



*A LifeBridge Health Center*

**CARE BRAVELY**

**Organization:** Sinai Hospital/Lifebridge Health

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**Solution Title:** Measles Met its Match in Baltimore: How Sinai Hospital and Public Health Officials Partnered to Prevent an Outbreak

**Program/Project Description, including Goals:**

During an education session at the 2019 Maryland Patient Safety Center conference in downtown Baltimore, Sinai Hospital Infection Preventionists received an urgent text with a report of Measles at a local Orthodox Jewish school. Secondary exposures were likely. The IP's got to work. While verifying the limited details available, they alerted key Sinai Hospital personnel and prepared for an influx of additional cases and worried well into the Emergency Department and outpatient practices/clinics.

Despite the high vaccination rate among Jewish private school students in Baltimore, Sinai leaders understood this was not a typical community outbreak scenario and had the potential to escalate quickly. Why? The Orthodox Jewish community is known for large families living within a relatively dense geographic area crossing the Baltimore City/Baltimore County border. Sabbath and holiday prayer services are well-attended by both community members and guests and run concurrent children's playgroups. With the Passover holiday approaching in a few short weeks, many Baltimore residents planned travel to Measles-affected areas in New York, New Jersey, and Israel- among other hotspots- to stay with friends and family and attend synagogue services there. Those who weren't traveling were likely to host guests in Baltimore, and with many outbreak zip codes located within a short drive along the I-95 corridor, a major outbreak seemed inevitable.

The recent Oakland County, Michigan Measles outbreak had everyone on alert. Several cases of Measles were confirmed in Orthodox Jewish adults over 35 who had received 1 dose of MMR as children, which provides approximately 93% protection. Some were calling friends and family in Baltimore to share personal stories of an incapacitating week of illness with Measles, and to encourage their loved ones to get an MMR booster. The Jewish community in Oakland County responded to the initial wave of Measles cases by organizing synagogue-based vaccine clinics, containing the total confirmed cases to 44.

But Sinai Hospital was not content to react once an outbreak was declared. After a single confirmed case in Maryland, imported from another community, Sinai Hospital leadership took immediate action to prevent a similar outbreak in Baltimore. Through a multidisciplinary internal response, Sinai was able to protect its patients and staff from the highly contagious virus (approximately 90% of susceptible hosts will develop Measles after exposure). While other hospitals might limit its scope to internal response, Sinai Hospital President and COO Dr.

Jonathan Ringo and his Lifebridge Health team simultaneously coordinated a series of collaborative vaccine clinics with 2 local health departments, Maryland Department of Health, community volunteers, and Sinai Hospital resources.

**Process (see key dates on Project Timeline):**

Upon notification of the suspected Measles case, Sinai's internal response was swift and aggressive. Key hospital personnel were notified, and preparations were made for an expected influx of secondary cases, exposed persons, and worried well. To separate exposed and/or ill persons from the department's vulnerable population, Sinai's Emergency Department (ED) reserved an internal care center for screening and immunoglobulin (IG) administration. Portable HEPA units were deployed and extra N95 respirators for staff and surgical masks for patients were stocked. The department's airborne isolation rooms (negative pressure) were emptied of patients and reserved for symptomatic cases. Triage staff answered phone calls about the availability of vaccine and IG; Chair of Pediatric Infectious Disease Dr. Susie Lipton and Infection Prevention and Control staff were frequently consulted. Key stakeholders led by Sinai Hospital Senior VP and COO, drafted a pediatric visitor restriction policy for Lifebridge Health facilities and arranged a series of collaborative conference calls with Jewish communal leaders, public health officials, and Sinai staff to ensure hospital and community needs were addressed. Sinai activated its incident command team and worked closely with Emergency Preparedness staff from the Baltimore City Health Department.

With guidance from public health officials and Infectious Disease physicians, Sinai's Marketing and Communications team drafted internal and external messaging. Pharmacy sourced additional MMR vaccine and IV and IM immunoglobulin (IG). ED and Emergency Preparedness staff prepared IM/IV IG algorithms for the at-risk population and planned to cohort patients to conserve reconstituted IG in case supply of IG was insufficient to meet demand.

Supply Chain procured additional pediatric and adult surgical masks for waiting rooms and hospital entrances, and stockpiled injectable supplies (syringes, needles, alcohol pads, bandages, hand sanitizer, gloves). Occupational Health verified immunity status of employees. Security and Transportation services facilitated the system-wide visitor restriction policy (under age 14). The Emergency Department and Children's Hospital clinical staff were on high alert for suspected cases and screened everyone for travel and/or houseguests from outbreak areas. Pediatrics began to verify vaccine records for all elective surgery cases and rescheduled any found to be under-immunized against Measles.

Proactive community advice was issued through local Jewish and mainstream media regarding an exposure in the community, reiterating that the Emergency Department (ED) is for medical emergencies and not vaccine, and instructed the public to contact their primary care provider (PCP) with questions or concerns about exposure. Local media also reminded the public to call ahead before self-reporting to clinics or private practices to prevent secondary exposures. Baltimore's Jewish volunteer ambulance service, Hatzalah, consulted Sinai Infection Control for cleaning and personal protective equipment (PPE) advice for patient transport, and ultimately rented a car for the sole purpose of transporting stable patients with suspected Measles to the doctor, clinic, or ED, allowing their specialized ambulance units to remain available for true emergencies.

Sinai's Chair of Pediatric Infectious Diseases, Dr. Susie Lipton, partnered with the Assistant Commissioner from the Baltimore City Health Department, Dr. Adena Greenbaum to

present Pediatric Grand Rounds- just days after the index case was confirmed- to a packed auditorium about Measles identification, treatment and clinical considerations, an accelerated vaccine schedule for those visiting outbreak areas, addressing vaccine hesitancy, and troubleshooting vaccine supply.

Fact sheets/letters from the Baltimore City Health Department and the Maryland Department of Health were then distributed to the public while clinician guidance was issued to Pediatric practices and clinics on infection control measures, patient screening and treatment, and the accelerated vaccine schedule for infants aged 6-12 months and adults who received only 1 MMR who plan to travel to- or host visitors from- known Measles outbreak areas. The fact sheets/letters were sent to the entire healthcare coalition for distribution to Emergency Preparedness coordinators throughout the region. MIEMMS sent an advisory to EMS personnel and held a conference call to ensure units were prepared to screen and transport Measles cases.

Communications were highly effective; Sinai's ED screened very few worried well inside the department and eventually decommissioned the designated screening care center.

However, *the threat of a second wave from Passover holiday travel caused Sinai and public health officials to partner on a truly innovative solution: a series of co-funded community vaccine clinics to increase herd immunity among adults and under-vaccinated, high-risk children, and correspondingly decrease the risk of a large-scale Measles outbreak.*

### **Solution:**

Due to the unique epidemiologic risk factors in the community, Baltimore City Health Department agreed to staff and facilitate a vaccine clinic to increase herd immunity among under-vaccinated adults and children. Community support was swiftly engaged and comprehensive: A local synagogue offered to host the clinic, volunteers from several Jewish aid agencies assisted with traffic control, staffed on-site emergency medical services, drafted and distributed event flyers, and worked with health department officials to create a culturally respectful, yet efficient clinic workflow. The local police department provided on-site security and several news outlets interviewed attendees. 720 vaccines were administered that day, all doses purchased by Sinai Hospital as a commitment to the community it serves.

The response was overwhelmingly positive from the community and was extensively covered in local print and TV media.

Over the next few weeks, an additional 3 community vaccine clinics were successfully implemented: 2 with the support and innovative POD (dispensing) techniques of the Baltimore County Health Department (a total of 979 doses administered in an average throughput time of 5-7 minutes), and 1 additional clinic just before the holiday began in Baltimore City (20 doses). After the turnout and success of the first community clinic, Maryland Department of Health provided MMR vaccine for the remainder of the clinics.

The most successful intervention took place at the clinics themselves: Medical advisors at each clinic patiently answered thousands of questions from community members about personal health status, contraindications, immunocompetence of family members, pregnancy and breastfeeding, and more. They also sensitively addressed misinformation about vaccine safety and Measles virus. The clinics brought public health experts into the community itself and

provided a supportive, culturally sensitive forum in which to disseminate evidence-based health guidance.

### **Measurable Outcomes:**

The Sinai Hospital/Health Department vaccine clinics administered a total of 1,719 doses of MMR, and the Baltimore County clinics boasted an average throughput time of only 5-7 minutes, with the longest just 12 minutes.

Despite the risk factors and unique challenges like Passover travel to/from other outbreak areas, Maryland confirmed only 5 cases of Measles through spring 2019. Herd immunity rates over 93-95% are required to prevent ongoing Measles transmission, and this unique hospital/public health partnership increased that protection in Baltimore and successfully prevented an outbreak.

Although one cannot quantify exactly how many infections this initiative prevented, or how many lives were saved, the number of confirmed cases by secondary transmission in MD was limited to 3, versus the confirmed cases from secondary transmission in a similar community in MI (40) suggest the efficacy of the intervention.

The financial cost of Measles outbreaks can, however, be quantified. Outbreak investigations require tremendous resources. During a September 23, 2019 Capital Hill briefing by the Big Cities Health Coalition, NY state health officials estimated the 2019 Measles outbreak cost over \$6 million. Los Angeles health officials reported an estimated \$30,000 to investigate *each* travel case without propagation and an additional \$500-\$1,000 to investigate *each* contact during their 2019 outbreak.

Clinical care for Measles complications like pneumonia or encephalitis (approximately 1:1000 cases) is estimated to cost up to \$30,000.<sup>1</sup>

Maryland public health agencies have not released a financial report from this initiative but dedicated extensive resources for this effort. Sinai Hospital contributed approximately \$71,500 in vaccine and disposable supplies for the clinics, in addition to its internal preparedness and response efforts.

Although prevention costs are high and personnel resource-heavy, the total cost of this innovative partnership was likely significantly lower than the cost of containing a Measles outbreak, as evidenced by NYC and LA communities' reports.

### **Sustainability:**

Orthodox Jewish schools in Baltimore have strongly supported vaccination and continue to do so. In November 2018, months before the first confirmed case of Measles in Maryland, the Rabbinical Council of Baltimore (a group of Orthodox Jewish Rabbinic leaders and experts in Jewish religious law) issued a unanimous declaration to the community: "*We consider it a Halachic [Jewish legal] obligation for every member of the community – adults and children –*

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<sup>1</sup> Zhou F, Reef S, Massoudi M, et al. *An economic analysis of the current universal 2-dose measles-mumps-rubella vaccination program in the United States.* J Infect Dis. 2004 ;189(suppl 1):S131–S145

*to be properly vaccinated according to the standards and schedules established by the medical community as outlined by the CDC...”*

In response to the first confirmed case of Measles in Maryland, the religious schools issued a reiteration of the vaccine requirements for not only students, but employees as well. Many of these under-vaccinated adults received MMR at the Sinai vaccine clinics in order to return to work after the Passover holiday, further increasing the total community vaccination rate or herd immunity.

By providing vaccine and medical consultation to young families previously under-protected, this initiative may have carryover effects on the timely vaccination of future children, and perhaps future generations.

Measles surveillance continues today. The ED and Labor and Delivery triage nurses are regularly trained in high-consequence infectious disease recognition and response, and periodic no-notice drills are performed to assess effectiveness and identify improvement opportunities. Lifebridge Health frequently updates its triage screening tools to reflect current outbreak areas and assist frontline staff in prompt recognition of travel risk. A robust response algorithm guides staff to follow CDC’s “Identify, Isolate, Inform” model and provides an easy reference for internal response. Sinai’s Infection Prevention and Control and Emergency Preparedness teams co-chair the hospital-wide Emerging Pathogens workgroup and are making continuous improvements to protocols and training programs to ensure the latest evidence-based prevention efforts are in place and practiced often.

### **Role of Collaboration and Leadership:**

Sinai Hospital’s internal response and vaccine clinic initiative was only possible due to the tremendous, proactive response and support from hospital leadership. Sinai’s President and COO Dr. Jonathan Ringo and his team led this innovating partnership in public health to protect local community members in the hospital’s catchment area.

Baltimore City Health Department officials, led by Dr. Adena Greenbaum (Assistant Commissioner for Clinical Services) and Kimberly Eschleman (Director Office of Public Health Preparedness and Response) and their disease investigators led by Melina Turtle spent countless hours listening to community concerns and requests, provided culturally sensitive care, and disseminated timely and pertinent clinical information in multiple forums.

### **Innovation:**

Sinai Hospital’s proactive stance to protect its patients and community from illness is truly unprecedented. While other communities experienced true outbreaks before large-scale prevention measures were initiated, Sinai escalated a response immediately and was so successful, approximately a dozen other Orthodox Jewish communities reached out to Sinai for advice over the next few months, looking to replicate their efforts.

## **Culture of Safety:**

Sinai Hospital immediately responded to the external threat, examining readiness from all angles to keep its patients, staff, and visitors safe. While simultaneously verifying Measles immunity for all employees and increasing supply stockpiles, Sinai implemented a restriction on visitors under age 14 in its facilities. The triage screening tool was updated to include the latest zip codes experiencing ongoing Measles transmission and pediatric practices and clinics implemented strong infection control measures and vaccination record review for inpatients and outpatient surgeries. Sinai led the charge in the community, providing best practice advice to local volunteer agencies and outpatient departments. Lessons learned were reviewed through the Emerging Pathogens workgroup, and continuous preparedness improvements are underway.

## **Patient and Family Integration:**

Baltimore City Health Department leaders and disease investigators met with Sinai and community stakeholders over the course of several weeks to ensure the community concerns were addressed and needs met in a culturally respectful way. The clinic layout was modified to allow separate-gender lines and immunizers for patient comfort, and Baltimore County offered a family line option for those who preferred to be vaccinated together.

The medical expert table at each clinic was able to answer questions about vaccine safety and were able to enter vaccination records into ImmuNet, Maryland's vaccine database, for each patient's convenience and future reference. This facilitates the continuity of care between the community, hospital, and outpatient practices throughout the state.

Scientific and medical resources for the community were delivered with great sensitivity and utilized the community's most robust communication channels to reach the greatest audience, through print and online media, and through social media.

## **Related Tools and Resources (Attached)**

1. Project Timelines (Parts 1 and 2)
2. Sinai's Measles Survival Guide (preview)
3. Sinai's HCID Response "Rainbow" algorithms
4. MDH letter
5. Baltimore City HD letter
6. Links to local media coverage, "In the News"
7. Baltimore City Health Department Clinic Flyer
8. Clinic flyers made by Baltimore Jewish Life media
9. Hospital signs: Visitor Restriction then MDH Surveillance Poster

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