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Health systems planning for an influenza pandemic

by Kathleen Graham and Maureen Connolly

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Abstract

District planning, in general, and influenza pandemic planning, in particular, are necessary to sustain health care organizations and systems. An extensive stakeholder process used by Capital District Health Authority (CDHA) and the Izaak Walton Killam (IWK) Health Centre involved more than 25 teams. This work resulted in a joint CDHA/IWK pandemic influenza contingency plan for public health, primary care, acute care and tertiary care services. In addition, district and business continuity planning has been enhanced.

Résumé

La planification régionale, en général et la planification de la lutte contre une pandémie, en particulier, doivent viser à soutenir les organisations et les systèmes de soins de santé. Un processus d'intervenant exhaustif utilisé par la Capital District Health Authority (CDHA) et le Izaak Walton Killam (IWK) Health Centre faisait appel à plus de 25 équipes. Ce travail a permis de créer un plan mixte d'urgence en cas d'une épidémie de grippe à l'intention des services de santé publique, de soins primaires, de soins actifs et de soins tertiaires. De plus, la planification de la continuité régionale et commerciale a été améliorée.

It is not uncommon to hear, "Don't worry, we have a disaster plan," when asking about a response to pandemic or other extended emergency situations. However, organizational disaster plans are likely limited in their responsiveness to pandemic or other crises. One need only consider the impact and aftermath of Severe Acute Respiratory Syndrome (SARS)¹ or the unfolding story in New Orleans to begin to appreciate the extent of devastation and unprecedented changes in both the types and volumes of services that communities and health care organizations may face while simultaneously dealing with reduced resources.

Organizational effort expended to develop a robust systemic plan is more than an investment in flu contingency planning. It is an investment in capacity building.

Background

The Capital District Health Authority (CDHA) and Izaak Walton Killam (IWK) Health Centre are independent organizations serving adults and children in the Regional Municipality of Halifax, Nova Scotia. They provide tertiary and quaternary services to the Maritimes and beyond.

The CDHA/IWK Pandemic Influenza Contingency Plan (PICP) is intended to enable an effective district response. Specific objectives include: description of the command, control and management structure and functions, enhancement of surveillance systems, development of a communications plan, operational procedures for vaccines and anti-viral administration and delivery, and service delivery plans for acute care, emergency services and public health measures during a pandemic.

Figure 1. Conceptual framework; CDHA/IWK pandemic influenza contingency planning.

To date, pandemic plans at the district and local level vary. CDHA/IWK and the Nova Scotia (NS) Department of Health (DoH) have been concurrently developing pandemic contingency plans, with the district focusing on health services operational delivery and the NS DoH developing provincial policy to promote consistency for health services delivery.

Pandemic influenza conceptual planning framework

There are two universal goals in a pandemic:

1. to reduce the burden of illness and excess deaths, and
2. to minimize the disruption to society.

For this project, we adopted the World Health Organization (WHO) Phases,² Canadian Phase terminology³ and several of the *Canadian Pandemic Influenza Plan* (CPIP) (2004)⁴ planning assumptions.

There are no standard “triggers” to initiate local responses during an influenza pandemic. The Canadian Phase terminology does not include the end of the first pandemic wave, the interval between waves or the onset of a second pandemic wave. We refined the phases for clinicians, support staff and planners to ensure a common framework. The resulting clinical services delivery plan was a step-wise approach activated by a series of specific trigger points, which are defined as points in time when certain events activate responses (e.g., reduce surgeries). To promote consistency, timing and alignment of response activities in health services planning, each clinical service plan used a generic template and added assumptions, response activities and surge capacity results.

Figure 1 illustrates the conceptual framework for CDHA/IWK pandemic influenza contingency planning framework.

Adapting and building on a pandemic influenza contingency planning exercise conducted in Albany, New York,⁵ we identified the following key points in time:

- It's There!
 - WHO Pandemic Alert Phase 3-5; virus outside Canada
 - WHO declares Phase 6.0; virus outside Canada

- It's Coming!
 - Pandemic virus in Canada/US; virus outside province
- It's Here!
 - Pandemic virus lands in province; 1st wave arrives
- In the Thick of It!
 - 1st wave peaks in province
- Take a Breath!
 - 1st wave ends
- It's Back!
 - 2nd wave arrives
- It's Over!
 - Pandemic ends: Return to inter-pandemic period

The issue

During an influenza pandemic, there will be high rates of both community illness and illness among health care workers, and increased demand for medical services. This will result in an imbalance between the supply of and demand for medical services.

An “all-hazards” plan is a unified, operational plan with strategies built on existing procedures for disaster planning and emergency preparedness. Using an “all-hazards”⁶ approach to pandemic influenza contingency planning, the following two key questions should be posed: 1) What is the impact on population health and the health system? Who is affected, how and to what extent? 2) How do we match population health care needs to appropriate available resources for service delivery within our communities? What are the possible solutions?

The following discussion is organized around these two central questions.

Key Question 1: What is the impact?

The Centre for Disease Control (CDC) software, FluAid and FluSurge,⁷ was used to model the potential impact of an influenza pandemic on our population's health and on the health system. Influenza planning projections require con-

TABLE 1
CDHA/IWK health system impact due to pandemic influenza

Pandemic Influenza Impact on CHDA/IWK		Week									
		1	2	3	4	5	6	7	8	9	10
Outpatient consultations	# outpatient consults	4,477	7,462	11,194	14,179	14,179	11,194	7,462	4,477		
If FP/GPs at 50% capacity	Additional flu consults per "healthy" FP/GP	26	43	64	81	81	64	43	26		
Hospital Admissions	Weekly admissions Peak admissions/day	115	192	288	365 57	365 57	288	192	115		
Hospital Capacity (a)	# of patients in hospital % hospital capacity needed	115 10%	192 17%	288 26%	365 32%	384 34%	353 31%	273 24%	180 16%		
ICU Capacity	# patients in ICU % ICU capacity needed	17 27%	37 58%	56 89%	74 118%	81 128%	78 124%	62 99%	43 68%		
Ventilator Capacity (b)	# on ventilators % usage of ventilator	9 10%	18 20%	28 31%	37 41%	40 44%	39 43%	32 34%	22 24%		
Deaths (c)	# of deaths # of in-hospital deaths			22 16	37 26	56 39	71 49	71 49	56 39	37 26	22 16

(a) % capacity calculated assuming 1,130 staffed acute care beds available and 63 ICU beds. Total hospital beds required will be the sum of hospitalizations + deaths in hospital; (b) Includes paediatric and adult ventilators. For adult capacity only, 67% ventilator capacity during Week 5; (c) Assumes that 70% of influenza-related deaths will occur in hospital.

sideration of highly variable epidemiologic factors, including attack rate, morbidity and mortality, rate of spread and duration of wave(s).

The projections are likely understated, since CDHA/IWK provide tertiary and quaternary services to a broader population. Using a 35% attack rate and assuming 16% of the population are at high risk, FluAid⁸ output results for a population approximating 400,470 in CDHA/IWK yielded:

- 57,694 to 107,247 outpatients (Emergency Department and Family Practice/General Practice (FP/GP) clinics),
- 576 to 2,083 hospitalizations, and
- 200 to 625 deaths.

While the focus of this paper is on acute care delivery, three other component areas, public health, emergency preparedness and response and communications, are under development as follows:

Public health

The *Public Health* working group is identifying appropriate Public Health Measures (PHM), determining how to operationalize these measures and assessing resource requirements to implement mass immunization, PHM and public education.

The *Surveillance/Laboratory* working group is examining how to enhance surveillance information (e.g., FluWatch), developing rapid lab diagnostic testing and reporting, and planning for lab and surveillance surge capacity.

The *Anti-Virals and Vaccine* working groups are developing plans for the supply, distribution and use of anti-virals and vaccines, establishing priorities for access and mass vaccine

immunization and developing monitoring tools to oversee anti-viral use and adverse impact(s).

Emergency preparedness and response

The *Emergency Preparedness and Response* working group has established roles and responsibilities and enhanced linkages with external resources (e.g., NS Department of Community Services, DOH, Emergency Health Services, Department of National Defence, municipalities, universities and colleges, the local Chamber of Commerce and others). The group is conducting a site selection process for community-based assessment centres, immunization sites and alternative care (sub-acute and palliative care) sites.

Communications

The *Communications* working group has developed a toolkit for leaders/managers to communicate pre/pan/post-pandemic to public, media, staff, government and other stakeholders. They have built on Risk Communication principles and developed a spokesperson(s) roster system.

Impact on primary care – Our first line of response

Primary care services will likely see influenza pandemic impact first, and may be at greater risk of becoming overwhelmed early in an outbreak. Planning for traditional hospital and health services, while overlooking primary care, would be to everyone's detriment. More than half of the people who acquire influenza will require some form of outpatient or primary care.

Table 1 shows the estimated impact on the Capital District over an eight-week period, assuming 35% of the pop-

Figure 2. Structure for CDHA/IWK pandemic contingency planning.

ulation is affected. An estimate of the number of outpatient medical consults and the number of additional flu consultations per “healthy” FP/GP per week is indicated. This latter calculation was done recognizing that practitioners will be ill themselves, covering for group practices and potentially staffing Assessment Centres.

Impact on acute care

Using FluSurge 2.0,⁹ Table 1 outlines the demand for CDHA/IWK’s hospital-based resources. At the peak of an eight-week outbreak with a 35% attack rate, there would be 365 influenza-related hospital admissions per week and 71 deaths per week (49 occurring in hospital). Based on this modeling, influenza patients will utilize 34% of hospital bed capacity, 128% of ICU capacity and 44% of ventilator capacity.

Key Question 2: Matching resources to needs

The second key question of how best to match population health care needs to appropriate resources for delivery of services relates to strategies for preparation, response and recovery. Disaster planning solutions are multi-faceted and involve the simultaneous pursuit of two pathways:

1. Minimizing the Impact on population health and the health system by:

- a. Reducing demand on the health care system, by encouraging the public to self-diagnose and treat their own influenza-like illness (ILI),

- b. Minimizing spread of transmission by “cohorting” patients with suspected influenza,
- c. Implementing non-medical and medical interventions to minimize morbidity and mortality. The former includes public health measures, surveillance, infection control and communications. Medical interventions include vaccine and anti-virals.

2. Building Resource Capacity to enable hospitals and the community to cope by:

- a. Building “surge capacity” across the care continuum by:
 - i. Reducing outpatient demand at Primary Care/FP/GP offices/clinics and Emergency Departments by establishing Primary and Secondary Assessment and Treatment Centres,
 - ii. Supplementing capacity by providing ILI advice via non-traditional methods (e.g., tele-triage),
 - iii. Encouraging the establishment of alternative care sites for sub-acute and palliative care.
- b. Maximizing efficient and effective influenza care delivery by:
 - i. Using standardized assessment and treatment protocols,
 - ii. Matching caregiver skill sets to patient needs,
 - iii. Ensuring effective flow of information,
 - iv. Reducing duplication of effort.

- c. Reducing “elective activity” across the continuum of services by:
 - i. Deferring surgeries and ambulatory care,
 - ii. Pre-arranging chronic disease management plans, including service delivery in alternative care settings,
 - iii. Expediting early discharges from hospitals and judiciously using family, home care and volunteer services,
 - iv. Encouraging patients with stable chronic illnesses to defer seeking medical care for those illnesses in primary care.

Methodology – Collaboration, imagination and iterations

Project initiation – The discovery phase

In February 2005, a Project Manager was hired to coordinate the project. This initiative was jointly funded and its ongoing sponsorship came from the clinical VPs of the CDHA and the IWK.

In March 2005, more than 10 individuals from CDHA/IWK attended a workshop in Edmonton, thereby enabling them to obtain a collective understanding of the status of their counterparts, establish contacts and discuss best practices for pandemic planning in large urban centres. One presenter likened the challenge of contingency planning efforts to a “herding of cats.” This insight provided a level of comfort and reassurance in addressing the obstacles encountered along the way. This core group formed a critical pool of local advocates.

Project design – The transition framework

We realized that we could not produce a collaborative, comprehensive plan if the planning process was not unfolding as it should and we did not have the appropriate subject matter expertise. A combination of project management, change management and knowledge transfer tools were designed into the process. Active and visible executive sponsorship was obtained in the form of funding, oversight meetings, communications and participation in major workshops. Project management techniques¹⁰ were used to identify and prioritize what was doable. Project committee and working groups were restructured. Common templates for work plans and pandemic response plans were developed, and mechanisms for ongoing performance monitoring and evaluation were implemented throughout the project.

The CDHA/IWK Pandemic Influenza Plan became a documentation of decisions made as we journeyed through a process. Change management¹¹ was used to unfreeze the status quo and introduce new thinking into corporate cultures. Large-scale workshops enabled education and created a sense of urgency and resource commitment. The project plan was formalized and communicated through a project charter. Champions were recruited. The creation of 25 or more work groups empowered and engaged a broad base. This active participation promoted a sense of ownership. Interim presentations by work group leaders and the sharing of iterative draft plans enabled knowledge transfer. The interactive exer-

cising of plans in workshops provided invaluable education, team building and motivation.

Getting on people’s radar – The stakeholder engagement process

The importance of involving people and sharing their expertise cannot be overstated. The following series of events occurred with clinicians, including physicians, as part of the Stakeholder Engagement Process.

- Stakeholder Engagement Workshop, April 2005
 - Created awareness and education around the need for planning,
 - Identified and engaged stakeholders required for planning.
- Executive Buy-In and Resource Commitment, May 2005
 - Recommendations for a joint collaborative planning process and resources were approved by the Chief Executive Officers.
- Presentations and Recruitment of Resources, June-July 2005
 - A series of presentations are ongoing on an iterative basis to provide awareness and education to engage staff and community stakeholders in contingency planning.
- Project Re-Launch Oversight Steering Committee, August 2005
 - A Pandemic Influenza Contingency Planning Oversight Steering Committee (OSC) was officially launched on August 10, 2005. To optimize linkages, the OSC structure included key stakeholders from the provincial government (Department of Health, Department of Community Services), municipalities (Halifax Regional Municipality and West Hants), and the military (Department of National Defence).
 - A Project Charter was developed, identifying key planning components, project scope, expected results and key milestone dates signifying progress.

Mobilizing the troops – The two-day fall planning session

In September 2005, there was a workshop for the planning and design of a common engagement with the facilitation of an external consultant. Pre-workshop activities were assigned to each team to capture a descriptive understanding of their “As Is” status of how they were operating at that time. Figure 2 illustrates the resulting organizational structure for delivery of this initiative.

- Fall Planning Session, October 2005
 - A two-day session was held in October 2005, attended by more than 150 people from communications, public health, emergency preparedness, health and support services, government and the community.

TABLE 2

Thoughts to consider for your plan: Addressing the “Ss” to develop the solution

The Solution	Addressing the “Ss”
1. Surveillance	What information will need to be collected and reported, by and to whom?
2. Strategies & Sequence	What are your response strategies/actions in the event of a pandemic? When do they occur? And what triggers them? Do you rely on other groups to activate these strategies/actions? If so, for what services and to what extent? Have those groups agreed to your assumptions and commitments?
3. Surge Capacity	How do you plan to build resource capacity to meet pandemic requirements, and maintain service continuity of your essential services, with one-third less staff?
4. Structure	Who is in charge of decision-making at each level? Who is their backup?
5. Services Prioritization and Continuity	Guided by “surge capacity/business continuity” templates for clinical and non-clinical services, identify: <ul style="list-style-type: none"> • Services needing to ramp up, continue as is, be deferred, and for how long? • Prioritization of Services • Services that can be consolidated and potential location on or off-site • Minimum staffing thresholds needed to deliver services
6. Staffing and Skills	Identify Skill, Training and Deployment Requirements for Physician, Clinical, Non-Clinical and Volunteers, by: <ul style="list-style-type: none"> • Identifying and matching skill sets to type and level of care required • Developing HR strategies on how to recruit, mobilize, train, deploy and redeploy • Identifying HR issues needing to be addressed ahead of time
7. Supplies	Identify and quantify stockpiling and inventory priorities for consumables, supplies, equipment.
8. Space	Planning for Physical Infrastructure and Patient Cohorting requirements by: <ul style="list-style-type: none"> • Optimize space to build physical bed capacity • Identify areas for cohorting of flu and non-flu patients and staff
9. Scopes of Practice	<ul style="list-style-type: none"> • How can you utilize other professional disciplines to meet the care needs of patients? • What educating/training is required?
10. Safety	<ul style="list-style-type: none"> • Develop Infection Prevention and Control requirements across settings • Identify communication and educating/training needs for infection control for patients and staff
11. Security	Protect Patient and Provider by identifying/addressing security/access issues for facilities, patients, staff, supplies.
12. Stakeholders	Identify communications requirements for public, media, government, patient and provider.

- The Planning Session objectives were to:
 - Provide a “common” understanding of what a pandemic looks like, its phases, and what we can reasonably expect,
 - Identify system-level response(s) by Pandemic Phase(s),
 - Obtain agreement on Planning Assumptions,
 - Develop a work plan and determine lead responsibility and resources for essential activities to produce a CDHA/IWK pandemic plan.

Getting down to work – Developing the pandemic influenza plan

By mid-November 2005, multiple working groups were tasked with developing draft plans for response strategies and preparedness activities. A series of guidelines, tools and templates from project management to business and service continuity were developed. Table 2 contains a sample guideline used to assist work groups’ “creative thinking” in developing service-delivery plans.

For physician-specific input, the Medical Advisory Committees (MACs) at CDHA and IWK were provided a template for each department and division to complete. Key elements included: 1) Business/Service Continuity; 2) Chronic Disease Management; 3) HR Mobilization/Cross-Training and Reassignment; and 4) Ethical and Legal Framework.

Compiling, testing and validating – Day 3 interactive retreat

A compilation and validation process followed receipt of work group draft plans in the spring of 2006. Draft plans were compiled and work group leaders were invited to a session to share their planning assumptions, response activities, outstanding issues and gaps. A highly interactive day-long session was attended by 250-plus participants. Each of the plans was “tested” by an exercise that engaged participants in a series of injected events based on local triggers established over the timeframe of a pandemic. Each group was tasked with communicating their needs to others, identifying issues and negotiating resolutions. Outstanding issues were brought to an executive group for resolution and follow-up by the Oversight Steering Committee. Workshop outputs included a log of all communications between groups, issues with resolutions and outstanding issues, including gaps. A matrix of each group’s key response activities over the timelines of a pandemic was produced to verify alignment.

Results – Bringing the pieces together

The Day 3 Workshop evaluation results affirmed the interest in and tremendous success of this initiative. Based on an 85% response rate, 97% of participants “strongly agreed” or “agreed” that the workshop and the overall planning were worthwhile and useful.

A compendium of pandemic plans for 25-plus groups exists as part of the CDHA/IWK Pandemic Influenza Contingency Plan. An executive summary is being developed, which will include the clinical surge capacity results and templates for beds, services prioritization and human resource needs by staff type. Another noteworthy output was the development of proposed patient flow and medical treatment for the CDHA/IWK population during a pandemic.

Challenges and lessons learned

- Structures and Potential Silos
 - 1st major joint planning exercise between IWK and CDHA,
 - IWK and CDHA have responsibility for Public Health, Primary Care and Acute Care,
 - Long-Term Care and Home Care are not within our mandates.
- Direction and Resources
 - Federal plan provided very broad guidelines and provincial plan was under development,
 - Staff had competing priorities and this work required significant time commitment,
 - Dedicated project manager was essential.
- Scope and Complexity
 - Earlier smaller-scale planning attempts left people cautious to commit,
 - Iterative nature ultimately resulted in more than 25 working groups,
 - Planning the services was the easier task, while broader ethical concerns are more challenging,
 - Decision-making in an extended disaster requires different structures and processes for command and control. Our military colleagues and the municipal Emergency Measures Organization staff provided invaluable expertise,
 - As pandemic planning evolved, our focus shifted from individual patients to communities, from a short-term to a multi-phased, long-term outbreak, from a traditional disaster planning approach to an all-hazards plan and broader business continuity planning.¹²

Conclusions

The collaborative and iterative process provided experiential learning about disaster preparedness and business continuity planning for more than 250 inter-disciplinary key stakeholders. The development of pandemic plans by more than 25 working groups covered clinical services and resource management for major hospital sites providing acute, secondary and tertiary and quaternary care. The best of plans would not have created these results without the dedication and commitment of all participants.

The methodology provided unique opportunities for collaboration, creativity and innovation. Use of change management¹³ and knowledge transfer principles and concepts enabled successful generation of a product greater than the

sum of its component parts. Use of project management tools and templates enabled consistency of language and development of plans across multiple cross-functional clinical and non-clinical areas.

The use of an all-hazards approach for disaster planning coupled with the application of business continuity planning templates resulted in an emergency preparedness plan and process that is generic and complementary to an all-hazards planning approach. The plan is currently being transitioned from the Oversight Steering Committee to the CDHA/IWK All Hazards Emergency Preparedness and Response Group. It continues to evolve in an iterative manner.

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