Preparing for an influenza pandemic: model of an immunization clinic in an urban family practice

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Abstract

Problem addressed The surge in patient demand for the H1N1 influenza vaccine during the 2009 pandemic.

Objective of the program To facilitate timely delivery of the 2009 H1N1 influenza vaccine to a family practice population while preserving regular clinic function and to create a model of effective vaccination delivery for future outbreaks.

Program description An academic family practice in Toronto, Ont, adopted a process-improvement approach and implemented 3 Saturday stand-alone H1N1 vaccination clinics to accommodate increased demand for the vaccine. Medical directives were developed to give nurses the authority to vaccinate patients. Consent forms with eligibility criteria and risks versus benefits sheets were provided to patients in the waiting area to make optimal use of time. The clinic with "appointment blocks" for patients had improved efficiency (ie, fewer bottlenecks from waiting area to vaccination room), which was satisfactory to both staff and patients.

Conclusion During a pandemic, when patient demand for vaccination is high, such stand-alone vaccination clinics in conjunction with family practices can deliver vaccines to patients in a timely and acceptable manner while promoting continuity of care. This model requires the commitment of extra staffing resources if regular primary care delivery is to be maintained.

Préparation en vue d'une pandémie d'influenza : le modèle de la clinique de vaccination d'un établissement urbain de médecine familiale

Résumé

Problème à l'étude L'afflux de demandes des patients pour le vaccin contre la grippe H1N1 durant la pandémie de 2009.

Objectif du programme Faciliter la distribution en temps opportun du vaccin contre la grippe H1N1 pour la clientèle d'une clinique de médecine familiale, sans interférer avec le fonctionnement habituel de la clinique, et créer un modèle de vaccination efficace pour les éclosions futures.

Description du programme Afin d'améliorer la distribution du vaccin, une clinique de médecine familiale universitaire de Toronto, Ontario,

KEY POINTS

- In a large family practice, a stand-alone vaccination clinic provides rapid mass immunization during a pandemic while maximizing existing clinic resources.
- The pilot clinics comprised a multidisciplinary team of health providers and administrative staff, whose respective roles were essential to developing the program and maintaining clinic flow.
- Ongoing feedback from patients and staff helped improve clinic design and implementation, resulting in high rates of reported satisfaction.
- Cost-effectiveness of providing influenza vaccination with this model is unknown; further study is required.
- Influenza pandemics are unpredictable; therefore, it is important to be prepared with a plan for mass immunization well in advance of an outbreak in order to respond rapidly to a surge in patient demand.

POINTS DE REPÈRE

- Dans une grande clinique de médecine familiale, une clinique de vaccination indépendante permet une immunisation de masse rapide en cas de pandémie, tout en utilisant au mieux les ressources de la clinique.
- Les cliniques pilotes comprenaient une équipe multidisciplinaire de professionnels de la santé et un personnel administratif dont les rôles respectifs étaient essentiels au développement du programme et au maintien des activités de la clinique.
- Un feedback continu de la part des patients et du personnel a permis d'améliorer le modèle initial ainsi que la mise en place de la clinique, avec comme résultat un taux élevé de satisfaction exprimée.
- On ignore le rapport coût-bénéfice d'un tel modèle pour la vaccination contre l'influenza; d'autres études seront donc nécessaires.
- Les pandémies d'influenza sont imprévisibles; il est donc important d'être muni d'un plan d'immunisation de masse bien avant leur éclosion, de façon à répondre promptement à une montée rapide des demandes des patients.

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a créé 3 cliniques de vaccination autonomes, les samedis, pour répondre à l'augmentation des demandes des patients. On a élaboré des directives médicales pour permettre au personnel infirmier de vacciner les patients. Des formulaires de consentement avec un document précisant les critères d'admissibilité et le rapport coût-bénéfice ont été distribués aux patients dans la salle d'attente pour perdre le moins de temps possible. Grâce aux « rendez-vous regroupés », la clinique a amélioré l'efficacité du processus (moins d'embouteillages entre la salle d'attente et la pièce de vaccination), et cela, à la satisfaction du personnel et des patients.

Conclusion Durant une pandémie, en présence d'une forte demande de vaccins, une clinique de vaccination autonome de ce type peut, conjointement avec une clinique de médecine familiale, distribuer des vaccins d'une façon acceptable et en temps opportun tout en assurant la continuité des soins. Un tel modèle exige la participation d'un nombre accru de membres du personnel si l'on veut maintenir la prestation habituelle des soins de première ligne.

Family practices face a surge in workload during the influenza season because of Ontario's universal immunization program. Although patients can be vaccinated in public health clinics, most are immunized in hospitals, long-term care centres, workplaces, or family practices.[1] Therefore, it is worthwhile to deliver influenza vaccine efficiently in primary care.

In the fall of 2009, influenza vaccine delivery in Ontario was complicated by many factors, including the need to provide both the 2009 H1N1 vaccine and the seasonal influenza vaccine; a phased-in strategy, with evolving patient eligibility criteria; an unpredictable supply of the H1N1 vaccine; and unprecedented media coverage, which fueled the public's demand for the H1N1 influenza vaccine.[2-5] This article discusses the development, implementation, and evaluation of an influenza vaccination clinic in a large urban family practice within that context.

Background

Women's College Hospital Family Practice Health Centre (FPHC) in Toronto, Ont, is a large, academic, urban family practice that is based on an interprofessional model of care, with 33 physicians, 9 nurses, a nurse practitioner (NP), 31 postgraduate family medicine trainees (PGFMTs), a registered practical nurse, a health promoter, and 11 secretaries. The practice has 17 000 registered patients with 54 000 patient visits each year. Seventy percent of the patients are women, and 90% are younger than 65 years of age.

The 2009 H1N1 influenza pandemic led to a surge in patient demand for influenza vaccine delivery.[6-8] The FPHC responded by pilot-testing a stand-alone clinic as an adjunct to regular influenza shot delivery practices, which normally occur during office visits. Saturday H1N1 vaccination clinics were held on October 31, November 7, and November 21, 2009, with the goal of delivering the H1N1 vaccine in an efficient manner acceptable to both patients and staff. The decision to conduct each clinic was based on vaccine, staff, and clinic space availability and perceived patient demand. As the second clinic was not functioning at capacity owing to insufficient vaccine supply, only the first and third clinics will be examined here. This evaluation also highlights the quality improvement processes implemented.

Program description

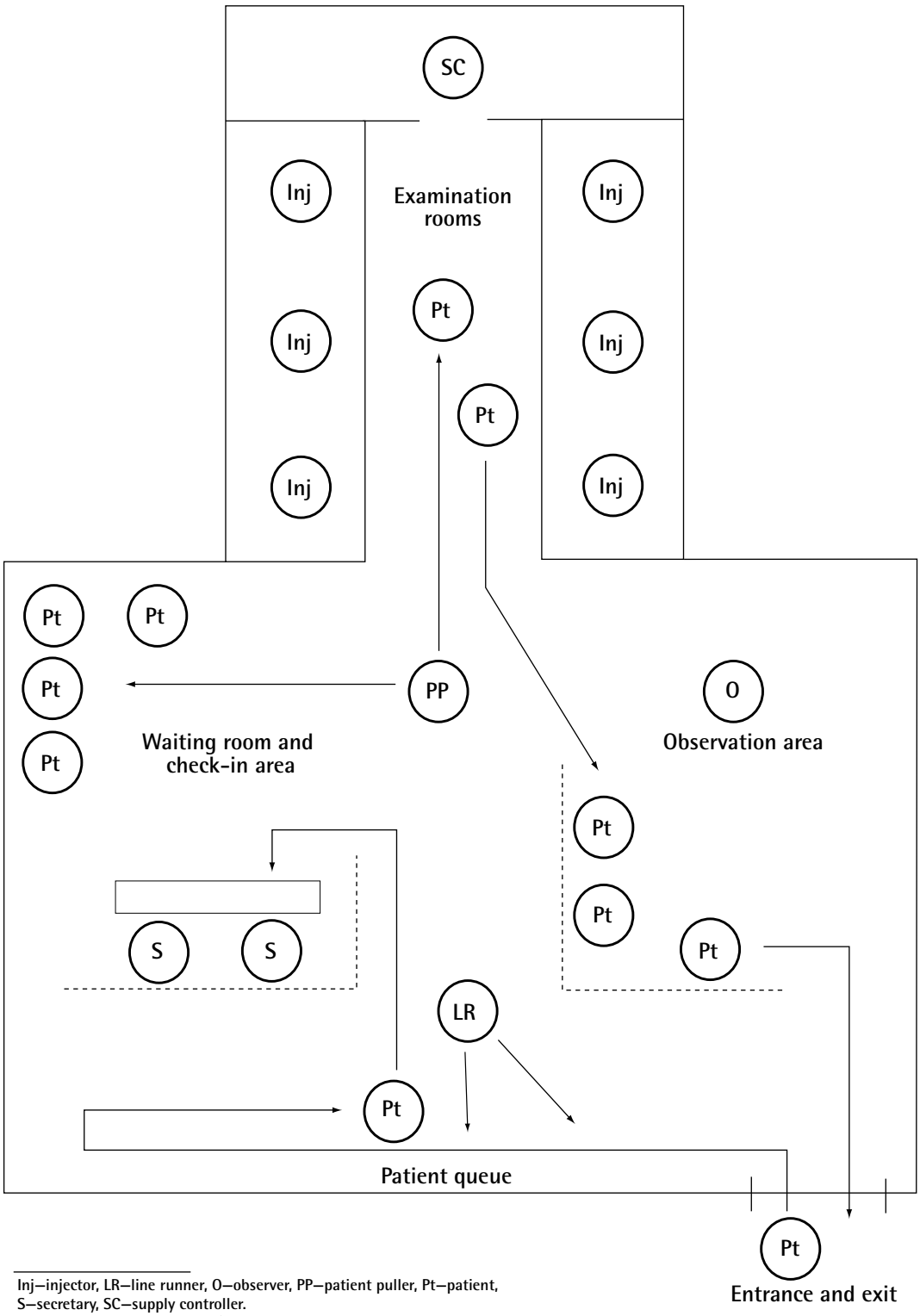
Team and program development. A multidisciplinary planning committee, which included 1 physician, 2 nurses, 1 NP, 1 administrator, 1 secretary, and the health promoter, met to plan and implement stand-alone H1N1 influenza vaccination clinics. The physician lead was in regular contact with the government pharmacy to inform them of the need for H1N1 vaccines for the FPHC. An evaluation and process-improvement strategy was established at the outset, which included a patient satisfaction survey, informal staff debriefings, and an evaluation of patient volume and flow after each clinic; necessary adjustments to improve vaccine delivery were made between clinics.

Development of a medical directive and patient information. A medical directive was developed and signed by staff physicians to give nurses the authority to vaccinate FPHC patients. A consent form and patient education sheet on the risks versus benefits of the vaccine were also developed under the NP's leadership. As consent forms included any potential contraindications, patient charts were not required during the clinics—vaccinations were incorporated into the charts later.

Physical layout and patient flow. The clinic layout comprised 4 main areas: a place for patients to line up and complete consent forms, a waiting room and check-in area, examination rooms for vaccinating patients, and a postvaccination observation area to monitor patients for adverse reactions (**Figure 1**).

Optimizing flow is essential when dealing with large patient volumes. The first clinic used a walk-in model and was held in a small space, with a relatively small waiting room serving 6 examination rooms. This clinic area was severely congested when unanticipated numbers of patients arrived simultaneously, including entire families with infants and toddlers in bulky strollers. In response to patient and staff feedback, subsequent clinics were held in a larger area, which greatly improved patient flow.

Figure 1. Diagram of walk-in vaccination clinic flow



Inj—injector, LR—line runner, O—observer, PP—patient puller, Pt—patient, S—secretary, SC—supply controller.
Arrows represent movement of people.

Other strategies to maximize clinic flow were also employed. Because one expected rate-limiting factor was the time spent by patients reviewing and completing the consent forms, a secretary distributed these to patients in the queue while they were waiting to check in, inquired about any symptoms of influenza-like illness, and ensured their eligibility for vaccination under Ontario Ministry of Health and Long-Term Care guidelines. Symptomatic patients were redirected to the practice's urgent care clinic. A PGFMT was available to answer patients' questions.

The first 2 clinics operated on a walk-in basis, which caused a bottleneck when patients arrived in large numbers well before the clinic opened. To alleviate this problem, staff suggested implementing appointment arrival blocks for the third clinic. When patients called, they were assigned a 1-hour "block" during which the first to arrive was the first served. Based on volume analysis from the first 2 clinics, it was possible to book the maximum number of patients that could be accommodated for each injector per hour. Therefore, lines and wait times were reduced by having patients evenly distributed throughout the clinic hours. Appointment blocks also made it possible to match staffing supply with demand, so that additional injectors were enlisted only after appointment blocks were filled.

Staffing. Staff roles in the initial design were clearly defined to permit even distribution of workload. They included 2 secretaries for check-in (one who worked the queue and the other to ensure patients had valid health cards and were registered to the practice), 7 injectors (nurses and physicians), and 1 registered practical nurse to monitor patients for adverse reactions. Extra staff (including PGFMTs and 1 nursing student) was available to help as required.

To improve flow and efficiency after the first clinic, 2 new roles were suggested by staff. To successfully administer the H1N1 influenza vaccine, the antigen and adjuvant had to be mixed together before injection and the entire 10-dose vial had to be used within 24 hours. A "supply controller" role was created, a registered nurse who mixed vaccines and restocked examination rooms with syringes and vaccine as supplies dwindled, which reduced vaccine wastage and injectors' wait time for supplies. Patient flow was maximized by having a "patient puller" stationed in an area visible to all examination rooms who directed patients from the waiting area to an available injector (**Table 1**).

Communication and patient access to clinics in October 2009. Staff reported a surge in patient calls, which coincided with the media frenzy focused on the H1N1 influenza pandemic.[2] A centralized telephone message, based on the Ministry of Health and Long-Term Care's evolving patient eligibility criteria, was updated regularly to inform patients about our clinics as well as our vaccine supply.

Results

Vaccination rates. Our capacity for vaccine delivery was limited by an inadequate supply of the vaccine.[5]

Table 1. Station roles for walk-in influenza vaccination clinics

ROLES	TEAM MEMBER	DESCRIPTION	NO. REQUIRED	TOTAL STAFFING HOURS
Initial (first clinic)				
Line runner	Secretary	Screening patients in queue for eligibility (based on Ontario Ministry of Health and Long-Term Care criteria), distributing consent forms, informing patients about the clinic process	1	5
Check-in	Secretary	Verification of health cards and family practice registration	2	10
Injectors	Nurses, physicians, PGFMTs	Reviewing informed consent, verifying eligibility, giving and documenting vaccinations, fielding any questions surrounding vaccination sequencing	6	24
Observer	Registered practical nurse	Monitoring patients postimmunization for any allergic reactions, collecting patient satisfaction surveys	1	6
Added to final design (third clinic)				
Supply controller	Nurses, physicians	Mixing and distributing vaccines as needed, monitoring visual signals from injectors if their supplies dwindle, distributing needles and syringes as required by injectors	1	4
Patient puller	Administrative staff, nursing students	Calling or "pulling" patients by order of check-in and directing them to injectors as they become available	1	6

PGFMT—postgraduate family medicine trainee.

Nonetheless, within 4 weeks of receiving our vaccine supply, 2050 doses of the H1N1 influenza vaccine were given to 2020 patients (children younger than 3 years received 2 doses). One-third of the vaccine (697 doses) was given during the Saturday clinics and 66% during regular clinic hours (1353 doses). When the H1N1 influenza shot clinic was functioning at capacity, approximately 14 (clinic 3) to 17 (clinic 1) patients were vaccinated per injector per hour (**Table 2**).

Table 2. Rates of injection for a 3-hour clinic

CLINIC	TOTAL NO. OF DOSES	NO. OF INJECTORS	NO. OF DOSES PER INJECTOR PER HOUR
First	357	7	17
Third	262	6	14

Patient satisfaction regarding wait times. During the first clinic, 59% of patients waited longer than 30 minutes to get their shots; some patients waited up to 2.5 hours (**Table 3**). By the final clinic, 86% of patients waited less than 15 minutes, and positive comments outweighed suggestions for improvement. One patient commented, "Excellent improvement between October 31st and November 21st clinics (this is our second)."

Staff satisfaction. After the last clinic, all FPHC staff, whether they worked in one of the clinics or not, were asked to fill out an online survey about workload and patient flow (available for 1 week). Of 25 staff respondents (60% of whom worked in at least 1 clinic), 32% were physicians, 20% were PGFMTs, 32% were nurses, and 16% were nonmedical support staff. Overall response rate was 27%.

Table 3. Results of patient satisfaction surveys

QUESTION	RESPONSES FROM FIRST CLINIC, % (N = 179)	RESPONSES FROM THIRD CLINIC, % (N = 175)	POOLED RESPONSES, % (N = 354)
How long did it take you to get your influenza shot?			
• Less than 5 minutes	3.4	33.1	18.1
• Between 5 and 15 minutes	2.2	52.6	27.1
• Between 15 and 30 minutes	35.8	11.4	23.7
• More than 30 minutes	58.7	0.0	29.7
• NA or other	0.0	2.9	1.4
• Comments stating a wait time of longer than 2 hours	5.6	0.0	NA
Are you satisfied with the length of time it took?			
• Yes	48.6	96.0	72.0
• No	15.1	0.0	7.9
• NA	36.3	3.4	20.1

NA—not applicable.

Almost half of respondents perceived that the stand-alone clinics decreased patient volume during regular clinic hours. However, two-thirds of respondents still believed that workload during regular clinic hours was greater than in previous years, with an increase in patient calls and visits for influenza shots. In total, 88% of respondents recommended continuing the stand-alone clinics the following year.

Discussion

In a pandemic, rapid delivery of vaccine builds earlier immunity in the community, which is essential to controlling an outbreak. Our stand-alone influenza clinic model is an effective and satisfactory means of influenza vaccine delivery in a large family practice during outbreaks, when patient demand is high. These extra stand-alone clinics allowed more patients to be vaccinated in a shorter time. They also maximized the use of existing resources (eg, clinic space, pre-existing communication channels, staff). Additional benefits included comprehensive documentation of immunization status and continuity of family-centred care.

Our rates of 14 to 17 immunizations per injector per hour were higher than the 10 predicted by Toronto Public Health in its planning for mass immunization clinics.[9] Our rates were also higher than the 4 to 12 injections per hour described in US primary care practices,[10] and compared well with the rates of 9.65 to 29 described in public health clinics.[1] Our high immunization rates might be explained by 2 factors: first, our patients had already decided to be vaccinated; second, they were well informed and completed their consent forms before seeing the injector. Additionally, families were vaccinated together and injectors reviewed consent forms only once per group, which likely saved time.

Several factors enabled successful implementation of these clinics, including staff members' willingness to work on Saturdays, institutional support for nurses' overtime salaries, and a high level of buy-in from both medical and nonmedical staff. Although we did not study staffing costs, this model is feasible only if the anticipated billings for a stand-alone clinic exceed anticipated staffing costs. During a nonpandemic scenario with lower patient demand and clinic volumes, this model might not be cost-effective.

Influenza pandemics are unpredictable. Therefore, it is important to be prepared with a plan for mass immunization well in advance of an outbreak in order to respond rapidly to a surge in patient demand, especially

when the vaccine first becomes available. The hours of operation and number of stand-alone clinics should be based on vaccine supply and patient demand. It would be beneficial to hold many clinics in the first week of vaccine availability. Had we held more clinics early on, more patients would have been vaccinated. In the future, improved collaboration with the government pharmacy in facilitating vaccine delivery to family practices would be beneficial.

Appointment blocks are a useful and easy tool with which to forecast day-to-day patient demand and maintain orderly flow during vaccination clinics. When patient demand is variable, staffing hours can be adjusted accordingly to avoid excess staffing costs. Although some might argue that appointment blocks are not essential to vaccine delivery, we found that they added value, as both patients and staff commented on shorter lines and wait times and fewer bottlenecks in the clinic space.

Ongoing feedback and evaluation during and after the clinics are invaluable in making adjustments to improve vaccine delivery. Informal staff feedback allowed our team to propose and implement the appointment blocks, as well as clarify the roles of "line runner," "supply controller," and "patient puller." In response to patient feedback, evening clinics will also be offered in the future. We plan to use e-mail and website messaging to inform patients about these clinics, which will limit calls to the FPHC during a pandemic. We also plan to use more PGFMTs in future influenza vaccination clinics.

Limitations

Patient and staff surveys evaluated subjective measures, primarily perceptions of wait times, workload, and patient flow. It was unclear from the patient surveys which wait time they were referring to, as the question was not broken down into discrete subsections (eg, early-morning lines, wait time once clinic opened, time to check-in or receive vaccination, observation time). Also, patient satisfaction might be influenced by expectations. During the first clinic, expectations were probably low, because the media portrayed wait times for vaccinations at public health clinics as being up to 7 hours.[11] The economic feasibility of this model is unknown, and our findings in a large, academic setting might not be generalizable to all community practices. However, we believe that our model can easily be modified for smaller clinics. Considering that about 50% of Canadian family physicians are now in group practices,[12] and more than 1.9 million Ontarians belong to family health teams,[13] this model might be increasingly useful for community physicians during a pandemic outbreak.

Conclusion

In an influenza pandemic, or any other disease outbreak for which a vaccine is available, the model of a vaccination clinic outlined here is an acceptable way to deliver vaccines to patients in a timely manner in family practices. Provided that sufficient staff are available, this model helps to maintain regular clinic function by offloading some of the increased work associated with increased patient demand during influenza season. It is unclear whether this model is cost-effective. However, the FPHC would not have achieved such high volumes of H1N1 vaccination in the span of only 4 weeks without these stand-alone clinics.

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Contributors
All authors contributed to the concept, design, and implementation of the program and preparing the article for submission.

Competing interests
None declared

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