ORIGINAL RESEARCH

Increasing Out-of-Hospital Regional Surge Capacity for H1N1 2009 Influenza A Through Existing Community Pediatrician Offices: A Qualitative Description of Quality Improvement Strategies

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ABSTRACT

Objective: To describe initiatives undertaken by a network of community pediatricians to increase a city's surge capacity for patients presenting with influenza-like illnesses during the 2009 H1N1 influenza A pandemic.

Methods: This was a descriptive quality improvement project detailing the measures employed by a network of private practice community pediatricians in Houston, Texas, caring for both insured and uninsured children.

Results: Four categories of interventions were used: enhanced communication, increasing community pediatrician presence, vaccine distribution, and targeted viral diagnosis and antiviral utilization. Promoting communication between clinicians, families, and an affiliated local tertiary care children's hospital allowed for the efficient coordination of resources as well as a unified and consistent message. Increasing access of families to their primary medical home by employing additional clinicians, extending office hours, and locating additional space served to decrease the number of children with low-acuity illness seen in the local emergency centers. Vaccine distribution was enhanced by effective communication between clinicians and families. Finally, targeted antiviral testing and adherence to national recommendations on antiviral utilization enabled judicious utilization of a limited supply of antiviral medications.

Conclusions: Effective communication and improved access to health care enabled children within the network with influenza-like illnesses to continue to be cared for in their medical home. The measures used in response to novel influenza virus outbreaks can be adapted for other situations requiring increased community surge capacity.

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Key Words: H1N1 influenza, surge capacity, children, community pediatricians

The first death in the United States from the novel H1N1 2009 influenza A virus occurred in a young child in Houston, Texas, on April 27, 2009.[1] At that point in time, local emergency centers (ECs) were already seeing excess numbers of ill visits for children with influenza-like illnesses. The large number of children presenting to the Texas Children's Hospital (TCH) EC led to the creation of an onsite mobile pediatric emergency response team (MPERT),[2] which enabled the institution to increase surge capacity by 25%. Once it was clear to hospital leadership that the increase in surge consisted primarily of patients with low-acuity illness, they began to question the appropriateness of using and maintaining a hospital EC-based surge response to address what appeared to be a nonemergent need within its community. The Texas Children's Pediatric Associates (TCPA), a network of TCH-affiliated pediatric practices, implemented a multifaceted approach to increasing community surge capacity that would operate parallel to the hospital-based response (MPERT). This report describes the initiatives that served to divert children with low-acuity illness from presenting to the EC.

METHODS

Study Design

This is a descriptive study detailing the quality improvement initiatives undertaken by a network of community pediatricians (TCPA) from May to November of 2009. Clinicians (physicians, nurse practitioners, physician assistants, and nursing staff) and administrators in the TCPA practices and the TCH EC described the measures implemented to augment surge capacity in community practice settings. The Baylor College of Medicine Institutional Review Board approved this study.

Setting

The TCPA network includes approximately 150 physicians and physician-extenders in over 40 locations throughout greater Houston/Harris County, a metropolitan region with a population of almost 6 million persons.[3] TCPA practices saw more than 1 million visits in 2009, and patients included children with private insurance (82%), Medicaid (11%), Children's Health Insurance Program (4%), and those without insurance (3%).

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In addition to these practices, TCPA includes four practices termed Project Medical Home. These practices, which provide care to medically underserved regions of the city, saw more than 50 000 visits in 2009. In all, TCPA serves as the primary medical home for approximately 20% to 25% of children in the greater Houston area.

RESULTS

The quality improvement initiatives focused on communication (including education), increasing the presence of TCPA in the community, vaccine distribution, and selective testing and antiviral therapy.

Communication

Communication with families and between health care workers was performed using a multimedia approach. The TCPA and TCH Web sites provided the latest updates for the Centers for Disease Control and Prevention (CDC), as well as advice on warning signs that should trigger the decision to seek medical attention. These communications were available in a bilingual (English/Spanish) electronic PDF format that could be downloaded as a brochure. The TCPA Web site also offered information on antiviral availability in local pharmacies, obtained from the TCH hospital pharmacy calling area pharmacies to determine availability. TCH also sponsored two well-attended Web chats hosted by the local newspaper, the *Houston Chronicle*, where community members could e-mail questions and concerns that were addressed by pediatric emergency medicine and pediatric infectious disease specialists. The questions raised in this forum provided real-time insight into the confusion and concerns circulating in the community. Following these forums, TCPA and TCH Web sites were updated to better address these issues.

As many physician offices were inundated by calls from concerned families, the After-Hours Call Center (AHCC) at TCH extended their services to take calls from families. The call center used a prepared script modified by TCH EC physicians that was read in response to several potential questions. Attempts to relieve call volumes also led to the use of off-site call centers, where prepared scripts were also used for frequently asked questions; these were modified from the CDC Web site and translated into Spanish. Similar scripts were used by TCH, the AHCC, and TCPA practices to minimize dissemination of conflicting information. The telephone messages at TCPA offices played while families were on-hold; the messages also offered general information on influenza signs, symptoms, and reasons to seek medical attention.

Finally, communication was essential for informing families of vaccine availability. This was accomplished by leaving automated phone messages for families and by using social networking sites such as Twitter®. Using an extensive electronic medical record system made identification of high-risk patients possible. In the future, notification of vaccine arrival will be augmented by using e-mail addresses.

Community Presence

The TCPA practices are the single largest provider of primary pediatric health care in the greater Houston area, caring for 20% to 25% of children. TCPA practices first were accessed to assist with the community's pediatric disaster response to Hurricane Katrina evacuees in 2005,[4] when an MPERT unit was constructed in the Houston Astrodome and staffed by TCH and TCPA physicians. Rather than staff the hospital's MPERT, as they did successfully during the Katrina response, TCPA clinicians and staff were asked to expand the surge capacity of their community practices. This expansion was done by extending office hours and increasing resources (ie, physicians, staff, equipment, supplies, and space). The TCPA practices saw 69 544 (19.8%) excess patient visits from April to October when compared with historical norms over the last three years. Of these visits, 200 393 (32.2%) were well-child visits and 421 315 (67.8%) were ill visits.

To meet the increase in patient visits, TCPA used locums tenens clinicians to work three to four additional evening hours, and the permanent clinician staff worked during their half-day administrative time. In addition, clinicians stayed late to see all children who presented to the clinic, walk-in and scheduled alike. To help increase the availability of appointments and to decrease nosocomial transmission within the offices, many well-child visits, particularly for older children, were rescheduled. Alternatively, well-child visits occurred in the mornings and ill visits were scheduled for afternoons. In an effort to maximize space to see patients, children were triaged in waiting areas. The net cost in terms of office/nursing staff and locum tenens salaries for all 40 TCPA practices totaled $222 090 per month. Physicians who worked extra days did not receive additional base salary, but would have been paid as part of a productivity bonus structure.

In contrast to the Katrina response (which was exclusively volunteer-based), an incentive-based system was used to facilitate staffing of clinicians and ancillary staff. In part, this was because clinicians were reimbursed for seeing additional patients. However, in part this was in recognition that staffing a sustained, long-term response with volunteerism alone would not have been feasible. When nursing or ancillary staff became ill, the TCPA administrative officers, all of whom were licensed nurses, were distributed to the regional TCPA offices to help with staffing.

Vaccine Distribution

The centralization of vaccine distribution and delays encountered on the manufacturing end led to initiation of H1N1 influenza vaccination on October 14, 2009. The TCPA was the first organization in the city to receive H1N1 vaccine. Vaccine was distributed according to CDC guidelines.[5] As more vaccine became available, the groups eligible to receive vaccine were expanded. Families were informed of vaccine availability by automated telephone calls and Twitter®. Vaccine clinics were organized at health centers, primarily on the evenings

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and weekends after vaccine inventory became more reliable; TCPA administrative staff helped schedule vaccines. The flexibility of hours may have led to increased rates of vaccinations, although H1N1 fears likely contributed to vaccine uptake. During the first six weeks of vaccine availability, 32 797 doses were administered.

Selective Diagnostic Testing and Antiviral Utilization

At the beginning of the epidemic, screening by rapid viral testing was widely implemented. Rapid influenza diagnostic tests (RIDTs) were performed in the community setting, and clinicians then sent samples to the virology laboratory at TCH for reverse transcriptase polymerase chain reaction-based subtyping. While providing important biosurveillance data, the utility of widespread screening initially was hampered by low pretest probability of H1N1 infection and by the poor sensitivity of the RIDT used.[6] Later in the epidemic, most clinicians were using the RIDT alone, but were using the assay to screen children with symptoms more consistent with influenza. While CDC guidelines recommended empirical treatment of high-risk children with influenza-like illnesses, some local school districts initially required febrile children to present a physician's note or evidence of a negative H1N1 test before returning to school. Community pediatricians providing this service prevented unnecessary EC visits.

The decision of whom to treat for influenza-like illnesses was controversial early in the epidemic, when criteria for initiation of therapy were understandably broad. With shortages in antiviral medications (particularly those in suspension formulation), efforts were made to use revised CDC guidelines on therapy.[7] As many low-risk, well-appearing children presented for medical care to their clinicians, judicious use of a limited stock of antiviral medications would have been impossible without the cooperation of community clinicians.

DISCUSSION

Surge planning often has been discussed primarily for tertiary care centers and other hospital-based settings,[8] under the assumption that much of the care required by patients would outstrip the resources of community clinicians. While this might be the case for natural disasters resulting in traumatic injuries, or severe illnesses caused by bioterrorism events, this assumption might not be valid for diseases of lesser acuity stretching over a longer period. In the latter instance, the chronicity of the disaster makes sole management of these conditions untenable for tertiary care facilities, and some of the burden of excess patient visits needs to be distributed to the community setting when possible. Several characteristics of the H1N1 2009 influenza A epidemic lent themselves to exploring the role of community clinicians in surge response. These included the burden of influenza on children; the rapid and multiphasic spread of the virus across the country; and the initial paucity of data on this novel infection and, consequently, changing recommendations.

H1N1 2009 influenza A disproportionately affected young adults when compared with seasonal influenza.[9] However, as with all influenza outbreaks, children composed a significant number of cases, and it was estimated that 45% of hospitalizations early in the epidemic occurred in children.[10] Also, children have been recognized as being very efficient spreaders of influenza in the community.[11] In any given year with seasonal influenza, it is estimated that 50% of children with fever and acute respiratory symptoms have influenza[12]; influenza symptoms may account for up to 95 office visits per1000 children and up to 27 EC visits per 1000 children[12]; and up to 3% of young children may require hospitalization due to influenza.[13] Thus, the burden of disease during a winter with seasonal influenza is disproportionately more likely to be borne by the health care workers caring for children. This was particularly the case in Houston, where parental anxiety was heightened by the first US death of a child at TCH. Had these children continued to seek care in the pediatric EC as opposed to primary care provider offices, this would have compromised the ability of the EC to care for patients with higher acuity illness. The TCPA model is also attractive because it does not discriminate by method of payment; this network of clinicians sees children with private and government-subsidized insurance, as well as caring for uninsured children. This ability has become increasingly important in recent years, when many children face disruptions in insurance coverage,[14] and lack of insurance may result in increases in nonurgent EC visits.[15]

The rapid spread of 2009 H1N1 influenza A across the country meant that it was difficulty for certain geographic regions to coordinate their responses based on the experience of other regions. Consequently, at the dawn of the epidemic, responses often were being coordinated locally, albeit with guidance from state and federal public health authorities. The multiple waves of cases, beginning in the springtime, with increased cases seen after the openings of summer camps and schools, enabled the evolution of the community response to H1N1. In the spring, there was concern that the onus for caring for what were presumed to be large numbers of critically ill children would rest on tertiary care centers. While measures were implemented to augment surge capacity in these settings,[2] these were neither sustainable nor necessary over the months that the epidemic persisted. Earlier studies had indicated that primary care providers, while not necessarily feeling well prepared for an outbreak of novel influenza, nonetheless were willing to participate in the event of a public health emergency.[16] The majority of physicians surveyed stated willingness to participate in immunization and antibiotic clinics and assessment and treatment centers.[16] In Houston, the goal of TCPA practices was to provide quality care for as many children as possible, in part by increasing community presence. The close relationship of the TCPA practices allowed for dissemination of strategies that worked, and the occasional waning of patient visits offered some time to reflect on interventions that were more (or less) effective. Finally, at the height of the H1N1 epidemic in the spring of 2009, daily incident command meetings were held, and leaders from TCPA, TCH, and the health plan together helped to coordinate institutional responses.

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The initial lack of information regarding how 2009 H1N1 influenza A differed from its seasonal counterparts led to widespread variations in practice and attendant anxiety on the part of health care workers and parents alike. The paucity of data at the onset of the epidemic thus resulted in changing recommendations as additional data became available, also contributing to community anxiety. In many communities, prior knowledge about novel influenza was minimal to nonexistent[17] before the spring of 2009. Lack of knowledge and fear of contagion, combined with the dire projections of the social, medical, and economic ramifications of pandemic influenza, had the potential to incite large-scale panic.[18] Thus, the importance of communicating an accurate message that was consistent between reputable community sources cannot be overstated.

There are limitations to generalizing the interventions described in this study. The TCPA group of practices has a very close and mutually beneficial affiliation with a large tertiary care children's hospital serving the same catchment area as the TCPA network. This preexisting relationship facilitated the spread of educational materials and enhanced communication between the two organizations in a manner that might be difficult to replicate in different settings. Parental satisfaction with TCPA response was not measured, and may have provided insight into factors that could be modified for future surge events. Another limitation is that it is unclear if the interventions used would have been sustainable over several months. Fortunately, the multiphasic nature of the epidemic also included periods of waning of patient volume, allowing resumption of a modicum of normal operations.

CONCLUSIONS

The surge response to H1N1 2009 influenza A evolved over the course of the epidemic. Initially, there were concerns about hospitals being overwhelmed with critically ill patients. As the epidemic continued and it became evident that the vast majority of cases of H1N1 influenza progressed along similar lines as seasonal influenza, emphasis shifted to augmenting surge potential in the community setting, where most of these children were being seen. One community pediatrician network used a multimedia approach to communicate with and educate families, increasing community presence to care for more ill-child visits, efficiently distributing vaccine, and using targeted viral diagnosis and antiviral distribution. These strategies served to increase community surge capacity. The interventions used for novel influenza also can be implemented for other instances in which increasing community surge potential is both appropriate and feasible.

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