that 90% of Americans live within 5 miles of a pharmacy and 86% of community pharmacy pharmacists are authorized to administer immunizations. There has been an increase in pharmacist-administered influenza vaccinations from 20% in 2010–2011 to 25% in 2014–2015.¹⁶ This alone shows the impact a pharmacist can have not only at administering immunizations, but also at educating patients about them. In similar outpatient settings, a 17-month pharmacist-driven immunization program for indigent and uninsured patients highlighted equal success, as more than 500 patients were notified of their eligibility for immunizations and 1878 doses of vaccines were delivered.¹⁷ A 2016 meta-analysis¹⁸ demonstrated an increase in vaccinations when a pharmacist was involved as an educator, facilitator, or administrator versus vaccination without pharmacist involvement. Specifically for influenza, Drozd et al¹⁹ reported that as states amended legislation to allow pharmacists to administer, the percentage of influenza-vaccinated adult patients increased from 32.2% in 2003 to 40.3%

in 2013. Moreover, a 2014 survey regarding accessibility to pharmacist-administered influenza immunizations found that approximately one-third of the 1502 total respondents stated they would not have been vaccinated that year if pharmacist-administered vaccinations had not been available.²⁰ Pharmacist vaccination administration can also be done at a lower cost and easier convenience for patients.²¹

Community pharmacists can also identify patients who exhibit particular signs and symptoms of a disease during an outbreak. Pharmacists can collect information, assess, and provide recommendations to patients for transmission prevention. By the community pharmacist leading these continuing immunization programs and initiatives, patients can be prepared for future outbreaks.

During an inpatient admission, a patient can interact with a pharmacist or pharmacy staff through medication reconciliation or discharge education. Pharmacists who round with multidisciplinary teams can prospectively review a patient's vaccination history and provide recommendations to vaccinate before discharge. Inpatient pharmacist and pharmacy student programs have shown increases in discharge vaccination rates.^{22,23} During admission medication reconciliation, pharmacists and pharmacy interns can identify, document, and inform the health care team of a patient's vaccination history and willingness to discuss recommended vaccinations. These opportunities for pharmacist-patient interaction provide crucial time for vaccination education and counseling prior to an outbreak occurrence.

While during an outbreak vaccination remains equally important, the information a pharmacist can provide may change. In the last year, the measles and novel coronavirus outbreaks in the United States have created further discussion on vaccinations and necessary strategies to prevent transmission. As a member of the health care team, the pharmacist's role has become one that is more important than ever before. First and foremost, it is vital to consider where outbreaks are occurring because this increases the risk of exposure and contracting infection. Individuals who have been traveling outside the United States have been noted to contribute to the outbreaks themselves. Additionally, it is crucial to identify high-risk groups, such as pregnant and immunocompromised patients, and communicate specific vaccination recommendations to them.^{24,25} Despite measles' elimination in 2000 due to vaccine usage, the CDC reported approximately 1000 cases of measles across the United States in September of 2019.²⁶ Furthermore, a 2020 study²⁷ indicated that the current COVID-19 pandemic could be a contributing factor to the decline in vaccinations of children and vaccine orders, both of which could lead to increased risk of outbreaks in vaccine-preventable diseases, like measles. Pharmacists have been instrumental in the dissemination of information and resources during

times of resurgence.^{28,29}

COVID-19 is creating similar clamor with a growing amount of cases globally. Because no specific vaccination currently exists, pharmacists can directly advise the public and their patients on preventive measures, such as frequently washing hands, practicing social distancing, and self-quarantining for 14 days if travel history includes affected areas or contact with infected individuals.^{30,31} Additionally, pharmacists can share CDC best practices in coughing and sneezing etiquette and the appropriate use of face-coverings.³² Similarly to the previously mentioned outbreaks, it requires understanding of where the reported cases currently are. It is crucial during this ongoing outbreak to provide evidence-based advice on what is currently known regarding COVID-19, what credible resources can be used to stay informed and their access points, and to reassure individuals that fear can disrupt fact. If a vaccine is developed, pharmacists can further assist by mobilizing community resources to expand access to patients and to assess patient-specific desirability of specific vaccines if multiple vaccine variants are clinically available, and as noted above, if viral mutations are substantial, the need for repeated (e.g., annual) revaccination.

With the current novel coronavirus outbreak, pharmacists can be pivotal in ensuring infected patients are appropriately isolated and proper source control is strictly followed throughout the health system. In Taiwan, community pharmacies have been an important part in limiting virus spread through community education and taking on responsibility to distribute and ration surgical masks.³³ Inpatient pharmacists can continue to educate their patients and develop accountability for their peers to ensure all safety policies are followed during this outbreak. New strategies and procedures are being implemented by pharmacists during the current COVID-19 outbreak; these approaches include changes in dispensing practices, proactively ensuring their patients can continue taking their chronic medications through shortages (e.g., hydroxychloroquine for their lupus patients), and increased involvement in point-of-care testing.^{34,35} This later development of increased point-of-care testing by pharmacists underscores their ready availability as noted above and professional competence. As various therapies are tested internationally and domestically, pharmacists must continue to review the published literature and advocate for opportunities for investigational medications.³⁰ As governments and businesses begin to reopen, pharmacists and pharmacy students can be an integral part of programs to trace contacts and assist with clinical telehealth services.³⁶ It is crucial that health care professionals and patients work together to recognize these current areas of outbreak, understand ways to mitigate the continuing spread, and stay consistently educated on new reports.

Recently, 12 national pharmacy organizations have

released a joint policy recommendation to combat the COVID-19 pandemic.³⁷ In summary, the statement discusses 4 policy recommendations: authorization of test-treat-immunize, ease of operational barriers to address workforce and workflow issues, addressing shortages and continuity of care, and reimbursement for services. These recommendations, if accepted by the Secretary of Health and Human Services, would afford pharmacists expanded roles in areas where they have already received training. These roles could include expansion of ambulatory care services to test and treat patients for influenza, streptococcal infection, and COVID-19; administering a broader range of immunizations; and evaluating and managing medications independently for chronic disease states, therapeutic interchanges, and refill authorizations. The recommendations also advocate for a temporary loosening of regulations for pharmacists and technicians to work across state borders, for technicians to work in more advanced roles, and for tasks to be completed remotely when possible. The statement calls for better transparency with medication shortages, more flexibility with the use of 503A and 503B pharmacy compounders, and expanded authorization for pharmacists to conduct therapeutic interchange and substitution without authorization, as appropriate.³⁷ New guidance from the US Department of Health and Human Services authorizes pharmacists to order and administer COVID-19 tests.³⁸ Pharmacists can continue to look for these opportunities to assist in times of crisis.

Across settings, developing rapport with their patients is necessary as all pharmacists recommend proper immunization schedules and provide support during outbreaks. Trust between patients and health care professionals and lobbying for patient advocacy help to build relationships and to enhance the communication between provider and patient. With that trust, effective counseling is possible. Educational tools, resources, and clarifications on vaccinations and the current status of an outbreak during those counseling sessions aid in that patient advocacy role. If hesitations exist, express empathy and hear patients' concerns. Specifically during outbreaks, it is important that pharmacies remain open for the public while still abiding by scientifically sound policies regarding social distancing and proper hygiene maintenance. Pharmacists should encourage patients to take their health and the health of those around them seriously.

For preventable diseases, it is not too late to vaccinate and it is important that pharmacists stress an individualized approach to the immunization schedule within the patient care process. Routine health maintenance including regular vaccinations may fall by the wayside in an outbreak setting. During the recent COVID-19 outbreak, administration of the MMR vaccine was reduced by 50%. Reductions were also seen in several other vaccinations including those for diphtheria and pertussis (42%) and human papillomavirus (73%).³⁹

The American Academy of Pediatrics and the American Association of Family Physicians have urged practitioners to maintain vaccination schedules to maintain herd immunity for other communicable diseases that have since been eradicated.^{40,41} The CDC has recommended continuing childhood immunizations and prioritizing immunization in those younger than 24 months when resources for well-child visits are limited.⁴² The CDC is currently recommending postponement of some adult preventative care measures, including adult immunizations, unless there is another reason for a face-to-face meeting.⁴³ Pharmacists can continue to monitor these recommendations and modify their practice.

While pharmacists have extensive history with providing outpatient immunizations, regulations have historically placed limits on the types of vaccines and age groups that can receive them.⁴⁴ In 2018, the Pediatric Pharmacy Advocacy Group published a position paper advocating for pharmacist immunizations for vaccination schedules.⁴⁵ Others have discussed the barriers to implementation, namely regulation and physician and parental attitudes.⁴⁴ In times of an outbreak, pharmacists are well positioned to further advocate and expand their roles to meet this important community need.

Disease outbreaks create a lot of uncertainty and these types of open communication from all health care providers are important. No matter where the practice site, it is vital for pharmacists to create educational conversations with peers and patients on proper immunizations for preventable diseases. Ultimately, this will help ensure the development of engaged, health-literate patients and prevent future outbreaks by recommending appropriate immunizations of vaccines. After an outbreak, many of the roles and responsibilities of the pharmacists prior to and during an outbreak will continue as communities reopen. Pharmacists should always do their due diligence to ensure that after an outbreak, proactive measures are in place for future ones.

Conclusions

Pharmacists are valuable members before, during, and after response to an outbreak. As the most accessible health care provider, pharmacists provide recommendations for and administer vaccinations, disseminate evidence-based advice regarding disease transmission, and contribute to reducing the spread of disease in their communities and health care settings. Disease outbreaks can be unnerving for patients and caregivers, but through multidisciplinary teams, pharmacists can alleviate public concern and engage in practices that support the community.

ARTICLE INFORMATION

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Disclosure The authors declare no conflicts or financial interest in any product or service mentioned in the manuscript, including grants, equipment, medications, employment, gifts, and honoraria.

Ethical Approval and Informed Consent Given the nature of this study, it was exempt from institution review board/ethics committee review.

Accepted April 19, 2020

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